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Chroma

Test & Measurement

2016 Product Catalog



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Chroma Group

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CHROMA ATE INC.			
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Chroma/Shanghai	Chroma/Netherlands	MAS Automation/Xiamen	Testar Electronics
Chroma/Suzhou	Chroma/Japan		Chroma New Material
Chroma/Chongqing	Quantel/SE Asia (Company of Chroma)		DynaScan Technology
Chroma/Xiamen			ADLINK Technology
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Taiwan



Hwa-Ya Technology Park, Taoyuan



Hsinchu Science Park



Nanzi, Kaohsiung

Asia



Shinyokohama, Japan



Singapore, SE Asia



Beijing, China



Shanghai, China



Suzhou, China



Shenzhen, China

USA



Irvine, CA



Foothill Ranch, CA

Europe



Ede, Netherlands

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★ New products are asterisked.

Video Pattern Generator — Model 2235



- Comply with DisplayPort 1.2a standard
  - 4K x 2K 60/50Hz
  - Pixel rate support up to 600MHz
  - Auto / Manual training mode
  - 1.62 / 2.7 / 5.4Gbps per lane
  - 1 / 2 / 4 Link
  - 0 / 3.5 / 6 / 9.5 dB pre-emphasis
  - 400 / 600 / 800 / 1200mV Swing level
  - MST(Multi Stream Transport)
  - DPCD Analyze
- HDMI support up to 300MHz
  - 4K x 2K 24/30Hz
  - 1080p 120Hz
  - 3D format with 1080p 60Hz (Frame packing / Side-by-Side Full)
- 2 HDMI ports + 2 DisplayPort output
- Analog support up to 300MHz
- Support HDCP function
- S-Video/CVBS/SCART/RGB/Component/ D-terminal NTSC/PAL/SECAM standard
- Digital DVI Frequency 330MHz
- EDID Read/Write/Compare/Analyze
- Support Pattern Scrolling Function
- ESD Protection Circuit
- Front Panel USB Port & Control Interface
- Graphic Operating & Editing Interface

See Page 4-11

Video Pattern Generator — Model 2403



- Modular design
- HDMI 2.0 Signal module (option)
  - Comply with HDMI 2.0 standard
  - 4K x 2K 60/50Hz
  - Pixel rate support up to 600MHz (6Gbps TMDS rate)
  - RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2 or 4:2:0
  - HDCP 1.4 / 2.2
  - CEA-861-F timing
  - 24 / 30 / 36 color depth
  - ARC (Audio Return Channel)
  - sYCC601 / Adobe RGB / Adobe YCC601 / xvYCC / ITU-R BT.2020
- DisplayPort Signal module (option)
  - Comply with DisplayPort 1.2a standard
  - 4K x 2K 60/50Hz
  - Pixel rate support up to 600MHz
  - 1.62 / 2.7 / 5.4Gbps per lane
  - 1 / 2 / 4 Link
  - 2 Channel (L-PCM)
- EDID Read / Write / Compare / Analyze
- Scrolling function
- Built in China high-definition / 3D / 4K test pattern
- User Define Key(32 Key max)
- One-touch function keys

See Page 4-21

FPD Tester — Model 27014



- Modular interface design for various panel test application
- Highly accurate programmable power
  - VDD 2 ~ 20V / 10A max, 36W max (24W max available on September)
  - VBL 2 ~ 25V / 20A max, 100W Max (100W max available on September)
  - Real-time voltage / current measurement
  - Programmable power protection function
- Cross coordinate defect positioning function
- eDP 1.4 Signal module (Option)
  - Support up to UHD (5K x 3K@60Hz)
  - 6 / 8 / 10 bit color depth
  - 1.62 / 2.16 / 2.43 / 2.7 / 3.24 / 4.32 / 5.4Gbps per lane
  - 1 / 2 / 4 / 8 Link
  - 0 / 3.5 / 6 / 9.5 dB pre-emphasis
  - 200 / 250 / 300 / 350 / 400 / 450 / 600 / 800 / 1000mV Swing level
  - PSR1 test function

See Page 5-11

LED Chip Level Tester — Model 58173-TC



- High test speed: complete whole test within 25ms (selected test items)
- Super statble of temperature variation
- Support high voltage and high power LED test requirement
- Support multi-die test (option)
- Support ESD test (option)

See Page 6-3



LED Mapping Probe Tester — Model 58212-C

- High Speed and Accuracy
- Lateral, Vertical, and Flip Chip
- Wide Power Test Range (up to 200V/2A)
- Up to 8 inch Wafers
- Chroma® Huge Photo Detector
- Unique Edge Sensor
- Patented Probe Head
- Robust Z-Axis Stage
- Wafer Mapping Algorithm
- External Light Shielding Enclosure
- Analysis Tools and Statistical Reports

HARDWARES

- Automatic LED Wafer/Chip Prober
- Electrical Test Module
- Optical Test Module
- Optional ESD Test Module

See Page 6-4



LED Lighting Test System (For Laboratory) — Model 58158

- Simulate the real AC test condition and environment
- Integrate AC, DC, and optical features test to one platform
- Support DC test for AC LED
- Support dual-optical test module in one platform (Integrating sphere or average intensity) (optional)
- Support AC /DC LIV Analysis
- Offer standard light source for calibration

See Page 6-11



TOSA/BOSA Temperature Control System — Model 58690/58691

- Wide temperature range (-40˚C~ 85˚C)
- Excellent temperature uniformity to make sure all DUTs are under the same temperature condition
- Within ±0.5˚C temperature stability
- Fast heating and cooling to shorten testing time
- Temperature control up to 72 DUTs at the same time to increase testing output
- In mass production, TOSA/BOSA provides:
  - Electrical test connector
  - Optical fiber connector

* Dependent on DUT form factor

See Page 7-5



TO-CAN Package Inspection System — Model 7925

- It can inspect lens scratch, crack, particle and metal cap defect of TO-CAN package
- Auto focus function can overcome height variation from tray or package
- Defect criteria editor for versatile pass/fail criteria setting
- Higher reliability and repeatability than visual inspection
- Throughput is higher than UPH 3600
- Reduce time of operator loading/unloading because of auto-cassette function
- Provide customized inspection report and defect images for defect analysis

See Page 7-7

Solar Cell Inspection Test/Sorting System — Model 3760



- Good for 6 inches mono/multi-crystalline silicon cells
- Inline structure un-loader together with firing furnace including cells position pre-capture CCD and Bernoulli Arm picking up cells to conveyor speedy
- Flexible design of buffer loader to support engineer/operator during production maintenance period no matter frontend or backend side
- High throughput and low breakage rate< 0.1%.
- High integration capability with customized optical inspector and IV tester
- Customized efficiency, Color classes and sorting Bins
- High cell positioning repeatability to ensure consistent result
- Extendable sorting bins module to fulfill customer request
- MES systems for instant production result analysis
- Lane by lane controller for engineer maintenance easy

See Page 8-3

Automatic Optical Solar Wafer/Cell Inspection Modules — Model 7200 Series



- Adjustable criteria for different process application or model
- Flexible algorithms programming editor for mono-crystalline and multi-crystalline silicon solar cells
- Multiple interface to communicate with manufacturing equipment or information system
- Various defects inspection capability from multilayer LED lighting design
- Flexible design that can be easily integrated to your in-line printing system and sorting system

See Page 8-5

Wafer Inspection System — Model 7940



- Inspect 6" LED wafer in 2.5 minutes with high speed architecture
- Maximum 8 inch wafer handling capability (10 inch inspection area)
- Unique detection algorithm can be replaced or added for different customer or model
- No precise wafer loading is needed because of auto alignment function
- Edge finding to test various wafer shapes
- Defect criteria editor for versatile pass/fail criteria setting
- Chip optical character defect detection rate > 98%
- Combine AOI and upstream machine data and upload a final mapping file for downstream machine
- Customized inspection report for defect analysis
- Suitable for LED, laser diodes, photo diodes, and other wafer chip

See Page 9-7

LED Load Simulator — Model 63110A/63113A/63115A

LED Load Simulator



- Unique LED mode for LED power driver test
- Programmable LED dynamic resistance (R_d)
- Programmable internal resistance (Rr) for simulating LED ripple current
- Fast response for PWM dimming test
- Up to eight channels in one mainframe
- 16-bit precision voltage and current measurement with dual-range
- Full Protection: OC, OP, OT protection and OV alarm

See Page 10-10

High Power DC Electronic Load — Model 63200A Series

Ultra High Power Density 6kW@4U



- Rated power up to 240kW: 4kW, 5kW, 6kW, 24kW
- Voltage range: 150V, 600V, 1200V
- Current range: 2,000A max. per unit
- CC, CR, CV & CP operation modes
- CR+CC, CR+CV, CC+CV complex modes
- Up to 10 units master/slave parallel control
- Dynamic synchronous control in static and dynamic loads
- User defined waveform (UDW)
- CZ mode for turn on capacitive load simulation

See Page 10-12

Regenerative Grid Simulator — Model 61800 Series



- Power rating - 61830 : 30kVA ; 61845: 45kVA ; 61860: 60kVA
- Voltage range : 0-300V, 400V (option)
- Frequency: DC, 30Hz-100Hz
- Full regenerative capability based on 100% of output current rating
- Specifically designed for PV inverter, Smart Grid and EV related test applications
- Single phase or three-phase output selectable
- Programmable slew rate settin for changing voltage and frequency
- Programmable voltage and current limit
- Turn on, turn off phase angle control
- TTL signal which indicates Output transient
- LIST, PULSE, STEP mode functions for testing Power Line Disturbance (PLD) simulation
- Voltage dips, short interruption and voltage variation simulation
- Harmonics, inter-harmonics waveform synthesizer
- Comprehensive measurement capability, including current harmonics
- Analog programmable interfaces
- Remote interface: GPIB, RS-232, USB and Ethernet
- Provide parallel feature for meeting high power test applications (Three phase only)

See Page 10-43

Digital Power Meter — Model 66200 Series



- Embedded high speed DSP, 16 bits Analog/Digital converters
- 5mA minimum current range(66203/66204/66205)and 0.1mW power resolution
- Capable of extending current measurement range up to 30A (66205)
- Meets ENERGY STAR / IEC 62301 / ErP ecodesign / SPEC POWER measurement requirement
- Meets IEC 61000-4-7 standard requirement for harmonics measurement (66205)
- Accumulated energy methods for unstable power measurement
- Voltage/current harmonics measurement up to 50 orders
- Capable of displaying input waveform DC component measurement reading
- Half rack width and small 2U height, suitable for system integration
- Support different wiring configuration power measurement (1P2W/1P3W/3P3W/3P4W) (66203/66204)
- Support external shunt and CT for higher current measurement application (66204)
- SMART Range function provides seamless power measurement capability (66205)
- Support GPIB, USB, RS232, Ethernet (LXI) interface (66205)

See Page 10-47

Solar Array Simulator — Model 62150H-S Series

Solar Array Simulator



- Voltage range : 0 ~150V / 600V / 1000V / 1500V
- 3U/15kW high power density module with easy master/slave parallel operation up to 1.5MW
- Fast transient response solar array simulation
- Simulation of multiple solar cell material's I-V characteristic (fill factor)
- Simulation of dynamic irradiation intensity and temperature level from clear day to cloud cover conditions
- Shadowed I-V curve output simulation (4096 points)
- Low leakage current (< 3mA)
- Build-in dynamic MPPT test profile of EN50530, Sandia, CGC/GF004, CGC/GF035, NB/T 32004
- Auto I-V program: 100 I-V curves & Dwell time 1-15,000s

See Page 10-59



EVSE ATS — Model 8000

- Customized system for EV Supply Equipment (EVSE) testing
- Meets SAE-J1772, CNS15511, GB/T18487, GB/T27930,GB/T20234 standards
- Simulates various AC grid situation and EV charging mode
- Integrated connecting panel
- Exclusive test items

See Page 10-65



Battery Pack ATS — Model 8700

- Specifically designed for battery production line, or battery development testing
- The application range of this system includes battery modules for electric vehicles, motor vehicles, and power storage systems
- Increases QA efficiency by up to 80%
- Inspection of BMS functions, connector withstand voltage, consistency, and performance of battery module
- Charge/discharge power range : 5kW~500kW
  Charge/discharge voltage range : 0V~1200V
  Charge/discharge current range : 0A~2600A
- Standard test items include insulation resistance, electrical tests, software/communication, and battery performance testing
- Able to create test fixture to connect the customized battery module with the automated switch control
- The control system is an easy to use open software platform that supports shop floor control integration with Manufacturing Execution System (MES)

See Page 11-13



Regenerative Charge & Discharge Test System — Model 17011

- Lithium-ion secondary batteries, Electrical Double Layer Capacitors (EDLC) and Lithium-ion Capacitors test
- High precision output and measurement up to 0.02%
- Independent operation and test
- Channel parallel output function maximum 1200A
- High Sampling Rate up to 10ms
- Build-in battery DCIR test function
- Build-in EDLC/LIC capacitance (F) and DCR test functions to provide prompt and accurate test results
- Real-time outer loop resistance monitoring, contact check and polarity check safety function
- Discharging energy recycle function

See Page 11-3



Regenerative Battery Pack Test System — Model 17020/17030

- Regenerative battery energy discharge
  - Energy saving, environment protection, and low heat output
- Channels paralleled for higher currents
- Charge / discharge mode (Constant current, Constant voltage, Constant power)
- Driving cycle simulation (Power/Current)
- High precision measurement accuracy
- Fast current conversion
- Smooth current without over shoot
- Testing data analysis function
- Data recovery protection (after power failure)
- Independent protection of multi-channel (Model 17020)
- Total harmonic distortion: less than 5% of rated power (Model 17020)
- Customized rating power/voltage/current
  - Voltage range : 0~200V ; Current range : 0~1200A ; Power range : 600W~50kW (Model 17020)
  - Voltage range : 10~1200V ; Current range : 0~1000A ; Power range : 90~500kW (Model 17030)
- System Integration (Model 17030)
  - Chamber Control
  - Multi-channels voltage/temperature measurement (Max 256CH)
  - BMS Communication

See Page 11-5
See Page 11-9

HF LCR Meter — Model 11050 Series



- Test Parameter: L/C/R/Z/Y/DCR/Q/D/ θ
- Test Frequency : 1kHz ~ 10MHz (11050), 60Hz ~ 5MHz (11050-5M)
- Test Level: 10mV ~ 5V
- Basic Accuracy: 0.1%
- 7ms fast speed measurement
- 3 kinds of output impedance modes
- Test signal monitoring function
- Compare & bin-sorting function
- Open/short zeroing & load correction function
- Detached measurement & display unit design
- Standard Handler, RS-232C, USB storage & external bias current control interface
- Optional GPIB or LAN interface

See Page 12-3

Impulsing Winding Tester — Model 19301A



- 10V~1000V impulse voltage test, with 0.25V test resolution
- High impulse test sampling rate (200MHz),10bits
- <35mS high speed mode (P1.0)
- Inductance contact check function
- Inductance differential voltage compensation function
- Apply to High/low inductance test (0.1uH~100uH)
- Breakdown voltage analysis function
- Low voltage range to increase the sensibility of waveform analysis (32V/64V/128V/256V/ 512V/1024V)
- USB port for storing waveform & screen capture
- Graphical color display
- Standard LAN,USB and RS232 interfaces

See Page 13-14

Inductor Test & Packing Machine — Model 1870D Series



- Test and packing speeds from 200ppm to 1,800ppm
- Provides 4 test stations based on test requirements for users to select desired test items
- Complete list of test items: Polarity, Layer Short Circuit, IR, DCR, Ls & Rs (Q value), Bias current
- Patented high-speed polarity reversing design ensures that products on the conveyor all have the same polarity
- Each test station has an independent NG (No Good) product collection box for later quality analysis
- Circular load plate design eliminates dropped inductors
- Equipment is fast, stable and safe
- Exclusive data collection software designed for test and packing machines for monitoring product quality in real time

See Page 12-25

Inductor Layer Short ATS — Model 1871



- Test speeds from 200ppm to1,500ppm
- Provides from 2 to 5 test stations for ATS selections based on testing requirements
- Equipped with inductance measurement contact check and voltage difference compensation functions
- Patented testing probe with "Four wire system" design to test voltage's authenticity and stability
- Tested NG inductors are collected to a separate box by failed item for bad process model and cause analysis
- Circular load plate design to eliminate dropped inductors
- Exclusive data collection software designed for layer short automatic test system for monitoring product quality in real time

See Page 12-26

New Products



VLSI Test System — Model 3380D

- 100 MHz clock rate
- 50/100 MHz data rate
- 256 I/O digital I/O pins
- Up to 256 sites Parallel testing
- 32/64/128M Pattern Memory
- Various VI source
- Flexible HW-architecture (Interchangeable I/O, VI, ADDA,)
- Real parallel Trim/Match function
- Time & Frequency Measurement Unit (TFMU)
- AD/DA test (16/24bits option)
- SCAN test option (max 1G M/chain)
- ALPG test option for embedded memory
- STDF tools support
- Test program/pattern converter (J750, D10, S50, E320, SC312, V7, TRI-6020)
- User friendly Windows 7 environment
- CRAFT C/C++ programming language
- SW (Software) Same as 3360 & 3360P
- D-M Probe-card compatible with 3360P DM Probe-card
- C-M DUT-card compatible with 3360D/3360P C-M DUT-card(FT/CP)
- Direct mount fixture can be compatible with 3360P probe-Card
- Cable mount fixture can be compatible with 3360D & 3360P

See Page 14-5



SoC/Analog Test System — Model 3650-EX

- 10 interchangeable slots for digital, analog and mixed-signal applications
- 50/100 MHz clock rate, 100/200 Mbps data rate
- Up to 512 sites parallel test
- Up to 1024 digital I/O pins
- 32/64 MW vector memory
- Up to 32 CH PMU for high precision measurement
- Per-pin timing/ PPMU/ frequency measurement
- Scan features to 4G depth / 32 scan chains
- ALPG option for memory test
- Switching timing accuracy ±300ps
- Up to 64 CH high-voltage pins
- 96 CH high density DPS
- 32 CH HDADDA mixed-signal option
- 8~32 CH VI45 analog option
- 2~8 CH PVI100 analog option
- MRX option for 3rd party PXI/PXIe applications
- Microsoft Windows® 7 OS
- C++ and GUI programming interface
- CRISP, full suite of intuitive software tools
- Test program and pattern converters for other platforms
- Accept DIB and probe card of other testers directly
- Support STDF data output
- Air-cooled, small footprint tester-in-a-test-head design

See Page 14-12



Full Range Active Thermal Control Handler — Model 3110-FT

- Temperature Test from -40~125˚C
- Final Test
- 3x3 mm~45x45 mm Package
- Contact Force Control 1~10 kg (Optional)
- Up to 4 Output Trays
- Remote Control Operation
- Yield Monitor
- Intelligent Auto Retest & Auto Retry
- Real-time Tray Status

See Page 14-16



Octal-site Test Handler — Model 3180

- Up to x8 Parallel Test Sites
- Up to 9000 UPH
- Flexible Test Site Configuration
- Dampened Contact Force
- Contact Force Auto Learning
- 3x3 mm ~ 50x50 mm Packages
- Up to 6 Output Tray Locations
- Temperature Test from Ambient ~ 150 ˚C
- Intelligent Auto Retest & Auto Retry
- Yield Monitor

See Page 14-18

New Products

Device Power Supply — Model 52310e Series



- 4 Isolated channels of ±6V, 1 A (max)
- 20-bit measurement resolution
- Low output noise
- Maximum sampling rate of 600 KS/s
- Deterministic output by hardware sequencer
- Programmable output resistance
- 8 selectable control bandwidths
- Master/Slave operation
- Drivers with LabVIEW/ LabWindows & C/C# API
- PXI Express Peripheral Module (X1 PCI Express Link)

See Page 15-6

TEC Controller — Model 54100 Series



- Bidirectional driving with 150W (24V/8A), 300W (27V/12A), or 800W (40V/20A) output
- Filtered PWM output with > 90% driving power efficiency while maintaining linear driving with current ripples < 20 mA
- Temperature reading and setting range -70 to 250°C with 0.01°C resolution and 0.3°C absolute accuracy
- Short term stability (1 hour) ±0.01°C and long term stability ±0.05°C with optimal PID control
- Feature true TEC large signal PID auto tune for best control performance
- 2 T-type thermal couple inputs, one for control feedback and the other for monitor and offset, providing versatile control modes
- RS232 serial communication port for PC remote operation and thermal data recording
- Powerful and user-friendly PC program available
- Perfect matching all Chroma designed temperature controlled platforms

See Page 16-4

Manufacturing Execution System — Model Sajet MES Series

Smart Factory



- Complete Production Process Trace - Traceability
- Full Production Information Monitoring - WIP Control
- Equipment /PLC Automatic Connectivity
  - Computer Integrated Manufacturing: CIM
  - Equipment Automation Program: EAP
- Professional Quality Control System
  - Statistical Process Control: SPC
  - Corrective Action Report: CAR
  - Out of Control Action Plan: OCAP
- Manufacturing Equipment Management
  - Equipment Management System: EMS
  - Overall Equipment Effectiveness: OEE
- Real-time Report
  - Yield Rate Report
  - WIP Report

See Page 17-1

Turnkey Test & Automation Solutions

Automation Integration

Test & Measurement Technology



Manufacturing Execution System

ASSEMBLY & TEST AUTOMATION

- LED Lighting Automatic Assembly & Testing
- IC Automatic Testing & Sorting
- Photovoltaic Automatic Testing & Sorting
- Flat Panel Display Burn-in & Testing
- Battery Cell Formation & Assembly
- Passive Component Testing & Packing
- 3C Device Automatic Assembly
- Smart Conveyor

See Page 18-1



Loading | Assembly | AOI | Safety Test | Power Electronics Test | TEC Test & Control | Aging | Final Test | Sorting | Unloading

Manufacturing Execution System | Computer Integrated Manufacturing | Equipment Management System | Statistics Process Control System

Selection Guides 4-1
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All other brand and logo and trademarks or registered trademarks of their respective holders.

VIDEO PATTERN GENERATOR



HDMI Distributor | MHL Module | SDI Module | Pattern Analyzer



Video Pattern Generator

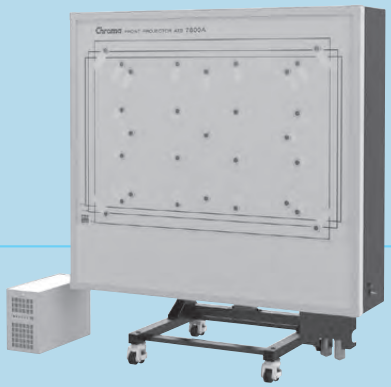
COLOR ANALYZER / SPECTROCOLORIMETER / Display ATS



Display Color Analyzer



Spectrocolorimeter



Front Projector ATS

Video Pattern Generator Selection Guide-1

TYPE	Model	Analog	Digital					PAGE
			DVI (TMDS)	HDMI	DisplayPort	Standard	Interface	
Programmable	22293-B	250MHz	330MHz	* 165MHz	--	HDMI 1.3	HDMI x 3	4-3
	22294-A	300MHz	330MHz	** 300MHz	--	HDMI 1.4	HDMI x 4	4-5
	2233-B	250MHz	330MHz	* 165MHz	270MHz	HDMI 1.3 DP 1.1	HDMI x 3 DP x 2	4-7
	2234	250MHz	330MHz	* 165MHz	270MHz	HDMI 1.3 DP 1.1	HDMI x 3 DP x 2	4-9
	2235	300MHz	330MHz	** 300MHz	600MHz	HDMI 1.4 DP 1.2	HDMI x 2 DP x 2	4-11
Non-Programmable	23293-B	250MHz	330MHz	* 165MHz	--	HDMI 1.3	HDMI x 3	4-13
	23294	250MHz	330MHz	* 165MHz	--	HDMI 1.4	HDMI x 3	4-15
	2333-B	250MHz	330MHz	* 165MHz	270MHz	HDMI 1.3 DP 1.1	HDMI x 3 DP x 2	4-17
Economy	2401	165MHz	--	--	--	--	--	4-19
	2402	165MHz	165MHz	165MHz	--	HDMI 1.3	HDMI x 1	4-19
	2403	--	--	*** 600MHz	600MHz	HDMI 2.0 DP 1.2	HDMI x 4 (Option) DP x 2 (Option)	4-21

* TMDS Rate 225MHz
** TMDS Rate 300MHz
*** TMDS Rate 600MHz

Video Pattern Generator Selection Guide-2

TYPE	Model	DTV		TV			OTHERS			PAGE
		SDTV	HDTV	NTSC	PAL	SECAM	HDCP	AUDIO	I/O	
Programmable	22293-B	V	V	V	V	V	V	V	USB	4-3
	22294-A	V	V	V	V	V	V	V	USB	4-5
	2233-B	V	V	V	V	V	V	V	USB	4-7
	2234	V	V	V	V	V	V	V	USB	4-9
	2235	V	V	V	V	V	V	V	USB	4-11
Non-Programmable	23293-B	V	V	V	V	V	V	V	USB	4-13
	23294	V	V	V	V	V	V	V	USB	4-15
	2333-B	V	V	V	V	V	V	V	USB	4-17
Economy	2401	V	V	V	V	V		V	USB	4-19
	2402	--	--	--	--	--	V	V	USB	4-19
	2403	--	--	--	--	--	V	V	USB	4-21

All specifications are subject to change without notice.

Signal Module Selection Guide					
Signal Module	**Output Signal**				**PAGE**
	HDMI 1.3 Distributor	MHL 2.0	3G/HD/SD SDI	Main board PCBA	
A222907	V	--	--	--	**4-22**
A222908	--	V	--	--	**4-23**
A222915	--	--	V	--	**4-24**
A222917	--	--	--	V	**4-25**



Analog 250 MHz
DVI (TMDS) 330 MHz
HDMI V1.3C 165 MHz
(TMDS Rate 225 MHz)
Multi-port (HDMIx3)

KEY FEATURES

- Multi-port independent output test application
  - HDMI port output x 3
  - SCART port x 2 (output x1 / input x1)
- Analog pixel rate 250MHz
- Digital (DVI) pixel rate 330MHz
- DVI Dual HDCP test application support
- HDCP supports Auto / Manual Mode
- HDMI V1.3C (with 24/30/36 bit deep color / xvYCC / CEC / Lip Sync)
- HDMI V1.3C maximum 687 billion color depth
- DVI and HDMI with HDCP output
- Y, Pb, Pr / Y, Cb, Cr / Y, R-Y, B-Y color difference output
- S-Video / CVBS / SCART / RGB / Color Component / D-terminal
- NTSC / PAL / SECAM signal
- EDID read / write / compare
- Optical / Coaxial audio input (S/PDIF)
- Easy and variable pattern edit
- Scrolling Pattern support
- HDMI / DVI plug & play function
- Gamma correction
- ESD protection circuit
- USB Host / Device

USB CE VESA HDMI xvYCC ANALOG DVI Dual HDCP 8/10/12 BITS
NTSC/PAL SECAM Close Caption Teletext V-Chip 4:3 SDTV 16:9 HDTV Ture Color Multi-Port

The 22293-B Programmable Video Pattern Generator provides a total solution for multi-media tests that are applied in the industries of high frequency digital and analog displays such as LCM Monitor / LCD TV / PDP / Projector of today and in
the future.

Large scale and high definition have become the trend as the development of video industry goes. The 22293-B designed with brand new architecture uses high performance CPU to carry the high speed/high density FPGA as Graphics Rendering Engine. It provides highly efficient system control as well as supports the up-to-date high resolution multimedia digital/video interface, HDMI V1.3, for the following features:

Higher bandwidth and Color Deep : It supports 24, 30, 36 bit (RGB or YCbCr) and new color standard xvYCC to implement real natural color and high resolution image screen with larger color range.

CEC (Consumer Electronics Control) Function :
It allows users to activate the HD device that equipped with multiple CEC functions via a remote controller. The 22293-B is able to set the CEC test parameters automatically or manually and support TX (transmission) / RX (reception) / MONITOR (monitoring) & FEATURE (user property) test modes. The built-in CEC test patterns give users easier and faster test judgment.

Lip Sync: Since the technology of digital signal process improves continuously, to have a high definition video presentation, there may have potential factors to cause delay when processing the video. HDMI 1.3 allows CE devices to compensate the time difference automatically that can synchronize both video and audio to enhance viewer's feeling.

The 22293-B is able to provide Analog/Digital/TV signals concurrently:

For the analog signal RGB output, the pixel rate is up to 250MHz that meets the RS-343A standard, and it supports Y,Pb,Pr / Y,Cb,Cr / Y,R-Y,B-Y. The digital signal output is TMDS with pixel rate up to 330MHz and the test screen resolution supports beyond UXGA. Furthermore, to cope with higher frequency signal test, the 22293-B supports DVI Dual HDCP test for dual channel DVI test application.

As to the specification of TV output, the image and chrominance signals of the 22293-B meet the NTSC, PAL and SECAM standards. The output signals include CVBS compound signals, BNC and Y/C (Luminance/ Chrominance) separated signals as well as S-Video/SCART output connectors. Tests for special TV functions such as Closed Caption, V-chip and Teletext are also supported. In the meantime to fulfill the test application for multi-port output, the 22293-B has built-in 3 HDMI and 2 SCART ports to reduce a great deal of test time, so as to finish the tests in the fastest way possible.

As to operation, the 22293-B has equipped with a 3.5 inches multicolor display with graphic operation interface. Users can edit various timing parameters and patterns through the icons on the panel directly or using the VPG MASTER control software via the USB interface to do remote control manually or automatically. The comprehensive, rapid and easy to understand user interface can improve the test efficiency effectively. Following the rising market of new generation display the competition and demand for product quality are getting more and more sever. Under the consideration of quality and cost, the 22293-B Video Pattern Generator has built in the most complete multi-media test interfaces that can meet the requirements for various video tests in the industry. It is the best solution for the users in the field of RD, production and inspection.

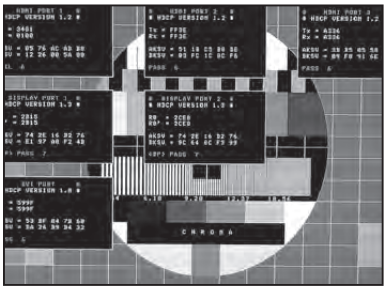


Model 22293-B Rear View

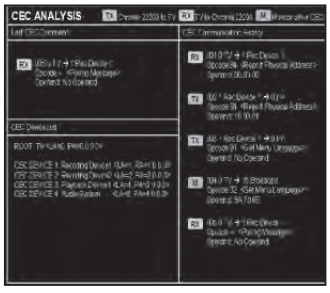
ORDERING INFORMATION

22293-B : Video Pattern Generator
Analog 250MHz/DVI 330MHz/HDMI 165MHz
(TMDS Rate 225MHz)/TV/HDTV
A240001: Remote Controller

Special Pattern



Multi-HDCP Pattern



CEC Analysis

All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	4096 x 2048
Pixel Rate Range	0.5~250MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green/Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	32~8192 pixels / 1 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) / 1 line programmable 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	
	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	
	BNC : Hs,Vs,Xs ; D-SUB : Hs(Xs), Vs
VIDEO FORMAT	
Video Output	R, G, B / RS-343A Y, R-Y, B-Y Y, Cb, Cr / ITU 601 Y, Pb, Pr / ITU 709, RP177, SMPTE 240M DDC II B (D-SUB)

DVI (TMDS) OUTPUT	
Pixel Rate Range	25< 1 link ≤ 165MHz / 165< 2 link ≤ 330MHz
EDID	Read / Write / Compare / Edit
HDCP	HDCP V.1.0 (with Dual Mode)
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI VIDEO OUTPUT	
Version	HDMI 1.3C (with 24,30,36bit deep color/xvYCC/CEC/Lip Sync)
Pixel Rate Range	25 ~ 165 MHz (TMDS CLK: 225MHz)
Support HDMI Timing	77 Timing (CEA-861D)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 / 10 / 12 @RGB & YCbCr
Color Space	RGB/ITU-R BT.601/ITU-R BT.709/xvYCC (IEC61966-2-4)/sYCC 601/Adobe RGB/ Adobe YCC 601
HDCP	HDCP V.1.2
EDID	Read / Write / Compare / Edit

HDMI AUDIO OUTPUT	
Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	10Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

TV OUTPUT									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/ 4.25	MHz
Subcarrier Stability	±50								Hz
Video Output	Composite (BNC, RCA), S-Video								
	Burst On/Off (NTSC, PAL)								
	Contrast programmable								
	Brightness programmable								
	Saturation programmable								
	Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4 / T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8ans+, 13ans+, 16ans+, 18ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

SDTV FORMAT					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate (Hz)		Standard
720 x 483	59.94P	60/1.001			SMPTE 293
			59.94I	59.94/2	ITU 601 SMPTE 170M
720 x 576	50P	50			ITU 1382
			50I	25	ITU 601

HDTV FORMAT					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate (Hz)		Standard
1920 x 1080	60P	60	60I	30	SMPTE 274
	59.94P	60/1.001	59.94I	30/1.001	SMPTE 274
	50P	50	50I	25	SMPTE 274
	30P	30			SMPTE 274
	29.97P	30/1.001			SMPTE 274
	25P	25			SMPTE 274
	24P	24			SMPTE 274
	23.98P	24/1.001			SMPTE 274
1920 x 1035			60I	30	SMPTE 240
			59.94I	30/1.001	SMPTE 240
1280 x 720	60P	60			SMPTE 296
	59.94P	60/1.001			SMPTE 296
	50P	50			SMPTE 296

DATA STORAGE DEVICE	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN}, 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION & WEIGHT	
22293-B	88 x 350 x 350 mm / 3.46 x 13.78 x 13.78 inch (HxWxD) 5.6 kg / 12.33 lbs

All specifications are subject to change without notice.



Analog	**300 MHz**
DVI (TMDS)	**330 MHz**
HDMI V1.4a	**300 MHz**
(TMDS Rate	**300 MHz)**
Multi-port	**HDMIx4**
3D Output	

KEY FEATURES

- Fully Comparable with HDMI 1.4 Standard
  - 3D Format Output
  - Audio Return Channel
  - Ethernet Channel
  - 4Kx2K / 1080P 120Hz
  - sYCC601 / Adobe RGB / Adobe sYCC601
  - CEC / Deep Color / Lip-Sync / xvYCC
- Multi ports output test application
  - HDMI port output x 4
  - SCART port x 2 (output x1/input x1)
- 330MHz digital (DVI) frequency
- Support Dual HDCP in DVI test application
- HDCP supports Auto / Manual Mode
- Ethernet Browser on Screen
- HDCP ON / OFF IN DVI & HDMI Interface
- S-Video / CVBS / SCART / RGB / Y.Pb.Pr / Y.Cb.Cr / Y,R-Y,B-Y / D-terminal
- NTSC / PAL / SECAM signals
- EDID Read/ Write/Compare/Analysis
- Optical / coaxial audio input (SPDIF)
- Support pattern dynamic scrolling
- Built-in China high definition standard HD patterns
- HDMI/DVI Hot-Plug function
- Support Gamma calibration
- ESD protection circuit
- Front USB & control interface
- PIP & OSD function

Chroma 22294-A Programmable Video Pattern Generator is a multi-functional test device with high speed signal transmission features. It has high resolution test quality and multiple outputs support that can meet the test requirements for the multimedia display industries such as LCD Monitor / LCD TV / PDP / Projector of today and in the future.

Chroma 22294-A supports the up-to-date high resolution multimedia digital/video interface, HDMI V1.4, with the features described below.

The VPG has 3D signal standard format output, Audio Return function that is able to test the external audio source and the Ethernet function that is able to do two-way data transmission. In addition, higher bandwidth and Color Deep are equipped to support 24, 30, 36 bit (RGB or YCbCr) and the new generation color standard xvYCC, sYCC601, Adobe RGB as well as Adobe YCC601 for the implementation of 4Kx2K real natural colors and high resolution image screens with larger color range.

CEC(Consumer Electronics Control) Function: Chroma 22294-A is able to set the CEC test parameters automatically or manually and support TX (transmission) / RX (reception) / MONITOR (monitoring) & FEATURE (user property) test modes.

Lip Sync : Since the technology of digital signal process improves progressively, potential factors may exist to cause delay when processing the video for a high definition presentation. The HDMI 1.3 allows CE devices to compensate the time difference automatically by synchronizing both of the video and audio to enhance viewer's experiance.

This video pattern generator is able to provide analog/digital/TV control signals concurrently: For the analog signal RGB output, the pixel rate is up to 300MHz that meets the RS-343A signal standard, and it supports Y, Pb, Pr/Y, Cb, Cr/Y, R-Y, B-Y.

The digital signal output is TMDS with pixel rate up to 330MHz and the test screen resolution supports beyond WQUXGA. Furthermore, to cope with the higher frequency signal tests, Chroma 22294-A also supports DVI Dual HDCP test for dual channel DVI test application.

As to the specification of TV output, the image and chrominance signals of Chroma 22294-A meet the NTSC, PAL and SECAM standards. The output signals include CVBS compound signals, BNC and Y/C (Luminance/Chrominance) separated signals as well as S-Video/SCART output connectors. Tests for special TV functions such as Closed Caption, V-chip and Teletext are also supported.

For the application of multiple tests, Chroma 22294-A supports a variety of audio/video and pattern file formats for play with the resolution up to 1080p. Meanwhile, to fulfill the test application for multi-ports output, multi-port HDMI have been built in to reduce a great deal of test time and finish the tests in the fastest way possible.

For operation, Chroma 22294-A has adopted full color graphic interface and built in super capacity memory for storage with the diversified special test patterns like xvYCC, HDCP&E-EDID, 8/10/12bit deep color, CEC, Lipsync and Chinese high definition test patterns embedded for use. Tests can be performed easily and rapidly to save the time and control the cost. Besides using the panel or remote controller for editing, users can edit various timing parameters and test patterns via the VPG Master application. Its easy operating interface and complete test functions are applicable for all video and related industries in R&D, production test and quality assurance.

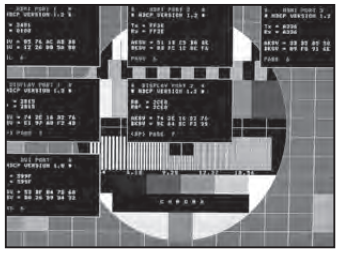


Model 22294-A Rear View

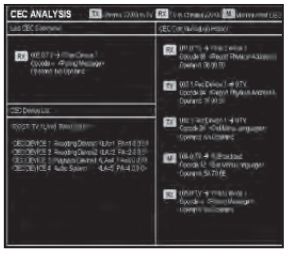
ORDERING INFORMATION

22294-A : Video Pattern Generator
Analog 300MHz/DVI 330MHz/HDMI 300MHz (TMDS Rate 300MHz)/TV/HDTV
A240001: Remote Controller

Special Pattern



Multi-HDCP Pattern



CEC Analysis



HEC & ARC Test Pattern



3D Operation Interface

All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	4096 x 2160
Pixel Rate Range	0.5~300MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green/Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	32~8192 pixels / 1 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	
	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	
	BNC : Hs,Vs,Xs ; D-SUB : Hs(Xs), Vs
VIDEO FORMAT	
Video Output	R, G, B / RS-343A Y, R-Y, B-Y Y, Cb, Cr / ITU 601 Y, Pb, Pr / ITU 709, RP177, SMPTE 240M DDC II B (D-SUB)

DVI (TMDS) OUTPUT	
Pixel Rate Range	25 < 1 link ≤ 165MHz/165 < 2 link ≤ 330MHz
EDID	Read / Write / Compare / Edit / Analysis
HDCP	HDCP V.1.0 (with Dual Mode)
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI VIDEO OUTPUT	
Version	HDMI V1.4b (3D Format / ARC / HEC / CEC / Lip Sync)
Pixel Rate Range	25~300MHz
Support HDMI Timing	85 Timing (CEA-861E)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 / 10 / 12 @RGB & YCbCr
Color Space	RGB / ITU-R BT.601 / ITU-R BT.709 / xvYCC (IEC61966-2-4) / sYcc601 / Adobe RGB / Adobe sYcc601
HDCP	HDCP V1.2
EDID	Read / Write / Compare / Edit / Analysis
HDMI AUDIO OUTPUT	
Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	1Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

TV OUTPUT									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/ 4.25	MHz
Closed Caption (NTSC)	C1, C2, C3, C4 / T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8ans+, 13ans+, 16ans+, 18ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

SDTV / HDTV FORMAT					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate (Hz)		Standard
720 x 483	59.94P	60/1.001			SMPTE 293
			59.94I	59.94/2	ITU 601 SMPTE 170M
720 x 576	50P	50			ITU 1382
			50I	25	ITU 601
1920 x 1080	60P	60	60I	30	SMPTE 274
	59.94P	60/1.001	59.94I	30/1.001	SMPTE 274
	50P	50	50I	25	SMPTE 274
	30P	30			SMPTE 274
	29.97P	30/1.001			SMPTE 274
	25P	25			SMPTE 274
	24P	24			SMPTE 274
	23.98P	24/1.001			SMPTE 274
1920 x 1035			60I	30	SMPTE 240
			59.94I	30/1.001	SMPTE 240
1280 x 720	60P	60			SMPTE 296
	59.94P	60/1.001			SMPTE 296
	50P	50			SMPTE 296

3D VIDEO FORMAT OUTPUT	
3D Scanning Mode	Frame packing
	Field alternative
	Line alternative
	Side-by-Side (Full)
	L + depth
	L + depth + graphics + graphics-depth
	Top & Bottom
	Side-by-Side (Half)

DATA STORAGE DEVICE	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN} 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION & WEIGHT	
22294-A	88 x 350 x 350 mm / 3.46 x 13.78 x 13.78 inch (HxWxD) 5.6 kg / 12.33 lbs



Analog	**250 MHz**
DVI (TMDS)	**330 MHz**
HDMI V1.3C (TMDS Rate 225 MHz)	**165 MHz**
DisplayPort V1.1a	**270 MHz**
Multi-port (HDMIx3, DPx2)	

KEY FEATURES

- Multi-port independent output test application
  - HDMI port output x 3
  - DisplayPort port output x 2
  - SCRAT port (output x 1 / input x 1)
- DisplayPort V1.1a pixel rate 270MHz
- DisplayPort with HDCP V1.3 support
- Support Automatically & Manually setting for DisplayPort function
  - 2 Link rate (1.62/2.7Gbps) selectable
  - 1, 2, 4 Video lane selectable
  - 0/3.5/6/9.5dB pre-emphasis selectable
  - 400/600/800/1200mV Swing level selectable
- HDMI V1.3C (with 24,30,36bit deep color / xvYCC / CEC / Lip Sync function)
- DVI pixel rate 330MHz
- Support DVI Dual HDCP test application
- DVI & HDMI & DisplayPort with HDCP output
- Y、Pb、Pr / Y、Cb、Cr / Y、R-Y、B-Y output
- S-Video / CVBS / SCART / RGB / Color Component / D-terminal output
- NTSC / PAL / SECAM TV signal
- EDID Read / Write / Compare
- Easy and variable pattern edit
- HDMI/DVI Plug & Play function
- Power saving mode support
- USB Host / Device

Chroma 2233-B Programmable Video Pattern Generator is a multi-function measurement equipment. Combining Analog / DVI / HDMI / DisplayPort / SDTV / HDTV signals with high resolution test quality and multiple output support, it is capable of providing a complete test solution to customers.

For the digital signal of TMDS output, the pixel rate is up to 330MHz with resolution supporting above UXGA. Moreover, for the higher frequency test application, Chroma 2233-B supports DVI Dual HDCP for 2 Link DVI transmission.

As large scale and high definition have become the trend for video industry, Chroma 2233-B supports the up-to-date high resolution multimedia digital video transmission interface, HDMI V1.3 is able to provide higher speed bandwidth and color depth. It supports 24,30,36 bits (RGB or YCbCr) and new color standard xvYCC, sYCC 601, Adobe RGB, and Adobe YCC 601 (CEA-861E) to get real natural color and high resolution image.

DisplayPort is the state-of-the-art video output interface defined by Video Electronics Standards Association (VESA). It is an open and extendable interface standard for industrial applications. The objective of this standard is to lower down the platform design cost and provides an interoperable digital communication interface for PC and components. Same as HDMI, the high definition digital audio and video frequency can be received via a digital video transmission cable. Its maximum transmission bandwidth is up to 10.8Gb/s. The sufficient bandwidth is able to fulfill the requirements for large display with higher resolution in the future.

The 2233-B is equipped with DisplayPort standard format with the following key features:

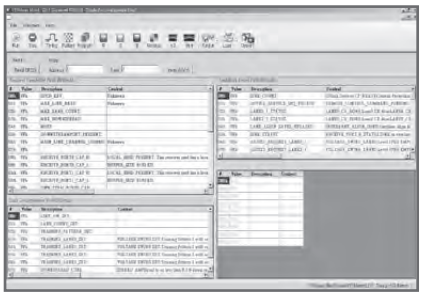
The connection of DisplyPort is composed of main channel, AUX CH and Hot Plug Detect (HPD) 3 types of signals. The main channel is formed by 4 lanes (1, 2, 4Lane) and each lane can support 2.7Gbps or 1.62Gbps transmission rate. Up to 10.8Gbps can be transmitted by 4 lanes.

DPCD (DisplayPort Configuration Data) is the main function of DisplayPort that acts as a communication bridge between source and sink. The 2233-B is able to adjust the parameters such as Lane, Main link rate, etc. automatically or manually after connection. As the signal attenuation may occur during long distance transmission for DisplayPort, the Pre-emphasis and Swing voltage can also be adjusted.

In addition the 2233-B supports SSC (Spread Spectrum Clock, the technology to eliminate EMI) test that can significantly reduce the EMI problems occurred among displays and components, and simplify the product design.

In the meantime to fulfill the test application for multi-port output, the 2233-B has built-in 3 HDMI, 2 DisplayPort and 2 SCART ports to reduce a great deal of test time, so as to finish the tests in the fastest way.

For operation, the 2233-B has adopted full color graphic interface and built in super capacity memory for storage. Besides using the panel for editing, users can edit various timing parameters and test patterns via the VPG Master application on PC site. Its easy operating interface and complete test functions are applicable for all video and related industries in R&D, production test and quality assurance that can satisfy the test requirements for the multimedia displays of today and in the future.



DPCD Screen



DisplayPort Timing Screen

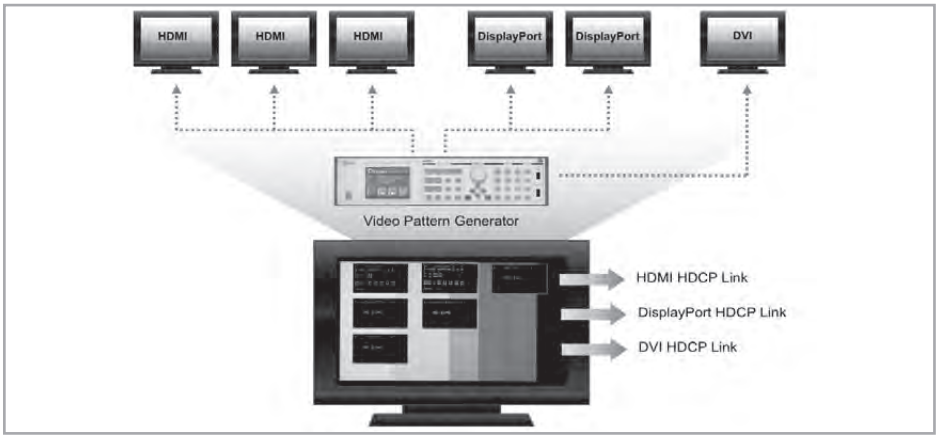


Model 2233-B Rear View

ORDERING INFORMATION

2233-B : Video Pattern Generator
Analog 250MHz/DVI 330MHz/HDMI 165MHz (TMDS Rate 225MHz)/DisplayPort 270MHz
A240001: Remote Controller

Multi-output with HDCP Test



All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	4096 x 2048
Pixel Rate Range	0.5~250MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green / Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	32~8192 pixels / 1 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	BNC: Hs, Vs, Xs
	D-SUB: Hs (Xs), Vs
VIDEO FORMAT	
Video Output	R,G,B/RS-343A
	Y, R-Y, B-Y
	Y, Cb, Cr / ITU 601
	Y, Pb, Pr / ITU 709, RP 177, SMPTE 240M
	DDC II B (D-SUB)

DVI (TMDS) OUTPUT	
Pixel Rate Range	25 < 1 link ≤ 165MHz/165 < 2 link ≤ 330MHz
E-EDID	Read / Write / Compare / Edit
HDCP Support	HDCP V1.0 (with Dual Mode)
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI VIDEO OUTPUT	
Version	HDMI V1.3C(with 24,30,36 bit deep color/xvYCC/ CEC/Lip Sync)
Pixel Rate Range	25 ~ 165 MHz (TMDS CLK : 225MHz)
Support HDMI Timing	77 Timing(CEA-861D)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 / 10 / 12 @RGB & YCbCr
Color Space	RGB/ITU-R BT.601/ITU-R BT.709/xvYCC (IEC61966-2-4) /sYCC 601/Adobe RGB/ Adobe YCC 601
HDCP Support	HDCP V.1.2
EDID	Read / Write / Compare / Edit
HDMI AUDIO OUTPUT	
Sample Rate	32,44.1,48,88.2, 96,176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	10Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

DISPALY PORT OUTPUT	
Pixel Rate Range	25~270MHz
Video Signal Type	RGB/YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Color Depth Transmission	6/8/10/12 bits per component
HDCP Support	HDCP V1.3
Main Link Data Rate	2.7Gbps or 1.62Gbps per lane
Lane Count	1/2/4 Lanes
Pre-emphasis	0dB/3.5dB/6dB/9.5dB selectable
Swing level	400mV/600mV/800mV/1200mV selectable
Audio	2 Channel (L-PCM)-Internal 8 Channel (AC3/DTS)-External
Bit Per Sample	24bit
Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192KHz

TV OUTPUT									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/4.25	MHz
Subcarrier Stability	±50								Hz
Video Output	Composite (BNC), S-Video								
	Burst On/Off (NTSC, PAL)								
	Contrast programmable								
	Brightness programmable								
	Saturation programmable								
	Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4/ T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8 ans+, 13 ans+, 16 ans+, 18 ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

HDTV FORMAT					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate (Hz)		Standard
1920 x 1080	60P	60	60I	30	SMPTE 274
	59.94P	60/1.001	59.94I	30/1.001	SMPTE 274
	50P	50	50I	25	SMPTE 274
	30P	30			SMPTE 274
	29.97P	30/1.001			SMPTE 274
	25P	25			SMPTE 274
	24P	24			SMPTE 274
	23.98P	24/1.001			SMPTE 274
1920 x 1035			60I	30	SMPTE 240
			59.94I	30/1.001	SMPTE 240
1280 x 720	60P	60			SMPTE 296
	59.94P	60/1.001			SMPTE 296
	50P	50			SMPTE 296

DATA STORAGE DEVICE	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN} 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION	
2233-B (H x W x D)	88 x 350 x 350 mm / 3.46 x 13.78 x 13.78 inch
WEIGHT	
2233-B	5.6 kg / 12.33 lbs

All specifications are subject to change without notice.



Analog 250 MHz
DVI (TMDS) 330 MHz
HDMI V1.3C 165 MHz
(TMDS Rate 225 MHz)
DisplayPort V1.1a 270 MHz
Multi-port (HDMIx3, DPx2)
Multimedia Audio/Video

KEY FEATURES

- Support multimedia audio / video play formats
- Support up to 1080p high definition resolution
- Multi ports independent output test application
  - HDMI port output x 3
  - DisplayPort output x 2
  - SCART port x 2 (output x 1 / input x 1)
- DisplayPort V1.1a pixel rate 270MHz
- DisplayPort supports HDCP V1.3
- Support automatically & manually setting for DisplayPort function
  - 2 Link rate (1.62 / 2.7Gbps) selectable
  - 1, 2, 4 Video lane selectable
  - 0 / 3.5 / 6 / 9.5dB pre-emphasis selectable
  - 400 / 600 / 800 / 1200mV swing level selectable
- Support HDMI V1.3C (with 24, 30, 36bit color depth / xvYCC / CEC / Lip Sync)
- Support dual HDCP in DVI test application
- HDCP supports auto / manual mode
- HDMI and DisplayPort multiplexer function or switching for independent output
- HDCP ON/OFF in DVI, HDMI & DisplayPort interface
- Y, Pb, Pr / Y, Cb, Cr / Y, R-Y, B-Y output
- S-Video / CVBS / SCART / RGB / Color Component / D-terminal
- NTSC / PAL / SECAM signals
- EDID read / write / compare
- Optical / coaxial audio input (SPDIF)
- Scrolling pattern support
- Built-in China HD standard test patterns
- HDMI / DVI hot plug function

In order to perform motion pictures on the displays nowadays, the 2234 Video Pattern Generator has integrated the Multi-Media playback technology to provide versatile motion pictures for display quality evaluation test. It has high resolution test quality and multiple outputs support that can meet the requirements for multimedia video tests such as LCD Monitor / LCD TV / PDP / Projector of today and in the future.

This Video Pattern Generator provides both analog and digital signals, also supports multiple ports for independent output test and multimedia audio/video formats for play application. For the digital signal, the pixel rate of TMDS output is up to 330MHz and the test screen resolution is able to support beyond WQUXGA. Moreover, to cope with the higher frequency signal test for DVI Dual HDCP tests, it also supports dual link DVI test application.

Chroma 2234 has built in the up to date high resolution multimedia digital video transmission interface, HDMI V1.3, to provide high speed bandwidth and color depth. It supports 24, 30, 36 bits (RGB or YCbCr) and new color standard xvYCC along with sYCC, Adobe RGB, and Adobe YCC(CEA-861E) to implement the real natural colors and high resolution images.

DisplayPort is the state-of-the-art video output interface defined by VESA. The signal transmission is mainly composed of main channel, AUX CH and hot plug (HPD) 3 types of signals. The main channel is formed by 4 lanes (1, 2, 4 Lane) and each lane can support 2.7Gbps or 1.62Gbps transmission rate. Up to 10.8Gbps can be transmitted by 4 lanes. Chroma 2234 supports the DisplayPort standard formats with the following key features:

DPCD (DisplayPort Configuration Data) is the main function of DisplayPort that acted as a communication bridge between source and sink. Chroma 2234 is able to adjust the parameters such as Lane, Main link rate and etc. automatically or manually after connection. As the signal attenuation may occur during long distance transmission for DisplayPort, the Pre-emphasis and Swing voltage can also be adjusted.

In addition Chroma 2234 supports SSC (Spread Spectrum Clock, the technology to eliminate EMI) test that can significantly reduce the EMI problems occurred among displays and components, and simplify the product design.

For the application of multiple tests, Chroma 2234 supports a variety of audio/video and pattern file formats for play with the resolution up to 1080p. Meanwhile, to fulfill the test application for multi ports output, 3 HDMI and 2 DisplayPorts of which the output settings can be executed separately have been built in to reduce a great deal of test time and finish the tests in the fastest way possible.

For operation, Chroma 2234 has adopted full color graphic interface and built in memory for storage with the diversified special test patterns like xvYCC, HDCP&E-EDID, 8/10/12bit deep color, CEC, Lipsync and China high definition test patterns embedded for use. Tests can be performed easily and rapidly to save the time and control the cost.

A remote controller (optional) can be used to replace the direct panel editing for flexible practice in a large test area. It is suitable for mass application in the production line. In addition, various timing parameters and test patterns can be edited via the VPG Master application on PC site. The easy operating interface and complete test functions of Chroma 2234 are applicable for all video and related industries in R&D, production test and quality assurance.



Model 2234 Rear View

ORDERING INFORMATION

2234 : Video Pattern Generator
Analog 250MHz/DVI 330MHz/HDMI 165MHz
(TMDS Rate 225MHz)/DisplayPort 270MHz
A240001 : Remote Controller

Multimedia Operation interface





All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	4096 x 2160
Pixel Rate Range	0.5~250MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green / Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	32~8192 pixels / 1 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	BNC: Hs, Vs, Xs
	D-SUB: Hs (Xs), Vs
VIDEO FORMAT	
Video Output	R,G,B/RS-343A
	Y, R-Y, B-Y
	Y, Cb, Cr / ITU 601
	Y, Pb, Pr / ITU 709, RP 177, SMPTE 240M
	DDC II B (D-SUB)

DVI (TMDS) OUTPUT	
Pixel Rate Range	25 < 1 link ≤ 165MHz/165 < 2 link ≤ 330MHz
E-EDID	Read / Write / Compare / Edit
HDCP Support	HDCP V1.0 (with Dual Mode)
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI VIDEO OUTPUT	
Version	HDMI V1.3C(with 24,30,36 bit deep color/xvYCC/ CEC/Lip Sync)
Pixel Rate Range	25 ~ 165 MHz (TMDS CLK : 225MHz)
Support HDMI Timing	77 Timing(CEA-861D)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 / 10 / 12 @RGB & YCbCr
Color Space	RGB/ITU-R BT.601/ITU-R BT.709/xvYCC (IEC61966-2-4) /sYCC 601/Adobe RGB/ Adobe YCC 601
HDCP Support	HDCP V.1.2
EDID	Read / Write / Compare / Edit
HDMI AUDIO OUTPUT	
Sample Rate	32,44.1,48,88.2, 96,176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	10Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

DISPALY PORT OUTPUT	
Pixel Rate Range	25~270MHz
Video Signal Type	RGB/YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Color Depth Transmission	6/8/10/12 bits per component

HDCP Support	HDCP V1.3
Main Link Data Rate	2.7Gbps or 1.62Gbps per lane
Lane Count	1/2/4 Lanes
Pre-emphasis	0dB/3.5dB/6dB/9.5dB selectable
Swing level	400mV/600mV/800mV/1200mV selectable
Audio	2 Channel (L-PCM)-Internal 8 Channel (AC3/DTS)-External
Bit Per Sample	24bit
Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192KHz

TV OUTPUT									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/4.25	MHz
Subcarrier Stability	±50								Hz
Video Output	Composite (BNC), S-Video								
	Burst On/Off (NTSC, PAL)								
	Contrast programmable								
	Brightness programmable								
	Saturation programmable								
	Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4/ T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8 ans+, 13 ans+, 16 ans+, 18 ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

MULTIMEDIA PLAY	
Video Format	MPEG-1(.mpg, .dat) ; MPEG-2(.vob) MPEG-4(.avi, .mp4) ; Support Up to 40Mbps(1080p)
Audio Format	MPEG-1 Layer-3(.mp3) ; LPCM(.wav) ; AAC(.aac)
Picture Format	BitMap(.bmp) ; JPEG(.jpg)
Interface	USB 2.0
File system	Internal: EXT-3, External: EXT-3 / FAT-32
Storage method	Internal: 16GB Flash Memory, External: Media USB Port

DATA STORAGE DEVICE	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN} 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION	
2234 (H x W x D)	88 x 350 x 350 mm / 3.46 x 13.78 x 13.78 inch
WEIGHT	
2234	5.6 kg / 12.33 lbs

All specifications are subject to change without notice.



KEY FEATURES

- Comply with DisplayPort 1.2a standard
  - 4K x 2K 60/50Hz
  - Pixel rate support up to 600MHz
  - Auto / Manual training mode
  - 1.62 / 2.7 / 5.4Gbps per lane
  - 1 / 2 / 4 Link
  - 0 / 3.5 / 6 / 9.5 dB pre-emphasis
  - 400 / 600 / 800 / 1200mV Swing level
  - MST(Multi Stream Transport)
  - DPCD Analyze
- HDMI support up to 300MHz
  - 4K x 2K 24/30Hz
  - 1080p 120Hz
  - 3D format with 1080p 60Hz (Frame packing / Side-by-Side Full)
- 2 HDMI ports + 2 DisplayPort output
- Analog support up to 300MHz
- Support HDCP function
- S-Video/CVBS/SCART/RGB/Component/ D-terminal NTSC/PAL/SECAM standard
- Dual link DVI support up to 330MHz
- EDID Read/Write/Compare/Analyze
- Support Pattern Scrolling Function
- ESD Protection Circuit
- Front Panel USB Port & Control Interface
- Graphic Operating & Editing Interface

Chroma 2235 is a programmable video pattern generator that equipped with various standard analog/digital signal output functions. The built-in high speed graphic engine is able to provide standard test signals and patterns for display devices with various resolutions to meet the requirements of multimedia display industries today and in the future for R&D and test applications.

The Video Pattern Generator supports the up-to-date high resolution multimedia digital audio and video transmission interface HDMI and DisplayPort specification with the following features:

Support 4Kx2K ultra high resolution

For digital interface, the DisplayPort supports 600MHz, the HDMI supports 300MHz and DVI supports up to 330MHz (Dual link). For analog interface, the signal supports up to 300MHz. The high bandwidth signal output capability supports the testing for the newest generation of 4K ultra high resolution displays.

xvYCC ANALOG DVI Dual HDCP

NTSC/PAL SECAM Close Caption Teletext V-Chip SDTV HDTV Ture Color Multi-Port

DP 1.2 standard format signal output

Supports DisplayPort 1.2 standard HBR2(High Bit Rate 2, 5.4Gbps) bandwidth transmission up to 4K x 2K 60Hz resolution. Supports MST(Multi Stream Transport) function, with one DisplayPort output testing 4 Full HD(1080P) monitors at once. The 3D function is fully supported with abundant 3D test patterns, and provided for the user to download customized 3D patterns (splitting left/ right images in Bitmap
file format).

Fully support HDMI defined functions

The 2235 is equipped with HEAC (Ethernet / Audio Return Channel) / Lipsync / HDCP / CEC / EDID functions and supports 24 / 30 / 36 bit color depth (RGB or YCbCr) and newest generation of color standard xvYCC / sYCC601/ Adobe RGB / Adobe YCC601.

Multi-signal port for simultaneous output

The 2235 has 2 HDMI / DisplayPort output ports that can provide multi-signal output simultaneously to meet the test applications for multi-port displays nowadays.

The RGB (BNC / D-Sub) and component (YPbPr / D-Terminal) signals provided by 2235 are able to output all kinds of standard signal formats to test the displays with traditional analog interface. The digital DVI output signal supports dual channels HDCP which is most applicable for high resolution display testing.

For TV signals, the 2235 is able to output the signals that comply with NTSC, PAL and SECAM specifications, also to support CVBS and Y/C separation signal formats for BNC / S-Video / SCART output ports. Special TV function tests such as Closed Caption, V-chip and Teletext are also supported.

Chroma 2235 has full color graphic interface and super large capacity of storage memory with lots of special test patterns built-in such as xvYCC, HDCP, E-EDID Deep color, CEC, Lipsync and high-definition test images defined by China to give the user an easy way to judge the test result and save the time for production improvement as well as to achieve cost effective control. In addition to the panel editing of standalone device, remote control can be applied also the application software VPG Master can be utilized to edit various test programs and parameters. Its easy-to-use interface and complete test functions are most suitable for the applications of R&D, production tests and quality assurance in all video and associate industries.



Model 2235 Rear View

ORDERING INFORMATION

2235 : Video Pattern Generator
Analog 300MHz/DVI 330MHz/HDMI 300MHz (TMDS Rate 300MHz)/DisplayPort 600MHz
A240001 : Remote Controller

Multi-Stream Transport (MST)



Soft Panel



DPCD Screen



DisplayPort Timing Screen

All specifications are subject to change without notice.

SPECIFICATIONS

Analog Output	
Display Size	4096 x 2160
Pixel Rate Range	0.5~300MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green/Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
Horizontal Timing	
Total Pixel	32~8192 pixels / 1 pixels resolution
Vertical Timing	
Total Line	4~4096 lines (non-interlace) / 1 line programmable 4~2048 lines (interlace) / 1 line programmable
Composite Sync	
	Hs+ Vs, Hs EXOR Vs, Equalization & Serration Pulse
Separate Sync	
	BNC : Hs,Vs,Xs ; D-SUB : Hs(Xs), Vs

DVI (TMDS) Output	
Pixel Rate Range	25 < 1 link ≤ 165MHz/165 < 2 link ≤ 330MHz
EDID	Read / Write / Compare / Edit / Analysis
HDCP	Support HDCP V.1.0 (with Dual Mode)
Compliant	DVI 1.0
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI Video Output	
Version	HDMI 1.4b (3D / ARC / HEC / CEC / Lip Sync)
Pixel Rate Range	25 ~ 300 MHz (TMDS rate 300 MHz)
Support HDMI Timing	85 Timing(CEA-861E)
Pixel Repetition	4
Video Signal Type	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Color depth	24 / 30 / 36 bits per pixel
Color Space	RGB / ITU-R BT.601 / ITU-R BT.709 / xvYcc / sYcc601 / Adobe RGB / Adobe sYcc601
HDCP	HDCP V.1.2
EDID	Read / Write / Compare / Edit / Analysis
HDMI Audio Output	
Sample Rate	32, 44.1, 48, 88.2, 96,176.4, 192KHz
Number of Channel	8 Channel (FL/FR/LR/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFs
Frequency Range	10Hz to 20KHz
Frequency Resolution	1Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

DISPLAYPORT Output	
Version	DISPLAYPORT 1.2a (3D)
Pixel Rate Range	25~600 MHz (4K x 2K 60Hz)
Main Link Data Rate	1.62 / 2.7 / 5.4 Gbps per lane
Lane Count	1/2/4 Lanes
Pre-emphasis	0dB/3.5dB/6dB/9.5dB selectable
Swing Level	400mV/600mV/800mV/1200mV selectable

Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Color Depth	6/8/10/12 bits per component
HDCP	HDCP V1.3
Audio	2 Channel internal (L-PCM)
Bit Per Sample	24bit
Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192KHz
Frequency Range	10Hz to 20KHz
MST *	FHD (1920 x 1080P60) x 4 max.

TV Output									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/ 4.25	MHz
	±50								Hz
Video Output	Composite (BNC), S-Video								
	Burst On/Off (NTSC, PAL)								
	Contrast /Brightness/Saturation/Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4/ T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA/FCC/Canada English /Canada French Rating								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

SDTV / HDTV Format					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate(Hz)		Standard
1920X1080	60P	60	60I	30	SMPTE 274
	59.94P	60/1.001	59.94I	30/1.001	SMPTE 274
	50P	50	50I	25	SMPTE 274
	30P	30			SMPTE 274
	29.97P	30/1.001			SMPTE 274
	25P	25			SMPTE 274
	24P	24			SMPTE 274
	23.98P	24/1.001			SMPTE 274
1920X1035			60I	30	SMPTE 240
			59.94I	30/1.001	SMPTE 240
1280X720	60P	60			SMPTE 296
	59.94P	60/1.001			SMPTE 296
	50P	50			SMPTE 296

Data Storage Device	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
Others	
AC Input	1Ø 100~240V ±10% V_{LN} 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
Dimension & Weight	
2235 (HxWxD)	88x350x350 mm / 3.46x13.78x13.78 inch 5.6 kg / 12.33 lbs



Analog 250 MHz
DVI (TMDS) 330 MHz
HDMI V1.3C 165 MHz
(TMDS Rate 225 MHz)

KEY FEATURES

- Multi-port output tests
  - 3 HDMI output ports
  - 2 SCART ports (output x1/ input x1)
- Analog Pixel rate 250MHz
- DVI Pixel rate 330MHz (dual channel)
- DVI Dual HDCP test application support
- HDMI V1.3C
  - True 30 bits color depth output
  - Support xvYCC & sYCC, Adobe RGB, Adobe YCC color space
  - Support CEC Function
  - Built-in Lip Sync test pattern
  - Digital audio output
  - 3 HDMI outputs to provide individual HDCP Enable/Disable
- DVI & HDMI with HDCP output
- Support HDCP V1.0 (DVI) / V1.2 (HDMI)
- Y, Pb, Pr / Y, Cb, Cr / Y, R-Y, B-Y output
- S-Video / CVBS / SCART / RGB / color component / D-terminal
- NTSC / PAL / SECAM TV signals
- Support Closed Caption / V-Chip / Teletext
- EDID read / write / compare
- Built-in low low-distortion audio output (2ch/8ch)
- Easy-to-use audio hot key
- Optical/Coaxial audio input (S/PDIF)
- Easy-to-use pattern editor
- Scrolling Pattern support
- HDMI / DVI plug & play function
- USB (Host & Device)
- User Key (up to 32 continuous actions can be combined)

Chroma 23293-B Video Pattern Generator is a high value-added test device that is designed by brand new architecture with high speed transmission features to provide high performance system control. It also supports the up-to-date high resolution multimedia digital/audio transmission interface, HDMI V1.3.

Chroma 23293-B has Analog/Digital/ TV signals. For the analog signal of RGB output, the pixel rate is up to 250MHz, while the digital signal of TMDS output, the pixel rate is up to 330MHz. Also, it supports the DVI dual channel HDCP test to satisfy the requirements for higher bandwidth application.

USB CE VESA HDMI xvYCC ANALOG DVI Dual HDCP
NTSC/PAL SECAM Close Caption Teletext V-Chip SDTV HDTV Ture Color Multi-Port

In TV output specification, the image and chromaticity signals comply with the NTSC, PAL and SECAM standards. Furthermore, the tests for special TV functions such as Closed Caption, V-chip and Teletext are supported.

The HDMI output video signals are RGB & YCbCr with the sampling modes of 4:4:4 & 4:2:2. The audio output contains the built-in low distortion sine wave. Chroma 23293-B supports the brand new HDMI V1.3 features:

Higher speed bandwidth and color depth: It supports 24,30 bits (RGB or YCbCr) and the new generation color standards xvYCC, sYCC 601, Adobe RGB and Adobe YCC 601 to attain truly natural color and high resolution image screen.

CEC (Consumer Electronics Control): The CEC parameter settings (VPG Master) support multiple test modes that is able to facilitate users for easier and faster tests with the patterns built-in specially for CEC tests.

Lip Sync: Since the technology of digital signals process improves continuously to have a high definition video presentation, there may have potential factors to cause delay when processing the video. HDMI 1.3 allows CE devices to compensate the time difference automatically that can synchronize both video and audio to enhance viewer's feeling.

To fulfill the application of multi-port output test, Chroma 23293-B has built-in 3 HDMI and 2 SCART ports that can finish testing the displays with multi-port in the fastest speed and reduce the test time in a great deal.

Various test patterns and timing parameters are built-in Chroma 23293-B for operation. Shortcuts are provided for Timing/Pattern/ Program/Audio to simplify the settings. The test program edited by the user on PC can be downloaded to Chroma 23293-B directly for storage and recall next time.

Moreover, for the function keys used frequently, a special User Key is designed to combine these functions. Up to 32 keys can be memorized for continuous actions and executed by a single key. Besides the panel operation, remote control can be enabled with a remote controller for users to operate the device more easily.



Model 23293-B Rear View

ORDERING INFORMATION

23293-B : Video Pattern Generator
Analog 250MHz/DVI 330MHz/HDMI 165MHz
(TMDS Rate 225MHz)/TV/HDTV
A240001: Remote Controller

All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	4096 x 2160
Pixel Rate Range	0.5~250MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green / Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	32~8192 pixels / 1 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	D-SUB: Hs (Xs), Vs
VIDEO FORMAT	
Video Output	R, G, B / RS-343A / RS-170 / VESA (VSIS)
	Y, R-Y, B-Y
	Y, Cb, Cr / ITU 601
	Y, Pb, Pr / ITU 709, RP 177, SMPTE 240M
	DDC II B (D-SUB)

DVI (TMDS) OUTPUT	
Pixel Rate Range	25 < 1 link ≤ 165MHz/165 < 2 link ≤ 330MHz
E-EDID	Read / Write / Compare / Edit
HDCP Support	HDCP V1.0 (with Dual Mode)
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI VIDEO OUTPUT	
Version	HDMI V1.3C(with 24,30,36 bit deep color/xvYCC/ CEC/Lip Sync)
Pixel Rate Range	25 ~ 165 MHz (TMDS CLK : 225MHz)
Support HDMI Timing	77 Timing(CEA-861D)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 / 10 @RGB & YCbCr
Color Space	RGB/ITU-R BT.601/ITU-R BT.709/xvYCC (IEC61966-2-4) /sYCC 601/Adobe RGB/ Adobe YCC 601
HDCP Support	HDCP V.1.2
EDID	Read / Write / Compare / Edit
HDMI AUDIO OUTPUT	
Sample Rate	32,44.1,48,88.2, 96,176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	10Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

TV OUTPUT									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/4.25	MHz
Subcarrier Stability	±50								Hz
Video Output	Composite (RCA), S-Video								
	Burst On/Off (NTSC, PAL)								
	Contrast programmable								
	Brightness programmable								
	Saturation programmable								
	Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4/ T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8 ans+, 13 ans+, 16 ans+, 18 ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

AUDIO (ANALOG) OUTPUT	
Number of Channel	2 Channel (R / L)
Sample Rate	32, 44.1 , 48 , 88.2 , 96 , 176.4 , 192KHz
Level Resolution	10mV / Step
Level Range	0V to 2V (at 600 Ohms Load)
Frequency Range	10Hz to 20KHz / 10Hz Step
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

HDTV FORMAT					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate (Hz)		Standard
1920 x 1080	60P	60	60I	30	SMPTE 274
	59.94P	60/1.001	59.94I	30/1.001	SMPTE 274
	50P	50	50I	25	SMPTE 274
	30P	30			SMPTE 274
	29.97P	30/1.001			SMPTE 274
	25P	25			SMPTE 274
	24P	24			SMPTE 274
	23.98P	24/1.001			SMPTE 274
1920 x 1035			60I	30	SMPTE 240
			59.94I	30/1.001	SMPTE 240
1280 x 720	60P	60			SMPTE 296
	59.94P	60/1.001			SMPTE 296
	50P	50			SMPTE 296

DATA STORAGE DEVICE	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN} 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION	
23293-B (H x W x D)	88 x 350 x 350 mm / 3.46 x 13.78 x 13.78 inch
WEIGHT	
23293-B	4.5 kg / 9.9 lbs

All specifications are subject to change without notice.



Analog 250 MHz
DVI (TMDS) 330 MHz
HDMI V1.4a 165 MHz
(TMDS Rate 225 MHz)
3D Output

KEY FEATURES

- Multiport independent output test application
  - 3 HDMI port output
  - 2 SCART port (Input/Output x1/Outputx1)
- Analog frequency 250MHz
- Digital (DVI) frequency 330MHz (dual channel)
- DVI Dual HDCP test application support
- HDMI 1.4 standard
  - 3D standard format output
  - ARC audio return function
  - HEC network test function
  - Color vector sYCC601 / Adobe RGB / Adobe YCC601
  - CEC / Deep Color / Lip-Sync / xvYCC
- 4Kx2K graphic display capability
- CEC analysis & multi-directional monitor
- Real 30bit deep color output
- DVI & HDMI with HDCP output
- Support HDCP V1.0 (DVI) / V1.2(HDMI)
- Y, Pb, Pr / Y, Cb, Cr / Y,R-Y, B-Y Output
- S-Video / CVBS / SCART / RGB / color component / D terminal
- NTSC / PAL / SECAM TV signals
- Support Close Caption / V-Chip / Teletext
- EDID read / write / compare
- HDMI supports fiber/coaxial audio input (S/PDIF)
- ARC supports fiber/coaxial audio output (S/PDIF)
- Built-in low distortion audio output (2ch / 8ch)
- Easy to use audio shortcuts
- Support graphic dynamic movement (Scrolling) function
- Built in China high definition standard test patterns / 3D test images
- HDMI / DVI plug and play function
- ESD protective circuit
- Front USB control interface
- User Key (maximum 32 combinations of serial actions)

Chroma 23294 Video Pattern Generator provides various international standard signals with built-in 3 HDMI and 2 SCART ports that can satisfy the output tests for multiple ports to shorten the test time and improve productivity.

Chroma 23294 adopts a brand new structure design with a high performance CPU to carry high speed / high density FPGA as the graphic engine. It has highly efficient system control and supports the up-to-date high definition multimedia digital video interface HDMI V1.4 standard to supply the following features:

3D signal standard format output: It is a fast operating interface designed specially for 3D only that can adjust and switch to various 3D output easily.

The ARC (Audio Return Channel) function is able to test the external audio source and the Ethernet (HDMI Ethernet Channel) function is able to provide dual data transmission test, higher speed bandwidth & Color Deep. It supports 24, 30 byte (RGB or YCbCr) and the color standards of new generation such as xvYCC, sYCC601, Adobe RGB and Adobe YCC601 to realize the true natural color and high definition image with broader color range.

CEC (Consumer Electronics Control) Function: The CEC test parameters can be set via the proprietary software VPG MASTER which also supports the test modes of TX (send)/RX (receive)/MONITOR (monitor) & FEATURE (user's).

Chroma 23294 has analog/digital/TV control signals as well.

For the analog RGB output, its pixel frequency is up to 250MHz that complies with the RS-343A signal standard and support Y,Pb,Pr / Y,Cb,Cr / Y, R-Y& B-Y. As to the digital signal, it is TMDS pixel frequency up to 330MHz with dual channel DVI output that can support DVI Dual HDCP tests to satisfy the application for testing higher bandwidth display.

In TV output specification, the image and chromaticity signals of 23294 comply with NTSC, PAL and SECAM regulations. The output signals include CVBS composite signals, Y/C (Luminance/Chrominance) image/chromaticity separate signals and S-Video/SCART output connector. It can also support special TV test functions such as Closed Caption, V-chip and Teletext.

To supply multiple test applications, Chroma is able to play the picture file format up to 4Kx2K resolution. Moreover, 3 HDMI and 2 SCART ports are built in to satisfy the test for multiport independent output and reduce the test time substantially.

Chroma 23294 has many special test patterns such as xvYCC, HDCP&E-EDID, 8/10 bit deep color, CEC, Lipsync and China high definition patterns for easy test assessment to save the time and increase productivity efficiently. In addition, the equipped application VPG Master with easy-to-use interface and complete test functions that is capable of editing various kinds of test procedures and parameters makes Chroma 23294 suitable for the R&D, production test and quality assurance of all video and related industries.



Model 23294 Rear View

ORDERING INFORMATION

23294 : Video Pattern Generator
Analog 250MHz/DVI 330MHz/HDMI 165MHz
(TMDS Rate 225MHz)/TV/HDTV
A240001: Remote Controller

All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	4096 x 2160
Pixel Rate Range	0.5~250MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green / Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	32~8192 pixels / 1 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	D-SUB: Hs (Xs), Vs
VIDEO FORMAT	
Video Output	R, G, B / RS-343A / RS-170 / VESA (VSIS)
	Y, R-Y, B-Y
	Y, Cb, Cr / ITU 601
	Y, Pb, Pr / ITU 709, RP 177, SMPTE 240M
	DDC II B (D-SUB)

DVI (TMDS) OUTPUT	
Pixel Rate Range	25 < 1 link ≤ 165MHz/165 < 2 link ≤ 330MHz
E-EDID	Read / Write / Compare / Edit
HDCP Support	HDCP V1.0 (with Dual Mode)
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI VIDEO OUTPUT	
Version	HDMI V1.4a (3D Format / ARC / HEC / CEC / Lip Sync)
Pixel Rate Range	25 ~ 165 MHz (TMDS rate 225MHz)
Support HDMI Timing	85 Timing(CEA-861E)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 / 10 / 12 @RGB & YCbCr
Color Space	RGB / ITU-R BT.601 / ITU-R BT.709 / xvYCC (IEC61966-2-4) / sYcc601 / Adobe RGB / Adobe sYcc601
HDCP Support	HDCP V.1.2
EDID	Read / Write / Compare / Edit
HDMI AUDIO OUTPUT	
Sample Rate	32,44.1,48,88.2, 96,176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	10Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

TV OUTPUT									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/4.25	MHz
Subcarrier Stability	±50								Hz
Video Output	Composite (RCA), S-Video								
	Burst On/Off (NTSC, PAL)								
	Contrast programmable								
	Brightness programmable								
	Saturation programmable								
	Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4/ T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8 ans+, 13 ans+, 16 ans+, 18 ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

HDTV FORMAT					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate (Hz)		Standard
1920 x 1080	60P	60	60I	30	SMPTE 274
	59.94P	60/1.001	59.94I	30/1.001	SMPTE 274
	50P	50	50I	25	SMPTE 274
	30P	30			SMPTE 274
	29.97P	30/1.001			SMPTE 274
	25P	25			SMPTE 274
	24P	24			SMPTE 274
	23.98P	24/1.001			SMPTE 274
1920 x 1035			60I	30	SMPTE 240
			59.94I	30/1.001	SMPTE 240
1280 x 720	60P	60			SMPTE 296
	59.94P	60/1.001			SMPTE 296
	50P	50			SMPTE 296

3D VIDEO FORMAT OUTPUT	
3D Scanning Mode	Frame packing
	Field alternative
	Line alternative
	Side-by-Side (Full)
	L + depth
	L + depth + graphics + graphics-depth
	Top & Bottom
	Side-by-Side (Half)

DATA STORAGE DEVICE	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN} 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION	
23293-B (H x W x D)	88 x 350 x 350 mm / 3.46 x 13.78 x 13.78 inch
WEIGHT	
23294	4.5 kg / 9.9 lbs



Analog	**250 MHz**
DVI (TMDS)	**330 MHz**
HDMI V1.3C	**165 MHz**
(TMDS Rate 225 MHz)	
DisplayPort V1.1a	**270 MHz**

KEY FEATURES

- Multi-port output tests
  - 3 HDMI output ports
  - 2 DisplayPort output ports
  - 2 SCART ports (output x1/ input x1)
- DisplayPort V1.1a pixel rate 270MHz
  - 2 Link Rate (1.62/2.7Gbps)
  - 1,2,4 Video Lane
- HDMI V1.3C
  - True 30 bits color depth output
  - Support xvYCC & sYCC, Adobe RGB, Adobe YCC color space
  - Support CEC Function
  - Built-in Lip Sync test pattern
  - Digital audio output
  - 3 HDMI outputs to provide individual HDCP Enable/Disable
- DVI pixel rate 330MHz (dual channel)
- DVI Dual HDCP test application support
- DVI, HDMI & DisplayPort with HDCP output
- Support HDCP V1.0 (DVI) / V1.2 (HDMI) / V1.3 (DisplayPort)
- Y, Pb, P r / Y, Cb, Cr / Y, R-Y, B-Y output
- S-Video / CVBS / SCART / RGB / color component / D-terminal output
- NTSC/PAL/SECAM TV signal
- Support Closed caption / V-Chip / Teletext
- Built-in low low-distortion audio output (2ch/8ch)
- Easy-to-use audio hot key
- EDID read/write/compare
- USB (Host & Device)
- User key (up to 32 continuous actions can be combined)

Chroma 2333-B is a high value-added test equipment that can meet the diversified demands for multi-media displays. It has high resolution test quality and multiple output types that can support comprehensive tests for large-scale application in the field of R&D, quality assurance and mass production.

Chroma 2333-B combines Analog / DVI / HDMI / DisplayPort / SDTV / HDTV signals that can satisfy the needs for testing various signals from multi-media displays.

For digital signal: The TMDS output with pixel rate 25~330MHz that supports the dual channel HDCP test is able to fit in the high bandwidth test requirements under 120Hz screen refresh rate.

xvYCC ANALOG DVI Dual HDCP

NTSC/PAL SECAM | Close Caption | Teletext | V-Chip | SDTV | HDTV | Ture Color | Multi-Port

For HDMI output: The 2333-B provides higher speed bandwidth and color depth. It supports 24,30 bits (RGB or YCbCr) and the new generation color standards xvYCC, sYCC, Adobe RGB and Adobe YCC to attain truly natural color and high resolution image screen.It also supports complete CEC and Lip Sync tests.

DisplayPort is the new video output interface promoted by Video Electronics Standards Ass ociation; VESA. It is an open and extendable interface standard for display devices. Its maximum transmission bandwidth is up to 10.8Gb/s. With the official certification of VESA, Chroma 2333-B is able to provide the consistency and integrity signals in highest standard.

DisplayPort is composed of main channel, auxiliary channel and hot swap (HPD) 3 types of signals. The main channel is made by 4 lanes (1, 2, 4 Lane) and each lane supports 2.7Gbps or 1.62Gbps transmission rate. The parameters can be adjusted automatically via DPCD connection and complete the test procedure in sequential.

For TV output, the image and chromaticity signals are complying with the NTSC, PAL and SECAM standards. Also, the tests for special TV functions such Closed Caption, V-chip and Teletext are supported.
To fulfill the application of multi-port output test, Chroma 2333-B has built-in 3 HDMI, 2 DisplayPort and 2 SCART ports that can finish testing the displays with multi-port in the fastest speed and reduce the test time in a great deal.

Various test patterns and timing parameters are built-in Chroma 2333-B for operation. Shortcuts are provide for Timing/Pattern/Program/Audio to simplify the settings. The test program edited by the user on PC can be downloaded to Chroma 2333-B directly for storage and recall next time.

Moreover, for the function keys used frequently a special User Key is designed to combine these functions. Up to 32 keys can be memorized for continuous actions and executed by a single key. Besides the panel operation, remote control can be enabled with a remote controller for users to operate the device more easily.



Model 2333-B Rear View

ORDERING INFORMATION

2333-B : Video Pattern Generator
Analog 250MHz/DVI 330MHz/HDMI 165MHz (TMDS Rate 225MHz)/DisplayPort 270MHz
A240001: Remote Controller

All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	4096 x 2160
Pixel Rate Range	0.5~250MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green / Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	32~8192 pixels / 1 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	D-SUB: Hs (Xs), Vs
VIDEO FORMAT	
Video Output	R, G, B / RS-343A / RS-170 / VESA (VSIS)
	Y, R-Y, B-Y
	Y, Cb, Cr / ITU 601
	Y, Pb, Pr / ITU 709, RP 177, SMPTE 240M
	DDC II B (D-SUB)

DVI (TMDS) OUTPUT	
Pixel Rate Range	25 < 1 link ≤ 165MHz/165 < 2 link ≤ 330MHz
E-EDID	Read / Write / Compare / Edit
HDCP Support	HDCP V1.0 (with Dual Mode)
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

HDMI VIDEO OUTPUT	
Version	HDMI V1.3C(with 24,30 bit deep color/xvYCC/CEC/ Lip Sync)
Pixel Rate Range	25 ~ 165 MHz (TMDS CLK : 225MHz)
Support HDMI Timing	77 Timing(CEA-861D)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 / 10 @RGB & YCbCr
Color Space	RGB/ITU-R BT.601/ITU-R BT.709/xvYCC (IEC61966-2-4) /sYCC 601/Adobe RGB/ Adobe YCC 601
HDCP Support	HDCP V.1.2
EDID	Read / Write / Compare / Edit
HDMI AUDIO OUTPUT	
Sample Rate	32,44.1,48,88.2, 96,176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16 / 24 bit
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS / -138.4 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	10Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

DISPLAYPORT OUTPUT	
Version	DisplayPort 1.1a
Pixel Rate Range	25~270MHz
Video Signal Type	RGB/YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Color Depth Transmission	6/8/10 bits per component
HDCP	HDCP V1.3
DPCD	Read / Write
Main Link Data Rate	2.7Gbps or 1.62Gbps per lane
Lane Count	1/2/4 Lanes
Audio	2 Channel (L-PCM)-Internal
Bit Per Sample	24bit
Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192KHz

TV OUTPUT									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/4.25	MHz
Subcarrier Stability	±50								Hz
Video Output	S-Video, RCA								
	Burst On/Off (NTSC, PAL)								
	Contrast programmable								
	Brightness programmable								
	Saturation programmable								
	Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4/ T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8 ans+, 13 ans+, 16 ans+, 18 ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

AUDIO (ANALOG) OUTPUT	
Number of Channel	2 Channel (R / L)
Sample Rate	32, 44.1 , 48 , 88.2 , 96 , 176.4 , 192KHz
Level Resolution	10mV / Step
Level Range	0V to 2V (at 600 Ohms Load)
Frequency Range	10Hz to 20KHz / 10Hz Step
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

DATA STORAGE DEVICE	
Default	2000 timings + 2000 patterns
Internal Memory	3000 timings + 3000 patterns + 1000 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN}, 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION	
2333-B (H x W x D)	88 x 350 x 350 mm / 3.46 x 13.78 x 13.78 inch
WEIGHT	
2333-B	4.5 kg / 9.9 lbs

All specifications are subject to change without notice.



Analog	**165MHz**	
DVI(TMDS)	**165MHz**	**(2402)**
HDMI V1.3b	**165MHz**	**(2402)**
(TMDS Rate	**225MHz)**	

KEY FEATURES

- Analog pixel rate 165MHz
- Analog output with DDC
- 2K x 2K Graphic size
- NTSC / PAL / SECAM signal (Model 2401)
- Closed Caption function (NTSC) (Model 2401)
- V-Chip function (NTSC) (Model 2401)
- Teletext function (PAL) (Model 2401)
- S-Video / CVBS / SCART / RGB Color Component / D-Terminal (Model 2401)
- Bi-level SDTV format (Model 2401)
- Tri-level HDTV Format (Model 2401)
- DVI pixel rate 165MHz (Model 2402)
- HDMI V1.3b (with xvYCC) (Model 2402)
- DVI & HDMI with HDCP output (Model 2402)
- Y, Pb, Pr/ Y, Cb, Cr/ Y, R-Y, B-Y output (Model 2401)
- PC remote control
- User Define Key
- Built-in variety of video timings & patterns
- Scrolling Pattern
- USB interface
- High Capacity Memory
- ESD protection circuit
- Economy

Along with the rapid development of LCD TV industry, all manufacturers are facing the competition of producing high value added and low cost products; and seeking for a total test solution to meet their needs has become the first priority.

Chroma 2401/2402 Video Pattern Generator with the features described below is specially designed to fit in the requirements and application of production line for LCD-TV manufacturers.

(1). Lightweight Design : The size of Chroma 2401/2402 VPG is close to A4 that is portable and handy for various kinds of spaces or locations.

(2). Exclusive Signals : The mapped international standard signal sources are provided for diverse Video signals requirements such as the requisite TV and monitor that are applied in the configuration of production line planning and test workstation.

(3). Convenient & Rapid Function : The test programs created in advance increase the production efficiency; in addition for the frequently used function keys, users can edit the User KEY to work with compound functions in specific test to save the test time.

(4). USB Interface : The convenient USB interface can use USB Disk on PC to edit test programs, patterns and even to upload or download the upgrade programs to 2401/2402 to reduce engineer's workload in setup and management.

(5). Large Capacity : It has built in large capacity of storage memory that allows users to swap and save for different UUT without backup or download.(1000 TIMINGS and PATTERNS, 500 PROGRAMS)

(6). Abundant Test Patterns : It includes standard static, dynamic and pattern screens to check the characteristics response, white balance and residual of UUT. Also it can use PC to create the test patterns required.

(7). Extended Control : The default extended function on the front/rear panel is able to add remote control device or output control device for on-line link automatically.



Model 2401 Rear View

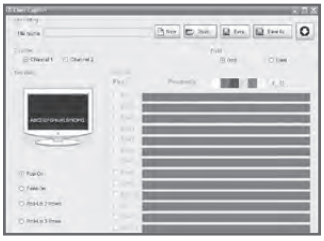


Model 2402 Rear View

ORDERING INFORMATION

2401: Video Pattern Generator
Analog 165MHz/TV/HDTV
2402: Video Pattern Generator
Analog 165MHz/DVI 250MHz/HDMI 165MHz
(TMDS Rate 225MHz)
A240001: Remote Controller

Software - Model 2401



Closed Capation Screen

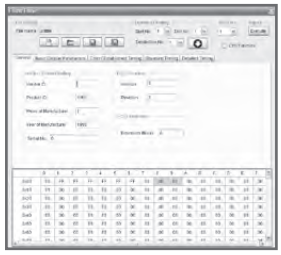


User Key Screen

Software - Model 2402



InfoFrame Screen



E-EDID Screen

All specifications are subject to change without notice.

SPECIFICATIONS

ANALOG OUTPUT	
Display Size	2048 x 2048
Pixel Rate Range	0.5~165MHz
Video Level	R,G,B (75 ohms) 0~1.0V programmable
Sync on Green / Level	0~0.5V On/Off programmable
White Level	0~1.2V programmable
Black Level	7.5 IRE / 0 IRE selectable
HORIZONTAL TIMING	
Total Pixels	64~8192 pixels / 2 pixels resolution
VERTICAL TIMING	
Total Pixels	4~4096 lines (non-interlace) / 1 line programmable 4~2048 lines (interlace) / 1 line programmable
COMPOSITE SYNC	H+V, H EXOR V, Equalization & Serration Pulse
SEPARATE SYNC	Hs(Xs), Vs
VIDEO FORMAT	
Video Output	R, G, B / RS-343A
	Y, R-Y, B-Y
	Y, Cb, Cr / ITU 601
	Y, Pb, Pr / ITU 709, RP 177, SMPTE 240M
	DDC II B

HDMI VIDEO OUTPUT (Model 2402 only)	
Version	HDMI V1.3b (with xvYCC)
Pixel Rate Range	25 ~ 165 MHz (TMDS CLK : 225MHz)
Support HDMI Timing	77 Timing(CEA-861D)
Pixel Repetition	4
Video Signal Type	RGB or YCbCr
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Bits per Component	8 bits (1024 color)
Color Space	RGB / ITU-R BT.601 / ITU-R BT.709 / xvYCC
HDCP Support	HDCP V.1.2
EDID	Read / Write / Compare / Edit
HDMI AUDIO OUTPUT	
Sample Rate	32,44.1,48,88.2, 96,176.4, 192KHz
Number of Channel	8 Channel (FL/FR/RL/RR/FC/LFE/RLC/RRC)
Bits per Sample	16
Waveform	Sine wave
Amplitude	-90.3 to 0.0 dBFS
Frequency Range	10Hz to 20KHz
Frequency Resolution	10Hz / Step
External Audio Input	Optical and Coaxial (S/PDIF)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

DVI (TMDS) OUTPUT (Model 2402 only)	
Pixel Rate Range	25< 1 link ≤ 165MHz (256 color)
E-EDID	Read / Write / Compare / Edit
HDCP Support	HDCP V1.0
Compliant	DVI 1.0 specification
Video Signal Type	RGB
Sampling Mode	4:4:4

TV OUTPUT (Model 2401 only)									
Output Mode	NTSC		PAL					SECAM	
Subcarrier Frequency	443 4.43	M,J 3.58	BDGHI 4.43	M 3.57	60 4.43	N 4.43	Nc 3.58	4.41/4.25	MHz
Subcarrier Stability	±50								Hz
Video Output	Composite (RCA), S-Video								
	Burst On/Off (NTSC, PAL)								
	Contrast programmable								
	Brightness programmable								
	Saturation programmable								
	Hue programmable								
Closed Caption Support (NTSC)	C1, C2, C3, C4/ T1, T2, T3, T4								
V-CHIP (NTSC)	MPAA Rating : G, PG, PG-13, R, NC-17, X								
	FCC Rating : TV-Y, TV-Y7, TV-G, TV-PG, TV-14, TV-MA								
	Canada English Rating : C, C8+, G, PG, 14+, 18+								
	Canada French Rating : G, 8 ans+, 13 ans+, 16 ans+, 18 ans+								
Teletext (PAL)	Teletext System B Level 1 , 1.5								

SDTV / HDTV FORMAT (Model 2401 only)					
Timing	Progressive Mode Frame Rate (Hz)		Interlace Mode Frame Rate (Hz)		Standard
720 x 483	59.94P	60/1.001			SMPTE 293
			59.94I	59.94/2	ITU 601 SMPTE 170M
720 x 576	50P	50			ITU 1382
			50I	25	ITU 601
1920 x 1080	60P	60	60I	30	SMPTE 274
	59.94P	60/1.001	59.94I	30/1.001	SMPTE 274
	50P	50	50I	25	SMPTE 274
	30P	30			SMPTE 274
	29.97P	30/1.001			SMPTE 274
	25P	25			SMPTE 274
	24P	24			SMPTE 274
	23.98P	24/1.001			SMPTE 274
1920 x 1035			60I	30	SMPTE 240
			59.94I	30/1.001	SMPTE 240
1280 x 720	60P	60			SMPTE 296
	59.94P	60/1.001			SMPTE 296
	50P	50			SMPTE 296

AUDIO (ANALOG) OUTPUT	
Frequency Range	50Hz~20KHz
Waveform	Sine wave
Number of Channel	2 Channel (R / L)
Level Range	0V to 2V (at 600 Ohms Load)
Special Control Mode	Tone / Sweep / Mute / Repeat / Play Time

DATA STORAGE DEVICE	
Default	1000 timings + 1000 patterns
Internal Memory	1000 timings + 1000 patterns + 500 programs
External Memory	USB Host interface
OTHERS	
AC Input	1Ø 100~240V ±10% V_{LN} 47~63Hz
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
DIMENSION	
2401 (H x W x D)	88 x 320 x 240 mm / 3.46 x 12.6 x 9.45 inch
2402 (H x W x D)	88 x 320 x 240 mm / 3.46 x 12.6 x 9.45 inch
WEIGHT	
2401	3.2 kg / 7.05 lbs
2402	3.1 kg / 6.83 lbs



KEY FEATURES

- Modular design
- HDMI 2.0 Signal module (Option)
  - Comply with HDMI 2.0 standard
  - 4K x 2K 60/50Hz
  - Pixel rate support up to 600MHz (6Gbps TMDS rate)
  - RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2 or 4:2:0
  - HDCP 1.4 / 2.2
  - CEA-861-F timing
  - 24 / 30 / 36 color depth
  - ARC (Audio Return Channel)
  - sYCC601 / Adobe RGB / Adobe YCC601 / xvYCC / ITU-R BT.2020
- DisplayPort Signal module (Option)
  - Comply with DisplayPort 1.2a standard
  - 4K x 2K 60/50Hz
  - Pixel rate support up to 600MHz
  - 1.62 / 2.7 / 5.4Gbps per lane
  - 1 / 2 / 4 Link
  - 2 Channel (L-PCM)
- EDID Read / Write / Compare / Analyze
- Scrolling function
- Built in China high-definition / 3D / 4K test pattern
- User Define Key(32 Key max)
- One-touch function keys
- Front panel USB and control interface
- Graphical software user interface
- ESD protection circuit

Chroma 2403 programmable video pattern generator is the perfect instrument for digital video signal interface testing. It provides users with a high performance-low cost test solution. The built-in high speed graphic engine is able to provide standard test signals and patterns for display devices with various resolutions to meet the requirements of multimedia display industries today and in the future for R&D and test applications.

The Video Pattern Generator supports the up-to-date high resolution multimedia digital audio and video transmission interface HDMI and DisplayPort specification with the following features:

Supports 4K x 2K 60Hz

2403 is built-in with a high speed graphic engine. The output signal can reach up to 600MHz. It supports UHD(Ultra High Definition) 4K x 2K@60Hz ultra high resolution displays testing.

Modulized Signal Interface Design

The modulized design output interface has 2 signal module terminals for users to choose from based on their testing needs. The modules support multi-signal terminal synchronized output capability which meet the multi-input terminals displays testing.

HDMI 2.0 Testing Function (HDMI module)

Supports HDMI 2.0 standard 6Gbps TMDS signal output (TMDS rate) and HDCP1.4 / 2.2 Supports 24 / 30 / 36 bits color depth (RGB / YCbCr) and HDMI 2.0 standard YCbCr 4:2:0 sampling format output and at the same time provides high resolution color standard ITU-R BT2020 and HDCP 2.2 / ARC (Audio Return Channel) / CEC / EDID testing functions.

DisplayPort 1.2a Testing Function (DP module)
Supports DisplayPort 1.2 standard HBR2(High Bit Rate 2, 5.4Gbps) bandwidth transmission up to 4K x 2K 60Hz . Also supports audio transmission and 3D/EDID testing functions.

Hot Key Function

Default or user-defined testing program can help to increase manufacturing efficiency. Chroma 2403 is built-in with abundant timing and pattern, including standard static, motion and scrolling pattern. It supports the testing of the displays' performance.The modulized signal interface design can be flexibly choose from based on testing application. The VPG Master supports programmable timing, pattern and program. Its user-friendly interface is suitable for R&D, production and QA verification.



Model 2403 Rear View

ORDERING INFORMATION

2403: Video Pattern Generator
A240001 : Remote Controller
A240301 : HDMI signal module
A240302 : DisplayPort signal module

2403 Main Frame	
Display Size	4096 x 2160
Horizontal Timing	
Total pixel	32~8192 pixels / 1 pixels resolution
Vertical Timing	
Total line	4~4096 lines (non-interlace) / 1 line programmable 4~2048 lines (interlace) / 1 line programmable

Data storage device	
Default	1000 timings + 1000 patterns (Depend on signal module)
Internal Memory	1000 timings + 1000 patterns + 500 programs
External Memory	USB Host interface
Other	
AC Input	100-240V , 50~60Hz , 1A Maximum
Operation/Storage Temp.	+5~+40 deg.C / -20~+60 deg.C
Humidity	20~90 %
2403 (HxWxD)	320x240mm / 3.46x12.6x9.45inch
Weight	3.1kg / 6.83 lbs



A240301 : HDMI signal module

HDMI Signal Module A240301	
Version	HDMI 2.0 x 4ch (3D / ARC / CEC)
Pixel Rate Range	25 ~ 600 MHz (TMDS rate 600 MHz)
Support HDMI Timing	125 Timing (CEA-861F)
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2 or 4:2:0
Color depth	24 / 30 / 36 bits per pixel
Color Space	RGB / ITU-R BT.601 / ITU-R BT.709 / xvYcc / sYcc601 / Adobe RGB / Adobe sYcc601 / ITU-R BT.2020
EDID	Read / Write / Compare / Edit / Analysis
HDCP	HDCP 2.2 / 1.4 (Automatic selection)
Audio	8 Channel (16 / 24 bit)



A240302 : DisplayPort signal module

DisplayPort Signal Module A240302	
Version	DISPLAYPORT 1.2a x 2ch
Pixel Rate Range	25 ~ 600 MHz
Main Link Data Rate	1.62 / 2.7 / 5.4Gbps per lane
Lane Count	1 / 2 / 4 Lanes
Sampling Mode	RGB 4:4:4 / YCbCr 4:4:4 or 4:2:2
Color depth	6 / 8 / 10 / 12 bits per component
HDCP	HDCP 1.3
Audio	2 Channel (16 / 24 bit)

All specifications are subject to change without notice.



KEY FEATURES

- One HDMI Source to connect up to 4 displays
- Support Full-HD 1080P resolution
- Compliant with HDMI V1.3
- Compliant HDCP V1.2
- HDCP Key sets allows each output independently
- Control by Smart I/O interface
- DDCIIB Plug & Play Function
- Distributor / Multiplexer Mode selection
- ESD protection
- Low cost

Chroma A222907 HDMI Distributor has HDMI signal output interface that can work with the Video Pattern Generator of Chroma to perform extended tests for HDMI signals.

This distributor has 1-In/4-Out HDMI ports that comply with the HDMI 1.3 standards to support the tests for the newest HDMI 1.3 functions.

In addition, Chroma A222907 is equipped with Distributor and Multiplexer modes that each output port can set the HDCP/EDID to be enabled or disabled concurrently or separately to facilitate the user's tests greatly.

Supporting most of CEC features which are used to communicate with HDMI network. Chroma A222907 can also output 4 CEC commands simultaneously to reduce user's test time. Depends on the showing response message from A222907 on the screen, users can verify the CEC function immediately.

In order to comply with the multi-port input design of digital FPD industry, this distributor adopts external connection with handy compact size to ease the use in variety of production lines and R&D labs.

Chroma A222907 has dynamic message function which can display HDCP key data and EDID content of TV and help users to check the data correctness.

This distributor is applicable for the Signal Generators with Smart I/O manufactured by Chroma to extend and expand the HDMI signals for various applications such as the long distance transmission of serial production line or parallel usage in demonstration room and etc. In the meantime, its special output design can be used to protect the back-end of a signal generator.

HDMI Distributor Application 1 for single unit

One A222907 has 4 outputs to test all of the HDMI ports (maximum 4) on the display directly.

HDMI Distributor Application 2 for single unit

One A222907 can output signals to 4 displays to test the EDID & HDCP functions and interpret the data separately or concurrently.

HDMI Distributor Application 3 for multiple units

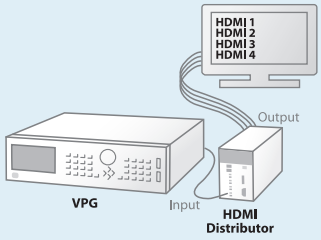
Multiple A222907 can be connected in series to test even more displays for the series-parallel application of multiple devices.

HDMI Distributor Application 4 for CEC feature

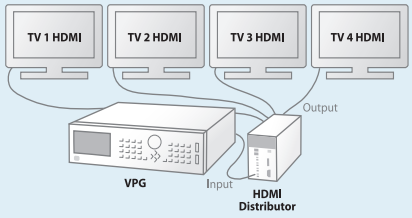
One A222907 can output features to 4 different displays to test CEC function of TV independently.

HDMI DISTRIBUTOR APPLICATIONS

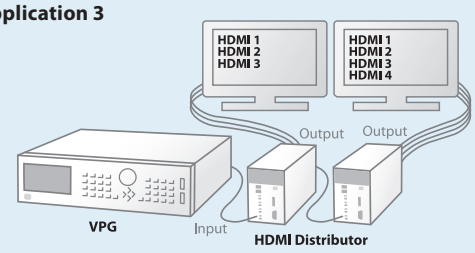
Application 1



Application 2



Application 3



SPECIFICATIONS

Output		
Signal Format		TMDS signal Link
Video Signal	Pixel Rate	25 to 165 MHz (TMDS CLK : 225MHz)
	Color Space	RGB, ITU-601, ITU-709, xvYcc
Audio Signal	Sampling Frequency	32 to 192 KHz
	Number of Channels	8 Channel
ESD / Surge protect (IEC 61000-4-2 Level 4 Regulation)		Contact 8KV / Air 15 KV
HDMI / HDCP		
HDMI Version		Version 1.3a
HDCP Version		Version 1.2
DDC		DDC2B compliant
E-EDID		Version1.3
Connector		
Input Signal Source from Chroma VPG Series		Equipped with Smart I/O port in 22xx / 23xx Series
HDMI		HDMI 19 Pin x5
Smart I/O		3 In 3 Out x1
CEC		
Support Feature		One touch play
		System standby
		OSD Display
		Set OSD Name
		Give power status
		Audio control
Front Control Mode		
Remote Mode		Control by VPG or Manual
Manual Mode		Output ON / OFF, or selection
Other		
User Interface		Smart I/O
DC Input		9V/2A (With Chroma adapter only)
Temperature	Operation	+5~+40 deg.C
	Storage	-20~+60 deg.C
Humidity		20~90%
DIMENSION & WEIGHT		
A222907 (H x W x D)		88 x 45 x 200 mm / 3.46 x 1.77 x 7.87 inch 750g / 1.65lbs



KEY FEATURES

- Compliant with MHL 2.0 standard
- MHL pixel rate support up to 150MHz
  - 1080p 60Hz
  - 3D format
- Cbus (RCP) test function
- Vbus test function
  - Active load 500/900mA
  - Voltage & current measurement
- EDID / HDCP linking test
- Test result on screen display
- 8 channel audio
- 2 MHL ports output
- 2 HDMI ports output
- ESD protection
- High cost-performance value
- Compliant with chroma 22/23/24 series

Chroma A222908 MHL module is a test equipment that supports the Mobile High-definition Link (MHL™) signal, which is able to work with the Chroma Video Pattern Generator for extending MHL signal output, in order to provide the solutions for display industry.

The A222908 supports the specification of MHL v2.0 which can expand 1 set of HDMI signal to 2 sets of MHL signal and HDMI signal. Its main features are as the following.

Standard MHL Signal Output

It provides two sets of standard MHL signal output that supports up to 1080P 60Hz (PackedPixel mode) and 8-channel audio signal transmission.

3D standard Format Signal Output

Supporting MHL defined 3D format (Frame packing / Top-and-Bottom / Left-Right) that works with the 3D Video Pattern Generator of Chroma to output 3D test pattern for 3D display application.

Multiple Signal Port Output function concurrently

The A222908 is equipped with signal output function of 2 sets of MHL and 2 sets of HDMI simultaneously that comply with multiple input port display test application nowadays.

HDCP/EDID Test Function

Working with the Video Pattern Generator of Chroma that can display HDCP and EDID test results on the test pattern for getting quick testing function.

Cbus Test Function

MHL specification provides Remote Control Protocol (RCP) to support RCP display for users control smart phone via the remote controller to select the film to be viewed and perform control functions of play, fast forward or rewind. Chroma A222908 works with the Video Pattern Generator of Chroma to provide RCP detection function and fast judge remote control function of MHL display.

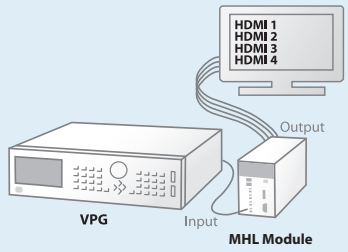
Vbus Measurement Function

Working with the Video Pattern Generator of Chroma that can provide MHL Vbus voltage measurement function. Fast judge Vbus function by reading the measured voltage and current value on the test pattern.

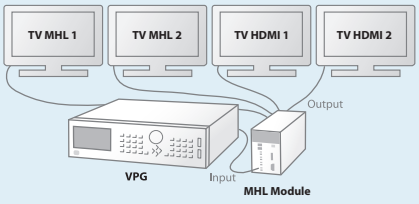
In the aspect of operation, the A222908 provides users simple and rapid setting management, easy operation interface and complete test function via Chroma control editing software (VPGMaster, need work with the Video Pattern Generator of Chroma). It is applicable for research and development, production test and quality verification application of all MHL related video industry.

MHL MODULE APPLICATIONS

Application 1



Application 2



SPECIFICATIONS

MHL Video Output	
Version	MHL v2.0
Pixel rate	25 ~ 150MHz
Color space	RGB / YCbCr
HDMI Video Output	
Version	HDMI v1.4
Pixel rate	25 ~ 165MHz
Color space	RGB / YCbCr
MHL / HDMI Audio Output	
Sample Rate	32, 44.1, 48, 88.2, 96, 176.4, 192KHz
Number of Channel	8 Channel
MHL Function	
Vbus test	Voltage / Current
Message Display	Cbus (RCP) / Device Capability / HDCP / EDID
Connector	
MHL	Micro USB 5 pin x 2
HDMI	HDMI TYPE A 19 Pin x3 (Input x 1 / Output x 2)
SMART I/O	Smart I/O x 1
Others	
DC Input	12V / 2.5A (With Chroma adapter only)
Temperature(Operation/Storage)	+5~+40 deg.C / -20~+60 deg.C
Humidity	20 ~ 90%
Dimension & Weight	
A222908 (HxWxD)	88x45x200mm / 3.46x1.77x7.87 inch
	750g / 1.65lbs

All specifications are subject to change without notice.



KEY FEATURES

- Convert HDMI signal to SDI signal output
- Support 48K Audio output
- SDI Output x 2
- SYNC Output x 1
- Comply with SDI Standard (SMPTE)
  - SD-SDI : SMPTE-259M
  - HD-SDI : SMPTE-274M / 296M
  - 3G-SDI : SMPTE-425M (Level A/B)
- SD/HD/3G format auto identification
- Control by Smart I/O interface
- ESD protection
- Low cost

Chroma A2229015 SDI Module is specially designed to meet the test demands of diversified low cost SDI signals for today's display industry. It has extended specifications and functions when integrated with the main VPG test device that creates the SDI signal products for applications in broad domain.

CE

It is an HMDI to SDI Adapter that can be controlled by Smart I/O. With the combination of Chroma VPG with A222915, the external module can be connected to Chroma VPG easily for various SDI tests.

Chroma A222915 has equipped with the latest 3G-SDI standard resolution which is the mainstream specification of all 1080P transmission. It can double the HDTV transmission rate in the advanced video environment, also enhance the overall broadcasting quality in the transmission network.

The industries of Chroma A222915 applied extensively include the distributed amplifier, video router and the serial connection interface of switch, camera and other devices. The SDI can use a 75Ω coaxial cable to transmit the uncompressed digital video signal within long distance range in a TV studio or a place with related equipment to achieve the high quality HD playback.

For peripheral industry, the display related customer can involve the SDI test requests directly to the application of LED TV wall, projector, outdoor large-scale display and broadcasting hardware.

In the meantime, its simple design is applicable for all SDI multimedia tests in practical use including R&D, manufacturing test and quality assurance, especially the mass production for rapid verification and assessment.

Moreover, Chroma A222915 uses HDMI as the signal input source and 2 sets of SDI can output at the same time. SD-SDI/ HD-SDI/3G-SDI supports 2CH / 8CH - 48khz Audio output that can work with VPG to test various standard static and dynamic images.

To cope with the design of multi-port inputs for the FPD in this digital age, the SDI module is developed to connect externally and in compact size to be used flexibly in any site of production line and laboratories.

SPECIFICATIONS

PIXEL RANGE				
Input : HDMI Signal		HDMI Ver1.0 ~ 1.3 (2.25Gbps)		
Output : SDI Signal		SD/HD/3G SDI SMPTE 259M/274M/296M/425M (Up to 2.97Gbps)		
Connector				
Input Signal Source from Chroma VPG Series		Equipped with Smart I/O port in 22xx / 23xx Series		
HDMI		Input : HDMI 19 Pin x1		
SDI		Output : BNC x2		
SYNC		Output : BNC x1		
ESD / Surge protect (IEC 61000-4-2 Level 4 Regulation)		Contact 8KV / Air 15 KV		
TIMING LIST				
Output format	Bit rate	Standard	Video format	
SD-SDI	270Mbps	SMPTE-259M	NTSC	720x480/59.94i
			PAL	720x576/50i
HD-SDI	1.485Gbps	SMPTE-274M	1920x1080p	30/29.97/25/24/23.98
			1920x1080i	60/59.94/50
		SMPTE-296M	720p	60/59.94/50
3G-SDI	2.97Gbps	SMPTE-425M (Level A)	1920x1080p	60/59.94/50
			1920x1080i	60/59.94/50
			1920x1080psf	30/29.97/25/24/23.98
		SMPTE-425M (Level B)	1920x1080p	60/59.94/50
Other				
User Interface		Smart I/O		
DC Input		9V/2A (With Chroma adapter only)		
Temperature	Operation	+5~+40 deg.C		
	Storage	-20~+60 deg.C		
Humidity		20~90%		
DIMENSION & WEIGHT				
A222915 (H x W x D)		88 x 45 x 200 mm / 3.46 x 1.77 x 7.87 inch 750g / 1.65lbs		



KEY FEATURES

- TV / Monitor PCBA test system
- VESA / JEIDA data mapping
- LVDS 2 channel input / output
- LVDS 6 / 8 / 10 bits
- LVDS pixel rate
  - 1 Link up to 135MHz
  - 2 Link up to 270MHz
  - 4 Link up to 540MHz (A222917 x 2)
- Timing / pattern / audio compare
- LVDS Vdd measurement
- DC voltage measurement
- PWM frequency / duty cycle measurement
- Bidirectional digital control
- Speaker / headphone audio input
- Optical / Coaxial audio input (SPDIF)
- EDID / HDCP test (with VPG)
- IR transceiver control (Option)
- ESD protection
- Modular design
- High Cost-performance value

Chroma A222917 is a multi-functional PCBA main board signal test device for display. It has ultra high speed LVDS (Low-voltage differential signaling) as image signal analysis core to provide high efficiency and stability test quality. It can form a PCBA automatic test system when integrated with the newest generation of Chroma 22XX Series Video Pattern Generator (*1) that can meet the requirements for testing the PCBA main boards automatically in present and future multi-media display industries.

The A222917 Pattern Analyzer supports various audio and video automatic testing functions for PCBA production line. The features include:

High speed LVDS video pattern standard format signal analysis interface that supports VESA and JEIDA standard with 6 / 8 / 10 color depth testing selection. The LVDS signal frequency supports up to 270MHz in Dual link mode and is able to output simultaneously during analysis so that the user can connect the panel to do screen inspection.

LVDS timing analysis

Timing analysis can be done via various detail parameters including pixel rate, horizontal and vertical timing, which can be used easily to judge if the LVDS transmission channel is correct.

Image comparison

It replaces the traditional artificial screen inspection with high speed image comparison core to do a series of comparison on each frame. The user can set the frame numbers and maximum 32 comparing blocks in each frame for comparison. It can also mark the error coordinates and inspection values for follow-up fixing latter.

Audio signal test
It has digital/analog audio signal amplitude and frequency test capability for the production line to test the audio signal interface function rapidly.

Digital control interface
It has 16 channels of bidirectional digital control interface and is able to set 3.3V or 5V interface voltage for automatic testing control or warning.

Voltage measurement module
Equipped with LVDS Vdd voltage and 8 DC voltage measurement modules, A222917 is able to measure the voltage for PCBA test points.

To achieve automated test application for PCBA production line, the A222917 Pattern Analyzer replaces the traditional screen inspection with automatic signal inspection device by programming the complex PCBA test procedures via software. Only one button is required for the actual production line inspection to complete related tests automatically. It saves the test time greatly and improve the test accuracy.

The A222917 has graphical test program editing software that gives the user an easy and fast way to manage and edit the test programs with the actual test items performed in production line. The easy-to-use operating interface and complete test functions are most applicable for all video and related industries when doing research and development, production test and quality assurance.

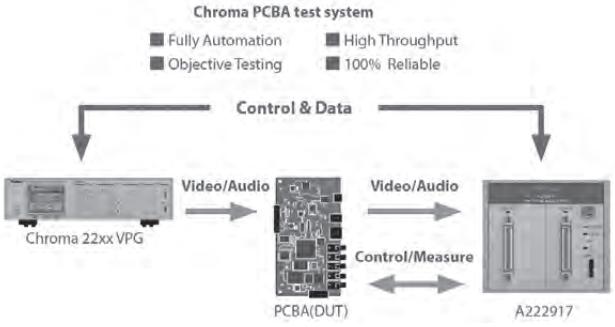
(*1) Support Model 22293-B/22294-A/2233-B/ 2234/2235

ORDERING INFORMATION

A222917 : Pattern Analyzer

CONFIGURATION





SPECIFICATIONS

LVDS In/Out	
Signal format	VESA / JEIDA
Color depth	6 / 8 / 10 bits
Link mode	1 link up to 135 MHz / 2 link up to 270MHz
Audio input	
Channel	2 Ch(LINE/COAX/OPTICAL) / 3 Ch(SPEAKER)
Amplitude	0 ~ 4 Vp-p(LINE) / 0 ~ 40 Vp-p(SPEAKER)
Frequency	20 Hz ~20 KHz
Digital I/O	
Voltage range	3.3V / 5V Selectable (Bidirectional)
DC voltage measurement	
Voltage range	0 ~ 20V
Connector	
LVDS	MDR 50 pin x 2
S/PDIF Input	Optical x1 / Coaxial x 1
Line in	Headphone Jack x 1
Speaker in	8 pin 2.5mm header x 1
Other	
DC Input	9V/2A (With Chroma adapter only)
Temperature (Operation/Storage)	+5~+40 deg.C / -20~+60 deg.C
Humidity	20 ~ 90%
Dimension & Weight	
A222917	88X100X200 mm / 3.46X3.94X7.87 inch (H x W x D) 1 kg / 2.2 lbs

All specifications are subject to change without notice.



USB Flash Disk | IIC | USB | RS-232 | CE

xyY | TΔuvY | u'v'Y | RGB | XYZ | FLVL | FMA | Contrast | Program

KEY FEATURES

- Luminance and chromaticity measurement of Color Display
- 0.005 cd/m² low luminance measurement (A712301)
- Wide range of luminance display:
  0.0001 to 25,000 cd/m² (A712301)
  0.01 to 200,000 cd/m² (A712302)
  0.01 to 6000 cd/m² (A712200)
- High accuracy measurement
- Maximum 9 display modes:
  xyY, TΔuvY, u'v'Y, RGB, XYZ, FMA(A712200), FLVL(A712200), Contrast, Program
- Support Contrast, JEITA and VESA for flicker measurements (A712200)
- Able to control Video Pattern Generator and UUT (Unit Under Test)
- Built-in contrast measurement function to calculate the contrast ratio directly
- Equipped with programmable test items that can complete the planned tests with one single button
- Support USB flash disk that can copy the test procedures to other station for use
- Judgment function embedded to judge the test result automatically with one single button
- Calibration period setting and reminding function
- Memory for storing 100 channels of standard color data and calibration data
- Built-in flat display calibration data LCD-D65 & LED-D65* to be applied for chromaticity measurement instantly
- Optional display white balance alignment system can be used to integrate all optical test stations to one single station

* It uses the typical fluorescent excited white light LED display

Chroma 7123 Display Color Analyzer adopts the design of contact and non-contact type measurements based on the probe selected to measure the luminance and chromaticity of display panels. Developed with the most advanced digital signal processor and the technology of optoelectronic transfer as well as precision optical parts and circuit design, the 7123 Display Color Analyzer is capable of performing high speed, accurate and stable color tests.

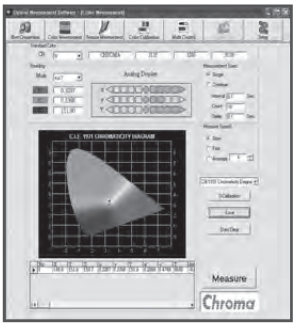
The configuration of Chroma 7123 complies with the color matching function sensor of CIE 1931 and CIE1976 UCS that can measure the luminance and chromaticity of display panel accurately. Users can switch to various types of chromaticity coordinates freely including xyY, TΔuvY, u' v' Y, RGB, XYZ, FMA (A712200), FLVL (A712200), Contrast and Program 9 modes in total. The A712301 that is designed to test the LCD characteristics with LED backlight is able to meet the low luminance test requirements of 0.005cd/m². In addition, the A712302, designed for small size display in particular can solve the problem of color analyzer measurement area larger than the display area with its 5mm measurement area.

To satisfy the needs for automation, the 7123 is equipped with the function to control the video pattern generator and the UUT without using a personal computer to cut down the acquisition and management cost. The 7123 also has the functions of contrast measurement, result judgment and programmable test items that can fulfill the auto test requirements to enhance the production efficiency.

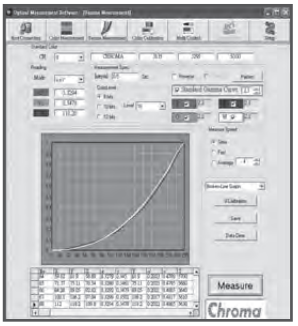
The Optical Measurement Software incorporated by Chroma 7123 is able to do chromaticity, luminance, Flicker (A712200) and Gamma measurements on PC, and then show the measured data on CIE 1931 and CIE1976 UCS chromaticity coordinate chart directly. Besides the function of drawing Gamma curve, the measured data can also be stored on PC and exported to EXCEL® for process. The example programs enclosed in optical measurement software allow users to develop the test programs that suit their needs.

Chroma 7123 Display Color Analyzer has 100 channels of built-in memory for storing the value of standard colors and calibrated data. In addition, Chroma 7123 also provides many friendly user interfaces for operation such as the way test data shows, the position set for push buttons, the positioning projector, USB and RS-232 interfaces for data transmission, calibration period setting as well as reminding function and etc. to satisfy the requirements for actual measures. Using the USB flash disk, the test procedures can be copied to other stations for use and reduce the time for repeated editing considerably.

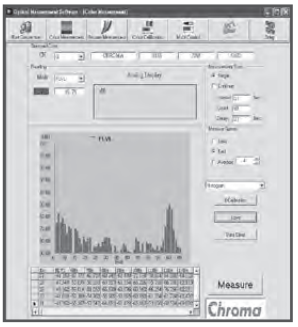
As the technology and products of flat displays have become the mainstream in the market today, every manufacturer is seeking for high value-added and low cost measurement solutions to raise its competitiveness; Chroma 7123 Display Color Analyzer is the excellent tool to assist in achieving that purpose.



Color Measurement



Gamma Measurement



Flicker Measurement

Software Development Kit (SDK)

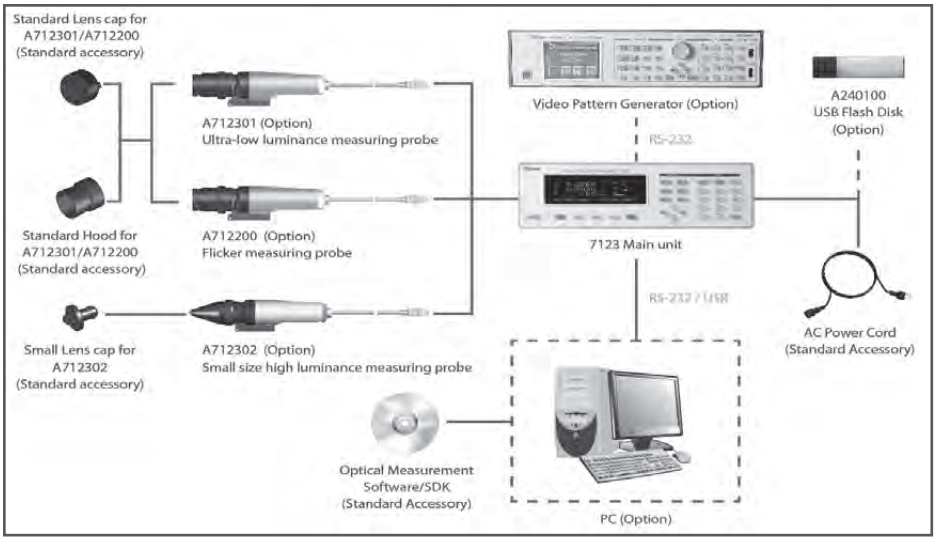
- Example Program:
  - Color Measurement
  - Color Calibration
  - Gamma Measurement
  - Multiple Control
- API Development Library

System Requirements

Operating System: Windows® XP/7

Windows® & EXCEL® are the registered trademarks of Microsoft in United States and other countries.

System Diagram



SPECIFICATIONS				
Model		**7123**		
Probe Model		A712301 (Ultra-Low luminance measuring probe)	A712302 (Small size high Luminance measuring probe)	A712200 (Flicker measuring probe)
Measurement Area		Ø27 mm / Ø1.06 inch	Ø5 mm / Ø0.20 inch	Ø27 mm / Ø1.06 inch
Measurement Distance		30±10mm	0~10mm	30±10mm
Acceptance Angle		± 2.5°	± 5°	± 2.5°
Display Range	Luminance	0.0001 to 25,000 cd/m²	0.01 to 200,000 cd/m²	0.01 to 6,000 cd/m²
	Chromaticity	4 or 3 digits display		
Luminance unit		cd/m² or fL, selectable via button on the front panel		
Display Mode	Digital	xyY ; TΔuvY; u' v' Y ; RGB ; XYZ ; Contrast; Program		xyY; TΔuvY; u' v' Y; RGB; XYZ; FMA; FLVL; Contrast; Program
	Analog	Δx Δy ΔY; ΔR ΔG ΔB; ΔR G/R B/R; R/G ΔG B/G		Δx Δy ΔY; ΔR ΔG ΔB; ΔR G/R B/R; R/G ΔG B/G;FMA
Luminance *1	Meas. Range	0.0050 to 6,000cd/m² (0.001 to 1751fL)	0.30 to 6,000 cd/m² (0.09 to 1751 fL)	0.10 to 6,000 cd/m² (0.03 to 1751 fL)
	Accuracy	0.0050 to 0.0199 cd/m² : ±0.0005cd/m² 0.020 to 0.099 cd/m² : ±4% ±2 digits 0.100 to 6,000 cd/m² : ±2% ±1 digit	0.30 to 6,000 cd/m² : ±2% ±1 digit	0.10 to 6,000 cd/m² : ±2% ±1 digit
	Repeatability	0.0050 to 0.0199 cd/m² : ±0.0003cd/m² 0.020 to 0.099 cd/m² : 1% + 2 digits(2σ) 0.100 to 0.999 cd/m² : 0.2% + 1 digit(2σ) 1.00 to 6,000 cd/m² : 0.1% + 1 digit (2σ)	0.30 to 2.99cd/m² : 0.2% +1 digit(2σ) 3.00 to 6,000 cd/m²:0.1%+1 digit(2σ)	0.10 to 0.99 cd/m² : 0.2% + 1 digit (2σ) 1.00 to 6,000 cd/m²: 0.1% + 1 digit (2σ)
Chromaticity *1	Accuracy	0.100 to 2.99 cd/m² : ±0.008 3.00 to 4.99 cd/m² : ±0.005 5.00 to 9.99 cd/m² : ± 0.003 10.00 to 6,000 cd/m² : ± 0.002	0.30 to 14.99 cd/m² : ± 0.008 15.00 to 119.9 cd/m² : ± 0.005 120.0 to 6,000 cd/m² : ± 0.003	0.1 to 2.99 cd/m² : ± 0.008 3.00 to 4.99 cd/m² : ± 0.005 5.00 to 9.99 cd/m² : ± 0.003 10.00 to 6,000 cd/m² : ± 0.002
	Repeatability	0.100 to 0.199 cd/m² : 0.015(2σ) 0.200 to 0.499 cd/m² : 0.008(2σ) 0.500 to 1.99 cd/m² : 0.003(2σ) 2.00 to 6,000 cd/m² : 0.001(2σ)	0.30 to 0.59 cd/m² : 0.015 (2σ) 0.60 to 1.49 cd/m² : 0.008 (2σ) 1.50 to 7.99 cd/m² : 0.003 (2σ) 8.00 to 6,000 cd/m² : 0.001 (2σ)	0.10 to 0.19 cd/m² : 0.015 (2σ) 0.20 to 0.49 cd/m² : 0.008 (2σ) 0.50 to 1.99 cd/m² : 0.003 (2σ) 2.00 to 6,000 cd/m² : 0.001 (2σ)
Flicker -Contrast Method(FMA)	Range	---	---	5 cd/m² or higher
	Display Range	---	---	0.0 to 100%
	Accuracy	---	---	±1% (Flicker frequency: 30 Hz AC/DC10 % sine wave) ±2% (Flicker frequency: 60 Hz AC/DC 10 % sine wave)
	Repeatability	---	---	1% (2σ) (Flicker frequency: 20 to 65 Hz AC/DC 10 % sine wave)
Flicker -JEITA/ VESA Method (FLVL)	Range	---	---	5 cd/m² or higher
	Display Range	---	---	6-240Hz
	Accuracy	---	---	±0.5dB (Flicker frequency: 30 Hz AC/DC10 % sine wave)
	Repeatability	---	---	0.3dB (2σ) (Flicker frequency: 30 Hz AC/DC 10 % sine wave)
Measurement Speed	xyY	Y:0.0050 to 0.0199 cd/m² : 1 time/sec (Low luminance Mode) Y:0.020 to 1.99 cd/m² : 4 times/sec. (Auto mode) ; 2.00 cd/m² and above: 15 times/sec.	0.3 to 7.99 cd/m² :1 time/sec. 8.00 cd/m² and above:15 times/sec.	0.1 to 3.99 cd/m² : 5 times/sec. ; 4.00 cd/m² and above: 15 times/sec.
	FMA	---	---	6 times/sec. (UNIV) ; 20 times/sec.(NTSC); 16 times/sec. (PAL)
	FLVL	---	---	0.5 time/sec.
Dimension		Ø 46 x 234.9(D) mm / Ø 1.81 x 9.25(D) inch	Ø 46 x 221.9(D) mm / Ø 1.81 x 8.74 (D) inch	Ø 46 x 234.9(D) mm / Ø 1.81 x 9.25(D) inch
Weight		0.5 kg / 1.1 lbs	0.5 kg / 1.1 lbs	0.5 kg / 1.1 lbs
Cord Length		2.5m / 98.43 inch		
Optical System		LED positioning function		
Main unit				
Memory Channel		100 Channels		
Sync Mode		NTSC, PAL, EXT, UNIV, INT		
Object Under Measurement		10~240 Hz		
Interface		USB(2.0), USB flash disk port, RS-232C (Baud rate max. 115200)		
Input Voltage Range		1Ø 110~240V ±10% V_{LN}, 47~63Hz, 50VA		
Operating Temperature/ Humidity Range		10°C to 30°C (50°F to 86°F); less than 75% relative humidity (with no condensation)		
Storage Temperature / Humidity Range		0°C to 40°C (32°F to 104°F); less than 75% relative humidity (with no condensation)		
Dimension (H x W x D)		115x320x260 mm / 4.5x12.6x10.2 inch		
Weight		2.7 Kg / 5.95lbs		
Other Functions		Customized light source calibration, memory channel ID storage, variable analog display range, display pause, remote control, comparison, video pattern generator and UUT control, programmable test item, test result judgment, calibration period setting and reminding function, USB flash disk supported. *2		
Certification		CE		

Note *1: Standard illuminant A is used for test according to Chroma's test condition.
***Reference standards:** IEC 61747-6, EIAJ ED-2522, ASTM E455-03, VESA Standard

Note *2: Only the USB flash disks certified by Chroma are supported.

ORDERING INFORMATION

7123 : Display Color Analyzer Main Unit
A712200 : Flicker measuring probe (with 2.5m signal cable)
A712301 : Ultra-Low luminance measuring probe (with 2.5m signal cable)
A712302 : Small size high luminance measuring probe (with 2.5m signal cable)
A712102 : Tripod (including a level gauge)

All specifications are subject to change without notice.

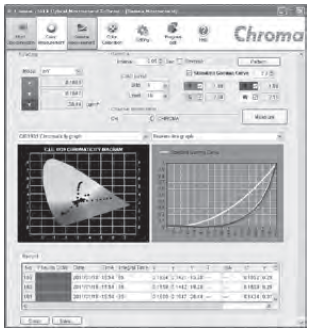


KEY FEATURES

- Use of spectrophotometric technique
- Suitable for laboratories and production lines
- Display luminance, chromaticity and spectral measurement
- 0.01 cd/m² low luminance measurement
- Wide range of luminance display: 0.01 to 2000 cd/m²
- Highly accurate measurement
- Up to 9 display modes: xyY, TΔuvY, u'v'Y, XYZ, λd/Pe, Spectral, Contrast, Program and User Define
- Wide view color LCD to facilitate the reading and operation
- Able to control the Video Pattern Generator and DUT
- Built-in contrast measurement for contrast ratio calculation
- Embedded with programmable test items to test the planned items with one key
- Support USB interface for data control and process
- Equipped with judgment function for production line to use easily
- Built-in calibration period setting and reminding function
- Able to connect external device for synchronized trigger function



Color Measurement



Gamma Measurement

Chroma 71611 Spectrocolorimeter is specially designed to meet the requirements of laboratory and production line by implementing the contact and non-contact measurement to test the luminance and color presentation of display panels. Developed with the most advanced digital signal processor and photoelectric conversion technology, Chroma 71611 is able to measure the color with high speed, accuracy and stability when integrated with precision optics and circuit design.

The spectrophotometric technique applied to 71611 can measure the display panel spectral precisely and calculate the luminance and chromaticity correctly. It is applicable for the displays in different technologies and solves the problem of measurement errors caused by the DUT (Device Under Test) spectral difference to save the time and cost from frequent calibrations. The user is able to change various display modes including xyY, TΔuvY, u' v' Y, XYZ, λd/Pe, Spectral, Contrast, Program and User Define. For the LCD with LED backlight, the 71611 has designed in particular to meet the 0.01cd/m² low luminance requirement.

The 71611 is able to control the Video Pattern Generator and DUT directly for automation without using a PC to save the cost of PC purchase and management. Moreover, there are functions of contrast measurement, result judgment and programmable test items to fulfill the needs of automated test and increase the production efficiency.

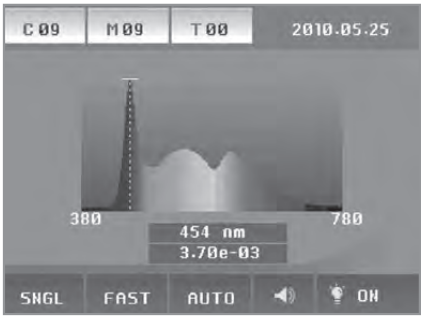
The optical measurement software 71611 uses is able to measure the chromaticity, luminance, spectral and Gamma on a PC, and show the data on the chromaticity coordinate of CIE 1931 and CIE1976 directly with Gamma curve drawing. It can also save the measured data to PC or import to EXCEL® for process. The program example of optical measurement software allows the user to develop a suitable test program fits the need rapidly.

The 71611 has 9 memories built in to store the standard spectral calibration data. In addition the 71611 has many user-friendly designs to comply with the user's requirements, such as the color display, the way test data displays, the button's position, the light positioning device, the USB and RS-232 data transmission interface, as well as the setting and reminding functions of calibration period. The supported USB flash disk drive can copy the test programs to other devices for use to save the time for repeat editing.

As the technology and products of flat panel display have become the mainstream of market, every manufacturer is in search of the solution for high value-added and low cost automated measurement. Chroma 71611 Spectrocolorimeter is the excellent tool to assist the FPD industry in improving the efficiency and the competitiveness.



Chromaticity Measurement



Spectrum Measurement



Test Result Judgment



Contrast Measurement



71611 Rear Panel

• Continued on next page ➟

All specifications are subject to change without notice.

Calibration Application



SPECIFICATIONS		
Model		**71611**
Wavelength		400~700 nm
Wavelength Resolution		0.3nm/pixel
Wavelength Interval		1nm
Spectral Accuracy		±0.3nm(average wavelength:546.1nm Hg lamp)
Acceptance Angle		±2.5°
Measuring Distance		30±10mm
Measuring Area		φ27mm
Luminance Unit		cd/m² or fL
Display Mode		xyY、T△uvY、u' v' Y、XYZ、λd/Pe、Spectral、Contrast、Program、User Define
Luminance *1	Range	0.01 to 2,000 cd/m² (0.003 to 583.8 fL)
	Accuracy	0.01 to 0.99 cd/m² : ±0.02 cd/m² ±1digit 1.00 to 2,000 cd/m² : ±2 % ±1digit
	Repeatability Accuracy	0.01 to 0.99 cd/m² : 0.01 cd/m² + 1digit (2σ) 1.00 to 7.99 cd/m² : 0.5 % + 1digit(2σ) 8.00 to 2,000 cd/m² : 0.1 % + 1digit (2σ)
Chromaticity *1	Accuracy	0.50 to 0.99 cd/m² : ±0.007 1.00 to 9.99 cd/m² : ±0.004 10.00 to 2,000 cd/m² : ±0.003
	Repeatability Accuracy	0.50 to 0.99 cd/m² : 0.003 (2σ) 1.00 to 1.99 cd/m² : 0.002 (2σ) 2.00 to 3.99 cd/m² : 0.001 (2σ) 4.00 to 7.99 cd/m² : 0.0005 (2σ) 8.00 to 2,000 cd/m² : 0.0004 (2σ)
Measurement Speed		Fast: 2~10 sec./per test , Slow: 4~15 sec./per test
Optical System		LED positioning function
Data Display		Color display
Memory		9 channels
Sync Mode		EXT, INT
Sync Frequency		10~200 Hz
Data Comm. Interface		USB(2.0), USB flash disk drive communication port, RS232C (Baud rate max. 115200)
Input Voltage Range		1Ø 110~240V ±10% V_{LN}, 47~63Hz, 1A ; DC 24V 16.7A
Operating Temperature / Humidity Range		5°C to 30°C (50°F to 86°F) ; less than 80% relative humidity (non-condensing)
Storage Temperature Range		0°C to 40°C (32°F to 104°F) ; less than 80% relative humidity (non-condensing)
Dimension (H x W x D)		218 x 138 x 364 mm / 8.59 x 5.44 x 14.33 inch
Weight		5.08 kg / 11.17 lbs
Other Function		Customized light source calibration, memory channel ID storage, display pause, remote control, contrast measurement, video pattern generator and DUT control, programmable test items, test result judgment, calibration period setting and reminding, USB flash disk drive supported *2

Note*1: The standard illuminant A light source is used for test which set measure mode on AUTO and measure speed on slow.
Note*2: Only the Chroma certified USB flash disk drive is supported.
* Reference standards: IEC 61747-6, EIAJ ED-2522, ASTM E455-03, VESA Standard

ORDERING INFORMATION

71611 : Spectrocolorimeter

All specifications are subject to change without notice.



KEY FEATURES

- 0.001 Lux ultra low illumination display range
- Comply with ANSI-1997, JBMIA, IEC & SJ/T projector testing standards
- 29 sets chroma meter & Illuminance meter measuring at the same time, high test throughput
- Integrated with Video Pattern Generator and one click to complete all measurements
- Accurate chroma meter with tuned color filters (closely approximates CIE 1931 color matching functions), and cosine correctors
- User-defined calibration function facilitates the system maintenance
- Testing criteria storage for various models requirements
- "Pre-Test" function to edit testing items setting for non-ANSI standard tests
- Automatic white balance adjustment
- Auto maximum brightness selection and DC-index compliance with chromaticity specification
- Complete test items: ANSI Lumens, Light Uniformity, Color Uniformity, Contrast Ratio and Correlated Color Temperature
- High accuracy measurement:
  Y : ±2%±1 digit
  x, y : ±0.002
- Precise repeatability measurement:
  Y : ±0.5%±1 digit
  x, y : ±0.0005
- NIST traceable calibration
- Data output saved automatically for statistical analysis and able to upload to MES
- User authority control for system management
- Support Windows 7 (32 bit)

Chroma 7600A is an automatic test system developed in compliance with with ANSI /NAPM IT 7.228-1997 which is defined by American National Standard Institute, JBMIA-ISO21118 (2005.8) which is defined by Japan Business Machine & Information Industry Association, IEC61947-1 (2002) which is defined by International Electrotechnical Commission and SJ/T 11340-2006 (2007.1.1) which is defined by Ministry of Industry and Information Technology of the People's Republic of China to test the front projectors. The chroma meter used in the system is designed with advanced microprocessor and precision optical components along with filters closely approximate to CIE 1931 Color Matching Function and Cosine Correction. It can offer accurate and high-speed illuminant and chromatic measurements performance and quality judgments for LCD, DLP and LCOS projectors.

The software of Chroma 7600A is a Window™ based control program with comprehensive graphic user interface that can enhance testing efficiency of the projector manufacturers and lower down the test and labor cost. With the integration of video pattern generator of Chroma, the user can complete all the ANSI-1997 testing items, acceptance criteria and file saving with just one click.

To accommodate the diversified needs users may have, Chroma 7600A provides various test results including ANSI Lumens, Light Uniformity, Color Uniformity, Contrast Ratio and Correlated Color Temperature for one's choice. In addition, a flexible formula editing wizard is offered for the user to edit the desired calculation formula. The "Pre-Test" function in the software allows the user viewing the measured values in real time to integrate into the convergence, grayscale tests and VR adjustments etc. before performing ANSI tests. And with the user-defined calibration function Chroma 7600A provides, it is very convenient for the system maintenance which can reduce the calibration cost in the future effectively.

When the performance of luminance-chrominance has become the key factor for the value of front projector, the chromaticity measurements must comply with more standards and test benchmarks. As the demand of compact, high brightness and resolution display devices is increasing quickly now, the front projector will play a leading role in the near future. Every front projector make is looking for the most cost-effective test solution to keep up with this trend. Such a versatile and easy-to-use instrument like Chroma 7600A must satisfy your intent to win competitive advantages.

SPECIFICATIONS

Model	7600A		
Photo Sensor	13 chroma meters (13 points) or 13 chroma meters plus 16 Illuminance meters (29 points) closely approximates CIE 1931 Color Matching Function, and cosine correctors		
Illuminance Range	0.05 to 30,000 Lux		
Display Range	0.001 to 30,000 Lux		
OS	Windows® 7		
Software User Interface	Based on ANSI test standard : Illuminance & Chromaticity test (13 points) readings : Y, x, y/CCT/ Y, u', v'/ Δ u'v'/ANSI Lumens/Uniformity/Max/Min/ Avg. Contract Ratio analysis (16 points) readings : Y/Contrast Ratio/Max/Min/ Avg.		
	User-defined testing parameters, calculating formula, white balance adjustment, auto maximum brightness selection and DC-index compliance with chromaticity specification		
	Data storage		
Measuring Area	100 in. (13 points & 29 points)	60 in. (13 points & 29 points)	25 in. (13 points) *1
Body Modular	Fixed : 4:3, 16:9,16:10 3 in 1 : 4:3/16:9/16:10	Fixed : 4:3, 16:9,16:10 3 in 1 : 4:3/16:9/16:10	Fixed : 4:3, 16:9,16:10 3 in 1 : 4:3/16:9/16:10
Chroma Meter Measuring Area	Ø22mm		
Repeatability (2σ) *2	Y : ±0.5% ± 1 digit ; x, y : ±0.0005		
Accuracy *2	Y : ±2%±1 digit ; x, y : ±0.002		
Data Communication	USB		
Power	1Ø 110~240V ±10% V_{LN}, 47~63Hz, 50VA		
Power Consumption	55VA max. (110V AC 60Hz)		
Operating Temp./Humidity Range	5°C to 40°C (41°F to 104°F); < 75% R.H. (without condensation)		
Storage Temp./ Humidity Range	0°C to 50°C (32°F to 122°F) ; < 75% R.H. (without condensation)		
Certification	CE		

Note *1 : 25 in. supports 13 chroma meters only
Note *2 : Measurement condition is under 500 Lux illuminant A

ORDERING INFORMATION

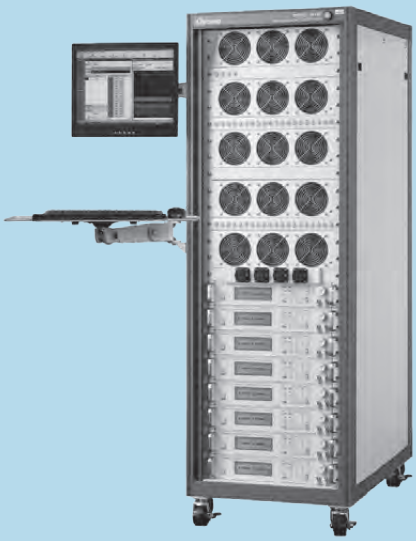
7600A : Front Projector ATS
Project Board : 100 inch, 60 inch ,25 inch ; project ratio : Fixed - 4:3 / 16:9 / 16:10, 3 in 1 - 4:3/16:9/16:10
Body Modular : Fixed - 4:3,16:9,16:10 ; 3 in 1 - 4:3/16:9/16:10
71507 : Chroma meter (13 points)
71508 : Illuminance meter (16 points)
A760020 : RS232 to UART bridge
A766006 : USB to I^2C bridge
LCD Display
Chroma Series Video Pattern Generators

Flat Panel Display (FPD) Test Solution

OLED Lifetime Test System 5-1
OLED Display Shorting Bar Pattern Generator 5-2
LTPS Display Shorting Bar Pattern Generator 5-3
LCD Shorting Bar Pattern Generator 5-4
LCM Pattern Generator Card 5-6
LCM Tester 5-8
FPD Tester 5-11
LCM ATS 5-13
DC Power Supply for LCM Burn-in Applications 5-20



OLED Lifetime Test System



OLED Display
Shorting Bar Pattern Generator



LTPS Display
Shorting Bar Pattern Generator



LCD Shorting Bar Pattern Generator

In-line Application
Signal Generator & DC Power
Signal Conversion Board

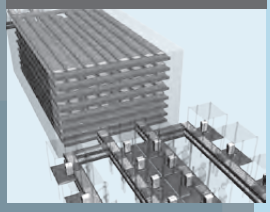


Off-line Application
LCM Pattern Generator Card



Off-line Application
DC Power Supply

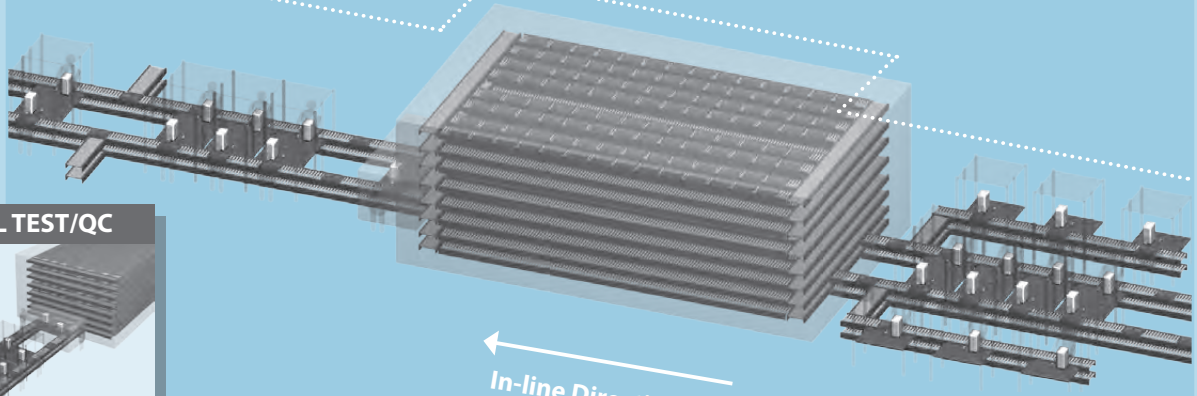
AGING OVEN



IN LINE APPLICATION

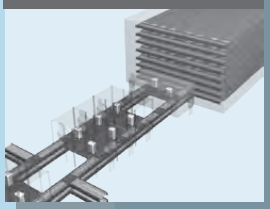
LCM Production Line

MES/CIM System

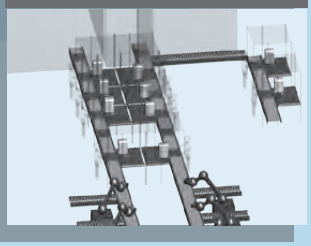


In-line Direction

FINAL TEST/QC



ASSEMBLY TEST







LCM ATS Family



FPD Tester

LCM Tester Family

OLED Lifetime Test System

Model 58131



KEY FEATURES

- Individual PMU for each UUT
  - Precision sourcing of current/voltage per UUT
  - Precision measurement unit per UUT
  - Single UUT failure is self contained, will not interrupt or corrupt other UUT testing
- Test Function
  - Electrical Characteristics
  - Brightness
  - Programmable driving waveform (Bipolar current/voltage)
- Automatic testing and data logging
  - Standard Test System
  - PXI Chassis with Controller
  - Modular OLED test cards (one for every two OLED panels)
  - Maximum 34 UUTs/system
- Optional Components
  - TEC heater
  - Spectrometer unit for in depth optical characterization
  - Turnkey test solution
  - Flexible test fixtures (Accept different OLED panel sizes)
  - Half rack with sliding drawers (4 fixtures per drawer)

The 58131 Lifetime Test System is designed specifically for the OLED industry. Model 58131 provides twoquadrant constant current (CC) and constant voltage (CV) stimulus to each OLED panel and acquires electrical and optical characteristics automatically. Two independent and isolated precision source-and-measure units (PMU) are incorporated in one modular card, which is capable of testing two OLED panels. Additional instrument cards are added to expand test capacity.

58131 comes with a simple to use windowing graphical interface. Configuration of stimulus voltage, current, duty cycle, calibration, and test intervals can be changed easily. Adjustable measurement frequency at different time intervals allows rapid sampling at initial stages and lengthened measurement period later on. Report generation, including graphical data presentation is available to facilitate data analysis. 58131 software is comprehensive enough for R&D in depth characterization, yet simple enough for production on-going reliability test operation.

58131 OLED Lifetime Test System offers good test capacity in a very small footprint, isolated PMU for each panel, and comprehensive software with a friendly user interface. Without a doubt, it is the best OLED test solution in the market.

PXI Systems Alliance

Hardware

- 18-slot PXI Chassis
- ADLINK PXI-3920 above, 1GHz Embedded
- 52951 Two-Quadrant Source-Measure Card
- Optional 19" Rack of 20U
- Optional 19" LCD monitor, mouse & keyboard

Software

The test system provides a WindowsTM interface for easy configuration of all electrical & optical tests. Each test comprises:

- Multiple stimulus configuration
- Real time test data presentation in tabular and graphical forms
- Up to 34 UUTs
- Brightness calibration
- Automatic test termination when brightness test limit is reached



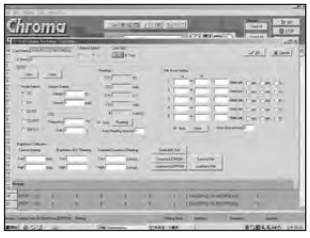
Customized Test Fixture

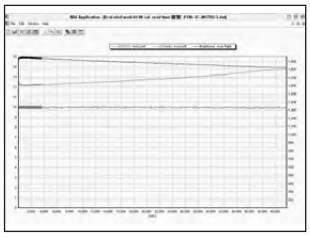
- 19" Rack Mount configuration
- Up to 34 test fixtures in drawers
- Flexible fixture design allows for different
- OLED panel sizes



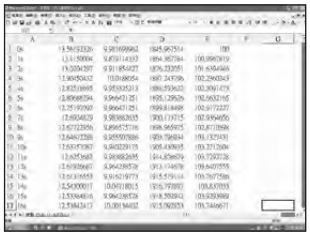
Calibration

Independent calibration data for each channel





Graphical Data Presentation



Tabular Data Presentation

SPECIFICATIONS	
HARDWARE	
Model	**58131**
Facilities	
Power source voltage	110/220VAC(50/60Hz)
Electric power consumption	Maximum 1,000Watt
Storage temperature	0 ~ 75°C
Operation environmental temperature	0 ~ 35°C
Operation humidity	35 ~ 90% RH (No condensation)
Atmosphere	No corrosive gas environment
Grounding	Grounding with 3-pin-plug
Size of System	W 600 x D1000 x H 1140 (mm)
Weight	Approximately 150kg
Constant Current Mode	
Current Range	0~10mA(0.64W)
Step Current	5uA
Accuracy	± (0.5% Programmed Value + 30uA)
Current Resolution	12Bit
Maximum Voltage	18V
Constant Voltage Mode	
Voltage Range	±18V
Step Voltage	10mV
Accuracy	± (0.5% Programmed Value + 30mV)
Voltage Resolution	12Bit
Switching Mode	
Output	CC/CV switching waveform
Cycle time	60HZ~120HZ(16.66msec~8.33msec)
Duty Cycle	1/256~256/256
Current Measurement	
Range	0~10mA
Accuracy	+/-(0.5% Programmed Value + 40uA)
Resolution	12Bit
Voltage Measurement	
Range	+/-18V
Accuracy	+/-(0.5% Programmed Value + 40mV)
Resolution	12Bit
Brightness Measurements	
Detector Type	Si Photodiode
Wavelength range	320~1100nm
Maximum Brightness	8,000 Nit
Output value	Relative Brightness

SOFTWARE
Operating Systems supported
Microsoft Windows XP or 7
Test Application
The application supports the following measurements: 1.Brightness 2. Constant Voltage mode Voltage and Current 3. Constant Current mode Voltage and Current The application support the following features: • Program restart can reload last configuration and status • Multiple stimulus configuration (CC, CV, CC/-CV switching, CC/OFF switching, CV/OFF switching) • Stimulus parameter setting (Frequency, Duty, Voltage, Current) • Up to 34 UUTs, each UUT may pause and restart testing • Automatic test termination when brightness test limit is reached • Real time graphical presentation of current, voltage, relative brightness and test time • Independent calibration data for each channel

ORDERING INFORMATION

Model 58131 : PXI OLED Lifetime Test System

All specifications are subject to change without notice.

OLED Display Shorting Bar Pattern Generator Model 58166



58166 is a Shorting Bar Pattern Generator especially designed for OLED Cell inspection. The unique PC-Based architecture can upgrade the inspection Flow settings automatically from Server through FTP network without doing it on the client side respectively that increases the production efficiency significantly. The built-in RS-232 and USB interfaces can work with any AOI and Gamma optical measurement systems. 58166 can solve the problems that traditional equipments had in complex upgrade procedures, unfriendly user interface, difficult system integration and etc.

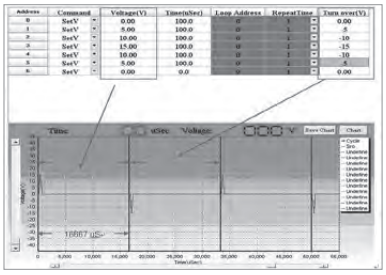
58166 works with 0.1 μS high-resolution time unit to edit the output waveforms of Source and Gate. The strong driving capacity and High Slew Rate design along with the step waveform output for maximum 255 steps can output the inspected waveform accurately that also eliminate panel from any block effect. In addition, the unique engineer analysis mode can provide engineers the best test environment for waveform analysis.

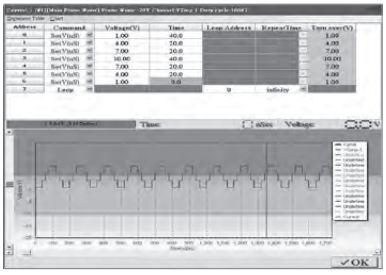
Utilizing the flexible adjustment function to change the parameters of voltage and time in real time can acquire the most applicable test conditions for the production line during mass production. Auto discharge function is especially designed to prevent the residual charge and potential ESD from damaging the panel. 58166 helps improving production yield rate, optimizing inspection process and also reduces measurement cost.

58166 is the most compatible Shorting Bar Pattern Generator for OLED testing in the market today.

KEY FEATURES

- Provide the test signal for different sizes of OLED display
- Powerful PC-based platform
- Flexible waveform editor
- Auto FTP download
- Engineer analysis function
- Lock function during testing
- 0-255 steps waveform output
- Auto discharge





SPECIFICATIONS			
Specifications of Inspection Signal			
Type of signal	Signal name	Number of signal	Voltage range
Data signal	Data1~Data24	12*2	+40V ~ -40V
Power signal	VDD(V1)	1*1	0~ + 40V
	VSS(V2)	1*1	- 40 ~ 0 V
Data signal (Vsign & WS) generator (Total 24CH)			
Vsign (Data 1~12)	Output	+ 40V ~ - 40V / 0.1A	
	Voltage accuracy	±2% ±0.1V	
	Time base	0.1 μs	
	Quantity of Ch	12	
	Load Regulation	2%	
WS (Data 13~24)	Output	+ 40V ~ - 40V / 0.1A	
	Voltage accuracy	±2% ±0.1V	
	Time base	0.1 μs	
	Quantity of Ch	12	
	Load Regulation	2%	
Power signal generator (Total 20CH+2CH)			
VDD(V1)	DC Output	+ 40V ~ 0V / 30A	
	Voltage accuracy	±1% ±0.1V	
	Load Regulation	5%	
VSS (V2)	DC Output	0V ~ - 40V / 50A	
	Voltage accuracy	±1% ±0.1V	
	Load Regulation	5%	
General Specification			
AC Power source voltage	220V/50Hz 1φ 5500VA		
Storage temperature	0 ~ 75°C		
Operation temperature	5 ~ 35°C		
Operation humidity	35 ~ 90% RH (No condensation)		
Dimension (H x W x D)	1827 x 600 x 900 mm		
Weight	Approximately 350kg		

Note*1: VDD(V1) and VSS(V2) are DC, waveform editor is not applicable

ORDERING INFORMATION

Model 58166 : OLED Display Shorting Bar Pattern Generator

LTPS Display Shorting Bar Pattern Generator Model 58167



KEY FEATURES

- High Slew Rate of max. 2500V/μs
- Provide the test signal for E-paper and LTPS panels
- Powerful PC-based platform
- Auto FTP download
- Engineer analysis function
- Lock function during testing
- 512 steps waveform output
- Auto discharge
- 36 channels output

In the evolution of panel design, larger display and higher resolution will be the main-stream of future technology for panel manufacturers. LTPS TFT process is one of many technologies that could fulfill the abovementioned requirements. It had become a more and more important milestone for panel manufacturers who want to maintain their competitiveness.

58167 is a Shorting Bar Pattern Generator especially designed for OLED Cell inspection. The unique PC-Based architecture can upgrade the inspection Flow settings automatically from Server through FTP network without doing it on the client side respectively that increases the production efficiency significantly. The built-in RS-232 and USB interfaces can work with any AOI and Gamma optical measurement systems. 58167 can solve the problems that traditional equipments had in complex upgrade procedures, unfriendly user interface, difficult system integration and etc.

58167 is the most compatible Shorting Bar Pattern Generator for LTPS technology testing in the market today.

SPECIFICATIONS	
Model	**58167**
Power source voltage	110/220VAC(50/60Hz)
Storage temperature	0 ~ 75˚C
Operation humidity temperature	5 ~ 35˚C
Operation humidity	35 ~ 90% RH (No condensation)
Dimension of Main unit (HxWxD)	130 x 442x 505 mm
Weight	Approximately 14 kg
Data1~Data12	
Output	+ 20V ~ - 20V / 400mA
Voltage Accuracy	±2% ±0.1V
Time base	0.1 μs
Number of output	12
Line Regulation	2%(full load, 1.8m cable)
Data13~Data36	
Output	+ 40V ~ - 40V / 120mA
Voltage Accuracy	±2% ±0.1V
Time base	0.1 μs
Number of output	24
Line Regulation	2% (full load, 1.8m cable)

ORDERING INFORMATION

58167 : LTPS Shorting Bar Pattern Generator

All specifications are subject to change without notice.



KEY FEATURES

- Strong Driving Capacity
- 0-255 step waves output
- Auto discharge
- 12 Source Output
- 8 Gate Output (expandable up to 16 channels)
- 4 COM Output
- Powerful PC-based platform
- Auto FTP download
- Friendly Flow editing
- Easy to integrate with AOI & Optical measure system
- Real-time voltage & time parameter adjustment
- Engineer Analysis Function

58162 is a high capability Shorting Bar Pattern Generator especially designed for LCD Cell inspection. The exclusive PC-Based architecture can download the inspection Flow settings automatically from Server through FTP network for update without doing it on the client respectively that increases the production efficiency significantly. The built-in RS-232 and USB interfaces can integrate with any AOI and Gamma optical measurement systems. 58162 can solve the problems of complex upgrade for traditional equipment, unfriendly user interface, difficult system integration and etc.

58162 works with 0.5 μS high-resolution time unit to edit the output waveforms of Source and Gate. The strong driving capacity and High Slew Rate design along with the step waves output for maximum 512 steps can output the inspected waveform accurately to eliminate panel from any block. In addition the unique engineer analysis mode can provide engineers the best test environment for waveform analysis. Utilizing the flexible adjustment function to change the parameters of voltage and time in real time can acquire the most applicable test conditions for the production line during mass production. Auto discharge function is especially designed to prevent the residual charge and ESD from damaging the panel. 58162 not only increases the panel defect inspection ability, reduce the inspection process but also improve the production yield rate and lower down the measurement cost.

58162 is expandable with Gate extension board up to 24 channels that can satisfy the a-Si/LTPS multiple panel design in the future. It is the most compatible Shorting Bar Pattern Generator in the market today.

SPECIFICATIONS

Model	58162	58162-A	58162-AE	58162-E	58162-EE
Power source voltage	110/220VAC(50/60Hz)				
Electric power consumption	Main unit : Maximum 500Watt				
Insulation resistance	Min. 10MΩ at DC500V Mega (Between AC power source terminal and housing case)				
Dielectric strength	1 minute of AC 1000V (Between AC power source terminal and housing case)				
Storage temperature	0 ~ 75˚C				
Working environmental temperature	5 ~ 35˚C				
Working humidity	35 - 90% RH (No condensation)				
Atmosphere	No corrosive gas environment				
Grounding	Grounding with 3-Pin-Plug				
Dimension of Main unit(HxWxD)	130 x 442 x 504 (mm)				
Weight	Approximately 14kg				

Type of signal	Number of signal	Voltage range	Number of signal	Voltage range	Number of signal	Voltage range	Number of signal	Voltage range	Number of signal	Voltage range
Source (Data)	6*2	-20 ~ +20V	6	-20 ~ +20V	6	-20 ~ +20V	12	-40 ~ +40V	12*2	-40 ~ +40V
Common	1*2	-20 ~ +20V	1	-20 ~ +20V	1	-20 ~ +20V				
	1*2		1		1					
Gate	4*2	-40 ~ +40V	4	-40 ~ +40V	4	-40 ~ +40V				
					12	-40 ~ +40V				

Specifications of Inspection Signal					
General					
Time base	0.5 μs				
Frame period	8,000us ~1,000,000us				
Source and Common total output power	75 Watt			--	--
Gate total output power	75 Watt				
Source signal generator					
Output	-20 ~ +20V / 400mA			--	--
Voltage accuracy	±2% ±0.1V			--	--
Number of output	12	6		--	--
Load Regulation	1.5%(full load, 2m cable)			--	--
Gate signal generator					
Output	-40V ~ +40V/ 500mA				
Voltage accuracy	±0.2V				
Number of output	8	4	16	12	24
Load Regulation	2% (full load, 2m cable)				
DC Voltage generator					
Output	-20V ~ +20V / 400mA			--	--
Voltage accuracy	±2% ±0.1V			--	--
Number of output	4	2		--	--
Load Regulation	1.5%(full load, 2m cable)			--	--
Industrial Computer					
Operating System	Windows XP Embedded				
CPU	1.6 GHz				
Hard Disk	80 Gbyte				
RAM	1 Gbyte				

Patent Name : Multi-Channel Signal Generator for Optical Display Device with Protective Circuit
Patent No. : 96208025

ORDERING INFORMATION

58162 : LCD Shorting Bar Pattern Generator 12S-8G-4C
58162-A : LCD Shorting Bar Pattern Generator 6S-4G-2C
58162-AE : LCD Shorting Bar Pattern Generator 6S-16G-2C
58162-E : LCD Shorting Bar Pattern Generator 12G
58162-EE : LCD Shorting Bar Pattern Generator 24G
A581600 : Conversion board box



Conversion board box



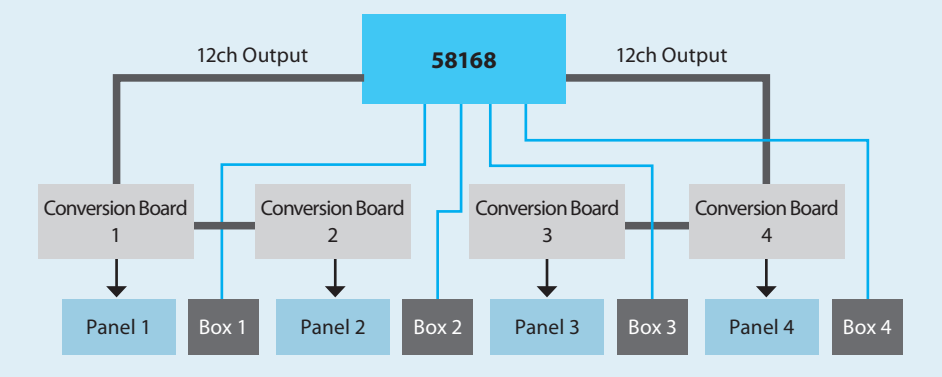
KEY FEATURES

- 24CH Output(12CH or 24CH, optional)
- 0~1024 step waves output
- Prober integration with RS-232
- Loading Recipes via SD Card
- 4 Colonization by 4 OP BOX
- Low cost

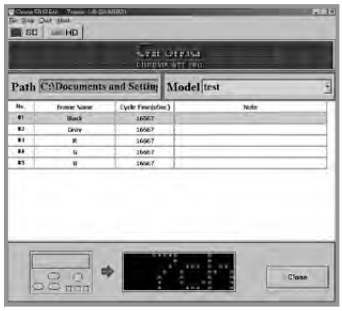
58168 is a high C/P ratio Shorting Bar Pattern Generator especially designed for small size LCD cell inspection. The exclusive modularized architecture provides the unique implement of inspections by "1 instrument, 4 Colonization", which provide 4 users 4 OP boxs to operate the only one 58168 instrument simultaneously but each one of them feel like that they own a whole instrument without interferenced by others. 58168 is truly suitable in low cost application display field.

58168 works with 0.5 μs high-resolution time unit to edit the output waveforms of Data channels. All channels of each model are edited in PC's software and saved to SD card, which is capable of more than 500 models . Fast duplication of SD which is easy in PC provide the engineer with efficiency with the lack of network. In addition no PC is required while 58168 operates ensures low power consumption.

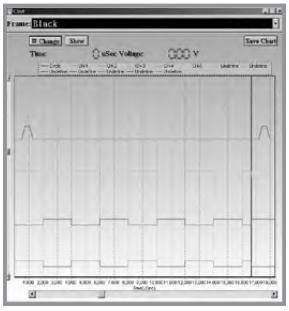
4 Colonization by 4 OP BOX



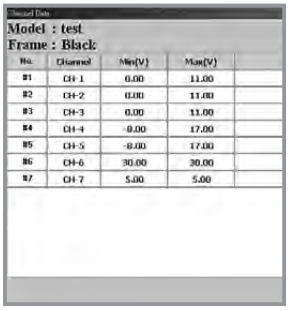
SPECIFICATIONS			
Model	**58168**		
Power source voltage	110/220VAC(50/60Hz)		
Electric power consumption	Main unit: Maximum 200Watt		
Storage temperature	0 ~ 75°C		
Operation humidity temperature	5 ~ 35°C		
Operation humidity	35 ~ 90% RH (No condensation)		
Dimension of Main unit (HxWxD)	190 x 320 x 370 mm		
Weight	Approximately 9.5kg		
Type of signal	**Signal name**	**Number of signal**	**Voltage range**
Data	Data1, Data2, Data3 Data4, Data5, Data6	6*4	-40V~+40V
Specifications of Inspection Signal			
General			
Time base	0.5 μs		
Frame period	8000us ~1000000us		
Total data output power	75 Watt		
Source signal generator			
Item	Content		
Output	-40V ~ +40V / 120mA		
Voltage accuracy	±2% ±0.1V		
Time base	0.5 us		
Number of output	24		
Load Regulation	2% (full load, 1.8m cable)		



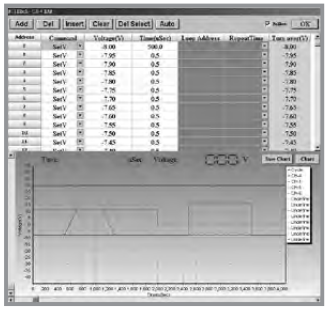
Channel Editing Screen



Waveform of all channels Screen



Channel Information Screen



Channel Editing Screen

ORDERING INFORMATION

58168 : LCD Shorting Bar Pattern Generator with 4 Colonization
A581600 : Conversion board box



Conversion board box

All specifications are subject to change without notice.



KEY FEATURES

- LVDS / MIPI(Optional) / eDP(Optional) output
- Display size up to UHD 4096x2160@60Hz max
- Data Clock: Single 1 Lin 150MHz / 2 Link 300MHz/ 4Link 600MHz / 8Link 1.2GHz max
- Data Bits: 6/8/10bit programmable max
- Vdd output 2V~24V/3A programmable max
- Vbl output 2V~36V/6A programmable max
- Vbl/Vdim Dimming adjustable 0~8V max
- Power OCP protection
- Up / down load function
- Timing / Pattern Auto / Manual Run
- Low cost
- Customer design for user define

＊All specifications of 27010 series are customer design, please contact Chroma sales representative for detailed information.

To comply with the current digital standard signal, LCD and digital display for test application, the Pattern Generator Card is a low cost and high value-added product that can provide LCD manufactures for In-line or Batch oven of aging test.

This 27010 series LCM Pattern Generator Card can be output with LVDS signal. For the multimedia applications, the 27010 series can be support MIPI/eDP(optional). By supporting the display screen up to 4096x2160@60Hz, it is capable of performing LCD pixel inspection during production, OLB test, burn-in test, combination test, final test and life test widely.

The PG Card uses Programmable Logic Device which is the pattern generator for LCD MODULE test. It supports VGA~ UHD, 1 Link / 2 Link / 4 Link /8 Link and 30 sets Timings, 64 sets Patterns and 30 sets Programs max for testing.

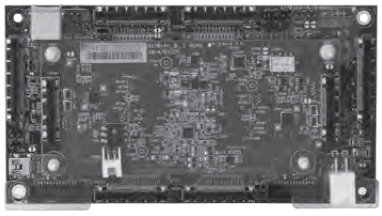
The signal transmission using the method of replacement output to panel depends on the interface the LCD Module installed for the signal (LVDS, MIPI, eDP) used. As to power rating, its VDD support 2V~24V, 3A max output power is applicable to signal and LCD Module. Furthermore the required pattern, Color and other test functions can be set manually via the system control.

The PG card is equipped with a unique window-based editing software. Its convenient operating environment allows users to set timings, create patterns, and edit programs as well as control the power on/off timings of the PG Card via PC. The created files can be uploaded or downloaded from data buffer to PG Card easily for modification. This useful and practical design enables the software and testing parameter of PG Card be updated efficiently and optimizes its functions. Under this series could be customer design by user define.

LVDS 4K UHD mipi eDP

Signal Conversion Board A270144

- Extension of the 2701007 PG Card for eDP/MIPI tests
- Signal Conversion Board modular design
- Compatible eDP V1.3 Standard
  - Resolution: 2560 x 1600 @ 60 Hz max
  - Lane rate : 1.62 / 2.7 Gbps selectable
  - Lane count : 1 / 2 / 4 Lane selectable
  - Color depth : 8 /10 bits
- Compatible MIPI DSI V1.02.00 spec
  - Lane rate : 1 Gbps selectable
  - Lane count : 1 / 2 / 3 / 4 / 4+4 Lane selectable
  - Pixel format : RGB-565 / RGB-666 / RGB-888
- Output resolution up to
  - eDP up to 2560x1600 @ 60Hz (Max)
  - MIPI up to 2560x1600@60Hz Max (4+4 Lane)
- Able to provide 2 sets of eDP / MIPI standard signal source simultaneously
- Easy-to-use graphical interface
- Production line process control and data editing



The Chroma A270144 Signal Conversion Board is a device designed to convert signals to various types of video signals for output that can meet the testing demands of multimedia display industries for the products like Notebook, PAD and Mobile Phone.

The Signal Conversion Board supports the latest eDP and MIPI standard and featured as follows:

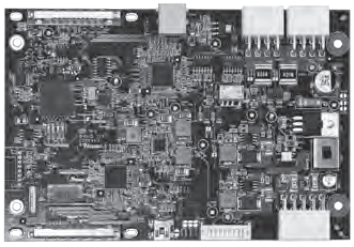
Display Port is a digital video interface standard promoted by Video Electronics Standards Association (VESA). It is one of the new generation specifications in video display interface technology that can transmit image and voice data when connected to PC with display (screen) or PC with home theatre system or DVD player and Notebook, etc. to replace the traditional LVDS interfaces.

The latest specification, eDP (embedded Display Port), developed by VESA for mobile devices is also becoming the major internal interface specification of portable PCs such as notebook and tablet PC.

MIPI (Mobile Industry Processor Interface) designed for handheld electronic products have the following main standards.
DCS (Display command set) specifies the control command set ; DSI (Display Serial Interface) specifies the transmission interface between CPU and display module (ex. MIPI signal source output) All of the above can easily by Chroma software.

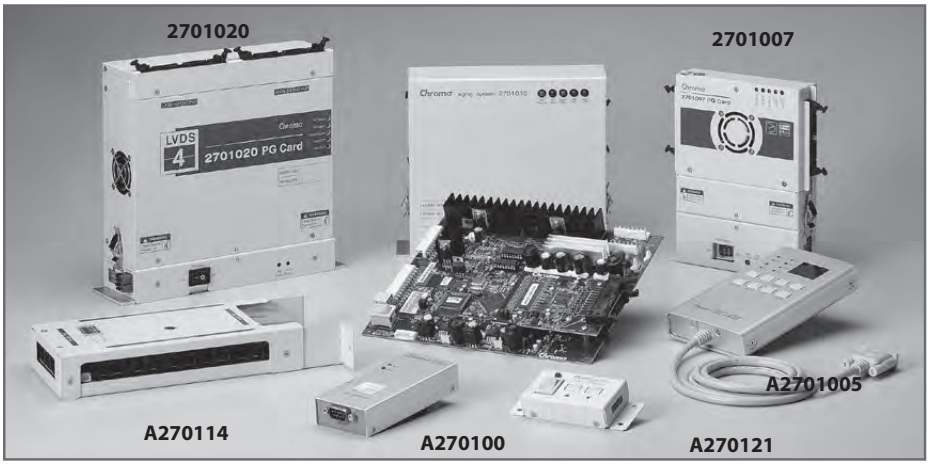
eDP Bist module A270148

- Compatible eDP V1.3 Standard
  - Version: Support DPCD V1.1
  - DP AUX Channel : 1MHz
  - BIST mode : DPCD Read / Write control
- Vdd output 3V~12V/3A programmable max
- Vbl output 10V~24V/6A programmable max
- Able to provide 2 sets of eDP BIST signal source simultaneously
- Easy-to-use graphical interface
- Production line process control and data editing



A270148 eDP Bist module can provides the DPCD control signal and power for panel into BIST mode, integrate with Chroma Aging system can provide a complete eDP panel aging test solution.

27010 Series Pattern Generator Cards



規格表					
Model		**2701007**	**2701007 10 bit**	**2701009 ***	**2701020**
LVDS Interface					
Resolution		up to 1920 x1080/60Hz	up to 2560 x1600/60Hz	up to 4096x2160/120Hz	up to 2560 x1600/60Hz
Pixel Rate	1 Link	90MHz	135MHz	150MHz	135MHz
	2 Link	180MHz (90MHz x 2)	270MHz (135MHz x 2)	300MHz (150MHz x 2)	270MHz (135MHz x 2)
	4 Link	-	-	600 MHz (150MHz x 4)	330MHz
	8 Link	-	-	1.2 GHz (150MHz x 8)	
Color Depth		6/8 bits	6/8/10 bits	6/8/10 bits	6/8/10 bits (10bit for gray scale)
Output Mode		2 Channel x 2	2 Channel x 2	8 channel x 1 / 4 channel x 2 / 2 channel x 4 / 1 channel x 4	2 Channel x 2 4 Channel x 1
I/O		Box Head 34pin	Box Head 40pin	JAE 51 pin	Box Head 50pin
Power Requirement					
Input (Vdd)		15V/3A	15V/3A	16V/8A	16V/10A
Output (DC)		Vdd : 3.3,5,12V/2.5A Vbl : 12,24V/6A max Vif : 3.3,5V	Vdd : 3.3~12V/3A Vbl : 12~24V/6A Vif : 3.3/5V/1A	Vdd : 2 ~24 V/6A Vbl : 2~36V/12A	Vdd : 3.3~13V/4A max Vbl : 10~25V/26A Vif : 5V
Communication Interface		RS-485	RS-485	Ethernet	RS-485
Vdim		0~7V/0.1 step	0~7V/0.1 step	0 ~ 8V/0.1 step	0~7V/0.1 step
Inverter Voltage		On : 5V ; Off : 0V	On : 5V ; Off : 0V	On : 3.3V ; Off : 0V	On : 5V ; Off : 0V
Power Sequence Resolution					
Turn-on (Vdd/Signal/Vbl)		1ms	1ms	1ms	1ms
Turn-off (Vdd/Signal/Vbl)		1ms	1ms	1ms	1ms
Operation					
Pattern Control		64 sets auto/manual (30 sets by editing)	64 sets auto/manual (30 sets by editing)	200 sets by editing	64 sets auto/manual (30 sets by editing)
Timing Control		30 sets by editing	30 sets by editing	200 sets by editing	30 sets by editing
Program Control		30 sets by editing	30 sets by editing	100 sets by editing	30 sets by editing
Environment					
Operation Temperature		0~60˚C	0~60˚C	0~60˚C	0~60˚C
Storage Temperature		-20~80˚C	-20~80˚C	-20~80˚C	-20~80˚C
Humidity		0~80%	0~80%	0~80%	0~80%
Dimension					
HxWxD		180x140x30 mm	180x140x30 mm	216x66x228 mm	210x230x60mm
Weight		845g	845g	2000g	1870g

Model	**A270144**
Main Board	
Input Video	LVDS 2 Link 25 ~ 135 MHz / 1 Link 50 ~ 270 MHz / 2 Link
Vdd(Vcc)	By pass from PG Card
Input Power	DC +16V
Communication	RS-485
eDP Signal Module	
Compliant	eDP V1.3
Resolution	2560 x 1600 @ 60 Hz max
Lane rate	1.62 / 2.7 Gbps
Lane Count	1 / 2 / 4 Lane
Color depth	8 /10 bits
Function	HPD / EDID
MIPI Signal Module *	
Compliant	MIPI DSI V1.02.00
Resolution	2560 x 1600 @ 60 Hz max
Lane rate	1 Gbps
Lane Count	1/2/3/4/4+4 Lane
Pixel format	RGB-565 / RGB-666 / RGB-888
Environment	
Operation Temperature	20 ~ 60˚C
Storage Temperature	-20 ~ 70˚C
Humidity	70%
Dimension (H x W x D)	16x153x82 mm
Weight	85g

Model	**A270148 ***
Main Board	
Input Power	LDC + 16V
Vdd(Vcc)	RS-485
eDP Signal Module	
Compliant	eDP V1.3
DP AUX Channel	1 MHz
BIST Mode	DPCD Read / Write control
Lane Count	1 / 2 / 4 Lane
Color depth	8 /10 bits
Function	HPD / EDID
Environment	
Operation Temperature	20 ~ 60˚C
Storage Temperature	0 ~ 70˚C
Humidity	70%
Dimension (H x W x D)	17x163x105 mm
Weight	300g

* Call for availability

ORDERING INFORMATION

2701007 : Pattern Generator Card, 2CH Signal 90MHz/Dual 180Hz
2701007 10 bit : Pattern Generator Card, 2CH Signal 135MHz/Dual 270MHz
2701009 : Pattern Generator Card 8 CH
2701020 : Pattern Generator Card, 4CH 330MHz/10bit
A270100 : Data Bank
A2701005 : Remote Keypad
A270114 : Hub
A270121 : External Control Box
A270144 : Signal Conversion Board
A270148 : eDP Bist Module

All specifications are subject to change without notice.



LVDS Power

To meet the high accuracy and low price requirements for LCM test device, Chroma 27011 that integrates the signal and power source provide a complete test solution for LCD Module. Its LVDS / TTL signal source fully complies with the digital signal standard, meanwhile with the 12V/5V/3.3V DC source output it is able to supply power to VDD/Backlight for LCM test without obtaining external power source. Equipped with the interface of single key to switch the timing/pattern/program rapidly for test in auto or manual mode, the 27011 is able to provide a direct and convenient test environment for LCM by its complete hardware configuration and easy operation.

To fulfill the standard test signal requirements of various panels, this device supports LVDS signal with optional TTL signal available for use. It has 16 timings, 64 patterns, auto image rotation display system and multiple test functions settings. In addition an editor software is available for editing timing / pattern / program at PC site to create a product specific test program. The design of signal and power source integration for 27011 allows it to be utilized extensively in R&D/Quality Assurance/ Quality Inspection/After Sales Services/Sales fields for LCM related tests.

The Programmable Logic Device is used in 27011 as the image generator to test the LCD Module. It supports VGA, SVGA, XGA, SXGA, UXGA and 1 Link / 2 Link digital signal output, also it has quartz oscillator built in to supply stable test signals as the standard signal source to the Device Under Test. This test device provides LVDS signal primarily, however, users can purchase the optional TTL signal conversion board for use to cope with the LCM features.

Besides the power source input of AC 90~250V, it has the 12V / 5V / 3.3V DC power switch required by the LCM Vdd in the market and the 12V / 5V power for Backlight Inverter. Moreover, it has Signal/Vdd power on sequence to fit in the LCM Turn On test sequence.

As regards operation, 27011 can switch the Timing / Pattern and Program by the Mode key on the front panel directly to show the status on a 7-segament display. Users can select the required Timing and switch it to Pattern mode by pressing the Mode key, or switch it to program; and then conduct the test automatically or manually. It can execute tests easily and quickly with the convenient operation method and multiple function keys.

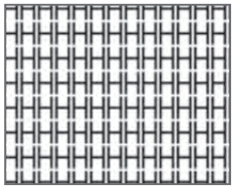
KEY FEATURES

- LVDS / TTL (Optional) / TMDS (Optional) output
- Pixel rate up to 162 MHz (LVDS x 2 Link)
- Display size up to UXGA (1600 x 1200)
- 16 timings selecting and editing
- 64 patterns library (32 sets by editing)
- 16 programs (total 3553 sequence)
- 12V / 5V output for backlight
- 12V / 5V / 3.3V output for Vdd
- Power on sequence for signal / Vdd
- Timing / Pattern editing via PC
- Up / down load function
- Timing / Pattern Auto / Manual Run
- Low cost









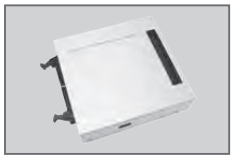




ORDERING INFORMATION

27011 : LCM Tester
A270100 : Data Bank
A270111 : LVDS to TTL Signal Adapter
A270112 : TTL to TMDS Signal Adapter

SPECIFICATIONS			
Model	**27011**		
Output	LVDS		
Option	TTL (A270111) / TMDS (A270112)		
Pixel Range			
Pixel Rate	1 Link	2 Link	
25.175MHz	VGA (25.175MHz)	-	
40MHz	SVGA (40MHz)	-	
32.5MHz	XGA (65MHz)	XGA (65MHz)	
54MHz	-	SXGA (108MHz)	
81MHz	-	UXGA (162MHz)	
Signal Interface			
Signal	LVDS (6 or 8 bit)		
Connector	Box Header 26 Pin Right Angle		
Power Requirement			
Input (AC)	1Ø 110~240V ±10% V_{LH}, 47~63Hz		
Output (DC)	5V/2.5A max. and 12V/4A max. (for Backlight) 12V/5V/3.3V (for Vdd)		
Power Sequence Resolution	Main Board PWR	Vdd	Signal
Turn-on	1ms	1ms	1ms
Turn-off	-	1ms	1ms
Operation			
Pattern Control	64 sets auto / manual (32 sets by editing)		
Timing Control	16 sets auto / manual		
Program Control	16 programs (Total 3553 sequence max.)		
Environment			
Operation Temperature	0 ~ 60°C		
Storage Temperature	-20 ~ +80°C		
Humidity	0 ~ 80 %		
Dimension (H x W x D)	84.4 x 103.5 x 232.2 mm / 3.32 x 4.07 x 9.14 inch		
Weight	1.4 kg / 3.08 lbs		



A270111



A270100

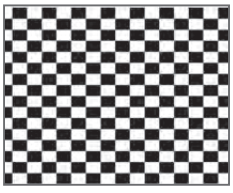
All specifications are subject to change without notice.



KEY FEATURES

- Support LCD TV Module Testing
- LVDS signals output
- TTL (Optional) signals output
- Pixel rate up to 162 MHz (LVDSX2 Link)
- Display size up to 1920X1080 @ 60Hz
- 16 timings for selection
- 64 patterns library
- 16 programs (total 3553 sequence)
- 24V / 12V / 5V output for Vbl
- 12V / 5V / 3.3V output for Vdd
- Power on sequence for signal / Vdd
- Timing / Pattern editing & download
- Timing / Pattern Auto / Manual Run
- Low cost

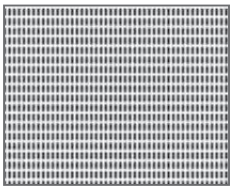












CE LVDS Power

To meet the high accuracy and low price requirements for LCM TV test device, Chroma 27012 that integrates the signal and power source provide a complete test solution for LCD Module. Its LVDS / TTL(Option) signal source fully complies with the digital signal standard, meanwhile with the 24V/12V/5V/3.3V DC source output it is able to supply power to VDD/ Backlight for LCM test without obtaining external power source. Equipped with the interface of single key to switch the Timing/Pattern/Program rapidly for test in auto or manual mode, the 27012 is able to provide a direct and convenient test environment for LCM TV by its complete hardware configuration and easy operation.

To fulfill the standard test signal requirements of various panels, this device supports LVDS signal with optional TTL signal available for use. It has 16 timings, 64 patterns, auto image rotation display system and multiple test functions settings. In addition an editor software is available for editing Timing/Pattern/Program at PC site to create a product specific test program. The design of signal and power source integration for 27012 allows it to be utilized extensively in R&D/Quality Assurance/ Quality Inspection/After Sales Services/Sales fields for LCM related tests.

The Programmable Logic Device is used in 27012 as the image generator to test the LCD TV Module. It supports VGA~UXGA and 1 Link/2 Link digital signal output, also it has quartz oscillator built in to supply stable test signals as the standard signal source to the Device Under Test. This test device provides LVDS signal primarily, however, users can purchase the optional TTL signal conversion board for use to cope with the LCM TV features.

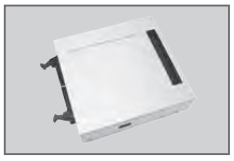
Besides the power source input of AC 100V~240V, it has the 12V/5V/3.3V DC power switch required by the LCM Vdd in the market and the 24V/12V/5V power for Backlight Inverter. Moreover, it has Signal/Vdd power on sequence to fit in the LCM TV Turn On test sequence.

As regards operation, 27012 can switch the Timing/Pattern and Program by the Mode key on the front panel directly to show the status on a 7-segament display. Users can select the required Timing and switch it to Pattern mode by pressing the Mode key, or switch it to program for test program editing; and then conduct the test automatically or manually. It can execute tests easily and quickly with the convenient operation method and multiple function keys.

ORDERING INFORMATION

27012 : LCM Tester
A270100 : Data Bank
A270103 : Editor Software
A270111 : LVDS to TTL Signal Adapter

SPECIFICATIONS			
Model	**27012**		
Output	LVDS		
Option	TTL (A270111) / TMDS (A270112) / Data Bank (A270100)		
Pixel Range			
Pixel Rate	1 Link up to 81 MHz	2 Link up to 162 MHz	
25.175MHz	VGA (25.175MHz)	-	
40MHz	SVGA (40MHz)	-	
32.5MHz	XGA (65MHz)	XGA (65MHz)	
54MHz	-	SXGA (108MHz)	
81MHz	-	UXGA (162MHz)	
Signal Interface			
Signal	LVDS (6 or 8 bit)		
Connector	Box Header 34 Pin (Compatible with 27011)		
Power Requirement			
Input (AC)	1Ø 110~240V ±10% V_{LH}, 47~63Hz		
Output (DC)	5V / 1.5A ; 12V / 7A ; 24V / 6.5A max. (for Vbl) ; 12V / 5V / 3.3V / 3.5A (for Vdd)		
Power Sequence Resolution	Vdd	Signal	Vbl
Turn-on	1ms	1ms	1ms
Turn-off	1ms	1ms	1ms
Operation			
Pattern Control	64 sets auto / manual (32 sets by editing)		
Timing Control	16 sets auto / manual		
Program Control	16 programs (Total 3553 sequence max.)		
Environment			
Operation Temperature	0 ~ 40°C		
Storage Temperature	-20 ~ +70°C		
Humidity	0 ~ 70 %		
Dimension (H x W x D)	69.6 x 310.5 x 273 mm / 2.74 x 12.22 x 10.75 inch		
Weight	3.3 kg / 7.27 lbs		



A270111



A270100

All specifications are subject to change without notice.



LVDS | Power | Full HD 1080 | 120Hz

KEY FEATURES

- LVDS Signals support
  - 1 / 2 / 4 Channel output
  - Color depth 6 / 8 / 10bits
  - 2 output port
  - Pixel rate up to 330MHz (1 Link 135MHz / 2 Link 270MHz / 4 Link 330MHz)
- The Resolution up to 2560x1600
- 30 sets Timing / Power / Program selection
- 64 sets Pattern
- Vdd output 3.3~13V / 3.5A programmable
- Vbl by pass outside DC source
- DC Power protection OCP
- EDID Read / Write / Compare
- 10 sets EDID data store
- Auto / Manual Pattern switch
- Auto Pattern switch delay time setting
- Power on sequence for signal / Vdd / Vbl (External)
- RGB Signal reverse Hot Key
- Control by RS-232

Chroma 27013 is a portable tester that supports high resolution and large scale LCM with the signals, power supply and test patterns required for LCD Module test.

Users can edit various timing parameters and patterns on PC via software applications. Auto execution or one-key manual control on the device can switch the Timing / Pattern / Program mode rapidly. The easy and convenient operation along with compound key usage made the 27013 LCM Tester most applicable for R&D/ Quality Assurance/ Quality Verification/ Services/ Sales areas for LCM related tests.

27013 LCM Tester contains the following features:

(1) Comply with Full HD 120Hz Test: The 27013 LCM Tester supports LVDS signal with pixel rate 330MHz (1 Link 135MHz/2 Link 270MHz/4 Link 330MHz) that can test the screen resolution up to 2560x1600 pixels to meet the test requirements for standard test signal of various panels today and Full HD 120Hz (Double frame rate.)

(2) Providing, Measuring & Determining Output Power: The system provides 3.3~13V / 3.5A VDD output power for users to set auto test by LCM's electrical features. Each output channel is able to simulate the timing relationship of power on/off and over voltage protection function. Protection occurs when the power parameter exceeds the predefined range.

(3) Complete Test Patterns: The large capacity of memory provides 30 Timings/64 Patterns with many built-in standard test patterns. The 27013 not only can generate the patterns of 10Bit grayscale, pure color, stripes, text and cross.

(4) Separate RGB Signal Control: The panel of 27013 LCM Tester has several rapid one-key operation modes which include: R, G, B & Inversion signal separation and resume – it can separate or resume one of the RGB signals in the display screen; while the Inversion reverses the pattern display on the screen.

Timing / Pattern / Program / Power mode – users can create the test program specially for UUT by the PC software application and conduct one-key operation from the panel directly.

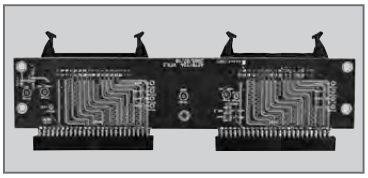
The VDD rapid key is able to switch the built-in 3 fixed voltage settings 3.3V/5V/12V directly to meet the power output conditions for most LCM tests rapidly.

(5) RS-232 Interface for Data Upload/ Download: 27013 LCM Tester with PG MASTER software can edit the test programs and upload/ download edited data through the RS-232 interface data control box. Users can update test programs on different testers via the data control box directly without controlling by PC to save the time effectively.

Chroma 27013 carried complete test functions with highly accurate signals and power source. It adopts 20x4 LCD screen in compact size with friendly user interface, and its small-scale design can be used flexibly on various tests to satisfy the work unit that needs to move often. The powerful function and fast test speed make it the best tool for production test.

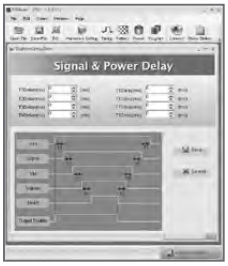
ORDERING INFORMATION

27013 : LCM Tester
A270122 : Conversion Board 50pin to 34pin



A270122

PG Master Software



Hardware Setting



Pattern Setting



Power Setting



Timing Setting

SPECIFICATIONS

Model	27013		
Output	LVDS		
Option	DataBank		
LVDS interface			
Resolution	Up to 2560x1600 / 60Hz , 1920X1080 / 120Hz		
Pixel Rate	1 link up to 135MHz / 2 link up to 270MHz / 4 link up to 330MHz		
Color Deep	6/8/10bits Programmable (10bit for gray scale)		
Output mode	2 Channel x2 / 4 Channel x1		
Connector	Box Header 50Pin		
Power Requirement			
Input (AC)	1Ø 110~240V ±10% V_{LH} 47~63Hz		
Output (DC)	Vdd : 3.3V~13V, 3.5A programmable Vbl : Internal 12V / 24V 4A Max Extenal 25V / 26A Max		
Vdim	0V~7V Step 0.1V		
Inverter Voltage	On: 5V , Off: 0V		
Power Sequence Resolution			
	Vdd	Signal	Vbl
Turn-on	1ms	1ms	1ms
Turen-off	1ms	1ms	1ms
Operation			
Pattern Control	64 sets auto/manual (30 sets by editing)		
Timing Control	30 sets by editing		
Program Control	30 sets by editing		
EDID Application			
EDID 1	Read / Write / Compare		
EDID 2	Read / Write / Compare		
EEDID	Read / Write / Compare		
EDID store	10 sets EDID Data store		
Environment			
Operation Temperature	0~40°C		
Storage Temperature	-20~70°C		
Humidity	0~80%		
Dimension (H x W x D)	69 x 309.3 x 271.5 mm / 2.74 x 12.18 x 10.69 inch		
Weight	2.9 kg / 6.39 lbs		



Chroma 27014 FPD Tester is a complete test solution that meets the requirements for LCM tests and production line and control by friendly remote keypad integrate the video generator, multi-channel precision power supply and process control unit for LCM signals, patterns and electricity tests.

Users can use software to edit the test program according to the LCM task features to create a comprehensive and effortless test mode for production improvement.
Chroma 27014 FPD Tester has the following test functions:

Test Program Editing: It sets the parameters of Turn On / Turn Off, Timing, Pattern and O.C.P. / O.V.P. / U.C.P. / U.V.P. following the LCM specification to offer a complete and accurate test.

Screen Quality Test: It has built in standard patterns for use, or users can create the required geometric patterns by assembling the Icons randomly or input the natural picture with BMP extension. With the pattern preview function, it is very convenient to edit it.

Timing Setting and Pattern Editing: Besides the default VESA timings and patterns available for use, users can define their own test timings and patterns for application.

KEY FEATURES

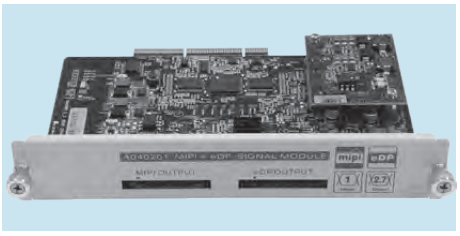
- Modular interface design for various panel test application
  - One LVDS module (option) + One MIPI / eDP / V-by-One signal module (option)
- Highly accurate programmable power
  - VDD 2 ~ 20V / 10A max, 36W max (24W max available on September)
  - VBL 2 ~ 25V / 20A max, 100W Max (100W max available on September)
  - Real-time voltage / current measurement
  - Programmable power protection function
  - On / off timing programmable
- Editable timing, pattern and power source for test program combination
- User friendly edit software available
- Cross coordinate defect positioning function
- Bitmap file display function
- Scrolling pattern display function
- eDP 1.4 Signal module (Option)
  - Support up to UHD (5K x 3K@60Hz)
  - 6 / 8 / 10 bit color depth
  - 1.62 / 2.16 / 2.43 / 2.7 / 3.24 / 4.32 / 5.4Gbps per lane
  - 1 / 2 / 4 / 8 Link
  - 0 / 3.5 / 6 / 9.5 dB pre-emphasis
  - 200 / 250 / 300 / 350 / 400 / 450 / 600 / 800 / 1000mV Swing level
  - PSR1 test function



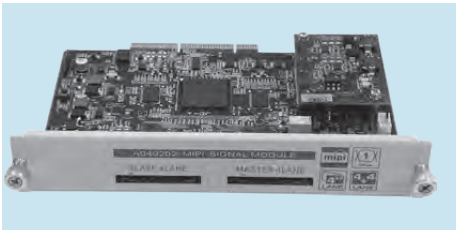
ORDERING INFORMATION

* **27014** : FPD Tester
* **eDP+MIPI Signal Module**
* **MIPI Signal Module**
* **V-by-One Signal Module**
* **eDP 1.4 Signal Module**
* **LVDS Output Module**

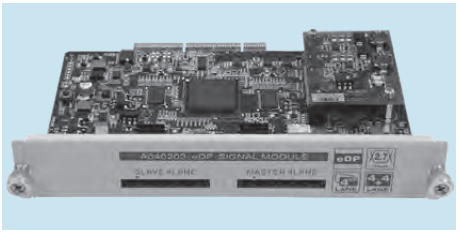
* Call for availability



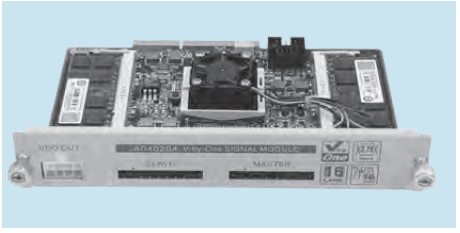
eDP+MIPI Signal Module



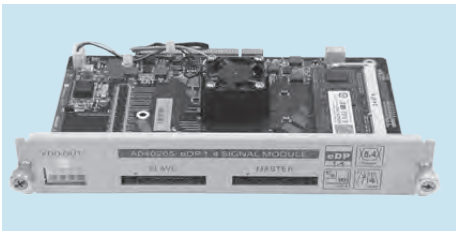
MIPI Signal Module



eDP Signal Module



V-by-One Signal Module



eDP 1.4 Signal Module



Remote Control Box

All specifications are subject to change without notice.

SPECIFICATIONS

Model	27014
Main Frame	
Configuration	Embedded MCU with FPGA graphic engine
Signal interface	Slot front: Option for eDP / MIPI / V-by-One Slot upper: Option for LVDS 4 ch
I^2C x 1 (VBL output connector)	Floating / 0V / 3.3V / 5 V programmable
Inverter On/Off Control (VBL output connector)	0V / 3.3V / 5V programmable
Analog Vdim control (VBL output connector)	0~8 V (20mA), 0.1Vstep programmable
Digital Vdim control (PWM) (VBL output connector)	3.3V / 5V Frequency 100~15K Hz / 1 Hz step Duty cycle 0~100% +/-1%

Data Store	
Timing	50
Pattern	Logic: 300 BMP: 8G Memory (999 BMP files max)
Program	50
Power	50
Communication I/O	
Remote / PC	D-Sub 15
Application Functions	
Cursor	Display x, y coordinates and RGB values
Motion Pattern	Moving direction and speed programmable

VDD Output	
Voltage range	2 ~ 20V / 10A max, 36W max
Resolution	0.1 V/ step
Accuracy	1% F.S.
Voltage ripple and noise	Under 100mV@20MHz
Rising time	1ms <Tr < 30ms
Falling time	< 30ms @ full load
Protection	OCP / OVP / UCP / UVP / OPP
Measurement range	OVP / UVP: 0~ 22V OCP / UCP: 0~ 11A OPP: 40W Protection delay range: 0~1000 ms programmable
Measurement accuracy	Voltage: ±1% F.S. Current: ±2% F.S.
Maximum remote sense	Maximum remote sense line drop compensation is 1V (If the voltage is compensated to maximum voltage, the voltage is no longer compensated)

VBL Output	
Voltage range	2 ~ 25V / 20A max, 100W Max
Resolution	0.1 V/ step
Accuracy	1% F.S.
Voltage ripple and noise	Under 100mV@20MHz
Rising time	1ms <Tr < 30ms
Falling time	< 50ms@full load
Protection	OCP / OVP / UCP / UVP / OPP
Measurement range	OVP / UVP: 0~ 27V OCP / UCP: 0~ 22A OPP: 100W Protection delay range: 0~1000 ms programmable
Measurement accuracy	Voltage: ±1% F.S. Current: ±2% F.S.
Maximum remote sense	Maximum remote sense line drop compensation is 1V (If the voltage is compensated to maximum voltage, the voltage is no longer compensated)

MIPI + eDP Signal Module	
MIPI	
Compliant	MIPI DSI v1.02.00 spec
Resolution	1920 x 1200@60Hz max
Lane count	1 / 2 / 3 / 4 Lane
Pixel format	RGB-565 / RGB-666 / RGB-888
eDP	
Compliant	eDP v1.3 spec
Resolution	2560 x 1600@60Hz max
Lane count	1 / 2 / 4 Lane
Color Depth	6 / 8 / 10 bits
Lane rate	1.62 / 2.7 Gbps

MIPI Signal Module	
Compliant	MIPI DSI v1.02.00 spec
Resolution	1920 x 1200@60Hz max(4 lane) 2560 x 1600@60Hz max(8 lane)
Lane count	1 / 2 / 3 / 4 / 8 Lane
Pixel format	RGB-565 / RGB-666 / RGB-888

eDP Signal Module	
Compliant	eDP v1.3 spec
Resolution	2560 x 1600@60Hz max (4 lane) 3840 x 2160@60Hz max (8 lane)
Lane count	1 / 2 / 4 / 8 Lane
Color Depth	6 / 8 / 10 bits
Lane rate	1.62 / 2.7 Gbps

V-by-One Signal module	
Resolution	5120 x 2880@60Hz max
Lane count	16 / 8 / 4 lane
Color Depth	8 / 10 bits
Data mapping	Non / 2 / 4 / 8 division

eDP 1.4 Signal Module	
Compliant	eDP v1.4 spec
Resolution	4096 x 2160 @ 60Hz max (4 lane) 5120 x 2880 @ 60Hz max (8 lane)
Lane count	1 / 2 / 4 Lane
Color Depth	6 / 8 / 10 bits
Lane rate	1.62Gbps / 2.16Gbps / 2.43Gbps / 2.7Gbps / 3.24Gbps / 4.32Gbps / 5.4Gbps Lane
Pre- Emphasis	0 / 3.5 / 6 / 9.5 dB selectable
Swing Level	200mV / 250mV / 300mV / 350mV / 400mV / 450mV / 600mV / 800mV / 1000mV selectable

LVDS Output Module	
Resolution	4096 x2160 @ 60Hz max
LVDS mode	VESA / JEIDA
Color Depth	6 / 8 / 10 bits
Link mode	4 Channel 1 Link : 10-150 MHz 2 Link : 20- 300 MHz 4 Link : 40- 600 MHz

Others	
AC Input	1Ø 100~240Vac ± 10% V_{LN}, 47~63 Hz
Operating temperature	10 ~ 40 °C
Storage temperature	0 ~ 80 °C
Humidity	20 ~ 90%
Dimensions (W x H x D)	210 x 300 x 100 mm
Weight	5 kg / 11 lbs

All specifications are subject to change without notice.



KEY FEATURES

- For full HD measurement
- True Color computer base LCM Testing
- LVDS/TTL(OPT)/TMDS signals support (29130 LVDS 8 bit only)
- Display Up to WUXGA @ 60Hz
- Precise programmable DC source
- Extension Power control (option)
- Power protection OVP/OCP/UVP/UCP
- Voltage/Current measurement
- GO/NOGO fast measurement
- Easy for Timing/Pattern/Program editing
- Unlimited Timing/Pattern/Program storage
- EDID read/write/compare
- LCM failure code editing & record
- Cross Mark for cell checking
- JPG/BMP/AVI/MPEG file support
- Keypad operation
- Special I/O
- Network management function (option)
- Production line process control and data collection

The Chroma 29133/29135 LCM Automatic Test System (ATS) which is structured in computer based system with powerful on-line network function and easy-to-use interface is designed to fulfill the key requirements of LCM tests and the production line management theory from factory. By integrating the video generator, multi-channel precision power supply and process control unit, the LCM ATS is capable of providing complete test solutions for LCM signals, patterns and electricity.

The test programs performed by LCM ATS tasks can be edited by the embedded test editor. The mouse and remote keypads used by the test program editor give the production line a most complete and convenient test mode to expedite the productivity. The test functions Chroma 29133/29135 LCM ATS have are:

RS-232 USB CE LVDS Power Full HD 1080

(1) Test Program Editor: It contains the parameters settings of power Turn On/ Turn Off, scanning timing, pattern, over and under voltage/ current protection (OCP/OVP/UCP/UVP), and real-time voltage Ramp Up/Ramp Down based on the LCM electricity specifications for accurate and comprehensive tests.

(2) Screen Quality Test: Besides the built-in standard patterns, users can define the geometry patterns that composed of various ICONs; moreover, the natural picture file with BMP/JPG filename extension can be imported. In addition the animation function is available for the LCD Response time test. All patterns can be scaled automatically according to the LCM resolution to facilitate the pattern editing preview function.

(3 Timing Setting and Pattern Editing: It provides VESA timings and patterns; furthermore, the user-defined test timings and patterns can be created as per request. The LVDS / TMDS / TTL (OPTION) signals required by LCM are offered as well.

(4 Output voltage, current measurement and judgment: The system has 3 programmable DC power outputs 15V/4A, 16V/1A to provide the power source required by LCM control chip, driver chip and backlight module through the RS-232 interface.

(5 Test Methods: Mouse and keypad are used to control the cross mark for cell checking and log during test, also the LCM defect types can be built by the test patterns that minimize the test time intensely. Thus the test can be done rapidly no matter it is applied in R&D or production line.

(6) Network Management Control(Option): The system administrator is able to perform the test program maintenance and management, hardware configuration, data upload/download, computing and EDID read/write/compare network on-line function via the network interface for production status control at the first time as well as analysis of production, efficiency and yield rate.

The Chroma 29133/29135 LCM ATS utilizes the computer based system to integrate the signal source /power source for LCM patterns and electricity specification tests, also equips with easy-to-use system program for Timing/Pattern/ Power/Program editing, mouse or keypad for LCM defect log, system self test for electricity judgment and rapid selection for defect types greatly reduce the test time in production line.

LCM Master II Software



Main Test Screen

- Model and Test Program Mapping Setting
- System layout and on-line status for factory production line
- Visualization management in factory to show real time information
- Real time production line fail rate display, warning appears when the failure rate is too high
- VDD/VBL voltage/current setting, real time reading for 2D display, and high speed auto voltage/current maximum/minimum judgment and warning
- Display all of the information required including, model, test date and time, detected date, production area, fail status, and etc.



Pattern Edit Screen

- More than 23 types of ICON for patterns creation
- Various ICON composition for logic computing
- Support BMP / JPG file format
- Various resolution auto scaling
- Support animation
- Real time preview function



Timing Edit Screen

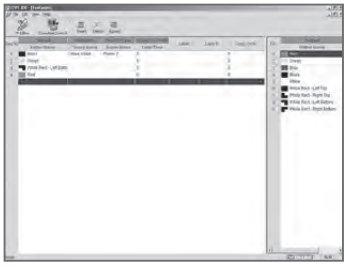
- H / V Display, Sync, Back-Porch, Front-Porch,setting
- H / V Sync Polarity ± setting
- LVDS / TMDS / TTL output setting
- Pixel rate setting
- 1 / 2 Clock Mode, 6 / 8 / 10 bit link setting
- Bit Rotate setting

All specifications are subject to change without notice.



Power Edit Screen

- 3 channel DC source setting
- OVP / OCP / UVP / UCP setting
- Vdd / Signal / Vbl On / Off sequence setting
- Vdd / Vbl / Idd / Ibl spec judgment
- Power Sweep setting



Test Program Edit Screen

- Provide TIMING / PATTERN / POWER for LCM test programs creation
- Provide Loop function
- Provide Pre-test function

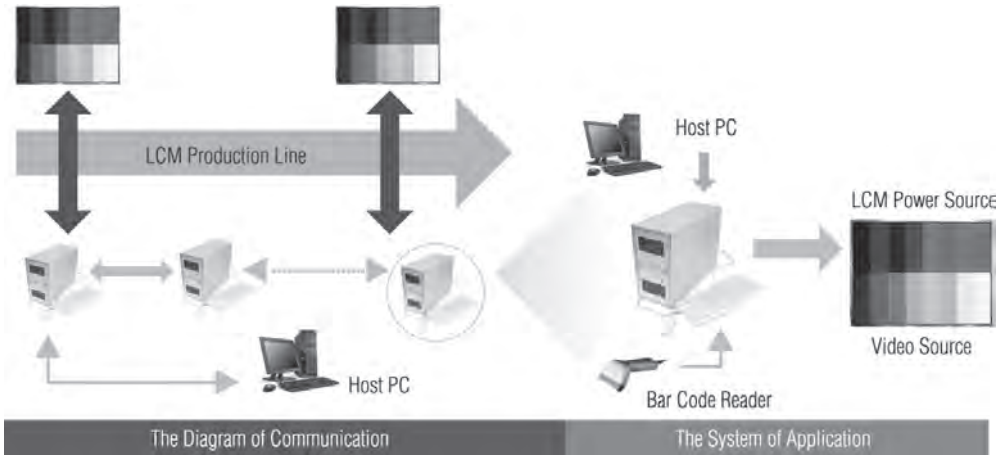
ORDERING INFORMATION

29133 : LCM Automatic Test System
29135 : LCM Automatic Test System
A270111 : LVDS to TTL Signal Adapter
A270143 : Signal Conversion Board
A712306 : Flicker Measuring Probe (for LCM ATS)
Network management function of software



A270111

The application of LCM ATS



SPECIFICATIONS			
Model	**29133**	**29135**	
LVDS Interface			
Resolution	640x480; 800x600; 1024x768; 1152x864; 1280x768; 1280x960; 1280x1024; 1400x1050; 1600x900; 1600x1024;1600x1200; 1920x1080; 1920x1200; 1280x800; 1366x768;1280x854		
Pixel Rate	1 link 135/2 link 162MHz	1 link 135/2 link 270MHz	
Signal	6 / 8 / 10 bit (10 bit for Gray Scale)		
H,V Sync Polarity	+ or -		
Video signal output can turn ON OFF by software			
DVI Interface			
Resolution	640x480; 800x600; 1024x768; 1152x864; 1280x768; 1280x960; 1280x1024; 1400x1050; 1600x900; 1600x1024;1600x1200 ; 1920x1080 ; 1920x1200; 1280x800; 1366x768;1280x854		
Pixel Rate	Up to 162MHz		
Interlace	Interlace or Non-Interlace		
H,V Sync Polarity	+ or -		
Video signal output can turn ON OFF by software			
Internal Power Source			
Channel	**Channel 1**	**Channel 2**	**Channel 3**
Output Voltage	2 ~ 15V	3 ~ 16V	3 ~ 25V
Output Current	0 ~ 4A	0 ~ 1A	0 ~ 3A
Programmable Resolution			
Output Voltage	5mV	5mV	12.5mV
Current Protect	1mA	1mA	1mA
Meter Ratings			
Read back Voltage	0 ~ 20V	0 ~ 20V	0 ~ 30V
Read back Current	0 ~ 5A	0 ~ 2A	0 ~ 4A
Meter Resolution			
Read back Voltage	2mV	2mV	4mV
Read back Current	0.3mA	0.2mA	0.4mA
On / Off Sequence Resolution			
Turn-On/Off	1ms	1ms	1ms
V-dim function			
Vdim	PWM function		
	Freq: 100~500Hz / 1Hz step;		
	Duty: 0%~100%;		
	Level: 5V / 3.3V programmable		
	Analog function 0~8V / 0.1V step		
Others			
AC Input Voltage	1Ø 110~240V ±10% V_{LH}		
AC Input Frequency	47~63 Hz		
Operation Temperature	10~30˚C		
Operation Humidity	Max. 70%		



RS-232 USB CE LVDS 240Hz Power Full HD 1080 LED Backlight

KEY FEATURES

- LCM signal and power source test systems
- LVDS 4 channel output
- LVDS pixel rate Signal :
  135MHz
  Dual 270MHz
  4 Link 540MHz
- The resolution up to 1920x1080/240Hz
- LVDS data Even/Odd switch support
- MPEG/AVI/GIF Playback
- Easy transfer pattern file to BMP file
- Output voltage and current measurement
- Output 8 channel DC Power
- Power protection OVP/OCP/UVP/UCP
- EDID read/write/Compare
- External control interface I²C/SMBUS/PWM individually
- Network function base on fast Ethernet (option)
- GO/NOGO fast measurement
- Operator authority control
- High efficient GUI for easy operation
- Production line process control and data collection

Chroma 2916 is a high performance, highly stable LCM Automatic Test System with modular design that can work with different signals and power modules flexibly to compose the test conditions required. It integrates the signals and power source with powerful network function and friendly interface that make it suitable for the production tests of various sizes LCMs including the standard signal source required, pattern inspection and voltage/current measurements. Chroma 2916 is an integrated LCM ATS equipment that is most applicable for production test, quality inspection or automatic system integration.

This equipment mainly supports LVDS signals with optional TMDS signal converters available for purchase to meet the standard test signals requirement for various panels and digital displays of today.

2916 LCM ATS has the following test functions:

LVDS Signal Output

It supports Signal, Dual, Quad Link output test with pixel rate up to 600MHz. The test screen resolution supports up to 1920x1080 @240Hz (refresh rate) that complies with the test specification of Full HD high multiple frequency transmission technology nowadays.

Editing Timing, Pattern & Test Sequence

Chroma 2916 supports standard JEIDA/VESA Timing Format. Users can select the timing parameters directly or build them as need.

Through the combination of Icon, the geometry patterns required for diversified tests can be built, also the natural patterns with the extension of BMP/JPG can be inputted. In the meantime it supports MPEG/AVI/GIF play format for animation and provides LCD Response time test. All patterns can be scaled based on the LCM resolution and previewed by pattern editor.

Besides the LVDS signals required for LCM test, the LCM electricity specification can be followed to provide parameter settings of Turn On/Turn Off, Scan Timing, Pattern, supply voltage/current high/low limit protection (OCP/OVP/UCP/UVP) and voltage Ramp Up/Ramp Down for the most complete and accurate LCM test.

Multiple High-Precision DC Power Supply

This system has many modulized external power supplies that are applicable for various kinds of panel sizes. It supports 8 sets of direct power output to provide the power required by LCM control chip, driver chip and backlight module via USB standard interface. Each output contains the actual readings of voltage and current. Its unique design can move the measurement point to load to prevent the transmission voltage drop also ensure the measurement accuracy reaches mV level for complete analysis of LCM working status. Meanwhile each output channel is able to simulate the timing relationship of power on/off, the Ramp-up/down waveform output and over voltage/current protection function. When the status exceeds the setting, in addition to the protection, LED and beeps are activated to remind users to fix it.

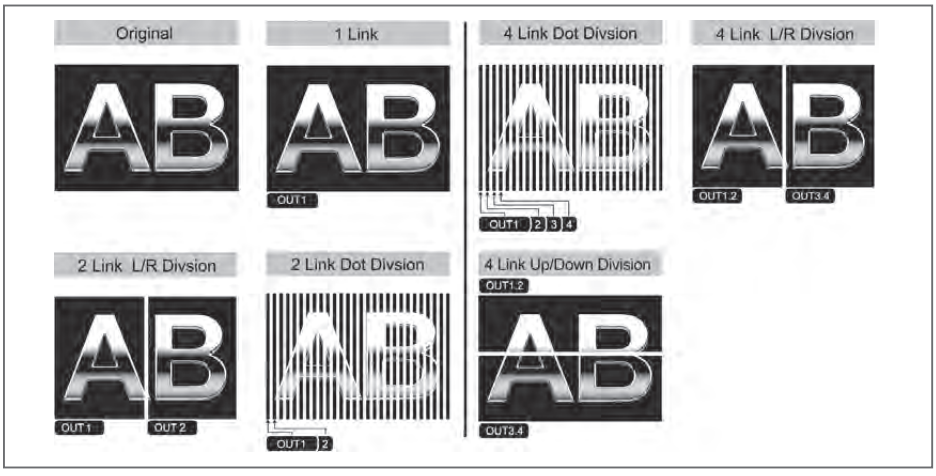
Environment & Network Control (Optional)

For production test, Chroma 2916 allows the administrator to preset the operator's access permission and unify the system management mode to reduce the human operation error. The user friendly graphic interface is very easy to use. Mouse and keypad can be utilized to control the cross coordinate defect positioning check and log during test. Moreover, the information including the LCM defect types and levels as well as all kinds of test report analysis are able to build and generate via the interface. Thus tests can be done in the fastest way to cut down the test time significantly no matter it is applied to R&D or production line.

To fulfill complete test application and management on the production line, network interface is used to maintain and manage the test programs, configure the hardware, upload/download data, compile statistics and write in EDID so that the system administrator can control the production status effectively from remote distance for productivity, efficiency as well as yield rate review. The system also has other external control interfaces such as I²C/SMBUS/PWM to extend the functions and enhance the system flexibility.

2916 LCM ATS is structured based on PC under the OS of Windows XP to give users an easy and familiar operating environment. With powerful software support and user-friendly operation interface to edit Timing/Pattern/Power/Program, the system is able to judge the electrical specification automatically and select the defect type rapidly to save the test time. In addition the test result can be exported to network easily for data gathering and analysis via network management function to provide an excellent solution for production management.

4 Link Data Mapping



All specifications are subject to change without notice.

SPECIFICATIONS

Model	2916 (CE)
LVDS Interface	
Resolution	640x480; 800x600; 1024x768; 1152x864; 1280x768;1280x960;1280x1024;1400x1050; 1600x900; 1600x1024; 1600x1200; 1920x1080; 1920x1200; 1280x800; 1366x768; 1280x854; 2560x1600
Pixel Rate	1 Link up to 135 MHz 2 Link up to 270 MHz (135 MHz x 2) 4 Link up to 540 MHz (135 MHz x 4)
Signal	6/8/10 Bit and support bit rotate (10 Bit for Gray Scale)
H,V Sync Polarity	+ or -
Connector	10 Bit Four Link by MDR36 x 2
Video signal output can turn ON OFF by software	

General Specifications	
AC Input Voltage	1Ø 110~240V ±10% V_{LH}
AC Input Frequency	47~63Hz
Operation Temperature	10~40˚C
Operation Humidity	Max. 70%
Dimension & Weight	
2916 Main System	
Dimension (HxWxD)	156.4x320x430 mm / 6.16x12.6x16.9 inch
Weight	8 kg / 17.62 lbs
A291600 Signal Module	
Dimension (HxWxD)	50x320x230 mm / 1.96x12.59x9.06 inch
Weight	1.7 kg / 3.8 lbs
A291512 Power module	
Dimension (HxWxD)	206.4x100x430 mm / 8.12x3.937x16.92 inch
Weight	4.6 kg / 10.1 lbs
2916LCM ATS (2916+A291600+A291512)	
Dimension (HxWxD)	206.4x420x430 mm / 8.13x16.54x16.93 inch
Weight	14.3 kg / 31.5 lbs

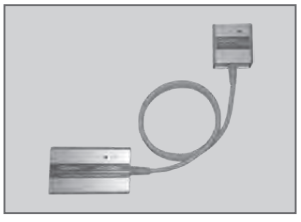
Power Source			
Channel	DC1	DC2	DC3~DC8
Output Voltage	2-25V	5-25V	0-5V
Output Current	0-4A	0-26.5A	0-1A
Programmable Resolution			
Output Voltage	20mV	20mV	-
Current Protect	5mA	20mA	-
Meter Ratings			
Read back Voltage	0-30	0-30V	-
Read back Current	0-5A	0-30A	-
Meter Resolution			
Voltage	20mV	20mV	-
Current	5mA	20mA	-
On / Off Sequence Resolution			
Turn-On/Off	1ms	1ms	1ms
I^2C BUS Function			
SDA	3.3 / 5V / device select		
SCL	50~100KHz		
DIM Function			
Analog	Analog function 0~8 / 0.1V step		
V-PWM Function			
Vpwm	3.3 / 5V / FV Selectable		
Fout	100~15KHz		
Dout	0~100% 1% Step		
SMBUS Function			
SDA	3.3 / 5V / device select		
SCL	10~100KHz		

ORDERING INFORMATION

2916 : LCM Automatic Test System
A270143 : Signal Conversion Board
A291600 : Signal Module LVDS 135/270/540 MHz
A291512 : Power Module 780W
A712306 : Flicker Measuring Probe (for LCM ATS)
Network Management Function of Software


A291600


A291512


A712306



RS-232 USB CE LVDS 240Hz Power Full HD 1080 LED Backlight

KEY FEATURES

- LCM signal and power source test systems
- Easy for Timing / Pattern / Program editing
- Suitable for Full HD measurement
- The Resolution up to 1920x1080@240Hz, 3840x2160@60Hz
- LVDS 8 channel output
- MPEG/AVI Playback
- High accurate programmable DC source
- Output voltage and current measurement
- Power protection OVP/OCP/UVP/UCP
- EDID read/write
- Cross coordinate defect positioning function
- Network management function (OPT)
- In-line process control and data collection
- Operator authority control
- GO/NOGO fast measurement
- High efficient GUI for easy operation

The technology development of liquid display has been moving toward the features of large scale, high quality, high contrast and fast dynamic response recently that made the Full HD (1920X1080) high resolution specification become a new mainstream in the market. In order to meet the test requirements of today's industries, Chroma 2917 LCM ATS is structured in modulized with integrated signals and power source. The powerful on-line network function and easy-to-use interface are equipped to fulfill the test requirements such as all kinds of standard signal sources, test patterns and voltage/current measurements for various sizes of LCM.

This ATS provides LVDS signals and users can set the settings through mouse and Remote Keypad in accordance with the LCM features to give the production line a most complete and convenient test mode to expedite the productivity. The test functions Chroma 2917 LCM ATS have are:

Modulized Design

To cope with the test requirements of various sizes panels, the design concept of modulization is applied to fit in the specifications of different signals and power modules for application.

Test Program Editor

It contains the parameters settings of power Turn On/ Turn Off, scanning timing, pattern, over and under voltage/current protection (OCP/OVP/UCP/UVP), and real-time voltage Ramp Up/Ramp Down based on the LCM electricity specifications for accurate and comprehensive tests.

Screen Quality Test

Besides the built-in standard patterns, users can define the geometry patterns that composed of various ICONs; moreover, the natural picture file with BMP/JPG filename extension can be imported. In addition the animation function is available for the LCD Response time test. All patterns can be scaled automatically according to the LCM resolution to facilitate the pattern editing preview function.

Timing Setting and Pattern Editing

The ATS allows users to define the test timings and patterns for application as need and provides LVDS signals for comprehensive LCM tests by setting the signal/power supply activation time. Other signals like TMDS / TTL / ANALOG (option) can also be applied for testing.

Output voltage, current measurement and judgment

This system has multiple modulized external power supplies that can be used for different sizes of panels / LED backlight constant current sources (option) and to provide the power source required by LCM control chip, driver chip and backlight module through the USB interface. Also Provide the optional of multi-channel metering system for readback applications.

Test Methods

Mouse and keypad are used to control the cross mark for cell checking and log during test, also the LCM defect types can be built by the test patterns that minimize the test time intensely. Thus the test can be done rapidly no matter it is applied in R&D or production line.

Network Management Control

The system administrator is able to perform the test program maintenance and management, hardware configuration, data upload/download, computing and EDID read/write network on-line function via the network interface for production status control at the first time as well as analysis of production, efficiency and yield rate.

Chroma 2917 LCM ATS integrates the signal source/power source for LCM patterns and electricity specification tests. The user-friendly interface along with simple system programs can be used to edit the Timing / Pattern / Power / Program while the mouse or keypad can be used to log the LCM defects. Moreover, the PC based platform can fully utilize the network function for data collection and analysis that makes it most applicable for production line management.

High Performance Hardware Devices

Chroma 2917 LCM ATS is structured in modulized with integrated signals and power source. The powerful on-line network function and easy-to-use interface are equipped to fulfill the test requirements such as all kinds of standard signal sources, test patterns and voltage/current measurements for various sizes of LCM.

Main Unit

- Support 2 port LAN
- Integrated all test signals with LVDS
- Provide LVDS Signal Output
- Support 2 / 4 / 8 ch Data Output



Power Module Series A291710

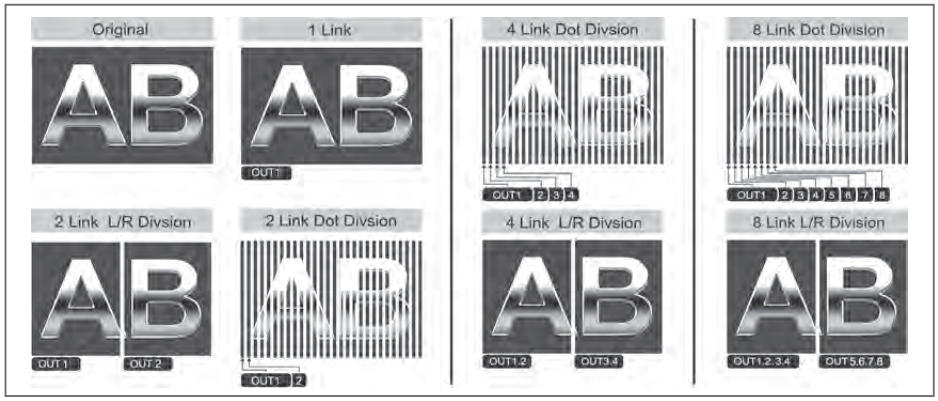
- 4~8 channel Power Source (Depend on Model)
- OCP/UCP/OVP/UVP Protection
- SM Bus, I²C external data read and write functions



Signal Conversion Board A270143(option)

- Extension of the 29135 LCM ATS for eDP/MIPI tests
- Signal Conversion Board modular design
- Compatible eDP V1.3 Standard
  - Auto / Manual Training
  - Lane rate selectable: 1.62 / 2.7 Gbps
  - Lane count selectable: 1 / 2 / 4 Lane
  - Color depth: 8 /10 bits
- Compatible MIPI DSI V1.02.00 spec
  - Auto / Manual Training
  - Lane rate selectable: 1 Gbps
  - Lane count selectable: 1 / 2 / 3 / 4 Lane
- Output resolution up to
  - eDP up to 2560x1600 @ 60Hz (Max)
  - MIPI up to 1920x1080 @ 60Hz (Max)
- Able to provide 2 sets of eDP / MIPI standard signal source simultaneously
- Test images support BMP format output

4/8 Link Data Mapping



All specifications are subject to change without notice.

- Easy-to-use graphical interface
- Production line process control and data editing



LVDS to eDP Signal Conversion Module A270147 (option)

The Chroma A270147 is a signal conversion module that converts the LVDS to eDP signal, the eDP output support up to 5.4Gbps/lane and comply with eDP1.4 standard, extension of the 2917 LCM ATS for eDP testing.

- Signal Conversion Board modular design
- LVDS input: 8 links up to 1.2Gbps
- Compatible eDP V1.4 Standard
  - Resolution: 4096 x 2160@60Hz max
  - Lane rate : 1.62Gbps / 2.16Gbps / 2.43Gbps/ 2.7Gbps /3.24Gbps / 4.32Gbps / 5.4Gbps Lane selectable
  - Lane count : 1 / 2 / 4 Lane selectable
  - Color depth : 6 / 8 /10 bits
  - Function : HPD / EDID
- Able to provide 2 sets of eDP standard signal source simultaneously



Flicker Measuring Probe A712306 (option)

The Chroma A712306 Flicker Measuring Probe for LCM ATS is specifically designed for adjusting the flicker on LCM automatically following the FMA(Flicker Modulation Amplitude) standards defined by VESA (Video Electronics Standards Association) and JEITA(Japan Electronics Information Technology Industries Association) for flicker measurement. It can work with the Chroma 291X Series LMC automatic test system to complete auto flicker adjustment.

- Able to integrate with LCM ATS for LCM auto flicker adjustment
- Capable of integrating Chroma 29XX Series LCM Auto Test System
- Support FMA and FLVL flicker measurement mode
- Have a patented adjustment algorithm, making adjustment speed faster
- Capable of editing adjustment script when using with LCM Master



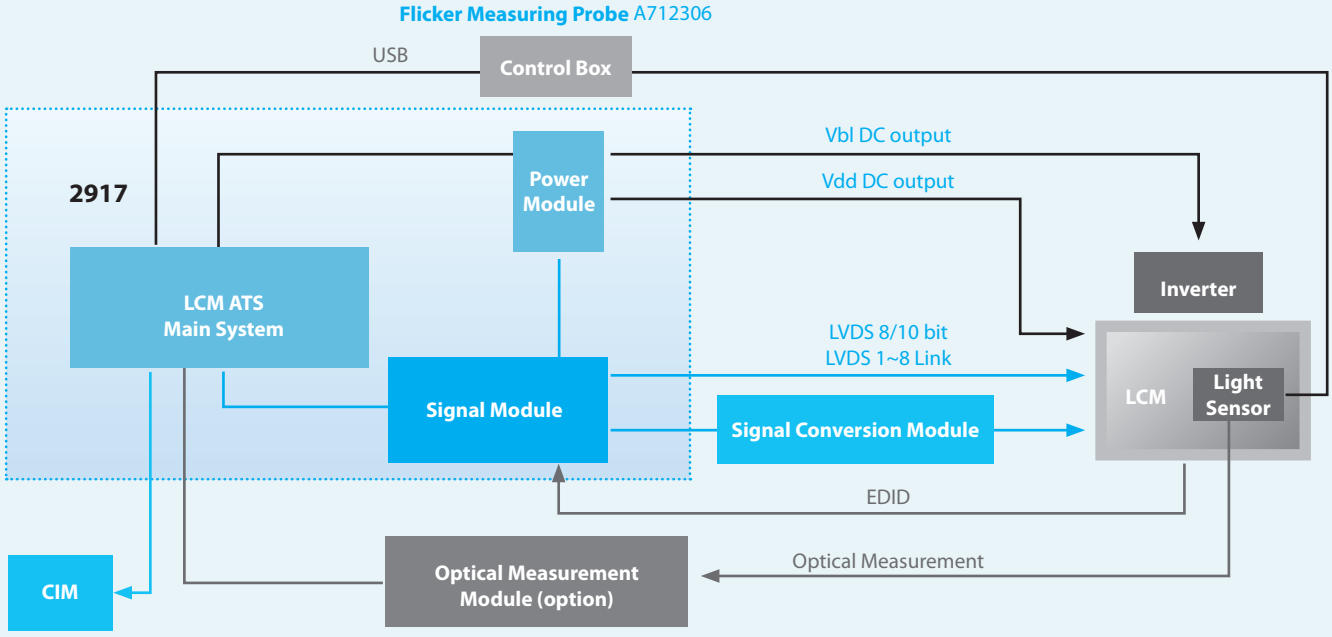
V by one SG & Power Module A040105 (option)

The Chroma A040105 is a signal conversion module that converts the LVDS to V by One signal with additional sets of IO signals for panel control. V-By One signal is defined as the next generation of LCM video signal transmission interface to provide high bandwidth and long distance signal transmission.

- Extension of the 2917 LCM ATS for V by one testing
- Signal/power source integrated design
- Support 3840 x 2160 resolution
- Support 8 channel LVDS input and outputting 16 Lanes V by one
- Support 16 Lanes Channel Data mapping function (follow up V by One V1.3)



2917 System Application Block Diagram



ORDERING INFORMATION

2917 : LCM Automatic Test System
A040105 : V by one SG & Power module
A270143 : Signal conversion board
A270147 : eDP signal conversion module
A270148 : eDP bist module
A291710 : Power module 650W
A712306 : Flicker measuring probe (for LCM ATS)
7123 : Display color analyzer main unit
Network Management Function of Software

All specifications are subject to change without notice.

• Continued on next page ➟

SPECIFICATIONS

Model	2917
LVDS Interface	
Resolution	640x480; 800x600; 1024x768; 1152x864; 1280x768; 1280x960; 1280x1024;1400x1050; 1600x900; 1600x1024; 1600x1200; 1920x1080; 1920x1200; 1280x800; 1366x768; 1280x854; 2560x1600; 3840x2160
Pixel Rate	1 Link up to 135 MHz 2 Link up to 270 MHz (135 MHz x 2) 4 Link up to 540 MHz (135 MHz x 4) 8 Link up to 1.08GHz (135 Mhz x 8)
Signal	6/8/10 Bit and support bit rotate (10 Bit for Gray Scale)
Data Swap	+ or -
H,V Sync Polarity	+ or -

General Specifications	
AC Input Voltage	1Ø 110~240V ±10% V_{LH}
AC Input Frequency	47~63Hz
Operation Temperature	10~40˚C
Operation Humidity	Max. 70%
Dimension & Weight	
2917 Main System	
Dimension (HxWxD)	20.64 x 32 x 43 mm / 8.12 x 12.6 x 16.92 inch
Weight	12.6 kg / 27lbs lbs
A291710 DC Power Source	
Dimension (HxWxD)	206.4 x 100 x 430 / 8.12 x 3.94 x 16.92 inch
Weight	4.6 kg/10.1 lbs
2917 LCM ATS (2917 Main System and A291710 DC Power Source)	
Dimension (HxWxD)	206.4 x 420 x 430 mm / 8.12 x 16.54 x 16.92 inch
Weight	17.2 kg / 37.1 lbs

Power Source			
Channel	DC1	DC2	DC3~DC4
Output Voltage	2-20V	5-50V	0-5V
Output Current	10A	22A	0-1A
Power Consumption	132W	500W	15W
Programmable Resolution			
Output Voltage	20mV	20mV	-
Current Protect	20mA	20mA	-
Meter Ratings			
Read back Voltage	0-22V	0-55V	-
Read back Current	0-11A	0-24.2A	-
Meter Resolution			
Voltage	100mV	100mV	-
Current	100mA	100mA	-
On / Off Sequence Resolution			
Turn-On/Off	1ms	1ms	1ms
I^2C BUS Function			
SDA	3.3 / 5V / device select		
SCL	50~100KHz		
DIM Function			
Analog	Analog function 0~12/0.1V step		
V-PWM Function			
Vpwm	3.3 / 5V / FV Selectable		
Fout	100~15KHz		
Dout	0~100% 1% Step		
SMBUS Function			
SDA	3.3 / 5V / device select		

Model	A270143
Main Board	
Input Video	LVDS 2 Link 25 ~ 135 MHz / 1 Link ; 50 ~ 270 MHz / 2 Link
Vdd(Vcc)	By pass from Tester
Input Power	DC +12V
Communication	USB
eDP Signal Module	
Compliant	eDP V1.3
Resolution	2560 x 1600 @ 60 Hz max
Lane rate	1.62 / 2.7 Gbps
Lane Count	1 / 2 / 4 Lane
Color depth	8 /10 bits
Function	HPD / EDID
MIPI Signal Module	
Compliant	MIPI DSI V1.02.00
Resolution	1920 x 1200 @ 60 Hz max
Lane rate	1 Gbps
Lane Count	1/2/3/4/4+4 Lane
Pixel format	RGB-565 / RGB-666 / RGB-888
Environment	
Operation Temperature	20 ~ 40˚C
Storage Temperature	-20 ~ 70˚C
Humidity	70%
Dimension (H x W x D)	43 x 190 x 164 mm
Weight	1 Kg / 2.2 lbs

Model	A270147
Main Board	
Input Video	LVDS 2 / 4 / 8 Link, 15 ~ 150 MHz / 1 Link, 30 ~ 300 MHz / 2 Link, 60 ~ 600 MHz / 4 Link, 20MHz ~ 1.2GHz / 8 Link
Vdd(Vcc)	By pass from Tester
Input Power	DC +12V
Communication	LAN
eDP Signal Module	
Compliant	eDP V1.4
Resolution	4096 x 2160@60Hz max
Lane rate	1.62Gbps / 2.16Gbps / 2.43Gbps / 2.7Gbps / 3.24Gbps / 4.32Gbps / 5.4Gbps Lane
Lane Count	1 / 2 / 4 Lane
Color depth	6 / 8 /10 bits
Function	HPD / EDID
Environment	
Operation Temperature	5~ 40˚C
Storage Temperature	-20 ~ 60˚C
Humidity	70%
Dimension (H x W x D)	34 x 147 x 211 mm
Weight	1 Kg / 2.2 lbs

Model		A712306
Measurement Area		Ø10mm
Measurement Distance		0 mm (contact measurement)
Measurement Range		10 lux ~1000lux
Measurement Mode		FMA , FLVL
Flicker -Contrast Measurement method (FMA)	Display Range	0.0 to 100%
	Accuracy	±2% (Flicker frequency : 30 Hz AC/DC 10 % sine wave) ±3% (Flicker frequency : 60 Hz AC/DC 10 % sine wave)
	Repeatability	1% (2σ) (Flicker frequency : 20 to 65 Hz AC/DC 10 % sine wave)
Flicker -JEITA Measurement method	Accuracy	±1dB (Flicker frequency : 30 Hz AC/DC 10 % sine wave)
	Repeatability	0.5dB (Flicker frequency : 30 Hz AC/DC 10 % sine wave)
Measurement time	FMA	0.5 sec / time
	JEITA	2 sec / time
Communication Interface		USB
Supported Software		LCM Master
Input Voltage		DC 5V, 500 mA
Operating Temp./Humidity		0˚C to 40˚C (32˚ F to 104˚ F) ; less than 90% relative humidity (non-condensing)
Storage Temp./Humidity		0˚C to 40˚C (32˚ F to 104˚ F) ; less then 90% relative humidity (non-condensing)

All specifications are subject to change without notice.



RS-485

ORDERING INFORMATION

67300 : Six Position 67300 Mainframe with 1 output BUS bar, 220V 1Ø
67300 : Six Position 67300 Mainframe with 2 output BUS bar, 220V 1Ø
67300 : Six Position 67300 Mainframe with 3 output BUS bar, 220V 1Ø
67300 : Six Position 67300 Mainframe with 6 output BUS bar, 220V 1Ø
A673002 : Six Position 67300 Mainframe with 2 output BUS bar, 220V/380V 3Ø
A673003 : Six Position 67300 Mainframe with 3 output BUS bar, 220V/380V 3Ø
A673004 : Six Position 67300 Mainframe with 6 output BUS bar, 220V/380V 3Ø
A673005 : Three Position 67300 Mainframe with 2 output BUS bar, 220V/380V 3Ø
67322 : DC Power Supply Module 5V/100A/600W
67346 : DC Power Supply Module 12V/90A/1484W
67366 : DC Power Supply Module 30V/50A/1500W



Module

KEY FEATURES

- Three models: 67322 5V/100A
  67346 12V/90A
  67366 24V/50A
- N+1 Redundancy Power System Ideal for Burn-in Applications
- High Power Density (464mW / cm^3)
- Hot-swappable
- Cost-effective
- Remote Sense, 1V Line Loss Compensation
- Remote ON/OFF Signal
- Remote RS-485 Interface Control
- Graphic Softpanel Control and Monitor (option)

Chroma's new 67300 Series of modular DC power supplies offer many unique features for Burn-in applications. The features include a N+1 redundancy power system, high power density, hot-swappable for maintenance, remote ON/OFF input signal as well as the ability to create a custom burn-in chamber system.

The 67300 Series contain 3 different modules ranging from 600W to 1500W, up to 100A and 30V. The 67300 mainframe allows encasing up to six modules for parallel or stand-alone operation that made it easy to expand up to thirty units of mainframe for high power applications via RS-485 control.

The Modular DC Power Supplies of 67300 Series are cost effective with high power density (464mW/cm^3). They are most suitable for burn-in applications such as the typical LCD panel, D2D converter, power inverter, notebook, battery charger, and etc.

Modern power factor correction circuitry is incorporated in 67300 Series to increase the input power factor above 0.98 to meet the IEC regulation. It not only reduces the input current requirement but also raises the efficiency over 80%. In addition, an optional graphic Softpanel connected via RS-485 is offered to control and monitor the power system which is a user friendly tool applicable for factory automation.

SPECIFICATIONS			
Model	**67322**	**67346**	**67366**
Electrical Specifications			
Output Ratings			
Output Voltage Range	2.5 ~ 6V	2 ~ 16V	2 ~ 30V
Default Voltage Setting	5V	15V	24V
Output Current	100A	90A	50A
Output Power	600W	1440W	1500W
Line Regulation	0.10%		
Load Regulation	5%		
Meter Accuracy	1% F.S.		
Noise (0-20MHz) : V (P-P)	100mV	100 mV	100 mV
Output Ripple (rms) : V	30 mV	30 mV	30 mV
Efficiency	> 80% @ Full Load		
Transient response time -Time	< 5 ms		
25% step change-Leve	Time for the output voltage to recover within 1% of its rated for a load changed of 25%		
Protection Function			
OVP	Automatically shuts down when over setting voltage plus 0.2V (67322) / plus 0.5V(67346 / 67366)		
OCP	0A - Full Scale setting current limit, CC mode		
OTP	Automatically shuts down		
I/O Signal			
Remote ON/OFF	Closed is enable, vice versa		
Remote Interface			
RS-485	Standard (Adjustable via DIP switch of each power supply)		
General Specifications			
Remote Sensing	1V line loss compensation		
Parallel Operation	Current Sharing (± 5%)		
Operating Temperature	-5˚C to 50˚C		
Humidity Range	0 ~ 90% RH. Non-condensing		
AC Input Voltage	220~230V ±10% V_{LN}, 47~63Hz		
Input Power Factor	> 0.98@ full load		
Weight	3.7 kg / 8.15 lbs		
Dimension (H x W x D)	132.5 x 67.5 x 376 mm / 5.22 x 2.66 x 14.8 inch		
Front Panel Overview			
Control Function	V&I display change buttom, main switch		
Indications LED	Normal, Warming, V, I, 7-segment LED		

LED/Lighting Test Solution

ESD Test System 6-1
LED Electrical Test Module 6-2
LED Chip Level Tester 6-3
LED Mapping Probe Tester 6-4
Packaged LED Test Sorter & Tapper 6-5
LED Burn-in Tester 6-7
LED Light Bar Test System 6-8
LED Light Bar Electrical Test System 6-9
LED Luminaires Test System (For Laboratory) 6-10
LED Luminaires In-line Test System (For Production) 6-11



ESD Test System



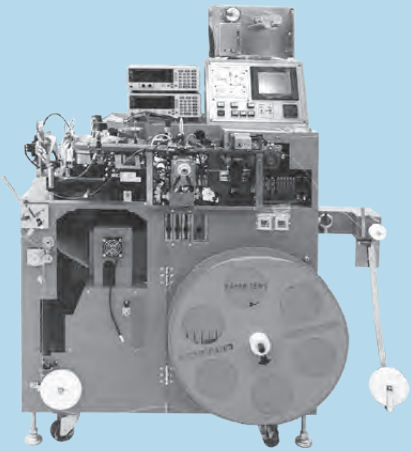
LED Electrical Test Module



LED Chip Level Tester



LED Mapping Probe Tester



Packaged LED Test Sorter & Tapper



LED Burn-in Tester



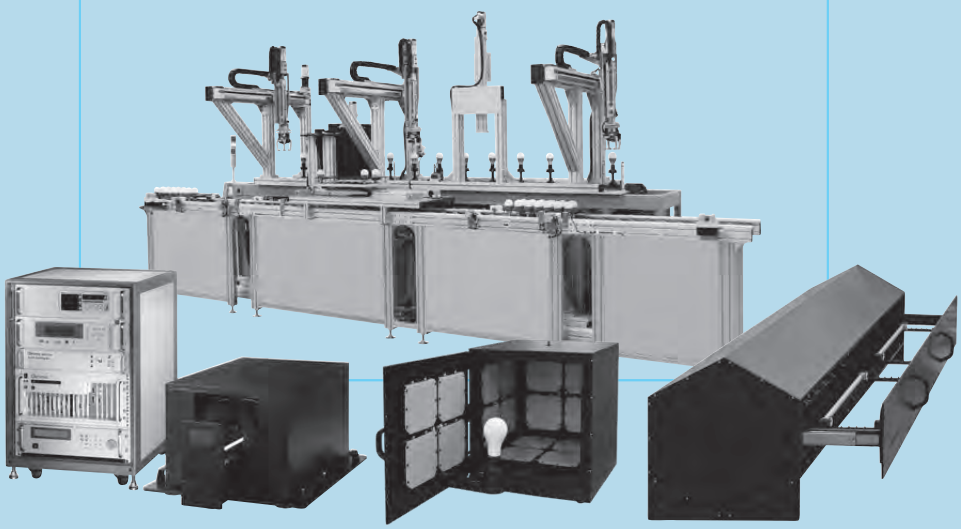
LED Light Bar
Electrical Test System



LED Light Bar Test System



LED Lighting Test System
(For Laboratory)



LED Luminaires In-line Test System
(For Production)



KEY FEATURES

- Two models ESD pulse generation : human body model and machine model
- Programmable auto test : pulse delay, cycle and polarity are programmable
- Resolution (58154) : 5V per-step for machine model, 20V per-step for human body model
- Resolution (58154-B) : 10V per-step for machine model, 30V per-step for human body model
- Resolution (58154-C) : 10V per-step for machine model, 30V per-step for human body model
- Diversity control interface : PCI DIO card
- Up to 8000V (58154-C)

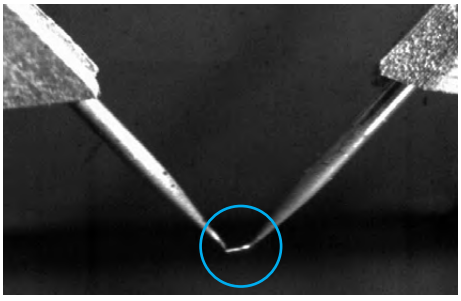
Chroma 58154 series ESD (Electrostatic Discharge) Test Systems are PCI controlled module to simulate electrostatic discharge pulse during electronic device testing. The 58154 series offer both ANSI/ESDA/JEDEC JS-001-2014-Human Body Model and ANSI/ESD STM 5.2-2012-Machine Model. The user friendly software offers programmable and flexible features, such as sampling test on a wafer, ESD model, ESD pulse polarity, ESD pulse interval in a sequence, and automatic testing function.

The 58154 series includes a control module and a pulse output external box. High voltage power supply unit (PSU) and pulse shaping circuits provide the ESD standards compliant pulse waveform.

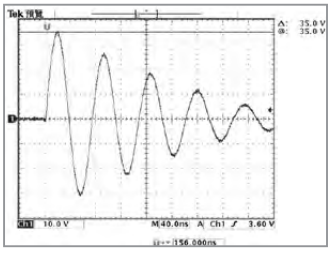
The 58154 series offer a flexible and total ESD test solution to customers. Furthermore, the ESD pulse is generally applied to the device under test before measuring device electric parameters and the 58154 series can be perfectly integrated with Chroma 58212-C to provide a total solution in production line.

ORDERING INFORMATION

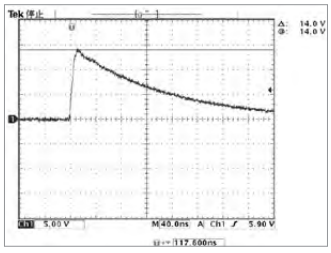
58154 : ESD Test System (4kV/400V)
58154-B : ESD Test System (6kV/800V)
58154-C : ESD Test System (8kV/800V)



ESD Test on LED chip



Machine Model waveform



Human Body Model waveform

SPECIFICATIONS			
Model	**58154**	**58154-B**	**58154-C**
Parameter	Value		
ESD Mode	Machine Model / Human body model		
Pulse Voltage	Machine model: 50V to 400V ± 5V Human body model: 250V to 4KV ± 20V	Machine model: 100V to 800V ± 10V Human body model: 250V to 6KV ± 30V	Machine model: 100V to 800V ± 10V Human body model: 250V to 8KV ± 30V
ESD Specification *1 *2	Machine model reference on STM5.2-2012 ; Human body model reference on ANSI/ESDA/JEDEC JS-001-2014		
Pulse Interval	20 ms *3 to 1 s (User definable)		
Pulse Repetition	Single or multiple		
Pulse Polarity	Positive or negative (software control)		
AC Input	100 to 240V, 47 to 63 Hz		
Dimensions	434.6mm(W) x 97.7mm(H) x 306.8mm(D)		434.6mm(W) x 97.7mm(H) x 450mm(D)
Weight	12 kg		

Pattern No. : I311648, I398655, ZL 2009 2 0148342.2
Pattern Name : Discharge and remote feedback integrated testing system
Note*1 : The test condition is under Chroma's probe tips
Note*2 : The accuracy of Chroma 58154 may vary in customer's setup conditions. To fix this problem, ESD tester needs to be tuned the value of the impedance to minimized waveform distortion, or customers provide their setup information in advance and Chroma tunes ESD testers before shipment to fit customer's test method.
Note*3 : The test condition is for Model 58154 and the operation is at fix pulse mode.

All specifications are subject to change without notice.



Chroma 58221-200-2 is a module specially designed to test the electrical features of LED in full range. It has all functions required for testing the LED electrical features. The 58221-200-2 supplies high accuracy current source up to ±200V/±120mA for High voltage (HV) and up to ±10V/±2A for High Power (HP). Besides the standalone operation the 58222-200-2 is featured in, the USB interface and other integrated design can also be applied for synchronous measurement.

ORDERING INFORMATION

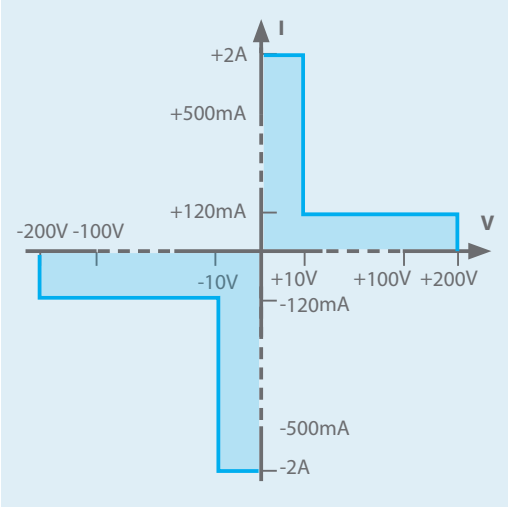
58221-200-2 : LED Electrical Test Module

KEY FEATURES

- Focuses on LED test application
- Cover High Voltage (HV) and High Power (HP) LED test requirement
- Build-in hardware sequencer
- Build-in program memory and data memory
- Support LED SCR characteristic detect function

TEST ITEMS

- Forward voltage (Vf)
- Reverse breakdown voltage (Vrb) Leakage (Ir)
- LIV
- I-V characterization



SPECIFICATIONS				
Model	**58221-200-2**			
Current Source Accuracy				
Range	Programming Resolution	Source Accuracy 23˚C±5˚C ±(Reading + Range)	Default Measurement Resolution	Measurement Accuracy 23˚C±5˚C ±(Reading + Range)
±20 μA	1nA	0.05% + 0.04%	1nA	0.05% + 0.04%
±500 μA	50nA	0.05% + 0.04%	50nA	0.05% + 0.04%
±20mA	1 μA	0.05% + 0.04%	1 μA	0.05% + 0.04%
±500mA	50 μA	0.08% + 0.04%	50 μA	0.08% + 0.04%
±2A	100 μA	0.05% + 0.1% (≥0.1A range) 0.1% + 0.3% (<0.1A range)	100 μA	0.05% + 0.1% (≥0.1A range) 0.08% + 0.1% (<0.1A range)
Voltage Source Accuracy				
Range	Programming Resolution	Source Accuracy 23˚C±5˚C ±(Reading + Range)	Default Measurement Resolution	Measurement Accuracy 23˚C±5˚C ±(Reading + Range)
±10V	1mV	0.03% + 0.02%	1mV	0.03% + 0.02%
±100V	10mV	0.03% + 0.02%	10mV	0.03% + 0.02%
±200V	10mV	0.03% + 0.02%	10mV	0.03% + 0.02%
General Specification				
Interface	USB/Stand alone			
Trigger	Available			
RAM (16 bits)	16M			
Operatoin Environment	0˚C~5˚C (32˚F~122˚F) ; Humidity : < 70% R.H. Non-condensing			
Max. Power Consumption (VA)	120VA			
Dimensions (WxHxD)	432x110x432 mm			
Weight (kg)	10			

LED Chip Level Tester

Model 58173-TC



The LED Test System Model 58173-TC focuses on LED wafer/chip characteristics analysis and provides optimized test performance. Its test items include a variety of voltage/current output measurement, optical power measurement, and spectrum analysis. On measurement, several electrical and optical characteristics analysis can be achieved at a time within 25 ms, and its electrical measurement supports high-voltage LED and high-brightness LED applications.

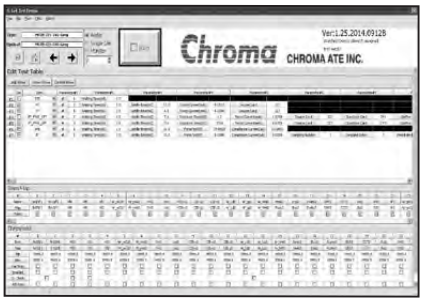
On system integration, the 58173-TC can easily integrate various Probers and Handlers for wafer probing and chip sorting. In addition, optional switch module allows test system to perform multi-channel and multi-chip measurements.

KEY FEATURES

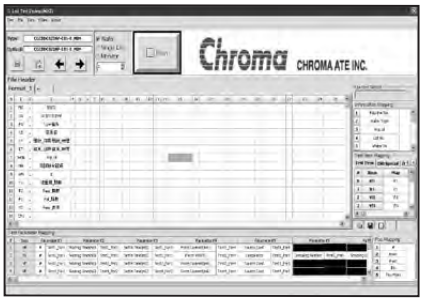
- High test speed: complete whole test within 25ms (selected test items)
- Super statble of temperature variation
- Support high voltage and high power LED test requirement
- Support multi-die test (option)
- Support ESD test (option)



Real-Time Production Information



Flexible Editable Test Parameters



Powerful Report File Editing

SPECIFICATIONS		
Model		**58173-TC**
Parameters		
Electiral Test Items		Forward Voltage(Vf), Reverse Leakage Current (Ir), Reverse Breakdown Voltage (Vrb), SCR
Optical Test Items		Luminous Intensity (mcd), Lumen (lm), Radiant power (mw), Dominant Wavelength (Wd), Peak Wavelength (Wp), FWHM, CIE Chromaticity, CCT, CRI
Electrical Parameter Measurements		
Power Range		≦ 20W, as the figure shows on next page
Voltage	Source Range	±10V / ±100V / ±200V
	Source Accuracy	0.05% + 0.03%F.S. / 0.05% + 0.03%F.S. / 0.05% + 0.03%F.S. *1
	Measurement Range	±10V / ±100V / ±200V
	Measurement Accuracy	0.03% + 0.02%F.S. / 0.03% + 0.02%F.S. /0.03% + 0.02%F.S. *1
Current	Source Range	±20uA / ±500uA / ±20mA / ±500mA / ±2°
	Source Accuracy	0.08% + 0.06%F.S. / 0.08% + 0.05%F.S. / 0.08% + 0.05%F.S. / 0.3% + 0.1%F.S. / 0.3% + 0.3%F.S *1
	Measurement Range	±20uA / ±500uA / ±20mA / ±500mA / ±2°
	Measurement Accuracy	0.06% + 0.04%F.S. / 0.06% + 0.03%F.S. / 0.06% + 0.03%F.S. / 0.25% + 0.1%F.S. / 0.25% + 0.3%F.S. *1
Optical Measurements		
Spectrometer	Wavelength Rang	350 ~ 780 nm
	Detector Pixels	2048 pixels
Wp	Repeatability *2	±0.5 nm
Wd (380~780nm)	Repeatability *2	±0.2 nm
Radiant Flux (mW)	Repeatability *2	±1%
Operation Environment	Temperature	20°~ 30°
	Humidity	40% ~ 70%
Facility Requirements		
Power Requirement		800 VA
Dimensions (W x D x H)		Electrical Test Module : 486 mm x 462 mm x 110 mm Optical Test Module : 486 mm x 475 mm x 110 mm
Weight		15 kg

Note *1 : Test condition is under point of sensing
Note *2 : The tested device is blue LED chip

ORDERING INFORMATION

58173-TC : LED Chip Level Tester
Optical Fiber : UV-VIS / 0.25m~2m / ψ100~600nm
Optical Attenuation Module
Solar Cell Photo Detector (optional)
Integrating Sphere (2"~4") (optional)
Industrial Personal Computer
Four channels Switching Box

All specifications are subject to change without notice.

LED Mapping Probe Tester

Model 58212-C



The Chroma 58212-C features an automated LED wafer/chip probe tester, delivering fast and accurate LED measurements with test times less than 125ms *1.

The system can be modified to support different LED structures including Lateral, Vertical, and Flip Chip designs. Integrated scanners provide autonomous wafer mapping to guarantee precision testing. The patented probe head prevents device scratches and ensures solid contact with every LED.

Chroma's unique design acquires and analyzes optical data such as the dominant wave length, peak wavelength, and CCT. Additionally, it provides essential electrical data such as forward voltage, leakage current, and reverse breakdown voltage, all in one test step.

The 58212-C includes a user-friendly graphical interface and advanced logic algorithms to significantly increase production efficiency. Comprehensive statistical reports and analysis tools allow for easy control and mass production management.

Note *1 : Test condition: under 300um sample pitch, 5 electrical test parameters and 1 optical parameter. Due to differences in LED characteristics, the measurement results may vary.



KEY FEATURES

- High Speed and Accuracy
- Lateral, Vertical, and Flip Chip
- Wide Power Test Range (up to 200V/2A)
- Up to 8 inch Wafers
- Chroma® Huge Photo Detector
- Unique Edge Sensor
- Patented Probe Head
- Robust Z-Axis Stage
- Wafer Mapping Algorithm
- External Light Shielding Enclosure
- Analysis Tools and Statistical Reports

HARDWARES

- Automatic LED Wafer/Chip Prober
- Electrical Test Module
- Optical Test Module
- Optional ESD Test Module

TEST ITEMS

- Electrical Parameters:
  - Forward Voltage Measurement (Vf)
  - Reverse Breakdown Voltage Measurement(Vrb)
  - Reverse Leakage Current (Ir)
  - SCR Detection
- Optical Parameters:
  - Optical Power (mw, lm, mcd)
  - Dominant Wavelength (Wd)
  - Peak Wavelength (Wp)
  - Full Width at Half Maximum (FWHM)
  - CIExy - CCT - CRI

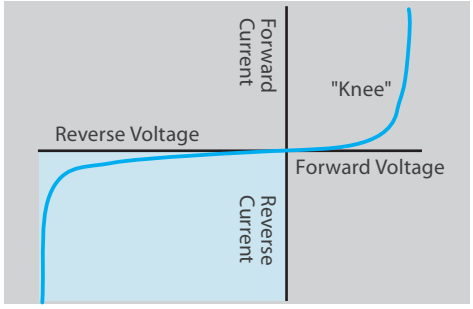


SPECIFICATIONS		
Model		**58212-C**
Application		
Test Area		ψ 8 inch wafer
Supported Device (Chuck is device selected)		Chip on wafer : 2", 4", 6", 8" Chip on tape : 2", 4", 6"
Chuck Type		Lateral type, Vertical type, and Flip Chip type (Select one of them)
Die Size		7 ~ 120 mil
Pad Size		≧ 70 μm
Electrical Parameter Measurements		
Power Range		≦ 20W
Voltage	Source Range	±10V / ±100V / ±200V
	Source Accuracy	0.05% + 0.03%F.S. / 0.05% + 0.03%F.S. / 0.05% + 0.03%F.S. *2
	Measure Range	±10V / ±100V / ±200V
	Measure Accuracy	0.03% + 0.02%F.S. / 0.03% + 0.02%F.S. / 0.03% + 0.02%F.S. *2
Current	Source Range	±20uA / ±500uA / ±20mA / ±500mA / ±2A
	Source Accuracy	0.08% + 0.06%F.S. / 0.08% + 0.05%F.S. / 0.08% + 0.05%F.S. / 0.3% + 0.1%F.S. / 0.3% + 0.3%F.S *2
	Measure Range	±20uA / ±500uA / ±20mA / ±500mA / ±2A
	Measure Accuracy	0.06% + 0.04%F.S. / 0.06% + 0.03%F.S. / 0.06% + 0.03%F.S. / 0.25% + 0.1%F.S. / 0.25% + 0.3%F.S. *1
Optical Measurements		
Spectrometer	Wavelength Rang	350 ~ 780 nm
	Wp Repeatability	±0.5 nm
	Wd Repeatability (380~780nm)	±0.3 nm
Optical Power	Repeatability	±1%
Operation Environment	Temperature	20° ~ 30°
	Humidity	40% ~ 70%
Facility Requirements		
Machine Dimension		980 mmx1160mmx1500 mm (does not include monitor and signal)
Power Requirement		Single phase, 220VAC ±10%, 50/60Hz, 20A
Input Air		-0.2 Mpa / ψ 6 mm
Weight		750 kg

Note *1 : Test condition is under point of sensing
Note *2 : The tested device is blue LED chip

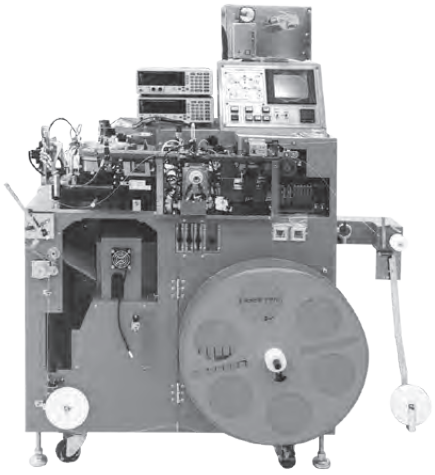
ORDERING INFORMATION

58212-C : LED Mapping Probe Tester



LED I-V curve

All specifications are subject to change without notice.



Tapper 58280

With rise of Green Energy, LED, with its high energy efficiency and reliability, has played important role in energy saving. Despite LED light, many modern electronics applications are also increasingly using LED because of its energy saving feature, such as backlight of LCD monitor, TV and mobile devices. This results continue growth of demand in, not only volume but also new innovations in packaged LED.

LED tester/sorter is equipment used to test and sort (white) packaged LEDs then sort them into different specs that are defined by customers. However, with new type of LED packaging technologies, primarily CSP (Chip Scale Packing), they brings new challenges to the conventional packaged LED Tester/Sorter design.

Unlike conventional white packaged LEDs which package Blue LED chips into plastic mold with metal lead frame and dispense phosphor to give desired white color, CSP LED dispense the phosphor directly on Flip-Chip type of LED wafer therefore, no additional packaging process is need. Plus, removing the plastic mold, it provides wider light emitting angle which highly desirable for backlight application. However, the CSP LED and its unique structure make probing lot difficult then conventional packaged LED. Also, lacking of plastic mold and lead frame, it is structurally more fragile than conventional packaged LED.

Chroma 58270 Packaged LED Tester/ Sorter was designed to meet all of the challenges brought by conventional and new type of CSP LED. Bin numbers can be custom-designed up to 256 bins. Innovative probing mechanism provides highly repetitive probing quality; Specially designed low stress bowl feeder guarantees minimum chipped chips; Optional optical inspection secure no fail devices go to pass bins. to provide high speed, high accurate yet high yield of testing & sorting solution.

For some manufacturing process alignments, Packaged LED Tester/Sorter may require to combine with Tapper so the main bin can be tapped into reel directly. Chroma 58280 is designed to combine LED Tester, Sorter and Tapper into one integrated system with all features available in Chroma 58270 (except bin numbers).

KEY FEATURES

- High testing/sorting speed : Up to 42k/48k LEDs per hour (58270)
- Fully configurable test stations
- Complete optical and electrical test functions including : CIE x,y, CCT, mW, Lumen, Vf, Ir etc.
- Auto polarity detection and orientation correction
- High accurate SMU and temperature controlled spectrometer provide highest measurement repeatability under any environment
- Super low stress bowl feeder provides highest yield
- Optional optical inspection secures no chipped chips or chips with stains go into pass bins
- Up to 256/36 (58270/58280) customer definable bins
- Packaged type supported : 1313 CSP, 1616 CSP, 0603, 0606, 0608, 1005, 1608, 1612, 1615, 2012, 3010, 3014, 3030, 3216, 3303, 3528, 4014, 5050, 5630, 7020, 7030, 8520 ; other types available upon request
- High speed tapping (58280)
- Versatile graphical user interface



LED Packaged Lavel Tester 58174



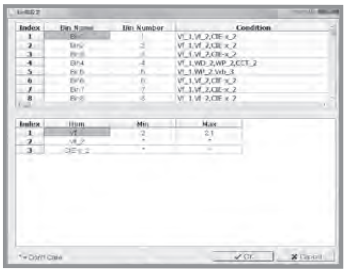
Packaged LED Tester/ Sorter 58270



Flexible Editable Test Parameters



Real-Time Production Information



Powerful Report File Editing

All specifications are subject to change without notice.

Model	58270	58280
Throughput (UPH)	up to 48k (0603) *1	up to 48k (0603) *1
LED Type	1313 CSP, 1616 CSP, 0603, 0606, 0608, 1005, 1608, 1612, 1615, 2012, 3010, 3014, 3030, 3216, 3303, 3528, 4014, 5050, 5630, 7020, 7030, 8520 ; other types available upon request	
Bin Number	up to 256	up to 37
Optical Inspection	optional	optional
LED Tester	Chroma 58174 LED Tester	Chroma 58174 LED Tester
LED Reel Type	void	carrier tape
Dimension (HxWxD)	1,680mm x 850mm x 1,400mm	1,800mm x 1,000mm x 1,500mm
Weight	approx. 450 kg	approx. 300 kg
Input Power	220V; 50/60Hz	
Environment	18~28°C ; < 70%RH	
Utility Requirement	Air pressure: >4~≦5kg/cm^2 Vacuum Input: 20~60 kpa	Air pressure: >4~≦5kg/cm^2 Vacuum Input: 20~60 kpa

Note *1 : Actual UPH may vary based on distribution of the bins.

Note *2 : The tested device is blue LED chip

SPECIFICATIONS		
Model		**58174**
Parameters		
Electiral Test Items		Forward Voltage(Vf), Reverse Leakage Current (Ir), Reverse Breakdown Voltage (Vrb), SCR
Optical Test Items		Luminous Intensity (mcd), Lumen (lm), Radiant power (mw), Dominant Wavelength (Wd), Peak Wavelength (Wp), FWHM, CIE Chromaticity, CCT, CRI
Electrical Parameter Measurements		
Power Range		≦ 20W
Voltage	Source Range	±10V / ±100V / ±200V
	Source Accuracy	0.05% + 0.03%F.S. / 0.05% + 0.03%F.S. / 0.05% + 0.03%F.S. *1
	Measurement Range	±10V / ±100V / ±200V
	Measurement Accuracy	0.03% + 0.02%F.S. / 0.03% + 0.02%F.S. /0.03% + 0.02%F.S. *1
Current	Source Range	±20uA / ±500uA / ±20mA / ±500mA / ±2°
	Source Accuracy	0.08% + 0.06%F.S. / 0.08% + 0.05%F.S. / 0.08% + 0.05%F.S. / 0.3% + 0.1%F.S. / 0.3% + 0.3%F.S *1
	Measurement Range	±20uA / ±500uA / ±20mA / ±500mA / ±2°
	Measurement Accuracy	0.06% + 0.04%F.S. / 0.06% + 0.03%F.S. / 0.06% + 0.03%F.S. / 0.25% + 0.1%F.S. / 0.25% + 0.3%F.S. *1
Optical Measurements		
Spectrometer	Wavelength Rang	350 ~ 780 nm
	Detector Pixels	2048 pixels
CIExy	Repeatability	±0.0015
Wp	Repeatability	±0.5 nm
Wd (380~780nm)	Repeatability	±0.2 nm
Radiant Flux (mW)	Repeatability	±1%

Note *1: Test condition is under point of sensing

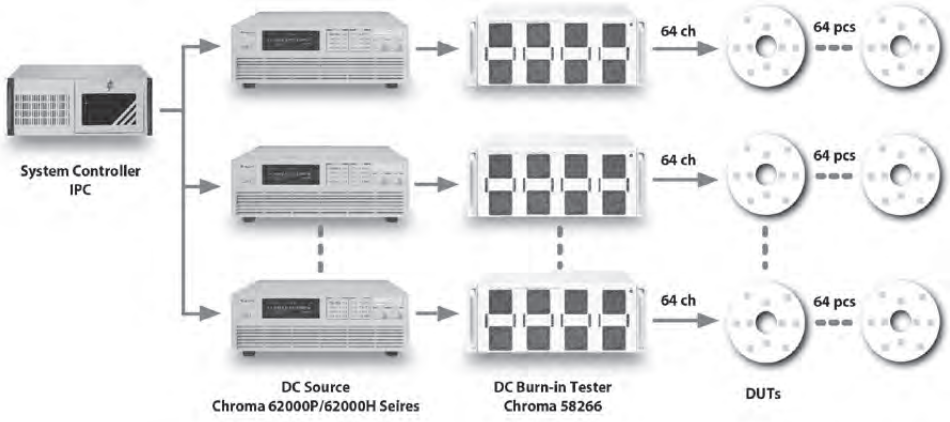
Note *2 : The tested device is cool white LED

Note *3 : The tested device is blue LED chip

ORDERING INFORMATION

58270 : Packaged LED Test Tapper
58280 : Packaged LED Test Sorter
58174 : LED Packaged Lavel Tester





KEY FEATURES

- Flexible channels output: 32/64/128 channels
- Each channel can offer up to 500mA /400V
- Each channel can parallel connection for high current requirement. Ex: 2-ch: 1A, 4-ch: 2A
- High accuracy of current output and voltage measurement

SYSTEM ARCHITECTURE

- DUT: single LED, LED array, LED light bar or LED module
- Support channels: 64 ch
- Force Current: Max. 500mA per-channel
- Support parallel connection: Ex: 2-ch: 1A
- Voltage measurement: Max. 400V

Chroma 58266 is a LED Burn-in Tester that each channel can offer a constant current up to 500mA but also has 0~400V voltage measurement function. For product application, various programmable power supplies can be applied for multi-channel constant current output and voltage measurement. The user can integrate several power supplies based on the demands of channels and current for multi-channel test.

CONFIGURATION

Programmable DC Power Supply	LED Burn-in Tester	Force I range	Measure V Range
Model 62012P-40-12 40V/120A/1200W	Model 58266	500mA	30V
		400mA	35V
Model 62012P-100-50 100V/50A/1200W	Model 58266	500mA	32V
		170mA	95V
Model 62024P-80-60 80V/60A/2400W	Model 58266	500mA	70V
		440mA	75V
Model 62024P-100-50 100V/50A/2400W	Model 58266	500mA	70V
		350mA	95V
Model 62024P-600-8 600V/8A/2400W	Model 58266	110mA	300V
		80mA	400V
Model 62050P-100-100 100V/100A/5000W	Model 58266	500mA	95V
Model 62050H-450 450V/34A/15KW (380V/3Φ4W)	Model 58266	500mA	400V

SPECIFICATIONS

Model	58266			
Voltage Accuracy (23˚C ± 5˚C)				
Range	0~4V	0~40V	0~400V	
Default Measurement Resolution	1mV	10mV	100mV	
Measure Accuracy ±(%rdg. + offset)	0.2%+5mV	0.2%+50mV	0.3%+500mV	
Current Accuracy (23˚C ± 5˚C)				
Range	10 μA	1mA	100mA	500mA
Programming Resolution	5nA	500nA	50 μA	200 μA
Source Accuracy ±(%rdg. + offset)	0.1%+20nA	0.1%+300nA	0.1%+200 μA	0.2%+1mA
Temperature Coefficient	10~18˚C & 28~50˚C ±(0.5 × accuracy specification)/˚C			
Max. Voltage Difference of all Channel	10V @ 500mA 50V @ 100mA 100V @ 50mA			
Operation Environment	Temperature : 10~50˚C Humidity : 10~70%RH			
Storage Environment	Temperature : -20~70˚C Humidity : 5~95%RH			

ORDERING INFORMATION

58266 : LED Burn-in Tester

All specifications are subject to change without notice.

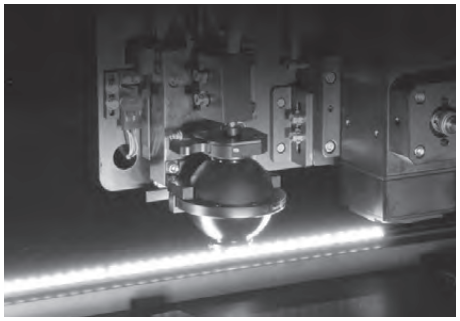
LED Light Bar Test System

Model 58182

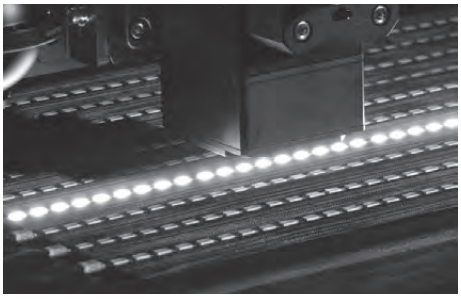


Chroma 58182 LED Light Bar Test System is a fully automatic test system able to measure the top-view/side-view light bar uniformity composed of white light. With image recognition function, it can accurately capture the location of LED and identify the center of LED under the measurement. With automatic mechanical and optical measurement function, the 58182 can perform extremely accurate optical and electrical measurement.

The 58182 integrates image recognition function, automatic mechanical and optical measurement. It can not only improve the yield rate by sifting out the defect products, but also reduce the product verification time and development cost. In addition, the 58182 has a flexible measurement platform to adapt different type of top-view / side-view LED light bar measurement, and friendly user interface to reduce user's learning time. Consequently, the 58182 is the best choice for testing top-view/side-view light bar.



CIE127 Partial Flux Measurement Module



CIE127 Condition B measurement Module

KEY FEATURES

- Measure the top-view/side-view light bar uniformity composed of white light
- Equipped with image recognition function to capture the LED location accurately
- Excellent optical performance
- ESD damaged sorting function
- FPC/PCB light bar adaptability

ORDERING INFORMATION

58182 : Top-view LED Light Bar Test System

SPECIFICATIONS

Model		58182		
Optical Module		CIE 127 condition B optical tube or Partial flux measurement module		
Average Intenstive (mcd)	Range	100~10000mcd		
	Accuracy	±5%		
	Repeatability	±2%		
CIE x, y	Accuracy	±0.004		
	Repeatability	±0.002		
Spectrumeter	Wavelength Range	380~780nm		
	Optical resolution	2nm		
	A/D	16 bits		
Light Bar length		600mm		
Offer Channels		20 X 12 Ch		
Power Supply	Voltage	0~200V	0~60V	0~300V
	Current	10uA~5mA	1mA~2A	40mA~2A
	Voltage accuracy	0.3%+0.1%F.S	0.01%+10mV	0.05%+0.05%F.S
	Current accuracy	0.3%+0.1%F.S	0.01%+1mA	0.03%+40mA
Data output	Format	Excel (*.csv)		
	Output items	mcd, CIEx, CIEy		
XY moving range		600x250mm		
Dimension		1300 (D) × 2360 (W) × 1815 (H)mm		

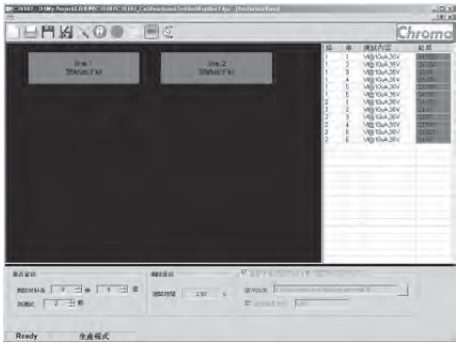
All specifications are subject to change without notice.

LED Light Bar Electrical Test System

Model 58183



Chroma 58183 is a PC base test system for LED light bar electrical test. In hardware design, Chroma 58183 not only offers a accurately current (10uA~5mA) to test LED electrical features but also can integrate an extra high power supply for high current test. Otherwise, Chroma 58183 offers multi-channels test function. It is widely used in many application. In LED light bar manufactory, 58183 can test more 10 pieces Light bar at the one time. In LED backlight manufactory, 58183 can test 4 pieces LED backlight via a 4 channels control box. To sum up, 58183 is a very strong and powerful tool for LED light bar and LED backlight manufactories.





KEY FEATURES

- Integrating customer's extened power supply
- PC base design
- Support multi- channels test
- Using general DUT adapter to offer test application widely
- Software support authority managerment

ORDERING INFORMATION

58183 : LED Light Bar Electrical Test System

SPECIFICATIONS		
Model	**58183**	
Voltage		
Output Range	10V / 100V / 200V	
Source Accuracy *1	0.05% + 0.03% F.S	
Measure Accuracy *1	0.03% + 0.02% F.S	
Current		
Output Range	20uA/500uA/20mA/500mA	
Source Accuracy *1	0.1% + 0.1% F.S	
Measure Accuracy *1	0.1% + 0.1% F.S	
Applicative Type	Top/side-view LED light bar	
Dimensions	IPC : 451 x 426.5 x 177 Relay Box : 276 x 430 x102 Chroma 58221 : 432 x 432 x 110 (D x W x H mm)	
Weights	Total 27 Kg (IPC 12Kg, Relay Box 5Kg, Chroma 58221-200-2 10Kg)	
Relay Box (Not in live wire)		
	Ch1~24	Ch25~32
Switch voltage	200VDC	300VDC
Carry current	300mA	600mA
Life expectancy of mechanical	10^6	10^6
Power IN		
IPC, Chroma 58221-200-2	90-240VAC	
Relay Box	110 / 220V,50~60Hz, 2A	
Others		
General purpose relay	32 Channels	
Operation environment	Temperature:10~40˚C Humidity:10%~70%	

All specifications are subject to change without notice.



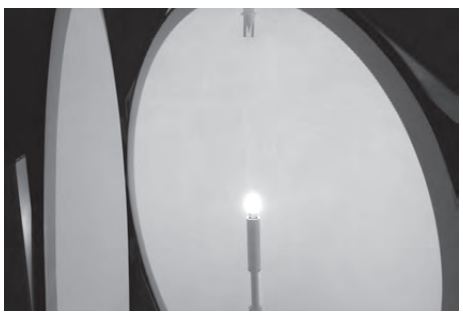
For Laboratory

KEY FEATURES

- Simulate the real AC test condition and environment
- Integrate AC, DC, and optical features test to one platform
- Support DC test for AC LED
- Support dual-optical test module in one platform (Integrating sphere or average intensity) (optional)
- Support AC /DC LIV Analysis
- Offer standard light source for calibration

Chroma 58158 LED Lighting Test System, compliances the AC LED Device National Standard, has integrated Chroma's Power Electronics Test Equipment - Programmable AC Power Source and Digital Power Meter to offer users a real AC environment for measuring AC LED.

Furthermore, the 58158 also integrates Chroma DC Power Supplies with the flexible optical test platform which equips with integrating sphere, photo detector, and etc.. Users can measure optical and electrical parameters of AC/DC LED through a friendly softtware interface.



For Laboratory Test

SPECIFICATIONS (50 cm Integrating Sphere)		
Model		**58158**
Measurement Items		
Optical Measurement Items		Lumens (lm), CIE(x,y)), CIE(u',v'), CCT, CRI
Electrical Measurement Items		Frequency, Real power P, power factor PF, THD (Option), Vf (Option)
Optical Measurement		
Photo Detector	Wavelength Range	380~780nm
	Lumens Range *1	<5,000 lm (>5K lm optional)
Spectrometer	Detector Type	2048 Pixels Linear CCD array (optional)
	Optical Fiber Connector	SMA 905
Lumen accuracy		±5%
CIExy accuracy		±0.004
Lumen Repeatability *2		±0.5%
CIExy Repeatability *2		±0.005
Electrical AC Source		
Output Rating-AC		500VA
Voltage	Range/Phase	150V/300V/Auto
	Accuracy	0.2%+0.2%F.S.
	Resolution	0.1V
	Line Regulation	0.10%
	Load Regulation	0.20%
Max.Current / Phase	RMS	4A/2A (150V/300V)
	peak	24A/12A (150V/300V)
Electrical AC Meter		
Power	Range (W)	1.5W~1KW (Model 66201) ; 1.5W~10KW (Model 66202)
	Power Factor Accuracy *3	0.006+(0.003/PF)KHz
Harmonic	Range	2~50 order
DC Measurement (Optional)		
DC Power Supply	Output Voltage	0~64V (> 64V optional)
	Output Current	0~3A (> 3A Optional)
	Ripple and Noise	1400 uVrms & 14 mVp-p / < 1mA
	Line Regulation	0.01% +4mV / 0.01% + 300 μ A
	Load Regulation	< 6mV / 0.01% + 300 μ A
	Program Accuracy	0.02% + 10mV / 0.01%+1mA
	Read back Accuracy	0.02% + 10mV / 0.01%+1mA
Others		
Dimension (H x W x D)		1081 x 532 x 700 mm
Weight		100k g
Power Consumption		300 W
Operating		100~240V VAC 50/60HZ
Software Support DC Source		
Chroma 6200P-300-8, Chroma 11200 (650V), Chroma 11200 (800V), Keithley 24XX Series		

Notes *1: 20 inch Integrating Sphere
Notes *2 : The unit under test is 10W halogen lamp
Notes *3 : The PF spec. applies only when the signals are higher then 50% of the selected voltage and current ranges

ORDERING INFORMATION

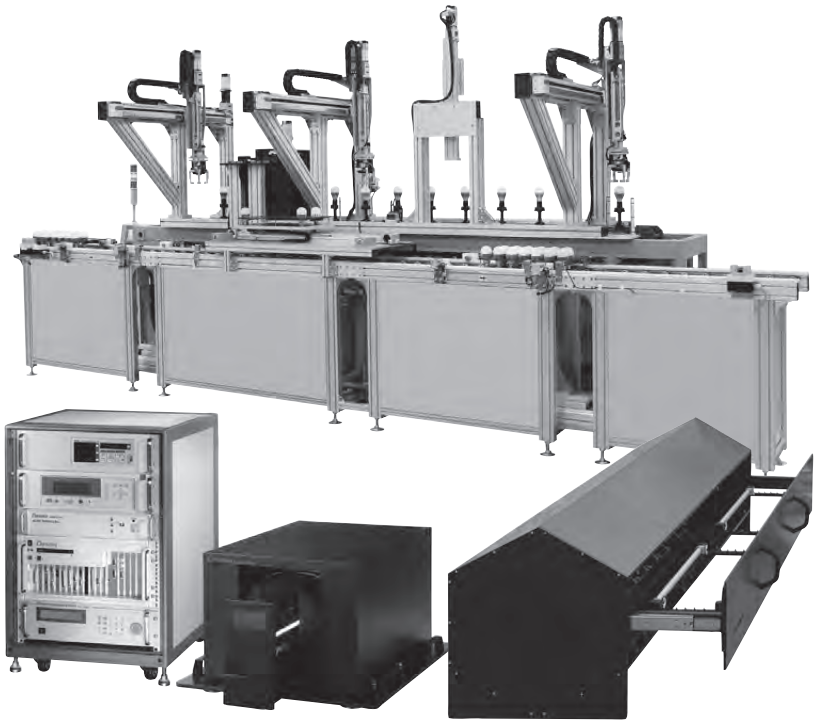
58158 : LED Luminaires Test System (for laboratory Test)

Integrating sphere	50cm	1m	2m
Luminaire	small lamp, bulb, MR-16	middle lamp, 2 feet T8/T5 tube	large lamp, 4 feet T8/T5 tube, street light
Application	laboratory	laboratory	laboratory

Note : Customization for 3m integrating sphere

LED Luminaires In-line Test System

Model 58158-SC



Test Instruments

Solar Cell Modules

The design concept of Chroma LED high speed measurement module is to combine several large size detectors and add up the luminous flux obtained by each detector to calculate the total flux of LED light. This design not only overcomes the shortcoming of previous inconvenient measurement for total flux by conventional integrating sphere, it also implements the inline test on production line. Chroma is able to provide the customer a fully automatic production line that covers both quality and productivity.

TEST ITEMS

- Optical Power characteristics :
  Lm, lm/w, LED operating frequency (Flicker)
- Color characteristics :
  CIExy, Duv, CIEu'v', CCT, CRI
- Power characteristics :
  AC mode : Power factor (PF), Irms, Vrms, THD
  DC mode : Forward voltage

ORDERING INFORMATION

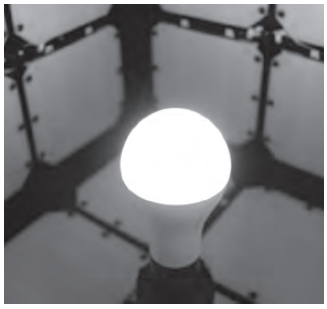
58158-SC : LED Luminaires In-line Test System *

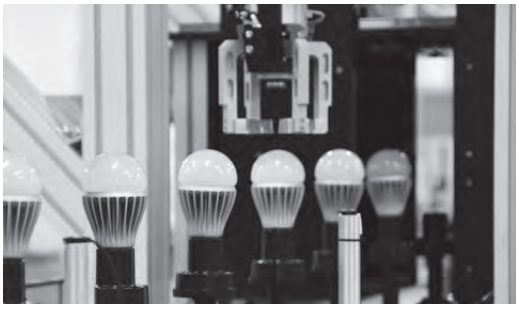
*Call for customized availability

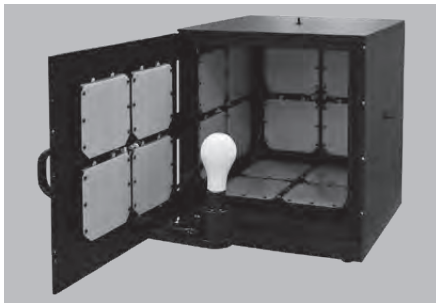
For Production

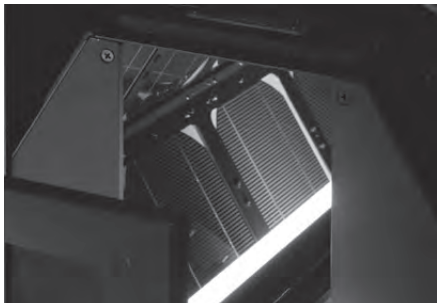
KEY FEATURES

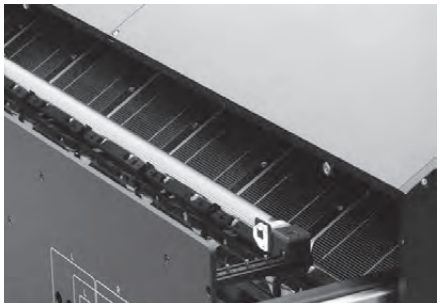
- Mass production application: LED lamp, LED bulb, LED bar, LED streetlight, and other luminaries
- Less error comparing to integrating sphere measurement
- High speed test and flicker measurement
- Provide standard light source for calibration which is international standard traceable
- Thermal control fixture adaptable (option)

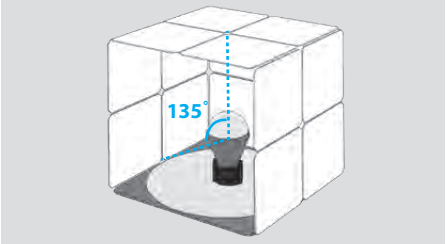




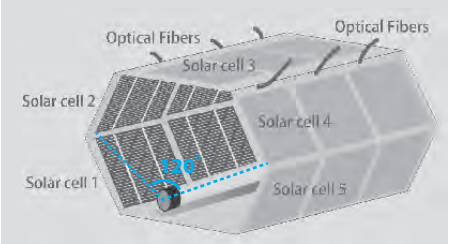








Solar Cell Module for Omnidirectional lamp



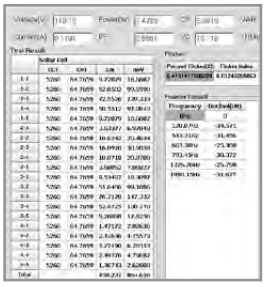
Solar Cell Module for JEL 801 LED Tube

All specifications are subject to change without notice.

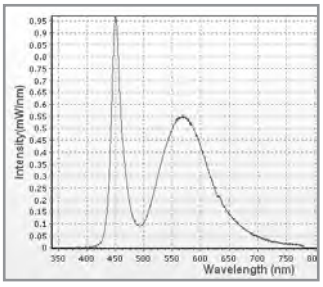
SPECIFICATIONS		
Model		**58158 -SC**
Measurement Items		
Optical Measurement Items		Lumens (lm), CIE(x,y)), CIE(u',v'), CCT, CRI
Electrical Measurement Items		Frequency, Real power P, power factor PF, THD (Option), Vf (Option)
Optical Measurement		
Photo Detector	Wavelength Range	380~780nm
	Lumens Range	<5,000 lm (>5K lm optional)
Spectrometer	Detector Type	2048 Pixels Linear CCD array
	Optical Fiber Connector	SMA 905
Lumen measurement Repeatability		±0.5%
CIExy Repeatability *1		±0.0005
CCT Repeatability		±5K
CRI Repeatability		±1
Electrical AC Source		
Output Rating-AC		500VA
Voltage	Range/Phase	150V/300V/Auto
	Accuracy	0.2%+0.2%F.S.
	Resolution	0.1V
	Line Regulation	0.10%
	Load Regulation	0.20%
Max.Current / Phase	RMS	4A/2A (150V/300V)
	peak	24A/12A (150V/300V)
Electrical AC Meter		
Power	Range (W)	1.5W~1KW (Model 66201) ; 1.5W~10KW (Model 66202)
	Power Factor Accuracy *2	0.006+(0.003/PF)KHz
Harmonic	Range	2~50 order
DC Measurement (Optional)		
DC Power Supply	Output Voltage	0~64V (> 64V optional)
	Output Current	0~3A (> 3A Optional)
	Ripple and Noise	1400 uVrms & 14 mVp-p / < 1mA
	Line Regulation	0.01% +4mV / 0.01% + 300 μ A
	Load Regulation	< 6mV / 0.01% + 300 μ A
	Program Accuracy	0.02% + 10mV / 0.01%+1mA
	Read back Accuracy	0.02% + 10mV / 0.01%+1mA
Others		
Dimension (H x W x D)		1081 x 532 x 700 mm
Weight		100k g
Power Consumption		300 W
Operating		100~240V VAC 50/60HZ
Software Support DC Source		
Chroma 58221-200-2, Chroma 6200P-300-8, Chroma 11200 (650V), Chroma 11200 (800V), Keithley 24XX Series		

Notes *1 : The unit under test is 10W halogen lamp
Notes *2 : The PF spec. applies only when the signals are higher then 50% of the selected voltage and current ranges

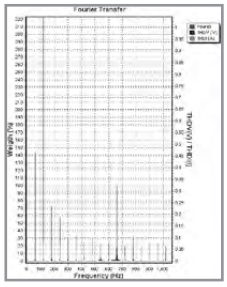
Analysis Tools



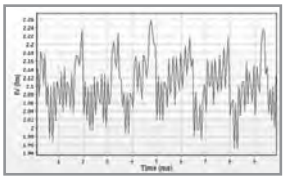
Power Analysis :
Im, Im/W, PF, Power



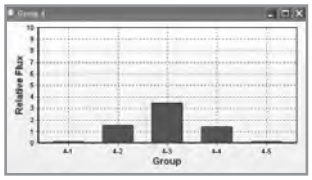
LED Spectrum Analysis :
CCT, CRI, Duv



THD Analysis



Flicker Analysis



Flicker Analysis

TO-CAN/CoC Burn In System 7-1
Laser Diode Characterization System 7-3
TOSA/BOSA Temperature Control System 7-5
TO-CAN Package Inspection System 7-7



TO-CAN/CoC Burn In System



Laser Diode Characterization System



TOSA/BOSA Temperature Control System



TO-CAN Package Inspection System



Half height rack

KEY FEATURES

- For Burn-In, Reliability and Life Testing
- Up to 128 laser diodes per module
- Up to 10 modules (1280 laser diodes) per systems
- ACC and APC control modes
- Individual channel driving and measurement
- Driving current 500 mA per channel and up
- Precise temperature control up to 120 ˚C
- Individual module operation
- Customization for device form factor upon request

Burn-in, Reliability & Life Test

The Chroma 58603 is a high density, multifunction, and temperature controlled module for laser diode burn-in and lifetime tests. Each module has up to 128 discrete channels which can source current and measure voltage in various control modes as described below.

Auto Current Control Mode (ACC)

In auto current control (ACC) mode, the control circuit will provide the preset current to each laser diode with high stability. No matter how the device resistance and temperature change, the current will be kept constant over the test period. The device voltage will be recorded as a quality reference parameter.

Auto Power Control Mode (APC)

With feedback signal from the optional external Photo Diode PCB, the control circuit can adjust the laser diode current automatically to keep constant feedback signal strength, which means the optical output of the laser diode is maintained constant over the test period. The device voltage and current are recorded as quality parameters for reference.

Temperature Control

A proprietary designed heat plat will control the laser diode case temperature with high accuracy, excellent stability, and good uniformity. Compared with oven or chamber types of laser diode burn-in systems, our solution is much more compact, easier to operate, better performance, and energy saving. Customers gain benefit for small footprint, versatile usage, and easy maintenance.

Individual Module Operation

Modules are mounted in a 19" rack to form a system. Each module is a 3U height drawer to fit in the rack. Customers can set different modules in different temperatures, operated in different control modes, and with different start and stop times. This provides great flexibility in operation.

Protection and Individual Channel Shutdown

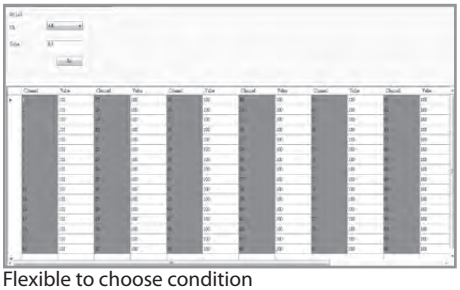
The control circuit is specially designed for protecting laser diodes. No rush current or voltage will occur to hurt the devices. High/Low limits of current and voltage can be set to perform shutdown protection. When abnormality happens, only the particular channel will be shutdown while others are running normally. Besides the protection functions implemented in the control circuit, isolation and ESD protection are also taken care in system design.

Auto Data Recovery after Communication Interruption

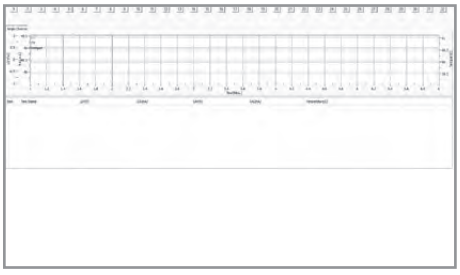
The burn-in data are stored in system PC and optional remote servers. If the communication between the module and PC is broken temporarily, the data will be buffered in the module up to 8 hours or even longer. After the communication is restored, the buffered data will be dumped to the PC/server without loss.

User Friendly Softpanel

The soft panel provides an intuitive visual interface that one can check certain device at certain module with some simple mouse-clicks anytime during the tests. The burn-in raw data are stored in Microsoft Excel compatible format for further analyses. Optional barcode system can be cooperated for test management.



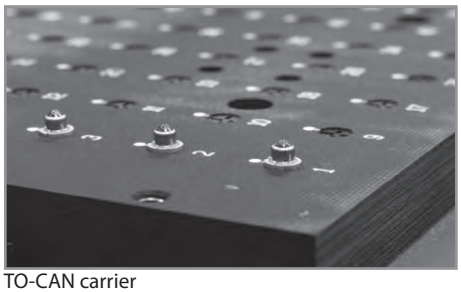
Flexible to choose condition



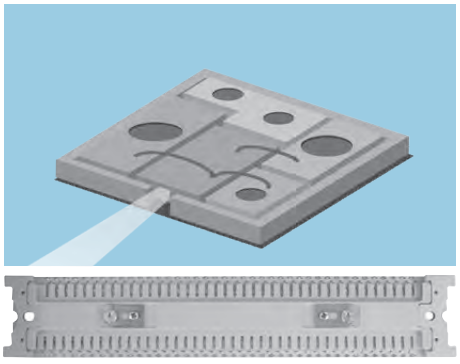
Comprehensive test data



GUI calibration interface



TO-CAN carrier



CoC carrier



Optical module



Full height rack

All specifications are subject to change without notice.

SPECIFICATIONS		
Model		**58603**
Module		
Channel Number		up to 128
Laser Diode Type		TO-46, TO-56, CoC, CoS
Test Function		ACC, APC (optional)
Burn-in Record Time		1 min to 5000 hours
Communication Port		RS232
Change Kit		DUT carrier board
Auto Current Control Mode		
Current Range		0~500 mA *1
Currnt Setting Resolution		0.02 mA
Current Accuracy		1%+1mA
Compliant Voltage		4 V
Voltage Measurement Range		4 V
Voltage Measurement Resolution		200uV
Voltage Measurement Accuracy		1%+10mV
Auto Power Control Mode (Optional)		
External PD type		Si or InGaAs *2
Wavelength Range		390 to 1700 nm
PD Current Stability		1%
LD Current Range		0~500 mA
LD Current Measurement Accuracy		1%+1mA
LD Compliant Voltage		4 V
LD Voltage Measurement Accuracy		1% + 10mV
Temperature Control		
Temperature Measuring Range		0~150 ˚C
Temperature Setting Range		40~120 ˚C
Temperature Setting/Reading Resolution		0.1 ˚C
Temperature Stability		0.2 ˚C
Temperature Accuracy		1 ˚C
Temperature Uniformity		±(1 ˚C + 1.2% ΔT)
System		
Configuration		23" rack, half or full height
Number of Modules		up to 10 (For full height rack)
DUTs per system		up to 1280 (For full height rack)
CommunicationPort		Ethernet to server
Dimensions (H x W x D)	Half height rack , 3 modules	1600 x 600 x 900 mm
	Full height rack , 10 modules	2000 x 600 x 900 mm
Weights	Half height rack , 3 modules	230kg
	Full height rack , 10 modules	500kg
Power Requirements	Half height rack , 3 modules	AC 220V±10%, 50/60Hz, 11.4A, 2.5KW
	Full height rack , 10 modules	AC 220V±10%, 50/60Hz, 20A, 4.4KW
Environment Temperature		20~30˚C
Humidity		<80% RH, non-condensing

Note *1 : Can be customized for other specifications
Note *2 : Wavelength dependent, customized PD types upon request
Note *3 : Thermal platform temperature without DUT loading, ΔT = | ambient temperature - setting temperature |

ORDERING INFORMATION

58603 : TO-CAN/CoC Burn In System

All specifications are subject to change without notice.



KEY FEATURES

- Full turnkey automated test for edge-emitting laser diodes
- High precision and large capacity carrier, interchangeable with other automated equipment
- Fully automated alignment for fiber-coupled tests
- Automated optical inspection to decrease mechanical positioning delays
- Highly accurate TEC temperature controller with stability up to ±0.01˚C
- PXI-Based SMU and power meter for fast test times
- Full suite of software analysis tools for laser diode characterization (Ith, Rs, Vf, slope efficiency, λ p, and etc.)

Laser Diodes are becoming more ubiquitous. Current applications range from medical and defense, to being the critical backbone of the world's fiber optic communication networks. There are several highly precise processes involved in the production of Laser Diodes. These processes are all quite cost intensive ranging from wafer growth all the way to fibre alignment and package high speed testing.

The Chroma 58620 Laser Diode Characterization Station is a state-of-the-art full turnkey system designed specifically for Laser Diodes. Its features range from macro inspection of the facette or aperture active area to a full suite of electro-optical parametric tests. When Chroma's high capacity carrier is used, multiple devices can be rapidly repeatably indexed improving not only test times but the reliability of the tests themselves. The Chroma 58620 is equipped with a highly stable, large scale, temperature control platform to provide the ability to incorporate R&D style tests in a production environment. This enables the ability to study correlation between laser diode forward current and temperature.

Ultra-precise Carrier Design

Chroma's high precision carriers can be adapted to suit multiple form factors such as Chip on Carrier, Submounts, or Laser-Bar's. The innovative bi-lateral design is symmetrical with components placed on both sides to allow for a larger volume of components. The carrier is multi-layered to allow for components to be easily placed in their respective pockets yet secured once the other layers are mounted. The thermal interface structure allows for efficient component thermal contact along with a high degree of temperature control during heating and cooling cycles. At the touch of a button, an operator can perform full-scale automated testing once a carrier has been inserted.



Customized & Sharing Carrier

From developed technology in Semiconductor IC test technology, Chroma 58620 introduces batch processing through the sharing carrier and changing kit to the Laser Diode industry. The carrier protects the laser diode from being handled and damaged as it is processed as test lots through the burn-in and test process while providing the hooks for data tracking thus increasing both productivity and yields. This same carrier is designed to operate with the Chroma 58603 Optoelectronic SMU Module for seamless burn-in & test processing. Through a 58620 change kit, as the laser diode under test changes (by evolving design or new product), the systems can adapt to various form factors and features. This flexibility allows for one solution to potentially test TO-Can, Chip on Carrier, Laser-bar, etc.



Burn-In system Model 58603

Characterization System Model 58620

Auto-aligment Fiber with AOI Assistance

One of the primary uses of high performance laser diodes are in the fields of optical data and telecommunications where the requirements for fiber coupling are quite stringent. If most DC parametric and optical characteristics are understood before a laser diode is inserted into the final product there is a greater cost savings and higher degree of in-field reliability. The Chroma 58620 is equipped with a fully automated alignment station to simulate a real-world fiber package coupling test to predict coupling efficiencies and spectral performance. Multiple optical heads and fibers may be used and coupled to an optical receiver such as an Optical Spectrum Analyzer (OSA) to analyze full spectral characteristics such as Side Mode Suppression Ration and Center Wavelength (λ p, λ c). Since every device is traceable with data, the Chroma 58620 affords the ability to correlate unpackaged optical performance with final package performance and helps in justifying a reduced final package test requirement.

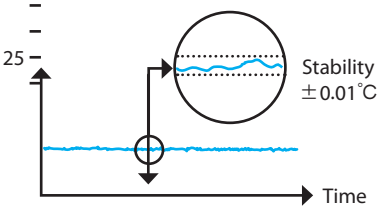


High Precision Control Platform

External and Internally induced thermal stresses on Laser Diodes strongly influence spectral and other electro-optical characteristics. Due to these issues, the Chroma 58620 includes a temperature control platform using a high precision Chroma 54130 - 300W TEC Controller and a Chroma 51101 Data Logger. These are highly regarded as world class instruments to ensure the uniformity of the carrier temperature and hence the devices under test. There are several thermal sensors placed along the carrier platform to ensure both a high degree of temperature uniformity and stability.



Temp. Data Logger





TEC Controller

All specifications are subject to change without notice.

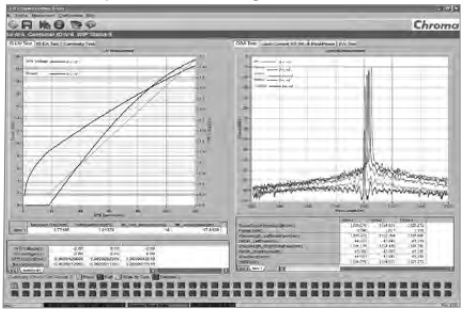
PXI Test Platform

Chroma's PXI Turnkey Test Solutions product offers an open and flexible platform that can be rapidly integrated into production. High performance test instruments such as Chroma 52400-Series High Precision Source Measure Unit (SMU) along with the Chroma 52961 Optical Power Meter (with various wavelength detectors) can perform an ultra-fast current source and detection sweep with a high dynamic range (80dB) for testing various Laser Diode demonstrating a wide range of output power and irradiance characteristics.



Friendly and Flexible User Interface

The Chroma 58620 is equipped with a completed Graphical User Interface (GUI) which includes recipe generation, test execution, and data management. There are checks and balances to ensure correct part placement in the carrier such as enabling the user to photograph every device and provide an ability to adjust before testing begins, saving time. Recipe generation enables the user to create test plans for an entire carrier down to the device level. Test execution provides the user with an in-depth window into the performance of every DUT from tabular opto-electronic parameters to graphical curves of spectral magnitude or any combination thereof. Depending on how test limits are managed, the Chroma 58620 can be a dumb data gathering tool with no pass/fail criteria or provide the user with an accurate picture of final test yield. Once tests are performed, Data Management is extremely flexible ranging from viewing on the tester itself to remote database and the file storage systems for cross-enterprise data sharing.



Flexible User Interface

SPECIFICATIONS	
Model	**58620**
Device Under Test	
Form Factor	CoC, CoS
Channels in Carrier	80 Channels per cycle *1
Current Ranges (Chroma Model 52401)	
Current Range (Source & Measurement)	±200nA / 2μA / 20μA / 200μA /2mA / 20mA / 200mA
Current Resolution	±1.6pA/±16pA/±160pA/±1.6nA/±16nA/ ±160nA/±1.6μA
Current Accuracy (Source & Measurement)	I range ≥ 1mA : 0.1% + 0.1% FS ; I range < 1mA : 0.05%+0.2% FS
Voltage Ranges	
Compliance Voltage Range	± 0.5V/1V/2.5V/5V/10V/25V
Compliance Voltage Accuracy	≥ 1V: 0.05% + 0.01%FS ; <1V: 0.05% + 0.1%FS
Voltage Measurement	± 3.8nV~ ± 25V
Voltage Measurement Accuracy	0.05% + 38nV @0.5V to 0.05% + 1.9mV @25V
Test Parameters	
Electrical	L-I-V Curves, Ith, Vf, Rs, Linearity (Kink)
Spectral	Peak wavelength, SMSR, etc.
Optical Spectrum Analyzer*(Optional)	
Wavelength Range	700 nm to 1700 nm
Resolution Bandwidth	< 0.1 nm
SMSR Measurement	> 40 dB
Wavelength Accuracy	±0.03 nm
Temperature Control	
Temperature Range	25 ˚C ~85˚C ; -5˚C ~85˚C (optional)
Temperature Accuracy	0.3 ˚C
Temperature Uniformity	±(0.5˚C+1% ΔT) *3
Mechanical Specification	
Motion Stage Travel Distance	400 mm
Minima Fine Stage Resolution	20 nm
System Size (W x D x H)	1000 mm x 1200 mm x 1350 mm
System Weight	400 ± 20 Kg
Power Input	220V single phase , 50/60 Hz
Water flow Rate	<3~5 lpm
Operating Environment	Temperature : 20˚C ~25 ˚C ; Humidity : <70%
Software	
Operating System Supported	Microsoft Windows® 2000, XP or 7

Note *1 : Capacity of carrier depends on the DUT size and form factor
Note *2 : Chroma 58620 is compatible with multiple Optical Spectrum Analyzers. Please inquire for further details.
Note *3 : ΔT = | Ambient temperature - setting temperature |

ORDERING INFORMATION

58620 : Laser Diode Characterization System



KEY FEATURES

- Wide temperature range (-40˚C~ 85˚C)
- Excellent temperature uniformity to make sure all DUTs are under the same temperature condition
- Within ±0.5˚C temperature stability
- Fast heating and cooling to shorten testing time
- Temperature control up to 72 DUTs at the same time to increase testing output
- In mass production, TOSA/BOSA provides:
  - Electrical test connector
  - Optical fiber connector

* Dependent on DUT form factor

TOSA (transmitter optical sub assembly) and BOSA (bi-directional optical sub assembly) are very important components for optical communication. Since the characteristics of TOSA and BOSA are sensitive to temperature(such as threshold current and wavelength), they need to go through temperature testing before shipment. The Chroma 58690/58691 are models with novel technology specially designed for TOSA and BOSA testing. Integrating with the outstanding temperature control technology, the 58690/58691 are temperature control systems devised specifically for TOSA and BOSA featured in fast heating, cooling and excellent temperature uniformity that can substantially increase the test throughput.

Excellent Temperature Uniformity

Different from warming up the ambient air surrounding the DUT to get the temperature control effect, Chroma 58690/58691 use contact temperature platform design to make the carrier's temperature achieve perfect control and uniformity when working with a high precision TEC controller. The temperature platform presents excellent temperature uniformity as there are 4 temperature sensors evenly distributed on it with a temperature feedback controller in the center.

Fast Heating and Cooling

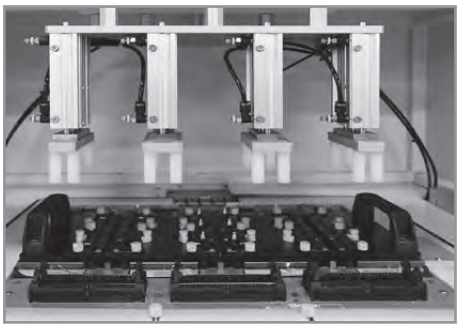
Currently TOSA/BOSA temperature control system is required to perform tri-state temperature tests during mass production. The 58690/58691 configured with Chroma high precision TEC controller. Excellent temperature control technique make tri-temperature cycle (including soaking time) within 25 minutes to significantly increase the mass production.

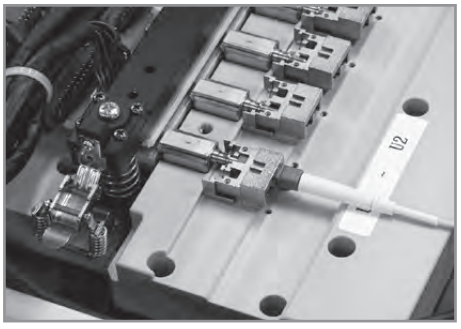
High Precision Customized Fixtures

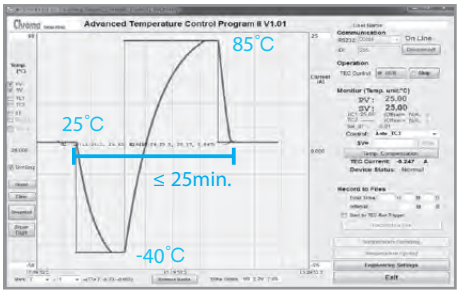
Chroma provides high precision fixtures for various TOSA/BOSA packing types to use. The fixtures comprise the temperature control platform required by DUT. Moreover, electrical and optical connection interfaces are conceived for testing the optical and electrical characteristics on DUT. The fixtures are easy for the user to place DUTs in the temperature control system and connect to the testing system on user site directly. Different channels of fixtures are also provided for different DUT packing types. The TO-56 packing type TOSA, for example, can support up to 72 channels increasing throughput of production lines.

User Friendly Interface

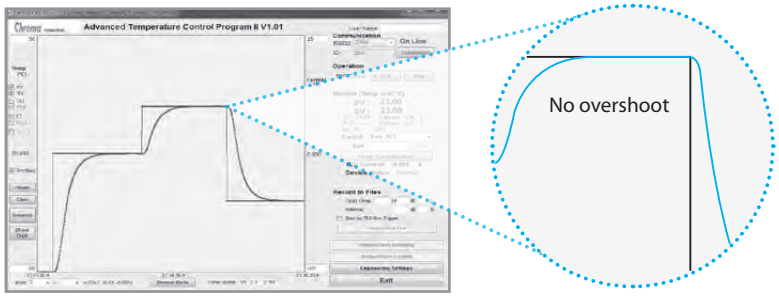
An user interface is provided to configure the 58690/58691 and TEC controller. It allows the user to set up and read temperature parameters, check TEC current and temperature vs. time curve, record data to documents, set temperature cycling and rising/falling speed, etc. The PID, current limit and other essential settings are set in engineering mode.





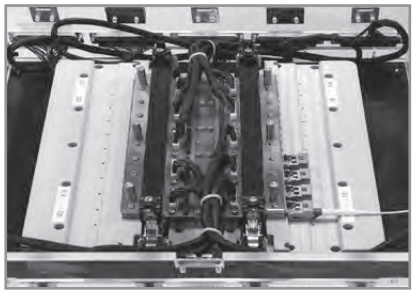


Fast Heating and Cooling

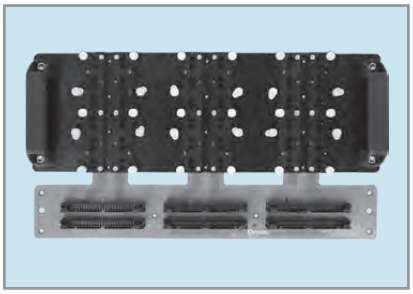


Excellent Temperature Control Ability

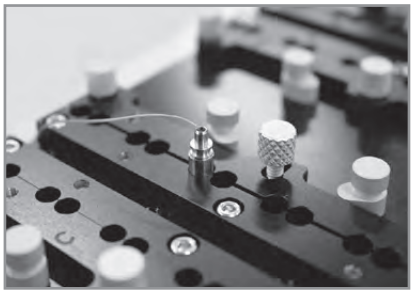
All specifications are subject to change without notice.



TOSA/BOSA Temperature Control Fixture (58690)



TOSA/BOSA Temperature Control Fixture (58691)



Optical Communication Devices Test Application

SPECIFICATIONS		
Model	**58690**	**58691**
Device Under Thermal Control		
Form Factor	QFSP TOSA	Cylindrical TOSA, BOSA
Temperature Area	440 x 350 (mm)	440 x 350 (mm)
DUT Number *1	20 typically	72 typically
Communication Port	Ethernet	Ethernet
Temperature Control		
Temperature Setting Range	-40 to 85˚C	-40 to 85˚C
Temperature Setting/Reading Resolution	0.01˚C	0.01˚C
Temperature Control Stability *2	< ±0.5˚C	< ±0.5˚C
Temperature Uniformity	<±(1+1% ΔT) *3	<±(1+1% ΔT) *3
Temperature Cycle *2	≦25 minutes typically	≦25 minutes typically
Mechanical Specifications		
Dimension (W x D x H)	700mm x 900mm x 1511mm	700mm x 900mm x 1511mm
System Weight	220kg	220kg
Facility		
Power Requirement	220 VAC, 50/60Hz, 2kW	220 VAC, 50/60Hz, 2kW
Operation Temperature	10 to 35˚C	10 to 35˚C
Dry Air	Meets ISO 8573.1:2001 Class 2.1.2 Flow Rate ≧50 LPM	Meets ISO 8573.1:2001 Class 2.1.2 Flow Rate ≧50 LPM

Note *1 : Dependent on DUT form factor (e.g. 64 channel for TOSA TO-CAN form factor)
Note *2 : Under the condition that is without loading and stable thermal loading
Note *3 : ΔT = | ambient temperature – setting temperature |

ORDERING INFORMATION

58690 : OSA/BOSA Temperature Control System
58691 : OSA/BOSA Temperature Control System

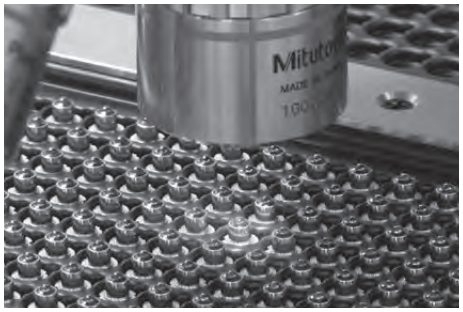


KEY FEATURES

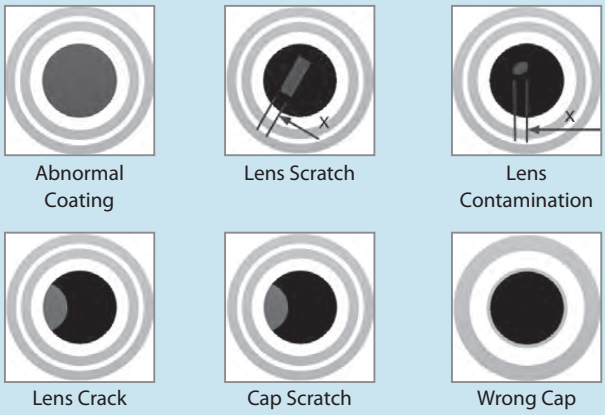
- It can inspect lens scratch, crack, particle and metal cap defect of TO-CAN package
- Auto focus function can overcome height variation from tray or package
- Defect criteria editor for versatile pass/fail criteria setting
- Higher reliability and repeatability than visual inspection
- Throughput is higher than UPH 3600
- Reduce time of operator loading/unloading because of auto-cassette function
- Provide customized inspection report and defect images for defect analysis

Chroma 7925 is an automatic inspection system for TO-CAN package. The appearance defects over 30 μm like lens scratch, partial are clearly conspicuous by using advanced illumination technology. Because the height variation of tray and package exists, Chroma 7925 can calculate the focus distance and compensate to overcome the variation with auto focus function.

User can edit his own defect criteria for versatile pass/fail rule setting and pick by the defect code. The whole machine process is automatic during load, inspection, pick to unload. It greatly reduces the opportunity of operator error and abnormal process. Engineer can get a detail inspection raw data and defect images. It is more helpful to analysis the process problem and increase the yield for using the data got from Chroma 7925.



TO-CAN DEFECT ITEMS



SPECIFICATIONS

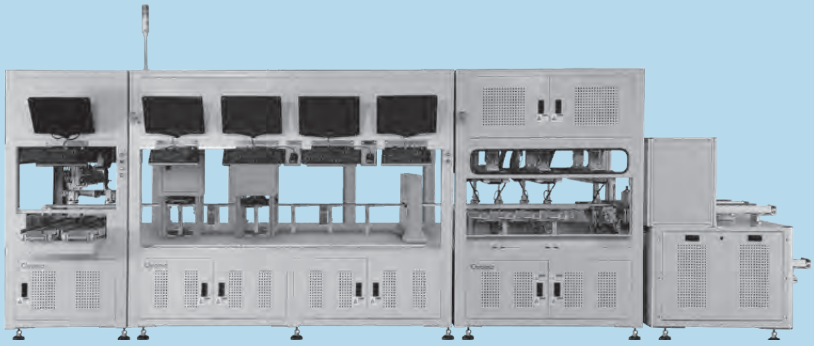
Model	7925
Target	TO-CAN package
Tray Size	< 6” (width) X 6” (Length)
Station Layout	Optical side inspector X1 Auto cassette X 2 Picker X1
Throughput	UPH 3600 (depends on the numbers of lighting)
Stages	X, Y axis motorized stages
Algorithm	Provide enable/ disable function and external algorithm interface
Image Save	All/ defect/ none image selectable
Monitor	Real-time tray map
Report	*.txt, including chip position, defect type
Dimension	1500mm x 1200 mm x 1800mm

ORDERING INFORMATION

7925 : TO-CAN Package Inspection System

All specifications are subject to change without notice.

Solar Wafer Inspection System 8-1
Solar Cell Inspection Test/Sorting System 8-2
Solar Wafer/Cell Diffusion Loader/Unloader 8-4
Automatic Optical Solar Wafer/Cell Inspection System 8-5
c-Si Solar Cell Tester 8-9

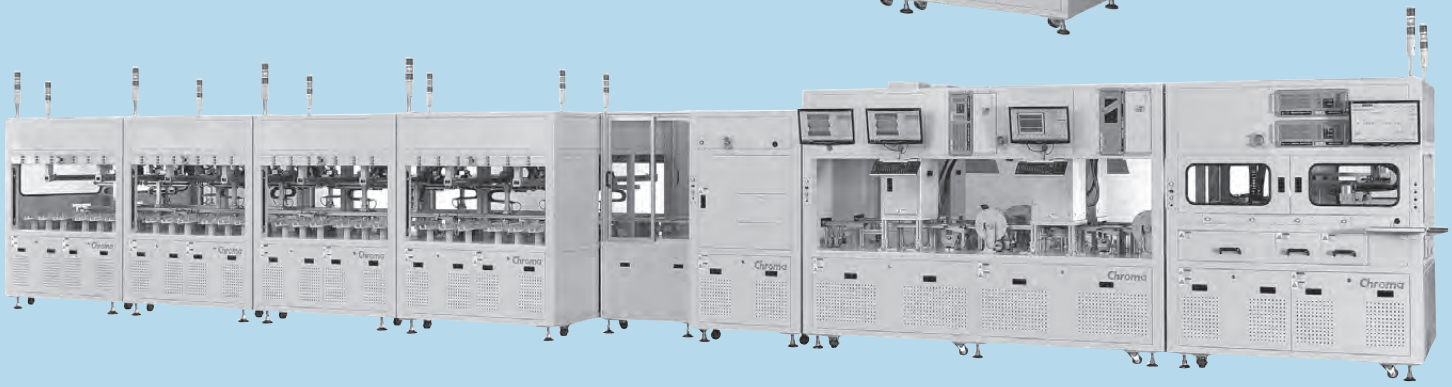


Solar Wafer Inspection System



Solar Wafer/Cell Diffusion Loader/Unloader





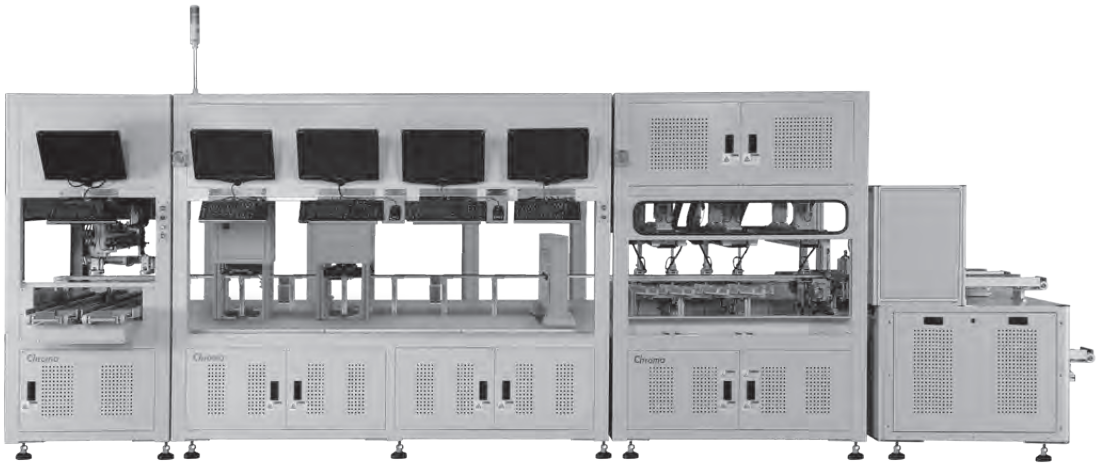
Solar Cell Inspection Test/Sorting System



Automatic Optical Solar Wafer/Cell Inspection System



c-Si Solar Cell Tester



KEY FEATURES

- Good for 5 inches and 6 inches wafer
- High throughput and low breakage rate ≤0.1%
- 2D geometry inspection
- Surface inspection
- Micro Crack inspection
- Saw Mark Inspection
- Resistively/ Thickness tester
- Lifetime tester
- Easy trouble shooting
- Loader : coin stack
- Unload : Coin stack / cassette

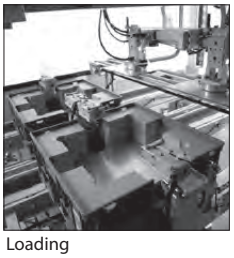
Integrated with 2D Geometry, Surface, Micro Crack, Saw mark inspection system and Resistivity & Thickness, Lifetime tester by customer defined, Chroma 3710-HS is a fully user configuration wafer sorter system with very low breakage rate and high through put.

Chroma 3710-HS solar wafer inspection system is ideal for PV incoming process. Plus wafer can be sorted by user defined algorithm fully automatically into coin stack or cassette. The unique auto coin stack/cassette exchange feature eliminates system down time when changing full coin stack/cassette to empty coin stack/cassette manually.

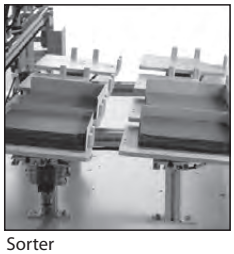
For the breakage rate that is one of the key concern for PV wafer handling system. The 3710-HS uses state-of-the-art cell transportation technique to ensure minimum breakage rate.

ORDERING INFORMATION

3710-HS : Solar Wafer Inspection System


Loading


Optical Inspection


Sorter


Unloading

All specifications are subject to change without notice.

Solar Cell Inspection Test/Sorting System Model 3730



KEY FEATURES

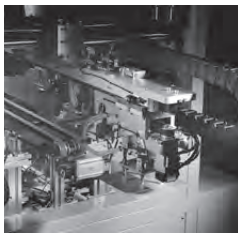
- Good for 5 inches and 6 inches mono/ multi-crystalline silicon cells
- High throughput and low breakage rate ≦0.1%
- Loader can automatically pick up and place cell finished by firing
- Efficiency and Color classes and Sorting Bins can be defined by customers' request
- Integrated with Inspector and IV Tester by customers' request
- High cell positioning repeatability to ensure consistent test result
- Sorting Bins can be extended by module

Chroma 3730 Solar Cell Inspection Test/Sorting System is ideal for PV backend process. In loader it can automatically pick up and place PV cell finished by firing. Then it will inspect cell surface and backside defects and will automatically sort the cells into carrier by different efficiency and color classes defined by customers' request.

Breakage rate is one of the key concern for PV cell handling system. Chroma 3730 uses state-of-the-art cell transportation technique to ensure minimum breakage rate. Based on customer's requirement of different processes, the carrier type and the amount of sorting bins also can be designed and adjusted.

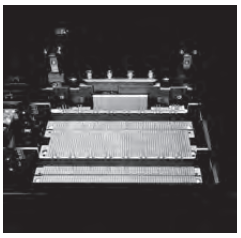
ORDERING INFORMATION

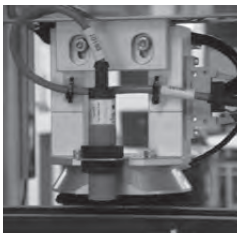
3730 : Solar Cell Inspection Test/Sorting System


Firing Unload


Loading


AOI


IV Testing


Sorting



KEY FEATURES

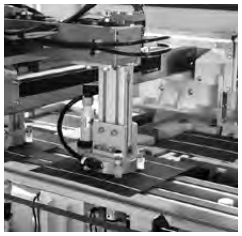
- Good for 6 inches mono/multi-crystalline silicon cells
- Inline structure un-loader together with firing furnace including cells position pre-capture CCD and Bernoulli Arm picking up cells to conveyor speedy
- Flexible design of buffer loader to support engineer/operator during production maintenance period no matter frontend or backend side
- High throughput and low breakage rate< 0.1%.
- High integration capability with customized optical inspector and IV tester
- Customized efficiency, Color classes and sorting Bins
- High cell positioning repeatability to ensure consistent result
- Extendable sorting bins module to fulfill customer request
- MES systems for instant production result analysis
- Lane by lane controller for engineer maintenance easy

Chroma 3760 Solar Cell Inspection Test/Sorting System is an ideal design and suitable for PV backend process. There will be a detection CCD and an Arm to proceed the cell pick and place from Firing furnace to conveyor. The cells will be transferred to Automatically Optical Inspector for cells quality inspection and IV Tester for efficiency measurement. Finally the cells will be put in the corresponding Soting Bins based on above testing results.

The breakage rate is one of the key concerns for PV cell handling system. Chroma 3760 uses state-of-the-art cell transportation technique to ensure the minimum breakage rate. Based on the customer's requirement of different process, the carrier type and the amount of sorting bins can be designed and adjusted.

ORDERING INFORMATION

3760 : Solar Cell Inspection Test/Sorting System


Loading


Flipping



AOI


IV Testing


Sorting

All specifications are subject to change without notice.

Solar Wafer/Cell Diffusion Loader/Unloader Equipment Model 3775



KEY FEATURES

- Low Breakage rate
- High Throughput
- Flex picker robot transfer
- Surface Inspection：Option
- Loader: Quartz Boat
- Unload：Coin stack / Cassette (option)

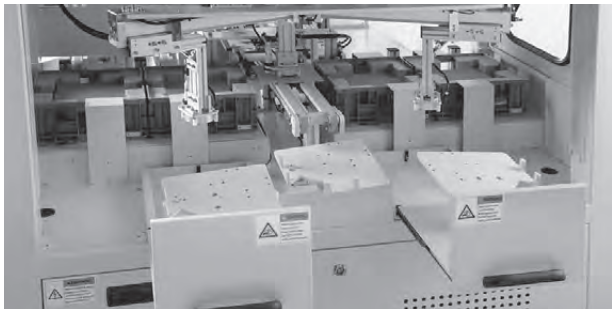
Furnace tube process is commonly used for wafer phosphorous diffusion . Chroma is not only providing short boat but also long boat for diffusion process loader/Unloder system to our customers. High speed flex picker robots are used on wafer transfer . Chroma provide the lower breakage, high throughout and low cost loader and unloader system in diffusion process and met our customer all of diffusion process function requirement.

ORDERING INFORMATION

3775 : Solar Wafer/Cell Diffusion Loader/Unloader Equipment



Loading



Unloading

All specifications are subject to change without notice.



Model 7201
Model 7210



Model 7202



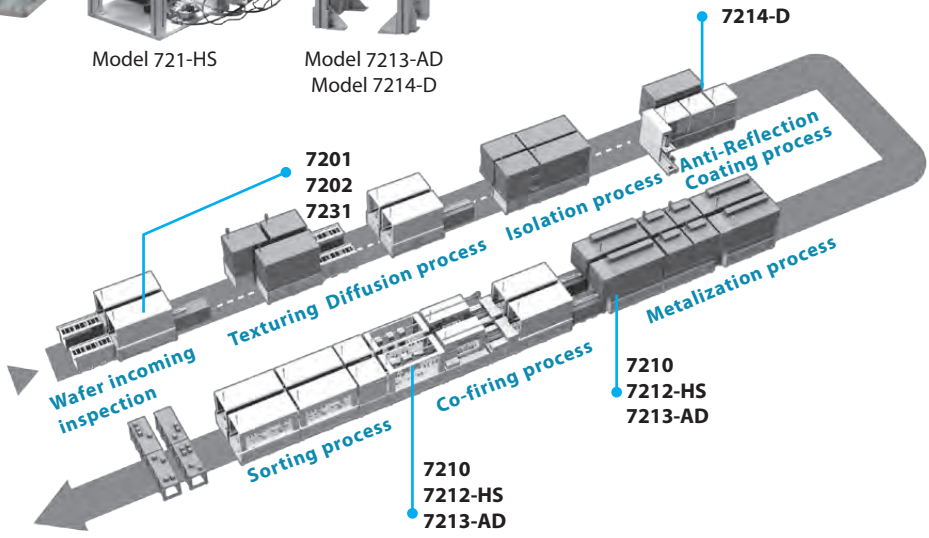
Model 7231



Model 721-HS



Model 7213-AD
Model 7214-D



KEY FEATURES

- Adjustable criteria for different process application or model
- Flexible algorithms programming editor for mono-crystalline and multi-crystalline silicon solar cells
- Multiple interface to communicate with manufacturing equipment or information system
- Various defects inspection capability from multilayer LED lighting design
- Flexible design that can be easily integrated to your in-line printing system and sorting system

Among several factors for PV to achieve grid-parity, reliability of the PV modules plays an important role. Since it's known that some of the cell defects such as edge chips/ flakes, bumps of cell surface were proved to be source of infant mortality of the c-Si PV modules, therefore, to detect those defects is very important for c-Si cell manufacturers.
However, most of cell defects are inherited by wafers. Therefore, both cell and wafer defect inspections are crucial to final PV module quality and reliability.

Due to the increasing BIPV and rooftop application, even for those defects that does not directly link to reliability issues such as water mark, surface stain, have to detected and considered as fail or secondary grade of cells for c-Si cell buyers.

Conventionally, those defects were visually inspected by operators. But, the inconsistent inspect result makes fully automatic optical inspection (AOI) solution becomes unavoidable equipment for c-Si cell & wafer lines.

Chroma 7200 series are specially designed for detecting wide variety of defects observed for c-Si cells & wafers for all sizes and crystallizations. Base on the process needs, eight inspectors are available for both incoming wafer and final cell sorting requirements.

Function Guide	7201	7202	7210	7212-HS	7231	7213-AD	7214-D
Sawmark					✓		
Geometry (Length, angle, area, and etc)	✓						
Surface stain (Particle, water mark, finger print, and etc)	✓	✓	✓	✓		✓	✓
Printing defect (Fat, interruptions, nodes⋯etc)			✓	✓		✓	
Color defect (Coloring, variation, spot, and etc)			✓	✓			✓

Solar Wafer Geometry and Surface Inspector Model 7201

The Chroma 7201 was designed to measure wafer lengths, widths, diagonal, orthogonal and chamfer size and angle, it is also capable to detect surface stains. User friendly software and GUI enable versatile parameter settings and result, it also provides defect display and storage function for further analysis or potential MES/CIM integration.



- Capable to be integrated to any wafer sorters
- Flexible algorithms editor for mono-crystalline, multi-crystalline and quasi-crystalline wafers, and works for both 5" and 6"
- Multiple interface to communicate with different equipment or manufacturing execution system (MES)
- Ready for diamond-saw wafers inspection
- Self-monitor and calibration system

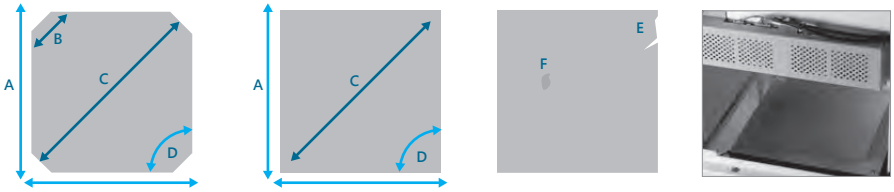


Illustration on 7201 inspection items

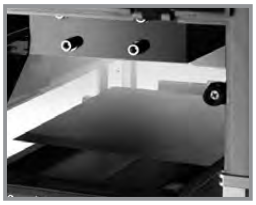
A: Side length
B: Chamfer length
C: Diagonal
D: Orthogonal
E: V-cut
F: Stain

All specifications are subject to change without notice.

Solar Wafer Quality Inspector
Model 7202

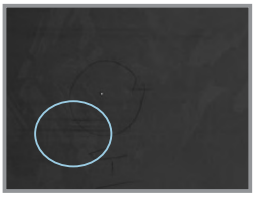
In the design of 7202, Chroma applied an unique optical design that ensures the result of grain-size calculation is highly repetitive. Since the classification of different grain-size could be quantified, the inspected wafers can be applied to the proper cell manufacturing lines to get highest possible cell efficiency.

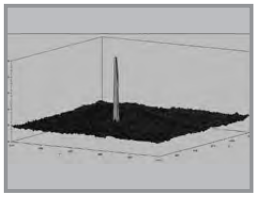
Pinhole defect can also be detected by 7202. The pinhole defect is known to be cause of μ-crack or severe local shunting that will lead to reliability issue to the PV module.





- Capable to be integrated to any wafer sorters
- Flexible algorithms editor for mono-crystalline, multi-crystalline and quasi-crystalline wafers, and works for both 5" and 6"
- Multiple interface to communicate with different equipment or manufacturing execution system(MES)
- Unique illumination design to ensure the repeatability of grain-size





Analysis on pinhole defect

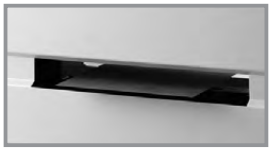




Examples on the grain-size inspection result on 7202

Solar Wafer Sawmark Inspector
Model 7231

Sawmarks happened during the wafering process because of the impurities or vibration of the wires. It happens sometimes in near the edge and sometimes in the center. By following the British standard of EN 50513 2009, Chroma is able to provide the solution that also sense the sawmarks in the center.

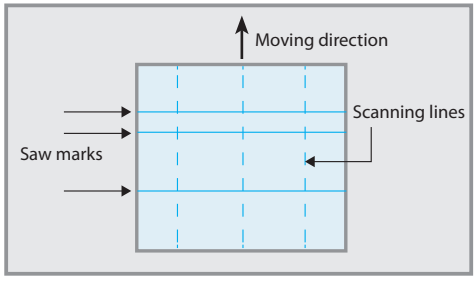




Different sawmark profiles

- Capable to be integrated to any wafer sorters
- Flexible algorithms editor for mono-crystalline, multi-crystalline and quasi-crystalline wafers, and works for both 5" and 6"
- Multiple interface to communicate with different equipment or manufacturing execution system(MES)
- Follow the British standard of EN 50513 2009 to measure different wafer properties





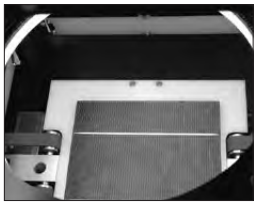
Sawmark inspection methodology

Solar Cell Quality Inspector
Model 7210

Chroma 7210 has built two functions which are color sorting and printing inspection in one structure. With the compact "2 in 1" design, it not only optimizes the floor space but also maximizes the performance. As the "metallization" technology goes further in PV industry, the finger width has become narrower. Experts believe that practical finger width through "screen printing" technology would be narrower than 40 μm in the near future, and Chroma's 7210 is able to provide 33 μm/pixel* solution for Photovoltaic technology innovators.

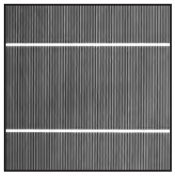
The Chroma c-Si cell coloring theory was designed to provide high repetitive color classification for c-Si PV cells. The CIE 1931 Lab color space and up to 60x60 grids for entire cell surface allow Chroma to provide numeric color severities down to 3600 blocks throughout the cell under test. Using the color information of each block and the customized algorithm, the user may determine the represented color for non-uniform color cells such as poly-crystalline cells or the cells have uneven anti-reflection coating thickness.

Note * : When working with Chroma 3730 Series

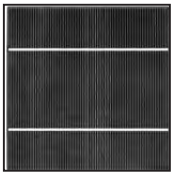




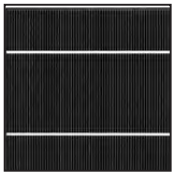
7210 Color Examples



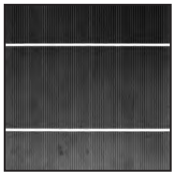
Light Blue



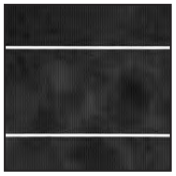
Blue



Dark Blue

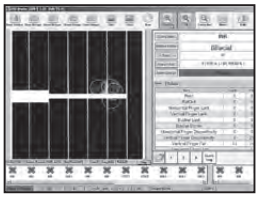


Color Variance



Mix Color

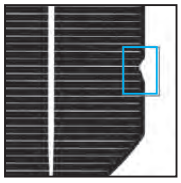
The defects caused by front-side (sunny side) printing process of c-Si PV cells may impact the performance, reliability or appearance. Therefore, a reliable and repetitive inspection of defects such as losing Ag paste on busbars, gridline interruptions, printing shift or rotation, water mark etc., has to be performed to ensure the quality before shipment. The Chroma 7210 solar cell quality classifier has equipped with a high resolution camera and superior software algorithm to recognize the unwanted defects on the front-side of c-Si PV cells.



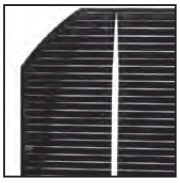


The 7210 can be used right after the front-side process to retire cells with major defects. This allows best use of the capacity for the processes like I-V testing and sorting which are known as the bottlenecks of c-Si cell line. It can be integrated into in-line or off-line sorter for final inspection prior to shipping. The 7210 can also detected cells' back side surface defects and color classification.

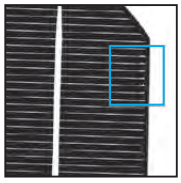
The 7210's backside inspection is applied on screen printing defect detection and color classification for Bifacial production. As to PERC production, the 7210 also provides defect detections for both screen printing and laser process.



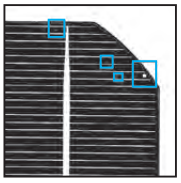
Chipping



Discoloration



Finger Width



Stains

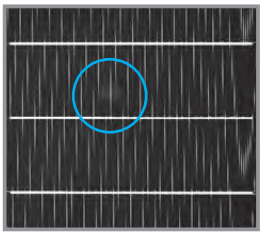
Solar Cell Front-side Printing and Surface Defect Inspector (High-Speed) Model 7212-HS

The Chroma 7212-HS is a line scan AOI inspector that can provide superior defect inspection for PV cells . As the fine grid printing process goes even faster than before, a reliable printing quality inspector is required to reduce the cost during PV cells metallization. The Chroma 7212-HS is able to provide 14μm/pixel resolution that can stop even the finest finger interruptions during the metallization process, and also feed back to the operator for instant response to improve the production yield rate.

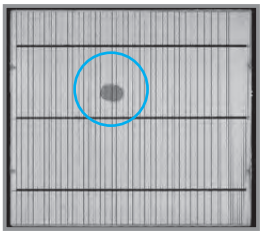
The Chroma 7212-HS can also use 20μm/pixel resolution to make the final quality judgment on the PV cell sorting process. The optical design in Chroma 7212-HS is even better. It can provide superior inspections for defects like stains and finger prints, which have been hurdles in other PV AOI products.

- Integrated with screen printing line and cell sorting lines from any manufacturers
- Flexible and intuitive SW user interface
- Resolution down to 14 μm/pixel
- Superior stain defects detection





Stain shown before detection



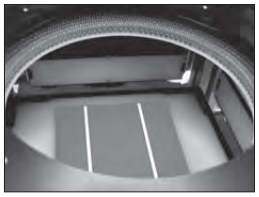
Stain shown after detection

Solar Cell Backside Printing and Surface Inspector Model 7213-AD

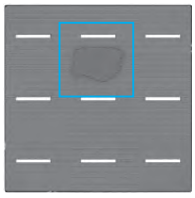
Defects causes by back-side printing process of c-Si PV cells will also cause performance, reliability impact. Among all the back-side printing defects, bumps caused by improper printing may cause high cell breakage rate during lamination of c-Si module process. Chroma 7213-AD c-Si cell back-side printing inspector uses unique lighting technique to detect common back-side printing defects plus most demanding bumps.

The 7213-AD can be used after back-side process to retire cells with major defects. It can also be integrated to in-line or off-line sorter for final inspection prior to shipping.









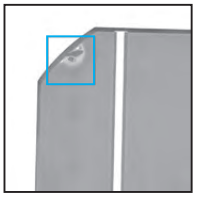
PERC Laser Line Variation



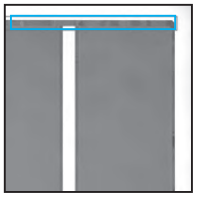
Bump



Busbar Defect



Stain



Alignment Shift

• Continued on next page ➟

All specifications are subject to change without notice.

Solar Cell Anti-Reflection Coating Inspector
Model 7214-D

Chroma 7214-D is the inspector for Anti-reflection coating process. With 4M mono CCD and Chroma's experience RGB illumination design, we could assure that each defined defectives could be identified through our cusomized setup. Chroma 7214-D can be used right after anti-reflection coating process to ensure only cells with acceptable color uniformity go down to metallization process. And the fail cells may then be sent for re-work.

With our flexible and hierarchy software design, customer could set up the criteria to inspect their unique defect that is generated because of different PECVD machines.

7214-D Inspection Items :

- Color difference
- Stripe shape watermark
- Belt mark
- Stacking cells
- Brownish stains
- Particles
- Acid mark
- Chipping




Stain


Watermark stripe shape


Particles


Acid mark

SPECIFICATIONS

Model	7201	7202	7231
Description	Solar wafer geometry & surface inspector	Solar wafer quality inspector	Solar wafer sawmark inspector
Wafer size	5' or 6'wafers, for mono c-Si, multi c-Si and quasi mono c-Si		
Detection limit	80μm	80μm	5μm
Speed	NA *3	350mm/s	350mm/s
Inspection items	Length, Width, Diagonal, Chamfer length, Pinhole, Stain, Chipping, Grain-size, Sawmark, backside		
UPH*2	3000~3600		
Interface	TCP/IP ; Option: IO,RS-232		
Options	RAID, UPS, MES,		

Model	7210	7212-HS/C8	7212-HS/M12
Camera	25M mono CCD	8K linescan	12K linescan
Resolution	33μm/pixel *1	20μm/pixel	14μm/pixel
Speed	NA	350mm/s	500mm/s
Light Source	LED strobe lighting	RGB LED strobe lighting	
Application	Frontside defect and color inspection	Frontside defect inspection	
Lens	Low distortion lens		
Dimension	320mm x 324mm x 1032mm	340mm x 380mm x 760mm	
Weight	60 kg	70 kg	
Accessory	External keyboard, mouse, PC, monitor		
Interface	Ethernet, Option : IO, RS-232		

Model	7213-AD	7214-D
Camera	4M mono CCD	4M mono CCD
Resolution	90μm/pixel	90μμm/pixel
Speed	NA	NA
Light Source	LED strobe lighting	WRGB LED strobe lighting
Application	Backside defect inspection	Anti-reflection coating inspection
Lens	Low distortion lens	
Dimension	320mm x 324mm x 1032mm	
Weight	60 kg	
Accessory	External keyboard, mouse, PC, monitor	
Interface	Ethernet, Option : IO, RS-232	

Note *1 : When work with Chroma 3730
Note *2: When work with Chroma 3710-HS
Note *3 : On-fly inspection on demand, maximum speed is 250mm/s

ORDERING INFORMATION

7201 : Solar wafer geometry and surface inspector
7202 : Solar Wafer Quality Inspector
7231 : Solar Wafer Sawmark Inspector
7210 : Solar Cell Quality Inspector
7212-HS : Solar Cell Front-side Printing and Surface Defect Inspector
7213-AD : Solar Cell Backside Printing and Surface Inspector
7214-D : Solar Cell Anti-reflection Coating Inspector

All specifications are subject to change without notice.

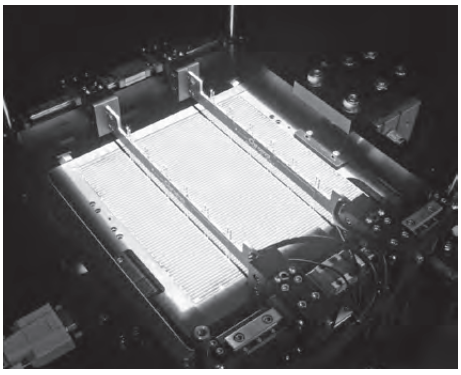


I-V test is the most important test for PV cell/ module manufacturing because the measured power rating or efficiency of the cell or module directly affect the selling price of the product. Therefore, highly accurate and repeatable I-V test result is not only for quality issue but also for Business issue.

However, PV cell I-V testing represents several technical challenges; therefore, it's extremely hard to achieve stable and accurate test results even if class AAA type of solar simulator is used. Those challenges include:

- Spectral mismatch correction
- Minimize impact of non-uniformity
- Simultaneous measurement to avoid error caused by temporal instability of irradiance intensity
- Temperature correction or control to STC or desired temperature
- Low stress probing to avoid cell breakage
- Maximize probe-contact repeatability & minimize probing shadow

Chroma 58301 c-Si Solar Cell (Crystalline Silicon) Tester is ideal for both RD & in-line production (see Chroma 3720) application. Using Wacom® class AAA+ solar simulator, comprehensive irradiance/temperature correction technique and probing system, Chroma 58301 c-Si Solar Cell Tester achieves the highest test repeatability and measurement accuracy for most demanding customers.



SYSTEM FEATURES

- Measurements: Eff, Pmpp, Impp, Vmpp, Isc, Voc, FF, Rshunt, Rs, Irev.
- Full four-quadrant source for both light forward/reverse & dark forward / reverse test
- Class AAA+ solar simulator
- Versatile system software and user editable test sequences
- Low stress probe
- Patterned probe-bar to ensure minimum probe shadow
- PV cell sorter integration (Chroma 3720)

ORDERING INFORMATION

58301: c-Si Solar Cell Tester

SPECIFICATIONS	
Model	**58301**
Solar Simulator Section	
Lamp Type	Xenon Short Arc
Lamp Life	1,200 hrs
Illumination Area	163mm x163mm
Light Source	Steady State (w/Shutter Control)
Air Mass	AM1.5G (IEC60904-3)
Irradiation Intensity	100mW/cm2±15% (1 Sun±15%)
Spectral Mismatch	±25% or Better
Positional Non-uniformity	2% or Better
Temporal Stability	1% or Better
Light Collimation	<5°
Power Section	
Voltage	
Voltage Forward Range	20V
$V_{FORWARD}$ Program Resolution	16 bits
$V_{FORWARD}$ Ripple	<3mVrms
Voltage Reverse Range	-20V
$V_{REVERSE}$ ProgramResolution	16 bits
$V_{REVERSE}$ Ripple	<3mVrms
Transient Response Time	< 100µs
Load regulation	0.002% F.S.
Line regulation	0.002% F.S.
Slew Rate	1V/µs
Current	
Current Forward Range	20A
$I_{FORWARD}$ Program Resolution	16 bits
$I_{FORWARD}$ Ripple	<0.03%
Current Reverse Range	-20A
$I_{REVERSE}$ Program Resolution	16 bits
Transient Response Time	< 75µs
Load regulation	1mA
Line regulation	0.005% F.S.
Slew Rate	1.25A/µs
Power	
Power Rating	400W
Measurement Section	
Voltage	
Voltage Measurement Range - Forward	1V
$V_{FORWARD}$ Measurement Resolution	16 bits
$V_{FORWARD}$ Measurement Accuracy	0.05% F.S.
Measurement Points per I-V - Forward	40-200 programmable
Voltage Measurement Range - Reverse	-15V
$V_{REVERSE}$ Measurement Resolution	16 bits
$V_{REVERSE}$ Measurement Accuracy	0.05% F.S.
Measurement Points per I-V - Reverse	40-100 programmable
Current	
Current Measurement Range - Forward	10A/20A
$I_{FORWARD}$ Measurement Resolution	16 bits
$I_{FORWARD}$ Measurement Accuracy	0.1% F.S.
Measurement Points per I-V - Forward	40-200 programmable
Current Measurement Range - Reverse	-0.1A/-1A/-15A
$I_{REVERSE}$ Measurement Resolution	16 bits
$I_{REVERSE}$ Measurement Accuracy	0.1% F.S.
Measurement Points per I-V - Reverse	40-100 programmable
Irradiance (Forward Only)	
Input Range	200mV
Irradiance Measurement Resolution	16 bits
Irradiance Measurement Accuracy	500uV
Measurement Points per I-V - Forward	40-200 programmable
Temperature Sensing Section	
Measurement Type	IR/Thermopile
Temperature Range	0~500°C
Reproducibility	± 0.5°C

All specifications are subject to change without notice.

Automated Optical Inspection (AOI) Solution

Video Microscope 9-1

3D Optical Profiler 9-3

Double Sided Wafer Inspection System 9-5

Wafer Inspection System 9-7

Selection Guide

Model	Primary Function	Examples of Inspection Applications	Page
7200 Series	Automatic Optical Solar Wafer/Cell Inspection Modules : Solar Wafer Geometry and Surface Inspector (7201) Solar Wafer Quality Inspector (7202) Solar Wafer Sawmark Inspector (7231) Solar Cell Quality Inspector (7210) Solar Cell Front-side Printing and Surface Defect Inspector (7212-HS) Solar Cell Backside Printing and Surface Inspector (7213-AD) Solar Cell Anti-Reflection Coating Inspector (7214-D)	Solar wafers, solar cells	**8-5**
7310	Video Microscope	Capacitors, Resistors, PCB, connectors, fiber connectors, SMD, die chips, textiles, etc.	**9-1**
7503	Sub-nano 3D Optical Profiler	Display : Photo spacers, prism sheets of LCD PCB : laser via, wire high, wide, pitch MEMS : printer nozzles, hard disk read heads Semiconductor : thin film transistors	**9-3**
7925	TO-CAN Package Inspection System	TO-CAN package	**7-7**
7936	Double Sided Wafer Inspection System	Top side and back side of laser diodes, photo diodes, and LED chips	**9-5**
7940	Wafer Inspection System	Laser diodes, Photo diodes, and LED chips	**9-7**
7970	CMOS Image Sensor Inspection System	CMOS image sensors	**14-28**



Video Microscope



3D Optical Profiler



Double Sided Wafer Inspection System



Wafer Inspection System



The 7310 video microscope is a color CCD video-based microscope system that allows you to clearly view small objects on any TV monitor or video projector. Unlike conventional optical microscopes that are complicated and intimidating for the viewer to use, the 7310 is an easy-to-use and friendly video-based system. High resolution video viewing eliminates the operator eyestrain and fatigue associated with conventional and binocular microscopes and the unnatural "hologram effect" of optical projection systems.

The 7310 guided LED light surrounds the lens and automatically provides the best illumination for you to obtain the optimum viewing angle and color of the target object on the video monitor. By using the advanced automatic gain control of DSP technology, it gives the user distortion-free microscope quality images.

With the frame freeze button and memory switch, it allows you to freeze the images with one, or one-two frame on the screen. Image retention on hard copy and image storage are possible by simply connecting the video output of 7310 directly to an optional Color Video Printer, Video Tape Recorder (VTR), or Personal Computer (PC with appropriate image capture card installed).

Two illumination heads of contact and non-contact measurement are available. The user can use the one that meets versatile applications of top-view angle or oblique-view angle. The compact size allows it to be hand held for observation anywhere, anytime. More than one person can observe the same clear image on the color monitor for discussion getting the best results and solutions.

The Chroma video microscope offers the sophisticated inspection methods in the applications of semiconductor, SMD PCB, electronics, tab and wire bonding, hybrid circuit, metal works, quality control, textiles, etc. The versatile and easy-to-use product introduces wholly new ways of treatment. It makes you work faster and more effectively than before.

FUNCTIONS

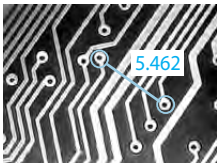
- **Handy Type Easy to Operate**
  It can be held by hand easily to view the object in clear image without adjusting the focus
- **Picture Freeze**
  You can freeze the frame and release it easily by touching the frame freeze button on the handle. Besides, you are also able to use remote cord to freeze the frame via the terminal on the rear panel.
- **Frame Split**
  If you need to compare two objects, you can choose one-two frame on the screen by switching the "Memory" to "2".
- **Measurement for Multiple Masks**
  The mask designed for multiple functions can be used with magnification lens to observe the object with non-contact, contact and oblique for three-dimension effect.
- **Fully Field Use**
  It provides complete lens combination from magnification 5X to 1000X with maximum working distance up to 18cm. To work with appropriate accessories and measurement software, the Measurement Master can meet the different requirements for various industries.
- **Multiple Peripherals Support**
  The 7310 can connect diverse recording media, color displays, and PC environment (with appropriate interface card installed) via the video out terminal. You can select the desired peripheral.

Resistor



20X Contact

PCB



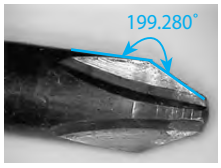
20X Non-Contact
with Measurement Master

connector



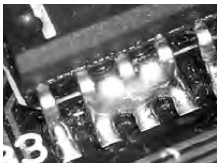
20X Non-Contact

Screw Driver



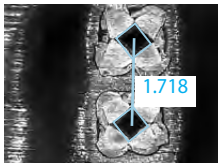
40X Contact
with Measurement Master

SMD



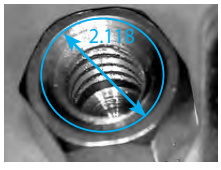
40X Oblique

Capacitor



100X Non-Contact
with Measurement Master

Screw



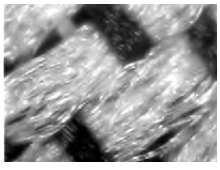
100X Non-Contact
with Measurement Master

LED



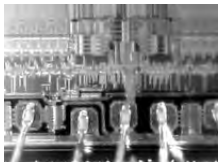
100X Non-Contact

Textile



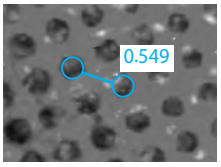
200X Contact

Die Chip



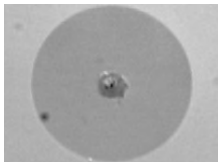
200X Non-Contact

Halftone Dot



200X Non-Contact
with Measurement Master

Fiber Connector



1000X Non-Contact

All specifications are subject to change without notice.

SPECIFICATIONS	
Model	**7310**
Camera	
Image Pickup Sensor	1/3 inch CCD
Total Pixels	
NTSC	811 (H) x 508 (V)
PAL	795 (H) x 596 (V)
Scanning Method	2:1 interlaced
Scanning Frequency	
NTSC	15.734 KHz (H) x 59.94 Hz (V)
PAL	15.625 KHz (H) x 50.00 Hz (V)
S/N	46dB
AGC	DSP Control
White Balance	Automatic
Operating Environment	
Operating Temperature	-5 to 40˚C
Operating Humidity	35 to 80% R.H. (without condensation)
Light Source	
Lamp	White LED
Service Life of Lamp	5000 hrs (avg.)
Color Temperature	7100˚k (max)
Intensity Regulation	Auto
Others	
Still Picture	1, 1/2 frame
Supply Voltage	1Ø 110~240V ±10% V_{LN}, 47~63Hz ; DC 12V 0.5A
Power Consumption	Less than 6W
Dimension (H x W x D)	Probe (without Lens Head): 57 x 50 x 160 mm / 2.24 x 1.97 x 6.30 inch Stand: 60 x 125 x 190 mm / 2.36 x 4.92 x 7.48 inch
Weight	Probe (without Lens Head): 220g / 0.48 lbs Stand: 1.0 kg / 2.2 lbs
Camera Probe Length	1.5m / 59.05 inch
Outputs	
Video Output	VBS1.0Vp-p/75Ω RCA Type

ORDERING INFORMATION

7310 : Video Microscope -NTSC, Adapter (Mark I)
7310 : Video Microscope -PAL, Adapter (Mark I)
A730001 : 20X Magnification Lens
A730002 : 40X Magnification Lens
A730003 : 200X Magnification Lens
A730007 : 100X Magnification Lens
A730009 : Suitcase
A730011 : 400X Magnification Lens
A730012 : 650X Magnification Lens (Constant Focus)
A730013 : 1000X Magnification Lens
A730015 : 35X Polarization Magnification Lens
A730016 : 40X LWD Magnification Lens
A730025 : Copy Stand (Mark I)
A731008 : Long Rod for Copy Stand
A731026 : 5X-15X Adjustable Magnification Lens
A731027 : 20X Polarization Magnification Lens
A731028 : 40X Polarization Magnification Lens
A731029 : 650X Adjustable Magnification Lens (Adjustable Focus)
A731030 : Remote cable for freeze
A731034 : USB Video Grabber

MAGNIFICATION LENS					
Model		**A731026**	**A730001**	**A731027**	**A730015**
Magnification on 14" monitor		5-15X	20X	20X Polarization	35X Polarization
Illumination Head		Non-contact	Contact, Non-contact, Oblique, Diffusion	Non-contact	Contact
View Area	Horizontal length	56 / 18.7mm	14mm	14mm	8mm
	Vertical length	42 / 14mm	11mm	11mm	6mm
	Diagonal length	70 / 23.4mm	17.8mm	17.8mm	10mm
Depth-Of-Field		≦18 / 7mm	≦8.8mm	≦8.8mm	≦3.3mm
Working distance (non-contact lightguide applied)		160 / 40mm	50mm	40mm	(Contact type only)

Model		**A730002**	**A730028**	**A730016**	**A730007**
Magnification on 14" monitor		40X	40X Polarization	40X LWD	100X
Illumination Head		Contact, Non-contact, Oblique, Diffusion	Non-contact	None	Contact Non-contact
View Area	Horizontal length	7.5mm	7.5mm	7.5mm	2.8mm
	Vertical length	6mm	6mm	6mm	2.2mm
	Diagonal length	9.6mm	9.6mm	9.6mm	3.56mm
Depth-Of-Field		≦3.85mm	≦3.85mm	≦3.5mm	≦0.55mm
Working Distance (non-contact lightguide applied)		30mm	18mm	179.5mm	4mm

Model		**A730003**	**A730011**	**A731029**	**A730013**
Magnification on 14" monitor		200X	400X	650X	1000X
Illumination Head		Contact, Non-contact	Contact, Non-contact	adjustable Focus	Contact, Non-contact
View Area	Horizontal length	1.4mm	0.7mm	0.43mm	0.28mm
	Vertical length	1.1mm	0.52mm	0.32mm	0.21mm
	Diagonal length	1.78mm	0.87mm	0.53mm	0.35mm
Depth-Of-Field		≦0.22mm	≦0.055mm	≦0.07mm	≦0.066mm
Working Distance (non-contact lightguide applied)		4mm	2.5mm	1.4mm	3.6mm

All specifications are subject to change without notice.

Sub-nanometer 3D Optical Profiler

Model 7503



KEY FEATURES

- Up to 0.1 nm height resolution for measurement
- Use white light interference measurement technique to do nondestructive and rapid surface texture measurement and analysis
- Modulized design to select parts based on test demands or budget concerns
- Work with color or monochrome camera to do 2D measurement and enable the measuring microscope function
- Equipped with electric nose gear to mount various lens for switch programmatically
- LED or halogen light source for selection
- Measurement range 150 mm x150 mm
- Integrate low magnification lens (5X & 2.5X ratio) for large area 3D measurement
- Provide various surface measurement parameters, such as sectional difference, included angle, area, dimension, roughness, waviness, film thickness and flatness
- Equipped with dark point and boundary error correction algorithms
- Friendly user interface with simple graphical control system and 3D graphics display
- Exchangeable file format to save and read various 3D profile file formats
- Powerful STA (Surface Texture Analysis) Master software providing more than 150 lines and surfaces profiling parameters
- Automated rapid self calibration to ensure the system's measurement capability
- Provide Chinese/English user interface for switch
- Provide measu rement script for auto test

CE

Chroma 7503 is a sub-nano 3D Optical Profiler developed using the technology of white light interference to measure and analyze the surface profile of micro-nano structures with sophisticated scanning system and innovative algorithms. It can work with color or monochrome camera as required for 2D and microscope measurements.

The latest system modular design of Chroma 7503 has flexible configurations that can comply with diversified test applications. When equipped with electric nose gear, maximum 5 types of lens can be mounted and switched directly for use without changing manually. In addition the equipped electrical adjustment mobile platform is able to adjust and position the sample automatically. The large scanning range of vertical and horizontal axis is applicable for various auto measurements. Nondestructive and rapid surface texture measurement as well as analysis can be done on the sample without any preprocessing that is most suitable for R&D, production, process improvement and academic research.

The height resolution Chroma 7503 is up to 0.1 nm and it can achieve 100mm when Z vertical axis is used to measure the scanning stroke. Also the horizontal axis is able to reach sub-micro resolution with scanning range up to 150 × 150mm when a PC is used to control the mobile platform as demand. The fast calibration procedure and algorithm theory enables the system calibration result to be traced to NIST standard. Combined with several innovative, robust and reliable algorithms, Chroma 7503 has the quality of high precision and large scale measurement.

The configured auto scanning platform is able to find the best focus position via the automated vertical axis mobile platform with rapid autofocus algorithm. Moreover, the tilt adjustment platform is able to level the unit under test within a few seconds without complex operations.

The commercial white light interference analyzers frequently use the centroid algorithm to calculate the surface height. Since the light diffraction causes incorrect height calculation of some positions and results wrong profiling data. Chroma 7503 applies the most advanced 3D Profiler Master software along with the interference signal process algorithm of Chroma to analyze the spectrum of white light interference and prevent the boundary error problem. The system has dark point process function to filter out and correct the data that is incapable of creating interference to reduce the error in measurement. Since the dark point process runs while the data is retrieving, the dark point filter function can be executed effectively; meanwhile the correction is made by referencing the surrounding data that makes the measurement more robust and reliable.

STA (Surface Texture Analysis) Master software analyzes and corrects the data of surface texture, also provides complete profiles in icon. It has more than 150 lines or surfaces profiling parameters including roughness, ripple, flatness, apex and valley. The high pass filter, low pass filter, fast Fourier transformation and cusp removal space filter tools allow the user to filter out the high/low/bandpass signals. The software has polynomial fitting, region growth, the entire surface and multiple area leveling tools that can used in data processing and analysis flexibly.

In many hi-tech industries such as semiconductor, flat panel display, fiber communication, MEMS, biomedical and electronic packaging, the accuracy of micro structure surface texture determines the performance and function of the product, thus it needs to be monitored for quality during manufacturing. Chroma 7503 has many surface measurement parameters such as section height, included angle, area, dimension, roughness, ripple, film thickness and flatness that can meet the requirements of the industries and R&D units.

Chroma 7503 has 2D and 3D measurements with fast switch of ratio and large area map interlinking function that can cope with various applications' needs. Furthermore, the flexible modular design allows customization for practical use to gain the balance between price and performance. Chroma 7503 is the best choice for improving efficiency and saving cost.

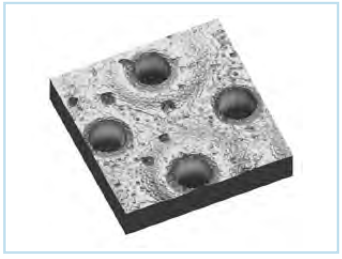
ORDERING INFORMATION

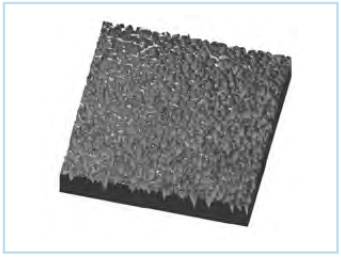
7503 : Sub-nanometer 3D Optical Profiler
Imaging system: 640x480 pixel (mono), 640x480 pixel (color), 1000x1000 pixel (mono) *1, 1000x1000 pixel (color) *1
Interference objective lens:
2.5X *2, 5X, 10X, 20X, 50X, 100X
Conventional objective lens:
5X, 10X, 20X, 50X, 100X
Tube lens: 0.45X, 0.5X, 1.0X
Nose gear:
None, Manual rotary 5 holes, Electric rotary 5 holes
Light Source:
White light LED, Halogen, Mono LED
Anti-vibration table
Software: STA Master

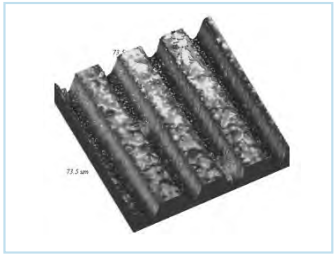
All specifications are subject to change without notice.

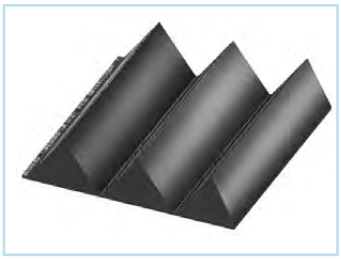
Application Examples

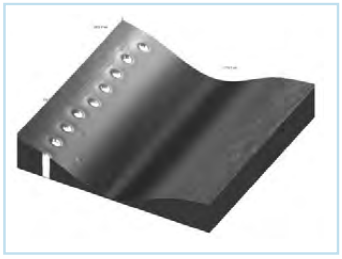

LCD-Photo Spacer

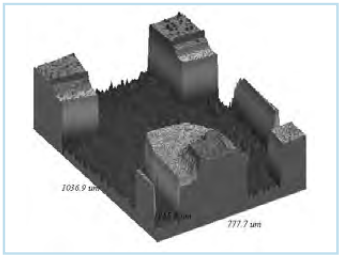

PCB-Laser Via

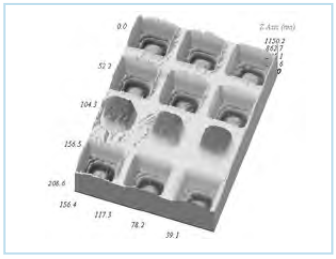

Material-Rough Surface


PCB-Wire high, wide, pitch


LCD-Prism Sheet


MEMS-Printer Nozzle


MEMS-Hard Disk Read Head


Semiconductor-Thin Film Transistor

SPECIFICATIONS			
Model			**7503**
Measurement			Noncontact 3D & 2D measurements
Imaging system (CCD video camera)			640x480 pixel (mono), 640x480 pixel (color)
			Optional 1000x1000 pixel (mono), 1000x1000 pixel (color) *1
Interference objective lens			2.5X *2, 5X, 10X, 20X, 50X, 100X
Conventional objective lens			5X, 10X, 20X, 50X, 100X
Supported tube lens ratio			0.45X, 0.5X, 1.0X
Nose gear			Standard : Electric rotary 5 holes
			Optional : None, Manual rotary 5 holes
Light Source			White light LED
			Optional Halogen
Measurement Mode *3			PSI, VSI
XY automatic platform	Stroke		150 mm
	Resolution		2 μm (auto version)
	Load capacity		≦1.1 Kg (without carrying tray)
	Control mode		Auto
Level Measurement Range			150 x 150 mm
Z axis	Stroke		100 mm electrical platform, optional for 100 mm manual platform
	Resolution		< 0.5 μm (Electrical platform)
Level adjustment platform			Manual 2 axes , ± 6°
PZT Scan	Stroke		100 μm, optional 400 μm
Vertical direction	Accuracy (Step Height)	VSI	≦1.5 % *4
		PSI	≦5.0 % *5
	Repeatability (Step Height)	VSI	≦0.14 % *4
		PSI	≦1.7 % *5
	Scan speed	PZT	12 μm / sec
Operating system			Microsoft Window® 7 (32-bit)
Operating environment			Noise : ≤ 60db Vibration : VC-C or above
Input voltage range			1Ø 110~240V ± 10% V_{LN}, 47~63Hz, 50VA
Operating temperature/ humidity			15~35°C (47°F to 67°F) ; less than 75 % relative humidity (non condensing)
Dimension (H x W x D)			1800 x 760 x 760 mm / 70.87 x 29.92 x 29.92 inch
Weight			Approx. 220 Kg / 485 lbs *6
Certification			CE

Note*1: Only support 1.0X tube lens ratio
Note*2: 2.5X objective lens have special working distance with other objective lens
Note*3: VSI: Vertical Scanning Interferometry; PSI: Phase Shift Interference
Note*4: Measured with 8.0 μm standard step height
Note*5: Measured with 46nm standard step height
Note*6: The actual weight varies with selected option

All specifications are subject to change without notice.

Double Sided Wafer Inspection System Model 7936



Chroma 7936 double sided wafer inspection system is an automatic inspection system for after-dicing wafer chip. It can do double side inspection simultaneously. The appearance defects of wafer chip are clearly conspicuous by using advanced illumination technology. Illumination and camera acquisition mode can be adjusted for various wafer process, like vertical chip or flip chip.

Applied with high speed camera and inspection algorithms, Chroma 7936 can inspect a 2" LED wafer in 4.5 minutes; the throughput is about 35msec/ chip. Chroma 7936 also provides auto focus and warpage compensation function to overcome wafer warpage and chuck leveling issue. There are two magnifications for selection by applicable chip size or defect size. The minimum resolution of the system is 0.7um that has capability to detect 2 um defect size.

KEY FEATURES

- It can do double side inspection simultaneously
- Maximum 8 inch wafer handling capability (10 inch inspection area)
- With inspection item framework that unique detection algorithm can be replaced or added for different customer or product
- No precise wafer loading is needed because of auto alignment function
- Edge finding to test various wafer shapes
- Defect criteria editor for versatile pass/fail criteria setting
- Defect detection rate > 98%
- Combine AOI and upstream machine data and upload a final mapping file for downstream machine
- Customized inspection report for defect analysis

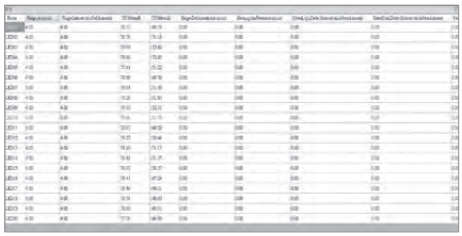
System Function

After the tape expansion process, the arrangement of dies on wafer may be formed an irregular alignment. Chroma 7936 also offers software alignment function to adjust wafer alignment angle for scan. In addition, Chroma 7936 owns a friendly user interface to reduce user's learning time. All of inspection information is visualized for easy reading, like mapping map, defect region, inspection results.

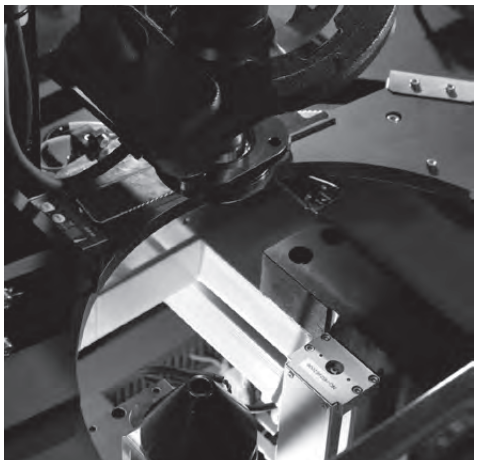
Defect Analysis

All of inspection result raw data are recorded not only pass/fail and bin data. This is easily to analysis an optimal parameter that achieves the balance overkill and underkill. The data also helps to monitor the defect trend caused by the production process, and feedback to production unit in advance.

In conclusion, Chroma 7936 is an ideal cost and performance selection for wafer chip inspection process.

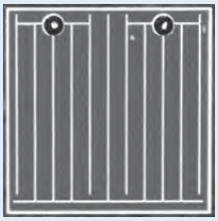


Detail defect raw data for analysis



Application for vertical LED chip

LED Top Side Inspection Items



- Pad Defect
- Pad Residue
- ITO Peeling
- Finger Broken

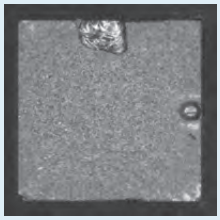


- Mesa Abnormality
- Epi Defect
- Chipping
- Chip Residue

LED Back Side Inspection Items



- Cutting Abnormality
- Pad Bump



- Chipping
- Metal Lack

All specifications are subject to change without notice.

SPECIFICATIONS	
Model	**7936**
Suitable Chip and Package Type	
Applicable Ring	Grip ring holder or wafer holder
Inspection Area	10" , suit for 6" LED expanding wafer and 8" sawing wafer
Chip Size	125umX125um ~1.2mmX1.2mm
Chip Height	10um~1.5mm
Suitable Package	Vertical chip, flip chip
Inspection	
Camera	5M Color Camera X 2
Light Source	LED Co-axis light, ring light, back light
Magnification	2X, 5X objective lens selectable
Throughput	For LED, 2" wafer in 4.5 minutes at 2 lights
Algorithm	Pad defect, mesa defect, chipping defect, double chips and emitting area defect
External Interface	Provide external algorithm interface to replace or add new inspection algorithm
System	
Loading/ unloading	Auto load port X 2
Warpage Compensation	Software auto focus and mechanical fix focus column to overcome wafer warpage
MTBF	> 2000 hours
PC	X1
Software Function	
Monitor	Real-time wafer map display
Image Storage	All/ defect image saving selectable
Report	Including chip position, defect type, inspection results
Cassette Selection	Programmable cassette selection and scheduling
Facility Requirement	
Dimension	1200mm x 800 mm x 1550mm
Weight	800kg
Power	AC 220V±10%, 50/60 Hz, 1Φ, 2KW
Compressed Air	0.6 MPa
Operation Temperature	+5˚C ~40 ˚C
Operation Humidity	20%~65% R.H.

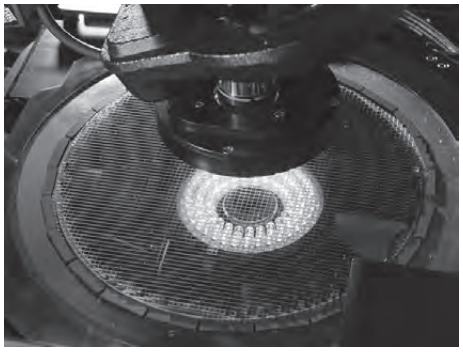
ORDERING INFORMATION

7936 : Double Sided Wafer Inspection System



KEY FEATURES

- Inspect 6" LED wafer in 2.5 minutes with high speed architecture
- Maximum 8 inch wafer handling capability (10 inch inspection area)
- Unique detection algorithm can be replaced or added for different customer or model
- No precise wafer loading is needed because of auto alignment function
- Edge finding to test various wafer shapes
- Defect criteria editor for versatile pass/fail criteria setting
- Chip optical character defect detection rate > 98%
- Combine AOI and upstream machine data and upload a final mapping file for downstream machine
- Customized inspection report for defect analysis
- Suitable for LED, laser diodes, photo diodes, and other wafer chip



Chroma 7940 wafer inspection system is an automatic inspection system for after-dicing wafer chip. The appearance defects of wafer chip are clearly conspicuous by using advanced illumination technology. Illumination and camera acquisition mode can be adjusted for various wafer chip, like LED, laser diodes and photo diodes.

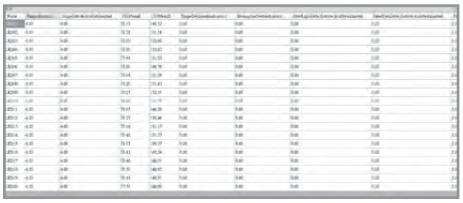
Applied with high speed camera and inspection algorithms, Chroma 7940 can inspect a 6" LED wafer in 2.5 minutes. Chroma 7940 also provides auto focus and warpage compensation function to overcome wafer warpage and chuck leveling issue. There are two magnifications for selection by applicable chip size or defect size. The minimum resolution of the system is 0.5um that has capability to detect 1.5 um defect size.

System Function

After the tape expansion process, the arrangement of dies on wafer may be formed an irregular alignment. Chroma 7940 also offers software alignment function to adjust wafer alignment angle for scan. In addition, Chroma 7940 owns a friendly user interface to reduce user's learning time. All of inspection information is visualized for easy reading, like mapping map, defect region, inspection results.

Defect Analysis

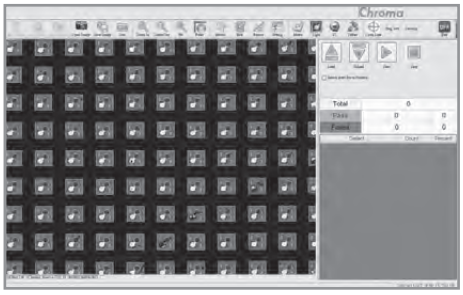
All of inspection result raw data are recorded not only pass/fail and bin data. This is easily to analysis an optimal parameter that achieves the balance of overkill and underkill. The data also helps to monitor the defect trend caused by the production process, and feedback to production unit in advance.



Detail defect raw data for analysis

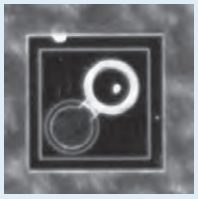
In conclusion, Chroma 7940 is an ideal cost and performance selection for wafer chip inspection process.

Applications for Laser Diodes & Photo Diodes



Laser Diodes & Photo Diodes Inspection Items

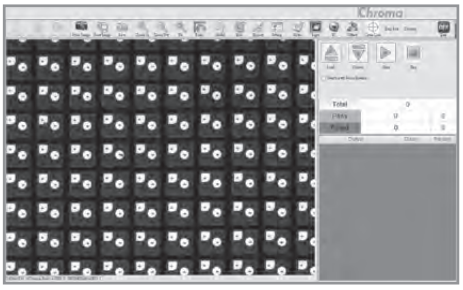




- Photosensitive Region Defect
- Bond Pad Defect
- Passivation Film Defect

-Scribe Line Defect
-Chipping
-Double Chip

Application for LED Chips



LED Inspection Items





- Pad Defect
- Pad Residue
- ITO Peeling
- Finger Broken

- Mesa Abnormality
- Epi Defect
- Chipping
- Chip Residue

All specifications are subject to change without notice.

SPECIFICATIONS	
Model	**7940**
Suitable Chip and Package Type	
Applicable Ring	Suitable for grip ring or wafer frame
Inspection Area	10", suitable for 6" LED expanded wafer and 8" unsawn wafer
Chip Size	125um x 125um ~ 5mm x 5mm
Chip Type	LED, laser diodes, photo diodes, and other wafer chip
Inspection	
Magnification	Multiple magnification for selection, 2X, 5X
Throughput	6" wafer in 2.5 minutes at 2 lights For LED application
Algorithm	Provide external algorithm interface to replace or add new inspection algorithm
System	
Loading/ unloading	Auto load port x 4
Warpage Compensation	Software auto focus and mechanical focus supporting to overcome wafer warpage
Software Function	
Monitor	Real-time wafer map display
Image Storage	All/defect image saving selectable
Report	Including chip position, defect type, inspection results
Cassette Selection	Programmable cassette selection and scheduling
Facility Requirement	
Dimension (WxDxH)	1600 mm x 1500 mm x 1800 mm
Weight	1800 kg
Power	AC 220V±10%, 50/60 Hz, 1Φ, 2.5KW
Compressed Air	0.6 MPa

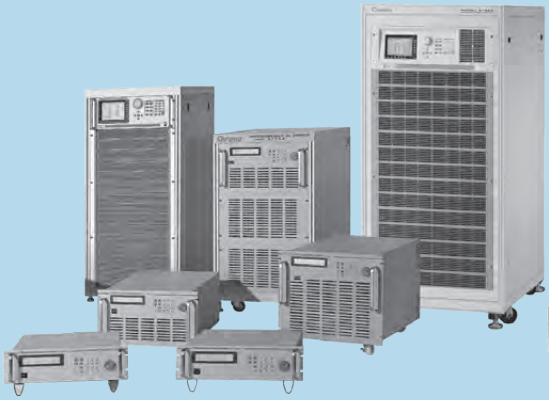
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7940 : Wafer Inspection System

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AC Electronic Load 10-31
AC Power Source 10-33
Digital Power Meter 10-47
DC Power Supply 10-51
Automatic Test System 10-65

Automatic Test System





AC Source



DC Electronic Load

AC Electronic Load



Digital Power Meter



DC Power Supply



Burn-in
DC Power Supply



Solar Array Simulation
DC Power Supply

DC Electronic Load Selection Guide						
Series	**6310A Series**	**6330A Series**	**63200A Serie**	**63200 Series**	**63600 Series**	**63800 Series**
Power Rating (Modular)	200W, 100Wx2(Dual), 30W&250W, 300W, 350W, 600W, 1200W	200W, 100Wx2(Dual) 30W&250W, 300W, 350W, 600W, 1200W	4kW, 5kW, 6kW, 24kW	2600W, 5200W, 6500W, 10000W, 10400W, 14500W, 15600W	100Wx2(Dual), 300W, 400W	1800W, 3600W, 4500W
Current	Up to 240A	Up to 240A	Up to 2000A	Up to 1000A	Up to 80A	Up to 45A
Voltage	Up to 600V	Up to 600V	Up to 1200V	Up to 1000V	Up to 600V	Up to 500V
Configuration	Modular	Modular	Stand-Alone	Stand-Alone	Modular	Stand-Alone
Max. Channel / Mainframe	8	8	1	1	10	1
Operating Mode	CC/CR/CV/CP	CC/CR/CV/CP	CC/CR/CV/CP/CZ	CC/CR/CV/CP	CC/CR/CV/CP/CZ	CC/CR/CV/CP/ DC Rectified
Slew Rate	Up to 10A/μs	Up to 10A/μs	Up to 200A/μs	Up to 41A/μs	Up to 8A/μs	Up to 600A/ms
Dynamic Loading	Y	Y	Y	Y	Y	-
Measurement	V, I, P	V, I, P	V, I, P, Vpeak	V, I, P	V, I, P, Vpeak	V, I, P, R
External Waveform Control	-	-	Y	Y	Y	-
User Defined Waveform	-	-	Y	-	Y	-
Short Circuit Test	Y	Y	Y	Y	Y	Y
Von Point Control	Y	Y	Y	Y	Y	-
V&I Monitor	-	-	Y	Y	Y	Y
Synchronize Dynamic	-	Y	Y	Y	Y	-
Synchronize Control Multi-load	Y	Y	Y	-	Y	-
Master/Slave Parallel Mode	-	Y	Y	Y	Y	Y
Data Setting (Rotary)	Y	Y	Y	Y	Y	Y
Data Setting (Keypad)	Y	Y	Y	Y	-	Y
Status Storage (100 files)	Y	Y	Y	Y	Y	Y
Remote Controller	Option	Option	Option	Option	-	-
GO/NG Test	Y	Y	Y	Y	Y	-
Fan Speed Control	Y	Y	Y	Y	Y	Y
Self Test at Power On	Y	Y	Y	Y	Y	Y
Programmable Test (10 Pro.)	Y	Y	Y	Y	Y	-
RS-232 Interface	Standard	Standard	-	Standard	-	Standard
GPIB Interface	Option	Option	Option	Standard	Option	Standard
USB Interface	Option	Option	Standard	-	Standard	-
Ethernet Interface	-	-	Option	-	Option	-
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All specifications are subject to change without notice.

AC Power Source Selection Guide

Step 1 by Function

Series	6500 Series	61500 Series	61600 Series	61700 Series	61800 Series
Power Measurement	Standard	Standard	Standard	Standard	Standard
PLD Simulation	Standard	Standard	-	Option	Standard
Arbitrary Waveform	-	Standard	-	-	Standard
DC Output	-	Standard	Standard	Standard	Standard
Programmable Output Impedance	-	Standard	-	-	-
Harmonic Measurement	-	Standard	-	-	Standard
IEC Regulation Testing	Standard	Standard	-	-	Standard
GPIB Interface	Option	Option	Option	Option	Standard
RS-232 Interface	Option	Option	Option	Option	Standard
PAGE	10-45	10-33	10-37	10-41	10-43

Step 2 by Model

Series	6500 Series		61500 Series		61600 Series		61700 Series	61800 Series
Power	1 Ø	3 Ø	1 Ø	3 Ø	1Ø	3 Ø	3 Ø	1 Ø/3 Ø
500VA	-	-	61501	-	61601	-	-	-
1000VA	-	-	61502	-	61602	-	-	-
1200VA	6512	-	-	-	-	-	-	-
1500VA	-	-	61503	-	61603	-	61701	-
2000VA	6520	-	61504	-	61604	-	-	-
3000VA	6530	-	-	-	-	-	61702	-
4000VA	-	-	61505	-	61605	-	-	-
4500VA	-	-	-	-	-	-	61703	-
6000VA	6560	-	-	-	-	-	61704	-
9000VA	6590		-	-	-	-	-	-
12000VA	-	-	61511		61611		61705	-
18000VA			61512		61612		-	-
30000VA			61511 + A615103		61611 + A615103		-	61830
36000VA			61512 + A615103		61612 + A615103		-	-
45000VA	-		-		-		-	61845
60000VA	-		-		-		-	61860
PAGE	10-45		10-33		10-37		10-41	10-43

Power Meter Selection Guide

Model	66201	66202	66203	66204	66205
Channel	1	1	3	4	1
Max. Voltage range	500Vrms	500Vrms	600Vrms	600Vrms	600Vrms
Max. Current range	4Arms	20Arms	20Arms	20Arms	30Arms
Frequency	15Hz-10kHz	15Hz-10kHz	10Hz-10kHz	10Hz-10kHz	10Hz-10kHz
Graphical Display	-	-	-	-	-
Result storage	-	-	-	-	-
Rotary / keypad Data input	-	-	-	-	-
GPIB Interface	V	V	V	V	V
RS-232 Interface	-	-	-	-	-
USB Interface	V	V	V	V	V
Centronics Interface	-	-	-	-	-
Parameters	V, I, PF, W, VA, P, CF, Vpk, Ipk	V, I, F, PF, W, Wr, Wa, P, CF, Vpk, Ipk, Ip-p, THD, E	V, I, F, PF, W, VAR, VA, CF, Vpk, Ipk, THD, E, EFF	V, I, F, PF, W, VAR, VA, CF, Vpk, Ipk, THD, E, EFF	V, I, F, PF, W, VAR, VA, CF, Vpk, Ipk, THD, E, EFF
AC/DC Measurement mode	DC, AC + DC	DC, AC+DC	DC, AC+DC	DC, AC+DC	DC, AC+DC
40th Harmonics Measurement Capability	-	V	V	V	V
Pre-Compliance IEC 61000-3-2	-	Software	Software	Software	Software
DFT & DSP Technology	V	V	V	V	V
Waveform display	Software	Software	Software	Software	Software
Waveform moving cursor	-	-	-	-	-
Waveform trigger function	-	-	-	-	-
Recording function	Software	Software	Software	Software	Software
Stand alone operating	V	V	V	V	V
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DC Power Supply Selection Guide						
Model	**62000B Series / 1.5KW**		**62000H Series / 2KW & 5KW & 10KW & 15KW**		**62000P Series / 600W & 1.2KW & 2.4KW & 5KW**	
Volts	**Amps**	**Model**	**Amps**	**Model**	**Amps**	**Model**
0-15	1-90	**62015B-15-90**				
0-30	1-50	**62015B-30-50**	0-250A/ 0-375A	**62075H-30/ 62100H-30**	0-80	**62006P-30-80**
0-40			0-125A/ 0-250A/ 0-375A	**62050H-40/ 62100H-40/ 62150H-40**	0-120	**62012P-40-120/ 62024P-40-120**
0-60	1-25	**62015B-60-25**				
0-80	1-18	**62015B-80-18**			0-60	**62012P-80-60/ 62024P-80-60**
0-100			0-125A/ 0-250A/ 0-375A	**62050H-100P/ 62100H-100P/ 62150H-100P**	0-25/ 0-50/ 0-100	**62006P-100-25/ 62012P-100-50/ 62024P-100-50/ 62050P-100-100**
0-150	1-10	**62015B-150-10**	0-40A	**62020H-150S**		
0-300					0-8	**62006P-300-8**
0-450			0-11.5A/ 0-23A/ 0-34A	**62050H-450/ 62100H-450/ 62150H-450**		
0-600			0-8.5A/ 0-17A/ 0-25A	**62050H-600/62050H-600S 62100H-600/62100H-600S 62150H-600/62150H-600S**	0-8	**62012P-600-8/ 62024P-600-8**
0-1000			0-10A/ 0-15A	**62100H-1000/ 62150H-1000/ 62150H-1000S**		
PAGE	**10-63**		**10-55, 10-59**		**10-51**	

All specifications are subject to change without notice.

Automatic Test System Selection Guide					
System Model	**8000**	**8010**	**8020**	**8200**	**8491**
UUT Type					
Battery Charger	V		V		
Switching Mode Rectifier	V				
Switching Power Supply (Multi-Output)	V	V	V	V	
Adapter	V		V	V	
DC to DC Converter	V				
DC Power	V	V			
LED Power Driver					V
EV Power Electronics	V				
PV Inverter	V				
Functionality					
Open System Architecture	V				V
Optional Instrument Extendible	V				V
Support Windows 98/NT/2000 or higher	V	V	V	V	V
User Permission Setting	V	V	V	V	V
System Administrator Access Log	V	V	V		V
Network Management	V	V	V		V
Support Shop Floor Control Software *1	V	V	V	V	V
Test Report Editing	V	V	V	V	V
Test Item Editing	V				V
Test Program Editing	V	V	V	V	V
Test Program Saving	V	V	V	V	V
Debug Run	V				V
GO/NO GO Test	V	V	V	V	V
Statistical Analysis Control	V	V	V	V	V
Test Report Printing	V	V	V	V	V
On-Line Control *2	V				V
Report Wizard *3	V				V
PAGE	**10-65**	**10-72**	**10-73**	**10-71**	**10-74**

Notes:

1. Support Shop Floor Control Software:
The system can work with Shop Floor Control Software used on manufacturing production line to attain overall factory control and remote control through internet.

2. On-Line Control:
Enables users to operate all instruments on-line via one computer screen, incorporating the test values from individual instruments to save time and resources.

3. Report Wizard:
Automatically generates various R&D reports including oscilloscope waveform and the others to meet customer's needs and reduce the report preparation time.



KEY FEATURES

- Max Power: 200W, 100W × 2(Dual), 30W & 250W, 300W, 350W, 600W, 1200W
- Wide range 0~600V operating voltage
- Compatibility between 6310 and 6310A
- Up to 8 channels in one mainframe, for testing multiple output SMPS
- Parallel load modules up to 1400W for high current and power application
- Synchronization with multiple loads
- Flexible CC, CR, CP and CV operation modes
- Dynamic loading with speeds up to 20kHz
- Fast response of 0.32mA/μs~10A/μs slew rate
- Minimum input resistance allowing load to sink high current at low voltage (63123A : 0.6V@70A)
- Real time power supply load transient response simulation and output measurement
- User programmable 100 sequences. Front panel input status for user-friendly operating
- High/Low limits of testing parameters to test GO/NG
- Digital I/O control
- Over current protection (OCP) testing function
- 16-bit precision voltage and current measurement with dual-range
- Remote sensing capability
- Short circuit test
- Self-test at power-on
- Full Protection: OC, OP, OT protection and OV alarm
- USB, GPIB & RS-232 interfaces

The Chroma 6310A series Programmable DC Electronic Load is suitable for the test and evaluation of multi-output AC/DC power supplies, DC/DC converters, chargers and power electronic components. It is ideal for applications in research and development, production, and incoming inspection. The system is configured by plugging the user selectable load modules into the system mainframe. The user interfaces include an ergonomically designed user friendly keypad on the front panel and the following computer interfaces: RS-232, USB or GPIB.

The 6310A series has a self-diagnosis routine to maintain instrument performance. It also provides OP, OC, OT protection and alarm indicating OV, reverse polarity protection to guarantee quality and reliability for even the most demanding engineering testing and ATE applications.

Module Load Design

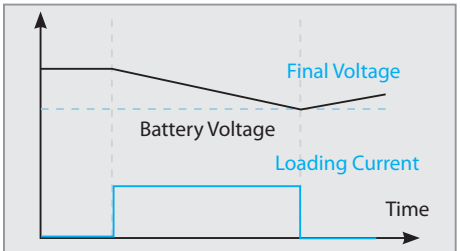
The Chroma 6314A 1400W and 6312A 700W electronic load mainframes accept the user-installable 6310A series load modules for easy system configuration and will mount in a 19" instrument rack.



Timing Function

The 6310A series of loads include a unique timing & measurement function, which allows precise time measurements in the range of 1ms to 86,400s. This feature allows the user to set the final voltage & timeout values for battery discharge testing and other similar applications.

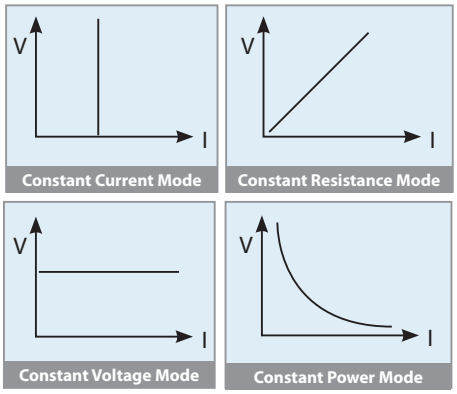
The Timing function can be used in testing battery and super capacitor discharge, or other similar applications.



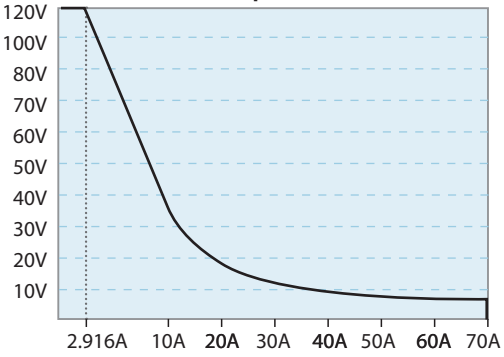
Battery Discharge Testing

Application of Specific Load Simulation

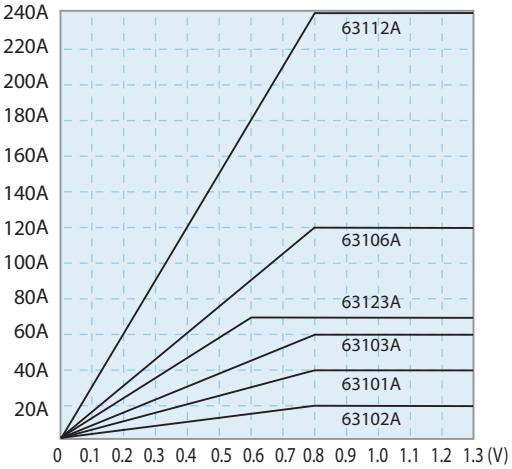
The 6310A load modules operate in constant current, constant voltage, constant power or constant resistance to satisfy a wide range of test requirements. For example, the test of a battery charger can be simulated easily by setting the load to operate in constant voltage.



Model 63123A Input Characteristics



Low Voltage Characteristics (Typical)
Model 63101A/63102A/63103A/
63106A/63112A/63123A

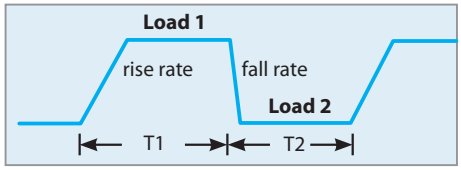


Note: All specifications are measured at load input terminals. (Ambient Temperature of 25˚C)

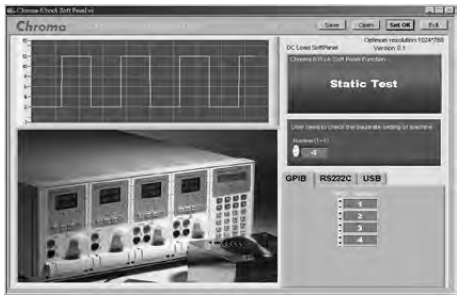
All specifications are subject to change without notice.

Dynamic Loading and Control

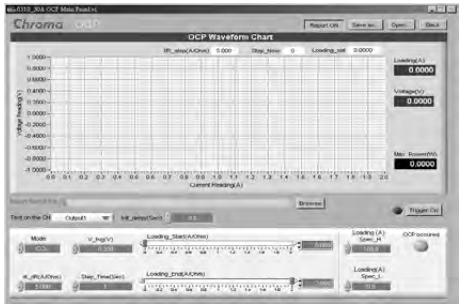
Modern electronic devices operate at very high speeds and require fast dynamic operation of their power providing components. To satisfy these testing applications, the 6310A loads offer high speed, programmable dynamic load simulation and control capability. The figure below shows the programmable parameters of the 6310A modules.



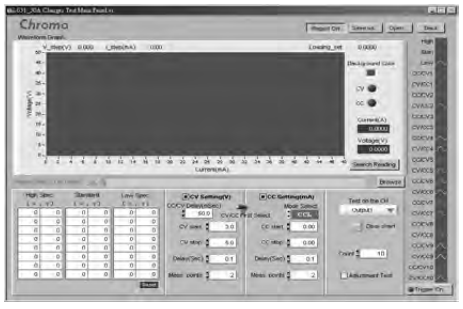
Soft Panel



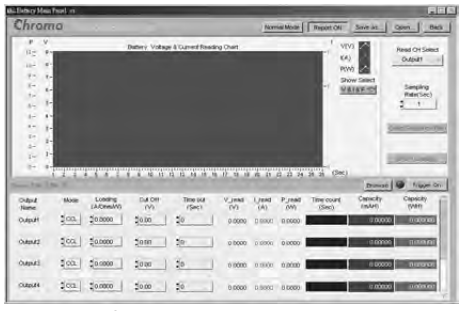
Main Operation Menu



OCP Test



Charger Test



Battery Discharge Test

6310A Series DC Electronic Load Family





6314A : 4 in 1 Mainframe



6312A : 2 in 1 Mainframe



A631001: Remote Controller

Mainframe Model	6312A	6314A
Number of slots	2	4
Operating Temperature	0~40˚C	0~40˚C
Input Rating	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LL}, 47~63Hz
Dimensions (HxWxD)	194x275x550mm / 7.6x10.8x21.7inch	194x439x550mm / 7.6x17.3x21.7inch
Weight	15 kg / 33.1 lbs	21.5 kg / 47.4 lbs

ORDERING INFORMATION

6312A : Mainframe for 2 Load Modules
6314A : Mainframe for 4 Load Modules
63101A : Load Module 80V/40A/200W
63102A : Load Module 80V/20A/100W x 2
63103A : Load Module 80V/60A/300W
63105A : Load Module 500V/10A/300W
63106A : Load Module 80V/120A/600W
63107A : Load Module 80V/5A & 40A/30W & 250W
63108A : Load Module 500V/20A/600W
63112A : Load Module 80V/240A/1200W
63123A : Load Module 120V/70A/350W
A631000 : GPIB Interface for Model 6314A/6312A Mainframe
A631001 : Remote Controller
A631003 : USB Interface for Model 6314A/6312A Mainframe
A631005 : Softpanel for 6310A/6330A series
A631006 : Rack Mounting Kit for Model 6312A Mainframe
A631007 : Rack Mounting Kit for Model 6314A Mainframe
A800042 : Test Fixture
LED Load Simulator for LED Driver Test
63110A : Load Module 500V/2A/100W x 2
63113A : Load Module 300V/20A/300W
63115A : Load Module 600V/20A/300W

• Continued on next page ➟

SPECIFICATIONS-1						
Model	**63101A**		**63102A (100Wx2)**		**63103A**	
Power	20W	200W	20W	100W	30W	300W
Current	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Voltage *3	0~80V		0~80V		0~80V	
Typical Min. Operation Voltage (DC)*1	0.4V@2A 0.8V@4A	0.4V@20A 0.8V@40A	0.4V@1A 0.8V@2A	0.4V@10A 0.8V@20A	0.4V@3A 0.8V@6A	0.4V@30A 0.8V@60A
Constant Current Mode						
Range	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Resolution	1mA	10mA	0.5mA	5mA	1.5mA	15mA
Accuracy	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.
Constant Resistance Mode						
Range	0.0375Ω~150Ω (200W/16V) 1.875Ω~7.5kΩ (200W/80V)		0.075Ω~300Ω (100W/16V) 3.75Ω~15kΩ (100W/80V)		0.025Ω~100Ω (300W/16V) 1.25Ω~5kΩ (300W/80V)	
Resolution*5	6.667mS (200W/16V) 133μS (200W/80V)		3.333mS (100W/16V) 66.667μS (100W/80V)		10mS (300W/16V) 200μS (300W/80V)	
Accuracy	150Ω: 0.1S+ 0.2% 7.5kΩ: 0.01S + 0.1%		300Ω: 0.1S + 0.2% 15kΩ: 0.01S + 0.1%		100Ω: 0.1S+ 0.2% 5kΩ: 0.01S+ 0.1%	
Constant Voltage Mode						
Range	0~80V		0~80V		0~80V	
Resolution	20mV		20mV		20mV	
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.		0.05% + 0.1%F.S.	
Constant Power Mode						
Range	0~20W	0~200W	0~20W	0~100W	0~30W	0~300W
Resolution	5mW	50mW	5mW	25mW	7.5mW	75mW
Accuracy	0.5% + 0.5%F.S.		0.5% + 0.5%F.S.		0.5% + 0.5%F.S.	
Dynamic Mode						
Dynamic Mode	C.C. Mode		C.C. Mode		C.C. Mode	
T1 & T2	0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms	
Accuracy	1μs/1ms+100ppm		1μs/1ms+100ppm		1μs/1ms+100ppm	
Slew Rate	0.64~160mA/μs	6.4~1600mA/μs	0.32~80mA/μs	3.2~800mA/μs	0.001~0.25A/μs	0.01~2.5A/μs
Resolution	0.64mA/μs	6.4mA/μs	0.32mA/μs	3.2mA/μs	0.001A/μs	0.01A/μs
Accuracy	10% ±20μs		10% ±20μs		10% ±20μs	
Min. Rise Time	10μs (Typical)		10μs (Typical)		10μs (Typical)	
Current	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Resolution	1mA	10mA	0.5mA	5mA	1.5mA	15mA
Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.	
Measurement Section						
Voltage Read Back						
Range	0~16V	0~80V	0~16V	0~80V	0~16V	0~80V
Resolution	0.25mV	1.25mV	0.25mV	1.25mV	0.25mV	1.25mV
Accuracy	0.025% + 0.025%F.S.		0.025% + 0.025%F.S.		0.025% + 0.025%F.S.	
Current Read Back						
Range	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Resolution	0.0625mA	0.625mA	0.03125mA	0.3125mA	0.09375mA	0.9375mA
Accuracy	0.05% + 0.05%F.S.		0.05% + 0.05%F.S.		0.05% + 0.05%F.S.	
Power Read Back*2						
Range	0~20W	0~200W	0~20W	0~100W	0~30W	0~300W
Accuracy	0.1% + 0.1%F.S.		0.1% + 0.1%F.S.		0.1% + 0.1%F.S.	
Protective Section						
Over Power Protection	Yes		Yes		Yes	
Over Current Protection	Yes		Yes		Yes	
Over Temperature Protection	Yes		Yes		Yes	
Over Voltage Alarm*3	Yes		Yes		Yes	
General						
Short Circuit						
Current (CC)	-	≒40A	-	≒20A	-	≒60A
Voltage (CV)	-	0V	-	0V	-	0V
Resistance (CR)	-	≒0.0375Ω	-	≒0.075Ω	-	≒0.025Ω
Power (CP)	-	≒200W	-	≒100W	-	≒300W
Input Resistance (Load Off)	100kΩ (Typical)		100kΩ (Typical)		100kΩ (Typical)	
Temperature Coefficient	100PPM/˚C (Typical)		100PPM/˚C (Typical)		100PPM/˚C (Typical)	
Power	Supply from 6314A Mainframe		Supply from 6314A Mainframe		Supply from 6314A Mainframe	
Dimensions (HxWxD)	172x82x489.5mm / 6.8x3.2x19.3inch		172x82x489.5mm / 6.8x3.2x19.3inch		172x82x489.5mm / 6.8x3.2x19.3inch	
Weight	4.2 kg / 9.3 lbs		4.2 kg / 9.3 lbs		4.2 kg / 9.3 lbs	
Operating Range	0~40˚C		0~40˚C		0~40˚C	
EMC & Safety	CE		CE		CE	

All specifications are subject to change without notice.

SPECIFICATIONS-2							
Model	**63105A**		**63106A**		**63107A (30W & 250W)**		
Power	30W	300W	60W	600W	30W	30W	250W
Current	0~1A	0~10A	0~12A	0~120A	0~5A	0~4A	0~40A
Voltage*3	0~500V		0~80V		0~80V		
Typical Min. Operation Voltage (DC)*1	1.0V@0.5A 2.0V@1A	1.0V@5A 2.0V@10A	0.4V@6A 0.8V@12A	0.4V@60A 0.8V@120A	0.4V@2.5A 0.8V@5A	0.4V@2A 0.8V@4A	0.4V@20A 0.8V@40A
Constant Current Mode							
Range	0~1A	0~10A	0~12A	0~120A	0~5A	0~4A	0~40A
Resolution	0.25mA	2.5mA	3mA	30mA	1.25mA	1mA	10mA
Accuracy	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.
Constant Resistance Mode							
Range	1.25Ω~5kΩ (300W/125V) 50Ω~200kΩ (300W/500V)		12.5mΩ~50Ω (600W/16V) 0.625Ω~2.5kΩ (600W/80V)		0.3Ω~1.2kΩ (30W/16V) 15Ω~60kΩ (30W/80V)		0.0375Ω~150Ω (250W/16V) 1.875Ω~7.5kΩ (250W/80V)
Resolution*5	200μS (300W/125V) 5μS (300W/500V)		20mS (600W/16V) 400μS (600W/80V)		833μS (30W/16V) 16.67μS (30W/80V)		6.667μS (250W/16V) 133μS (250W/80V)
Accuracy	5kΩ: 20mS+ 0.2% 200kΩ:5mS+ 0.1%		50Ω: 0.4S + 0.5% 2.5kΩ: 0.04S + 0.2%		1.2kΩ: 0.1S + 0.2% 60kΩ: 0.01S + 0.1%		150Ω: 0.1S + 0.2% 7.5kΩ: 0.01S + 0.1%
Constant Voltage Mode							
Range	0~500V		0~80V		0~80V		
Resolution	125mV		20mV		20mV		
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.		0.05% + 0.1%F.S.		
Constant Power Mode							
Range	0~30W	0~300W	0~60W	0~600W	0~30W	0~30W	0~250W
Resolution	7.5mW	75mW	15mW	150mW	7.5mW	7.5mW	62.5mW
Accuracy	0.5% + 0.5%F.S.		0.5% + 0.5%F.S.		0.5% + 0.5%F.S.		
Dynamic Mode							
Dynamic Mode	C.C. Mode		C.C. Mode		C.C. Mode		
T1 & T2	0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		
Accuracy	1μs/1ms+100ppm		1μs/1ms+100ppm		1μs/1ms+100ppm		
Slew Rate	0.16~40mA/μs	1.6~400mA/μs	0.002~0.5A/μs	0.02~5A/μs	0.8~200mA/μs	0.64~160mA/μs	6.4~1600mA/μs
Resolution	0.16mA/μs	1.6mA/μs	0.002A/μs	0.02A/μs	0.8mA/μs	0.64mA/μs	6.4mA/μs
Accuracy	10% ±20μs		10% ±20μs		10% ±20μs		
Min. Rise Time	24μs (Typical)		10μs (Typical)		10μs (Typical)		
Current	0~1A	0~10A	0~12A	0~120A	0~5A	0~4A	0~40A
Resolution	0.25mA	2.5mA	3mA	30mA	1.25mA	1mA	10mA
Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.		
Measurement Section							
Voltage Read Back							
Range	0~125V	0~500V	0~16V	0~80V	0~16V	0~80V	0~16V	0~80V
Resolution	2mV	8mV	0.25mV	1.25mV	0.25mV	1.25mV	0.25mV	1.25mV
Accuracy	0.025% + 0.025%F.S.		0.025% + 0.025%F.S.		0.025% + 0.025%F.S.		
Current Read Back							
Range	0~1A	0~10A	0~12A	0~120A	0~5A	0~4A	0~40A
Resolution	0.016mA	0.16mA	0.1875mA	1.875mA	0.078125mA	0.0625mA	0.625mA
Accuracy	0.05% + 0.05%F.S.		0.05% + 0.05%F.S.		0.05% + 0.05%F.S.		
Power Read Back*2							
Range	0~30W	0~300W	0~60W	0~600W	0~30W	0~30W	0~250W
Accuracy	0.1% + 0.1%F.S.		0.1% + 0.1%F.S.		0.1% + 0.1%F.S.		
Protective Section							
Over Power Protection	Yes		Yes		Yes		
Over Current Protection	Yes		Yes		Yes		
Over Temperature Protection	Yes		Yes		Yes		
Over Voltage Alarm*3	Yes		Yes		Yes		
General							
Short Circuit							
Current (CC)	-	≒10A	-	≒120A	-	-	≒40A
Voltage (CV)	-	0V	-	0V	-	-	0V
Resistance (CR)	-	≒1.25Ω	-	≒0.0125Ω	-	-	≒0.0375Ω
Power (CP)	-	≒300W	-	≒600W	-	-	≒250W
Input Resistance (Load Off)	100kΩ (Typical)		100kΩ (Typical)		100kΩ (Typical)		
Temperature Coefficient	100PPM/°C (Typical)		100PPM/°C (Typical)		100PPM/°C (Typical)		
Power	Supply from 6314A Mainframe		Supply from 6314A Mainframe		Supply from 6314A Mainframe		
Dimensions (HxWxD)	172x82x489.5mm / 6.8x3.2x19.3inch		172x164x489.5mm / 6.8x6.5x19.3inch		172x82x489.5mm / 6.8x3.2x19.3inch		
Weight	4.2 kg / 9.3 lbs		7.3 kg / 16.1 lbs		4.5 kg / 9.9 lbs		
Operating Range	0~40°C		0~40°C		0~40°C		
EMC & Safety	CE		CE		CE		

SPECIFICATIONS-3						
Model	**63108A**		**63112A**		**63123A**	
Power	60W	600W	120W	1200W	350W	
Current	0~2A	0~20A	0~24A	0~240A	0~7A	0~70A
Voltage*3	0~500V		0~80V		0~120V	
Typical Min. Operation Voltage (DC)*1	1.0V@1A 2.0V@2A	1.0V@10A 2.0V@20A	0.4V@12A 0.8V@24A	0.4V@120A 0.8V@240A	0.05V@3.5A 0.1V@7A	0.3V@35A 0.6V@70A
Constant Current Mode						
Range	0~2A	0~20A	0~24A	0~240A	0~7A	0~70A
Resolution	0.5mA	5mA	6mA	60mA	0.125mA	1.25mA
Accuracy	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.1%F.S.
Constant Resistance Mode						
Range	0.625Ω~2.5kΩ (600W/125V) 25Ω~100kΩ (600W/500V)		6.25mΩ~25Ω (1200W/16V) 0.3125Ω~1.25kΩ (1200W/80V)		0.015Ω~150Ω (350W/24V)*4 2Ω~2kΩ (350W/120V)	
Resolution*5	400μS (600W/125V) 10μS (600W/500V)		40mS (1200W/16V) 800μS (1200W/80V)		1.33mS (350W/24V)*4 10μS (350W/120V)	
Accuracy	2.5kΩ: 50mS + 0.2% 100kΩ: 5mS + 0.1%		25Ω: 0.8S + 0.8% 1.25kΩ: 0.08S + 0.2%		150Ω: 67mS + 0.1% 2kΩ: 5mS + 0.2%	
Constant Voltage Mode						
Range	0~500V		0~80V		0~120V	
Resolution	125mV		20mV		2mV	
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.		0.05% + 0.1%F.S.	
Constant Power Mode						
Range	0~60W	0~600W	0~120W	0~1200W	0~35W	0~350W
Resolution	15mW	150mW	30mW	300mW	2.5mW	25mW
Accuracy	0.5% + 0.5%F.S.		0.5% + 0.5%F.S.		0.5% + 0.5%F.S.	
Dynamic Mode						
Dynamic Mode	C.C. Mode		C.C. Mode		C.C. MODE	
T1 & T2	0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms~50ms/Res: 5μs 0.1ms~500ms / Res: 25μs 10ms~50s / Res: 2.5ms	
Accuracy	1μs/1ms+100ppm		1μs/1ms+100ppm		1μs /1ms+100ppm	
Slew Rate	0.32~80mA/μs	3.2~800mA/μs	0.004~1A/μs	0.04~10A/μs	0.001~0.25A/μs	0.01~2.5A/μs
Resolution	0.32mA/μs	3.2mA/μs	0.004A/μs	0.04A/μs	0.001A/μs	0.01A/μs
Accuracy	10% ±20μs		10% ±20μs		10% ±20μs	
Min. Rise Time	24μs (Typical)		10μs (Typical)		25μs (Typical) *6	
Current	0~2A	0~20A	0~24A	0~240A	0~7A	0~70A
Resolution	0.5mA	5mA	6mA	60mA	0.125mA	1.25mA
Accuracy	0.4%F.S.		0.4%F.S.		0.1% F.S.	
Measurement Section						
Voltage Read Back						
Range	0~125V	0~500V	0~16V	0~80V	0~24V	0~120V
Resolution	2mV	8mV	0.25mV	1.25mV	0.4mV	2mV
Accuracy	0.025% + 0.025%F.S.		0.025% + 0.025%F.S.		0.025%+0.015% F.S.	
Current Read Back						
Range	0~2A	0~20A	0~24A	0~240A	0~7A	0~70A
Resolution	0.03125mA	0.3125mA	0.375mA	3.75mA	0.125mA	1.25mA
Accuracy	0.05% + 0.05%F.S.		0.075% + 0.075%F.S.		0.04%+0.04% F.S.	
Power Read Back*2						
Range	0~60W	0~600W	0~120W	0~1200W	0~35W	0~350W
Accuracy	0.1% + 0.1%F.S.		0.1% + 0.1%F.S.		0.1%+0.1% F.S.	
Protective Section						
Over Power Protection	Yes		Yes		Yes	
Over Current Protection	Yes		Yes		Yes	
Over Temperature Protection	Yes		Yes		Yes	
Over Voltage Alarm*3	Yes		Yes		Yes	
General						
Short Circuit						
Current (CC)	-	≒20A	-	≒240A	-	≒70A
Voltage (CV)	-	0V	-	0V	-	0V
Resistance (CR)	-	≒0.625Ω	-	≒0.00625Ω	-	≒ 0.01Ω
Power (CP)	-	≒600W	-	≒1200W	-	≒350W
Input Resistance (Load Off)	100kΩ (Typical)		100kΩ (Typical)		800kΩ (Typical)	
Temperature Coefficient	100PPM/˚C (Typical)		100PPM/˚C (Typical)		100PPM/˚C (Typical)	
Power	Supply from 6314A Mainframe		Supply from 6314A Mainframe		Supply from 6314A Mainframe	
Dimensions (HxWxD)	172x164x489.5mm / 6.8x6.5x19.3inch		172x329x495mm / 6.8x12.9x19.5inch		172x82x489.5mm / 6.8x3.2x19.3inch	
Weight	7.3 kg / 16.1 lbs		14 kg / 30.8 lbs		4.2kg / 9.3 lbs	
Operating Range	0~40˚C		0~40˚C		0~40˚C	
EMC & Safety	CE		CE		CE	

NOTE*1 : Low voltage operation, under 0.8 volt, is possible at correspondingly reduced current level. Operating temperature range is 0˚C to 40˚C.
All specifications apply for 25˚C±5˚C, except as noted
NOTE*2 : Power F.S. = Vrange F.S. x Irange F.S.
NOTE*3 : When the operating voltage exceeds the rated voltage for 1.02 times, a warning will occur and if it exceeds 1.1 times of the rated voltage, it would cause permanent damage to the device.
NOTE*4 : Please refer to user's manual for detail specifications.
NOTE*5 : S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.
NOTE*6 : The loading current should be 0.35A at least.

All specifications are subject to change without notice.



KEY FEATURES

- Unique LED mode for LED power driver test
- Programmable LED dynamic resistance (R_d)
- Programmable internal resistance (Rr) for simulating LED ripple current
- Fast response for PWM dimming test
- Up to eight channels in one mainframe
- 16-bit precision voltage and current measurement with dual-range
- Full Protection: OC, OP, OT protection and OV alarm

As a constant current source, the LED power driver has an output voltage range with a constant output current. LED power drivers are usually tested in one of the following ways :
1. With LEDs
2. Using resistors for loading
3. Using Electronic Loads in Constant Resistance (CR) mode, or Constant Voltage (CV) mode

However, all these testing methods, each of them has their own disadvantages.

As shown on the V-I curve in Figure 1, the LED has a forward voltage V_F and a dynamic resistance (Rd). When using a resistor as loading, the V-I curve of the resistor is not able to simulate the V-I curve of the LED as shown on Figure 1. This may cause the LED power driver to not start up due to the difference in V-I characteristic between the resistors and the LEDs. When using Electronic Loads, the CR and CV mode settings are set for when the LED is under stable operation and therefore, is unable to simulate turn on or PWM brightness control characteristics. This may cause the LED power driver to function improperly or trigger it's protection circuits. These testing requirements can be achieved when using a LEDs as a load; however, issues regarding the LED aging as well as different LED power drivers may require different types of LEDs or a number of LEDs. This makes it inconvenient for mass production testing.



63113A/63115A

Chroma has created the industries first LED Load Simulator for simulating LED loading with our 63110A/63113A/63115A load model from our 6310A series Electronic Loads. By setting the LED power driver's output voltage, and current, the Electronic Load can simulate the LED's loading characteristics. The LED's forward voltage and operating resistance can also be set to further adjust the loading current and ripple current to better simulate LED characteristics. The 63110A design also has increased bandwidth to allow for PWM dimming testing.

Figure 2 shows the dimming current waveform of the LED. Figure 3 shows the dimming current waveform when using 63110A as a load.The 6314A holds up to four 63110A load modules, which will result in an 8-channel 100W/channel load with standard front-panel inputs. This makes it ideal for testing single output and multiple output LED driver. Additionally, the GO/NG output port is useful for UUT's pass/fail testing on an automated production line. All modules on the 6314A/6312A mainframe share a common GPIB address to synchronize and speed up the control of the load modules and the read-back of data.

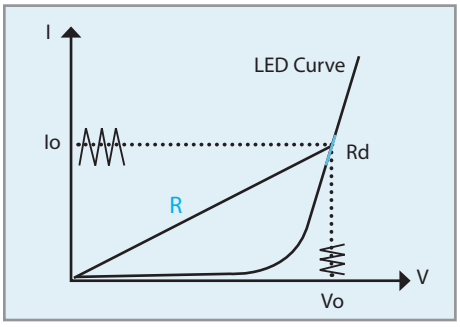


Figure 1 LED V-I Characteristics

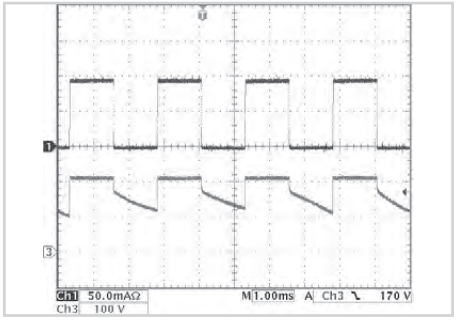


Figure 2 - LED dimming test

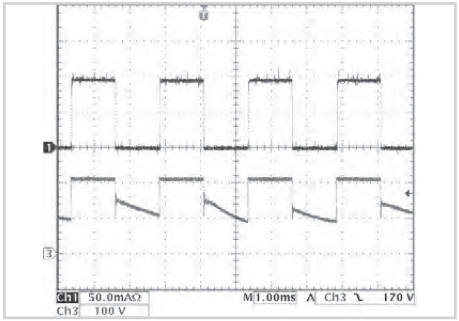


Figure 3 - 63110A dimming test

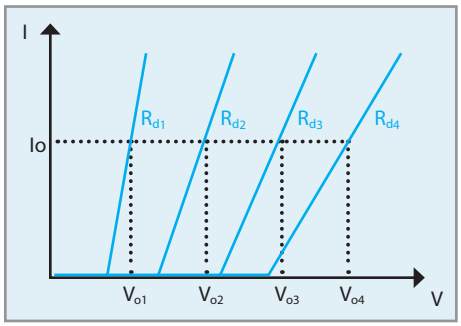


Figure 4 - Simulate different number of LEDs

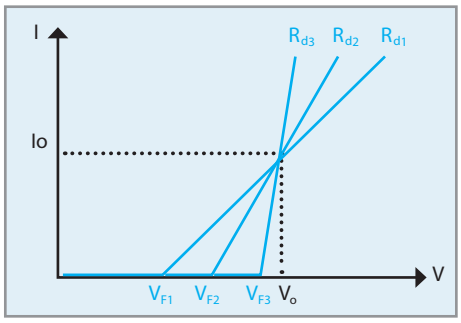


Figure 5 - Simulate different characteristic of LEDs



6312A : 2 in 1 Mainframe



6314A : 4 in 1 Mainframe

SPECIFICATIONS						
Model	**63110A (100Wx2)**		**63113A**		**63115A**	
Power	100W		300W		300W	
Current	0~0.6A	0~2A	0~5A	0~20A	0~5A	0~20A
Voltage *1	0~500V		0~300V		0~600V	
Min. Operating Voltage	6V@2A		4V@20A		4V@20A	
Constant Current Mode						
Range	0~0.6A	0~2A	0~5A	0~20A	0~5A	0~20A
Resolution	12μA	40μA	100μA	400μA	100μA	400μA
Accuracy	0.1%+0.1% F.S.		0.1%+0.1% F.S.	0.1%+0.2% F.S.	0.1%+0.1% F.S.	0.1%+0.2% F.S.
Constant Resistance Mode						
Range	CRL : 3Ω~1kΩ (100W/100V) CRH : 10Ω~10kΩ (100W/500V)		CRL @ CH : 0.2Ω~200Ω (300W/60V) CRL @ CL : 0.8Ω~800Ω (300W/60V) CRH @ CL : 4Ω~4kΩ (300W/300V)		CRL @ CH : 0.2Ω~200Ω (300W/60V) CRL @ CL : 0.8Ω~800Ω (300W/60V) CRH @ CL : 8Ω~8kΩ (300W/600V)	
Resolution*2	CRL : 62.5μS CRH : 6.25μS		CRL @ CH : 100μS CRL @ CL : 25μS CRH @ CL : 5μS		CRL @ CH :100μS CRL @ CL : 25μS CRH @ CL : 2.5μS	
Accuracy	1kΩ : 4mS+0.2% 10kΩ : 1mS+0.1%		0.2% (setting + range)		0.2% (setting + range)	
Constant Voltage Mode						
Range	0~500V		0~300V		0~600V	
Resolution	20mV		6mV		12mV	
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.		0.05% + 0.1%F.S.	
LED Mode						
Range	Operating Voltage: 0~100V/0~500V R_d Coefficient : 0.001~1 V_F: 0~100V/0~500V Current : 0~2A R_d: 1Ω~1kΩ/10Ω~10kΩ		Operating Voltage : 0~60V/0~300V R_d Coefficient : 0.001~1 V_F : 0~60V/0~300V LEDL @ CH : 0~60V- 0~20A (R_d: 0.05Ω~50Ω) LEDL @ CL : 0~60V- 0~5A (R_d: 0.8Ω~800Ω) LEDH @ CL : 0~300V- 0~5A (R_d: 4Ω~4kΩ)		Operating Voltage : 0~60V/0~600V R_d Coefficient : 0.001~1 V_F : 0~60V/0~600V LEDL @ CH : 0~60V- 0~20A (R_d: 0.05Ω~50Ω) LEDL @ CL : 0~60V- 0~5A (R_d: 0.8Ω~800Ω) LEDH @ CL : 0~600V- 0~5A (R_d: 8Ω~8kΩ)	
Resolution *2	Vo : 4mV/20mV Io : 0.1mA R_d Coefficient : 0.001 R_d : 62.5μS/6.25μS V_F : 4mV/20mV		Vo : 1.2mV/6mV Io : 100μA/400μA R_d Coefficient : 0.001 R_d : 400μS / 25μS / 5μS V_F : 1.2mV/ 6mV		Vo : 1.2mV/12mV Io : 100μA/400μA R_d Coefficient : 0.001 R_d : 400μS/25μS/2.5μS V_F : 6mV/ 60mV	
Dynamic Mode						
Dynamic Mode	--		C.C. Mode		C.C. Mode	
T1 & T2	--		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms	
Accuracy	--		1μs/1ms+100ppm		1μs/1ms+100ppm	
Slew Rate	--		0.8~200mA/μs	3.2~800mA/μs	0.8~200mA/μs	3.2~800mA/μs
Resolution	--		0.8mA/μs	3.2mA/μs	0.8mA/μs	3.2mA/μs
Accuracy	--		10% ±20μs		10% ±20μs	
Min. Rise Time	--		25μs (Typical)		25μs (Typical)	
Current	--		0~5A	0~20A	0~5A	0~20A
Resolution	--		100μA	400μA	100μA	400μA
Accuracy	--		0.4%F.S.		0.4%F.S.	
Measurement Section						
Voltage Read Back						
Range	0~100V	0~500V	0~60V	0~300V	0~60V	0~600V
Resolution	2mV	10mV	1.2mV	6mV	1.2mV	12mV
Accuracy	0.025%+0.025% F.S.		0.025%+0.025% F.S.		0.025%+0.025% F.S.	
Current Read Back						
Range	0~0.6A	0~2A	0~5A	0~20A	0~5A	0~20A
Resolution	12μA	40μA	100μA	400μA	100μA	400μA
Accuracy	0.05%+0.05% F.S.		0.05%+0.05% F.S.		0.05%+0.05% F.S.	

NOTE*1 : If the operating voltage exceeds 1.1 times of the rated voltage, it would cause permanent damage to the device.
NOTE*2 : S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.

All specifications are subject to change without notice.



Ultra High Power Density 6kW@4U
Voltage 0.015%+0.015%F.S.
Current 0.04%+0.4%F.S.

KEY FEATURES

- Rated power up to 240kW: 4kW, 5kW, 6kW, 24kW
- Voltage range: 150V, 600V, 1200V
- Current range: 2,000A max. per unit
- CC, CR, CV & CP operation modes
- CR+CC, CR+CV, CC+CV complex modes
- Up to 10 units master/slave parallel control
- Dynamic synchronous control in static and dynamic loads
- User defined waveform (UDW)
- CZ mode for turn on capacitive load simulation
- External loading current simulation
- Auto frequency sweep up to 50kHz
- Real time power supply load transient response simulation & Vpk+/- measurement
- User programmable 250 sequential front panel input status
- Ultra high precision voltage & current measurement
- Precision high speed digitizing measurement/data capture
- Voltage, current & Pmax measurement for OCP/OLP tesing
- Timing & discharging measurement for batteries
- Instant overpower loading
- Short circuit simulation
- Smart fan control
- Full protection: OC (adjustable), OT, OP (adjustable) protection & OV warning
- Standard USB, optional Ethernet & GPIB interfaces

The 63200A series high power DC electronic loads are designed for testing a wide range of power conversion products including AC/DC and server power supplies, DC/DC converters, EV batteries, automotive charging stations, and other power electronics components.

The 63200A series have three operating voltage choices, 150V, 600V & 1,200V, with models covering power levels from 4kW to 24kW and up to 2,000A in a single unit.

The DC loads have unique user defined waveform (UDW) capability and external analog modulating input for simulating real-world, custom waveforms. Another distinct feature is the dynamic auto-frequency sweep function, which enables detecting a UUTs worst case output deviation across a wide range of current frequencies.

As each model of the 63200A series has 3 power ranges, they can precisely measure the voltage and current in real time. Since short circuit testing is one of the essential power testing items, the 63200A series provides short circuit simulation to effectively solve the application demands for power and automated testing. With the vacuum florescent display (VFD) and rotary knob, the 63200A series loads offer versatile front panel operation. Users are able to control the 63200A family remotely via standard USB or optional Ethernet and GPID interfaces. The embedded PWM fan speed control reduces noise caused by fans.



Flippable Front Panel for 7U/10U/13U models

Softpanel



Main



Over Current Protection



User Defined Waveforms



Battery Discharge

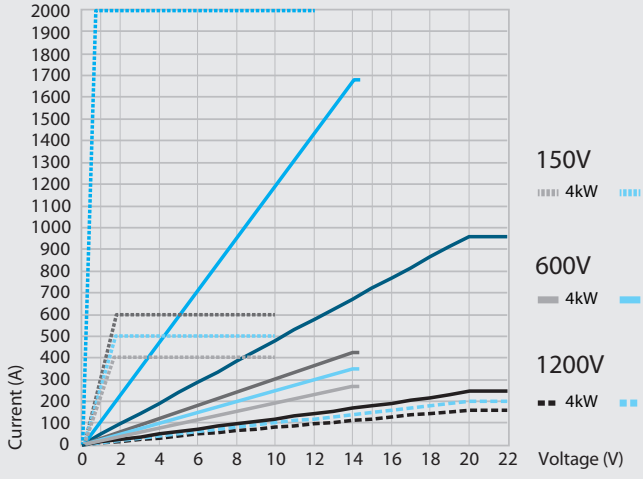


Sine Wave



Program

Low Voltage Characteristics (Typical)



訂購資訊

63204A-150-400 : High Power DC Electronic Load 150V / 400A/ 4kW
63205A-150-500 : High Power DC Electronic Load 150V / 500A / 5kW
63206A-150-600 : High Power DC Electronic Load 150V / 600A / 6kW
63224A-150-2000 : High Power DC Electronic Load 150V / 2000A / 24kW
63204A-600-280 : High Power DC Electronic Load 600V / 280A / 4kW
63205A-600-350 : High Power DC Electronic Load 600V / 350A / 5kW
63206A-600-420 : High Power DC Electronic Load 600V / 420A / 6kW
63224A-600-1680 : High Power DC Electronic Load 600V / 1680A / 24kW
63204A-1200-160 : High Power DC Electronic Load 1,200V / 160A / 4kW
63205A-1200-200 : High Power DC Electronic Load 1,200V / 200A / 5kW
63206A-1200-240 : High Power DC Electronic Load 1,200V / 240A / 6kW
63224A-1200-960 : High Power DC Electronic Load 1,200V / 960A / 24kW
A600009 : GPIB cable (200cm)
A600010 : GPIB cable (60cm)
A632000 : Softpanel for 63200A Series
A632006 : NI USB-6211 Bus-Powered Multifunction DAQ
A636000 : GPIB interface
A636009 : Ethernet & USB interfaces
A636010 : Ethernet interface

• Continued on next page ➟

All specifications are subject to change without notice.

User Defined Waveforms



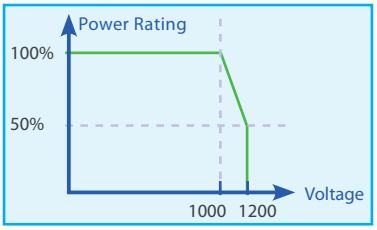
SPECIFICATIONS-1												
Model	**63204A-150-400**			**63205A-150-500**			**63206A-150-600**			**63224A-150-2000**		
Voltage*2	0~150V			0~150V			0~150V			0~150V		
Current	0~400A			0~500A			0~600A			0~2,000A		
Power*3	0~4,000W			0~5,000W			0~6,000W			0~24,000W		
Static mode												
Min. voltage @ full current	0.18V @40A	0.9V @200A	1.8V @400A	0.15 @50A	0.75V @250A	1.5V @500A	0.18V @60A	0.9V @300A	1.8V @600A	0.18V @200A	0.9V @1,000A	1.8V @2,000A
Constant current mode												
Range	40A	200A	400A	50A	250A	500A	60A	300A	600A	200A	1,000A	2,000A
Accuracy*4	0.05%+0.05%F.S.			0.05%+0.05%F.S.			0.05%+0.05%F.S.			0.05%+0.05%F.S.		
Constant resistance mode												
Range	0.0075Ω~75Ω (16V) 0.03Ω~300Ω (80V) 0.75Ω~1,500Ω (150V)			0.005Ω~50Ω (16V) 0.02Ω~200Ω (80V) 0.5Ω~1,000Ω (150V)			0.005Ω~50Ω (16V) 0.02Ω~200Ω (80V) 0.5Ω~1,000Ω (150V)			0.0013Ω~12.5Ω (16V) 0.005Ω~50Ω (80V) 0.125Ω~250Ω (150V)		
Accuracy	Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.		
Constant voltage mode												
Range	16V	80V	150V	16V	80V	150V	16V	80V	150V	16V	80V	150V
Accuracy	0.025%+0.025%F.S.			0.025%+0.025%F.S.			0.025%+0.025%F.S.			0.025%+0.025%F.S.		
Constant power mode												
Range	400W	2,000W	4,000W	500W	2,500W	5,000W	600W	3,000W	6,000W	2,400W	12,000W	24,000W
Accuracy *5	0.2%+0.2%F.S.			0.2%+0.2%F.S.			0.2%+0.2%F.S.			0.2%+0.2%F.S.		
Constant impedance mode												
Range	C_L: 30μF-50,000μF ; R_L: as CR ; Ls: 0.1μH-16μH ; Rs: 30mΩ-20Ω											
CC+CV	Refer to CC & CV specifications											
CR+CV	Refer to CR & CV specifications											
CR+CC	Refer to CR & CC specifications											
Dynamic mode												
T1 & T2	0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms		
Accuracy	1μs+100ppm			1μs+100ppm			1μs+100ppm			1μs+100ppm		
Slew rate	0.4mA/μs~4A/μs 2mA/μs~20A/μs 4mA/μs~40A/μs			0.5mA/μs~5A/μs 2mA/μs~25A/μs 5mA/μs~50A/μs			0.5mA/μs~6A/μs 2mA/μs~30A/μs 5mA/μs~60A/μs			2mA/μs~20A/μs 10mA/μs~100A/μs 20mA/μs~200A/μs		
Accuracy	5% ± 10μs			5% ± 10μs			5% ± 10μs			5% ± 10μs		
Min. rise time *6	10μs (Typical)			10μs (Typical)			10μs (Typical)			10μs (Typical)		
Measurement												
Voltage read back												
Range	16V	80V	150V	16V	80V	150V	16V	80V	150V	16V	80V	150V
Accuracy	0.015%+0.015%F.S.			0.015%+0.015%F.S.			0.015%+0.015%F.S.			0.015%+0.015%F.S.		
Current read back												
Range	40A	200A	400A	50A	250A	500A	60A	300A	600A	200A	1,000A	2,000A
Accuracy	0.04%+0.04%F.S.			0.04%+0.04%F.S.			0.04%+0.05%F.S.			0.04%+0.04%F.S.		
Power read back												
Range	0~4,000W			0~5,000W			0~6,000W			0~24,000W		
Accuracy *5	0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.		
Protection												
Over Current	Yes (Settable)			Yes (Settable)			Yes (Settable)			Yes (Settable)		
Over Power	Yes (Settable)			Yes (Settable)			Yes (Settable)			Yes (Settable)		
Over Temperature	Yes			Yes			Yes			Yes		
Over Voltage Alarm	Yes			Yes			Yes			Yes		
Reverse Alarm	Yes			Yes			Yes			Yes		
General												
Input Resistance (Load Off)	800kΩ (Typical)			800kΩ (Typical)			800kΩ (Typical)			800kΩ (Typical)		
Dimension (HxWxD)	175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			574.6 x 428 x 670.5 mm / 22.62 x 16.85 x 26.40 inch		
Weight	35kg / 77.2lbs			35kg / 77.2lbs			35kg / 77.2lbs			150kg / 330.69lbs		
Operating Temp	0~40°C			0~40°C			0~40°C			0~40°C		
Line Voltage	100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz		
Power Consumption	200VA(max)			200VA(max)			200VA(max)			800VA(max)		
EMC & Safety	CE			CE			CE			CE		

All specifications are subject to change without notice.

SPECIFICATIONS-2												
Model	**63204A-600-280**			**63205A-600-350**			**63206A-600-420**			**63224A-600-1680**		
Voltage*2	0~600V			0~600V			0~600V			0~600V		
Current	0~280A			0~350A			0~420A			0~1,680A		
Power*3	0~4,000W			0~5,000W			0~6,000W			0~24,000W		
Static mode												
Min. voltage @ full current	1.4V @28A	7V @140A	14V @280A	1.4V @35A	7V @175A	14V @350A	1.4V @42A	7V @210A	14V @420A	1.4V @168A	7V @840A	14V @1,680A
Constant current mode												
Range	28A	140A	280A	35A	175A	350A	42A	210A	420A	168A	840A	1,680A
Accuracy*4	0.05%+0.05%F.S.			0.05%+0.05%F.S.			0.05%+0.05%F.S.			0.05%+0.05%F.S.		
Constant resistance mode												
Range	0.075Ω~750Ω (80V) 0.3Ω~3,000Ω (150V) 3Ω~6,000Ω (600V)			0.05Ω~500Ω (80V) 0.2Ω~2,000Ω (150V) 2Ω~4,000Ω (600V)			0.05Ω~500Ω (80V) 0.2Ω~2,000Ω (150V) 2Ω~4,000Ω (600V)			0.013Ω~125Ω (80V) 0.05Ω~500Ω (150V) 0.5Ω~1,000Ω (600V)		
Accuracy	Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.		
Constant voltage mode												
Range	80V	150V	600V	80V	150V	600V	80V	150V	600V	80V	150V	600V
Accuracy	0.025%+0.025%F.S.			0.025%+0.025%F.S.			0.025%+0.025%F.S.			0.025%+0.025%F.S.		
Constant power mode												
Range	400W	2,000W	4,000W	500W	2,500W	5,000W	600W	3,000W	6,000W	2,400W	12,000W	24,000W
Accuracy *5	0.2%+0.2%F.S.			0.2%+0.2%F.S.			0.2%+0.2%F.S.			0.2%+0.2%F.S.		
Constant impedance mode												
Range	C_L : 30μF-50,000μF ; R_L : as CR ; Ls: 0.1μH-16μH ; Rs: 30mΩ-20Ω											
CC+CV	Refer to CC & CV specifications											
CR+CV	Refer to CR & CV specifications											
CR+CC	Refer to CR & CC specifications											
Dynamic mode												
T1 & T2	0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms		
Accuracy	1μs+100ppm			1μs+100ppm			1μs+100ppm			1μs+100ppm		
Slew rate	0.4mA/μs~1.4A/μs 2mA/μs~7A/μs 4mA/μs~14A/μs			0.4mA/μs~1.75A/μs 2mA/μs~8.75A/μs 4mA/μs~17.5A/μs			0.4mA/μs~2.1A/μs 2mA/μs~10.5A/μs 4mA/μs~21A/μs			2mA/μs~8.4A/μs 10mA/μs~42A/μs 20mA/μs~84A/μs		
Accuracy	5% ± 10μs			5% ± 10μs			5% ± 10μs			5% ± 10μs		
Min. rise time *6	20μs (Typical)			20μs (Typical)			20μs (Typical)			20μs (Typical)		
Measurement												
Voltage read back												
Range	80V	150V	600V	80V	150V	600V	80V	150V	600V	80V	150V	600V
Accuracy	0.015%+0.015%F.S.			0.015%+0.015%F.S.			0.015%+0.015%F.S.			0.015%+0.015%F.S.		
Current read back												
Range	28A	140A	280A	35A	075A	350A	42A	210A	420A	168A	840A	1,680A
Accuracy	0.04%+0.04%F.S.			0.04%+0.04%F.S.			0.04%+0.05%F.S.			0.04%+0.04%F.S.		
Power read back												
Range	0~4,000W			0~5,000W			0~6,000W			0~24,000W		
Accuracy *5	0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.		
Protection												
Over Current	Yes (Settable)			Yes (Settable)			Yes (Settable)			Yes (Settable)		
Over Power	Yes (Settable)			Yes (Settable)			Yes (Settable)			Yes (Settable)		
Over Temperature	Yes			Yes			Yes			Yes		
Over Voltage Alarm	Yes			Yes			Yes			Yes		
Reverse Alarm	Yes			Yes			Yes			Yes		
General												
Input Resistance (Load Off)	1MΩ (Typical)			1MΩ (Typical)			1MΩ (Typical)			1MΩ (Typical)		
Dimension (HxWxD)	175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			574.6 x 428 x 670.5 mm / 22.62 x 16.85 x 26.40 inch		
Weight	35kg / 77.2lbs			35kg / 77.2lbs			35kg / 77.2lbs			150kg / 330.69lbs		
Operating Temp	0~40˚C			0~40˚C			0~40˚C			0~40˚C		
Line Voltage	100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz		
Power Consumption	200VA(max)			200VA(max)			200VA(max)			800VA(max)		
EMC & Safety	CE			CE			CE			CE		

SPECIFICATIONS-3												
Model	**63204A-1200-160**			**63205A-1200-200**			**63206A-1200-240**			**63224A-1200-960**		
Voltage*2	0~1,200V			0~1,200V			0~1,200V			0~1,200V		
Current	0~160A			0~200A			0~240A			0~960A		
Power*3	0~4,000W			0~5,000W			0~6,000W			0~24,000W		
Static mode												
Min. voltage @ full current	2V @16A	10V @80A	20V @160A	2V @20A	10V @100A	20V @200A	2V @24A	10V @120A	20V @240A	2V @96A	10V @480A	20V @960A
Constant current mode												
Range	16A	80A	160A	20A	100A	200A	24A	120A	240A	96A	480A	960A
Accuracy*4	0.04%+0.06%F.S.			0.04%+0.06%F.S.			0.04%+0.06%F.S.			0.04%+0.06%F.S.		
Constant resistance mode												
Range	0.15Ω~1.5kΩ (150V) 0.6Ω~6kΩ (600V) 15Ω~30kΩ (1200V)			0.1Ω~1kΩ (150V) 0.4Ω~4kΩ (600V) 10Ω~20kΩ (1200V)			0.1Ω~1kΩ (150V) 0.4Ω~4kΩ (600V) 10Ω~20kΩ (1200V)			0.025Ω-0.25kΩ (150V) 0.1Ω-1kΩ (600V) 2.5Ω-5kΩ (1200V)		
Accuracy	Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.			Vin/Rset*(0.2%)+0.2% IF.S.		
Constant voltage mode												
Range	150V	600V	1,200V	150V	600V	1,200V	150V	600V	1,200V	150V	600V	1,200V
Accuracy	0.025%+0.025%F.S.			0.025%+0.025%F.S.			0.025%+0.025%F.S.			0.025%+0.025%F.S.		
Constant power mode												
Range	400W	2,000W	4,000W	500W	2,500W	5,000W	600W	3,000W	6,000W	2,400W	12,000W	24,000W
Accuracy *5	0.2%+0.2%F.S.			0.2%+0.2%F.S.			0.2%+0.2%F.S.			0.2%+0.2%F.S.		
Constant impedance mode												
Range	C_L : 30μF-50,000μF ; R_L : as CR ; Ls: 0.1μH-16μH ; Rs: 30mΩ-20Ω											
CC+CV	Refer to CC & CV specifications											
CR+CV	Refer to CR & CV specifications											
CR+CC	Refer to CR & CC specifications											
Dynamic mode												
T1 & T2	0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms			0.020~99.999ms/ 100ms~99,999ms		
Accuracy	1μs+100ppm			1μs+100ppm			1μs+100ppm			1μs+100ppm		
Slew rate	0.2mA/μs~0.8A/μs 1mA/μs~4A/μs 2mA/μs~8A/μs			0.2mA/μs~1.A/μs 1mA/μs~5A/μs 2mA/μs~10A/μs			0.2mA/μs~1.2A/μs 1mA/μs~6A/μs 2mA/μs~12A/μs			1mA/μs~4.8A/μs 5mA/μs~24A/μs 10mA/μs~48A/μs		
Accuracy	5% ± 10μs			5% ± 10μs			5% ± 10μs			5% ± 10μs		
Min. rise time *6	20μs (Typical)			20μs (Typical)			20μs (Typical)			20μs (Typical)		
Measurement												
Voltage read back												
Range	150V	600V	1,200V	150V	600V	1,200V	150V	600V	1,200V	150V	600V	1,200V
Accuracy	0.015%+0.015%F.S.			0.015%+0.015%F.S.			0.015%+0.015%F.S.			0.015%+0.015%F.S.		
Current read back												
Range	16A	80A	160A	20A	100A	200A	24A	120A	240A	96A	480A	960A
Accuracy	0.04%+0.06%F.S.			0.04%+0.06%F.S.			0.04%+0.06%F.S.			0.04%+0.06%F.S.		
Power read back												
Range	0~4,000W			0~5,000W			0~6,000W			0~24,000W		
Accuracy *5	0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.		
Protection												
Over Current	Yes (Settable)			Yes (Settable)			Yes (Settable)			Yes (Settable)		
Over Power	Yes (Settable)			Yes (Settable)			Yes (Settable)			Yes (Settable)		
Over Temperature	Yes			Yes			Yes			Yes		
Over Voltage Alarm	Yes			Yes			Yes			Yes		
Reverse Alarm	Yes			Yes			Yes			Yes		
General												
Input Resistance (Load Off)	2MΩ (Typical)			2MΩ (Typical)			2MΩ (Typical)			2MΩ (Typical)		
Dimension (HxWxD)	175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch			175 x 428 x 647 mm / 6.97 x 16.85 x 25.47 inch		
Weight	35kg / 77.2lbs			35kg / 77.2lbs			35kg / 77.2lbs			150kg / 330.69lbs		
Operating Temp	0~40˚C			0~40˚C			0~40˚C			0~40˚C		
Line Voltage	100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz			100~240 VAC / 47~63Hz		
Power Consumption	200VA(max)			200VA(max)			200VA(max)			800VA(max)		
EMC & Safety	CE			CE			CE			CE		

1. The specifications are guaranteed to meet specified performance at temperature range of 25±5˚C.
2. If the operating voltage exceeds the rated voltage for 1.05 times, it would cause permanent damage to the device.
3. The power rating specifications at ambient temperature = 25˚C.
4. If the operating current is below range 0.2%, the accuracy specification is 0.1% F.S.
5. Power F.S. = Vrange F.S.x Irang F.S.
6. The specification is valid only for loading current > 4% F.S.
7. The short circuit function simulates full power loading and thus it cannot perform mechanical short circuit.



All specifications are subject to change without notice.



KEY FEATURES

- Power Rating: 2.6kW, 5.2kW, 6.5kW, 10kW, 10.4kW, 14.5kW, 15.6kW
- Voltage range: 0~80V/0~600V/0~1000V
- Current range: Up to 1000A
- CC, CR, CV, CP load modes
- Master/Slave paralleling control mode, allow synchronous load control under static and dynamic loading mode (Up to 93.6kW)
- Dynamic loading: Up to 20kHz
- Only need 1V to draw rated current
- Programmable slew rate, up to 41A/μs
- Measurement: Voltage / Current / Power/ Resistance
- Large LED/LCD display
- External loading waveform simulation
- Short circuit simulation and short circuit current measurement
- Full protection: OC, OP, OT protection and OV, reverse alarm
- Versatile remote controller
- GPIB & RS-232 interfaces

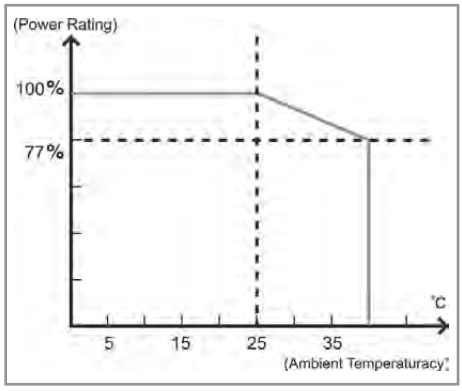
The Chroma Electronic Loads 63200 series are designed for DC power source, power electronic devices and components testing. The high power rating, parallel and synchronization capabilities make them the ideal tool for testing the high power UUT such as SMR,UPS, battery, and fuel cell.

The 63200 series offers 12 different models with power range from 2600 watts to 15600 watts, current from 50A to 1000A and up to 500V input voltage. The 4 load modes setup provide different load simulations for various application occasions. The CC/CR modes are designed to test constant voltage type of power supply. CV mode is used to test battery charger and current source, while CP mode is ideal for battery testing by simulating the real discharge curve.

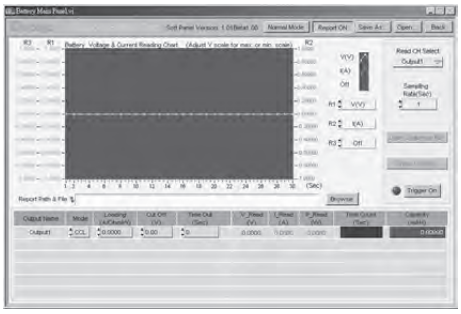
The 63200 series can draw its rated current under very low voltage (1V typical) even under the highest specified slew rate. This unique feature guarantees the best loading performance to a low voltage power supply. With the unique external waveform simulation and Master /Slave control capability, the 63200 series electronic loads allow users to parallel and synchronize more than one load together from an internal or external loading control signal. This feature provides unlimited load simulation and the possibility of power expansion.

The 63200 series also supply necessary measurement functions and short circuit simulation that extend the test capability for even the most demanding engineering tests and ATE applications. With the LCD display and rotary knob, the 63200 electronic loads offer versatile front panel operations. Users are able to control the 63200 family remotely via GPIB, RS-232 or APG (Analog Programming) interface.

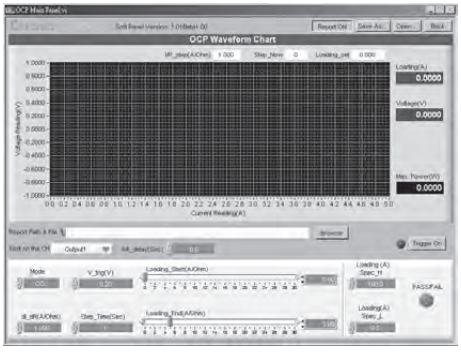
Chroma 63200 series loads are built in fan speed control to minimize the audio noise. The self-diagnosis routine and the full protections against OP, OC, OT and alarm indicating OV, reverse polarity to ensure the best quality and reliability.



Soft Panel

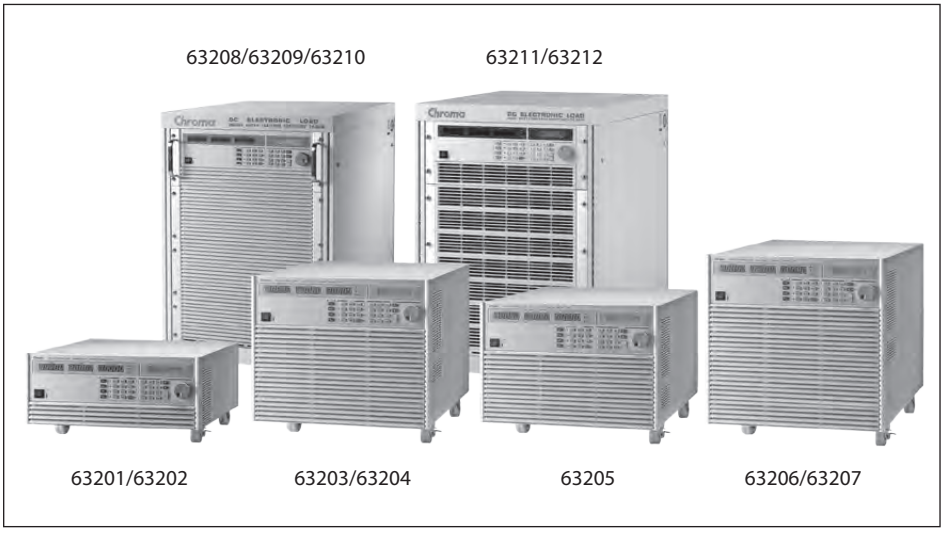


Battery Discharge Test



OCP Test

63200 Series DC Electronic Load Family



ORDERING INFORMATION

63201 : DC Electronic Load 80V/300A/2.6kW
63202 : DC Electronic Load 600V/50A/2.6kW
63203 : DC Electronic Load 80V/600A/5.2kW
63204 : DC Electronic Load 600V/100A/5.2kW
63205 : DC Electronic Load 80V/180A/6.5kW
63206 : DC Electronic Load 80V/600A/10.4kW
63207 : DC Electronic Load 80V/300A/10.4kW
63208 : DC Electronic Load 80V/600A/15.6kW
63209 : DC Electronic Load 80V/1000A/15.6kW
63210 : DC Electronic Load 600V/150A/14.5kW
63211 : DC Electronic Load 1000V/150A/15.6kW
63212 : DC Electronic Load 1000V/150A/10kW
A632001 : Remote Controller
A632002 : Load Cable 38mm/247A/200cmx2
A632003 : Load Cable 80mm/350A/200cmx2
A632004 : Sync. Link Box for 6330A & 63200 series
A632005 : Softpanel for 63200 series
A632006 : NI USB-6211 Bus-Powered Multifunction DAQ



SPECIFICATIONS-1						
Model	**63201**		**63202**		**63203**	
Power *1	260W	2600W	260W	2600W	520W	5200W
Current	0~30A	0~300A	0~5A	0~50A	0~60A	0~600A
Voltage *2	0~80V		0~600V		0~80V	
Min. Operating voltage	0.5V @ 15A 1V @ 30A	0.5V @ 150A 1V @ 300A	1.5V @ 2.5A 3V @ 5A	1.5V @ 25A 3V @ 50A	0.5V @ 30A 1V @ 60A	0.5V @ 300A 1V @ 600A
Constant Current mode						
Range	0~30A	0~300A	0~5A	0~50A	0~60A	0~600A
Resolution	7.7mA	77mA	1.4mA	14mA	16mA	160mA
Accuracy	0.1%+0.1%F.S.	0.2%+0.1%F.S.	0.1%+0.1%F.S.	0.2%+0.1%F.S.	0.1%+0.1%F.S.	0.2%+0.1%F.S.
Constant Resistance Mode						
Range	0.005~20Ω	0.25~1000Ω	0.25~1000Ω	10~40000Ω	0.0025~10Ω	0.125~500Ω
Resolution*3	52mS	1.04mS	1.2mS	28.8μS	104mS	2.1mS
Accuracy*4	0.104S+0.35%	0.9S+0.1%	0.0046S+0.35%	0.04S+0.1%	0.208S+0.35%*5	1.2S+0.1%
Accuracy*6 (Vin>7V)	0.104S+0.35%	0.0021S+0.35%	0.0046S+0.35%	114μS+0.35%	0.208S+0.35%	0.0042S+0.35%
Constant Voltage mode						
Range	0~16V	0~80V	0~150V	0~600V	0~16V	0~80V
Resolution	4mV	20mV	40mV	162mV	4mV	20mV
Accuracy	0.05%+0.1%F.S.		0.05%+0.1%F.S.		0.05%+0.1%F.S.	
Constant Power mode						
Range	0.6~260W	6~2600W	0.625~260W	6.25~2600W	1.2~520W	12~5200W
Resolution	7.5mW	75mW	3.125mW	31.25mW	22.5mW	225mW
Accuracy	0.5%+0.5%F.S.		0.5%+0.5%F.S.		0.5%+0.5%F.S.	
Dynamic mode						
Timing						
T1&T2	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s
Resolution	1μs	1ms	1μs	1ms	1μs	1ms
Accuracy	1μs+100ppm	1ms+100ppm	1μs+100ppm	1ms+100ppm	1μs+100ppm	1ms+100ppm
Slew rate	5mA~1.25A/μs	50mA~12.5A/μs	0.8mA~0.2A/μs	8mA~2A/μs	10mA~2.5A/μs	100mA~25A/μs
Resolution	5mA/μs	50mA/μs	0.8mA/μs	8mA/μs	10mA/μs	100mA/μs
Accuracy	10% ± 20μs		10% ± 20μs		10% ± 20μs	
Min. Rise Time	24μs (typical)		24μs (typical)		24μs (typical)	
Current						
Range	0~30A	0~300A	0~5A	0~50A	0~60A	0~600A
Resolution	7.7mA	77mA	1.4mA	14mA	16mA	160mA
Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.	
Measurement						
Voltage Read Back						
Range	0~16V	0~80V	0~150V	0~600V	0~16V	0~80V
Resolution	0.6mV	2.6mV	5.1mV	21mV	0.6mV	2.6mV
Accuracy	0.05%+0.05%F.S.		0.05%+0.05%F.S.		0.05%+0.05%F.S.	
Current Read Back						
Range	0~30A	0~300A	0~5A	0~50A	0~60A	0~600A
Resolution	1mA	10mA	0.18mA	1.8mA	2mA	20mA
Accuracy	0.1%+0.1%F.S.		0.1%+0.1%F.S.		0.1%+0.1%F.S.	
Power Read Back						
Range	0~260W	0~2600W	0~260W	0~2600W	0~520W	0~5200W
Accuracy*7	0.3%+0.3%F.S.		0.3%+0.3%F.S.		0.3%+0.3%F.S.	
General						
Short Circuit						
current	30A	300A	5A	50A	60A	600A
Input Rating	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz	
Dimension (H x W x D)	177 x 440 x 589 mm / 6.9 x 17.3 x 23.2 inch		177 x 440 x 589 mm / 6.9 x 17.3 x 23.2 inch		353 x 440 x 589 mm / 6.9 x 17.3 x 23.2 inch	
Weight	30 kg / 66.13 lbs		30 kg / 66.13 lbs		63 kg / 138.89 lbs	
Safety & EMC	CE		CE		CE	

All specifications are subject to change without notice.

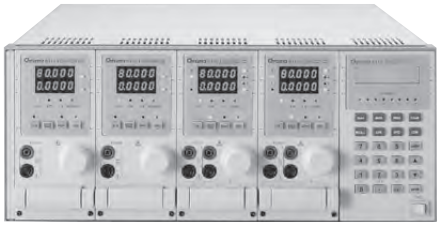
SPECIFICATIONS-2						
Model	**63204**		**63205**		**63206**	
Power*1	520W	5200W	650W	6500W	1040W	10400W
Current	0~10A	0~100A	0~18A	0~180A	0~60A	0~600A
Voltage*2	0~600V		0~80V		0~80V	
Min. Operating voltage	1.5V @ 5A 3V @ 10A	1.5V @ 50A 3V @ 100A	0.5V @ 9A 1V @ 18A	0.5V @ 90A 1V @ 180A	0.5V @ 30A 1V @ 60A	0.5V @ 300A 1V @ 600A
Constant Current mode						
Range	0~10A	0~100A	0~18A	0~180A	0~60A	0~600A
Resolution	2.8mA	28mA	5.2mA	52mA	21mA	170mA
Accuracy	0.1%+0.1%F.S.	0.2%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.
Constant Resistance Mode						
Range	0.125~500Ω	5~20000Ω	0.008~32Ω	0.4~1600Ω	0.0025~10Ω	0.125~500Ω
Resolution*3	2.3mS	57.56μS	35mS	0.7mS	112.5mS	2.25mS
Accuracy*4	0.0046S+0.35%	0.08S+0.1%	0.07S+0.35%	0.75S+0.1%	0.225S+0.35% *5	1.2S+0.1%
Accuracy*6 (Vin>7V)	0.0046S+0.35%	115.51μS+0.35%	0.07S+0.35%	0.0014S+0.35%	0.225S+0.35%	0.0045S+0.35%
Constant Voltage mode						
Range	0~150V	0~600V	0~16V	0~80V	0~16V	0~80V
Resolution	40mV	162mV	4mV	20mV	4mV	20mV
Accuracy	0.05%+0.1%F.S.		0.05%+0.1%F.S.		0.05%+0.1%F.S.	
Constant Power mode						
Range	1.25~520W	12.5~5200W	0.36~650W	3.6~6500W	1.2~1040W	12~10400W
Resolution	6.25mW	62.5mW	4.6mW	46mW	22.5mW	225mW
Accuracy	0.5%+0.5%F.S.		0.5%+0.5%F.S.		0.5%+0.5%F.S.	
Dynamic mode						
Timing						
T1&T2	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s
Resolution	1μs	1ms	1μs	1ms	1μs	1ms
Accuracy	1μs+100ppm	1ms+100ppm	1μs+100ppm	1ms+100ppm	1μs+100ppm	1ms+100ppm
Slew rate	1.6mA~0.4A/μs	16mA~4A/μs	3mA~0.75A/μs	30mA~7.5A/μs	10mA~3A/μs	100mA~25A/μs
Resolution	1.6mA/μs	16mA/μs	3mA/μs	30mA/μs	12mA/μs	100mA/μs
Accuracy	10% ± 20μs		10% ± 20μs		10% ± 20μs	
Min. Rise Time	24μs (typical)		24μs (typical)		20μs (typical)	
Current						
Range	0~10A	0~100A	0~18A	0~180A	0~60A	0~600A
Resolution	2.8mA	28mA	5.2mA	52mA	21mA	170mA
Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.	
Measurement						
Voltage Read Back						
Range	0~150V	0~600V	0~16V	0~80V	0~16V	0~80V
Resolution	5.1mV	21mV	0.6mV	2.6mV	0.6mV	2.6mV
Accuracy	0.05%+0.05%F.S.		0.05%+0.05%F.S.		0.05%+0.05%F.S.	
Current Read Back						
Range	0~10A	0~100A	0~18A	0~180A	0~60A	0~600A
Resolution	0.35mA	3.5mA	0.7mA	7mA	2.6mA	21mA
Accuracy	0.1%+0.1%F.S.		0.1%+0.1%F.S.		0.1%+0.1%F.S.	
Power Read Back						
Range	0~520W	0~5200W	0~650W	0~6500W	0~1040W	0~10400W
Accuracy*7	0.3%+0.3%F.S.		0.3%+0.3%F.S.		0.3%+0.3%F.S.	
General						
Short Circuit						
current	10A	100A	18A	180A	60A	600A
Input Rating	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz	
Dimension (H x W x D)	353 x 440 x 589 mm / 13.9 x 17.3 x 23.2 inch		310 x 440 x 589 mm / 12.2 x 17.3 x 23.2 inch		443.7 x 440 x 589 mm / 17.5 x 17.3 x 23.2 inch	
Weight	63 kg / 138.89 lbs		64.5 kg / 142.20 lbs		90 kg / 198.41 lbs	
Safety & EMC	CE		CE		CE	

SPECIFICATIONS-3						
Model	**63207**		**63208**		**63209**	
Power *1	1040W	10400W	1560W	15600W	1560W	15600W
Current	0~30A	0~300A	0~60A	0~600A	0~100A	0~1000A
Voltage*2	0~80V		0~80V		0~80V	
Min. Operating voltage	0.5V @ 15A 1V @ 30A	0.5V @ 150A 1V @ 300A	0.5V @ 30A 1V @ 60A	0.5V @ 300A 1V @ 600A	0.5V @ 50A 1V @ 100A	0.5V @ 500A 1V @ 1000A
Constant Current mode						
Range	0~30A	0~300A	0~60A	0~600A	0~100A	0~1000A
Resolution	10.3mA	82mA	21mA	163mA	34.2mA	274mA
Accuracy	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.
Constant Resistance Mode						
Range	0.005~20Ω	0.25~1000Ω	0.0025~10Ω	0.125~500Ω	0.0015~6Ω	0.075~300Ω
Resolution*3	55.7mS	1.1mS	110mS	2.22mS	186.5mS	3.73mS
Accuracy *4	0.111S+0.35%	0.9S+0.1%	0.22S+0.35% *5	1.2S+0.1%	0.373S+0.35% *5	1.2S+0.1%
Accuracy *6 (Vin>7V)	0.111S+0.35%	0.0022S+0.35%	0.22S+0.35%	0.0044S+0.35%	0.373S+0.35%	0.0075S+0.35%
Constant Voltage mode						
Range	0~16V	0~80V	0~16V	0~80V	0~16V	0~80V
Resolution	4mV	20mV	4mV	20mV	4mV	20mV
Accuracy	0.05%+0.1%F.S.		0.05%+0.1%F.S.		0.05%+0.1%F.S.	
Constant Power mode						
Range	0.744~1040W	6~10400W	1.2~1560W	12~15600W	2.5~1560W	20~15600W
Resolution	9.3mW	75mW	22.5mW	225mW	31.255mW	250mW
Accuracy	0.5%+0.5%F.S.		0.5%+0.5%F.S.		0.5%+0.5%F.S.	
Dynamic mode						
Timing						
T1&T2	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s
Resolution	1µs	1ms	1µs	1ms	1µs	1ms
Accuracy	1µs+100ppm	1ms+100ppm	1µs+100ppm	1ms+100ppm	1µs+100ppm	1ms+100ppm
Slew rate	6mA~1.5A/µs	50mA~12.5A/µs	12mA~3A/µs	100mA~25A/µs	20mA~5A/µs	166mA~41.6A/µs
Resolution	6mA/µs	50mA/µs	12mA/µs	100mA/µs	20mA/µs	166mA/µs
Accuracy	10% ± 20µs		10% ± 20µs		10% ± 20µs	
Min. Rise Time	20µs (typical)		20µs (typical)		20µs (typical)	
Current						
Range	0~30A	0~300A	0~60A	0~600A	0~100A	0~1000A
Resolution	10.3mA	82mA	21mA	163mA	34.2mA	274mA
Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.	
Measurement						
Voltage Read Back						
Range	0~16V	0~80V	0~16V	0~80V	0~16V	0~80V
Resolution	0.6mV	2.6mV	0.6mV	2.6mV	0.6mV	2.6mV
Accuracy	0.05%+0.05%F.S.		0.05%+0.05%F.S.		0.05%+0.05%F.S.	
Current Read Back						
Range	0~30A	0~300A	0~60A	0~600A	0~100A	0~1000A
Resolution	1.3mA	11mA	2.7mA	21mA	4.5mA	36mA
Accuracy	0.1%+0.1%F.S.		0.1%+0.1%F.S.		0.1%+0.1%F.S.	
Power Read Back						
Range	0~1040W	0~10400W	0~1560W	0~15600W	0~1560W	0~15600W
Accuracy*7	0.3%+0.3%F.S.		0.3%+0.3%F.S.		0.3%+0.3%F.S.	
General						
Short Circuit						
Current	30A	300A	60A	600A	100A	1000A
Input Rating	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz	
Dimension (H x W x D)	443.7 x 440 x 589 mm / 17.5 x 17.3 x 23.2 inch		762.8 x 546 x 700 mm / 30 x 21.5 x 27.6 inch		762.8x546x700mm/ 30x21.5x27.6inch(cabinet)	
Weight	90 kg / 198.24 lbs		170 kg / 374.45 lbs		170 kg / 374.45 lbs	
Safety & EMC	CE		CE		CE	

All specifications are subject to change without notice.

SPECIFICATIONS-4						
Model	**63210**		**63211**		**63212**	
Power *1	1450W	14500W	15600W	15600W	10000W	10000W
Current	0~15A	0~150A	0~30A	0~150A	0~30A	0~150A
Voltage*2	0~600V		10~1000V		10~1000V	
Min. Operating voltage	1.5V @ 7.5A 3V @ 15A	1.5V @ 75A 3V @ 150A	5V @ 15A 10V @ 30A	5V @ 75A 10V @ 150A	5V @ 15A 10V @ 30A	5V @ 75A 10V @ 150A
Constant Current mode						
Range	0~15A	0~150A	0~30A	0~150A	0~30A	0~150A
Resolution	4.9mA	39mA	7.5mA	37.5mA	7.5mA	37.5mA
Accuracy	0.1%+0.1%F.S.	0.2%+0.1%F.S.	0.1%+0.1%F.S.	0.2%+0.1%F.S.	0.1%+0.1%F.S.	0.2%+0.1%F.S.
Constant Resistance Mode						
Range	0.1~400Ω	5~20000Ω	0.2~200Ω	8~8000Ω	0.2~200Ω	8~8000Ω
Resolution*3	3.21mS	80.1μS	14.3mS	360μS	14.3mS	360μS
Accuracy *4	0.0128S+0.35%	0.092S+0.1%	28.7mS+0.5%	715μS+0.5%	28.7mS+0.5%	715μS+0.5%
Accuracy *6 (Vin>7V)	0.0128S+0.35%	317.7μS+0.35%	--	--	--	--
Constant Voltage mode						
Range	0~150V	0~600V	0~250V	0~1000V	0~250V	0~1000V
Resolution	40mV	162mV	62.5mV	250mV	62.5mV	250mV
Accuracy	0.05%+0.1%F.S.		0.05%+0.1%F.S.		0.05%+0.1%F.S.	
Constant Power mode						
Range	5~1450W	50~14500W	2.5~1560W	20~15600W	2.5~1000W	20~10000W
Resolution	25mW	250mW	390mW	3.9W	250mW	2.5W
Accuracy	0.5%+0.5%F.S.		0.5%+0.5%F.S.		0.5%+0.5%F.S.	
Dynamic mode						
Timing						
T1&T2	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s	0.025~10ms	1ms~30s
Resolution	1μs	1ms	1μs	1ms	1μs	1ms
Accuracy	1μs+100ppm	1ms+100ppm	1μs+100ppm	1ms+100ppm	1μs+100ppm	1ms+100ppm
Slew rate	3mA~0.75A/μs	25mA~6A/μs	5mA~1.25A/μs	25mA~6.25A/μs	5mA~1.25A/μs	25mA~6.25A/μs
Resolution	3mA/μs	25mA/μs	5mA/μs	25mA/μs	5mA/μs	25mA/μs
Accuracy	10% ± 20μs		10% ± 20μs		10% ± 20μs	
Min. Rise Time	150 μs (typical)		24 μs (typical)		24 μs (typical)	
Current						
Range	0~15A	0~150A	0~30A	0~150A	0~30A	0~150A
Resolution	4.9mA	39mA	0.6mA	3mA	0.6mA	3mA
Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.	
Measurement						
Voltage Read Back						
Range	0~150V	0~600V	0~250V	0~1000V	0~250V	0~1000V
Resolution	5.1mV	21mV	5mV	20mV	5mV	20mV
Accuracy	0.05%+0.05%F.S.		0.05%+0.05%F.S.		0.05%+0.05%F.S.	
Current Read Back						
Range	0~15A	0~150A	0~30A	0~150A	0~30A	0~150A
Resolution	0.64mA	5.1mA	0.6mA	3mA	0.6mA	3mA
Accuracy	0.1%+0.1%F.S.		0.1%+0.1%F.S.		0.1%+0.1%F.S.	
Power Read Back						
Range	0~1450W	0~14500W	0~1560W	0~15600W	0~1000W	0~10000W
Accuracy*7	0.3%+0.3%F.S.		0.3%+0.3%F.S.		0.3%+0.3%F.S.	
General						
Short Circuit						
Current	15A	150A	30A	150A	30A	150A
Input Rating	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz		1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz	
Dimension (H x W x D)	762.8x546x700mm/ 30x21.5x27.6inch(cabinet)		762.8x546x700mm/ 30x21.5x27.6inch(cabinet)		762.8x546x700mm/ 30x21.5x27.6inch(cabinet)	
Weight	170 kg / 374.45 lbs		170 kg / 374.45 lbs		170 kg / 374.45 lbs	
Safety & EMC	CE		CE		CE	

NOTE*1 : The power rating specifications at ambient temperature=25˚C and see the diagram below for power derating.
NOTE*2 : If the operating voltage exceeds the rated voltage for 1.1 times, it would cause permanent damage to the device.
NOTE*3 : S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.
NOTE*4 : The Vin must be greater than min. operating voltage of each model.
NOTE*5 : Setting error will be 1% for R<0.005Ω at CRL range.
NOTE*6 : The Vin must be greater than 7V of each model.
NOTE*7 : Power F.S. = Vrange F.S. x Irange F.S.



KEY FEATURES

- Improve operating speeds of load for auto test system integration
- Synchronous paralleling control mode, allow Synchronous load control under static and dynamic Loading mode up to 6000W
- Up to 8 channels in one mainframe, fit for testing Multiple output SMPS.
- GPIB, RS-232 & USB Interfaces
- Max Power: 200W, 100W x 2(Dual), 30W&250W, 300W, 350W, 600W, 1200W
- Voltage Range:0~80V/0~120V/0~500V/0~600V
- CC, CR, CV, CP operating modes
- Dynamic loading with speed up to 20kHz
- Programmable slew rate, up to 10A/μs
- Only need 0.6V to draw rated current (63323A)
- Individual panel meters
- Real time power supplies load transient response simulation and output measurement
- 16-bit precision voltage and measurement with dual-range selection
- Remote sensing capability
- Short circuit test
- Self-test at power-on
- CE marking

Chroma Model 6330A series high speed DC electronic improves CPU clock, baud rate, parser and added synchronic parallel function for fast operation, which is ideal for auto test system integration to increase your manufacturing test throughput. Plugging the user selectable load modules into the system mainframe can also provide easy system configuration and future reconfiguration configure the system.

The 6330A family offers 12 types of modular loads with power ranging from 30 watts to 1200 watts, current from 0.5mA to 240A, and voltage measurement from 0.5mV to 500V. Each load is isolated and floating, programmable in dual current range and measuring voltage range, and capable of synchronizing with other modules for control operating. The load can be operated in constant current, constant voltage, and constant resistance.

With Synchronic parallel control capability, 6330A series loads allow users to parallel and synchronize more than one load together from an internal loading control signal. This feature provides synchronic dynamic loading test for multi-output power and high power test solution.

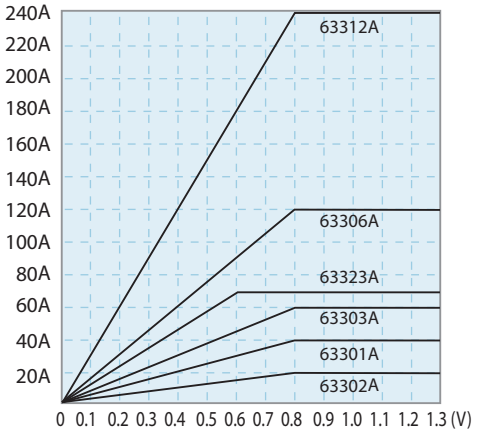
Real time measurement of voltage, current, is integrated into each 6330A load module using a 16-bit precision measurement circuit. The user can perform on line voltage measurement and adjustment, or simulate short circuit test using the simple keypad on the front panel.

The 6330A have self-diagnosis routine to maintain instrumental performance all the time. It is also protected against OP, OC, OT protection, and alarm indicating OV, reverse polarity to guarantee quality and reliability for even the most demanding engineering testing and ATE application.

The FET technology accomplishes minimum input resistance and enables the load to sink high current even at very low voltage. For example, model 63303A is capable of sinking 60A at 1V output, and well-suited for testing the new 3V low voltage power supplies. Low voltage operation, down to zero volt, is possible at correspondingly reduced current level. (see below)

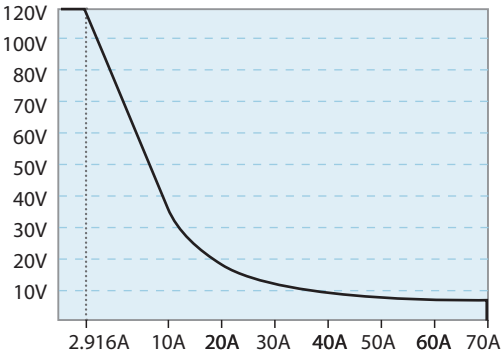
Chroma has created the industries first LED Load Simulator for simulating LED loading with our 63310A load model from our 6330A series Electronic Loads. By setting the LED power driver's output voltage, and current, the Electronic Load can simulate the LED's loading characteristics. The LED's forward voltage and operating resistance can also be set to further adjust the loading current and ripple current to better simulate LED characteristics. The 63310A design also has increased bandwidth to allow for PWM dimming testing.

Low Voltage Characteristics (Typical)
Model 63301A/63302A/63303A/
63306A/63312A/63323A

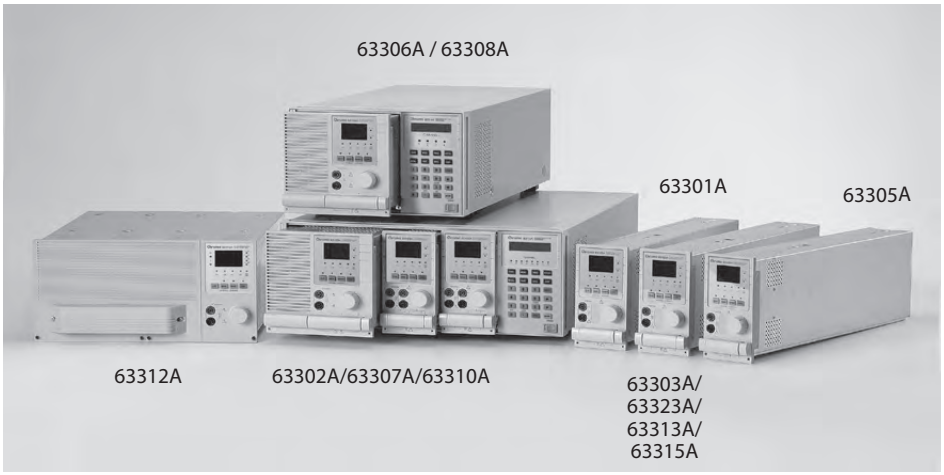


Note: All specifications are measured at load input terminals. (Ambient Temperature of 25˚C)

Model 63323A Input Characteristics



6330A Series High Speed DC Electronic Load Family



All specifications are subject to change without notice.

SPECIFICATIONS-1						
Model	**63301A**		**63302A (100Wx2)**		**63303A**	
Power	20W	200W	20W	100W	30W	300W
Current	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Voltage *3	0~80V		0~80V		0~80V	
Min. Operation Voltage (DC) *1	0.4V@2A	0.4V@20A	0.4V@1A	0.4V@10A	0.4V@3A	0.4V@30A
(Typical)	0.8V@4A	0.8V@40A	0.8V@2A	0.8V@20A	0.8V@6A	0.8V@60A
Constant Current Mode						
Range	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Resolution	1mA	10mA	0.5mA	5mA	1.5mA	15mA
Accuracy	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.
Constant Resistance Mode						
Range	0.0375Ω~150Ω (200W/16V) 1.875Ω~7.5kΩ (200W/80V)		0.075Ω~300Ω (100W/16V) 3.75Ω~15kΩ (100W/80V)		0.025Ω~100Ω (300W/16V) 1.25Ω~5kΩ (300W/80V)	
Resolution*5	6.667mS (200W/16V) 133μS (200W/80V)		3.333mS (100W/16V) 66.667μS (100W/80V)		10mS (300W/16V) 200μS (300W/80V)	
Accuracy	150Ω: 0.1S + 0.2% 7.5kΩ: 0.01S + 0.1%		300Ω: 0.1S + 0.2% 15kΩ: 0.01S + 0.1%		100Ω: 0.1S+ 0.2% 5kΩ: 0.01S+ 0.1%	
Constant Voltage Mode						
Range	0~80V		0~80V		0~80V	
Resolution	20mV		20mV		20mV	
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.		0.05% + 0.1%F.S.	
Constant Power Mode						
Range	0~20W	0~200W	0~20W	0~100W	0~30W	0~300W
Resolution	5mW	50mW	5mW	25mW	7.5mW	75mW
Accuracy	0.5% + 0.5%F.S.		0.5% + 0.5%F.S.		0.5% + 0.5%F.S.	
Dynamic Mode						
Dynamic Mode	C.C. Mode		C.C. Mode		C.C. Mode	
T1 & T2	0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms	
Accuracy	1μs/1ms+100ppm		1μs/1ms+100ppm		1μs/1ms+100ppm	
Slew Rate	0.64~160mA/μs	6.4~1600mA/μs	0.32~80mA/μs	3.2~800mA/μs	0.001~0.25A/μs	0.01~2.5A/μs
Resolution	0.64mA/μs	6.4mA/μs	0.32mA/μs	3.2mA/μs	0.001A/μs	0.01A/μs
Accuracy	10% ±20μs		10% ±20μs		10% ±20μs	
Min. Rise Time	10μs (Typical)		10μs (Typical)		10μs (Typical)	
Current	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Resolution	1mA	10mA	0.5mA	5mA	1.5mA	15mA
Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.	
Measurement Section						
Voltage Read Back						
Range	0~16V	0~80V	0~16V	0~80V	0~16V	0~80V
Resolution	0.25mV	1.25mV	0.25mV	1.25mV	0.25mV	1.25mV
Accuracy	0.025% + 0.025%F.S.		0.025% + 0.025%F.S.		0.025% + 0.025%F.S.	
Current Read Back						
Range	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A
Resolution	0.0625mA	0.625mA	0.03125mA	0.3125mA	0.09375mA	0.9375mA
Accuracy	0.05% + 0.05%F.S.		0.05% + 0.05%F.S.		0.05% + 0.05%F.S.	
Power Read Back*2						
Range	0~20W	0~200W	0~20W	0~100W	0~30W	0~300W
Accuracy	0.1% + 0.1%F.S.		0.1% + 0.1%F.S.		0.1% + 0.1%F.S.	
Protective Section						
Over Power Protection	Yes		Yes		Yes	
Over Current Protection	Yes		Yes		Yes	
Over Temperature Protection	Yes		Yes		Yes	
Over Voltage Alarm*3	Yes		Yes		Yes	
General						
Short Circuit						
Current (CC)	-	≒40A	-	≒20A	-	≒60A
Voltage (CV)	-	0V	-	0V	-	0V
Resistance (CR)	-	≒0.0375Ω	-	≒0.075Ω	-	≒0.025Ω
Power (CP)	-	≒200W	-	≒100W	-	≒300W
Input Resistance (Load Off)	100kΩ (Typical)		100kΩ (Typical)		100kΩ (Typical)	
Temperature Coefficient	100PPM/°C (Typical)		100PPM/°C (Typical)		100PPM/°C (Typical)	
Power	Supply from 6334A Mainframe		Supply from 6334A Mainframe		Supply from 6334A Mainframe	
Dimension (H x W x D)	172x82x489.5mm / 6.8x3.2x19.3inch		172x82x489.5mm / 6.8x3.2x19.3inch		172x82x489.5mm / 6.8x3.2x19.3inch	
Weight	4.2 kg / 9.3 lbs		4.2 kg / 9.3 lbs		4.2 kg / 9.3 lbs	
Operating Range	0~40°C		0~40°C		0~40°C	
EMC & Safety	CE		CE		CE	

SPECIFICATIONS-2				
Model	**63305A**		**63306A**	
Power	30W	300W	60W	600W
Current	0~1A	0~10A	0~12A	0~120A
Voltage*3	0~500V		0~80V	
Min. Operation Voltage (DC) *1	1.0V@0.5A	1.0V@5A	0.4V@6A	0.4V@60A
(Typical)	2.0V@1A	2.0V@10A	0.8V@12A	0.8V@120A
Constant Current Mode				
Range	0~1A	0~10A	0~12A	0~120A
Resolution	0.25mA	2.5mA	3mA	30mA
Accuracy	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.
Constant Resistance Mode				
Range	1.25Ω~5kΩ (300W/125V) 50Ω~200kΩ (300W/500V)		12.5mΩ~50Ω (600W/16V) 0.625Ω~2.5kΩ (600W/80V)	
Resolution*5	200μS (300W/125V) 5μS (300W/500V)		20mS (600W/16V) 400μS (600W/80V)	
Accuracy	5kΩ: 20mS+ 0.2% 200kΩ:5mS+ 0.1%		50Ω: 0.4S + 0.5% 2.5kΩ: 0.04S + 0.2%	
Constant Voltage Mode				
Range	0~500V		0~80V	
Resolution	125mV		20mV	
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.	
Constant Power Mode				
Range	0~30W	0~300W	0~60W	0~600W
Resolution	7.5mW	75mW	15mW	150mW
Accuracy	0.5% + 0.5%F.S.		0.5% + 0.5%F.S.	
Dynamic Mode				
Dynamic Mode	C.C. Mode		C.C. Mode	
T1 &T2	0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms	
Accuracy	1μs/1ms+100ppm		1μs/1ms+100ppm	
Slew Rate	0.16~40mA/μs	1.6~400mA/μs	0.002~0.5A/μs	0.02~5A/μs
Resolution	0.16mA/μs	1.6mA/μs	0.002A/μs	0.02A/μs
Accuracy	10% ±20μs		10% ±20μs	
Min. Rise Time	24μs (Typical)		10μs (Typical)	
Current	0~1A	0~10A	0~12A	0~120A
Resolution	0.25mA	2.5mA	3mA	30mA
Accuracy	0.4%F.S.		0.4%F.S.	
Measurement Section				
Voltage Read Back				
Range	0~125V	0~500V	0~16V	0~80V
Resolution	2mV	8mV	0.25mV	1.25mV
Accuracy	0.025% + 0.025%F.S.		0.025% + 0.025%F.S.	
Current Read Back				
Range	0~1A	0~10A	0~12A	0~120A
Resolution	0.016mA	0.16mA	0.1875mA	1.875mA
Accuracy	0.05% + 0.05%F.S.		0.05% + 0.05%F.S.	
Power Read Back*2				
Range	0~30W	0~300W	0~60W	0~600W
Accuracy	0.1% + 0.1%F.S.		0.1% + 0.1%F.S.	
Protective Section				
Over Power Protection	Yes		Yes	
Over Current Protection	Yes		Yes	
Over Temperature Protection	Yes		Yes	
Over Voltage Alarm*3	Yes		Yes	
General				
Short Circuit				
Current (CC)	-	≒10A	-	≒120A
Voltage (CV)	-	0V	-	0V
Resistance (CR)	-	≒1.25Ω	-	≒0.0125Ω
Power (CP)	-	≒300W	-	≒600W
Input Resistance (Load Off)	100kΩ (Typical)		100kΩ (Typical)	
Temperature Coefficient	100PPM/˚C (Typical)		100PPM/˚C (Typical)	
Power	Supply from 6334A Mainframe		Supply from 6334A Mainframe	
Dimension (HxWxD)	172x82x489.5mm / 6.8x3.2x19.3inch		172x164x489.5mm / 6.8x6.5x19.3inch	
Weight	4.2 kg / 9.3 lbs		7.3 kg / 16.1 lbs	
Operating Range	0~40˚C		0~40˚C	
EMC & Safety	CE		CE	

All specifications are subject to change without notice.

SPECIFICATIONS-3						
Model	**63307A (30W & 250W)**			**63308A**		
Power	30W	30W	250W	60W	600W	
Current	0~5A	0~4A	0~40A	0~2A	0~20A	
Voltage*3	0~80V			0~500V		
Min. Operation Voltage (DC) *1	0.4V@2.5A	0.4V@2A	0.4V@20A	1.0V@1A	1.0V@10A	
(Typical)	0.8V@5A	0.8V@4A	0.8V@40A	2V@2A	2V@20A	
Constant Current Mode						
Range	0~5A	0~4A	0~40A	0~2A	0~20A	
Resolution	1.25mA	1mA	10mA	0.5mA	5mA	
Accuracy	0.1%+0.1%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	
Constant Resistance Mode						
Range	0.3Ω~1.2kΩ (30W/16V) 15Ω~60kΩ (30W/80V)		0.0375Ω~150Ω (250W/16V) 1.875Ω~7.5kΩ (250W/80V)	0.625Ω~2.5kΩ (600W/125V) 25Ω~100kΩ (600W/500V)		
Resolution*5	833μS (30W/16V) 16.67μS (30W/80V)		6.667μS (250W/16V) 133μS (250W/80V)	400μS (600W/125V) 10μS (600W/500V)		
Accuracy	1.2kΩ : 0.1S + 0.2% 60kΩ : 0.01S + 0.1%		150Ω : 0.1S + 0.2% 7.5kΩ : 0.01S + 0.1%	25kΩ : 50mS+ 0.2% 100kΩ : 5mS+ 0.1%		
Constant Voltage Mode						
Range	0~80V			0~500V		
Resolution	20mV			125mV		
Accuracy	0.05% + 0.1%F.S.			0.05% + 0.1%F.S.		
Constant Power Mode						
Range	0~30W	0~30W	0~250W	0~60W	0~600W	
Resolution	7.5mW	7.5mW	62.5mW	15mW	150mW	
Accuracy	0.5% + 0.5%F.S.			0.5% + 0.5%F.S.		
Dynamic Mode						
Dynamic Mode	C.C. Mode			C.C. Mode		
T1 & T2	0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms			0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		
Accuracy	1μs/1ms+100ppm			1μs/1ms+100ppm		
Slew Rate	0.8~200mA/μs	0.64~160mA/μs	64~1600mA/μs	0.32~80mA/μs	3.2~800mA/μs	
Resolution	0.8mA/μs	0.64mA/μs	64mA/μs	0.32mA/μs	3.2mA/μs	
Accuracy	10% ±20μs			10% ±20μs		
Min. Rise Time	10μs (Typical)			24μs (Typical)		
Current	0~5A	0~4A	0~40A	0~2A	0~20A	
Resolution	1.25mA	1mA	10mA	0.5mA	5mA	
Accuracy	0.4%F.S.			0.4%F.S.		
Measurement Section						
Voltage Read Back						
Range	0~16V	0~80V	0~16V	0~80V	0~125V	0~500V
Resolution	0.25mV	1.25mV	0.25mV	1.25mV	2mV	8mV
Accuracy	0.025% + 0.025%F.S.			0.025% + 0.025%F.S.		
Current Read Back						
Range	0~5A	0~4A	0~40A	0~2A	0~20A	
Resolution	0.078125mA	0.0625mA	0.625mA	0.03125mA	0.3125mA	
Accuracy	0.05% + 0.05%F.S.			0.05% + 0.05%F.S.		
Power Read Back*2						
Range	0~30W	0~30W	0~250W	0~60W	0~600W	
Accuracy	0.1% + 0.1%F.S.			0.1% + 0.1%F.S.		
Protective Section						
Over Power Protection	Yes			Yes		
Over Current Protection	Yes			Yes		
Over Temperature Protection	Yes			Yes		
Over Voltage Alarm*3	Yes			Yes		
General						
Short Circuit						
Current (CC)	-	-	≒40A	-	≒20A	
Voltage (CV)	-	-	0V	-	0V	
Resistance (CR)	-	-	≒0.0375Ω	-	≒0.625Ω	
Power (CP)	-	-	≒250W	-	≒600W	
Input Resistance (Load Off)	100kΩ (Typical)					
Temperature Coefficient	100PPM/˚C (Typical)					
Power	Supply from 6334A Mainframe					
Dimension (HxWxD)	172x82x489.5mm / 6.8x3.2x19.3inch			172x164x489.5mm / 6.8x6.5x19.3inch		
Weight	4.5 kg / 9.9 lbs			7.3 kg / 16.1 lbs		
Operating Range	0~40˚C					
EMC & Safety	CE					

SPECIFICATIONS-4				
Model	**63312A**		**63323A**	
Power	120W	1200W	350W	
Current	0~24A	0~240A	0~7A	0~70A
Voltage*3	0~80V		0~120V	
Min. Operation Voltage (DC) *1 (Typical)	0.4V@12A 0.8V@24A	0.4V@120A 0.8V@240A	0.05V @ 3.5A 0.1V @ 7A	0.3V @ 35A 0.6V @ 70A
Constant Current Mode				
Range	0~24A	0~240A	0~7A	0~70A
Resolution	6mA	60mA	0.125mA	1.25mA
Accuracy	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.1%F.S.
Constant Resistance Mode				
Range	6.25mΩ~25Ω (1200W/16V) 0.3125Ω~1.25kΩ (1200W/80V)		0.015Ω~150Ω (350W/24V)*4 2Ω~2kΩ (350W/120V)	
Resolution*5	40mS (1200W/16V) 80μS (1200W/80V)		1.33mS (350W/24V)*4 10μS (350W/120V)	
Accuracy	25Ω: 0.8S+ 0.8% 1.25kΩ: 0.08S+ 0.2%		150Ω: 67mS + 0.1% 2kΩ: 5mS + 0.2%	
Constant Voltage Mode				
Range	0~80V		0~120V	
Resolution	20mV		2mV	
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.	
Constant Power Mode				
Range	0~120W	0~1200W	0~35W	0~350W
Resolution	30mW	300mW	2.5mW	25mW
Accuracy	0.5% + 0.5%F.S.		0.5% + 0.5%F.S.	
Dynamic Mode				
Dynamic Mode	C.C. Mode		C.C. MODE	
T1 & T2	0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms~50ms/Res: 5μs 0.1ms~500ms / Res: 25μs 10ms~50s / Res: 2.5ms	
Accuracy	1μs/1ms+100ppm		1μs /1ms+100ppm	
Slew Rate	0.004~1A/μs	0.04~10A/μs	0.001~0.25A/μs	0.01~2.5A/μs
Resolution	0.004A/μs	0.04A/μs	0.001A/μs	0.01A/μs
Accuracy	10% ±20μs		10% ±20μs	
Min. Rise Time	10μs (Typical)		25μs (Typical) *6	
Current	0~24A	0~240A	0~7A	0~70A
Resolution	6mA	60mA	0.125mA	1.25mA
Current Accuracy	0.4%F.S.		0.1% F.S.	
Measurement Section				
Voltage Read Back				
Range	0~16V	0~80V	0~24V	0~120V
Resolution	0.25mV	1.25mV	0.4mV	2mV
Accuracy	0.025% + 0.025%F.S.		0.025%+0.015% F.S.	
Current Read Back				
Range	0~24A	0~240A	0~7A	0~70A
Resolution	0.375mA	3.75mA	0.125mA	1.25mA
Accuracy	0.075% + 0.075%F.S.		0.04%+0.04% F.S.	
Power Read Back*2				
Range	0~120W	0~1200W	0~35W	0~350W
Accuracy	0.1% + 0.1%F.S.		0.1%+0.1% F.S.	
Protective Section				
Over Power Protection	Yes		Yes	
Over Current Protection	Yes		Yes	
Over Temperature Protection	Yes		Yes	
Over Voltage Alarm*3	Yes		Yes	
General				
Short Circuit				
Current (CC)	-	≒240A	-	≒70A
Voltage (CV)	-	0V	-	0V
Resistance (CR)	-	≒0.00625Ω	-	≒ 0.01Ω
Power (CP)	-	≒1200W	-	≒ 350W
Input Resistance (Load Off)	100kΩ (Typical)		800kΩ (Typical)	
Temperature Coefficient	100PPM/°C (Typical)		100PPM/°C (Typical)	
Power	Supply from 6334A Mainframe		Supply from 6334A Mainframe	
Dimension (HxWxD)	172x329x495mm / 6.8x12.9x19.5inch		172x82x489.5mm / 6.8x3.2x19.3inch	
Weight	14 kg / 30.8 lbs		4.2kg / 9.3 lbs	
Operating Range	0~40°C		0~40°C	
EMC & Safety	CE		CE	

NOTE*1 : Low voltage operation, under 0.8 volt, is possible at correspondingly reduced current level. Operating temperature range is 0ºC to 40°C. All specifications apply for 25°C ± 5°C, except as noted
NOTE*2 : Power F.S.=Vrange F.S. x Irange F.S.
NOTE*3 : When the operating voltage exceeds the rated voltage for 1.02 times, a warning will occur and if it exceeds 1.1 times of the rated voltage, it would cause permanent damage to the device.
NOTE*4 : Please refer to user's manual for detail specifications.
NOTE *5 : S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.
NOTE *6 : The loading current should be 0.35A at least.

ORDERING INFORMATION

6332A: Mainframe for 2 Load Modules
6334A: Mainframe for 4 Load Modules
63301A: Load Module 80V/40A/200W
63302A: Load Module 80V/20A/100W x 2
63303A: Load Module 80V/60A/300W
63305A: Load Module 500V/10A/300W
63306A: Load Module 80V/120A/600W
63307A: Load Module 80V/5A & 40A/30W & 250W
63308A: Load Module 500V/20A/600W
63312A: Load Module 80V/240A/1200W
63323A: Load Module 120V/70A/350W
A631000: GPIB Interface
for Model 6334A/6332A Mainframe
A631001: Remote Controller
A631003: USB Interface
for Model 6334A/6332A Mainframe
A631005: Softpanel for 6310A/6330A series
A631006: Rack Mounting Kit
for Model 6332A Mainframe
A631007: Rack Mounting Kit
for Model 6334A Mainframe
A632004: Sync. Link Box for 6330A/63200 Series
A800042: Test Fixture
LED Load Simulator for LED Driver Test
63310A: Load Module 500V/2A/100W x 2
63313A: Load Module 300V/20A/300W
63315A: Load Module 600V/20A/300W

All specifications are subject to change without notice.

SPECIFICATIONS						
Model	**63310A (100Wx2)**		**63313A**		**63315A**	
Power	100W		300W		300W	
Current	0~0.6A	0~2A	0~5A	0~20A	0~5A	0~20A
Voltage *1	0~500V		0~300V		0~600V	
Min. Operating Voltage	6V@2A		4V@20A		4V@20A	
Constant Current Mode						
Range	0~0.6A	0~2A	0~5A	0~20A	0~5A	0~20A
Resolution	12μA	40μA	100μA	400μA	100μA	400μA
Accuracy	0.1%+0.1% F.S.		0.1%+0.1% F.S.	0.1%+0.2% F.S.	0.1%+0.1% F.S.	0.1%+0.2% F.S.
Constant Resistance Mode						
Range	CRL : 3Ω~1kΩ (100W/100V) CRH : 10Ω~10kΩ (100W/500V)		CRL @ CH : 0.2Ω~200Ω (300W/60V) CRL @ CL : 0.8Ω~800Ω (300W/60V) CRH @ CL : 4Ω~4kΩ (300W/300V)		CRL @ CH : 0.2Ω~200Ω (300W/60V) CRL @ CL : 0.8Ω~800Ω (300W/60V) CRH @ CL : 8Ω~8kΩ (300W/600V)	
Resolution*2	CRL : 62.5μS CRH : 6.25μS		CRL @ CH : 100μS CRL @ CL : 25μS CRH @ CL : 5μS		CRL @ CH :100μS CRL @ CL : 25μS CRH @ CL : 2.5μS	
Accuracy	1kΩ : 4mS+0.2% 10kΩ : 1mS+0.1%		0.2% (setting + range)		0.2% (setting + range)	
Constant Voltage Mode						
Range	0~500V		0~300V		0~600V	
Resolution	20mV		6mV		12mV	
Accuracy	0.05% + 0.1%F.S.		0.05% + 0.1%F.S.		0.05% + 0.1%F.S.	
LED Mode						
Range	Operating Voltage: 0~100V/0~500V R_d Coefficient : 0.001~1 V_F: 0~100V/0~500V Current : 0~2A R_d: 1Ω~1kΩ/10Ω~10kΩ		Operating Voltage : 0~60V/0~300V R_d Coefficient : 0.001~1 V_F : 0~60V/0~300V LEDL @ CH : 0~60V- 0~20A (R_d: 0.05Ω~50Ω) LEDL @ CL : 0~60V- 0~5A (R_d: 0.8Ω~800Ω) LEDH @ CL : 0~300V- 0~5A (R_d: 4Ω~4kΩ)		Operating Voltage : 0~60V/0~600V R_d Coefficient : 0.001~1 V_F : 0~60V/0~600V LEDL @ CH : 0~60V- 0~20A (R_d: 0.05Ω~50Ω) LEDL @ CL : 0~60V- 0~5A (R_d: 0.8Ω~800Ω) LEDH @ CL : 0~600V- 0~5A (R_d: 8Ω~8kΩ)	
Resolution *2	Vo : 4mV/20mV Io : 0.1mA R_d Coefficient : 0.001 R_d : 62.5μS/6.25μS V_F : 4mV/20mV		Vo : 1.2mV/6mV Io : 100μA/400μA R_d Coefficient : 0.001 R_d : 400μS / 25μS / 5μS V_F : 1.2mV/ 6mV		Vo : 1.2mV/12mV Io : 100μA/400μA R_d Coefficient : 0.001 R_d : 400μS/25μS/2.5μS V_F : 6mV/ 60mV	
Dynamic Mode						
Dynamic Mode	--		C.C. Mode		C.C. Mode	
T1 & T2	--		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms		0.025ms ~ 50ms / Res: 5μs 0.1ms ~ 500ms / Res: 25μs 10ms ~ 50s / Res: 2.5ms	
Accuracy	--		1μs/1ms+100ppm		1μs/1ms+100ppm	
Slew Rate	--		0.8~200mA/μs	3.2~800mA/μs	0.8~200mA/μs	3.2~800mA/μs
Resolution	--		0.8mA/μs	3.2mA/μs	0.8mA/μs	3.2mA/μs
Accuracy	--		10% ±20μs		10% ±20μs	
Min. Rise Time	--		25μs (Typical)		25μs (Typical)	
Current	--		0~5A	0~20A	0~5A	0~20A
Resolution	--		100μA	400μA	100μA	400μA
Accuracy	--		0.4%F.S.		0.4%F.S.	
Measurement Section						
Voltage Read Back						
Range	0~100V	0~500V	0~60V	0~300V	0~60V	0~600V
Resolution	2mV	10mV	1.2mV	6mV	1.2mV	12mV
Accuracy	0.025%+0.025% F.S.		0.025%+0.025% F.S.		0.025%+0.025% F.S.	
Current Read Back						
Range	0~0.6A	0~2A	0~5A	0~20A	0~5A	0~20A
Resolution	12μA	40μA	100μA	400μA	100μA	400μA
Accuracy	0.05%+0.05% F.S.		0.05%+0.05% F.S.		0.05%+0.05% F.S.	

NOTE*1 : If the operating voltage exceeds 1.1 times of the rated voltage, it would cause permanent damage to the device.
NOTE*2 : S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.

Mainframe Model	**6332A**	**6334A**
Number of slots	2	4
Operating Temperature	0~40˚C	0~40˚C
Input Rating	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz	1Ø 100/200Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 115/230Vac ± 10% V_{LN}, 47~63Hz
Dimension (HxWxD)	194x275x550mm / 7.6x10.8x21.7inch	194x439x550mm / 7.6x17.3x21.7inch
Weight	15 kg / 33.1 lbs	21.5 kg / 47.4 lbs



KEY FEATURES

- Max. Power : 100W x 2(Dual), 300W & 400W
- Voltage Range : up to 600V
- 5 module mainframe Max. 2000W, load modules up to 400W/ea
- Up to 10 channels in one mainframe, fit for testing multiple output SMPS
- 0.4V @ 80A (Typical) low voltage operating characteristics
- Flexible CC, CR, CV and CP operation modes
- CZ mode for turn on capacitive load simulation
- Parallel mode for high current and power application up to 2kW
- User defined waveform
- Multi Channel synchronous control
- Auto frequency sweep up to 50kHz
- Real time power supply load transient response simulation and Vpk+/- measurement
- User programmable 100 sequential front panel input status for user-friendly operating
- Precision voltage and current measurement
- Precision high speed digitizing measurement/ data capture
- Voltage, Current and Pmax measurement for OCP/OLP testing
- Timing measurement for batteries
- Short circuit simulation
- Self-test at power-on
- Full Protection : OC, OP, OT protection and OV alarm
- Ethernet, USB and GPIB interfaces

Ethernet GPIB USB CE

Chroma's 63600 Series DC Electronic Loads are designed for testing multi-output AC/DC power supplies, DC/DC converters, chargers, batteries, adapters, and power electronic components. They are excellent for research, development, production, and incoming inspection applications.

The 63600's state of the art design uses DSP technology to simulate non-linear loads using an unique CZ operation mode allowing realistic loading behavior.

The 63600 series can draw its rated current under very low voltage (0.4V typical). This unique feature guarantees the best loading performance for modern Point-of-Load conditions and fuel cells.

The 63600 series can simulate a wide range of dynamic loading applications, with programmable load levels, slew rates, duration, and conducting voltage. The 63600 also has a dynamic sweep function to meet the test requirements of ATX power supplies. The instrument allows up to 100 sets of system operating status which can be stored in the EEPROM and recalled instantly for automated testing application.

Real time measurement of voltage and current are integrated into each 63600 load module using a 16-bit measurement circuit with three current ranges. The user can perform online voltage measurements and adjustments or simulate short circuit test using the simple keypad on the front panel.

With the VFD display and rotary knob, the 63600 loads offer versatile front panel operation. Users are able to control the 63600 family remotely via Ethernet, USB, or GPIB interface.

Also included in the 63600 are self-diagnostic routines and full protections against OP, OC, OT and alarm indicating OV, reverse polarity. This ensures the quality and reliability of the 63600 and provides protection of units under test.

ORDERING INFORMATION

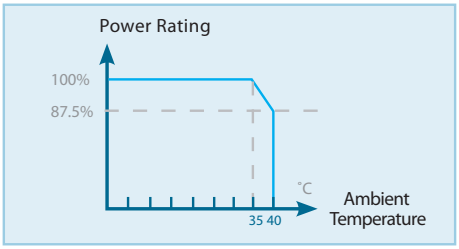
63600-1 : 63600 mainframe for single module
63600-2 : 63600 mainframe for 2 modules
63600-5 : 63600 mainframe for 5 modules (Max. 10 channels)
63601-5 : 63600 mainframe for 5 modules (Only one slot for dual channel load module, Max. 6 channels)
63610-80-20 : DC Load module, 80V / 20A / 100Wx2
63630-80-60 : DC Load module, 80V / 60A / 300W
63630-600-15 : DC Load module, 600V / 15A / 300W
63640-80-80 : DC Load module, 80V / 80A / 400W
63640-150-60 : DC Load Module, 150V / 60A / 400W
A632006 : NI USB-6211 Bus-Powered Multifunction DAQ
A636000 : GPIB interface for 63600-2 / 63600-5 / 63601-5 mainframe
A636001 : Ethernet interface for 63600-2/63600-5 mainframe
A636003 : External signal board (Test Pin) for 63600-2 / 63600-5 / 63601-5 mainframe
A636005 : External signal board (BNC) for 63600-2 / 63600-5 / 63601-5 mainframe
A636007 : Rack mounting kit for 63600-2 mainframe
A636008 : Rack mounting kit for 63600-5/63601-5 mainframe (for Europe only)
A636009 : Ethernet & USB interfaces for 63601-5 mainframe
A636010 : Ethernet interface for 63601-5 mainframe



Model 63600-2



Model 63600-5





Model	63600-1 *1	63600-2	63600-5	63601-5 *2
Number of slots	1 slot	2 slots	5 slots	5 slots
Operating temperature	0~40˚C	0~40˚C	0~40˚C	0~40˚C
Input Rating	1Ø 100~115V±10% V_{LN}, 1Ø 190~230V±10% V_{LN}, Switchable, 47~63Hz	1Ø 100~115V±10% V_{LN}, 1Ø 190~230V±10% V_{LN}, Switchable, 47~63Hz	1Ø 100~115V±10% V_{LN}, 1Ø 190~230V±10% V_{LN}, Auto Range, 47~63Hz	1Ø 100~115V±10% V_{LN}, 1Ø 190~230V±10% V_{LN}, Auto Range, 47~63Hz
Mainframe dimension (HxWxD)	177x70.22x554.9mm / 7x2.76x21.8 inch	177x210x554mm / 7.0x8.27x21.8 inch	177x447x554mm / 7.0x17.6x21.8 inch (Full Rack)	177x447x554mm / 7.0x17.6x21.8 inch (Full Rack)
Weight	7.5kg / 16.53lbs	11.5kg / 23.35lbs	15.6kg / 34.39lbs	15.6kg / 34.39lbs

Note *1 : None digital interface option
Note *2 : The dual channel module 63610-80-20 can only be placed at the rightmost slot.

All specifications are subject to change without notice.

SPECIFICATIONS-1						
Model	**63610-80-20**			**63630-80-60**		
Configuration	100Wx2			300W		
Voltage *1 *8	0~80V			0~80V		
Current	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A
Power *2	0~16W	0~30W	0~100W	0~30W	0~60W	0~300W
Static Mode						
Typical Min. Operating Voltage (DC)	0.5V@0.2A	0.5V@2A	0.5V@20A	0.5V@0.6A	0.5V@6A	0.5V@60A
Constant Current Mode						
Range	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A
Resolution	0.01mA	0.1mA	1mA	0.01mA	0.1mA	1mA
Accuracy	0.1%+0.1%F.S.			0.1%+0.1%F.S.		
Constant Resistance Mode						
Range	CRL : 0.04~80Ω (100W/6V) CRM: 1.44~2.9kΩ (100W/16V) CRH : 5.76~12kΩ (100W/80V)			CRL : 0.015~30Ω (300W/6V) CRM: 0.3~600Ω (300W/16V) CRH : 1.5~3kΩ (300W80V)		
Resolution *9	0.3288mS			0.9864mS		
Accuracy *3	0.1%+0.075S (6V) 0.1%+0.01S (16V) 0.1%+0.00375S (80V)			0.1%+0.2S (6V) 0.1%+0.03S (16V) 0.1%+0.01S (80V)		
Constant Voltage Mode						
Range	0~6V	0~16V	0~80V	0~6V	0~16V	0~80V
Resolution	0.1mV	1mV	1mV	0.1mV	1mV	1mV
Accuracy	0.05%+0.1%F.S.			0.05%+0.1%F.S.		
Constant Power Mode						
Range	0~2W	0~10W	0~100W	0~6W	0~30W	0~300W
Resolution *9	1mW	10mW	100mW	3.2mW	32mW	320mW
Accuracy *4	0.3%+0.3%F.S.			0.3%+0.3%F.S.		
Dynamic Mode - CC						
Min. Operating Voltage	1.5V			1.5V		
Frequency	100Hz~50kHz/0.01Hz~1kHz			100Hz~50kHz/0.01Hz~1kHz		
Duty	1~99% (Min. Rise Time Dominated)			1~99% (Min. Rise Time Dominated)		
Accuracy	1μs/1ms+100ppm			1μs/1ms+100ppm		
Slew Rate	0.04A/ms~0.02A/μs	0.4A/ms~0.2A/μs	4A/ms~2A/μs	0.12A/ms~0.06A/μs	1.2A/ms~0.6A/μs	12A/ms~6A/μs
Resolution	0.01mA/μs	0.1mA/μs	1mA/μs	0.01mA/μs	0.1mA/μs	1mA/μs
Accuracy	10% ±20μs			10% ±20μs		
Min. Rise Time	10 μs			10 μs		
Current						
Range	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A
Resolution	0.01mA	0.1mA	1mA	0.01mA	0.1mA	1mA
Ext Wave Mode(20kHz) : CC						
Range	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A
Level	0~10V			0~10V		
Accuracy	0.5%F.S.			0.5%F.S.		
Measurement						
Voltage Read Back						
Range	0~6V	0~16V	0~80V	0~6V	0~16V	0~80V
Resolution	0.1069mV	0.2849mV	1.3537mV	0.1069mV	0.2849mV	1.3537mV
Accuracy *5	0.025%+0.01%F.S.		0.01%+ 0.025%F.S.	0.025%+0.01%F.S.		0.01%+ 0.025%F.S.
Current Read Back						
Range	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A
Resolution	0.003349mA	0.034628mA	0.329561mA	0.009942mA	0.101748mA	1.009878mA
Accuracy *5	0.05%+0.05%F.S.			0.05%+0.05%F.S.		
Power Read Back						
Range	0~16W	0~30W	0~100W	0~30W	0~60W	0~300W
Accuracy *5	0.1%+0.1%F.S.			0.1%+0.1%F.S.		
Voltage Monitor						
Bandwidth	20 kHz			20 kHz		
Range	0~6V	0~16V	0~80V	0~6V	0~16V	0~80V
Output	0~10V			0~10V		
Accuracy	0.5%F.S.			0.5%F.S.		
Current Monitor						
Bandwidth	20 kHz			20 kHz		
Range	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A
Output	0~10V			0~10V		
Accuracy	0.5%F.S.			0.5%F.S.		

SPECIFICATIONS-2									
Model	**63630-600-15**			**63640-80-80**			**63640-150-60**		
Configuration	300W			400W			400W		
Voltage *1 *8	0~600V			0~80V			0~150V		
Current	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A
Power *2	0~90W	0~300W	0~300W	0~60W	0~60W	0~400W	0~90W	0~400W	0~400W
Static Mode									
Typical Min. Operating Voltage (DC)	2V@0.15A	2V@1.5A	2V@15A	0.4V@0.8A	0.4V@8A	0.4V@80A	0.3V@1A	0.3V@6A	0.9V@30A 1.8V@60A
Constant Current Mode									
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A
Resolution	0.005mA	0.05mA	0.5mA	0.01mA	0.1mA	1mA	0.02mA	0.1mA	1mA
Accuracy	0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.04%+0.04%F.S.		
Constant Resistance Mode									
Range	CRL : 0.133~270Ω (300W/80V) CRM : 1.92~4kΩ (300W/150V) CRH : 208~200kΩ (300W/600V)			CRL : 0.01~20Ω (400W/6V) CRM : 0.36~720Ω (400W/16V) CRH : 1.45~2.9kΩ (400W/80V)			CRL: 0.03~60Ω (400W/16V) CRM : 0.64~800Ω (400W/80V) CRH : 6.25~1.5kΩ (400W/150V)		
Resolution *9	0.2435mS			1.322mS			1mS		
Accuracy *3	0.1%+0.02S (80V) 0.1%+0.0005S (150V) 0.1%+0.0003S (600V)			0.1%+0.275S (6V) 0.1%+0.036S (16V) 0.1%+0.01375S (80V)			0.1%+0.067S (16V) 0.1%+0.00625S (80V) 0.1%+0.002S (150V)		
Constant Voltage Mode									
Range	0~80V	0~150V	0~600V	0~6V	0~16V	0~80V	0~16V	0~80V	0~150V
Resolution	1mV	10mV	10mV	0.1mV	1mV	1mV	1mV	1mV	10mV
Accuracy	0.05%+0.1%F.S.			0.05%+0.1%F.S.			0.025%+0.025%F.S.		
Constant Power Mode									
Range	0~6W	0~30W	0~300W	0~8W	0~40W	0~400W	0~8W	0~40W	0~400W
Resolution *9	5.625mW	56.25mW	562.5mW	4mW	40mW	400mW	4mW	40mW	400mW
Accuracy *4	0.3%+0.3%F.S.			0.3%+0.3%F.S.			0.3%+0.3%F.S.		
Dynamic Mode - CC									
Min. Operating Voltage	3V			1.5V			1.8V		
Frequency	100Hz~50kHz/0.01Hz~1kHz			100Hz~50kHz/0.01Hz~1kHz			100Hz~50kHz/0.01Hz~1kHz		
Duty	1~99% (Min. Rise Time Dominated)			1~99% (Min. Rise Time Dominated)			1~99% (Min. Rise Time Dominated)		
Accuracy	1μs/1ms+100ppm			1μs/1ms+100ppm			1μs/1ms+100ppm		
Slew rate	0.03A/ms ~0.015A/μs	0.3A/ms ~0.15A/μs	3A/ms ~1.5A/μs	0.16A/ms ~0.08A/μs	1.6A/ms ~0.8A/μs	16A/ms ~8A/μs	0.2A/ms ~0.1A/μs	1.2A/ms ~0.6A/μs	12A/ms ~6A/μs
Resolution	0.005mA/μs	0.05mA/μs	0.5mA/μs	0.01mA/μs	0.1mA/μs	1mA/μs	0.02mA/μs	0.1mA/μs	1mA/μs
Accuracy	10% ±20μs			10% ±20μs			10% ±20μs		
Min. Rise Time	10 μs			10 μs			10 μs		
Current									
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A
Resolution	0.005mA	0.05mA	0.5mA	0.01mA	0.1mA	1mA	0.02mA	0.1mA	1mA
Ext Wave Mode(20kHz) : CC									
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A
Level	0~10V			0~10V			0~10V		
Accuracy	0.5%F.S.			0.5%F.S.			0.5%F.S.		
Measurement									
Voltage Read Back									
Range	0~80V	0~150V	0~600V	0~6V	0~16V	0~80V	0~16V	0~80V	0~150V
Resolution	1.4194mV	2.661mV	10.645mV	0.1069mV	0.2849mV	1.3537mV	0.27mV	1.3mV	2.5mV
Accuracy *5	0.025%+0.01%F.S.		0.01%+ 0.025%F.S.	0.025%+0.01%F.S.		0.01%+ 0.025%F.S.	0.025%+0.01%F.S.		
Current Read Back									
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A
Resolution	0.00275mA	0.0266mA	0.255mA	0.013695mA	0.138766mA	1.31406mA	0.02mA	0.1mA	1mA
Accuracy *5	0.05%+0.05%F.S.			0.05%+0.05%F.S.			0.04%+0.04%F.S.		
Power Read Back									
Range	0~90W	0~300W	0~300W	0~60W	0~60W	0~400W	0~8W	0~40W	0~400W
Accuracy *5	0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.		
Voltage Monitor									
Bandwidth	20 kHz			20 kHz			20 kHz		
Range	0~80V	0~150V	0~600V	0~6V	0~16V	0~80V	0~16V	0~80V	0~150V
Output	0~10V			0~10V			0~10V		
Accuracy	0.5%F.S.			0.5%F.S.			0.5%F.S.		
Current Monitor									
Bandwidth	20 kHz			20 kHz			20 kHz		
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A
Output	0~10V			0~10V			0~10V		
Accuracy	0.5%F.S.			0.5%F.S.			0.5%F.S.		

All specifications are subject to change without notice.

GENERAL SPECIFICATION					
Model	**63610-80-20**	**63630-80-60**	**63630-600-15**	**63640-80-80**	**63640-150-60**
Program mode					
Sequence No.	100/Program				
Dwell / SEQ	0.1ms ~ 30s (Resolution : 0.1ms)				
Load Setting	Refer to Static mode specifications				
Spec Check	Voltage/Current/Power				
Protection					
Over Power	Yes				
Over Current	Yes				
Over Voltage Alarm*8	Yes				
Over Temperature	Yes				
Reverse	Yes				
Interface					
USB	Standard				
Ethernet	Optional				
GPIB	Optional				
System BUS	Master/Slave				
Dout					
No. of bits	2 bits per mainframe				
Level - H	1.8V/3.3V/5V switchable				
Level - L	<0.6V@I_{sink}=10mA				
Drive	Pull_up resistor = 4.7kΩ				
Din (TTL Compatible, Rising Edge)					
No. of bits	2 bits per mainframe				
External Trig. for Digitizing					
No. of bits	1 bit per mainframe				
External Trig. for Auto Sequences (TTL Compatible, Rising Edge)					
No. of bits	1 bit per mainframe				
Load ON - O/P					
Level	TTL Compatible, Level, Active High				
Short ON - O/P					
No. of channels	2 channels per 63600-1 mainframe 4 channels per 63600-2 mainframe 6 channels per 63601-5 mainframe 10 channels per 63600-5 mainframe				
Level	TTL Compatible, Level, Active High				
Short circuit					
Current *6	Set to 100% of rated current				
Input Resistance (Load Off)	700kΩ (Typical)	700kΩ (Typical)	2MΩ (Typical)	700kΩ (Typical)	700kΩ (Typical)
Dimensions (HxWxD)	142 x 86 x 514 mm / 5.6 x 3.4 x 20.2 inch				
Weight	5 kg / 11 lbs	4 kg / 8.8 lbs	5 kg / 11 lbs	4.5 kg / 9.9 lbs	4.5 kg / 9.9 lbs
Operating Temperature	0~40˚C				
Storage Temperature	-20~80˚C				
Power	Supply from mainframe				
EMC & Safety	CE				

NOTE*1 : The maximum current loading below the minimum operating voltage (0.5V) will follow a derating curve.
NOTE*2 : The 400W power rating of the 63640-80-80 specified at an ambient temperature of 35˚C, please refer to the power rating curve on the right.
NOTE*3 : Does not apply to setting current < 0.25% full scale current in high range. Does not apply to setting current < 0.05% full scale current in low and middle range.
NOTE*4 : The full scale is Vmax x Imax.
NOTE*5 : The DC level measurements are made over a period of 20ms, and does not measure any transient signals in the DC measurements.
NOTE*6 : Its limits are the maximum power and maximum current of the current ragne.
NOTE*7 : The 63600 is guaranteed to meet specified performance at temperature range of 25±5˚C.
NOTE*8 : If the operating voltage exceeds the rated voltage for 1.1 times, it would cause permanent damage to the device.
NOTE*9 : Please refer to user's manual for detail specifications, and S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.

Softpanel


Main Operation Menu


Battery Discharge Test


User Defined Waveform



RS-232 GPIB CE

KEY FEATURES

- Power Rating : 1800W, 3600W, 4500W
- Voltage Range : 50Vrms ~ 350Vrms
- Current Range : Up to 18Arms, 36Arms, 45Arms
- Peak Current : Up to 54A, 108A, 135A
- Parallel / 3-Phase Function (AC mode only)
- Frequency Range : 45 ~ 440Hz, DC
- Crest Factor Range : 1.414 ~ 5.0
- Power Factor Range : 0 ~ 1 lead or lag (Rectified mode)
- CC, CR, CV, CP for DC Loading
- Constant & Rectified Load Modes for AC Loading
- Analog Voltage & Current Monitor
- Timing Measurement for Battery, UPS, Fuse and Breaker tests
- Measurement : V, I, PF, CF, P, Q, S, F, R, Ip+/- and THDv
- Short circuit simulation
- Full Protection : OC, OP, OT protection and OV alarm
- GPIB & RS-232 interfaces

Chroma's 63800 Series AC&DC Electronic Loads are designed for testing uninterruptible power supplies(UPS), Off-Grid Inverters, AC sources and other power devices such as switches, circuit breakers, fuses and connectors.

The Chroma 63800 Loads can simulate load conditions under high crest factor and varying power factors with real time compensation even when the voltage waveform is distorted. This special feature provides real world simulation capability and prevents over-stressing thereby giving reliable and unbiased test results.

The 63800's state of the art design uses DSP technology to simulate non-linear rectified loads with its unique RLC operation mode. This mode improves stability by detecting the impedance of the UUT and dynamically adjusting the load's control bandwidth to ensure system stability.

Comprehensive measurements allow users to monitor the output performance of the UUT. Additionally, voltage & current signals can be routed to an oscilloscope through analog outputs. The instrument's GPIB/RS-232 interface options provide remote control & monitor for system integration. Built-in digital outputs may also be used to control external relays for short circuit (crowbar) testing.

Chroma's 63800 Loads feature fan speed control ensuring low acoustic noise. The diagnosis/ protection functions include self-diagnosis routines and protection against over-power, over-current, over-temperature and alarm indicating over-voltage.

Parallel / 3-Phase Control

The 63800 series provides parallel and 3-phase functions for high power and three phase applications. All the models within the 63800 series can be used together for both parallel and 3-phase functions as well as paralleled AC Load units in a 3-phase configuration, providing excellent flexibility and cost savings for the 63800 series AC load. Parallel and 3-phase controls are made easy by linking the AC Load units together and control of all AC load units is performed through the Master Unit.

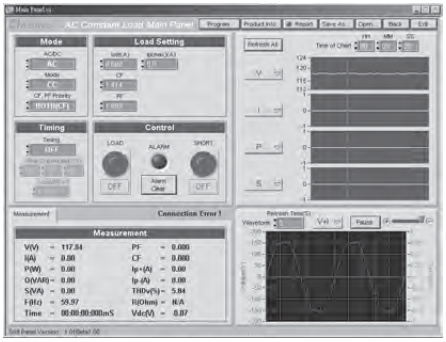


63802

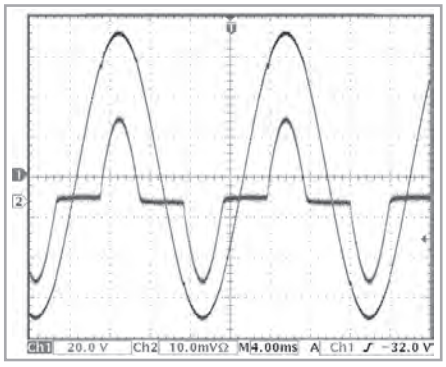
Softpanel

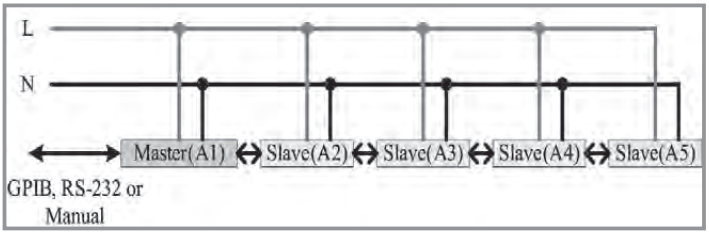


Main Operation Menu



AC Load

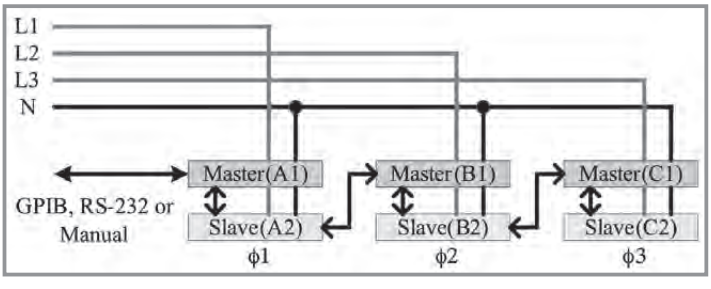




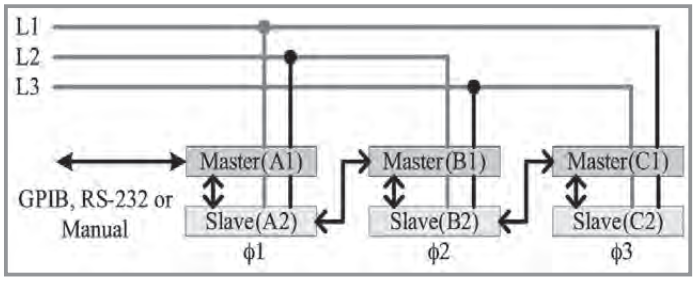
Parallel connection

ORDERING INFORMATION

63802 : Programmable AC & DC Electronic Load 350V/18A/1800W
63803 : Programmable AC & DC Electronic Load 350V/36A/3600W
63804 : Programmable AC & DC Electronic Load 350V/45A/4500W
A638001 : Rack Mounting Kit for Model 63802
A638002 : Rack Mounting Kit for Model 63803/63804



Parallel/3-Phase Y connection



Parallel/3-Phase Delta connection

All specifications are subject to change without notice.

SPECIFICATIONS			
Model	**63802**	**63803**	**63804**
Power	**1800W**	**3600W**	**4500W**
Current	0 ~ 18Arms (54 Apeak, continue)	0 ~ 36Arms (108 Apeak, continue)	0 ~ 45Arms (135 Apeak, continue)
Voltage*1	50 ~ 350Vrms (500 Vpeak)	50 ~ 350Vrms (500 Vpeak)	50 ~ 350Vrms (500 Vpeak)
Frequency	45 ~ 440Hz, DC	45 ~ 440Hz, DC	45 ~ 440Hz, DC
AC Section			
Constant Current Mode			
Range	0 ~ 18Arms, Programmable	0 ~ 36Arms, Programmable	0 ~ 45Arms, Programmable
Accuracy	0.1% + 0.2%F.S.	0.1% + 0.2%F.S.	0.1% + 0.2%F.S.
Resloution	2mA	5mA	5mA
Constant Resistance Mode			
Range	2.77Ω ~ 2.5kΩ, Programmable	1.39Ω~2.5kΩ, Programmable	1.11Ω~2.5kΩ, Programmable
Accuracy	0.5% + 0.5%F.S.	0.5% + 0.5%F.S.	0.5% + 0.5%F.S.
Resloution*2	20μS	50μS	50μS
Constant Power Mode			
Range	1800W, Programmable	3600W, Programmable	4500W, Programmable
Accuracy	0.5% + 0.5%F.S.	0.2% + 0.3%F.S.	0.2% + 0.3%F.S.
Resloution	0.375W	1.125W	1.125W
Crest Factor (under CC, CP modes)			
Range	1.414 ~ 5.0, Programmable	1.414 ~ 5.0, Programmable	1.414 ~ 5.0, Programmable
Accuracy	(0.5% / Irms) + 1% F.S.	(0.5% / Irms) + 1%F.S.	(0.5% / Irms) + 1%F.S.
Resloution	0.005	0.005	0.005
Power Factor			
Range	0 ~ 1 lead or lag, Programmable	0 ~ 1 lead or lag, Programmable	0 ~ 1 lead or lag, Programmable
Accuracy	1%F.S.	1%F.S.	1%F.S.
Resloution	0.001	0.001	0.001
Rectified Load Mode			
Operating Frequency	45Hz ~ 70Hz		
RLC Mode	Parameter : Ip(max), R_S, L_S, C, R_L		
Constant Power Mode	Parameter : Ip(max), Power setting=200W ~ 1800W, PF=0.4 ~ 0.75	Parameter : Ip(max), Power setting=200W ~ 3600W, PF=0.4 ~ 0.75	Parameter : Ip(max), Power setting=200W ~ 4500W, PF=0.4 ~ 0.75
Inrush Current Mode	Parameter : Ip(max), R_S, L_S, C, R_L, Phase		
	80A (peak current)	160A (peak current)	200A (peak current)
R_S Range	0 ~ 9.999Ω	0 ~ 9.999Ω	0 ~ 9.999Ω
L_S Range	0 ~ 9999μH	0 ~ 9999μH	0 ~ 9999μH
C Range	100 ~ 9999μF	100 ~ 9999μF	100 ~ 9999μF
R_L Range	2.77 ~ 9999.99Ω	1.39 ~ 9999.99Ω	1.11 ~ 9999.99Ω
DC Section			
Voltage Range	7.5V ~ 500V	7.5V ~ 500V	7.5V ~ 500V
Current Range	0A ~ 18A	0A ~ 36A	0A ~ 45A
Min. operating voltage	7.5V	7.5V	7.5V
Rise time	75μs	75μs	75μs
Operating Mode	CC, CV, CR, CP, DC Rectified		
Short Circuit Simulation	Use the CR mode loading under max. power rating		
Measurement Section			
DVM Range	$350V_{rms}$ ($500V_{peak}$)	$350V_{rms}$ ($500V_{peak}$)	$350V_{rms}$ ($500V_{peak}$)
DVM Accuracy	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.
DVM Resloution	10mV	10mV	10mV
DAM Range	$18A_{rms}$ ($80A_{peak}$)	$36A_{rms}$ ($160A_{peak}$)	$45A_{rms}$ ($200A_{peak}$)
DAM Accuracy(<70Hz)	0.1% + 0.2%F.S.	0.1% + 0.2%F.S.	0.1% + 0.2%F.S.
DAM Accuracy(>70Hz)	0.1% (1+CF^2 x kHz)+0.2% F.S.	0.1% (1+CF^2 x kHz)+0.2% F.S.	0.1% (1+CF^2 x kHz)+0.2% F.S.
DAM Resloution	1.0mA	1.0mA	1.0mA
Other Parameter	P(W), S(VA), Q(VAR), CF, PF, Freq, R, Ip-, Ip+, THDv		
Others			
Vmonitor	±500V / ±10V (Isolated)	±500V / ±10V (Isolated)	±500V / ±10V (Isolated)
Imonitor	±80A / ±10V (Isolated)	±200A / ±10V (Isolated)	±200A / ±10V (Isolated)
Protection	OCP : 19.2Arms ; OV alarm: 360Vrms (DC : 510VDC) OPP : 1920W ; OTP	OCP : 38.4Arms ; OV alarm: 360Vrms (DC : 510VDC) OPP : 3840W ; OTP	OCP : 48Arms ; OV alarm: 360Vrms (DC : 510VDC) OPP : 4800W ; OTP
Remote Interface	GPIB, RS-232		
Input Rating	1Ø 100~115Vac ± 10% V_{LN}, 47~63Hz ; 1Ø 200~230Vac ± 10% V_{LN}, 47~63Hz		
Dimension (H x W x D)	177 x 440 x 595 mm / 7.0 x 17.32 x 23.42 inch	310 x 440 x 595 mm / 12.2 x 17.32 x 23.42 inch	310 x 440 x 595 mm / 12.2 x 17.32 x 23.42 inch
Weight	37kg / 81.57 lbs	66 kg / 145.5 lbs	66 kg / 145.5 lbs

NOTE*1 : If the operating voltage exceeds the rated voltage for 1.1 times, it would cause permanent damage to the device.
NOTE*2 : S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.



500VA~90kVA

KEY FEATURES

- Compact size and weight attributable to advance PWM technology
- AC+DC output mode for voltage DC offset simulation
- Programmable output impedance for IEC 61000-3-3
- IEC 61000-4-11, IEC 61000-4-14, IEC 61000-4-28 voltage dips and frequency variation simulation
- Harmonics, interharmonics waveform synthesizer for IEC 61000-4-13 testing
- Power line disturbance simulation capability
- Programmable voltage and current limit settings
- Comprehensive measurement capability, including current harmonics
- High output current crest factor, ideal for inrush current testing
- Turn on, turn off phase angle control
- TTL signal which indicates output transient
- Optional analog programmable interface
- 2 units combined in series for high Voltage source (Model 61501~61505)
- 3 units combined to 3-phase power output (Model 61501~61505)
- Optional GPIB and RS-232 interface (Model 61501~61505)
- Easy use graphic user interface: softpanel (Option)
- Softpanel for IEC regulation test
- Capable of delivering power output up to 90KVA by implementing Master-slave parallel operation

RS-232 GPIB APG Ethernet CE PFC

The 61500 series AC power source defines new standard for high performance AC power source. It equips with all the powerful features. Such as power line disturbance simulation, programmable output impedance, comprehensive measurement function, wave-shape synthesis and regulation test software. Chroma also provides software for aerospace testing, including MIL-STD-704F, RTCA DO-160D, ABD100. These features make Chroma 61500 ideal for commercial, power electronics, avionics, marine, military and regulation test applications from bench-top testing to mass productions.

The 61500 series line up range from 500VA up to 90kVA, with one or three phase output. This allows user to have maximum choices from R/D design verification, quality assurance, to production testing.

Using the state-of-the-art PWM technology, the Chroma 61500 AC source is capable of delivering up to 6 times of peak current (Model 61501~61505) versus to its maximum rated current which makes it ideal for inrush current testing.

By using advanced DSP technology, 61500 AC power source offers precision and high speed power and harmonics measurements such as RMS voltage, RMS current, true power, power factor, current crest factor and up to 40 orders of current harmonics components.

The 61500 AC power source allows users to compose different harmonic components to synthesize your own harmonic distorted wave-shapes. The AC+DC and DC mode also extend the applications to simulate the natural waveform, Chroma 61500 also provides an external analog input, to amplify the analog signal from arbitrary signal generator. Thus, it is capable to simulate the unique waveform observed in the field.

With the versatile programmable output impedance and regulation test software, the 61500 AC power source allows users to perform Pre-compliance test against IEC 61000-4-11 and compliance test against IEC 61000-4-13/-4-14/-4-28 immunity test regulations and IEC 61000-3-2/-3-3 emission test regulations by incorporating a flicker meter.

ORDERING INFORMATION

61501 : Programmable AC Source 0~300V, 15~1kHz / 500VA, 1Ø
61502 : Programmable AC Source 0~300V, 15~1kHz / 1kVA, 1Ø
61503 : Programmable AC Source 0~300V, 15~1kHz / 1.5kVA, 1Ø
61504 : Programmable AC Source 0~300V, 15~1kHz / 2kVA, 1Ø
61505 : Programmable AC Source 0~300V, 15~1kHz / 4kVA, 1Ø
61511 : Programmable AC Source 0~300V, 15~1.5kHz / 12kVA, 1 or 3Ø
61512 : Programmable AC Source 0~300V, 15~1.5kHz / 18kVA, 1 or 3Ø
A615001 : Remote Interface for 61501~61505 and 61601~61605 (External V Input, RS-232 Interface, GPIB Interface)
A615002 : Remote interface board (LAN and USB) for Model 61500/61600/61700 Series
A615003 : AC voltage transform unit for Model 61500/61600 Series
A615007 : Softpanel for Model 61500/61600 Series
A615008 : DC Noise Filter (Max. 16A)
* **A615010 :** Aerospace softpanel for RTCA DO-160G standard
* **A615011 :** Aerospace softpanel for MIL-STD-704F standard
A615103 : Parallelable power stage unit 18kVA, 1 or 3Ø, for 61511/61512/61611/61612
A615104 : Input/Output terminals for parallel connecting 2 units of 61511/61512/61611/61612/A615103
A615105 : Input/Output terminals for parallel connecting 3 units of 61511/61512/61611/61612/A615103
A615106 : Reverse Current Protection unit for 61511/61512/61611/61612

* Call for availability

Option for 277VLN/480VLL (5Wires) AC input voltage are available with 61511/61512/ 61611/61612/ A615103 models, please contact Chroma sales representative for detailed information.

Support higher than 300V output voltage capability, please contact Chroma sales representative for detailed information.



Model 61505~61504



Model 61505



Model 61511, 61512



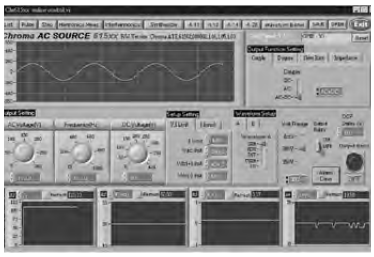
A615103 Parallelable Power stage Unit 18KVA

All specifications are subject to change without notice.

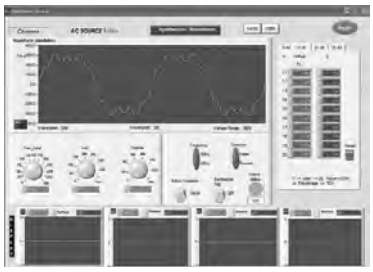
SPECIFICATIONS-1			
Model	**61501**	**61502**	**61503**
Output Phase	1	1	1
Output Rating -AC			
Power	500VA	1000VA	1500VA
Voltage			
Range/Phase	150V/300V/Auto	150V/300V/Auto	150V/300V/Auto
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V	0.1V
Distortion*1	0.3% @ 50/60Hz 1% @ 15-1kHz	0.3% @ 50/60Hz 1% @ 15-1kHz	0.3% @ 50/60Hz 1% @ 15-1kHz
Line Regulation	0.1%	0.1%	0.1%
Load Regulation*2	0.2%	0.2%	0.2%
Max. Current			
RMS	4A/2A (150V/300V)	8A/4A (150V/300V)	12A/6A (150V/300V)
Peak	24A/12A (150V/300V)	48A/24A (150V/300V)	72A/36A (150V/300V)
Frequency			
Range	DC, 15 ~ 1kHz	DC, 15 ~ 1kHz	DC, 15 ~ 1kHz
Accuracy	0.15%	0.15%	0.15%
Resolution	0.01 Hz	0.01 Hz	0.01 Hz
Output Rating-DC			
Power	250W	500W	750W
Voltage	212V/424V	212V/424V	212V/424V
Current	2A/1A (212V/424V)	4A/2A (212V/424V)	6A/3A (212V/424V)
Programmable Output Impedance			
Range	0Ω +200μH ~ 1Ω +1mH		
Harmonics & Interharmonics Simulation			
Bandwidth	2400Hz	2400Hz	2400Hz
Input Rating			
Voltage Operating Range	1Ø 100~240V ± 10%V_{LN}	1Ø 100~240V ± 10%V_{LN}	1Ø 100~240V ± 10%V_{LN}
Frequency Range	47~63Hz	47~63Hz	47~63Hz
Current (per phase)	10A Max. @ 90V	18A Max. @ 90V	22A Max. @ 90V
Power Factor*4	0.97 Min.	0.97 Min.	0.98 Min.
Measurement			
Voltage			
Range	150V/300V	150V/300V	150V/300V
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V	0.1V
Current			
Range (peak)	24A	48A	72A
Accuracy (RMS)	0.4%+0.3%F.S.	0.4%+0.3%F.S.	0.4%+0.3%F.S.
Accuracy (peak)	0.4%+0.6%F.S.	0.4%+0.6%F.S.	0.4%+0.6%F.S.
Power			
Accuracy	0.4%+0.4%F.S.	0.4%+0.4%F.S.	0.4%+0.4%F.S.
Resolution	0.1W	0.1W	0.1W
Harmonics			
Range	2~40 orders	2~40 orders	2~40 orders
Others			
Interface	GPIB, RS-232 (Optional)		
Temperature			
Operating	0 ~ 40˚C	0 ~ 40˚C	0 ~ 40˚C
Storage	-40 ~ +85˚C	-40 ~ +85˚C	-40 ~ +85˚C
Safety & EMC	CE (include EMC & LVD)		
Dimension (HxWxD)	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch
Weight	20 kg / 44.05 lbs	20 kg / 44.05 lbs	20 kg / 44.05 lbs

Note*1 : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.
Note*2 : Load regulation is tested with sine wave and remote sense.
Note*3 : Model 61505 can also use single-phase connecting method of input AC power, the maximum input current is 28A @ 190V.
Note*4 : Input power factor is tested on input 220V, full load condition.

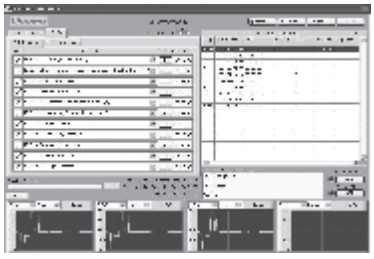
Softpanel



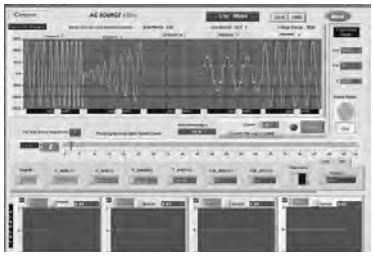
Main Operation Menu



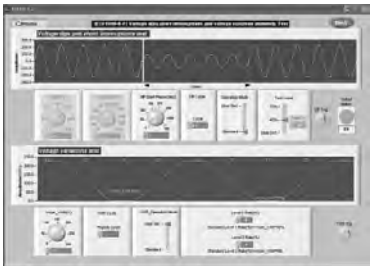
Distorted Waveform Editor



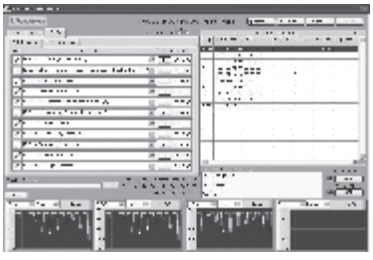
Aerospace Testing : MIL-STD-704F



Transient Voltage Programming



Voltage Dip, Short, Variation Regulation Test



Aerospace Testing : RTCA DO-160G

SPECIFICATIONS-2		
Model	**61504**	**61505**
Output Phase	1	1
Output Rating -AC		
Power	2000VA	4000VA
Voltage		
Range/Phase	150V/300V/Auto	150V/300V/Auto
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V
Distortion*1	0.3% @ 50/60Hz 1% @ 15-1kHz	0.3% @ 50/60Hz 1% @ 15-1kHz
Line Regulation	0.1%	0.1%
Load Regulation*2	0.2%	0.2%
Max. Current		
RMS	16A/8A (150V/300V)	32A/20A (150V/300V)
Peak	96A/48A (150V/300V)	192A/96A (150V/300V)
Frequency		
Range	DC, 15 ~ 1kHz	DC, 15 ~ 1kHz
Accuracy	0.15%	0.15%
Resolution	0.01 Hz	0.01 Hz
Output Rating-DC		
Power	1000W	2000W
Voltage	212V/424V	212V/424V
Current	8A/4A (212V/424V)	16A/8A (212V/424V)
Programmable Output Impedance		
Range	0Ω +200μH ~ 1Ω +1mH	
Harmonics & Interharmonics Simulation		
Bandwidth	2400Hz	2400Hz
Input Rating		
Voltage Operating Range	1Ø 100~240V ± 10%V_{LN}	3Ø 200~240V ± 10%V_{LN} *3
Frequency Range	47~63Hz	47~63Hz
Current (per phase)	28A Max. @ 90V	14A Max. @ 190V
Power Factor*4	0.98 Min.	0.98 Min.
Measurement		
Voltage		
Range	150V/300V	150V/300V
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V
Current		
Range (peak)	96A	192A
Accuracy (RMS)	0.4%+0.3%F.S.	0.4%+0.3%F.S.
Accuracy (peak)	0.4%+0.6%F.S.	0.4%+0.6%F.S.
Power		
Accuracy	0.4%+0.4%F.S.	0.4%+0.4%F.S.
Resolution	0.1W	0.1W
Harmonics		
Range	2~40 orders	2~40 orders
Others		
Interface	GPIB, RS-232 (Optional)	
Temperature		
Operating	0 ~ 40˚C	0 ~ 40˚C
Storage	-40 ~ +85˚C	-40 ~ +85˚C
Safety & EMC	CE (include EMC & LVD)	
Dimension (HxWxD)	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch	266.7 x 482.6 x 569.5 mm / 10.5 x 19 x 22.42 inch
Weight	20 kg / 44.05 lbs	41 kg / 90.31 lbs

Note*1 : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.
Note*2 : Load regulation is tested with sine wave and remote sense.
Note*3 : Model 61505 can also use single-phase connecting method of input AC power, the maximum input current is 28A @ 190V.
Note*4 : Input power factor is tested on input 220V, full load condition.

All specifications are subject to change without notice.

SPECIFICATIONS-3				
Model	**61511**	**61512**	**61511+A615103**	**61512+A615103**
Output Phase	1 or 3 selectable			
Output Rating-AC				
Power	12kVA	18kVA	30kVA	36kVA
Each phase	4kVA	6 kVA	10kVA	12kVA
Voltage				
Range	0~150V/0~300V			
Accuracy	0.1%+0.2%F.S.			
Resolution	0.1 V			
Distortion *1	0.3% @50/60Hz , 1%@15~1kHz , 1.5%@>1kHz			
Line regulation	0.1%			
Load regulation *2	0.2%			
Temp. coefficient	0.02% per degree from 25˚C			
Max Current (1-phase mode)				
RMS	96A / 48A	144A / 72A	240A / 120A	288A / 144A
Peak (CF=4)	384A / 192A	576A / 288A	960A / 480A	1152A / 576A
Max Current (each phase in 3-phase mode)				
RMS	32A / 16A	48A / 24A	80A / 40A	96A / 48A
Peak (CF=4)	128A / 64A	192A / 96A	320A / 160A	384A / 192A
Frequency				
Range	DC, 15-1.5kHz			
Accuracy	0.005%			
Resolution	0.01 Hz			
Phase				
Range	0 ~ 360˚			
Resolution	0.3˚			
Accuracy	<0.8˚@50/60Hz			
DC Output (1-phase mode)				
Power	6kW	9kW	15kW	18kW
Voltage	212V / 424V	212V / 424V	212V / 424V	212V / 424V
Current	48A / 24A	72A / 36A	120A / 60A	144A / 72A
DC Output (3-phase mode)				
Power	2kW	3kW	5kW	6kW
Voltage	212V / 424V	212V / 424V	212V / 424V	212V / 424V
Current	16A / 8A	24A / 12A	40A / 20A	48A / 24A
Input AC Power (each phase)				
AC type	3-phase, Delta or Y connecting			
Voltage Operating Range*3	3Ø 200~240V ± 10%V_{LN} (Delta: L-L, Y: L-N)			
Frequency Range	47-63 Hz			
Max. Current	Delta: 80A Y: 70A	Delta: 120A Y: 90A	Delta: 200A Y: 160A	Delta: 240A Y: 180A
Measurement				
Voltage				
Range	150V / 300V			
Accuracy	0.1%+0.2%F.S.			
Resolution	0.1 V			
Current				
Range	128/32/8 A peak	192/48/12 A peak	320/80/20 A peak	384/96/24 A peak
Accuracy (RMS)	0.4%+0.3%F.S.			
Accuracy (peak)	0.4%+0.6%F.S.			
Resolution	0.1 A			
Power				
Accuracy	0.4%+0.4% F.S			
Resolution	0.1 W			
Others				
Waveform Synthesis	40 orders @ 50/60Hz			
Harmonic Measurement	Voltage / Current 40 orders @ 50/60Hz			
Programmable Impedance	0Ω+200μH ~ 1Ω+1mH			
Efficiency*4	0.75 (Typical)			
Protect	UVP, OCP, OPP, OTP, FAN			
Interface	GPIB, RS-232, USB, Ethernet (standard)			
Temperature				
Operating	0˚C ~40˚C			
Storage	-40˚C~85˚C			
Humidity	30 %~90 %			
Safety & EMC	CE (include EMC & LVD)			
Dimension (H x W x D)	1163 x 546 x 700 mm / 45.78 x 21.5 x 27.56 inch*5		1163 x 546 x 700 mm / 45.78 x 21.5 x 27.56 inch x 2 units*5	
Weight	229.4 kg / 505.29 lbs	242.4 kg / 533.92 lbs	480 kg / 1057.27 lbs	495 kg / 1090.31 lbs

Note*1 : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.
Note*2 : Load regulation is tested with sine wave and remote sense.
Note*3 : Models with 277V_{LN}/480V_{LL}(5 Wires) AC input voltage are available upon request.
Note*4 : Efficiency is tested on input voltage 230V.
Note*5 : Dimensions (HxWxD) with wheel sets : 1246 x 546 x 700mm / 49.05 x 21.5 x 27.56 inch.

All specifications are subject to change without notice.



500VA~90kVA

KEY FEATURES

- Built-in PFC, provide input power factor over 0.98 (full load)
- AC+DC output mode for voltage DC offset simulation
- Programmable voltage and current limit setting
- Comprehensive measurement capability, V, Hz, Irms, Ipk, Iinrush, P, VAR, VA, PF, CF of current and etc.
- High output current crest factor, ideal for inrush current testing
- Turn on, turn off phase angle control
- One-key recall for 9 different voltage and frequency
- Programmable slew rate setting for changing voltage and frequency
- Analog input for power amplifier
- Optional Analog programming interface
- Optional GPIB and RS-232 interface (Model 61601~61605)
- Full protection: OP, OC, OV and OT protection
- Easy use graphic user interface: softpanel (option)
- Capable of delivering power output up to 90KVA by implementing Master-Slave operation

The Chroma Model 61600 series Programmable AC Power Source delivers pure, instrument grade AC and DC power at very low cost. The 61600 AC power source offers output voltage from 0 to 300VAC, and frequency from 15 to 1.5kHz. A easy-use software can let users edit an auto-run profile and record the measuring data during the test. It is suitable for commercial , avionics, marine, and military applications from bench-top testing to mass productions.

The 61600 AC power source generates very clean AC output with typical distortion less than 0.3%. With power factor correction circuit, the 61600 AC power source yields higher efficiency and deliver more output power .

Using the state-of-the-art PWM technology, the Chroma 61600 AC source is capable of delivering up to 6 times of peak current versus to its maximum rated current which makes it ideal for inrush current testing.

By using advanced DSP technology, 61600 AC power source offers precision and high speed measurements such as RMS voltage, RMS current, true power, power factor, and current crest factor.

The AC+DC and DC mode extend the applications when users need DC voltage component. The 61600 AC power source also provides an external analog input, to amplify the analog signal from arbitrary signal generator. Thus, it is capable to simulate the unique waveform which observed in the field.

With the LCD display and rotary knob, the Chroma 61600 AC power source offers versatile front panel operation. Users may also control the 61600 remotely via GPIB, RS-232 or APG (Analog Programming) interface.

The self-diagnosis routine and the full protections against OPP, OCP, OVP and OTP ensure the quality and reliability for even the most demanding engineering testing and ATE application.

ORDERING INFORMATION

61601 : Programmable AC Source 0~300V, 15~1kHz / 500VA, 1Ø
61602 : Programmable AC Source 0~300V, 15~1kHz / 1kVA, 1Ø
61603 : Programmable AC Source 0~300V, 15~1kHz / 1.5kVA, 1Ø
61604 : Programmable AC Source 0~300V, 15~1kHz / 2kVA, 1Ø
61605 : Programmable AC Source 0~300V, 15~1kHz / 4kVA, 1Ø
61611 : Programmable AC Source 0~300V, 15~1.5kHz / 12kVA, 1 or 3Ø
61612 : Programmable AC Source 0~300V, 15~1.5kHz / 18kVA, 1 or 3Ø
A615001 : Remote Interface for 61501~61505 and 61601~61605 (External V Input, RS-232 Interface, GPIB Interface)
A615002 : Remote interface board (LAN and USB) for Model 61500/61600/61700 Series
A615003 : AC voltage transform unit for Model 61500/61600 Series
A615007 : Softpanel for Model 61500/61600 Series
A615008 : DC Noise Filter (Max. 16A)
A615103 : Parallelable power stage unit 18kVA, 1 or 3Ø, for 61511/61512/61611/61612
A615104 : Input/Output terminals for parallel connecting 2 units of 61511/61512/61611/61612/A615103
A615105 : Input/Output terminals for parallel connecting 3 units of 61511/61512/61611/61612/A615103
A615106 : Reverse Current Protection unit for 61511/61512/61611/61612

Support higher than 300V output voltage capability, please contact Chroma sales representative for detailed information.



Model 61605~61604



Model 61605



Model 61611, 61612



A615103 Parallelable Power stage Unit 18KVA

All specifications are subject to change without notice.

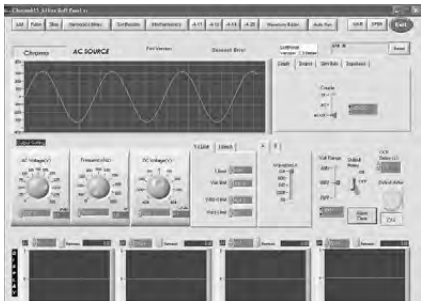
SPECIFICATIONS-1			
Model	**61601**	**61602**	**61603**
Output phase	1	1	1
Output Rating - AC			
Power/Phase	500VA	1000VA	1500VA
Voltage			
Range/Phase	150V/300V/Auto	150V/300V/Auto	150V/300V/Auto
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V	0.1V
Distortion *1	0.3% @ 50/60Hz 1% @ 15~1kHz	0.3% @ 50/60Hz 1% @ 15~1kHz	0.3% @ 50/60Hz 1% @ 15~1kHz
Line Regulation	0.1%	0.1%	0.1%
Load Regulation *2	0.2%	0.2%	0.2%
Max. Current/Phase			
RMS	4A/2A (150V/300V)	8A/4A (150V/300V)	12A/6A (150V/300V)
peak	24A/12A (150V/300V)	48A/24A (150V/300V)	72A/36A (150V/300V)
Frequency			
Range	DC, 15~1kHz	DC, 15~1kHz	DC, 15~1kHz
Accuracy	0.15%	0.15%	0.15%
Resolution	0.01 Hz	0.01 Hz	0.01 Hz
Output Rating - DC			
Power	250W	500W	750W
Voltage	212V/424V	212V/424V	212V/424V
Current	2A/1A (212V/424V)	4A/2A (212V/424V)	6A/3A (212V/424V)
Input Rating			
Voltage Operating Range	1Ø 100~240V±10%V_{LN}	1Ø 100~240V±10%V_{LN}	1Ø 100~240V±10%V_{LN}
Frequency Range	47~63Hz	47~63Hz	47~63Hz
Current	10A Max. @ 90V	18A Max. @ 90V	22A Max. @ 90V
Power Factor *4	0.97 Min.	0.97 Min.	0.98 Min.
Measurement			
Voltage			
Range/Phase	150V/300V	150V/300V	150V/300V
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V	0.1V
Current			
Range (peak)	24A	48A	72A
Accuracy (RMS)	0.4%+0.3%F.S.	0.4%+0.3%F.S.	0.4%+0.3%F.S.
Accuracy (peak)	0.4%+0.6%F.S.	0.4%+0.6%F.S.	0.4%+0.6%F.S.
Power			
Accuracy	0.4%+0.4%F.S.	0.4%+0.4%F.S.	0.4%+0.4%F.S.
Resolution	0.1W	0.1W	0.1W
Others			
Interface	GPIB, RS-232 (Optional)		
Temperature			
Operating	0~40˚C	0~40˚C	0~40˚C
Storage	-40 ~ +85˚C	-40 ~ +85˚C	-40 ~ +85˚C
Safety & EMC	CE (include EMC & LVD)		
Dimension (H x W x D)	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch
Weight	20 kg / 44.05 lbs	20 kg / 44.05 lbs	20 kg / 44.05 lbs

Note*1 : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.
Note*2 : Load regulation is tested with sinewave and remote sense.
Note*3 : Model 61605 can also use single-phase connecting method of input AC power, the maximum input current is 28A @ 190V.
Note*4 : Input power factor is tested on input 220V, full load condition.

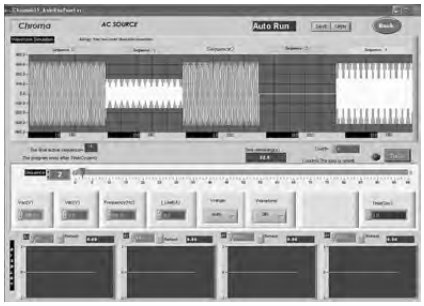
All specifications are subject to change without notice.

• Continued on next page ➟

Softpanel



Main Operation Menu



Auto Run (for ON/OFF Burn in test)

SPECIFICATIONS-2		
Model	**61604**	**61605**
Output phase	1	1
Output Rating - AC		
Power/Phase	2000VA	4000VA
Voltage		
Range/Phase	150V/300V/Auto	150V/300V/Auto
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V
Distortion *1	0.3% @ 50/60Hz 1% @ 15~1kHz	0.3% @ 50/60Hz 1% @ 15~1kHz
Line Regulation	0.1%	0.1%
Load Regulation *2	0.2%	0.2%
Max. Current/Phase		
RMS	16A/8A (150V/300V)	32A/20A (150V/300V)
peak	96A/48A (150V/300V)	192A/96A (150V/300V)
Frequency		
Range	DC, 15~1kHz	DC, 15~1kHz
Accuracy	0.15%	0.15%
Resolution	0.01 Hz	0.01 Hz
Output Rating - DC		
Power	1000W	2000W
Voltage	212V/424V	212V/424V
Current	8A/4A (212V/424V)	16A/8A (212V/424V)
Input Rating		
Voltage Operating Range	1Ø 100~240V±10%V_{LN}	3Ø 200~240V±10%V_{LN} *3
Frequency Range	47~63Hz	47~63Hz
Current	28A Max. @ 90V	14A Max. @ 190V
Power Factor *4	0.98 Min.	0.98 Min.
Measurement		
Voltage		
Range/Phase	150V/300V	150V/300V
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V
Current		
Range (peak)	96A	192A
Accuracy (RMS)	0.4%+0.3%F.S.	0.4%+0.3%F.S.
Accuracy (peak)	0.4%+0.6%F.S.	0.4%+0.6%F.S.
Power		
Accuracy	0.4%+0.4%F.S.	0.4%+0.4%F.S
Resolution	0.1W	0.1W
Others		
Interface	GPIB, RS-232 (Optional)	
Temperature		
Operating	0~40˚C	0~40˚C
Storage	-40 ~ +85˚C	-40 ~ +85˚C
Safety & EMC	CE (include EMC & LVD)	
Dimension (H x W x D)	133.35 x 482.6 x 569.5 mm / 5.25 x 19 x 22.42 inch	266.7 x 482.6 x 569.5 mm / 10.5 x 19 x 22.42 inch
Weight	20 kg / 44.05 lbs	41 kg / 90.31 lbs

Note*1 : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.
Note*2 : Load regulation is tested with sinewave and remote sense.
Note*3 : Model 61605 can also use single-phase connecting method of input AC power, the maximum input current is 28A @ 190V.
Note*4 : Input power factor is tested on input 220V, full load condition.

All specifications are subject to change without notice.

SPECIFICATIONS-3				
Model	**61611**	**61612**	**61611+A615103**	**61612+A615103**
Output Phase	**1 or 3 selectable**			
Output Rating-AC				
Power	12kVA	18kVA	30kVA	36kVA
Each phase	4kVA	6kVA	10kVA	12kVA
Voltage				
Range	0~150V/0~300V			
Accuracy	0.1%+0.2%F.S.			
Resolution	0.1 V			
Distortion *1	0.3% @50/60Hz , 1%@15~1kHz , 1.5%@>1kHz			
Line regulation	0.1%			
Load regulation *2	0.2%			
Temp. coefficient	0.02% per degree from 25˚C			
Max. Current (1-phase mode)				
RMS	96A / 48A	144A / 72A	240A / 120A	288A / 144A
Peak (CF=4)	384A / 192A	576A / 288A	960A / 480A	1152A / 576A
Max. Current (each phase in 3-phase mode)				
RMS	32A / 16A	48A / 24A	80A / 40A	96A / 48A
Peak (CF=4)	128A / 64A	192A / 96A	320A / 160A	384A / 192A
Frequency				
Range	DC, 15-1.5kHz			
Accuracy	0.005%			
Resolution	0.01 Hz			
Phase				
Range	0 ~ 360˚			
Resolution	0.3˚			
Accuracy	<0.8˚@50/60Hz			
DC Output (1-phase mode)				
Power	6kW	9kW	15kW	18kW
Voltage	212V / 424V	212V / 424V	212V / 424V	212V / 424V
Current	48A / 24A	72A / 36A	120A / 60A	144A / 72A
DC Output (3-phase mode)				
Power	2kW	3kW	5kW	6kW
Voltage	212V / 424V	212V / 424V	212V / 424V	212V / 424V
Current	16A / 8A	24A / 12A	40A / 20A	48A / 24A
Input AC Power (each phase)				
AC type	3-phase, Delta or Y connecting			
Voltage Operating Range *3	3Ø, 200~240V ± 10%V_{LN} (Delta: L-L, Y: L-N)			
Frequency Range	47-63 Hz			
Max. Current	Delta: 80A Y: 70A	Delta: 120A Y: 90A	Delta: 200A Y: 160A	Delta: 240A Y: 180A
Measurement				
Voltage				
Range	150V / 300V			
Accuracy	0.1%+0.2%F.S.			
Resolution	0.1 V			
Current				
Range	128/32/8 A peak	192/48/12 A peak	320/80/20 A peak	384/96/24 A peak
Accuracy (RMS)	0.4%+0.3%F.S.			
Accuracy (peak)	0.4%+0.6%F.S.			
Resolution	0.1 A			
Power				
Accuracy	0.4%+0.4% F.S			
Resolution	0.1 W			
Efficiency *4	0.75 (Typical)			
Protect	UVP, OCP, OPP, OTP, FAN			
Interface	GPIB, RS-232, USB, Ethernet (Standard)			
Temperature				
Operating	0˚C~40˚C			
Storage	-40˚C~85˚C			
Humidity	30%~90%			
Safety & EMC	CE (include EMC & LVD)			
Dimension (H x W x D)	1163 x 546 x 700 mm / 45.78 x 21.5 x 27.56 inch*5		1163 x 546 x 700 mm / 45.78 x 21.5 x 27.56 inch x 2 units*5	
Weight	229.4 kg / 505.29 lbs	242.4 kg / 533.92 lbs	480 kg / 1057.27 lbs	495 kg / 1090.31 lbs

Note*1 : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.
Note*2 : Load regulation is tested with sine wave and remote sense.
Note*3 : Models with 277V_{LN}/480V_{LL}(5 Wires) AC input voltage are available upon request.
Note*4 : Efficiency is tested on input voltage 230V.
Note*5 : Dimensions (HxWxD) with wheel sets : 1246 x 546 x 700mm / 49.05 x 21.5 x 27.56 inch.

All specifications are subject to change without notice.



1.5kVA~12kVA

KEY FEATURES

- Output Rating: Power: 1.5kVA, 3Ø (61701); 3kVA, 3Ø (61702) ; 4.5KVA, 3Ø (61703) ; 6kVA, 3Ø (61704) ; 12kVA, 3Ø (61705)
  Voltage: 0-150V/0-300V
- Frequency: 15~1.2kHz
- Phase angle: 0~360˚ Programmable
- Built-in PFC, provides input power factor of over 0.98
- AC+DC output mode
- Comprehensive measurement capability,V, Irms, Ipk, Iinrush, P, PF, CF of current etc.
- Programmable r.m.s. current limit
- Turn on, turn off phase angle control
- Full protection: OP, OC, OV and OT protection
- Optional GPIB and RS-232 interface
- Advanced PWM technology delivers high power density in a compact rack-mountable package
- User-definable power-on status
- Built-in output isolation relays
- Easy use graphic user interface: softpanel (Option)
- Optional function for transient voltage output, including LIST, PULSE, STEP and INTERHARMONICS mode

The Chroma Programmable AC Power Source model 61700 series delivers pure, 5-wire, 3-phase AC power. Unlike the traditional 3-phase AC power source, it includes low power rating models at very low cost. Users can program voltage and frequency, measure the critical characteristics of the output on its LCD display. It delivers the right solution to simulate all kinds of input condition of UUT to be utilized in R&D and QA. It is also suitable for commercial applications from laboratory testing to mass productions.

The 61700 supplies the output voltage from 0 to 300VAC and it can be set individually for each phase. Users also can set the phase angle from 0˚ to 360˚. These kinds of function make the 61700 series can simulate unbalance 3-phase power. Because of the wide output frequency from 15 to 1200Hz, it is suitable for avionics, marine and military application. The AC+DC mode extends the output function to simulate abnormal situation when power line contains DC offset.

RS-232 GPIB CE PFC

The 61700 series uses the state-of-the-art PWM technology, so it is capable to generate very clean AC output with typical distortion less than 0.3%. With power factor correction circuit, the 61700 series yields higher efficiency and deliver more output power.

By using advanced DSP technology, the 61700 series offers precision and high speed measurements such as RMS voltage, RMS current, true power, power factor, and current crest factor, etc.

The 61700 series offers an optional function to output transient voltage. The function includes LIST, PULSE, STEP and INTERHARMONICS mode. Users can easily program variant waveform for immunity test. The 61700 series can also be controlled by a powerful and user friendly softpanel through GPIB or RS-232 interface. Besides that, the softpanel includes a waveform editor that can edit up to 40th order harmonic components. By this way, the 61700 series get the ability to output distorted waveform as users like.

The self-diagnosis routine and protections against over power, over current, over voltage, over temperature and fan fail, the 61700 series ensure the quality and reliability for even the most demanding engineering testing and production line application.

ORDERING INFORMATION

61701 : Programmable AC Source 0~300V/DC, 15~1.2kHz, 3Ø 1.5kVA
61702 : Programmable AC Source 0~300V/DC, 15~1.2kHz, 3Ø 3kVA
61703 : Programmable AC Source 0~300V/DC, 15~1.2kHz, 3Ø 4.5kVA
61704 : Programmable AC Source 0~300V/DC, 15~1.2kHz, 3Ø 6kVA
61705 : Programmable AC Source 0~300V, 15~1.2kHz, 3Ø 12kVA
A615001 : Remote Interface Board for 61500/ 61600/61700 Series (RS-232 Interface, GPIB Interface)
A615002 : Remote interface board (LAN and USB) for Model 61500/61600/61700 Series
* **A615010 :** Aerospace softpanel for RTCA DO-160G standard
* **A615011 :** Aerospace softpanel for MIL-STD-704F standard
A617001 : Softpanel for Model 61700 Series
A617002 : Transient voltage output function, including WAVEFORM, LIST, PULSE, STEP and INTERHARMONICS mode

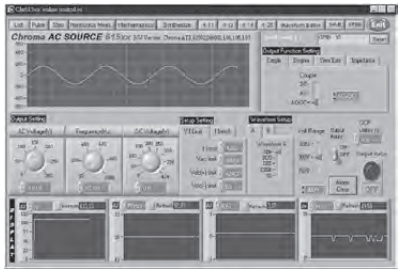
* Call for availability

Support higher than 300V output voltage capability, please contact Chroma sales representative for detailed information.

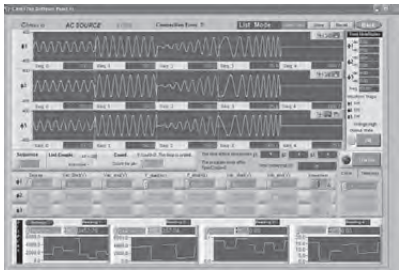


Model 61705

Softpanel



Softpanel of 61700 Series : Main page



Optional Function : LIST Mode Voltage Transient Output



Aerospace Testing : MIL-STD-704F



Aerospace Testing : RTCA DO-160G

All specifications are subject to change without notice.

SPECIFICATIONS					
Model	**61701**	**61702**	**61703**	**61704**	**61705**
AC Output Rating					
Max. Power	1500VA	3000VA	4500VA	6000VA	12000VA
Per Phase	500VA	1000VA	1500VA	2000VA	4000VA
Voltage (per phase)					
Range	150V/ 300V	150V/ 300V	150V/ 300V	150V/ 300V	150V/ 300V
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V	0.1V	0.1V	0.1V
Distortion *1	0.3%@50/60Hz 1.5% @ 15~1.2kHz	0.3%@50/60Hz 1.5% @ 15~1.2kHz	0.3%@50/60Hz 1.5% @ 15~1.2kHz	0.3%@50/60Hz 1.5% @ 15~1.2kHz	0.3%@50/60Hz 1.5% @ 15~1.2kHz
Line regulation	0.1%	0.1%	0.1%	0.1%	0.1%
Load regulation *2	0.2%	0.2%	0.2%	0.2%	0.2%
Temp. coefficient	0.02% per degree from 25˚C				
Max. Current (per phase)					
RMS	4A/2A	8A/4A	12A/6A	16A/8A	32A/20A
peak	24A/12A	48A/24A	72A/36A	96A/48A	192A/96A
Frequency					
Range	DC, 15~1.2kHz	DC, 15~1.2kHz	DC, 15~1.2kHz	DC, 15~1.2kHz	DC, 15~1.2kHz
Accuracy	0.15%	0.15%	0.15%	0.15%	0.15%
Phase Angle					
Range	0~360˚	0~360˚	0~360˚	0~360˚	0~360˚
Resolution	0.3˚	0.3˚	0.3˚	0.3˚	0.3˚
Accuracy	< 0.8˚@50/60Hz	< 0.8˚@50/60Hz	< 0.8˚@50/60Hz	< 0.8˚@50/60Hz	< 0.8˚@50/60Hz
DC Output Rating (per phase)					
Power	250W	500W	750W	1kW	2kW
Voltage	212V/424V	212V/424V	212V/424V	212V/424V	212V/424V
Current	2A/1A	4A/2A	6A/3A	8A/4A	16A/8A
Input 3-Phase Power (per phase)					
Voltage Operating Range	3Ø 100~240V ± 10%V_{LN}		3Ø 200~240V ± 10%V_{LN}		
Frequency range	47~63Hz	47~63Hz	47~63Hz	47~63Hz	47~63Hz
Current	9A Max.	16A Max.	10A Max.	14A Max.	28A Max.
Power factor *3	0.97 Min.	0.98 Min.	0.98 Min.	0.98 Min.	0.98 Min
Measurement					
Voltage (Line-Neutral)					
Range	150V/300V	150V/300V	150V/300V	150V/300V	150V/300V
Accuracy	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.	0.2%+0.2%F.S.
Resolution	0.1V	0.1V	0.1V	0.1V	0.1V
Current (per phase)					
Range (peak)	24A	48A	72A	96A	192A
Accuracy (RMS)	0.4%+0.3%F.S.	0.4%+0.3%F.S.	0.4%+0.3%F.S.	0.4%+0.3%F.S.	0.4%+0.3%F.S.
Accuracy (peak)	0.4%+0.6%F.S.	0.4%+0.6%F.S.	0.4%+0.6%F.S.	0.4%+0.6%F.S.	0.4%+0.6%F.S.
Resolution	0.01A	0.01A	0.01A	0.01A	0.01A
Power (per phase)					
Accuracy	0.4%+0.4% F.S.	0.4%+0.4% F.S.	0.4%+0.4% F.S.	0.4%+0.4% F.S.	0.4%+0.4% F.S.
Resolution	0.1W	0.1W	0.1W	0.1W	0.1W
Others					
Efficiency *4	68 %	77 %	81 %	82%	82%
Protection	UVP, OCP, OPP, OTP, FAN				
Temperature Range					
Operating	0˚C~40˚C				
Storage	-40˚C~85˚C				
Humidity	30 %~90 %				
Safety & EMC	CE				
Dimension (H x W x D)	400 x 482.6 x 600.5 mm / 15.75 x 19 x 23.64 inch	400 x 482.6 x 600.5 mm / 15.75 x 19 x 23.64 inch	400 x 482.6 x 600.5 mm / 15.75 x 19 x 23.64 inch	400 x 482.6 x 600.5 mm / 15.75 x 19 x 23.64 inch	896.4 x 546 x 699.9 mm / 35.28 x 21.5 x 27.56 inch*5
Weight	75 kg / 165.2 lbs	75 kg / 165.2 lbs	75 kg / 165.2 lbs	75 kg / 165.2 lbs	150 kg / 330.4 lbs

Note*1 : Maximum distortion is tested on output 125VAC (150V RANGE) and 250VAC (300V RANGE) with maximum current to linear load.
Note*2 : Load regulation is tested with sinewave and remote sense.
Note*3 : Input power factor is tested on input 220V, full load condition
Note*4 : Efficiency is tested on input voltage 110V for 61701 and 61702, 220V for 61703, 61704 and 61705.
Note*5 : For dimension including the wheel set, please add 80mm to overall height.



KEY FEATURES

- Power rating
  61830 : 30kVA
  61845: 45kVA
  61860: 60kVA
- Voltage range: 0-300V
- Frequency: DC, 30Hz-100Hz
- Full regenerative capability based on 100% of output current rating
- Specifically designed for PV inverter, Smart Grid and EV related test applications
- Single phase or three-phase output selectable
- Programmable slew rate settin for changing voltage and frequency
- Programmable voltage and current limit
- Turn on, turn off phase angle control
- TTL signal which indicates Output transient
- LIST, PULSE, STEP mode functions for testing Power Line Disturbance (PLD) simulation
- Voltage dips, short interruption and voltage variation simulation
- Harmonics, inter-harmonics waveform synthesizer
- Comprehensive measurement capability, including current harmonics
- Analog programmable interfaces
- Remote interface: GPIB, RS-232, USB and Ethernet
- Provide parallel feature for meeting high power test applications (Three phase only)

Market demand for Distributed Resource (DR) products such as PV inverters and wind energy systems is steadily growing as the world strives for clean renewable energy sources. This demand has created a need for rigorous regulation testing to standards such IEEE 1547 / IEC 61000-3-15 / IEC 62116 ensuring proper and safe operation of on-grid products. It has become critical to manufacturers to conduct these tests to prove compliance and to relieve product liability concerns. Chroma's new 61800 family of Grid Simulators has been designed to fulfill these test requirements by providing a full 4 quadrant, fully regenerative, grid simulator with advanced features for compliance, safety and product verification testing.

The 61800 regenerative grid simulator allows users to vary relevant parameters in order to simulate real world grid environments and

RS-232 Ethernet USB GPIB CE

conditions. Supported variations include frequency, phase angle, voltage amplitude, voltage drops in either single or three phase modes. Unbalanced three phase conditions can easily be simulated. And most importantly, the regenerative feature of the 61800 grid simulator provides an effective energy saving method since energy generated by unit under test is fed back to the grid instead of dissipated as heat during operation.

The 61800 grid simulator could also meet test requirements with smart grid and EV related test applications, such as Vehicle to Grid (V2G) and Energy Storage System (ESS) testing. The 61800 is also capable of meeting IEC regulatory standards' (such as IEC 61000-3-2/-3-3/-3-11/-3-12) requirement for AC supply.

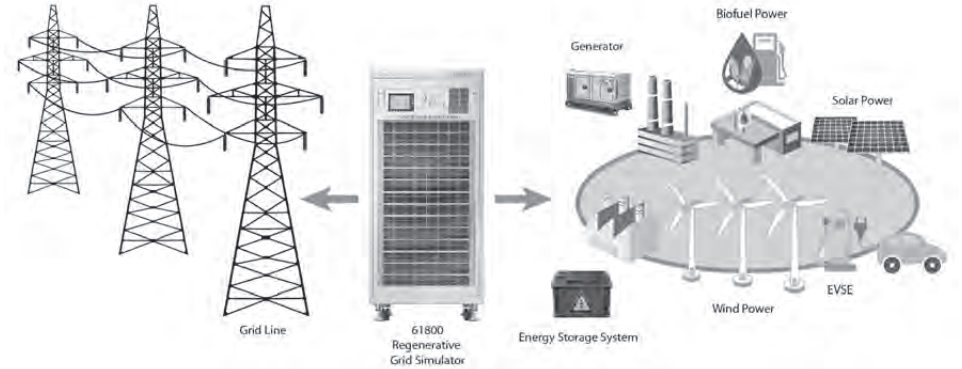
The 61800 regenerative grid simulator is not only limited to product development during R&D. Its extensive features are also valuable during design and quality verification as well as throughout various production stages. Using state-of-the-art digital control technology the 61800 can deliver up to 300VAC at output frequencies ranging from 30Hz to 100Hz. The AC+DC feature allows for applications which require a DC offset bias.

The 61800 series is also able to provide precision measurements such as RMS voltage, RMS current, true power, power factor, current crest factor and many others. By applying advanced DSP technology, the 61800 can easily simulate power line disturbance (PLD) using LIST, PULSE and STEP modes. Additional features such as the waveform synthesis function allows users to program various distorted harmonic waveforms which are required by some regulatory standards. GPIB (IEEE488.2), RS-232, USB and Ethernet interface are available to control the 61800 grid simulator remotely.

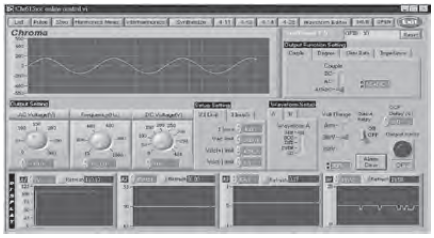
60kVA x 5 = 300kVA



Implement for Micro Grid Testing



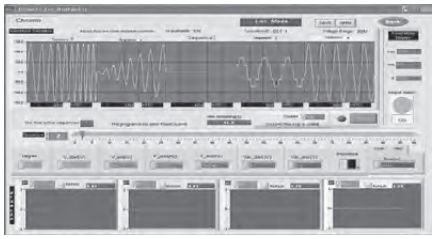
Softpanel



Main Operation Menu



Distorted Waveform Editor



Transient Voltage Programming

ORDERING INFORMATION

61830 : Regenerative Grid Simulator 30kVA
61845 : Regenerative Grid Simulator 45kVA
61860 : Regenerative Grid Simulator 60kVA
A618001 : Softpanel for 61800 Series
A618002 : Terminals for parallel connecting
B618001 : 400 V_{LN} HV option

Support higher than 300V output voltage capability, please contact Chroma sales representative for detailed information.

All specifications are subject to change without notice.

SPECIFICATIONS			
Model	**61830**	**61845**	**61860**
AC Output Rating			
Output Phase	1 or 3 selectable	1 or 3 selectable	1 or 3 selectable
Max. Power	30kVA	45kVA	60kVA
Per Phase	10kVA	15kVA	20kVA
Voltage			
Range	0~300V_{LN}/0~520V_{LL}	0~300V_{LN}/0~520V_{LL}	0~300V_{LN}/0~520V_{LL}
Accuracy	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.
Resolution	0.1V	0.1V	0.1V
Distortion *1	< 0.5% @ 50/60Hz < 0.8% @ 30Hz~100Hz	< 0.5% @ 50/60Hz < 0.8% @ 30Hz~100Hz	< 0.5% @ 50/60Hz < 0.8% @ 30Hz~100Hz
Line regulation	0.10%	0.10%	0.10%
Load regulation	0.20%	0.20%	0.20%
Max. Current (1-Phase Mode)			
RMS	150A	225A	300A
Peak	450A	675A	900A
Max. Current (each phase in 3-Phase Mode)			
RMS	50A	75A	100A
Peak	150A	225A	300A
Frequency			
Range	30Hz ~ 100Hz	30Hz ~ 100Hz	30Hz ~ 100Hz
Accuracy	0.01%	0.01%	0.01%
DC Output (1-Phase Mode) *2			
Power	15kW	22.5kW	30kW
Voltage	424V	424V	424V
Current	75A	112.5A	150A
DC Output (3-Phase Mode)			
Power	5kW	7.5kW	10kW
Voltage	424V	424V	424V
Current	25A	37.5A	50A
Harmonics Synthesis Function			
Harmonics range	up to 50 harmonics order @ 50/60Hz fundamental frequency		
Input Rating			
Voltage Operating Range *3	3Ø 200~220V ± 10%V_{LL}, 47~63Hz 3Ø 380~400V ± 10%V_{LL}, 47~63Hz 3Ø 440~480V ± 10%V_{LL}, 47~63Hz	3Ø 200~220V ± 10%V_{LL}, 47~63Hz 3Ø 380~400V ± 10%V_{LL}, 47~63Hz 3Ø 440~480V ± 10%V_{LL}, 47~63Hz	3Ø 200~220V ± 10%V_{LL}, 47~63Hz 3Ø 380~400V ± 10%V_{LL}, 47~63Hz 3Ø 440~480V ± 10%V_{LL}, 47~63Hz
Current	125A Max./Phase (3Ø 200~220V ± 10%V_{LL}) 65A Max./Phase (3Ø 380~400V ± 10%V_{LL}) 58A Max./Phase (3Ø 440~480V ± 10%V_{LL})	190A Max./Phase (3Ø 200~220V ± 10%V_{LL}) 100A Max./Phase (3Ø 380~400V ± 10%V_{LL}) 87A Max./Phase (3Ø 440~480V ± 10%V_{LL})	250A Max./Phase (3Ø 200~220V ± 10%V_{LL}) 130A Max./Phase (3Ø 380~400V ± 10%V_{LL}) 115A Max./Phase (3Ø 440~480V ± 10%V_{LL})
Power factor	0.99 (Typical)		
Measurement			
Voltage			
Range	0~300V	0~300V	0~300V
Accuracy	0.1%+0.2%F.S.	0.1%+0.2%F.S.	0.1%+0.2%F.S.
Current			
Range (peak)	150A	225A	300A
Accuracy (RMS)	0.4%+0.3%F.S.	0.4%+0.3%F.S.	0.4%+0.3%F.S.
Accuracy (peak)	0.4%+0.6%F.S.	0.4%+0.6%F.S.	0.4%+0.6%F.S.
Power			
Accuracy	0.4%+0.4% F.S.	0.4%+0.4% F.S.	0.4%+0.4% F.S.
Others			
Efficiency	80% (Typical)		
Protection	OVP, OCP, OPP, OTP, FAN		
Safety & EMC	CE (include EMC & LVD)		
Dimension (H x W x D)	1740 x 780 x 1000 mm (include wheel set)	1740 x 780 x 1000 mm (include wheel set)	1740 x 780 x 1000 mm (include wheel set)
Weight	850kg	850kg	870kg

Note*1 : Maximum distortion is tested on output 250V with maximum current to linear load
Note*2 : The DC function is mainly intended as DC offset for AC+DC output voltage function
Note*3 : Must be specified at time of order. All inputs are L-L, 3Ø, 3 wire+GND

All specifications are subject to change without notice.



1200VA~9000VA

KEY FEATURES

- Direct Digital Synthesis (DDS) waveform generation
- Programmable Sine, Square, or Clipped Sine waveform output
- Programmable voltage, current limit, frequency, phase, and distortion
- Power line disturbances simulation capability
- 30 factory installed harmonic waveforms in the waveform library
- User programmable harmonic waveforms
- User programmable sequential output waveforms for auto-execution
- Powerful measurement of Vrms, Irms, Ipk+, Ipk-, power, frequency, crest factor, power factor, inrush current, VA, VAR, etc.
- Built-in power factor correction circuit provides input power factor of over 0.98 to meet the IEC regulations
- Advanced PWM technology to deliver high power output in a light and compact rackmountable package
- Built-in output isolation relays
- User-definable power-on state
- TTL output to signal any output transition for ATE application
- Analog Programming Interface for external amplitude control
- Optional GPIB, RS-232 interface
- List mode transient power line disturbances simulation for Voltage Dip & Variation to meet IEC 61000-4-11
- Easy use graphic user interface: softpanel (Option)

The global AC power testing requirements demand more sophisticated AC Power Source that is capable of simulating a wide variety of AC line conditions, harmonic waveforms, accurate power measurement and analysis. The Chroma 6500 series Programmable AC Power Source delivers the right solution to simulate all kinds of normal/abnormal input conditions and measure the critical characteristics of the product under test. It can be used for R&D design characterization, production testing, and QA verification of commercial, industrial and aerospace electronic products.

The 6500 series delivers maximum rated power for any output voltage up to 300 Vac, and at any frequency between 15Hz to 2000Hz. It is suitable for commercial applications (47-63Hz); for avionics, marine, military applications at 400Hz or higher frequency; or for electrical motor, air-conditioner test applications at 20Hz. All models generate very clean sine or square waveforms output with typical distortion less than 0.5%.

The 6500 series has built-in Direct Digital Synthesis (DDS) Waveform Generator to provide user programmable high precision waveform. For testing products under AC line distortion conditions, clipped sinewave can be generated with 0% to 43% distortion and amplitude from 0% to 100%. It also can simulate all kinds of power line disturbances such as cycle dropout, transient spike, brown out, phase angle, voltage and frequency ramp up (ramp down), etc.. Up to 30 harmonic waveforms are factory installed, and testing for compliance to AC line harmonic immunity standards can be easily achieved in the field.

The 6500 series has built-in 16-bit precision measurement circuit to offer precision and high speed measurement of Vrms, Irms, Ipk+, Ipk-, power, frequency, crest factor, power factor, inrush current, VA, VAR, etc. It is designed as an integral part of the PMS Power Measurement System. By adding the 6630 Power Analyzer it becomes an ATE for testing IEC 61000-3-2 harmonic and IEC 61000-3-3 flicker measurement.

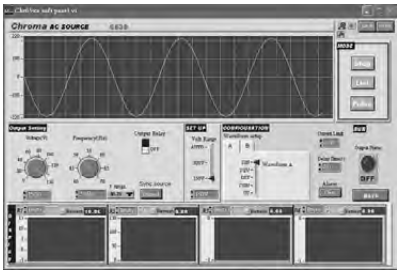
The 6500 series is very easy to operate from the front panel keypad, or from a remote controller via GPIB, RS-232 BUS or APG (Analog Programming) interface. Instrument drivers are available to integrate the AC source into any ATE application operating under Labview control.

Designed with self diagnostic routine and protected against over load, over power, over temperature, over current and fan fail, the instrument offers quality and reliability for even the most demanding production line applications.

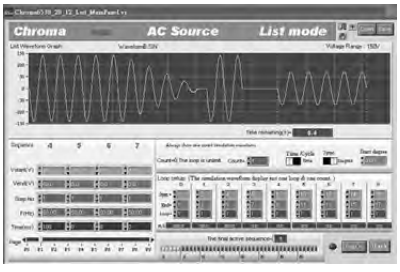
ORDERING INFORMATION

6512 : Programmable AC Source
0~300V/15~2kHz / 1.2kVA
6520 : Programmable AC Source
0~300V/15~2kHz / 2kVA
6530 : Programmable AC Source
0~300V/15~2kHz / 3kVA
6560-2 : Programmable AC Source
0~500V/45~1kHz / 6kVA I/P 3Ø 220V
6560-3 : Programmable AC Source
0~500V/45~1kHz / 6kVA I/P 3Ø 380V
6590-2 : Programmable AC Source
0~300V/45~1kHz / 9kVA 1Ø or 3Ø, 3000VA per phase, I/P 3Ø 220V
6590-3 : AC Power Source
0~300V/45~1kHz / 9kVA 1Ø or 3Ø, 3000VA per phase, I/P 3Ø 380V
A650001 : Remote Interface for Model 6500 Series (External V Reference, RS-232 interface, Printer Interface, GPIB Interface, Special I/O Port , System I/O Port)
A650002 : 19" Rack Mounting Kit for Model 6512/6520/6530
A650003 : Softpanel for Model 6500 Series
A610004 : Universal Socket Center for Model 6512/6520/6530/ 6560 Series

Softpanel



Main operation menu



List Mode: Transient voltage programming

6500 Series Programmable AC Source Family



All specifications are subject to change without notice.

SPECIFICATIONS					
Model	**6512**	**6520**	**6530**	**6560**	**6590**
Output Phase	1	1	1	1 (parallel or series)	1or 3 selectable
Output Ratings					
Power	1200VA	2000VA	3000VA	6000VA	3000VA per phase, 9000VA total
Voltage					
Range/phase	150V / 300V / Auto	150V / 300V / Auto	150V / 300V / Auto	150V / 300V (parallel) 300V / 500V (series)	150V / 300V
Accuracy	0.2% +0.2%of F.S.	0.2% +0.2%of F.S.	0.2% +0.2%of F.S.	0.2% +0.2%of F.S.	0.2% +0.2%of F.S.
Resolution	0.1V	0.1V	0.1V	0.1V	0.1V
Distortion *1	1% (15~45Hz) 0.5% (> 45~500Hz) 1% (> 500~1kHz) 2% (> 1K~2kHz)	1% (15~45Hz) 0.5% (> 45~500Hz) 1% (> 500~1kHz) 2% (> 1K~2kHz)	1% (15~45Hz) 0.5% (> 45~500Hz) 1% (> 500~1kHz) 2% (> 1K~2kHz)	1% (45~1kHz)	1% (45~1kHz)
Line Regulation	0.1%	0.1%	0.1%	0.1%	0.1%
Load Regulation *2	0.1%	0.1%	0.1%	0.2% (series), 0.8% (parallel)	0.2%
Temp. Coefficient	0.02% per˚C	0.02% per˚C	0.02% per˚C	0.02% per˚C	0.02% per˚C
Max. Current/Phase					
RMS	12A/6A (150V / 300V)	20A/10A (150V / 300V)	30A/15A (150V / 300V)	60/30/15A (150/300/500V)	30A/15A (150V / 300V) 90A/45A total
peak	36A/18A (15~100Hz) 30A/15A (>100~1KHz) 24A/12A (>1K~2KHz)	60A/30A (15~100Hz) 50A/25A (>100~1KHz) 40A/20A (>1K~2KHz)	90A/45A (15~100Hz) 75A/38A (>100~1KHz) 60A/30A (>1K~2KHz)	180/90/45A (45~100Hz) 150/75/38A (>100~1KHz)	90A/45A (45~100Hz) 75A/38A (>100~1KHz)
Frequency					
Range	15 ~ 2kHz	15 ~ 2kHz	15 ~ 2kHz	45 ~ 1kHz	45 ~ 1kHz
Accuracy	0.15%	0.15%	0.15%	0.15%	0.15%
Resolution	0.01Hz (15 ~ -99.9Hz) 0.1Hz (100 ~ 999.9Hz) 0.2Hz (1k ~ 2kHz)	0.01Hz (15 ~ 99.9Hz) 0.1Hz (100 ~ 999.9Hz) 0.2Hz (1k ~ 2kHz)	0.01Hz (15 ~ 99.9Hz) 0.1Hz (100 ~ 999.9Hz) 0.2Hz (1k ~ 2kHz)	0.01Hz (45 ~ 99.9Hz) 0.1Hz (100 ~ 999.9Hz)	0.01Hz (45 ~ 99.9Hz) 0.1Hz (100 ~ 999.9Hz)
Input Ratings					
Voltage Operating Range	1Ø 200~240V ± 10%V_{LN}			3Ø 200~240V ± 10%V_{LN}	
Frequency Range	47 ~ 63Hz	47 ~ 63Hz	47 ~ 63Hz	47 ~ 63Hz	47 ~ 63Hz
Current	10A max.	15A max.	23A max.	23A max./phase	23A max./phase
Power Factor	0.95 min. under full load	0.97 min. under full load	0.98 min. under full load	0.98 min. under full load	0.98 min. under full load
Measurement					
Voltage/Phase					
Range	0 ~ 150V / 0 ~ 300V	0 ~ 150V / 0 ~ 300V	0 ~ 150V / 0 ~ 300V	0 ~ 150V / 0 ~ 300V	0 ~ 150V / 0 ~ 300V
Accuracy (RMS)	0.25% + 0.1% F.S.	0.25% + 0.1% F.S.	0.25% + 0.1% F.S.	0.25% + 0.1% F.S.	0.25% + 0.1% F.S.
Resolution	0.1V	0.1V	0.1V	0.1V	0.1V
Current/Phase					
Range (peak)	0 ~ 60A	0 ~ 100A	0 ~ 140A	0 ~ 280A	0 ~ 140A
Accuracy (RMS)	0.4% + 0.25%F.S.	0.4% + 0.15%F.S.	0.4% + 0.1%F.S.	0.4% + 0.1%F.S.	0.4% + 0.1%F.S.
Accuracy (peak)	0.4% + 0.5%F.S.	0.4% + 0.3% F.S.	0.4% + 0.2% F.S.	0.4% + 0.2% F.S.	0.4% + 0.2% F.S.
Resolution	0.01A	0.01A	0.01A	0.01A	0.01A
Power/Phase					
Accuracy	1% F.S. (CF<6)	1% F.S. (CF<6)	1% F.S. (CF<6)	1% F.S. (CF<6)	1% F.S. (CF<6)
Resolution	0.01W	0.01W	0.01W	0.01W	0.01W
Frequency					
Range	15 ~ 2kHz	15 ~ 2kHz	15 ~ 2kHz	45 ~1kHz	45 ~1kHz
Accuracy	0.01% +2 count	0.01% +2 count	0.01% +2 count	0.01% +2 count	0.01% +2 count
Resolution	0.01Hz	0.01Hz	0.01Hz	0.01Hz	0.01Hz
Others					
Efficiency	80% typical	80% typical	80% typical	80% typical	80% typical
Protection	OPP, OLP, OTP, FAN Fail				
Temperature					
Operating	0 ~ 40˚C	0 ~ 40˚C	0 ~ 40˚C	0 ~ 40˚C	0 ~ 40˚C
Storage	-40 ~ +85˚C	-40 ~ +85˚C	-40 ~ +85˚C	-40 ~ +85˚C	-40 ~ +85˚C
Safety & EMC	CE (Include LVD and EMC Requirement)				
Dimension (H x W x D)	221.5 x 425 x 567 mm / 8.72 x 16.73 x 22.32 inch	221.5 x 425 x 567 mm / 8.72 x 16.73 x 22.32 inch	221.5 x 425 x 567 mm / 8.72 x 16.73 x 22.32 inch	765.94 x 546 x 700 mm / 30.16 x 21.5 x 27.56 inch*3	888.5 x 546 x 700 mm / 34.98 x 21.5 x 27.56 inch*3
Weight	26.4 kg / 58.15 lbs	26.4 kg / 58.15 lbs	26.4 kg / 58.15 lbs	107 kg / 235.68 lbs	156 kg / 343.61 lbs

Note*1 : Test under output voltage from half to full range.
Note*2 : Test with sinewave & with remote sense.
Note*3 : For dimension including the wheel set, please add 80mm to overall height.



66205

KEY FEATURES

- Embedded high speed DSP, 16 bits Analog/ Digital converters
- 5mA minimum current range(66203/66204) and 0.1mW power resolution
- Meets ENERGY STAR / IEC 62301 / ErP ecodesign / SPEC POWER measurement requirement
- Meets IEC 61000-4-7 standard requirement for harmonics measurement (66205)
- Accumulated energy methods for unstable power measurement
- User-define criteria for automatic PASS/FAIL judgment
- Half rack width and small 2U height, suitable for system integration
- Dual shunts for current range selection providing high accuracy over a wide current range (66202)
- THD and user-specify orders distortion measurement (66202)
- Inrush current and Energy measurement (66202)
- Optional remote interface: USB or GPIB+USB
- Voltage/current harmonics measurement up to 50 orders
- Capable of displaying input waveform DC component measurement reading
- Half rack width and suitable for system integration, 2U height (66201/66202,66205)
- 3U height, 4 input modules design (66203/66204)
- Support different wiring configuration power measurement (1P2W/1P3W/3P3W/3P4W) (66203/66204)
- Support external shunt and CT for higher current measurement application (66204)
- SMART Range function provides seamless power measurement capability (66205)
- Capable of extending current measurement range up to 30A (66205)
- USB (Host) interface provides data logging functionality (66205)
- Optional remote interface: USB or GPIB+USB
- Support GPIB, USB, RS232, Ethernet (LXI) interface (66205)



66203/66204



66201/66202

Chroma Digital Power Meter 66200 series provide both single and multiple phase power measurement solution designed for measurement of AC or AC+DC power signals and related parameters common to most electronic products. Instead of traditional analog measurement circuits, the Power Meter 66200 uses state-of-the-art DSP digitizing technology. The internal 16 bits analog/digital converters with sampling rates of up to 250kHz provide both high speed and high accuracy measurements. The instrument provides excellent function and stability compared to other power meters of same class currently available on the market. It includes a front panel 4 display area with 5 digits, 7-segment LED readouts as well as optional remote control using USB or GPIB interfaces.

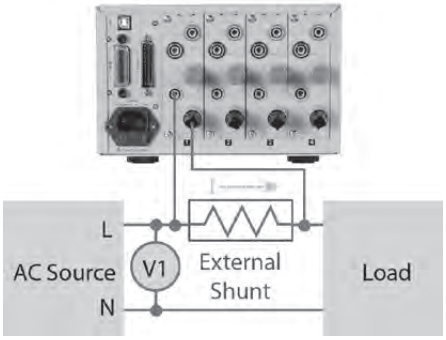
The 66200 series Power Meter is also designed to meet ENERGY STAR/IEC 62301/ErP ecodesign/ SPEC POWER measurement requirements. The instrument provides 5mA (66203/66204) minimum current range and 0.1mW power resolution providing less than 2% uncertainty for No-Load mode power measurement. Included are not only traditional averaging methods but also accumulated energy approach method used to calculate active power data. In this way, users can achieve accurate readings even if power consumption levels are not stable or operating on in non-linear modes (i.e. hiccup modes). The Model 66202 can even measure Total-Harmonic-Distortion (THD) and to user-specify distortion orders. Thus, the instrument can easily measure distortion values up to and including the 13th harmonic as required by ENERGY STAR requirements. The 66200 Power Meter also includes limit test GO/NG functions. This feature allows users to set pass/fail limits to automatically display PASS/FAIL according to these user-define criteria.

The 66201 includes simple measurement functions designed for testing at low power levels (maximum current 4A). Examples of these devices are AC adapters, battery chargers, LCD monitors and similar devices. Included measurement data is Voltage (Vrms, Vpeak+, Vpeak-), Current (Irms, Ipeak+, Ipeak-), Power (W, Power Factor, Apparent Power VA, Reactive Power VAR), Current Crest Factor and Frequency. The Model 66201 Power meter is competitively priced to be suitable for bench-top testing and automated production line testing.

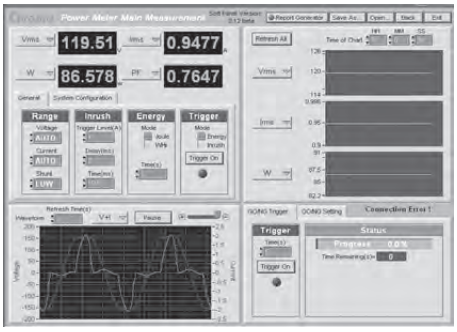
The 66202 includes a 2-shunt design to get 66202 highly accurate for both low and high current measurements. Besides the parameters measured on Model 66201, it also provides Inrush Current, Total Harmonic Distortion of V/I and Energy measurement. With these practical functions, The Model 66202 is suitable for meeting the demanding tasks of R&D and quality control departments.

The 66203/66204 are packaged in a 3U high, half rack enclosure suitable for bench top or system integration. The power meters are capable of supporting external shunts and CT for higher current application. The 4 channel 66204 is suitable for input and output parameter measurement and efficiency of 3 phase PV inverters can be calculated with measurement of the DC voltage/current at the input side of the inverter.

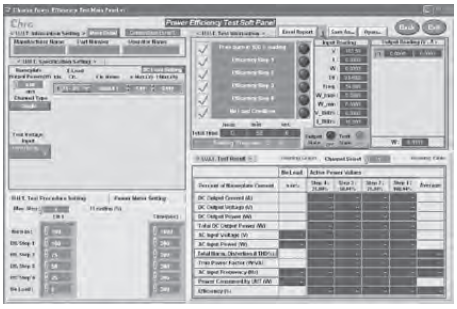
The 66203/66204 power meters include a 2-shunt design to provide high accurate readings for both low and high current measurements. The power meters also support features such as Inrush current, Total Harmonic Distortion of V/I, and Energy measurements. With these practical functions, the 66203/66204 power meters are suitable for meeting the demanding tasks of R&D, production and quality control departments.



66203/66204 Power Meters support external shunt function for high current (>20A) measurement application.



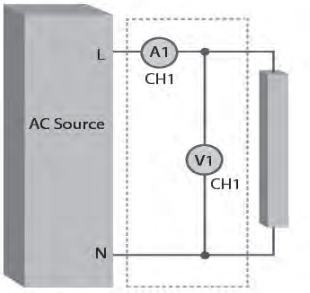
Softpanel for Model 66200 Series



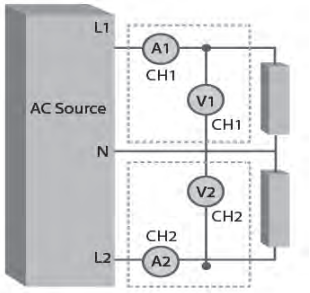
Power Efficiency Test Softpanel

All specifications are subject to change without notice.

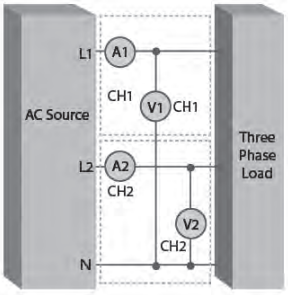
The multi-channel of 66203/66204 Power Meters are capable of supporting different wiring modes. As shown the instruments can be configured for single and 3 phase configurations by selection preset modes.



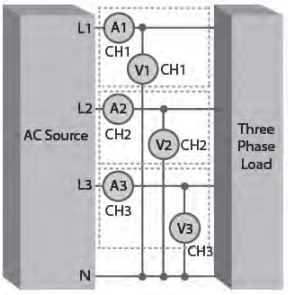
1P2W (Single Phase Two Wire)



1P3W (Single Phase Three Wire)



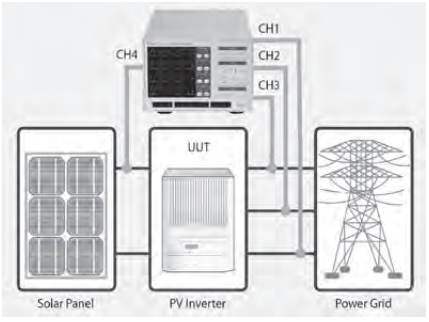
3P3W (Three Phase Three Wire)

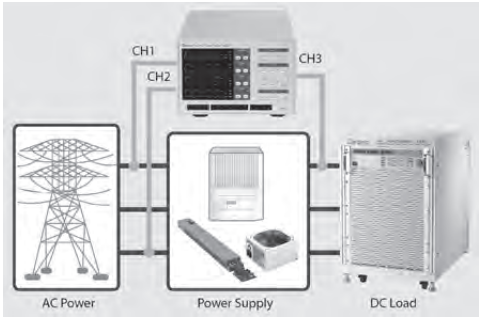


3P4W (Three Phase Four Wire)

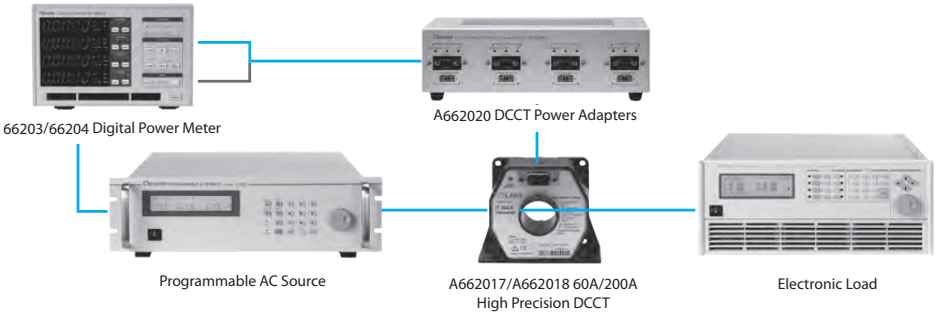
Each channel of 66203/66204 has the ability to provide independent measurements; hence the meters are suitable for multi-point measurement applications such as PV inverter testing. Instruments are designed for measuring DC input parameters as well as three phase AC readings on the output side. The overall efficiency for the PV inverter can easily be obtained by built-in functions. In order to meet high voltage applications (up to 1200Vrms) Chroma offers an HV option kit.

User could also implement 3P3W (Three Phase Three Wire) wiring mode for three phase power measurement application. Such as Power Supplies.





Support Ultra High Precision DCCT 60A/200A Optional Kit for High Current Measurement Application



ORDERING INFORMATION

66201 : Digital Power Meter
66202 : Digital Power Meter
66203 : Digital Power Meter (3ch)
66204 : Digital Power Meter (4ch)
* **66205 :** Digital Power Meter (1ch)
A662001 : USB Remote Interface Board for Model 66201/66202
A662002 : GPIB+USB Remote Interface Board for Model 66201/66202
A662003 : Measurement Test Fixture (250V/10A) for Model 66201/66202
A662004 : Rack Mounting Kit for Model 66201/66202
A662005 : USB Cable (180cm)
A662006 : External CT 50 Arms for Model 66202
A662007 : External CT 100 Arms for Model 66202
A662008 : Power Efficiency Test Softpanel
A662009 : Softpanel for Model 66200 Series
A662010 : Rack Mount Kit for Model 66203/66204
A662012 : 1200V HV option kit for Model 66203/66204
A662013 : External CT 50Arms for Model 66203/66204
A662014 : External CT 100Arms for Model 66203/66204
A662015 : Voltage and current measurement cables for Model 66204
A662016 : Voltage and current measurement cables for Model 66203
A662017 : Ultra High Precision DCCT 60A
A662018 : Ultra High Precision DCCT 200A
A662019 : DCCT Power Adapter for single channel
A662020 : DCCT Power Adapter for multi- channels

* Call for availability



A662003



A662019



A662020

SPECIFICATIONS-1		
Model	**66201**	**66202**
Channel	1	1
Parameters	V, Vpk, I, Ipk, W, VA, VAR, PF, CF_I, F	V, Vpk, I, Ipk, Is, W, VA, VAR, PF, CF_I, F, THD_V, THD_I, Energy
Voltage		
Range	150/300/500Vrms (CF = 1.6)	150/300/500Vrms (CF = 1.6)
Accuracy	DC, 15Hz - 1kHz: 0.1% of rdg + 0.08% of rng 1kHz - 10kHz: (0.1+0.05*KHz)% of rdg + 0.08% of rng	DC, 15Hz - 1kHz: 0.1% of rdg + 0.08% of rng 1kHz - 10kHz: (0.1+0.05*KHz)% of rdg + 0.08% of rng
Harmonics Accuracy	--	15Hz - 1kHz: 0.1% of rdg + 0.08% of rng 1kHz - 10kHz: (0.1+0.05*KHz)% of rdg + 0.08% of rng
Input Resistance	1MΩ	1MΩ
Current		
Range	0.01/0.1/0.4/2 Arms (CF=4) *1	SHUNT H : 0.2/2/8/20Arms (CF=2@0.2/2/8A, CF = 4@ 20A) SHUNT L : 0.01/0.1/0.4/2Arms (CF=4)
Accuracy *2	0.01A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.25% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.25% of rng 0.1A/0.4A/2A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng	SHUNT H: 0.2A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.12% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.12% of rng 2A/8A/20A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng SHUNT L: 0.01A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.25% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.25% of rng 0.1A/0.4A/2A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng
Harmonics Accuracy	--	SHUNT H: 0.2A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.12% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.12% of rng 2A/8A/20A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng SHUNT L: 0.01A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.25% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.25% of rng 0.1A/0.4A/2A Range: DC, 15Hz - 1kHz: 0.1% of rdg + 0.1% of rng 1kHz - 10kHz: (0.1+0.05 x kHz)% + 0.1% of rng
Power		
Range	1.5W ~ 1000W, 12 ranges	1.5W ~ 10kW, 24 ranges
Accuracy	47Hz~63Hz : 0.1% of rdg + 0.1% of rng 15Hz~1kHz : (0.1+ 0.2/PF x kHz)% of rdg+0.18% of rng	47Hz~63Hz : 0.1% of rdg + 0.1% of rng 15Hz~1kHz : (0.1+ 0.2/PF x kHz)% of rdg+0.18% of rng
Power Factor accuracy *3	0.006+(0.003/PF) x kHz	0.006+(0.003/PF) x kHz
Frequency		
Range	DC, 15Hz ~ 10kHz	DC, 15Hz ~ 10kHz
Measuring Condition	Voltage (10 ~ 100% of the voltage range)	Voltage (10 ~ 100% of the voltage range)
Others		
Display Resolution	5 Digits	
Display update rate	0.25~2 sec	
Input Voltage	90V ~ 130V /180V ~ 250V, 50Hz/ 60Hz, 30VA	
Interface	Option: USB or GPIB+USB	
Operating Temperature	0˚C ~ 40˚C	
Storage	-40˚C ~ 85˚C	
Safety & EMC	CE (include EMC & LVD)	
Dimension (H x W x D)	88 x 212 x 348.1 mm / 3.46 x 8.35 x 13.7 inch (excluding projections)	
Weight	Approx. 3.8 kg / 8.37 lbs	

The specifications are valid only after the power meter is turned on more than one hour in a thermally stable environment.

Note*1 : The maximum measurable current of 66201 is 4 Arms.

Note*2 : The current accuracy applies temperature range 23 ± 1˚C for 0.01A & 0.2A(CF=2). For all the other current ranges, the spec. applied under 23 ± 5˚C.

Note*3 : The PF spec. applies only when the signals are higher then 50% of the selected voltage and current ranges.

All specifications are subject to change without notice.

SPECIFICATIONS-2			
Model	**66203**	**66204**	**66205 *1**
Channel	3	4	1
Parameters	V, Vpk, I, Ipk, Is, W, VA, VAR, PF, CFi, F, THD V, THD I, Energy		
Voltage			
Range	15V/30V/60V/150V/300V/600Vrms (CF=2), 6 range HV option up to 1200Vrms		15V/30V/60V/150V/300V/600Vrms (CF=2), 6 range
Accuracy	DC, 10Hz to 1kHz : 0.1% RD + 0.08% RNG 1kHz to 10kHz: (0.1+0.05*kHz)% RD + 0.08% RNG		
Harmonics Accuracy	10Hz to 1kHz : 0.1% RD + 0.08% RNG 1kHz to 10kHz: (0.1+0.05*kHz)% RD + 0.08% RNG		
Input Resistance	2MΩ		
Current			
Range	5mA/20mA/50mA/200mA/500mA/2A/5A/20Arms (CF=4)		Low Shunt: 5mA/20mA/50mA/200mA/300mA (CF=4) High Shunt: 500mA/2A/5A/20Arms/30Arms (CF=4)
Accuracy	DC, 10Hz to 1kHz : 0.1% RD + 0.1% RNG 1kHz to 10kHz : (0.1+0.05 x kHz)% RD + 0.1% RNG		
Harmonics Accuracy	10Hz to 1kHz : 0.1% RD + 0.1% RNG 1kHz to 10kHz : (0.1+0.05 x kHz)% RD + 0.1% RNG		
Power			
Range	75mW ~ 12kW (48 ranges)		75mW ~ 18kW (60 ranges)
Accuracy	DC, 47Hz ~ 63Hz : 0.1% RD + 0.1% RNG 10Hz ~ 1KHz : 0.1% RD + 0.18% RNG 1KHz ~ 10KHz : (0.1+0.1 x kHz)% RD + 0.18% RNG		47Hz ~ 63Hz : 0.1% RD + 0.1% RNG 10Hz ~ 1kHz : 0.1% RD +0.18% RNG 1KHz ~ 10KHz : (0.1+0.1xkHz+0.3/PFxkHz)% RD+0.18% RNG
Power Factor accuracy	0.001+(15ppm/PF) x Hz		
Frequency			
Range	DC, 10Hz ~ 10kHz		
Measuring Condition	Voltage (10 ~ 100% of the voltage range)		
Others			
Display Resolution	5 Digits		
Display Update Rate	0.25sec/0.5sec/1sec/2sec		50ms/100ms/250ms/500ms/1s/2s/5s
Input Voltage	100~240V±10%, 50/60Hz		
Interface	USB+GPIB (Standard)		USB+GPIB+USB (Host)+ RS232+Ethernet (LXI) *1
Operation Temperature	0˚C ~ 40˚C		
Storage	-40˚C ~ 85˚C		
Safety & EMC	CE (include EMC & LVD)		
Dimension (H x W x D)	133 x 212 x 420 mm / 5.25 x 8.25 x 16.3 inch		88 x 212 x 348mm / 3.46 x 8.35 x 13.7 inch
Weight	7.5 kg / 16.5 lbs	8.5 kg / 18.7 lbs	Approx. 4kg / 8.8 lbs

Note*1 : Call for availability
The specifications are valid only after the power meter is turned on more than one hour in a thermally stable environment.



600W, 1200W, 2400W, 5000W

KEY FEATURES

- Wide range of voltage & current combinations with constant power
- Voltage range: 0 ~ 600V
  Current range: 0 ~ 120A
  Power range: 600W, 1200W, 2400W, 5000W
- Digital encoder knobs, keypad and function keys
- Power Factor Correction (0.95)
- High-speed Programming
- Precision V&I Measurements
- Current sharing for parallel operation with Master/Slave Control
- Voltage Ramp function : Time Range (5ms~99 hours)
- Auto Sequencing Programming : 10 Programs /100 Sequences / 8 bit TTL
- Voltage & Current Slew Rate Control
- OVP, Current Limit, Thermal protection
- Remote sense, 5V line loss compensation
- APG (Analog Programmable Interface) with Isolated Analog Interface Card
- Optional GPIB control with SCPI
- Optional Ethernet/LXI interface
- Standard RS-232 & USB interface
- LabView and Labwindows
- CE Certified

Chroma's new 62000P Series of programmable DC power supplies offer many unique advantages for ATE integration and testing. These advantage include a constant power operating envelope, precision readback of output current and voltage, output trigger signals as well as the ability to create complex DC transients waveforms to test device behavior to spikes, drops, and other voltage deviations.Designed for automated testing DC-DC converters and similar products, the 62000P sets a new standard for high accuracy programmable DC supplies.

The 62000P Series includes 12 different models ranging from 600W to 5000W, up to 120A and up to 600V. Due to their constant power operating envelope a single instrument can provide both high voltage/low current AND low voltage/ high current thereby reducing the number of supplies needed in typical ATE applications.

The 62000P also includes 16 bit readback capability for accurate voltage and current readings. This means systems no longer need complex shunt/multiplexers to make accurate readings of the UUT's input parameters. The instruments also include I/O ports providing 8 bit TTLs, DC-ON, fault output signal and remote inhibit as well as a output trigger signal for system timing measurements.

RS-232 GPIB USB Ethernet CE PFC

Another unique capability of the 62000P supplies is their ability to create complex DC transient waveforms. This capability allows devices to be tested to DC voltage dropouts, spikes and other voltage variations making them an ideal choice for airborne device testing, inverter testing and other devices which will experience voltage interrupts. Applications include DC/DC Converter & Inverter voltage drop test, engine start-up simulation, battery automated charging, electronic product life cycle test, and etc.

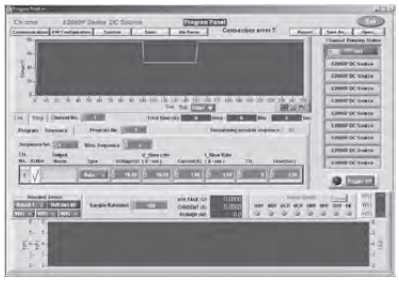
Master/Slave Parallel & Serial Control

When high power is required, it is common to connect two or more power supplies in parallel or series. The 62000P Series supplies have a smart Master / Slave control mode making series/ parallel operation fast and simple. In this mode the master scales values and downloads data to slave units so programming is simple and current sharing automatic.

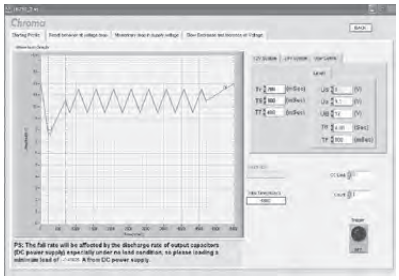


Model 62050P-100-100

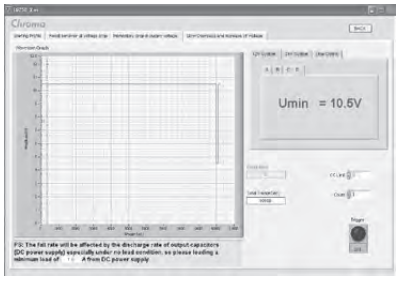
Soft Panel



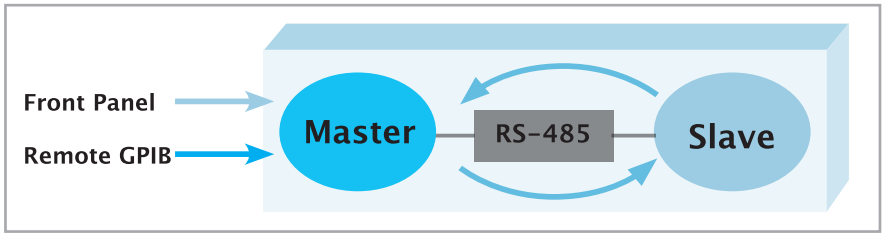
Transient Voltage Programming



ISO 16750-2 4.5.3 Starting Profile



ISO 16750-2 4.5.1 Momentary Drop In Supply Voltage



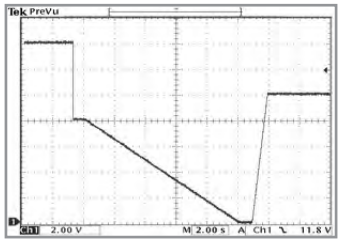
Master/Slave Parallel & Serial Control

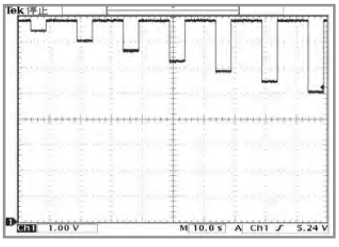
ORDERING INFORMATION

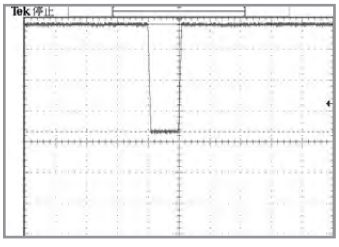
62006P-30-80 : Programmable DC Power Supply 30V/80A/600W
62006P-100-25 : Programmable DC Power Supply 100V/25A/600W
62006P-300-8 : Programmable DC Power Supply 300V/8A/600W
62012P-40-120 : Programmable DC Power Supply 40V/120A/1200W
62012P-80-60 : Programmable DC Power Supply 80V/60A/1200W
62012P-100-50 : Programmable DC Power Supply 100V/50A/1200W
62012P-600-8 : Programmable DC Power Supply 600V/8A/1200W
62024P-40-120 : Programmable DC Power Supply 40V/120A/2400W
62024P-80-60 : Programmable DC Power Supply 80V/60A/2400W
62024P-100-50 : Programmable DC Power Supply 100V/50A/2400W
62024P-600-8 : Programmable DC Power Supply 600V/8A/2400W
62050P-100-100 : Programmable DC Power Supply 100V/100A/5000W
A620004 : GPIB Interface for Model 62000P Series
A620006 : Rack mounting kit for Model 62000P Series (2U model)
A620009 : Softpanel for 62000P Series
A620015 : Rack mounting kit for Model 62050P-100-100
A620023 : Ethernet/LXI Interface for Model 62000P Series

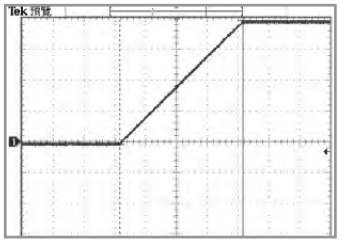
All specifications are subject to change without notice.

ELECTRICAL SPECIFICATIONS-1						
Model	**62006P-30-80**	**62006P-100-25**	**62006P-300-8**	**62012P-40-120**	**62012P-80-60**	**62012P-100-50**
Output Ratings						
Output Voltage	0~30V	0~100V	0~300V	0-40V	0~80V	0~100V
Output Current	0~80A	0~25A	0~8A	0-120A	0~60A	0~50A
Output Power	600W	600W	600W	1200W	1200W	1200W
Line Regulation						
Voltage	0.01%+2mV	0.01%+6mV	0.01%+18mV	0.01%+2mV	0.01%+8mV	0.01%+10mV
Current	0.01%+25mA	0.01%+5mA	0.03%+20mA	0.01%+25mA	0.01%+10mA	0.01%+12mA
Load Regulation						
Voltage	0.01%+3mV	0.01%+10mV	0.01%+50mV	0.01%+3mV	0.01%+12mV	0.01%+18mV
Current	0.01%+10mA	0.01%+5mA	0.03%+40mA	0.01%+10mA	0.01%+20mA	0.01%+28mA
Voltage Measurement						
Range	6V/30V	20V/100V	60V/300V	8V/40V	16V/80V	20V/100V
Accuracy	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.
Current Measurement						
Range	16A/80A	5A/25A	1.6A/8A	24A / 120A	12A/60A	10A/50A
Accuracy	0.1% + 0.2%F.S.	0.1% + 0.2%F.S.	0.1% + 0.1%F.S.	0.1% + 0.1%F.S..	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.
Output Noise (0 ~ 20MHz)						
Voltage Ripple (P-P)	60 mV	85 mV	180 mV	90 mV	100 mV	100 mV
Voltage Ripple (rms)	8 mV	10 mV	90 mV	10 mV	10 mV	15 mV
Current Ripple (rms)	60 mA	10 mA	60 mA	120 mA	30 mA	20 mA
OVP Adjustment Range	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax
Slew Rate Range						
Voltage	0.001V - 5V/ms	0.001V - 10V/ms	0.01V - 10V/ms	0.001V - 5V/ms	0.001V - 10V/ms	0.001V - 10V/ms
Current	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 1A/ms
Programming Response Time (Typical)						
Rise Time (Full & No Load)	6 ms	10 ms	30 ms	8 ms	8 ms	10 ms
Fall Time	350ms(max)	300 ms(max)	2.5 s(max)	460 ms(max)	240 ms(max)	300 ms(max)
Efficiency	0.75	0.75	0.75	0.8	0.8	0.8
Drift (8 hours)						
Voltage	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax
Current	0.04% of Imax	0.04% of Imax	0.04% of Imax	0.04% of Imax	0.04% of Imax	0.04% of Imax
Temperature Coefficient						
Voltage	0.02% of Vmax/°C	0.02% of Vmax/°C	0.02% of Vmax/°C	0.02% of Vmax/°C	0.02% of Vmax/°C	0.02% of Vmax/°C
Current	0.04% of Imax/°C	0.04% of Imax/°C	0.04% of Imax/°C	0.04% of Imax/°C	0.04% of Imax/°C	0.04% of Imax/°C
Transient Response Time	3 mS	3 mS	3mS	3mS	3 mS	3 mS
10 % step change	150 mV	180 mV	600 mV	150 mV	250 mV	250 mV
Voltage limit @ Series Mode	150V	500V	800V	200V	400V	500V
AC Input Operating Voltage Ranges	1Ø 100~240Vac ± 10% V_{LN}, 47~63 Hz					
Operating Temperature	0~40°C	0~40°C	0~40°C	0~40°C	0~40°C	0~40°C
Dimension (H x W x D)	89 x 430 x 425 mm / 3.5 x 16.93 x 16.73 inch					
Weight	12kg / 26.43 lbs	12.1 kg / 26.65 lbs	11.2 kg / 24.67 lbs	12kg / 26.43 lbs	13 kg / 28.63 lbs	12.1 kg / 26.65 lbs


Battery Voltage Dropout

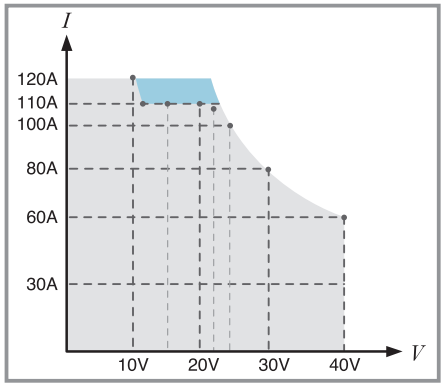

Reset Behavior at Voltage Drop of ISO 16750-2


Telecom Converter Sag Testing


Output Voltage Slew Rate Control

ELECTRICAL SPECIFICATIONS-2						
Model	**62012P-600-8**	**62024P-40-120**	**62024P-80-60**	**62024P-100-50**	**62024P-600-8**	**62050P-100-100**
Output Ratings						
Output Voltage	0~600V	0-40V	0~80V	0~100V	0-600V	0~100V
Output Current	0~8A	0-120A*1	0~60A	0~50A	0-8A	0~100A
Output Power	1200W	2400W*1	2400W	2400W	2400W	5000W
Line Regulation						
Voltage	0.01%+18mV	0.01%+2mV	0.01%+8mV	0.01%+10mV	0.01%+18mV	0.01%+8mV
Current	0.03%+20mA	0.01%+25mA	0.01%+10mA	0.01%+12mA	0.03%+20mA	0.01%+24mA
Load Regulation						
Voltage	0.01%+50mV	0.01%+3mV	0.01%+12mV	0.01%+18mV	0.01%+50mV	0.01%+12mV
Current	0.03%+40mA	0.01%+10mA	0.01%+20mA	0.01%+28mA	0.03%+40mA	0.01%+56mA
Voltage Measurement						
Range	120V/600V	8V / 40V	16V/80V	20V/100V	120V / 600V	20V/100V
Accuracy	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.	0.05% + 0.05%F.S.
Current Measurement						
Range	1.6A/8A	24A / 120A	12A/60A	10A/50A	1.6A / 8A	20A/100A
Accuracy	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.	0.1% + 0.1%F.S.
Output Noise (0 ~ 20MHz)						
Voltage Ripple (P-P)	180 mV	90 mV	100 mV	100 mV	200 mV	50 mV
Voltage Ripple (rms)	90 mV	10 mV	10 mV	15 mV	180 mV	15 mV
Current Ripple (rms)	60 mA	120 mA	30 mA	20 mA	120 mA	40 mA
OVP Adjustment Range	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax	110% of Vset to 110% of Vmax
Slew Rate Range						
Voltage	0.01V - 10V/ms	0.001V - 5V/ms	0.001V - 10V/ms	0.001V - 10V/ms	0.01V - 10V/ms	0.001V - 10V/ms
Current	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 1A/ms	0.001A - 2A/ms
Programming Response Time (Typical)						
Rise Time (Full & No Load)	60 ms	8 ms	8 ms	10 ms	60 ms	10 ms
Fall Time	5 s(max)	460ms(max)	240 ms(max)	300 ms(max)	5 s(max)	850 ms(max)
Efficiency	0.8	0.8	0.85	0.85	0.8	0.85
Drift (8 hours)						
Voltage	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax	0.02% of Vmax
Current	0.04% of Imax	0.04% of Imax	0.04% of Imax	0.04% of Imax	0.04% of Imax	0.04% of Imax
Temperature Coefficient						
Voltage	0.02% of Vmax/˚C	0.02% of Vmax/˚C	0.02% of Vmax/˚C	0.02% of Vmax/˚C	0.02% of Vmax/˚C	0.02% of Vmax/˚C
Current	0.04% of Imax/˚C	0.04% of Imax/˚C	0.04% of Imax/˚C	0.04% of Imax/˚C	0.04% of Imax/˚C	0.04% of Imax/˚C
Transient Response Time	3mS	3mS	3mS	3mS	3mS	3mS
10 % step change	600 mV	150 mV	250 mV	250 mV	600mV	250 mV
Voltage limit @ Series Mode	800V	200V	400V	500V	800V	500 V
AC Input Operating Voltage Ranges	1Ø 100~240Vac ± 10% V_{LN}, 47~63 Hz	1Ø 200~240Vac ± 10% V_{LN}, 47~63 Hz				3Ø 200~240Vac ± 10% V_{LL}, or 3Ø 380~400Vac ± 10% V_{LL}, 47~63 Hz
Operating Temperature	0~40˚C	0~40˚C	0~40˚C	0~40˚C	0~40˚C	0~40˚C
Dimension (H x W x D)	89 x 430 x 425 mm / 3.5 x 16.93 x 16.73 inch					176 x 428 x 566 mm / 6.93 x 16.85 x 22.28 inch
Weight	11.2 kg / 24.67lbs	13 kg / 28.63 lbs	12.2 kg / 26.87 lbs	13 kg / 28.63 lbs	13 kg / 28.63 lbs	28 kg / 61.67 lbs

Note *1 : The Max. power limit of 2400W is under output 22V~40V , and see the diagram below for operating power envelope.



The blue area is over specification due to low voltage (<22V) & high current output(>110A).
The following is operation power envelope :
(10V/120A), (11V/110A), (15V/110A), (20V/110A), (22V/109A), (24V/100A), (30V/80A), (40V/60A).

All specifications are subject to change without notice.

GENERAL SPECIFICATIONS	
Programming &Measurement Resolution	
Voltage (Front Panel)	10 mV
Current (Front Panel)	10 mA
Voltage (Remote Interface))	0.003% of Vmax
Current (Remote Interface))	0.002% of Imax
Voltage (Analog Programming Interface)	0.04% of Imax
Current (Analog Programming Interface)	0.04% of Imax
Programming Accuracy	
Voltage Programming (Front Panel and Remote Interface)	0.1% of Vmax
Voltage Programming (Analog Programming Interface)	0.2% of Vmax
Current Programming (Front Panel and Remote Interface)	0.3% of Imax
Current Programming (Analog Programming Interface)	0.3% of Imax
Programming Response Time	
Rise Time: For a programmed 5% to 95% step in output voltage. (Full & NoLoad)	See Electrical Specification
Fall Time: For a programmed 95% to 5% step in output voltage. (The fall time will be affected by the external loading from UUT.)	See Electrical Specification
Vout setting (USB send command to DC Power Supply receiver)	10ms
Measure Voltage, Current (under USB command using Fetch)	10ms
Measure Voltage, Current (under USB command using Measure)	70ms
Analog Programming Interface	
Voltage and Current Programming inputs	0~10Vdc or 0~5Vdc of F.S.
Voltage and Current monitor	0~10Vdc or 0~5Vdc of F.S.
Isolation: Maximum working voltage of any analog programming signal with respect to chassis potential	70Vdc
Auxiliary Power Supply	
Output Voltage	12Vdc
Maximum current source capability	10mA
Remote Inhibit Function (I/O)	
Use to disable the output of DC Power Supply; Active Low	TTL
DC-ON Output Signal	
Indicate the output status, Active High	TTL
Fault Output Signal	
Indicate if there is a fault/protection occurred, Active Low	TTL
Series & Parallel operation function with Master / Slave control	
Voltage limit @ Series Mode	See Electrical Specification
Number of DC Power Supplies allowed @ master / slave control mode	5
Auto Sequencing Programmable Function	
Number of program	10
Number of sequence	100
Time Range	5ms ~ 15000S
TTL signal out	8 bits
TTL source capability	7 mA
Auto Sequencing Programmable Function (Step Mode)	
Start Voltage Range	0 ~ full scale
End Voltage Range	0 ~ full scale
Total Run Time Range (hhh:mm:ss.sss)	10ms ~ 99 hours
Slew Rate Control Function	
Voltage slew rate range (The fall rate will be affected by the discharge rate of the output capacitors especially under no load condition.)	See Electrical Specification
Current slew rate range of current	See Electrical Specification
Minimum transition time	0.5 ms
Remote Sense	
Line loss compensation	5V



USB GPIB Ethernet RS-232 RS-485 APG CE

Chroma's new 62000H Series of programmable DC power supplies offer many unique advantages for telecom, automated test system & integration, industrial, battery charge & simulation for hybrid cars and solar panel simulation. These advantage include high power density of 15KW in 3U, precision readback of output current and voltage, output trigger signals as well as the ability to create complex DC transients waveforms to test device behavior to spikes, drops, and other voltage deviations.

The 62000H Series includes different models ranging from 5KW to 15KW, with current ranges up to 375A and voltage ranges up to 1000V. The 62000H can easily parallel up to ten units capable of 150KW with current sharing for bulk power applications, for example, battery bank simulation of 450V/150A/67.5KW for electric vehicle and military use.

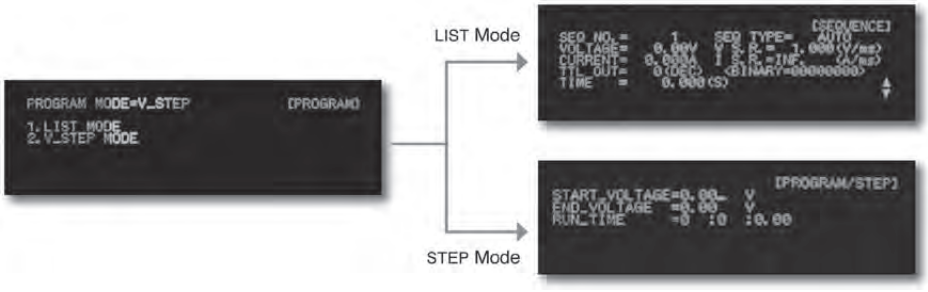
There are 100 user programmable input status on the front panel for automated test application and life cycle ON/OFF test. In addition, the 62000H has a 16 bit digital control with bright vacuum fluorescent display readout.

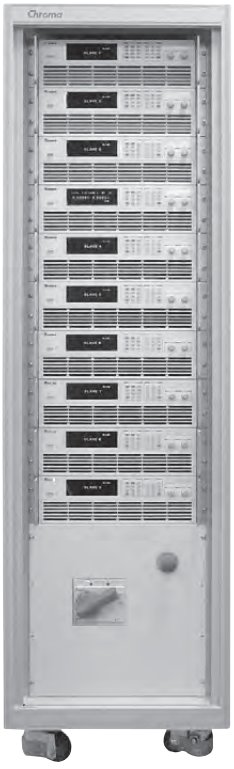
The 62000H series DC power supply are very easy to operate either from the front panel keypad or from the remote controller via USB / RS-232 / RS485 / APG (Standard) and GPIB & Ethernet (optional). Its compact size with 3U only can be stacked on a bench in a standard rack without any difficulties.

Another unique capability of the 62000H supplies is their ability to create complex DC transient waveforms. This capability allows devices to be tested to DC voltage dropouts, spikes and other voltage variations making them an ideal choice for aerospace device testing, inverter testing and other devices which will experience voltage interrupts. Applications include DC/DC Converter & Inverter voltage drop test, engine start-up simulation, battery automated charging, electronic product life cycle test, etc.

KEY FEATURES

- Power range: 5KW / 10KW / 15KW
- Voltage range: 0 ~ 1000V
- Current range: 0 ~ 375A
- High power density (15KW in 3U)
- Easy Master / Slave parallel & series operation up to 150KW
- Precision V&I Measurements
- High-speed programming
- Voltage & Current Slew Rate Control
- Digital encoder knobs, keypad and function keys
- Current sharing operation
- Voltage ramp function (time range: 5 ms ~ 99 hours)
- Auto Sequencing Programming: 10 Programs / 100 Sequences
- OVP, Current Limit, Thermal protection
- Standard Analog Programming interface
- Standard USB / RS-232 / RS485 interface
- Optional GPIB / Ethernet interface
- Remote output ON / OFF (I / P)
- Remote sense line drop compensation
- LabView and Labwindows
- CE Certified





Master/Slave Parallel Operation - 150kW

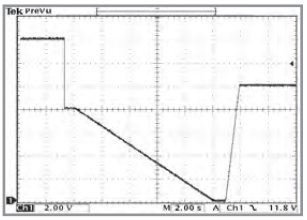
ORDERING INFORMATION

Power Rating	62000H Series Programmable DC Power Supply
5KW	62050H-40 : Programmable DC Power Supply 40V/125A/5KW
	62050H-450 : Programmable DC Power Supply 450V/11.5A/5KW
	62050H-100P *1 : Programmable DC Power Supply 100V/125A/5KW
	62050H-600 : Programmable DC Power Supply 600V/8.5A/5KW
10KW	62075H-30 : Programmable DC Power Supply 30V/250A/7.5KW
	62100H-30 : Programmable DC Power Supply 30V/375A/11KW
	62100H-40 : Programmable DC Power Supply 40V/250A/10KW
	62100H-100P *1 : Programmable DC Power Supply 100V/250A/10KW
	62100H-450 : Programmable DC Power Supply 450V/23A/10KW
	62100H-600 : Programmable DC Power Supply 600V/17A/10KW
	62100H-1000 : Programmable DC Power Supply 1000V/10A/10KW
15KW	62150H-40 : Programmable DC Power Supply 40V/375A/15KW
	62150H-100P *1 : Programmable DC Power Supply 100V/375A/15KW
	62150H-450 : Programmable DC Power Supply 450V/34A/15KW
	62150H-600 : Programmable DC Power Supply 600V/25A/15KW
	62150H-1000 : Programmable DC Power Supply 1000V/15A/15KW
Options	A620024 : GPIB Interface for 62000H series (Factory installed)
	A620025 : Ethernet Interface for 62000H series (Factory installed)
	A620026 : Rack Mounting kit for 62000H series

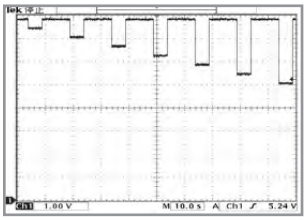
Note *1 : Model 62000H-100P (input 380Vac) will be available in May, 2016
Note *2 : Please specify GPIB or Ethernet Interface (alternative) at time of order.
Note *3 : All models output power are available for 200/220Vac, 380/400Vac and 440/480Vac (600V/1000V models) line voltage.
Note *4 : Call for availability. (30V/40V/450V for 200/220 Vac and 440/480 Vac line voltage)

All specifications are subject to change without notice.

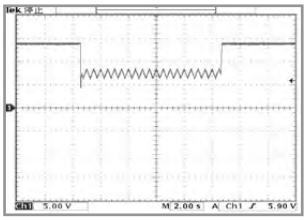
ELECTRICAL SPECIFICATIONS -1								
Model	**62075H-30**	**62050H-40**	**62050H-100P*1**	**62050H-450**	**62050H-600**	**62100H-30**	**62100H-40**	**62100H-100P*1**
Output Ratings								
Output Voltage	0-30V	0-40V	0-100V	0-450V	0-600V	0-30V	0-40V	0-100V
Output Current	0-250A	0-125A	0-125A	0-11.5A	0-8.5A	0-375A	0-250A	0-250A
Output Power	7500W	5000W	5000W	5000W	5000W	11250W	10000W	10000W
Line Regulation								
Voltage	±0.01% F.S.							
Current	±0.05% F.S.							
Load Regulation								
Voltage	±0.02% F.S.							
Current	±0.1% F.S.							
Voltage Measurement								
Range	6V / 30V	8V / 40V	20V / 100V	90V / 450V	120V / 600V	6V / 30V	8V / 40V	20V/100V
Accuracy	0.05% + 0.05% F.S.							
Current Measurement								
Range	50A / 250A	25A / 125A	25A / 125A	2.3A / 11.5A	1.7A / 8.5A	75A / 375A	50A / 250A	50A / 250A
Accuracy	0.1% + 0.1% F.S.							
Output Noise & Ripple								
Voltage Noise (P-P)	60mV	60mV	100mV	300mV	350mV	60mV	60mV	100mV
Voltage Ripple (rms)	15mV	15mV	20mV	450mV	600mV	15mV	15mV	20mV
Current Ripple (rms)	100mA	50mA	100mA	20mA	15mA	150mA	100mA	100mA
OVP Adjustment Range								
Range	0-110% programmable from front panel, remote digital inputs							
Accuracy	±1% of full-scale output							
Programming Response Time								
Rise Time: Full Load	6ms	8ms	10ms	60ms	60ms	6ms	8ms	10ms
Rise Time: No Load	6ms	8ms	10ms	60ms	60ms	6ms	8ms	10ms
Fall Time: Full Load	6ms	8ms	10ms	60ms	60ms	6ms	8ms	10ms
Fall Time: 10% Load	100ms	100ms	625ms	250ms	250ms	100ms	100ms	625ms
Fall Time: No Load	1s	1s	2.5s	2.5s	2.5s	1s	1s	2.5s
Slew Rate Control								
Voltage slew rate range	0.001V/ms ~ 5V/ms	0.001V/ms ~ 5V/ms	0.001V/ms ~ 10V/ms	0.001V/ms ~ 7.5V/ms	0.001V/ms ~ 10V/ms	0.001V/ms ~ 5V/ms	0.001V/ms ~ 5V/ms	0.001V/ms ~ 10V/ms
Current slew rate range	0.001A~1A/ms, or INF							
Min. transition time	0.5ms							
Transient Response Time	Recovers within 1ms to +/- 0.75% of steady-state output for a 50% to 100% or 100% to 50% load change(1A/μs)							
Efficiency (Typical)	0.87	0.87	0.93	0.87	0.87	0.87	0.87	0.93
Drift (30 minutes)								
Voltage	0.04% of Vmax							
Current	0.06% of Imax							
Drift (8 hours)								
Voltage	0.02% of Vmax							
Current	0.04% of Imax							
Temperature Coefficient								
Voltage	0.04% of Vmax/˚C							
Current	0.06% of Imax/˚C							



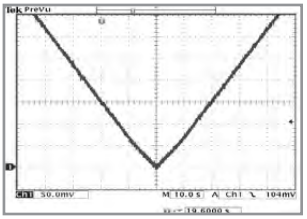
Battery Voltage Dropout



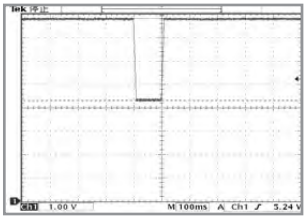
Reset Behavior at Voltage Drop of ISO 16750-2



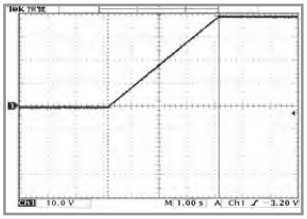
Engine Starting Profile of ISO 16750-2



Battery Voltage Slow Decrease & Decrease profile



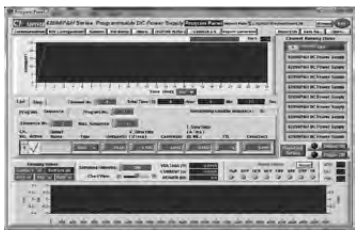
Telecom Converter Sag Testing



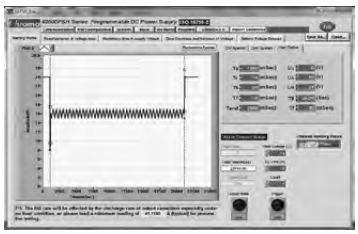
Output Voltage Slew Rate Control

ELECTRICAL SPECIFICATIONS -2								
Model	**62100H-450**	**62100H-600**	**62100H-1000**	**62150H-40**	**62150H-100P*1**	**62150H-450**	**62150H-600**	**62150H-1000**
Output Ratings								
Output Voltage	0-450V	0-600V	0-1000V	0-40V	0-100V	0-450V	0-600V	0-1000V
Output Current	0-23A	0-17A	0-10A	0-375A	0-375A	0-34A	0-25A	0-15A
Output Power	10000W	10000W	10000W	15000W	15000W	15000W	15000W	15000W
Line Regulation								
Voltage	±0.01% F.S.							
Current	±0.05% F.S.							
Load Regulation								
Voltage	±0.02% F.S.	±0.02% F.S.	±0.05% F.S.	±0.02% F.S.	±0.02% F.S.	±0.02% F.S.	±0.02% F.S.	±0.05% F.S.
Current	±0.1% F.S.							
Voltage Measurement								
Range	90V/450V	120V/600V	200V/1000V	8V/40V	20V/100V	90V/450V	120V/600V	200V/1000V
Accuracy	0.05% + 0.05%F.S.							
Current Measurement								
Range	4.6A/23A	3.2A/17A	4A/10A	75A/375A	75A/375A	6.8A/34A	5A/25A	6A/15A
Accuracy	0.1% + 0.1%F.S.							
Output Noise & Ripple								
Voltage Noise(P-P)	300mV	350mV	2550mV	60mV	100mV	300mV	350mV	2550mV
Voltage Ripple(rms)	450mV	600mV	1500mV	15mV	20mV	450mV	600mV	1500mV
Current Ripple(rms)	40mA	30mA	180mA	150mA	100mA	60mA	45mA	270mA
OVP Adjustment Range								
Range		0-110% programmable from front panel, remote digital inputs						
Accuracy		±1% of full-scale output						
Programming Response Time								
Rise Time:Full Load	60ms	60ms	25ms (30% F.S. CC Load)	8ms	10ms	60ms	60ms	25ms(50% F.S. CC Load)
Rise Time:No Load	60ms	60ms	25ms	8ms	10ms	60ms	60ms	25ms
Fall Time: Full Load	60ms	60ms	25ms (50% F.S. CC Load)	8ms	10ms	60ms	60ms	25ms(50% F.S. CC Load)
Fall Time: 10% Load	250ms	250ms	120ms (10% F.S. CC Load)	100ms	625ms	250ms	250ms	80ms(10% F.S. CC Load)
Fall Time: No Load	2.5s	2.5s	3s	1s	2.5s	2.5s	2.5s	3s
Slew Rate Control								
Voltage slew rate range	0.001V/ms ~7.5V/ms	0.001V/ms ~10V/ms	0.001Vms~ 40V/ms	0.001V/ms ~5V/ms	0.001V/ms ~10V/ms	0.001V/ms ~7.5V/ms	0.001V/ms ~10V/ms	0.001V/ms ~40V/ms
Current slew rate range	0.001A~0.1A/ms, or INF							
Min. transition time	0.5ms							
Transient Response Time	Recovers within 1ms to +/- 0.75% of steady-state output for a 50% to 100% or 100% to 50% load change(1A/μs)							
Efficiency (Typical)	0.87	0.87	0.85	0.87	0.93	0.87	0.87	0.87
Drift (30 minutes)								
Voltage	0.04% of Vmax							
Current	0.06% of Imax							
Drift (8 hours)								
Voltage	0.02% of Vmax							
Current	0.04% of Imax							
Temperature Coefficient								
Voltage	0.04% of Vmax/°C							
Current	0.06% of Imax/°C							

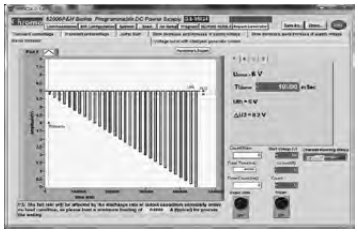
Soft Panel



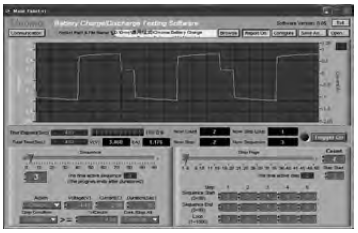
Program Sequences Function



ISO 16750-2 Standard for Voltage Transient Test



GS-95024 Standard for Voltage Transient Test



Battery Charge Test

All specifications are subject to change without notice.

GENERAL SPECIFICATIONS				
Programming & Measurement Resolution				
Voltage (Front Panel)		0.1mV / 1mV / 10mV / 100mV (V_o < 10V / 100V / 600V / 1000V)		
Current (Front Panel)		0.1mA / 1mA / 10 mA (I_o < 10A / 100A / 1000A)		
Voltage (Digital Interface)		0.002% of Vmax		
Current (Digital Interface)		0.002% of Imax		
Voltage (Analog Interface)		0.04% of Vmax		
Current (Analog Interface)		0.04% of Imax		
Remote Interface				
Analog programming		Standard		
USB		Standard		
RS-232		Standard		
RS485		Standard		
GPIB		Optional		
Ethernet		Optional		
System BUS(CAN)		Standard for master/slave control		
Programming Accuracy				
Voltage (Front Panel and Digital Interface)		0.1% of Vmax		
Current (Front Panel and Digital Interface)		0.3% of Imax		
Voltage (Analog Interface)		0.2% of Vmax		
Current (Analog Interface)		0.3% of Imax		
GPIB Command Response Time				
Vout setting		GPIB send command to DC source receiver <20ms		
Measure V & I		Under GPIB command using Measure <25ms		
Analog Interface (I/O)				
Voltage and Current Programming inputs (I/P)		0-10Vdc / 0-5Vdc / 0-5k ohm / 4-20 mA of F.S.		
Voltage and Current monitor output (O/P)		0-10Vdc / 0-5Vdc / 4-20mA of F.S.		
External ON/OFF (I/P)		TTL:Active Low or High(Selective)		
DC_ON Signal (O/P)		Level by user define. (Time delay = 1 ms at voltage slew rate of 10V/ms.)		
CV or CC mode Indicator (O/P)		TTL Level High=CV mode ; TTL Level Low= CC mode		
OTP Indicator (O/P)		TTL: Active Low		
System Fault indicator(O/P)		TTL: Active Low		
Auxiliary power supply(O/P)		Nominal supply voltage : 12Vdc / Maximum current sink capability: 10mA		
Safety interlock(I/P)		Time accuracy: <100ms		
Remote inhibit(I/P)		TTL: Active Low		
Series & Parallel Operation		Master / Slave control via CAN for 10 units up to 150KW. (Series: two units / Parallel: ten units)		
Auto Sequencing(List Mode)				
Number of program		10		
Number of sequence		100		
Dwell time Range		5ms - 15000S		
Trig. Source		Manual / Auto / External		
Auto Sequencing (Step Mode)				
Start voltage		0 to Full scale		
End voltage		0 to Full scale		
Run time		10ms - 99hours		
Input Specification				
AC input voltage 3phase , 3 wire + ground		3Ø 200~220Vac ± 10% V_{LL} 3Ø 380~400Vac ± 10% V_{LL} 3Ø 440~480Vac ± 10% V_{LL}		
AC frequency range		47-63 Hz		
Max Current (each phase)	200/220 Vac	5KW Model : 39A	10KW Model : 69A	15KW Model : 93A
	380/400 Vac	5KW Model : 22A	10KW Model : 37A	15KW Model : 50A
	440/480 Vac	5KW Model : 19A	10KW Model : 32A	15KW Model : 44A
General Specification				
Maximum Remote Sense Line Drop Compensation		<100V model: 5% of full scale voltage per line(10% total) >100V model :2% of full scale voltage per line (4% total)		
Operating Temperature Range		0˚C ~ 50˚C *2		
Storage Temperature Range		-40˚C ~ +85˚C		
Dimension (HxWxD)		132.8 x 428 x 610 mm / 5.23 x 16.85 x 24.02 inch		
Weight		5KW Model : Approx. 23 kg / 50.66 lbs 10KW Model : Approx. 29 kg / 63.88 lbs *3 15KW Model : Approx. 35 kg / 77.09 lbs		

Note*1 : Preliminary specification for Model 62000H-100P
Note*2 : The operating temperature range is 0˚C ~ 40˚C for Model 62100H-1000/62150H-1000
Note*3 : The weight is approx. 35kg/77.09 lbs for Model 62100H-1000



Solar Array Simulator

KEY FEATURES

- Voltage range : 0 ~150V/600V/1000V/1500V
- 3U/15kW high power density module with easy master/slave parallel operation up to 1.5MW
- Fast transient response solar array simulation
- Simulation of multiple solar cell material's I-V characteristic (fill factor)
- Simulation of dynamic irradiation intensity and temperature level from clear day to cloud cover conditions
- Shadowed I-V curve output simulation (4096 points)
- Low leakage current (< 3mA)
- Precision V & I measurements
- Auto I-V program: 100 I-V curves & Dwell time 1~15,000s
- Static & dynamic MPPT efficiency test
- Data recorded via softpanel
- Standard USB / RS232 / RS485 interface
- Optional GPIB / Ethernet interface
- Real time analysis of PV inverter's MPPT tracking via softpanel
- Free graphic user interface - softpanel for operation
- Support up to six-channel SAS control for multi-MPPT testing
- Build-in dynamic MPPT test profile of EN50530, Sandia, CGC/GF004, CGC/GF035, NB/T 32004

APG RS-485 RS-232 Ethernet GPIB USB CE

The latest programmable solar array simulator power supply 62000H-S Series released by Chroma provide simulation of Voc (open circuit voltage) up to 1000V and Isc (short circuit current) up to 25A. The 62000H-S provides an industry leading power density in a small 3U high package. The solar array simulator is highly stable and has a fast transient response design, which are both advantageos to MPPT performance evaluation on PV inverter devices.

The 62000H-S Series has many unique advantages including high speed & precision digitizing measurement circuits with a 100kHz A/D, 25kHz D/A controlled I-V curve and a digital filter mechanism. It can simulate an I-V curve accurately and response the mains ripple effect from the PV inverter. In addition, the built-in EN50530/Sandia SAS I-V model in the standalone unit can easily program the Voc, Isc, Vmp, and Imp parameters for I-V curve simulation, without a PC controller.

The real solar array is influenced by various weather conditions such as irradiation, temperature, rain and shade by trees or clouds, which will affect the I-V curve output. The 62000H-S Series is capable of storing up to 100 I-V curves into the simulator memory, with a programmed time interval range of 1-15,000 seconds. It can simulate the I-V curve from the early morning to nightfall for PV inverter testing or dynamic I-V curve transient testing.

The 62000H-S Series has a built-in 16 bit digital control and precision voltage & current measurement circuits with a voltage accuracy of 0.05%+0.05%FS and a current accuracy of 0.1%+0.1%F.S. It is ideal for real time MPPT analysis and tracking monitoring for PV inverters through our softpanel. The user can also enable the data recording function on the softpanel during the static MPPT performance test.

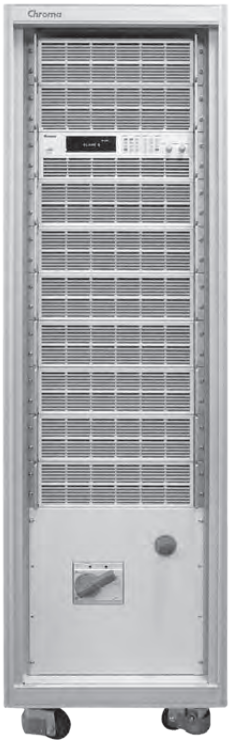
When high power solar array simulation is required it is common to connect two or more power modules in parallel. The 62000H-S Series with a current range up to 25A and a voltage range up to 1000V offers a high power density envelope maximum of 15KW in a 3U package. It can easily parallel up to ten units in a Master/Slave configuration to provide 150kW with current sharing and synchronized control signals for commercial PV inverter (10kW – 100kW) testing. The 62000H series supplies have a smart Master/Slave control mode that makes the parallel operation fast and simple. In this mode, the master scales values and downloads data to slave units so that the programming is as simple as using a standalone unit.

The 62000H-S series DC power supplies are very easy to operate from the front panel keypad or from the remote controller via USB / RS232/ RS485/APG (standard) and GPIB & Ethernet (optional). Its compact size (3U) makes it ideal for both benchtop and standard racking.

ORDERING INFORMATION

Power Rating	62000H-S Series Programmable DC Power Supply
2kW	**62020H-150S** : Programmable DC Power Supply 150V/40A/2kW with Solar Array Simulation
5kW	**62050H-600S** : Programmable DC Power Supply 600V/8.5A/5kW with Solar Array Simulation
10kW	**62100H-600S** : Programmable DC Power Supply 600V/17A/10kW with Solar Array Simulation
15kW	**62150H-600S** : Programmable DC Power Supply 600V/25A/15kW with Solar Array Simulation
	62150H-1000S : Programmable DC Power Supply 1000V/15A/15kW with Solar Array Simulation
Options	**A620024** : GPIB Interface for 62000H series (Factory installed)
	A620025 : Ethernet Interface for 62000H series (Factory installed)
	A620026 : 19" Rack Mounting kit for 62000H series
	A620027 : Parallelable Power Stage 15kW for 62150H-600S
	A620028 : Parallelable Power Stage 15kW for 62150H-1000S
	A620029 : Control and Supervisor Unit for 150kW~1.5MW
	A620030 : 19" Rack (41U) for 62000H-S series (380Vac input)
	B620000 : 19" Rack Mounting Kit for 62020H-150S (2U)

Note 1 : GPIB or Ethernet Interface (alternative) , please specified at time of order.
Note 2 : Call for more information regarding the customized solar array simulator of 150kW~1.5MW.
Note 3 : All models output power are available for 200/220Vac, 380/400Vac and 440/480Vac line voltage.



Master/Slave Parallel Operation - 150kW



Model 62020H-150S



Parallelable Power Stage A620027/A620028

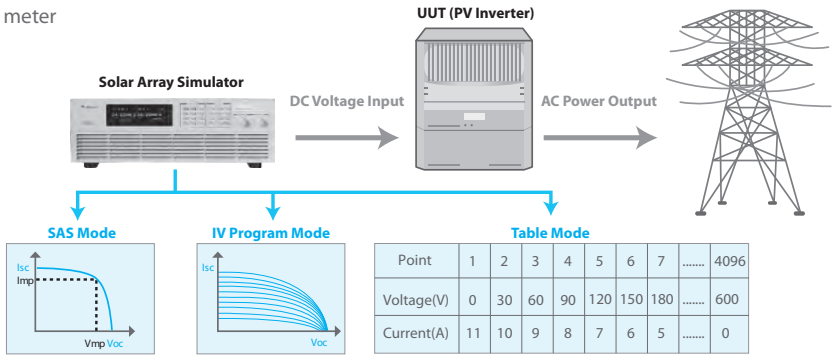
All specifications are subject to change without notice.

Solar Array I-V Curve Simulation Power Supply

The Model 62000H-S Series has a built in EN50530/Sandia SAS model that can easily program the Voc, Isc, Vmp, Imp parameters to simulate different solar cell materials I-V characteristic outputs with fast response time. Moreover, the TABLE mode is capable of saving a 128~4096 point array of user programmed voltages and currents via a remote interface. It can easily create a shadowed I-V curve and the I-V PROGRAM mode can save up to 100 I-V curves and dwell time intervals (1-15,000s) in memory. These advantages provide steady repetitive control conditions required for PV Inverter design as well as for verification testing. The solar array simulator is ideal for the following testing:

- Design and verify the maximum power tracking circuit and algorithm of the PV inverter
- Verify the high/low limit of operating input voltage allowed for the PV inverter.
- Verify the high/low limit of operating input voltage allowed for the inverter's maximum power point
- Verify the static maximum power point tracking efficiency of the PV inverter.
- Measure and verify the overall efficiency & conversion efficiency of PV inverter. *
- Verify the maximum power point tracking performance of the inverter for dynamic curves (EN50530, Sandia, CGC/GF004, CGC/GF035, and NB/T 32004)
- Verify the maximum power point tracking performance of the inverter under different time period conditions spanning from morning to nightfall
- Verify the maximum power point tracking mechanism of the inverter for the I-V curve when the solar array is shaded by clouds or trees
- Simulate the I-V curve under the actual environmental temperatures within burn-in room to do inverter burn-in testing.

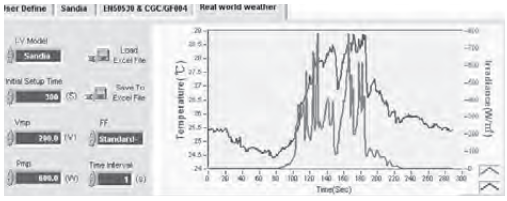
*Requires an extra power meter



Point	1	2	3	4	5	6	7	.....	4096
Voltage(V)	0	30	60	90	120	150	180	.....	600
Current(A)	11	10	9	8	7	6	5	.....	0

Real World Waether Simulation

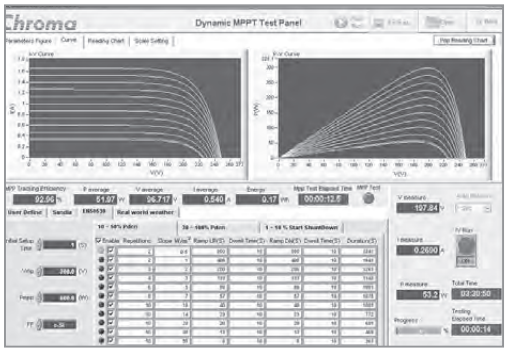
The real world weather simulation function allows the user to import real conditions of irradiation and temperature profiles of a whole day from excel file to Softpanel, in order to simulate the irradiation intensity and temperature level from early morning to nightfall. It can also set the interval time resolution to 1s for I-V curve update rate and enable the user to perform MPPT tracking tests under the simulation of actual weather environments.



Real World Weather Simulation

Solar Array I-V Curve Simulation Softpanel

The model 62000H-S Series includes a graphical user Interface software through remote digital interface (USB / GPIB / Ethernet / RS232) control. The user can easily program the I-V curve of the 62000H-S Series as well as the I-V & P-V curve for real-time testing. In addition it will display the MPPT status for the PV inverter. Readings and the report function with real-time monitoring using the softpanel are shown below.



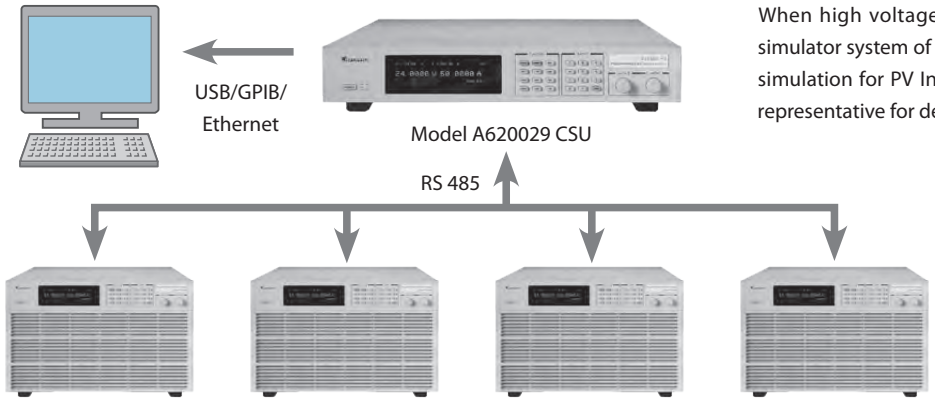
Solar Array Simulation SoftPanel

Simulates different solar cell materials I-V characteristic (Fill factor)

The purpose of the PV inverter is to convert the dc voltage (from solar array) to the ac power (utility). The better a PV inverter can adapt to the various irradiation & temperature conditions of sun, the more power that can be fed into the utility grid over time. So, the MPPT performance is a very important factor for PV generation system. The model 62000H-S Series is capable of simulating different types of standard crystalline, multi-crystalline and thin-film fill factor* parameters to verify the MPPT tracking algorithm mechanism and efficiency.

*Fill Factor = (Imp*Vmp)/(Isc*Voc)

Customization solar array simulator 1500V/60A/90kW



Note :

When high voltage 1500V is required, the customized solar array simulator system of 1500V/60A/90kW which can provide the I-V curve simulation for PV Inverter testing, please contact with Chroma sales representative for detailed information.

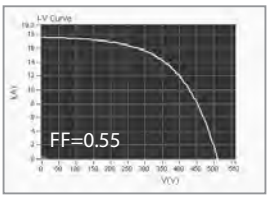
ELECTRICAL SPECIFICATIONS-WITH SOLAR ARRAY SIMULATION					
MODEL	**62020H-150S**	**62050H-600S**	**62100H-600S**	**62150H-600S**	**62150H-1000S**
Output Ratings					
Output Voltage	0-150V	0-600V	0-600V	0-600V	0-1000V
Output Current	0-40A	0-8.5A	0-17A	0-25A	0-15A
Output Power	2000W	5000W	10000W	15000W	15000W
Line Regulation					
Voltage	+/- 0.01% F.S.				
Current	+/- 0.05% F.S.				
Load Regulation					
Voltage	+/- 0.05% F.S.				
Current	+/- 0.1% F.S.				
Voltage Measurement					
Range	60V / 150V	120V / 600V	120V / 600V	120V / 600V	200V / 1000V
Accuracy	0.05% + 0.05%F.S.				
Current Measurement					
Range	16A / 40A	3.4A / 8.5A	6.8A / 17A	10A / 25A	6A / 15A
Accuracy	0.1% + 0.1%F.S.				
Output Noise&Ripple					
Voltage Noise(P-P)	450 mV	1500 mV	1500 mV	1500 mV	2550 mV
Voltage Ripple(rms)	65 mV	650 mV	650 mV	650 mV	1950 mV
Current Ripple(rms)	80 mA	150 mA	300 mA	450 mA	270mA
OVP Adjustment Range					
Range	0-110% programmable from front panel, remote digital inputs.				
Accuracy	+/- 1% of full-scale output				
Programming Response Time					
Rise Time: 50%F.S. CC Load	10ms (6.66A loading)	30ms	30ms	30ms	25ms
Rise Time: No Load	10ms	30ms	30ms	30ms	25ms
Fall Time: 50%F.S. CC Load	10ms (6.66A loading)	30ms	30ms	30ms	25ms
Fall Time: 10%F.S. CC Load	83ms (1.33A loading)	100ms	100ms	100ms	80ms
Fall Time: No Load	300ms	1.2s	1.2s	1.2s	3s
Slew Rate Control					
Voltage Slew Rate Range	0.001V/ms - 15V/ms	0.001V/ms - 20V/ms	0.001V/ms - 20V/ms	0.001V/ms - 20V/ms	0.001V/ms - 40V/ms
Current Slew Rate Range	0.001A/ms - 1A/ms, or INF	0.001A/ms - 0.1A/ms, or INF	0.001A/ms - 0.1A/ms, or INF	0.001A/ms - 0.1A/ms, or INF	0.001A/ms - 0.1A/ms, or INF
Minimum Transition Time	0.5ms				
Transient response time	Recovers within 1ms to +/- 0.75% of steady-state output for a 50% to 100% or 100% to 50% load change(1A/us)				
Efficiency	0.77 (Typical)	0.87 (Typical)			
Programming & Measurement Resolution					
Voltage (Front Panel)	10 mV	10 mV	10 mV	10 mV	100mV
Current (Front Panel)	1mA	1mA	1mA	1mA	1mA
Voltage (Digital Interface)	0.002% of Vmax				
Current (Digital Interface)	0.002% of Imax				
Voltage (Analog Interface)	0.04% of Vmax				
Current (Analog Interface)	0.04% of Imax				
Programming Accuracy					
Voltage (Front Panel and Digital Interface)	0.1% of Vmax				
Current (Front Panel and Digital Interface)	0.3% of Imax				
Voltage (Analog Interface)	0.2% of Vmax				
Current (Analog Interface)	0.3% of Imax				
Parallel Operation*1	Master / Slave control via CAN for 10 units up to 150KW. (Parallel: ten units)				
Auto Sequencing (I-V program)					
Number of program	10				
Number of sequence	100				
Dwell time Range	1s - 15,000S				
Trig. Source	Manual / Auto				

Note*1 : Max. Power is 20kW for 62020H-150S
Note*2 : There is parallel mode for DC power supply when the I-V curve function is enabled
Note*3 : None APG interface for A620027/A620028

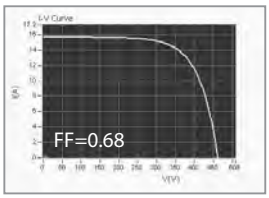
All specifications are subject to change without notice.

GENERAL SPECIFICATIONS						
MODEL		**62020H-150S**	**62050H-600S**	**62100H-600S**	**62150H-600S**	**62150H-1000S**
Remote Interface						
Analog programming		Standard				
USB		Standard				
RS232		Standard				
RS485		Standard				
GPIB		Optional				
Ethernet		Optional				
System bus(CAN)		Standard for master/slave control				
GPIB Command Response Time						
Vout setting		GPIB send command to DC source receiver <20ms				
Measure V&I		Under GPIB command using Measure <25ms				
Analog Interface (I/O) *3						
Voltage and Current Programming Inputs (I/P)		0-10Vdc / 0-5Vdc / 0-5k ohm / 4-20 mA of F.S.				
Voltage and Current monitor output (O/P)		0-10Vdc / 0-5Vdc / 4-20mA of F.S.				
External ON/OFF (I/P)		TTL:Active Low or High(Selective)				
DC_ON Signal (O/P)		Level by user define. (Time delay = 1 ms at voltage slew rate of 10V/ms.)				
CV or CC mode Indicator (O/P)		TTL Level High=CV mode ; TTL Level Low= CC mode				
OTP Indicator (O/P)		TTL: Active Low				
System Fault indicator(O/P)		TTL: Active Low				
Auxiliary power supply(O/P)		Nominal supply voltage : 12Vdc / Maximum current sink capability: 10mA				
Safety interlock(I/P)		Time accuracy: <100ms				
Remote inhibit(I/P)		TTL: Active Low				
Auto Sequencing(List Mode)						
Number of program		10				
Number of sequence		100				
Dwell time Range		5ms - 15000S				
Trig. Source		Manual / Auto / External				
Auto Sequencing (Step Mode)						
Start voltage		0 to Full scale				
End voltage		0 to Full scale				
Run time		10ms - 99hours				
Input Specification						
AC Input Volatage 3Phase, 3Wire+Ground		1Ø 200~220Vac ± 10% V_{LN}	3Ø 200~220Vac ± 10% V_{LL} 3Ø 380~400Vac ± 10% V_{LL} 3Ø 440~480Vac ± 10% V_{LL}			
AC Frequency range		47 ~ 63Hz				
Max Current (each phase)	200/220Vac	15.2A	39A	69A	93A	93A
	380/400Vac	--	22A	37A	50A	50A
	440/480Vac	--	19A	32A	44A	44A
General Specification						
Maximum Remote Sense Line Drop Compensation		2% of full scale voltage per line (4% total)				
Operating Temperature Range		0°C ~ 40°C				
Storage Temperature Range		-40°C ~ +85°C				
Dimension (HxWxD)		89 x 428 x 465 mm/ 3.5 x 16.85 x 16.73 inch	132.8 mm x 428 mm x 610 mm / 5.23 x 16.85 x 24.02 inch			
Weight		Approx. 17 kg / 37.44 lbs	Approx. 23 kg / 55.70 lbs	Approx. 29 kg / 63.88 lbs	Approx. 35 kg / 77.09 lbs	Approx. 35 kg / 77.09 lbs
Approval		CE	CE	CE	CE	CE

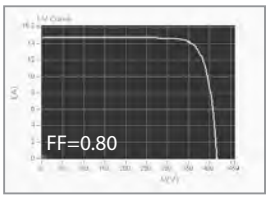
Note*3 : None APG interface for A620027/A620028



Thin-Film



Standard Crystalline Array



High-efficiency Crystalline



CAN USB GPIB APG RS-232 Ethernet CE

KEY FEATURES

- Voltage range: 1 ~ 150V
- Current range: 0 ~ 2000A (System)
- Power range: 1.5kW per module up to 120kW per system
- N+1 Redundancy
- High Power Density (464 mW / cm^3 = 7.13 W/In^3)
- Hot-swappable
- Remote Sense
- Remote ON / OFF
- CAN BUS Control
- DC OK Signal Output

Chroma's new 62000B series of Modular DC Power Supplies offer many unique features for Burn-in and plating applications. The features include a N+1 redundancy, high power densities, hot-swappable maintenance, remote ON/OFF and programmable control via the CAN BUS.

The 62000B family offers 5 types of power module with ranging from 1V to 150V, current from 10A to 90A, and offers two mainframe type of six and three position. The six position mainframe can envelop in up to six power modules paralleled operation for 9KW power output. The 62000B can easily parallel up to fourteen mainframe to 120KW with current sharing and CAN BUS control for bulk power applications.

The Modular DC Power Supplies of 62000B are very cost effective with high power density and low current ripple. These instruments have be designed for burn-in applications such as DC-DC converters, power inverters, telecom powers, battery chargers and many other types of electronic devices.

Modern power factor correction circuitry is incorporated in 62000B providing an input power factor above 0.98 to meet the IEC requirements. This PFC correction circuity not only reduces the input current but also raises the operating efficiency to over 80% Optional graphic SoftPanels and CAN BUS control allow for control and monitoring of the power system using an easy to use graphical interface.

Hot-swap Operation

Equipped with the functionality of N+1 redundancy and hot-swap, the 62000B Series of modular DC power supplies are most applicable for 24 hours non-stop applications such as the SMD plating production lines, as well as product life burn-in test for IT products like DC converters, inverters, fans, motors, switch components, and routers.

For continuous operation applications the modular hot-swap design allows engineers to replace the failure unit on-site without shutting down the entire system.

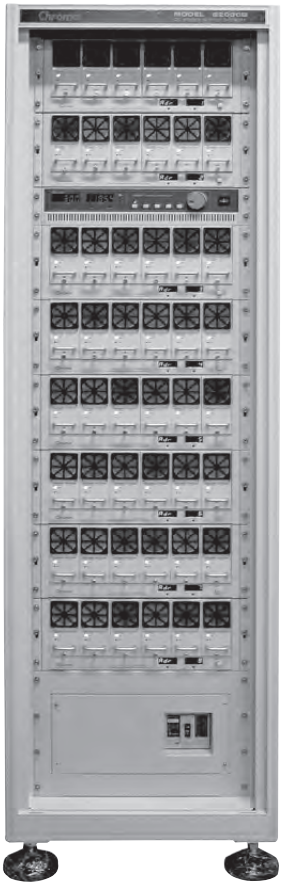


High Power Applications with CSU

The 62000B modular power supplies are capable of providing high power output up to 120KW/2000A with minimum specification degradation via CSU(Control & Supervisor Unit). Each chassis is designed to accommodate a maximum of 9KW and include current sharing capability to ensure system stability. In addition, for convenient control of even large power systems, a Control & Supervisor unit is provided to set and display output and protection circuits via a standard CAN BUS communication protocol.



Control & Supervisor Unit



Customized Power Solution

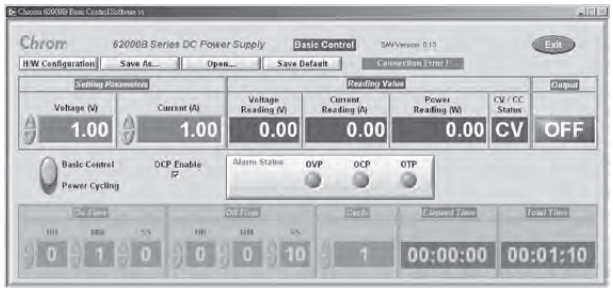
ORDERING INFORMATION

62000B-3-1 : Three Position 62000B Mainframe
62000B-6-1 : Six Position 62000B Mainframe
62015B-15-90 : DC Power Supply Module, 15V/90A/1350W
62015B-30-50 : DC Power Supply Module, 30V/50A/1500W
62015B-60-25 : DC Power Supply Module, 60V/25A/1500W
62015B-80-18 : DC Power Supply Module, 80V/18A/1440W
62015B-150-10 : DC Power Supply Module, 150V/10A/1500W
A620007 : Control & Supervisor Unit
A620008 : CAN BUS Interface for mainframe
A620010 : Rack Mounting Kit for mainframe
A620011 : Ethernet Interface for CSU
A620012 : AD-Link PCI 7841 CAN BUS Card
A620013 : 19" Rack (23U) for 62000B Series
A620014 : 19" Rack (41U) for 62000B Series
A620016 : Rack Mounting Kit for CSU
A620017 : Softpanel for 62000B Series
A620018 : NI USB-8473 high-speed USB to CAN interface
A620019 : USB Interface Control Box for mainframe & CSU
A620020 : GPIB Interface Control Box for mainframe & CSU
A620021 : Analog Interface Control Box for mainframe
A620022 : RS-485 Interface Control Box for mainframe & CSU

AVAILABLE POWER RATINGS

Current Rating / Power Rating / Voltage Rating	9KW	18KW	27KW	36KW	45KW
15V	540A	1080A	1620A	2160A	2700A
30V	300A	600A	900A	1200A	1500A
60V	150A	300A	450A	600A	750A
80V	108A	216A	324A	432A	540A
150V	60A	120A	180A	240A	300A
Paralleled unit of mainframe	1	2	3	4	5

Note : Call for more information on customization of high power system (>2000A)



Softpanel for Model 62000B Series

All specifications are subject to change without notice.

SPECIFICATIONS					
Model	**62015B-15-90**	**62015B-30-50**	**62015B-60-25**	**62015B-80-18**	**62015B-150-10**
Electrical Specifications					
Output Ratings					
Output Power	1350W	1500W	1500W	1440W	1500W
Output Voltage	1~15V	1~30V	1~60V	1~80V	1~150V
Output Current	1~90A	1~50A	1~25A	1~18A	1~10A
Line Regulation	0.1% F.S.				
Load Regulation *1	1% F.S.				
Programming Accuracy	1% F.S.				
Measurement Accuracy	1% F.S.				
Output Noise (20MHz)					
Voltage Noise (P-P)	100mV	100mV	200mV	200mV	400mV
Voltage Ripple (rms)	30mV	30mV	50mV	50mV	100mV
Current Ripple (rms)	0.9A	0.5A	0.25A	0.18A	0.1A
Efficiency	> 87% @ full load	> 88% @ full load			
Turn on over shoot voltage *2	5% of nominal output				
Transient Response Time *3	< 5 ms				
AC Input Voltage					
Six Position Mainframe	3Ø 200~240Vac ±10% V_{LL} or 3Ø 380~400Vac ±10% V_{LL}, 47~63 Hz				
Three Position Mainframe	1Ø 200~240Vac±10% V_{LN}, 47~63 Hz				
Input Power Factor	> 0.98@ full load				
Protection Function					
OVP	Automatically shuts down at 115% of set value				
Adjustment Range	1~16V	1~31V	1~65V	1~83V	1~155V
OCP	Current limit (0 ~ 100%) / OCP Shutdown at 115% of F.S.				
OTP	Automatically shuts down if internal limit is reached				
I/O Signal					
Remote ON/OFF (I/P)	Dry contact (closed = enabled), vice versa				
AUX Voltage	4 ~ 24V / 0.5A at mainframe (by trimmer adjust voltage)				
DC OK Signal Type (O/P)	Dry contact (closed = enabled) (Error : OVP / OCP / OTP / AC Fault)				
Programming Response Time *4 (Typical)					
Rise Time (Full Load)	For a programmed 5% to 95% step in output voltage : 100ms				
Rise Time (No Load)	For a programmed 5% to 95% step in output voltage : 100ms				
Fall Time (Full Load)	For a programmed 95% to 5% step in output voltage : 40ms				
Fall Time (No Load)	For a programmed 95% to 5% step in output voltage : 5s				
Vout Setting	CAN BUS send command to DC module receiver : 1s				
Measurement V & I	Under CAN command using fetch : 100ms				
Delay Time	For output ON/OFF enable and disable (under CAN command) : 5s(Single Mainframe)				
General Specifications					
Remote Sensing	3V max. line loss compensation				
Parallel Operation	Current Sharing (±5%)				
Operating Temperature	0 ~ 50°C				
Humidity Range	0 ~ 90% RH. Non-condensing				
Remote Interface	CAN BUS (optional)				
Safety & EMC	CE				
Dimension (H x W x D)	Mainframe : 175.6 x 443.9 x 466.2 mm / 6.91 x 17.48 x 18.35 inch (62000B-6-1) Mainframe : 175.6 x 239.9 x 466.2 mm / 6.91 x 9.44 x 18.35 inch (62000B-3-1) Module : 138.5 x 67.5 x 377.5 mm / 5.45 x 2.66 x 14.86 inch				
Weight	Mainframe : 14 Kg / 30.8 lbs (62000B-6-1) Mainframe : 8 Kg / 17.6 lbs (62000B-3-1) Module : 4 Kg / 8.8 lbs				

Note*1 : For 50% step load variation with remote sense at maximum output voltage
Note*2 : based on rise time of 100ms
Note*3 : Time for the output voltage to recover within 1% of its rated for a load changed of 25%
Note*4 : Six Position Mainframe through CAN

Switching Power Supply ATS

Model 8000



GPIB RS-232 RS-485 CE PFC

KEY FEATURES

- Open architecture software platform
  - Support instrument with GPIB / RS-232 or RS-485 / I²C /CAN BUS interfaces
  - User editable test item
  - User editable test program
  - User editable report format
  - Statistical report
  - On-line control function
  - User authority control
  - Release control
  - Activity log
  - Master / Slave control mode
  - Multi-UUT test capability for single-output PSU
  - Support bar code reader
  - Support Shop-floor control
  - Remote monitoring via internet
- Test command optimizer helps to improve test speed
- Capable of coding for any power supply testing applications
- Comprehensive hardware modules provide high accuracy and repetitive measurements
- High test throughput by system default test items
- Cost effective
- Other hardware expandable upon request
- Windows 98/NT/2000/XP/7 based software

This auto test system uses the unique test command optimization technology to prevent the repeating control commands from sending to the system hardware devices. This improves the system test speed dramatically and makes Chroma 8000, which uses open software architecture, highly efficient as a close or optimized auto test system.

To meet the power supply test requirements, Chroma Power Supply Auto Test System model 8000 has built in 56 ready-made test items. Users may create new test items based on new test requirements using the test item editing function, which gives users the capability to expand the test items unlimitedly.

With the powerful report, statistic and management functions, Chroma Power Supply Auto Test System model 8000 is able to provide complete tools to generate various test documents and perform system administration. Because the test and statistical reports are equally important nowadays for R/D evaluation, QA verification and mass production tests. So these save users a great deal of time for paper work.

Working under Windows 98/NT/2000/XP/7 operation system, Chroma 8000 Power Supply Auto Test System is able to get all the resources provided by Windows; thus, it can easily export the test results to network or to your web-page for remote manufacturing monitoring.

COMPREHENSIVE TEST ITEMS

OUTPUT PERFORMANCES

1. DC output voltage
2. DC output current
3. Peak-Peak noise
4. RMS noise
5. Current ripple*
6. Efficiency
7. In-test adjustment
8. Power good signal
9. Power fail signal
10. P/ S ON signal
11. Extended measure
12. Waveform capture
13. Overshoot voltage

INPUT CHARACTERISTICS

14. Input Inrush current
15. Input RMS current
16. Input peak current
17. Input power
18. Current harmonics against regulations
19. Input power factor
20. Input voltage ramp
21. Input freq. ramp
22. AC cycle drop out
23. PLD simulation

REGULATION TESTS

24. Current regulation
25. Voltage regulation
26. Total regulation

TIMING AND TRANSIENT

27. Power up sequence
28. Power down sequence
29. Transient response time
30. Transient spike
31. Turn ON time
32. Rise time
33. Fall time
34. Hold-up time
35. Extra timing
36. Tracking

PROTECTION TESTS

37. Short circuit
38. OV protection
39. UV protection
40. OL protection
41. OP protection

SPECIAL TESTS

42. Fan speed
43. Correlation test
44. UUT measurement verification test

SPECIAL FEATURE

45. Can BUS read/ write
46. I² C read/ write*
47. GPIB read/ write
48. RS-232 read/ write
49. RS-485 read/ write*
50. TTL signal control
51. Relay control
52. Bar code scan*
53. DMM measure

* These test items need to be created by users by using test item editor due to the variety of the UUTs, and unlimited customized or user defined test items are allowed.

DC to DC Converter Testing

Software: Special Design Test Items (Load Fault Power Dissipation Test, Switching Frequency Test, Synchnization Frequency Test)

Hardware: Create Standard Test Fixture platform (Receiver)



DC to DC Converter Test Fixture



DC to DC Converter



DC to DC Converter ATS

All specifications are subject to change without notice.

PV Inverter Testing

The Chroma 8000 ATS is equipped with optimized standard test items for PV inverters (the Unit Under Test), It meets IEEE1547, 1547.1, UL1741, GB/T 19939, CGC/GF004 preliminary test requirements. The user is only required to define the test conditions and specifications for the standard test items to perform the test.



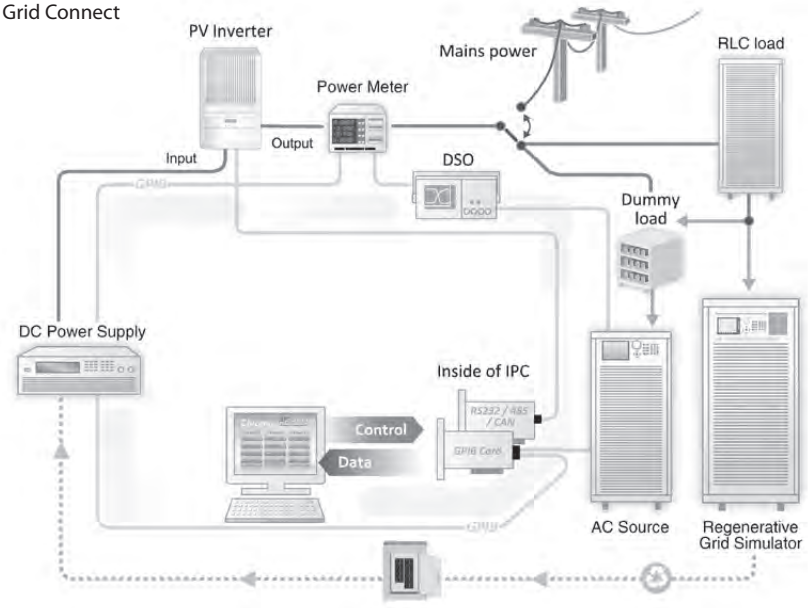
PV Inverter ATS



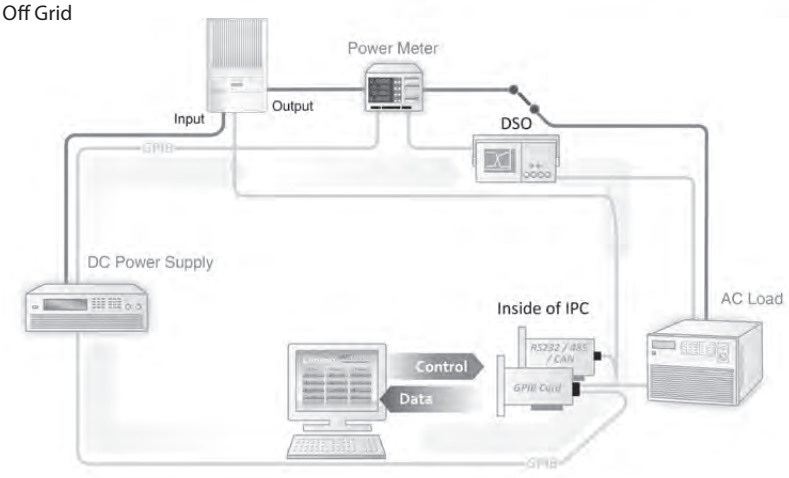
Micro Inverter ATS
(Parallel 4 DUTs)

Grid Connected PV Inverter Test Block Diagram

Grid Connect



Off Grid



Optimized Equipment & Test Items

The optimized test item covers 5 types of power supply test requirements. The OUTPUT PERFORMANCE test verifies the output characteristics of the UUT. The INPUT CHARACTERISTIC test checks the UUT input parameters. TIMING & TRANSIENT tests the timing and transient states during protection. The PROTECTION TESTS trigger and test the protection circuit, the SPECIAL TEST provides means to test the most sophisticated UUT when unique test routines are needed.

Output Performances

1. Output Voltage
2. Output Current
3. Output Power
4. Output Power Factor
5. EFF (CEC/European/Conversion/Max)
6. DC injection Current
7. THD
8. Current Harmonic Test
9. Night Time Power Consumption

Input Characteristics

10. Input Voltage
11. Input MPPT Voltage
12. Input Current
13. Input Power
14. Input MPPT Power

Timing & Transient

15. OVP/UVP Trip Time
16. OFP/UFP Trip Time
17. Anti-Islanding Trip Time *
18. Re On-Grid Time

Protection Tests

19. OV/UV Protection
20. OF/UF Protection
21. Anti-Islanding *

Special Tests

22. MPPT Efficiency
23. MPPT Time
24. MPPT Record
25. RS232/485/CAN communication

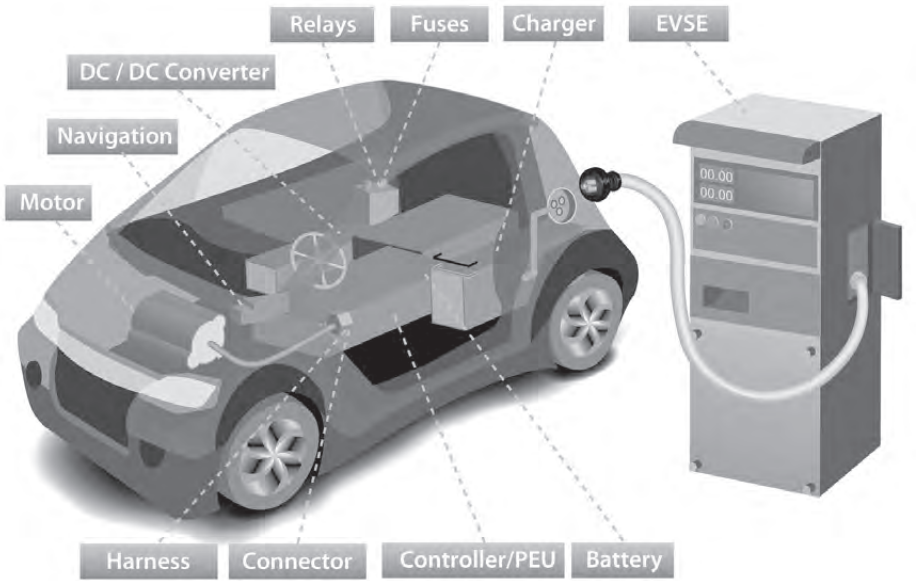
* The A800067 RLC load is required. This system can test automatically and meet regulations of multiple anti-islanding protection test conditions to save test time. It not only fits R&D and QC, but also very suitable for production line.

EV Power Electroncs Test Solutions

The power conversion section of the EV/HEV is composed of several power electronic units, which include the AC or DC EVSE (EV Supply Equipment), on-board charger, DC/DC converter, motor driver, etc. The Chroma 8000 addresses the specialized requirements involved in testing the power electronics during not only the development phase, but also the production phase.

The following pictures of the Chroma ATS show some applications for EV/HEV. The system will not only perform the tests and report it to an isolated PC, but it will also network to the shop-floor (MES) system for production line for data log-in, analysis and monitoring.

Power Electronics Devices in Electric Vehicle



Motor Driver ATS

For EV Motor driver & PCBA testing

- For Motor driver PCBA components voltage/ emperature/signal/ communication/ protection function testing
- For Motor driver over voltage/ over current/over temperature protection/ load regulation/ power testing



Motor Driver ATS

EVSE ATS

It is a customized system based on Chroma 8000 ATS specializing in verification of EV Supply Equipment (EVSE) and complying with SAE-J1772 in programming the test items for operation.

- Meets SAE-J1772, CNS15511, GB/T18487, GB/T27930, GB/T20234 standards
- Simulates various AC grid situation and EV charging mode



EVSE ATS

EV OBC & DC-DC Converter ATS

The automated test equipment are customized for EV OBC and DC to DC converter

- Meets all test requirements of EV on-board charger (OBC) and DC to DC converter
- Integrated connecting panels
- Exclusive test items
- Fully complies with QC/T 895 and GB/T 24347 test requirements



OBC & DC-DC Converter ATS

EV AC/DC Charging Compatibility ATS

- To simulates various states of EVSE to make sure AC charging compatibility before electric vehicle delivery
- Based on the requirements of different regulations to simulate EVSE for testing if electric vehicle can do accurate action or response appropriately when the signal contains error
- Testing response action of electric vehicle for EVSE transmission signal limit value in regulation to make sure the compatibility of miscellaneous EVSE

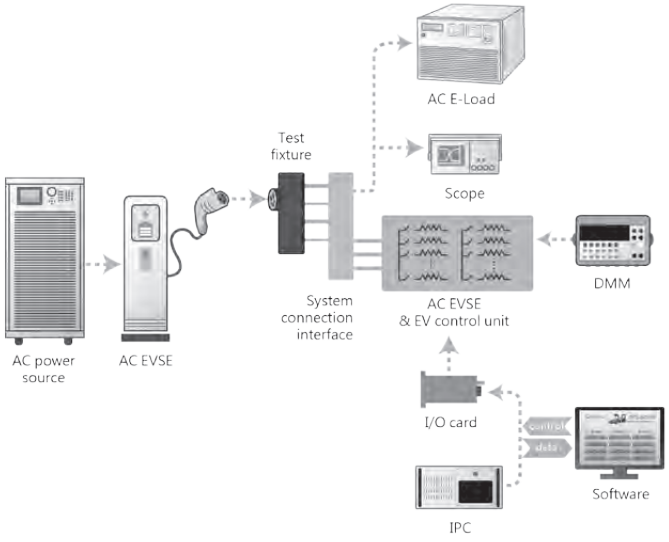


EV AC/DC Charging Compatibility ATS

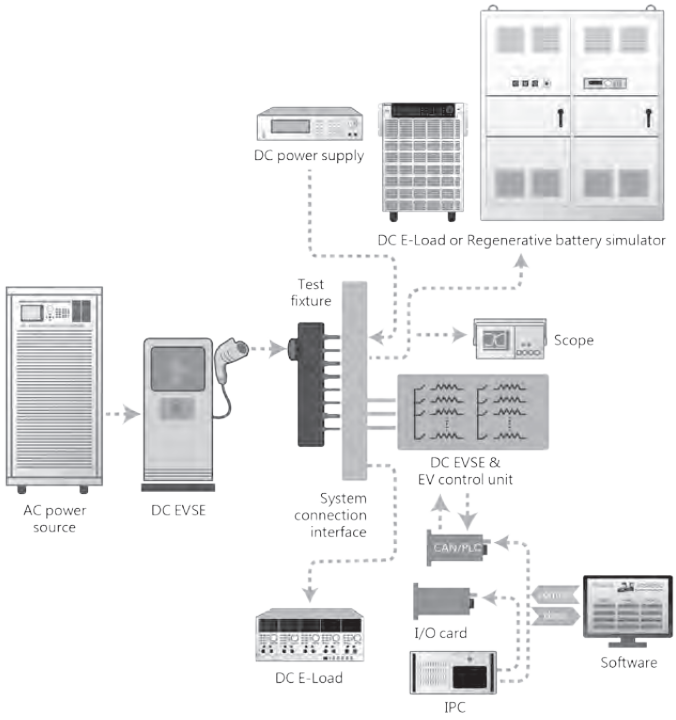
All specifications are subject to change without notice.

Electric Vehicle Supply Equipment testing Structure

AC output - AC charging station
AC charging station which delivers AC with lower power rating to the OBC (on board charger) of Electric Vehicle for AC to DC power conversion and the DC power is implemented for charging the Electric Vehicle battery pack.

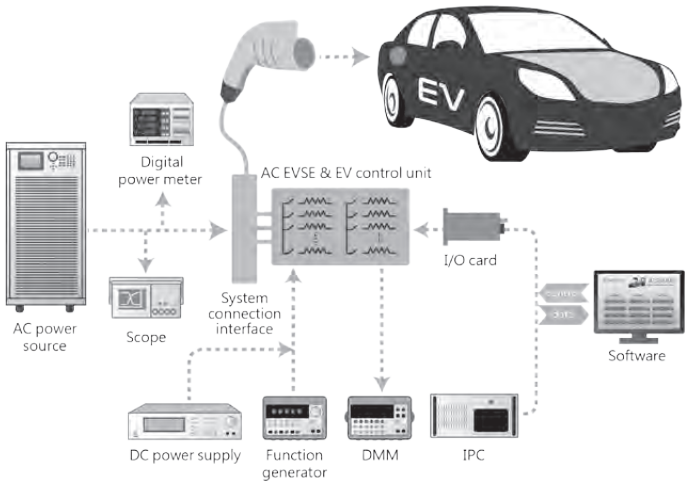


DC output - DC charging station
DC charging station which delivers DC in higher power rating with fast charging capability to the Electric Vehicle battery pack directly.

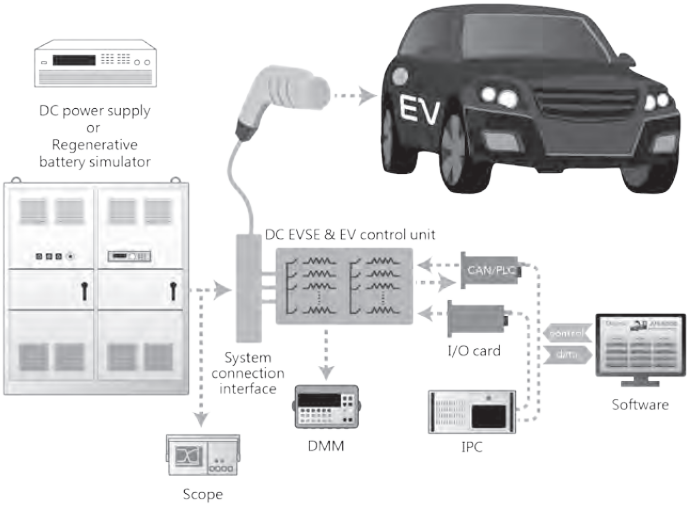


Electric Vehicle and Charging Station Interoperability Test

AC input -
AC charging station simulation for electric vehicle AC charging function testing.



DC input -
DC charging station simulation for Electric Vehicle DC charging function testing.



SPECIFICATIONS-1

Accurate and highly reliable hardware devices:

Power Meter				
Model	**66201**	**66202**	**66203**	**66204**
Measurement Channel	1	1	3	4
Power measurement range	12 ranges	24 ranges	48 ranges	48 ranges
Voltage measurement range	3 ranges	3 ranges	6 ranges	6 ranges
Current measurement range	4 ranges	8 ranges	8 ranges	8 ranges
Front panel display	Yes	Yes	Yes	Yes
Front panel editable	Yes	Yes	Yes	Yes
Harmonics measurement	No	Yes	Yes	Yes

* Please refer to respective product catalogs for detail specifications.

Electronic Load				
Model	**6310A series**	**6330A series**	**63200 series**	**63600 series**
Load mode	CC/CR/CV	CC/CR/CV	CC/CR/CV/CP	CC/CR/CV/CP/CZ
Power rating	30-1200W	30-1200W	2000-12000W	100-400W
Voltage range	1-500V	1-500V	1-600V	1-600V
Current range	Up to 240A	Up to 240A	Up to 1000A	Up to 80A
Slew rate	Up to 10A/μs	Up to 10A/μs	Up to 41.6A/μs	Up to 8A/μs
Measurements	Voltage/Current/Power	Voltage/Current/Power	Voltage/Current/Power	Voltage/Current/Power
Monitoring output	No	No	Current	Voltage/Current
Current share measurement	No	No	No	No
Noise measurement	No	No	No	No
Voltage sense input	Yes	Yes	Yes	Yes
Sync dynamic	No	Yes	Yes	Yes

* Please refer to respective product catalogs for detail specifications.

AC Source						
Model	**6400 series**	**6500 series**	**61500 series**	**61600 series**	**61700 series**	**61800 series**
Power rating	1500-9000VA	1200-9000VA	500-18000VA	500-18000VA	1500-12000VA	30-60KVA
Voltage range	0-100V/600V	0-300V	0-300V	0-300V	0-300V	0-300V
Output phase	1 or 3 phase	1 or 3 phase	1 or 3 phase	1 or 3 phase	3 phase	3 phase
DC output	No	No	Yes	Yes	Yes	Yes
Output measurement	Yes	Yes	Yes	Yes	Yes	Yes
Harmonic measurement	No	No	Yes	No	No	Yes
Waveform simulation	No	Yes	Yes	No	Yes	Yes
Programmable impedance	No	No	Yes	No	No	No
Harmonic synthesis	No	Yes	Yes	No	Yes	Yes
Inter-harmonic synthesis	No	No	Yes	No	Yes	Yes

* Please refer to respective product catalogs for detail specifications.

DC Source		
Model	**62000P series**	**62000H series**
Power rating	600,1200,2400,5000W	10KW,15KW
Voltage range	0-100V/600V	0-600V/1000V
Programmable current limit	Yes	Yes
Programmable OV point	Yes	Yes
Analog programming	Yes	Yes
Remote sensing	Yes	Yes
Line-drop compensation	5V	10%/4%

* Please refer to respective product catalogs for detail specifications.

Digital Measurement Card	
Model	**A800068**
Input DC Voltage Range	6V/30V/120V/500V
Noise Measurement range	500mV/5V/25V
Resolution	10 bit
Bandwidth	100MHz
Filter	HPF : 6Hz, 2KHz LPF : 2k, 10k, 100k, 500k, 1M, 4M, 10M, 20M, 100M Hz
Input Impedance	50 ohm / 0.95M ohm (DC)
AC mode AC Voltage range	20V/150V/300V (rms)
Resolution / Sampling Rate	16 bit / 1MS/s

Other hardware devices :

- Digital Multimeter (Agilent-34401A / Keithley 2000), other types or brands of DMM supported upon request
- Digital Storage Oscilloscope (Tektronix TDS-1000/2000/3000/5000/7000 series ,DPO-2000/3000/4000/5000/7000 series), other types or brands of DSO supported upon request

All specifications are subject to change without notice.

SPECIFICATIONS-2

System Controller	
Model	**PC/IPC**
CPU	Pentium III 600 or faster
SRAM	256KB
DRAM	512MB or higher
Hard drive	8.3GB or higher
CD-ROM	40X or faster
Monitor	15"
Keyboard	101 keys
I/O	Mouse/Print port
System Interface	GPIB/RS-232
System I/O	DIO Card
GPIB board	NI-PCI GPIB Card

Timing/Noise Analyzer			
Model	**6011**	**80611**	**80614**
NO. of input module	Up to 10	Up to 10	Up to 4
Noise measurement range	2V/0.4V	2V/0.4V	2V/0.4V
Low Pass Filter	Up to 20MHz	Up to 20MHz	Up to 20MHz
Input circuit	Differential input	Differential input	Differential input
Timing range	0-64 second	0-64 second	0-64 second
NO. of trigger input	4 sets	6 sets	6 sets
NO. of comparator	2 Input module	4 Input module	4 Input module
Controllable TTL bits	16 output	16 output / 16 input	No
Controllable floating relay	6	8	6
NO. of multiplex input	10	10	No
NO. of multiplex output	2 for DMM &. 2 for DSO	1 for DMM	No

ON/OFF Controller		
Model	**6013**	**80613**
Input	AC/DC	AC/DC
ON/OFF range - AC	0-360 deg	0-360 deg
Voltage range - AC	250V	277V
Current range - AC	30A	30A
Voltage range - DC	200V	200V
Current range - DC	40A	60A
Measurement Capability	By external DMM	Internal
Control Interface	Via Chroma 6011	RS 485

Short Circuit/OVP Tester		
Model	**6012**	**80612**
NO. of input terminal	Up to 6	Up to 6
Short circuit impedance	< 0.1 ohm	< 0.05 ohm
Short current measurement	Yes	Yes
Sync. Signal for short circuit	6 relay signal	6 relay signal
OVP/UVP testing	Internal / External	Internal / External
Internal impedance range	1K-1M ohm	100-1M ohm
External OVP/UVP source	DC source	DC source
Measurement Capability	By external DMM	Internal
Control Interface	Via Chroma 6011	RS 485

ORDERING INFORMATION

8000 : Switching Power Supply Auto Test System
6011/80611/80614 : Timing/Noise Analyzer
6011N/80611N : Timing/Noise module
6012/80612 : Short Circuit/OVP Tester
6013/80613 : ON/OFF Controller
5004ATM : System Controller
A800003 : 8000 software Package
A800004 : 19" Rack for Model 8000
A800005 : PCI BUS GPIB Card (National Instrument)
A800027 : Test Fixture for Model 8000
A800068 : Digital Measurement Card
DC Load Module: Refer to 6310A, 63200, 6330A,63600 Series
Digital Power Meter : Refer to Model 66200 Series
AC Source : Refer to Model 6400, 6500, 61500, 61600, 61700, 61800 Series
DC Source : Refer to Model 62000H, 62000P Series

All specifications are subject to change without notice.



KEY FEATURES

- User editable test program
- User editable report format
- User authority control
- Release control
- Activity log
- Comprehensive hardware modules provide high accuracy repetitive and measurements
- High test throughput by system default test items
- Cost effective
- Windows 98/NT/2000/XP/7 based software

Chroma Power Supply Auto Test System model 8200 provides complete solution for PC ATX power supply, adapter and battery charger testing. The application oriented system structure makes it the most cost effective test equipment for initial test in power supply production line.

To meet the power supply test requirements, Chroma Power Supply Auto Test System model 8200 has built in 20 ready-made test items. Users can simply enter the test conditions and test the power supply features while proceeding.

With the report and management functions, Chroma Power Supply Auto Test System model 8200 is able to provide versatile tools to establish test documents and perform system administration.

Meanwhile, Chroma Power Supply Auto Test System model 8200 can be upgraded to Chroma model 8000, the ultimate power supply auto test system, to fit the future test needs by changing system software and adding new hardware devices.

GENERAL TEST ITEMS

1. DC output voltage
2. DC output current
3. Voltage regulation
4. Current regulation
5. Turn ON time
6. Hold-up time
7. Power good signal
8. P/S ON signal
9. Efficiency
10. Input RMS current
11. Input peak current
12. Input power
13. Input power factor
14. Short circuit test
15. Short circuit current
16. OV protection
17. OL protection
18. OP protection
19. In-test adjustment

LED DRIVER TEST ITEMS

1. LED & Current Harmonics Test
2. LED & Discharge Load Test
3. LED & Hold On Adjust Test
4. LED & Input / Output Test
5. LED & Inrush Current Test
6. LED & Open Voltage Test
7. LED & OVP Test
8. LED & Power Saving Mode Test
9. LED & Regulation Test
10. LED & Short Circuit Test
11. LED & Static Test
12. LED & System Setup

ORDERING INFORMATION

8200 : Switching Power Supply Auto Test System
A820001 : PCI BUS AD Card
A800004 :19" Rack for Model 8200
A800005 : PCI BUS GPIB Card (National Instrument)
A820002 : 8200 software Package
A800027 : Test Fixture for Model 8200
A600013 : Adapter for A600011/A600012 Test Fixture (PC Standard)
A600014 : Adapter for A600011/A600012 Test Fixture (Terminal Block)
DC Load Module : Refer to Model 6310A, 6330A, 63600 Series
AC Source : Refer to Model 6400, 6500,61500, 61600, 61800 Series

* Please refer to Model 8000's specifications for detail instruments

SPECIFICATIONS

AC Source			
Model	**6500 series**	**61500 series**	**61600 series**
Power rating	1200-9000VA	500-18000VA	500-18000VA
Voltage range	0-300V	0-300V	0-300V
Output phase	1 or 3 phase	1 or 3 phase	1 or 3 phase
DC output	No	Yes	Yes
Output measurement	Yes	Yes	Yes
Harmonic measurement	No	Yes	No
Waveform simulation	Yes	Yes	No
Programmable impedance	No	Yes	No
Harmonic synthesis	Yes	Yes	No
Inter-harmonic synthesis	No	Yes	No

* Please refer to respective product catalogs for detail specifications.

All specifications are subject to change without notice.



USB RS-232 GPIB CE PFC

New test items and expandable hardware allows the Chroma 8010 ATS to meet the new testing requirements in the PC power industry such as voltage monotonic rise test, average efficiency test to comply with EPA requirements and various other tests.

Chroma 8010 ATS software runs under the user friendly Windows 98/2000/NT/XP/7(32 bits) operating environment, providing the test engineer a dedicated PC power supply testing system with easy access to Windows resources.

ORDERING INFORMATION

8010 : PC Power Supply ATS
6011/80611/80614 : Timing/Noise Analyzer
80611N : Timing/Noise module
8126 : Extended Controller
5004ATM : System Controller
A800027 : Test Fixture
A800004 : 19" Rack for Model 8010
A800068 : Digital Measurement Card
DC Load Module : Refer to Model 6330A Series
Digital Power Meter : Refer to Model 66200 Series
AC Source : Refer to Model 6500, 61500, 61600 Series
DC Source : Refer to Model 62000P Series

* Please refer to Model 8000's specifications for detail instruments

KEY FEATURES

- Equipped with both of the test performance of 6000 ATS and the flexible hardware architecture of 8000 ATS
- Provide optimized standard test items for the Unit Under Test (PC Power Supply) to deliver excellent test performance
- Easy-to-use software function specifically designed to meet the production line needs
- Flexible software platform with the following functions
  - User editable test program
  - User editable test report format
  - Test report generator
  - Statistical report
  - User authority control
  - Release control
  - Activity log
  - Support bar code reader
- New test items and expandable hardware allows the Chroma 8010 ATS to meet the new testing requirements in the PC power industry
  - Output voltage monotonic rise test
  - Average efficiency test that complies with EPA & 80Plus
- Windows 98/2000/NT/XP/7(32 bits) based software
- Offer the best performance/price ratio

Chroma 8010 PC Power Supply ATS is the test system of choice for PC power testing on the production line. Its test performance not only compares favorably with the Chroma 6000 ATS, but also has the flexibility of the Chroma 8000ATS hardware architecture. Available for selection are a range of hardware devices including AC/DC Power Supply, Electronic Load, Timing/Noise Analyzer, Power Meter and Extended Measurement Controller.

Chroma 8010 ATS was designed specifically with PC power supply characteristics in mind, with customized standard test items providing excellent test performance and optimized for mass production. The software provides a user friendly interface and intuitive controls suited for the production line.

OPTIMIZED TEST ITEMS

OUTPUT PERFORMANCES
1. DC output voltage
2. Peak-to-peak noise
3. RMS noise
4. Efficiency
5. In-test adjustment
6. Power good (PG) signal
7. Power fail (PF) signal
8. PS/ON signal
9. Extended measure
10. Overshoot voltage

INPUT CHARACTERISTICS
11. Input inrush current
12. Input RMS current
13. Input power
14. Input power factor
15. Input voltage ramp
16. Input frequency ramp
17. AC cycle drop out

REGULATION TESTS
18. Line regulation
19. Load regulation
20. Combine regulation
21. Dynamic load regulation
22. Sync.dynamic load regulation

TIMING AND TRANSIENT
23. Transient spike
24. Power up sequence
25. Rise time
26. Fall time
27. Power off time
28. Extended measure

PROTECTION TESTS
29. Short circuit
30. Over voltage protection
31. Over load protection

SPECIAL TESTS
32. Voltage monotonic test
33. Average efficiency test
34. Power on/off cycle test

SPECIAL FEATURE
35. TTL signal control
36. Relay control

規格表

Extended Controller	
Model	**8126**
Short circuit	
Input channel	10
Input Voltage Rating	60Vdc
Input Current Rating	20Adc
Short relay	30A continuous
OVP	
Output channel	10
Dc source input	1
Input Voltage Rating	60Vdc
Input Current Rating	20A continuous
Floating Relay	
Type	SPST
No. of Relay	6
Rating	5A
External Relay	
No. of Relay	1 via rear panel
Rating	5A
Timing (For Power Good / Power Fail Time)	
Input channel	2
Input Voltage Rating	5.5Vdc
Range	0-6.4Sec
Accuracy	1mS
Resolution	100µs
Trigger Reference Voltage	3Vdc / 4.5Vdc Select
Reference Voltage Accuracy	± 0.1V
Input Current Rating	20Adc
Input Voltage Rating	5.5Vdc
Range	0-6.4Sec



20U

KEY FEATURES

- Be able to test multiple UUTs concurrently that improve productivity significantly
- Equipped with both of the test performance of 6000 ATS and the flexible hardware architecture of 8000 ATS
- Provide optimized standard test items for the Unit Under Test (adapter/charger) to deliver excellent test performance
- Easy-to-use software function specially designed to meet the production line needs
- Flexible software platform with the following functions
  - Test Program editor
  - Test Report format editor
  - Test Report Generator
  - Statistics Analysis Report editor
  - User level setting
  - Release control
  - Activity log
  - Supporting bar code reader
- New test items and extended hardware are able to expand to fulfill the new requirements for adapter/chcrger industry
  - Average efficiency test that complies with Energy Star
- Rack specially designed more meet to the production line
- Windows 98/2000/NT/XP/7 based software

Chroma 8020 Adapter/Charger ATS is the best test system for testing Adapter and Charger in the production line. 8020 is able to test multiple UUTs concurrently that improve productivity significantly, the hardware architecture is also as flexible as Chroma 8000 ATS. There are many hardware devices available for selection such as AC Power Supply, Electronic Load, Timing/Noise Analyzer and Power Meter.

Chroma 8020 has standard test items specially customized and optimized for the features of Adapter and Charger that provides excellent test performance to meet the requirements of mass production. Meanwhile, the software equipped is very friendly and easy to operate that is suitable for production line use.

USB GPIB RS-232 CE PFC

New test items and extended hardware are expanded to Chroma 8020 ATS for the new test requirements in the Adapter/Charger industry, such as average efficiency to comply with Energy Star requirement, and etc.

Chroma 8020 ATS runs under the easy-to-learn Windows 98/2000/NT/XP/7 environment with a specialized power test system for test engineers so that they can utilize the Windows resources easily.

OPTIMIZED TEST ITEMS

OUTPUT PERFORMANCES

1. DC output voltage
2. DC output current
3. DC output power
4. Peak-to-peak noise
5. RMS noise
6. Efficiency
7. In-test adjustment
8. Overshoot voltage

INPUT CHARACTERISTICS

9. Input inrush current
10. Input RMS current
11. Input power
12. Input power factor
13. AC cycle drop out
14. Input voltage ramp

REGULATION TESTS

15. Line regulation
16. Load regulation
17. Combine regulation
18. Dynamic load regulation
19. Sync. dynamic load regulation

TIMING AND TRANSIENT

20. Power up sequence
21. Rise time
22. Fall time
23. Power off time

PROTECTION TESTS

24. Short circuit
25. Over load protection
26. Over voltage protection

SPECIAL TESTS

27. Average efficiency test
28. ID Pin Singnal measurement
29. Quick Charge 2.0 Charger test
30. Pump Express Charger test
31. Type C USB PD test

SPECIAL FEATURE

32. TTL signal control
33. Relay control

ORDERING INFORMATION

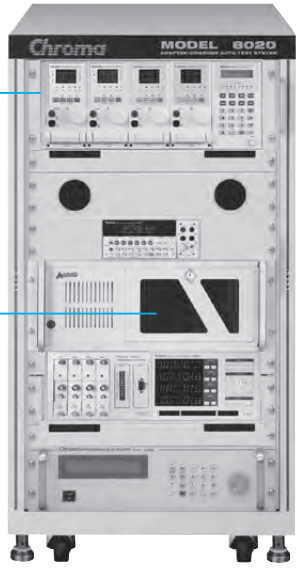
8020 : Adapter / Charger ATS
80611/80614 : Timing/Noise Analyzer
80611N : Timing/Noise Module
84903 : Control Card
84904 : DMM Card
5004ATM : System Controller
A800004 : 19" Rack for Model 8020
A800068 : Digital Measurement Card
A802001 : 4+4 Multi-UUT Test Fixture
A806101/A806103 : 100 MHz HF MUX Module
A806102/A806104 : Digital Output Module
DC Load Module : Refer to Model 6330A, 63600 Series
Digital Power Meter : Refer to Model 66200 Series
AC Source : Refer to Model 6500, 61500, 61600 Series
I/O Card : ADLink 7230

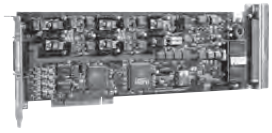
* Please refer to Model 8000's specifications for detail instruments



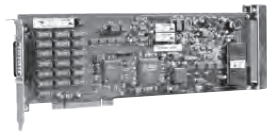
A802001 : 4+4 Multi-UUT Test Fixture

The 63600 High Speed DC Electronic Load is applied to verify PUMP Express Charger.





The 84903 Control Card is applied to verify Quick Charge 2.0 charger.



The 84904 DMM Card is applied to measure the voltage of charger ID pin.

All specifications are subject to change without notice.



KEY FEATURES

- For LED Power Driver testing
- Capable to test Multi-UUT/Multi-output concurrently that improve productivity
- Provide optimized standard test items for the Unit Under Test (LED Power Driver) to deliver excellent test performance
- Open architecture software
  - Expandable hardware support
  - Support instrument with GPIB/RS-232/RS-485/I²C interface
  - User editable test library
  - User editable test programs
  - User editable reports
  - Statistical report
  - On-line Softpanel
  - User authority control
  - Release control
  - Activity log
  - Support bar code reader
- Windows 98/2000/NT/XP/7 based software

Chroma 8491 LED Power Driver ATS is the ultimate test system for LED Power Driver. It is able to test Multi-UUT/Multi-output concurrently improving productivity significantly. The hardware devices available for selection include AC/DC Power Supply, Power Meter, PCI interface function card, Transducer Unit and the industries first LED Load simulator for simulating LED loading with 6330A series Electronic Loads.

The PCI interface function card - LED Power Driver Measurement Card & Control Card, they measure Dimming Current / Frequency / Duty & provide BL control signal(DC level, PWM, SM BUS), and Enable ON/OFF signal. Furthermore the Timing / Noise Card is using in Ripple Current measurement at 20MHz bandwidth.

USB GPIB RS-232 CE PFC

The Chroma 8491 ATS is equipped with optimized standard test items for LED power driver testing. The user is only required to define the test conditions and specifications for the standard test items to perform the test.

Chroma 8491 ATS software runs under the user friendly Windows 98/2000/NT/XP/7 operating environment, providing the test engineer a dedicated LED Power Driver testing system with easy access to Windows resources.

OPTIMIZED TEST ITEMS

OUTPUT PERFORMANCES

1. Output Voltage
2. Output Current
3. Ripple Current (RMS & p-p)
4. Dimming Current
5. Dimming Frequency
6. Dimming Duty
7. Efficiency
8. In-test adjustment
9. Turn ON Overshoot Current

INPUT CHARACTERISTICS

10. Input Inrush Current
11. Input RMS Current
12. Input Peak Current
13. Input Power
14. Current Harmonics
15. Input Power Factor
16. Input Voltage Ramp
17. Input Freq. Ramp
18. AC Cycle Drop Out
19. PLD Simulation

REGULATION TESTS

20. Current Regulation
21. Voltage Regulation
22. Total Regulation

TIMING & TRANSIENT

23. Turn ON Time
24. Hold Up Time
25. Rise Time
26. Fall Time

PROTECTION TESTS

27. Short Circuit
28. OV Protection
29. OL Protection *
30. OP Protection *

SPECIAL TESTS

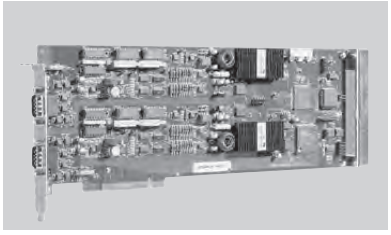
31. GPIB Read/Write
32. RS-232 Read/Write

* If UUT is constant voltage output

ORDERING INFORMATION

8491 : LED Power Driver ATS
A800068 : Digital Measurement Card
A849008 : Control Unit
84911 : LED Power Driver Measurement Card
84903 : Control Card
A849101 : Transducer Unit
A849102 : Transducer Module 400mA/500V
A849103 : Transducer Module 1600mA/500V
A849104 : Transducer Module 20A/500V
6011 / 80611 / 80614 : Timing / Noise Analyzer
6011N / 80611N : Timing / Noise Module
6012 / 80612 : Short Circuit/OVP Tester
6013 / 80613 : ON / OFF Controller
DC Load Module : Refer to Model 6310A, 6330A, 63600 Series
Digital Power Meter : Refer to Model 66200 Series
AC Source : Refer to Model 6500, 61500, 61600 Series
DC Source : Refer to Model 62000P Series

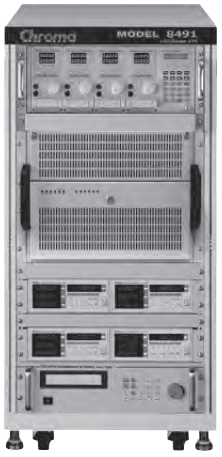
* Please refer to Model 8000's specifications for detail instruments



84911 : LED Power Driver Measurement Card



A849101 : Transducer Unit



8491 : LED Power Driver ATS

SPECIFICATIONS-1

Transducer Unit		A849101
No. of slot		8
Input Voltage Range		95~240 Vac @ 50 / 60Hz
Dimension (HxWxD)		221.5 x 450 x 500 mm / 8.72 x 17.72 x 19.69 inch

Transducer Module 400mA/500V		A849102
Input		
Vrms	Range	0~80V / 0~500V
	Bandwidth	200 KHz @ -3dB
	Accuracy	0.3%+0.2%F.S.
Irms	Range	0~100mA / 0~200mA / 0~400mA
	Bandwidth	200KHz @ -3dB
	Accuracy	0.5%+0.5%F.S.
Ripple Current(rms & p-p)	Range	0~50mAp-p / 0~100mAp-p / 0~150mAp-p
	Bandwidth	20MHz @ -3dB
	Accuracy	0.5%+0.5%F.S.
Voltage Ripple/Noise (rms & p-p)	Range	2.5Vp-p / 20Vp-p
	Bandwidth	20MHz @ -3dB
	Accuracy	1% F.S.
-3dB Tolerance		±1dB
Output		
9 Pin D-sub(to 84911 M card)	Range	4Vpk
BNC(to 80611N card)	Range	2Vp-p

Transducer Module 1600mA/500V		A849103
Input		
Vrms	Range	0~80V / 0~500V
	Bandwidth	200KHz @ -3dB
	Accuracy	0.3%+0.2%F.S.
Irms	Range	0~400mA / 0~800mA / 0~1600mA
	Bandwidth	200KHz @ -3dB
	Accuracy	0.5%+0.5%F.S.
Ripple Current (rms & p-p)	Range	0~100mAp-p / 0~400mAp-p / 0~800mAp-p
	Bandwidth	20MHz @ -3dB
	Accuracy	0.5%+0.5%F.S.
Voltage Ripple/Noise (rms & p-p)	Range	2.5Vp-p / 20Vp-p
	Bandwidth	20MHz @ -3dB
	Accuracy	1% F.S.
-3dB Tolerance		±1dB
Output		
9 Pin D-sub(to 84911 M card)	Range	4Vpk
BNC(to 80611N card)	Range	2Vp-p

A849104 Transducer Module 20A/500V		A849104
Input		
Vrms	Range	0~80V / 0~500V
	Bandwidth	200KHz @ -3dB
	Accuracy	0.3%+0.2%F.S.
Irms	Range	0~5A / 0~10A / 0~20A
	Bandwidth	200KHz @ -3dB
	Accuracy	0.5%+0.5%F.S.
Ripple Current(rms & p-p)	Range	0~1.25Ap-p / 0~5Ap-p / 0~10Ap-p
	Bandwidth	20MHz @ -3dB
	Accuracy	0.5%+30mA@5A, 0.5%+60mA@10A/20A
Voltage Ripple/Noise(rms & p-p)	Range	2.5Vp-p / 20Vp-p
	Bandwidth	20MHz @ -3dB
	Accuracy	1%F.S.
-3dB Tolerance		±1dB
Output		
9 Pin D-sub(to 84911 M card)	Range	4Vpk
BNC(to 80611N card)	Range	2Vp-p

• Continued on next page ➟

All specifications are subject to change without notice.

SPECIFICATIONS-2

LED Driver Measurement Card	84911
Vac measurement	
Input Voltage	4Vpk max.
Vpk+ / Vpk- / Vpp measurement	
Range	4Vpk
Bandwidth	10k-200kHz
Resolution	14bits
Accuracy	0.5%+0.5%F.S.(100-100kHz) 1%+0.5%F.S.(100K-200kHz)
Vrms measurement	
Range	4Vrms~2Vrms / 2Vrms~1Vrms / 1Vrms~0.5Vrms
Bandwidth	10k-200kHz
Resolution	14bits
Accuracy	1%+0.2%F.S.(100-100kHz) 1.5%+0.2%F.S.(100K-200kHz)
Iac measurement	
Input Voltage	4Vpk max.
Ipk+ / Ipk- / Ipp measurement	
Range	4Vpk
Bandwidth	10k-200kHz
Resolution	14bits
Accuracy	0.5%+0.5%F.S.(100-100kHz) 1%+0.5%F.S.(100K-200kHz)
Irms measurement	
Range	4Vrms~2Vrms / 2Vrms~1Vrms / 1Vrms~0.5Vrms 0.5Vrms~0.25Vrms / 0.25Vrms~0.125Vrms / 0.125Vrms~0.06Vrms
Bandwidth	10K-200KHz
Resolution	14bits
Accuracy	1%+0.2%F.S.(10K-100kHz) 1.5%+0.2%F.S.(100K-200kHz)
Pac measurement	
Range	V range x I range
Bandwidth	10K-200KHz
Resolution	14bit
Accuracy	1%+0.2%F.S.(10K-100kHz) 2%+0.3%F.S.(100K-200kHz)
Frequency measurement	
Range	10Hz-35KHz
Resolution	1Hz
Accuracy	0.1%reading
Input	Via voltage/current input
Timing measurement	
Trigger input	External x1(AC ON/Enable, A849101) and Vmeasurement input and Imeasurement input
Trigger level	
Range	5% ~ 95%F.S.
Resolution	2mV for voltage / 2mV for current
Accuracy	1%setting
Timing measure	
Resolution	0.01uS / 0.1mS
Accuracy	0.1uS / 1mS
Timing range	65uS / 650msec
Burst Mode measurement	
Frequency	
Range	10Hz-35KHz
Resolution	0.1Hz
Accuracy	0.1%reading
Duty(Ton)	
Range	3us-90ms
Resolution	1us
Accuracy	Error Max : 1us
Measurement speed	<10mS
Interface	PCI
Dimension	1 Slot width

Control Card	84903
BL control	
DC level control	
Program level	0 ~ 10V
Resolution	11 bits
Level Accuracy	0.5 % setting + 0.1 % F.S.
Sourcing current	20mA
PWM control	
Program level	0 ~ 10V
Resolution	7 bits
Accuracy	2 % + 1 % F.S (No Load) / 5.5% +1% F.S. (20mA output)
Sourcing current	20mA
Frequency	20Hz ~ 10kHz / 10kHz ~ 100kHz
Freq. Resolution	1Hz
Freq. Accuracy	0.1% (10kHz) / 1% (100kHz)
Duty	0 % ~ 100 % (10kHz) / 5% ~ 95% (100kHz)
Duty Resolution	1 %
Duty Accuracy	Error Max : 100nS
SMBUS control	
DC Output	5V
SM DATA	Bidirectional
SM CLK	Bidirectional
BLI measurement (DC)	
Range	0 ~ 20mA
Resolution	15 bits
Accuracy	0.1% reading + 1% F.S.
Analog output (Enable V and Vsave1, 2)	
Channel	
No. of channel	1 for Enable 2 for Vsave
DC level output	
Program level	0 ~ 10V
Resolution	11 bits
Level Accuracy	0.5 % setting + 0.1 % F.S.
Sourcing current	20mA
Analog I measurement (Idc)	
Range	0 ~ 20mA
Resolution	15 bits
Accuracy	0.1% reading + 1% F.S.
Digital I/O	
No. of channel	12 bits For Output 4 bits For Input
Output type	Open collector
Measurement speed	< 30mS
Interface	PCI
Dimension	1 Slot width

Battery Cell Formation System 11-1
Automatic Battery Cell Test Equipment 11-2
Battery Cell Charge & Discharge Test System 11-3
Regenerative Battery Pack Test System 11-5
Battery Pack ATS 11-13



Battery Cell Formation System



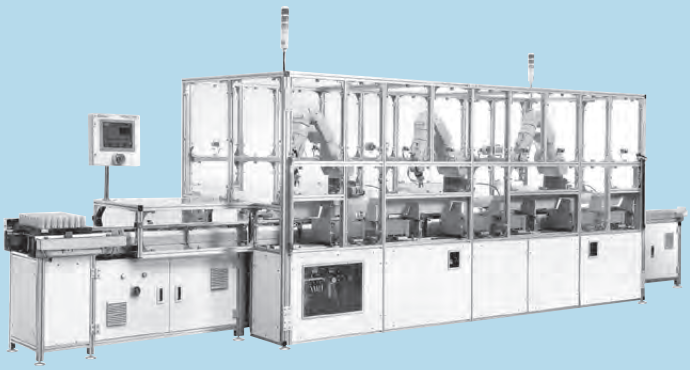
OCV/ACR Test Equipment



Barcode Binding Equipment



Rework Sorter



Grouping Equipment



Battery Cell Charge & Discharge Test System





Regenerative Battery Pack Test System



Battery Pack ATS

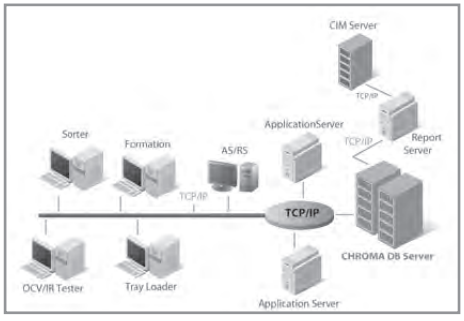




Hot Swap & Redundant DC Power Supplies



Plug In & Precise Electronic Modules



With Manufacturing Execution System

KEY FEATURES

- ERM (Energy Recycling Module) recycles discharged energy
- BVT (Battery Voltage Tracking) reduces power consumption while battery charging
- AC Energy Recycling : regenerate to grid
- Plug-in module design simplifies service and maintenance
- Real-time outer-loop resistance check
- System safety/test reliability through PLC/IPC monitoring of all sensors (temperature, smoke, device type and battery tray position)
- Systems are linked as a LAN offering remote monitoring and control
- Automated handling and sorting are available
- Automated calibration fixture with the small-size and wireless communication can calibrate and verify multiple channels at once, coordinate the production route with MES

Chroma 17000 series is specifically designed for the formation of Lithium Ion and Lithium Polymer secondary batteries. The 17000 series is a complete turn-key system, including carrier trays, robust battery probe contacts, high quality charge/discharge modules and intuitive software all under computer control.

Linear Type

Patented Battery Voltage Tracking (BVT) DC-DC conversion power modules minimize power consumption in battery charging, and Energy Recycle Modules (ERM) recycle the discharged energy directly back to the DC power system for increased power efficiency.

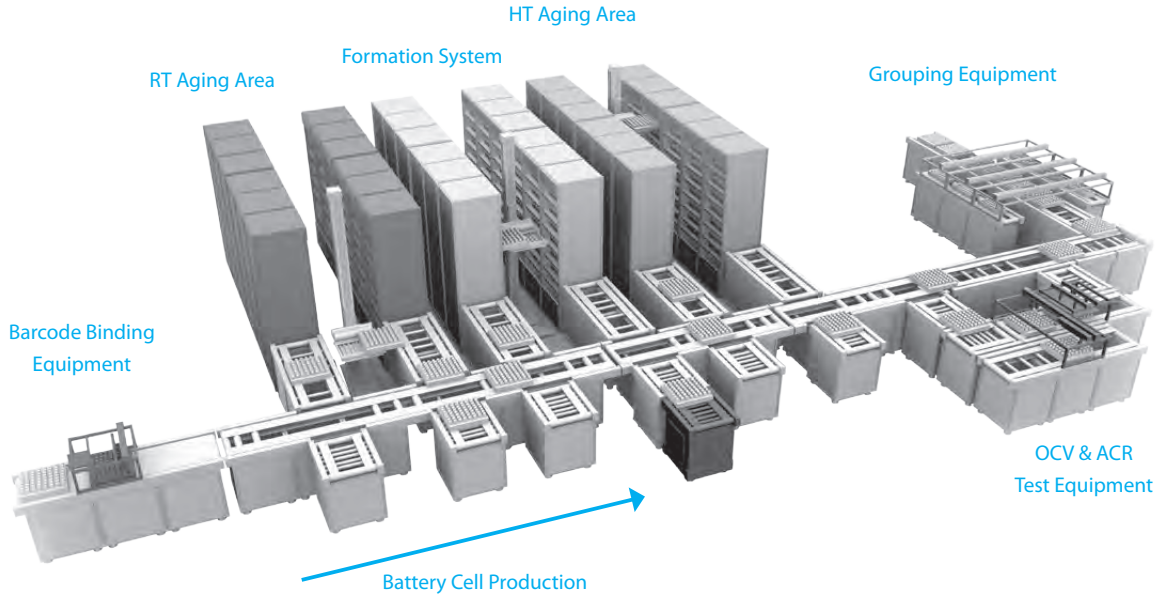
Switching Type

Regenerative design with low heat consumption, discharge energy Regenerate to electricity grid, this power source will transfer the battery discharged energy to charging channels to lower system power requirement. On the other hand, once discharging energy is higher than battery charging and system requirement, this converter will transfer the power back to facility grid. These power saving designs provide a planet friendly solution along with cost savings by reducing energy consumption.

The intuitive software provides a flexible selection in the charge/discharge channel, current rating, and modules under test. These features allow the Series 17000 to be used for final cell development, pilot line production, high volume production and ongoing reliability monitoring/ quality control.

ORDERING INFORMATION

17000 : Battery Cell Formation System



All specifications are subject to change without notice.



17800 : OCV/ACR Test Equipment

KEY FEATURES

- High-Precision Measurement
- High Sampling Rate
- Automated Test Equipment
- Remote Control/Management
- Customization and Automation
- High Efficiency & Reliability
- Avoid Operation Error
- Remote Control/Management

Chroma specifically developed battery cell test solution which is an integrated solution for battery cell formation & grading processes. From battery cell formation procedure to grouping process, Chroma 17900 series are customized with professional planning service which includes manufacturing flow path planning, test station/ equipment planning, test data management and so on to create high performance manufacturing capability.

Measuring OCV (Open Circuit Voltage) and ACR (AC Resistance) are one of the most important tests during battery cell manufacturing. In order to have high-speed and high-reliability OCV/ ACR measurement readings, customized Chroma 17800 can follow customers' manufacturing process flow to test a batch of battery cell OCV/ ACR with in process tray or any other carrying method.

Chroma 17800 can be designed to test both OCV/ ACR in a time sequence or individually. High-speed measurement can catch a batch of battery cell accurate readings and upload to test result database by Ethernet. Through customized probing unit can totally fit the tray size and battery cell size. Automated contact design improves the reliability of electrodes connection and keeps the contact consistence.

Chroma 17900 Automatic Equipment includes following automated equipment. Chroma 17910 Barcode Binding Equipment links the serial numbers of battery cell & its carrying tray. Then upload them to server or management system. This link provides a traceability of each battery cell. Furthermore, its high efficiency and low cost advantages bring improvement of manufacturing performance.

Chroma 17920 Rework Sorter helps to pick defect battery cell up during whole formation processes at rework station. According to the definitions of flow path planning in MES, operators will know how to deal with those battery cells. This function properly controls process flow and also avoids quality issues by unexpected operation errors.

Chroma 17930 Grouping Equipment is automated grading equipment. It will follow pre-defined criteria to grade battery cells with specific ranks. Different rank of battery cell will be moved to different outgoing tray by grouping equipment. Users can define the grading criteria by battery cell characteristics and test results from formation processes. Automatic grouping equipment helps the grading process to be more reliable and avoid unexpected operation errors.

ORDERING INFORMATION

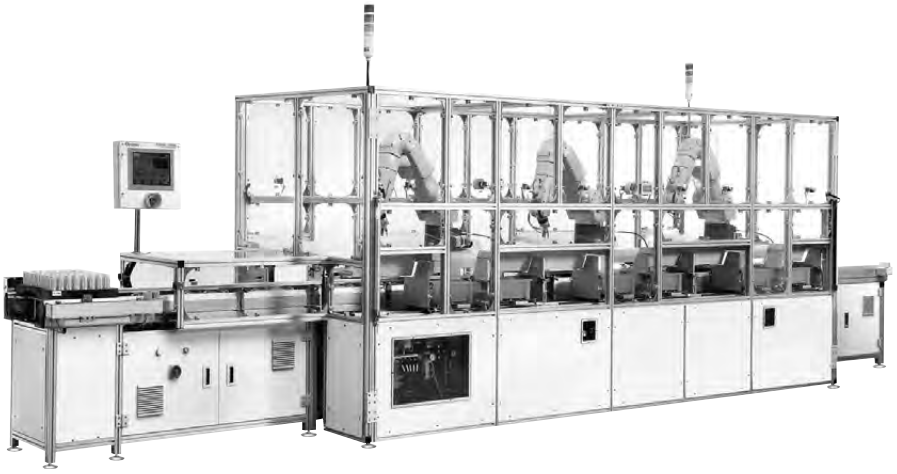
17800 : OCV/ACR Test Equipment
17910 : Barcode Binding Equipment
17920 : Rework Sorter
17930 : Grouping Equipment



17910 : Barcode Binding Equipment



17920 : Rework Sorter



17930 : Grouping Equipment



KEY FEATURES

- High precision output and measurement up to 0.02%
- Independent operation and test
- Channel parallel output function maximum 1200A
- High Sampling Rate up to 10ms
- CC/CC-CV/CP/CV charge/discharge modes
- Flexible (Δt, ΔV, ΔI, ΔQ, ΔW), data acquisition
- Real-time data acquisition and log (Q, Vt, It, time) and step termination status (Q, V_end, I_end, time)
- Linear circuit design, low ripple current (17202-5-20 & 17202-5-30)
- Build-in two battery DCIR test modes for rapid and accurate results
- Build-in EDLC capacitance (F) and DCIR test functions to provide prompt and accurate test results (17202-5-20 & 17202-5-30 only)
- Real-time outer loop resistance monitoring
- Modular design for easy installation and maintenance (17202-5-20 & 17202-5-30 only)
- Composed with redundancy DC power supply, avoid the effect for long term test during power down(62000B only)
- Discharging energy recycle function (A691103 only)
- Programmable ACR、LC Functions (option A172010)

FUNCTIONS

- Battery charge & discharge test
- Battery capacity and DCIR test
- EDLC charge & discharge test (17202-5-20 & 17202-5-30 only)
- EDLC capacitance and DCR (17202-5-20 & 17202-5-30 only)
- LIC Charge and Discharge Test
- LIC capacitance and DCR

APPLICATIONS

- Charge & discharge life cycle test
- OQC test
- IQC test
- Battery characteristic analysis
- Material test
- Production trial run
- Battery cell voltage balance

Chroma 17011 Programmable Charge/Discharge Test System is a high precision equipment designed specifically for testing Lithium-ion secondary battery, and Electrical Double Layer Capacitors (EDLC). It is suitable for cycle life testing, incoming and shipping inspection, product characteristics screening, material experiment and small batch trial run. The system is composed of Chroma 17200 Series Charge/Discharge Tester with Chroma 62000B Series Modular DC Power Supply or Chroma A691103 DC/AC Bi-directional Converter.

Chroma 17011 has fast output and measurement recording capability with highly accurate specification to assure the test quality. Its stable performance is applicable for various tests requiring reliable data. The flexible programming function is capable of sending recipe to each channel for independent test. Moreover, the design of multi-channel architecture can be configured based on the test requirement. The test channel supports parallel output that can be setup flexibly for large current tests.

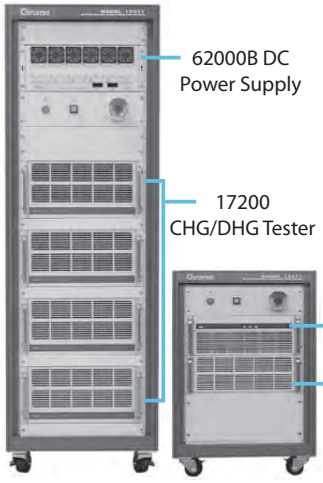
When 17011 system configure 17212R-5-100 for high current charge/discharge testing application, Chroma A691103 DC/AC Bi-direction converter will be the DC power source. This power source will transfer the battery discharged energy to charging channels to lower system power requirement. On the other hand, once discharging energy is higher than battery charging and system requirement, this converter will transfer the power back to facility grid. This feature will not only recycling energy and decreasing AC power requirement, but also reduce heat effect. It helps to reduce air condition costs and extend system life.

Chroma 17011 uses Ethernet interface to connect an external computer to control and program each channel independently with multiple test modes built in. It is able to implement the charge and discharge tests of CC-CV, CC, CV, CP, battery DCIR tests, Waveform tests.

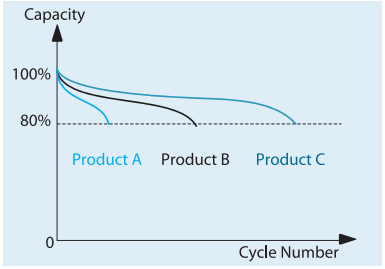
The built-in IEC 62391 (same as EIAJ-2377) for capacitance and DCR measurement solution are supplied for EDLC tests, which allows the user to utilize the standard to calculate the capacitance and internal resistance value without programming and data calculation.

Integrating Chroma A172010 ACR test switch fixture and ACR meter are able to measure 1kHz ACR and leakage current, while integrating Chroma 51101 are able to measure temperature. Each channel can specify up to eight temperature record points, data recorded in statements.

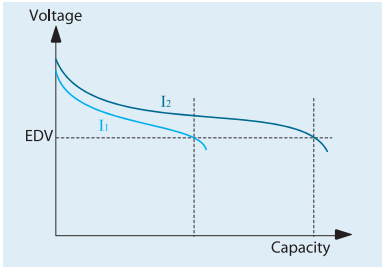
Multiple safety designs are made for Chroma 17011 for testing such as contact check and polarity check to confirm the circuit status before the test starts, also to ensure the safety of charge and discharge. It has over voltage, over current and loop resistance detecting functions to make sure the safety of test process . It also has data archive mechanism to store the data in memory without loss.



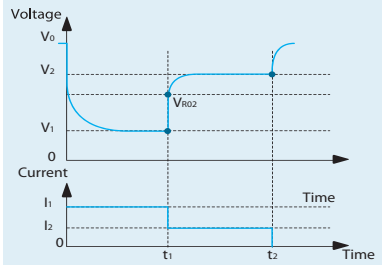
Lithium-ion secondary battery testing



Battery capacity curve

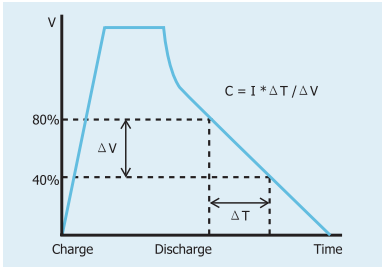


Cycle life testing curve

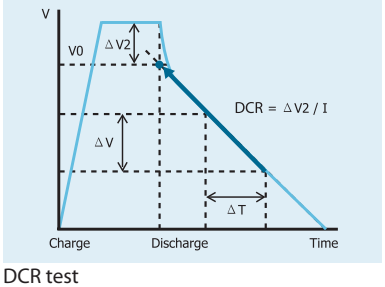


DCIR test

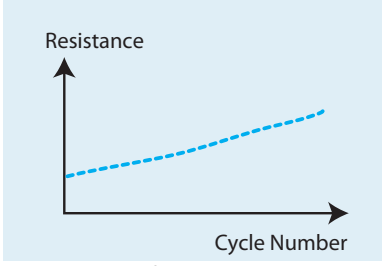
Electrical Double Layer Capacitor Test



Capacitance test



DCR test



ACR test curve (1kHz)

All specifications are subject to change without notice.

Chroma A172010 ACR Test Switch Fixture
- One fixture measures 10 DUTs
- One System controls eight fixtures

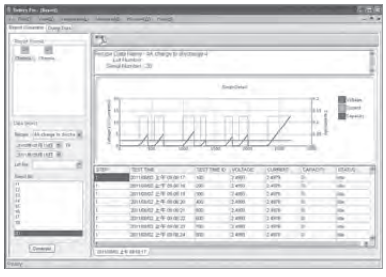


Chroma 51101 Thermal/Multi-function Data Logger
- Optional temperature channel (8ch/card) available
- Test 64 temperature channels maximum

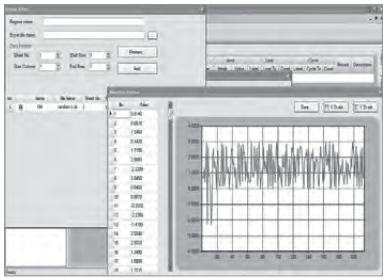




Multi-channel Real-time Monitoring Window



Graphic Analysis



Loading FUDS waveform current

SPECIFICATIONS

Frame	17200-5-10		17200-5-10		--	
Module	**17202-5-20**		**17202-5-30**		**17212R-5-100**	
Maximum Voltage/Current	5V/20A		5V/30A		5V/100A	
Maximum Channel	2 ch/module, 10 ch/frame (maximum)		2 ch/module, 10 ch/frame (maximum)		12 channels / set (fixed)	
Parallelable Current	40A, 100A, 200A		60A, 150A, 300A		200A, 300A, 400A, 600A, 1200A	
Control Method	CC/CV/CP/DCIR charge, discharge models		CC/CV/CP/DCIR charge, discharge models		CC/CV/CP/DCIR charge, discharge models	
Voltage						
Setting Range	0 mV ~ 5000 mV, resolution 1mV		0 mV ~ 5000 mV, resolution 1mV		0mV~5000mV *2, resolution 1mV	
Reading Range	0.0 mV ~ +5199.9 mV, resolution 0.1mV		0.0 mV ~ +5199.9 mV, resolution 0.1mV		0.0 mV ~ +5199.9 mV, resolution 0.1mV	
Accuracy	± (0.02% rdg.+0.02% F.S.)		± (0.02% rdg.+0.02% F.S.)		± (0.02% rdg.+0.02% F.S.)	
Current						
Setting Range	3A	1mA ~ 3,000mA , resolution 1mA	4A	1mA ~ 4,000mA , resolution 1mA	100A	10mA ~ 100.0A, resolution 10mA
	20A	0.01A ~ 20.00A , resolution 0.01A	30A	0.01A ~ 30.00A , resolution 0.01A		
Reading Range	3A	0.0mA~ 3,150.0mA, resolution 0.1mA	4A	0.0mA ~ 4,200.0mA, resolution 0.1mA	100A	0A ~ 105.00A, resolution 1mA
	20A	0.000A ~ 21.000A , resolution 0.001A	30A	0.000A ~ 31.500A, resolution 0.001A		
Accuracy	3A	± (0.02% rdg.+ 0.02% rng.)	4A	± (0.05% rdg.+ 0.05% rng.)	100A	± (0.05% rdg.+ 0.05% rng.)
	20A	± (0.03% rdg.+ 0.03% rng.)	30A	± (0.05% rdg.+ 0.05% rng.)		
Power						
Setting Range	15W	10 mW ~ 15,000 mW, resolution 1 mW	20W	10 mW ~ 20,000 mW, resolution 1 mW	500W	0.05W ~ 500.00W, resolution 0.01W
	100W	0.05 W ~ 100.00 W, resolution 0.01 W	150W	0.05 W ~ 150.00 W, resolution 0.01 W		
Reading Range	15W	0.0 mW ~ 15,600.0 mW, resolution 0.1 mW	20W	0.0 mW ~ 21,000.0 mW, resolution 0.1 mW	500W	0.000 W ~ 520.000 W, resolution 0.001W
	100W	0.000 W ~ 104.000 W, resolution 0.001 W	150W	0.000 W ~ 160.000 W, resolution 0.001 W		
Accuracy	15W	± (0.04% rdg.+ 0.04% rng.)	20W	± (0.07% rdg.+ 0.07% rng.)	500W	± (0.07% rdg.+ 0.07% rng.)
	100W	± (0.05% rdg.+ 0.05% rng.)	150W	± (0.07% rdg.+ 0.07% rng.)		
Flow Edit Capability	Max. step number in one flow: 500 steps Max. cycle number in one step: 999999 steps					
Data Storage	Battery mode : 100ms~60min EDLC mode : 10ms~60min *1				10ms~60min	
Power Requirement	DC 23.8~24.5V, 2kW (Chroma 62000B with 2 modules)				DC 42.75~47.25V, 11kW (Chroma A691103)	
Frame Dimension (H x W x D)	222 mm x 428 mm x 630 mm				179 mm x 428 mm x 688 mm	
Weight (Full Module)	Approx. 63 Kg				Approx. 40 Kg	

Model\Function	EDLC Function	Energy Regeneration	DC Power Source
17202-5-20	✓	×	62015B-24-62
17202-5-30	✓	×	62015B-24-62
17212R-5-100	✓ *2	✓	A691103

Note *1 : EDLC function has higher sampling rate, thus the current and power accuracy specification of EDLC mode is a bit lower than battery mode.
Note *2 : 17212R-5-100 is able to discharge down to 0V, but the line loss cause a voltage drop, when DUT is discharging at full current, the minimum discharge voltage will be 1V.

ORDERING INFORMATION

17011 : Battery Cell Charge & Discharge Test System
17200-5-10 : Programmable Charge/Discharge Tester Frame for 5 modules
17202-5-20 : Programmable Charge/Discharge Tester Module 5V/20A, 2 channels
17202-5-30 : Programmable Charge/Discharge Tester Module 5V/30A, 2 channels
17212R-5-100 : Programmable Charge/Discharge Tester Module 5V/100A, 12 channels
62000B-3-1 : 62000B Series Mainframe for 3 Modules
62000B-6-1 : 62000B Series Mainframe for 6 Modules
62015B-24-62 : Modular DC Power Supply 24V/62.5A/1500W (For 17202-5-20 & 17202-5-30 only)
51101-64 : Thermal Multi-function Data Logger 64 channel (option)
A172010 : ACR test switch fixture
A691103 : DC/AC Bi-direction Converter

All specifications are subject to change without notice.



KEY FEATURES

- Regenerative battery energy discharge
  - Energy saving
  - Environment protection
  - Low heat output
- Channels paralleled for higher currents
- Charge / discharge mode (CC, CV, CP)
  - Constant current
  - Constant voltage
  - Constant power
- Driving cycle simulation (Power/Current)
- High precision measurement accuracy
- Fast current conversion
- Smooth current without over shoot
- Testing data analysis function
- Data recovery protection (after power failure)
- Independent protection of multi-channel
- Total harmonic distortion: less than 5% of rated power

Chroma's 17020 is a high precision system specifically designed for secondary battery modules and pack tests. Accurate sources and measurements ensure the test quality that is suitable to perform repetitive and reliable tests that are crucial for battery modules / packs, for both incoming or outgoing inspections as well as capacity, performance, production and qualification testing.

Chroma's 17020 system architecture offers regenerative discharge designed to recycle the electric energy sourced by the battery module either back to the channels in the system performing a charging function or to the utility mains in the most energy efficient manner. This feature saves electricity, reduces the facilities thermal foot print and provides a green solution by reducing the environmental impact on our planet.

Chroma's 17020 system is equipped with multiple independent channels to support dedicated charge / discharge tests, on multiple battery modules / packs, each with discrete test characteristics. The channels can easily be paralleled to support higher current requirements. This feature provides the ultimate flexibility between high channel count and high current testing.

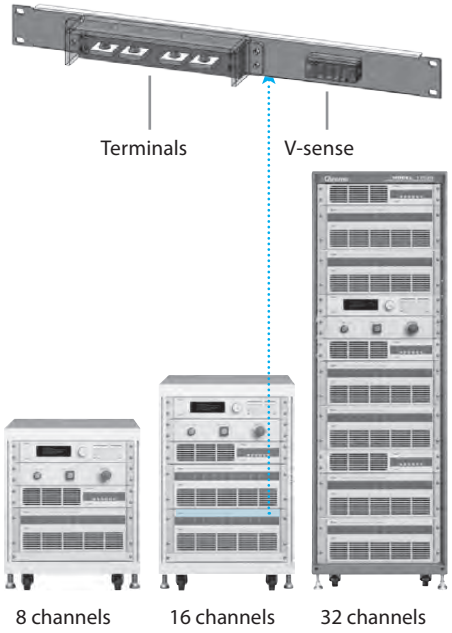
Chroma's 17020 system has flexible programming functions and may be operated with Chroma's powerful Battery Pro software. Battery Pro utilizes the system to create cycling tests from basic charge or discharge to complex drive cycle testing for each channel or channel groups. A thermal chamber control can be integrated into a profile and triggered by time or test results yielding a dynamic profile. Battery Pro's features allows quick and intuitive test development to eliminate the need of tedious scripting or programming by a software engineer.

17020's Regenerative Module / Battery Pack Test System uses bi-directional AC-DC converter and bi-directional DC-DC tester with a battery charge/discharge controller that is composed of the three standalone units.

Flexible System Configuration

17020 Regenerative Battery Pack Test System can be configured to specified requirements and expandable to 60 channels.

The driving cable can connect the front panel or rear outlet, users can choose their own.

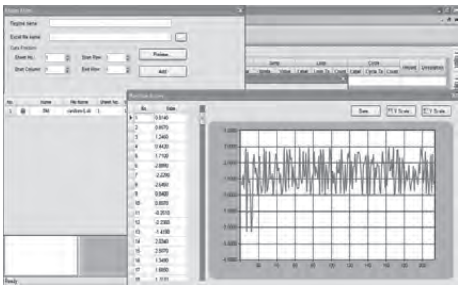


Operating Mode

- Constant current (CC) mode
- Constant voltage (CV) mode
- Constant power (CP) mode
- Constant voltage-limit current mode (CC-CV)
- Waveform current mode
- DCIR mode
- Rest

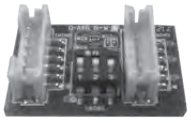
Driving Cycle Simulation

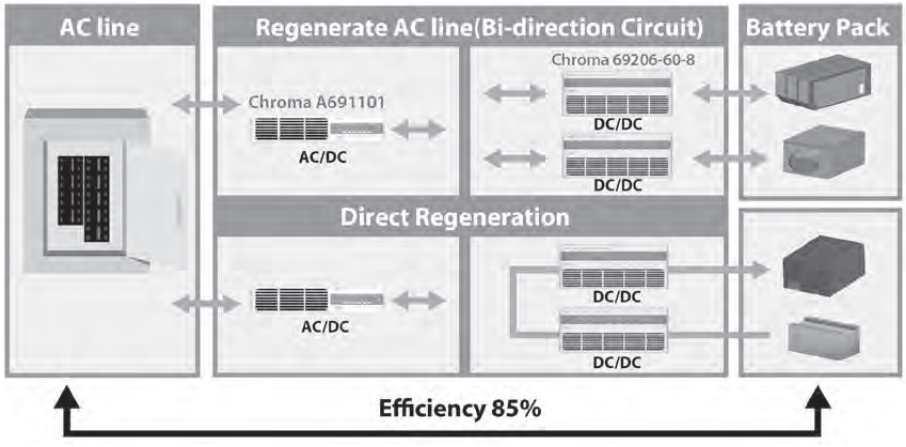
The battery pack always is used at quick and un-regular current condition. The system simulates the real condition on battery pack by working condition simulator.



Temperature Measurement

- Temperature measured for each channel within the range of 0~90°C±2°C
- 4 sets of measurements (Max) per channel to measure the battery surface temperature





All specifications are subject to change without notice.

Software Integration

- BMS communication interface : Collect the BMS data to controls the charge/ discharge profile and protection setting
- Data logger : Collect the data logger to controls the charge/ discharge profile and protection setting.
- Thermal Chambers : It synchronize temperature control with charge/discharge profile (See Model 51101-64 page)



BMS Communication Unit

- Communication interface : CANBus, SMBus, RS485
- Sampling Rate : 100ms/ch

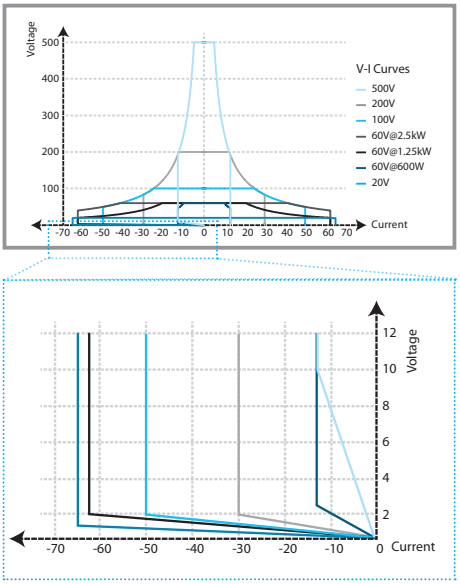


A692000 (4ch)



A692001 (8ch)

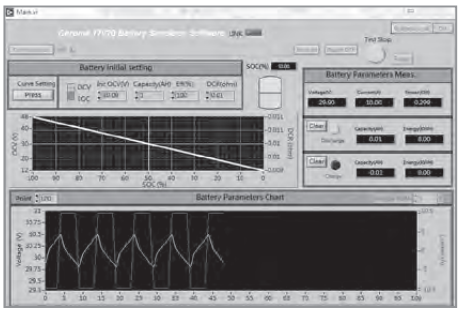
V-I curve of operating



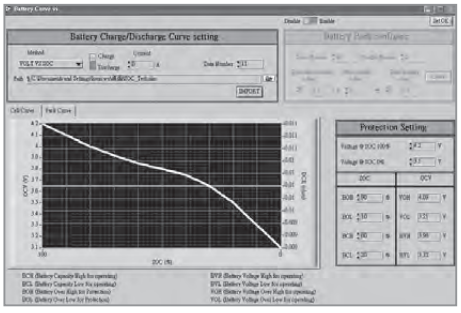
Low Voltage Discharge

Battery simulator Soft-panel (Option)

The soft-panel can simulate the battery capacity and DC impedance of battery cell. And it includes voltage-SOC curve simulation. The output voltage of battery simulator follows the user-defined curve. The function is suitable for testing chargers, inverters and motor drives.



Battery simulator softpanel



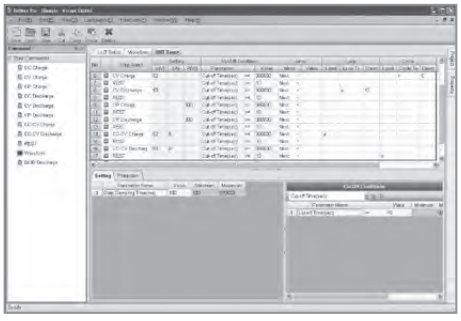
Voltage-SOC curve simulation

Graphic User Interface - Battery Pro

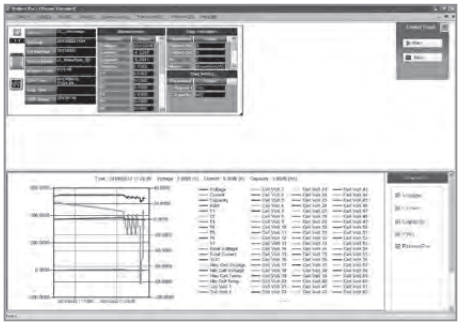
BatteryPro is specifically designed to meet the various requirements for testing secondary battery packs with high safety and stability. Charge and discharge protection aborts tests when abnormal conditions are detected. Data loss, storage and recovery are protected against power failure.



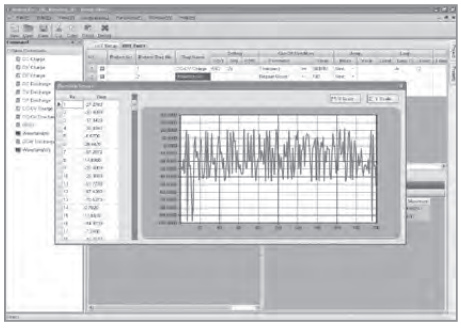
BatteryPro



Recipe editor



Recipe executor



Waveform simulator editor

SPECIFICATIONS							
Model	**17020**						
Voltage	20V	60V	60V	60V	100V	200V	500V
Current	65A	13A	62.5A	62.5A	50A	30A	13A
Power	1.25kW	600W	1.25kW	2.5kW	2.5kW	2.5kW	2.5kW
Channels	4~40	8~56	4~40	4~24	4~24	4~24	4~24
Max. Power (Parallelable)	50kW	33.6kW	50kW	60kW	60kW	60kW	60kW
Max. Current (Parallelable)	2600A	728A	2500A	1500A	1200A	720A	312A
Charge / Discharge mode per channel							
Voltage Range	0~20V	0~60V.	0~60V	0~60V	0~100V	0~200V	0~500V
Voltage Accuracy	0.1% stg.+ 0.05% F.S.	0.1% stg.+ 0.05% F.S.	0.1% stg. + 0.05% F.S.	0.1% stg. + 0.05% F.S.	0.1% stg. + 0.05%F.S.	0.1% stg. + 0.05%F.S.	0.1% stg. + 0.05%F.S.
Voltage Resolution	0.5mV	1mV	2mV	2mV	3mV	5mV	10mV
Current	65A	13A	62.5A	62.5A	50A	30A	13A
Current Accuracy	0.1% stg.+ 0.05% F.S.	0.1% stg. + 0.05% F.S.	0.1% stg. + 0.05% F.S.	0.1% stg. + 0.05% F.S.	0.1% stg. + 0.05%F.S.	0.1% stg. + 0.05%F.S.	0.1% stg.+ 0.05% F.S.
Current Resolution	5mA	1mA	5mA	5mA	5mA	5mA	1mA
Power	1.25kW	600W	1.25kW	2.5kW	2.5kW	2.5kW	2.5kW
Power Accuracy	0.2% stg.+ 0.1% F.S.	0.2% stg. + 0.1% F.S.	0.2% stg. + 0.1% F.S.	0.2% stg. + 0.1% F.S.	0.2% stg. + 0.1%F.S.	0.2% stg. + 0.1%F.S.	0.2% stg.+ 0.1% F.S.
Power Resolution	0.1W	0.1W	0.3W	0.3W	0.5W	0.5W	0.5W
Measurement per channel							
Voltage Range	0~20V	0~60V	0~60V	0~60V	0~100V	0~200V	0~500V
Voltage Accuracy	0.02% rdg. + 0.02% F.S.	0.02% rdg. + 0.02% F.S.	0.02% rdg. + 0.02% F.S.	0.02% rdg. + 0.02% F.S.	0.02% rdg. + 0.02% F.S.	0.02% rdg. + 0.02% F.S.	0.02% rdg. + 0.02% F.S.
Voltage Resolution	0.5mV	1mV	2mV	2mV	3mV	5mV	10mV
Current Range	24A/65A	4.8A/13A	24A/62.5A	24A/62.5A	20A/50A	12A/30A	4.8A/13A
Current Accuracy	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.	0.1% rdg. + 0.05% rng.
Current Resolution	5mA	1mA	5mA	5mA	5mA	5mA	1mA
Power Range	1.25kW	600W	1.25kW	2.5kW	2.5kW	2.5kW	2.5kW
Power Accuracy	0.12% rdg. + 0.07% rng.	0.12% rdg. + 0.07% rng.	0.12% rdg. + 0.07% rng.	0.12% rdg. + 0.07% rng.	0.12% rdg. + 0.07% rng.	0.12% rdg. + 0.07% rng.	0.12% rdg. + 0.07% rng.
Power Resolution	0.1W	0.1W	0.3W	0.3W	0.5W	0.5W	0.5W

Others - 17020 Power / Channels							
Voltage	20V	20V	20V	20V	60V	60V	60V
Current	130A	260A	520A	2600A	125A	125A	250A
Power	2.5KW	5KW	10KW	50KW	2.5KW	5KW	10KW
Channels	2 - 20	1 - 10	1 - 5	1	2 - 20	2 - 12	1 - 6
Model	17020						
Voltage	60V	60V	60V	100V	100V	100V	100V
Current	500A	750A	1500A	100A	200A	400A	600A
Power	20KW	30KW	60KW	5KW	10KW	20KW	30KW
Channels	1 - 3	1 - 2	1	2 - 12	1 - 6	1 - 3	1 - 2
Model	17020						
Voltage	200V	200V	200V	500V	500V	500V	500V
Current	60A	120A	60A	26A	52A	156A	312A
Power	5KW	10KW	30KW	5KW	10KW	30KW	60KW
Channels	2 - 12	1 - 6	1 - 2	2 - 12	1 - 6	1 - 2	1

All specifications are subject to change without notice.

GENERAL SPECIFICATIONS	
Measurement by A692003	
Temperature Range	0~90˚C
Temperature Accuracy	±2˚C
Temperature Resolution	0.1˚C
Temperature Coefficient	
Voltage / Current	50ppm/ ˚C
AC power	
Voltage Range	1Ø 100~240V ±10% 3Ø 200~220Vac ± 10% V_{LL} 3Ø 380~400Vac ± 10% V_{LL} 47~63Hz for input AC power
Current THD	< 5% at rated power
Power Factor	> 0.9 at rated power
Others	
Protection	UVP, OCP, OPP, OTP, FAN, FAN, Short
Efficiency (Typical)	85~90%
Data Acquisition Rate to PC	Minimum 40ms@ 4CH independent Minimum 10ms@ 4CH parallel Minimum 600ms@ 60CH independent Minimum 100ms@ 60CH parallel
PC Interface	Ethernet
Operating Temperature	0˚C ~ 40˚C
Storage Temperature	-40˚C ~ 85˚C
Safety & EMC	CE
Dimension (H x W xD)	
5kW ~ 20kW	120cm x 60cm x 90cm
20kW ~ 30kW	170cm x 60cm x 90cm
40kW ~ 60kW	170cm x 60cm x 90cm x 2 racks

ORDERING INFORMATION

Regenerative Battery Pack Test System Model 17020			
Power Range	**Voltage**	**Current**	**Channel**
600W	60V	13A	8~56
1.25kW	20V / 60V	65A / 62.5A	4~40
2.5kW	20V / 60V / 60V / 100V / 200V / 500V	130A / 125A / 62.5A / 50A / 30A / 13A	4~20
5kW	20V / 60V / 60V / 100V / 200V / 500V	260A / 250A / 125A / 100A / 60A / 26A	2~10
10kW	20V / 60V / 60V / 100V / 200V / 500V	520A / 500A / 250A / 200A / 120A /52A	1~5
20kW	20V / 60V / 60V / 100V / 200V / 500V	1040A / 1000A / 500A / 400A / 240A / 104A	1~3
50kW	20V / 60V / 60V / 100V / 200V / 500V	2600A / 2500A / 1250A / 1000A / 600A / 260A	1
60kW	60V / 100V / 200V / 500V	1500A / 1200A / 720A / 312A	1

Others and Options	
51101-64	Thermal/Multi-function Data logger 64 channels
A170201	IPC for battery test system
A692003	Thermal sensor with cable
A692000	BMS data communication unit 4 Channels
A692001	BMS data communication unit 8 Channels



KEY FEATURES

- Supports high power battery certification: IEC, SAE, GB, and etc.
- Regenerative battery discharge, Saves energy, environment-friendly and provides low heat dissipation
- Driving cycle simulator
- Industry Leading Accuracy
- 10ms Data acquisition
- Charge / discharge mode
  - Constant Current
  - Constant Voltage
  - Constant Power
- Customized rating power
  - Voltage range : 10~1200V
  - Current range : 0~1000A
  - Power range : 90~500kW
  (Parallel up to 2 units)
- System Integration:
  - Chamber Control
  - Multi-channels voltage/ temperature measurement (Max 256CH)
  - BMS Communication

Chroma's 17030 is an automated regenerative test system specifically designed for high power battery pack tests. Accurate power sources and measurements ensure test quality suitable for repetitive and reliable testing of crucial battery packs. Applications include incoming inspections capacity validation, production and certification testing.

Chroma's 17030 system architecture offers regenerative discharging designed to recycle the electric energy sourced by the battery pack. This feature saves electricity, reduces the facilities costs, reduces the thermal foot print and provides a green solution by reducing the environmental impact to the planet.

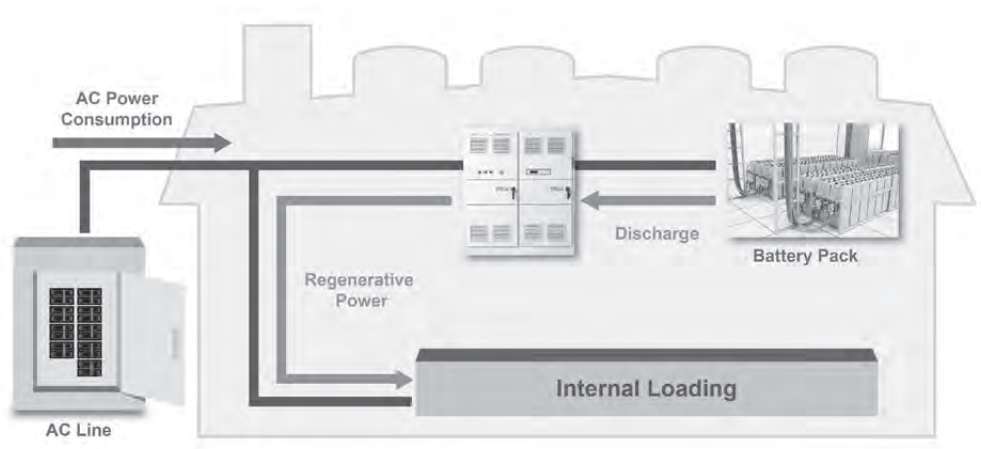
Chroma's 17030 system include a driving cycle simulation function. Since automotive battery packs are used at quick and irregular intervals, the 17030 incudes the capability to create seamless transitions between maximum charge and maximum discharge (or maximum discharge and maximum charge) with a rapid 50 ms conversion. This feature allows for charge/discharge mode simulations of real world driving scenarios. The system simulates the real conditions on the battery pack in its working condition.

Chroma's 17030 system has flexible programming functions and includes Chroma's powerful Battery Pro software. Battery Pro is a user friendly software environment allowing for the creation of a wide range of test scenarios from basic charge and discharge to complex drive cycle testing. Battery Pro's features allows quick and intuitive test development to eliminate the need for tedious scripting or programming by a software developer.

There are multiple safety features built into the 17030 including battery polarity checks, overvoltage protection, overcurrent protection and over temperature protection. In the unlikely event of a power or computer communication loss, the data is securely stored within the system in non-volatile memory thereby protecting against potential data loss and allowing for continuous flow after restart.

Regenerative Energy

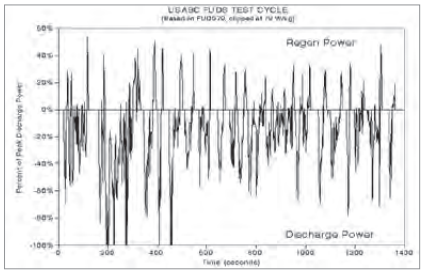
- Regenerate power to grid, Low heat dissipation, reduce air-conditioner loads and facility power consumption
- THD under 5% at rated power
- The PF over 0.9 at rated power
- Efficiency above 85% when operated above 20% of rated power



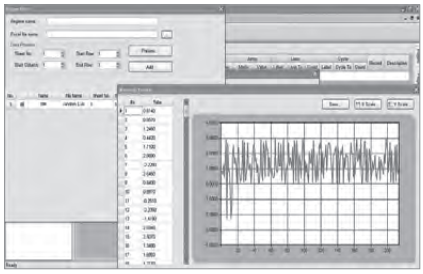
Driving Cycle Simulation (Power/ Current Waveform mode)

Simulate real automotive working conditions by defining quick and irregular charging and discharging conditions.

- Import dynamic charge/discharge waveforms to simulate the DRIVE CYCLE or other actual applications via .xls file formats
- Supports 720,000 points within driving profile memory for saving profiles of each channel
- Minimum transition time (△t) = 10ms



Support FUDS test



Loading FUDS waveform current

All specifications are subject to change without notice.

Software Function - Battery Pro

The 17030 Test system is specifically designed to meet the various requirements for testing secondary battery packs with high safety and stability. Charge and discharge protection aborts tests when abnormal conditions are detected. Data loss, storage and recovery are protected against power failure.

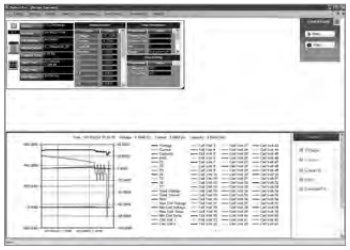
- Real-time battery pack status browse
- Icon Manager: Test status of each channel is managed through different icons, easy to read and understand
- Authority management: Allows for multiple user authority
- Fault record tracking: Records abnormal states of each channel independently

Recipe editor

- 255 charge/discharge conditions
- Sets dual layer loops (cycle & loop) with 9999 loops per layer
- Ability to edit dynamic charge/discharge waveform
- 10ms current switching speed in waveform current mode
- Testing modes: CV / CC / CP / CC-CV / Waveform current / DCIR)
- Cut-off conditions (time, current, capacity, cut-off voltage, cut-off current, etc.)



Battery Pro Main Page

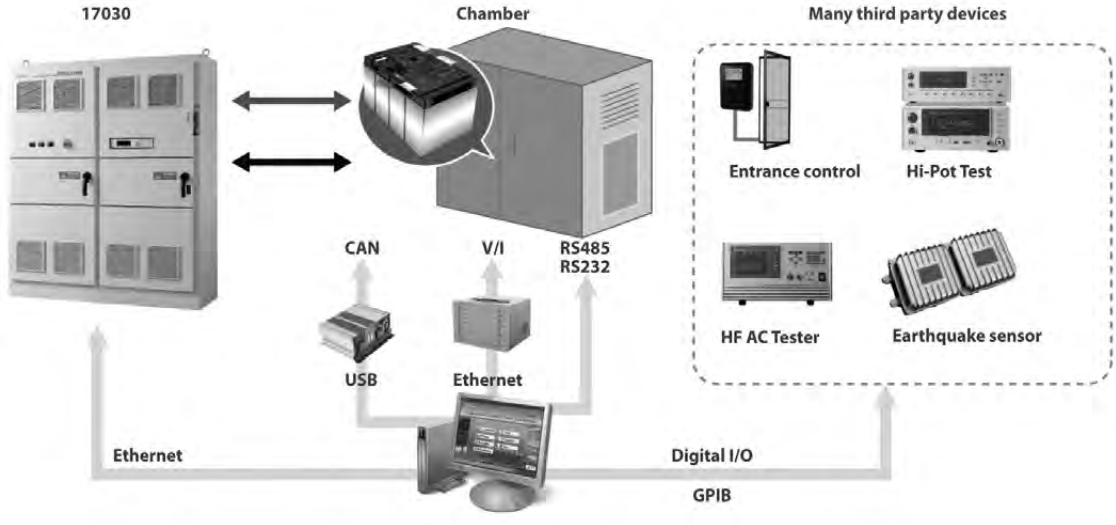

Status browser


DST waveform current


Loading multi-waveform

Software Integration

- Battery Pro can communicate to most thermal chambers for life and temperature testing .
- Many third party devices can be integrated into the 17030 via standard interface protocols (discrete I/O interface, GPIB, etc).



System configuration

ORDERING INFORMATION

Model 17030 Regenerative Battery Pack Test System			
Power Range	**Voltage**	**Current**	**Channel**
90kW	450V	200A	1
180kW	450V	200A	2
	700V	300A	1
210kW	900V	500A	1
250kW	700V	500A	1
	900V	500A	1
280kW	700V	200A	2
300kW	700V	1000A	1
500kW	1200V	700A	1
Others and Options			
51101-64	Thermal/Multi-function Data logger 64 channel (option)		
A170201	IPC for battery test system		
A692003	Thermal sensor (0~90˚C) and cable (30cm)		

SPECIFICATIONS-1						
Model		**17030 ***				
Channel		1	2	1	1	1
Max Power *1		90kW	180kW	180kW	250kW	210kW
Max Power /Per channel		90kW	90kW	180kW	250kW	210kW
Max Voltage		450V	450V	700V	700V	900V
Max Current / Per channel		200A	200A	300A	500A	500A
Constant Voltage Mode						
Voltage Range *2		15-450Vdc	15-450Vdc	15-700Vdc	15-700Vdc	19-900 Vdc
Voltage accuracy		0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.
Voltage resolution		10mV	10mV	15mV	15mV	20mV
Constant Current Mode						
Maximum Current		200A	200A	300A	500A	500A
Current accuracy		0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.
Current resolution		10mA	10mA	15mA	20mA	20mA
Constant Power Mode						
Max Power / Per channel		90kW	90kW	180kW	250kW	210kW
Power accuracy		0.2%F.S.	0.2%F.S.	0.2%F.S.	0.2%F.S.	0.2%F.S.
Power resolution		5W	5W	10W	20W	20W
Current Rising Time (10% to 90% Load)		10ms with 0.2Ω Resistive load	10ms with 0.2Ω Resistive load	10ms with 0.2Ω Resistive load	10ms with 0.2Ω Resistive load	10ms with 0.2Ω Resistive load
Ripple Noise (DC Current)		<1%F.S.	<1%F.S.	<1%F.S.	<1%F.S.	<1%F.S.
Overshoot		<1%F.S.	<1%F.S.	<1%F.S.	<1%F.S.	<1%F.S.
Measurement *3						
Voltage Read Back						
range		0~450V	0~450V	0~700V	0~700V	0~900V
accuracy		0.05% rdg.+0.05% F.S.	0.05% rdg.+0.05% F.S.	0.05% rdg.+0.05% F.S.	0.05% rdg.+0.05% F.S.	0.05% rdg.+0.05% F.S.
resolution		10mV	10mV	15mV	15mV	20mV
Current Read Back						
High range		0~200A	0~200A	0~300A	0~500A	0~500A
accuracy		0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.
Low range		0~50A	0~50A	0~75A	0~125A	0~125A
accuracy		0.2%F.S.	0.2%F.S.	0.2%F.S.	0.2%F.S.	0.2%F.S.
resolution		10mA	10mA	15mA	20mA	20mA
Power Read Back						
Power range		90kW	90kW	180kW	250kW	250kW
Power accuracy		0.2% F.S.	0.2% F.S.	0.2% F.S.	0.2% F.S.	0.2% F.S.
Power resolution		5W	5W	10W	20W	20W
Thermal Sensor						
range		0˚C ~90˚C	0˚C ~90˚C	0˚C ~90˚C	0˚C ~90˚C	0˚C ~90˚C
accuracy		±0.2˚C	±0.2˚C	±0.2˚C	±0.2˚C	±0.2˚C
resolution		0.1˚C	0.1˚C	0.1˚C	0.1˚C	0.1˚C
AC Input						
Line voltage / Frequency *4		3Ø 200V/220V/380V/440V/480V ±5%, 47~63Hz				
Others						
Audible noise level (in 1m distance)		Under 80dB				
Efficiency (Typical)		85%				
Interface *5		Ethernet				
Operation Temperature		0 ˚C ~ 40 ˚C				
Dimension (H x W x D) *6	Transformer	1111 x 813 x 686mm / 43.75 x 32 x 27 inch	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch
	Power Enclosure	1982 x 1982 x 915mm / 78 x 78 x 36 inch	1982 x 1982 x 915mm / 78 x 78 x 36 inch	1982 x 1982 x 915mm / 78 x 78 x 36 inch	1982 x 1982 x 915mm / 78 x 78 x 36 inch	1982 x 1982 x 915mm / 78 x 78 x 36 inch
Weight *7	Transformer	approx. 465 kg / approx. 1025 lbs	approx. 710 kg / approx. 1560 lbs	approx. 640 kg / approx. 1400 lbs	approx. 710 kg / approx. 1560 lbs	approx. 710 kg / approx. 1560 lbs
	Power Enclosure	approx. 1140 kg / approx. 2500 lbs	approx. 1600 kg / approx. 3500 lbs	approx. 1140 kg / approx. 2500 lbs	approx. 1140 kg / approx. 2500 lbs	approx. 1270 kg / approx. 2800 lbs

All specifications are subject to change without notice.

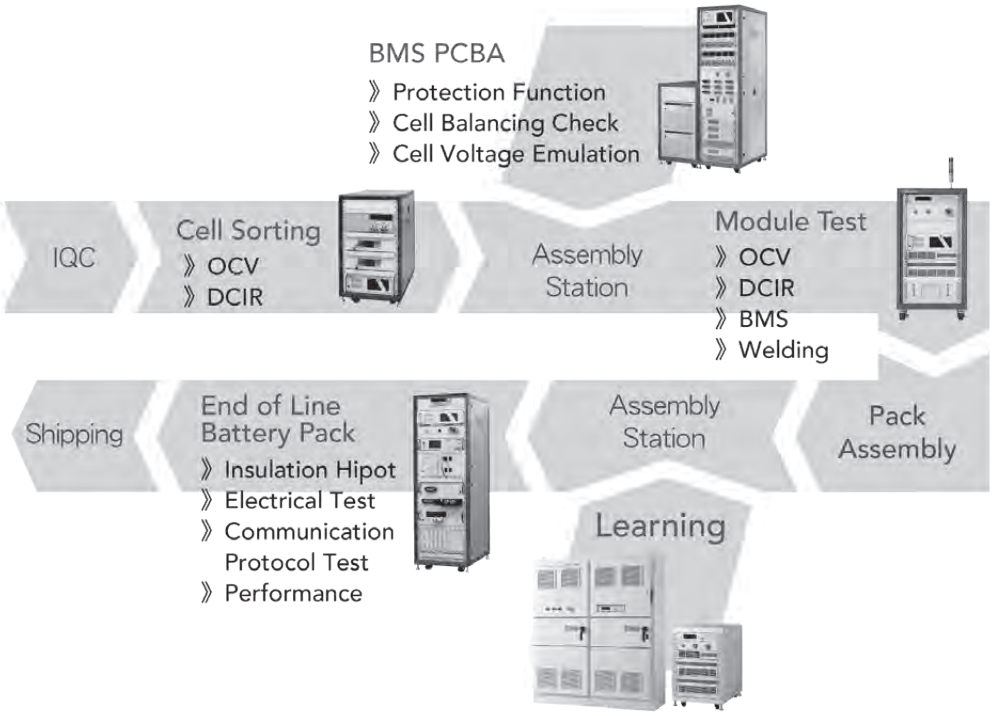
SPECIFICATIONS-2					
Model		**17030 ***			
Channel		1	2	1	1
Max Power *1		250kW	280kW	300kW	500kW
Max Power / Per channel		250kW	140kW	300kW	500kW
Max Voltage		900V	700V	700V	1200V
Max Current / Per channel		500A	200A	1000A	700A
Constant Voltage Mode					
Voltage Range *2		19-900 Vdc	15-700Vdc	15-700Vdc	30-1200Vdc
Voltage accuracy		0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.
Voltage resolution		20mV	15mV	15mV	30mV
Constant Current Mode					
Maximum Current		500A	200A	1000A	700A
Current accuracy		0.1%F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.
Current resolution		20mA	10mA	40mA	30mA
Constant Power Mode					
Max Power / Per channel		250kW	140kW	300kW	500kW
Current accuracy		0.2%F.S.	0.2%F.S.	0.2%F.S.	0.2%F.S.
Power resolution		20W	10W	20W	40W
Current Rising Time (10% to 90% Load)		10ms with 0.2Ω Resistive load	10ms with 0.2Ω Resistive load	10ms with 0.2Ω Resistive load	10ms with 0.2Ω Resistive load
Ripple Noise (DC Current)		<1%F.S.	<1%F.S.	<1%F.S.	<1%F.S.
Overshoot		<1%F.S.	<1%F.S.	<1%F.S.	<1%F.S.
Measurement *3					
Voltage Read Back					
Range		0~900V	0~700V	0~700V	0~1200V
Accuracy		0.05% rdg.+0.05% F.S.	0.05% rdg.+0.05% F.S.	0.05% rdg.+0.05% F.S.	0.05% rdg.+0.05% F.S.
Resolution		20mV	15mV	15mV	30mV
Current Read Back					
High range		0~500A	0~200A	0~1000A	0~700A
Accuracy		0.1% F.S.	0.1%F.S.	0.1%F.S.	0.1%F.S.
Low range		0~125A	0~50A	0~250A	0~175A
Accuracy		0.2% F.S.	0.2%F.S.	0.2%F.S.	0.2%F.S.
Resolution		20mA	10mA	40mA	30mA
Power Read Back					
Power range		250kW	140kW	300kW	500kW
Power accuracy		0.2% F.S.	0.2% F.S.	0.2% F.S.	0.2% F.S.
Power resolution		20W	10W	20W	40W
Thermal Sensor					
Range		0˚C ~90˚C	0˚C ~90˚C	0˚C ~90˚C	0˚C ~90˚C
Accuracy		±0.2˚C	±0.2˚C	±0.2˚C	±0.2˚C
Resolution		0.1˚C	0.1˚C	0.1˚C	0.1˚C
AC Input					
Line voltage / Frequency *4		3Ø 200V/220V/380V/440V/480V ±5%, 47~63Hz			
Others					
Audible noise level (in distance)		Under 80dB			
Efficiency (Typical)		85%			
Interface *5		Ethernet			
Operation Temperature		0 ˚C~ 40 ˚C			
Dimension (H x W x D) *6	Transformer	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch	1257 x 1041 x 813mm / 49.5 x 41 x 32 inch
	Power Enclosure	1982 x 1982 x 915mm / 78 x 78 x 36 inch	1982 x 1982 x 915mm / 78 x 78 x 36 inch	1982 x 1982 x 915mm / 78 x 78 x 36 inch	2286 x 5030 x 609mm / 90 x 198 x 24 inch
Weight *7	Transformer	approx. 710 kg / approx. 1560 lbs	approx. 710 kg / approx. 1560 lbs	approx. 710 kg / approx. 1560 lbs	approx. 1420 kg / approx. 3120 lbs
	Power Enclosure	approx. 1270 kg / approx. 2800 lbs	approx. 1270 kg / approx. 2800 lbs	approx. 1650 kg / approx. 3640 lbs	approx. 2270 kg / approx. 5000 lbs

Note*1 : Customized rated power : Voltage 10~1200V; max Current 1000A ; Power 90~500kW
Note*2 : The output range of voltage is referred by the cabling. The connection between the device and battery is 3 meters long as standard accessory.
Note*3 : 20us sampling rate for calculating battery capacity and energy
Note*4 : The transformer is for isolation and to accommodate various facility voltages
Note*5 : The interface from PC to 17030 is through Ethernet
Note*6 : The dimension is for reference. The dimensions are subject to change base on real condition
Note*7 : The weight is for reference. The weight are subject to change base on real condition



GPIB RS-232 RS-485 CE PFC

Battery Pack Production Flow Chart



KEY FEATURES

- Specifically designed for battery production line, or battery development testing
- The application range of this system includes battery modules for electric vehicles, motor vehicles, and power storage systems
- Increases QA efficiency by up to 80%
- Inspection of BMS functions, connector withstand voltage, consistency, and performance of battery module
- Charge/discharge power range : 5kW~500kW
  Charge/discharge voltage range : 0V~1200V
  Charge/discharge current range : 0A~2600A
- Standard test items include insulation resistance, electrical tests, software/ communication, and battery performance testing
- Able to create test fixture to connect the customized battery module with the automated switch control
- The control system is an easy to use open software platform that supports shop floor control integration with Manufacturing Execution System (MES)

Battery Cell/ Module/Pack Test Solutions

In order to increase testing coverage and the efficiency of the power storage battery industry, Chroma ATE has developed an automated inspection system that can be applied to the EOL (End Of Line) of battery pack production for testing assembly defects, Battery Management System (BMS) communication, internal power switches, battery balancing circuits/consistency, and temperature distribution, etc. before battery packs are shipped out of the factory.

The comprehensive PASS/FAIL tests can be used in production lines, in a development phase nearing completion and used during battery pack acceptance inspection for EV or energy storage station.

BMS PCBA Automated Test System

- 2~32 series cell voltage simulation
- Support active and passive balance test
- Flexible hardware architecture that can select a variety of hardware devices
- The test items can be expanded to meet the demands for inspecting tests.
- Support dual-output of battery module
- Resistor measurement (ID pin/NTC)
- BMS IC Firmware program & Parameter download BMS data compare
- Support BMS interface: CANBus/RS485/RS232
- Support BMS power consumption measurement
- BMS IC V/I/T calibration
- Over voltage protection test
- Under voltage protection test
- Over charge current protection test
- Over discharge current protection test
- Over temperature protection test



BMS PCBA ATS

All specifications are subject to change without notice.

Battery Cell Automated Test System

- Pass/fail validation for battery cell production
- OCV, ACIR and DCIR measurement for multi-channels
- Charge/discharge power range : 100W~400W
- Charge/discharge voltage/current range: 0V~80V/0A~80A



Battery Cell ATS

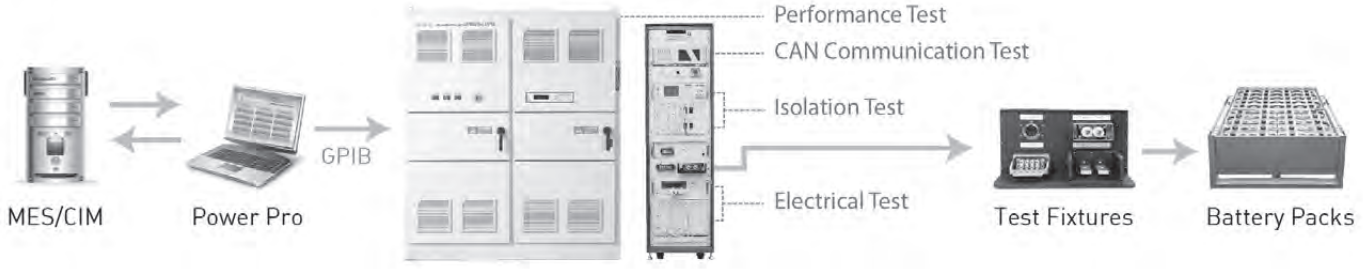
Battery Module Automated Test System

- Pass/Fail validation for battery module production
- Inspection of BMS functions for voltage/ temperature measurement accuracy as well as the distribution consistency of voltage/DC resistance/temperature for each serial cell of battery pack
- Charge/discharge power range: 2.5kW~50kW
- Charge/discharge voltage/current range: 0V~200V/0A~2600A

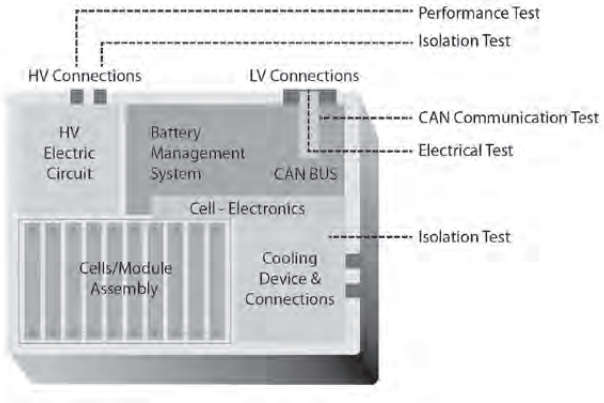


Battery Module ATS

Architecture of Battery Pack Automated Test System



Standard Function Test Items



Performance Test

- Standard charge/discharge capacity test
- Drive profile cycle test
- DCIR / OCV test

Isolation Test

- Terminal(HV+, HV-) insulation resistance
- Ground isolation
- Shield impedance
- Hi-Pot test

Electrical Test

- HV interlock function test
- Max. and Min Voltage/Temperature range test

CAN Communication Test

- Cell and Pack voltage/Temperature
- Contactor characterization
- Diagnostic trouble and fault mode test

ORDERING INFORMATION

8700 : Battery Pack ATS
6011/80611/80614 : Timing/Noise Analyzer
6011N/80611N : Timing/Noise module
6012/80612 : Short Circuit/OVP Tester
6013/80613 : ON/OFF Controller
5004ATM : System Controller
A800003 : 8000 software Package
A800004 : 19" Rack for Model 8000
A800005 : PCI BUS GPIB Card (National Instrument)
A800027 : Test Fixture for Model 8000
A800068 : Digital Measurement Card
DC Load Module: Refer to 6310A, 63200, 6330A,63600 Series
Digital Power Meter : Refer to Model 66200 Series
AC Source : Refer to Model 6400, 6500, 61500, 61600, 61700, 61800 Series
DC Source : Refer to Model 62000H, 62000P Series

* Please refer to Model 8000's specifications for detail instruments

All specifications are subject to change without notice.

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Passive Component Test Solution

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LCR Meter/Automatic Transformer Test System 12-3

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Programmable HF AC Tester 12-19

Milliohm Meter 12-21

Component Test Scanner 12-22

Automatic Test System 12-23

Options of Passive Component Test Instruments 12-33

Capacitor Test System

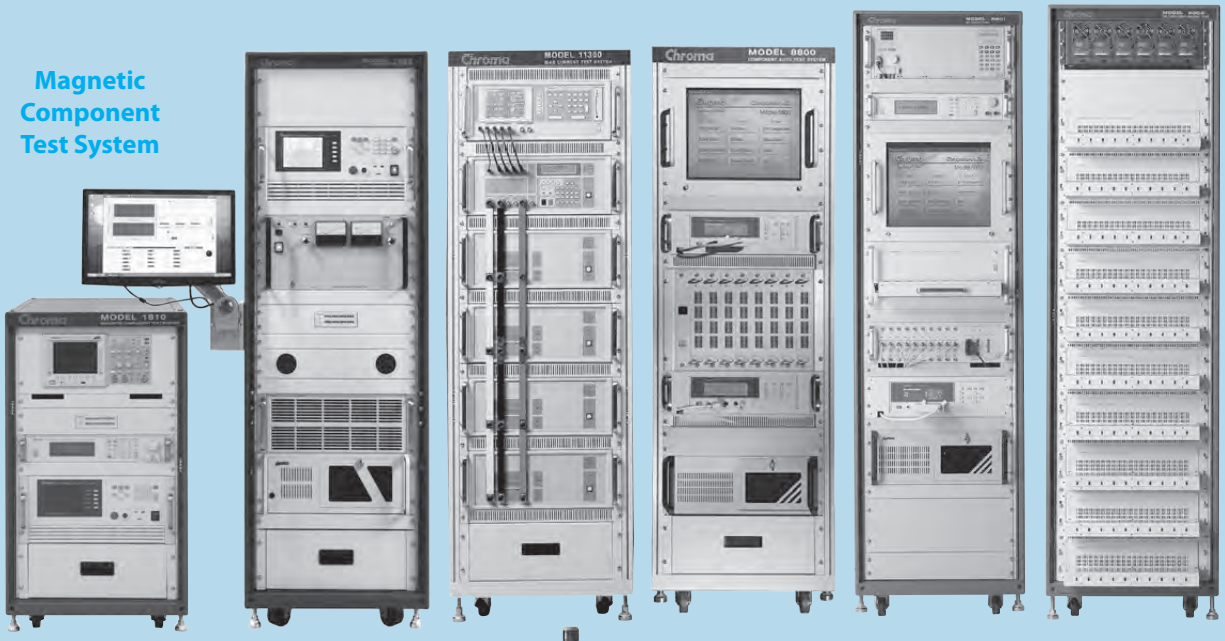
Bias Current Test System

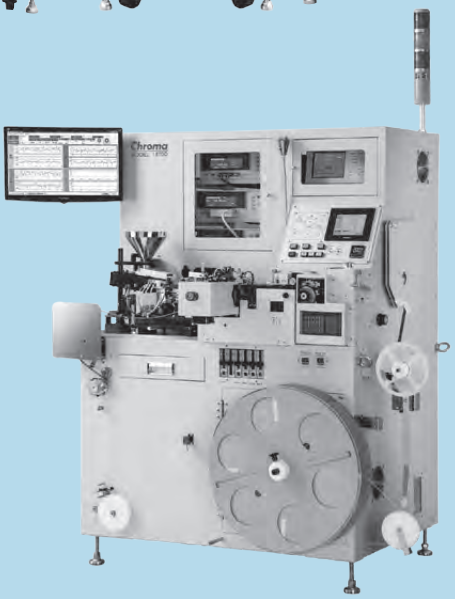
Component ATS

EDLC ATS

EDLC LC Monitoring System

Magnetic Component Test System





Inductor Test & Packing Machine



Inductor Layer Short ATS

Milliohm Meter
Capacitor Leakage Current/IR Meter
Electrolytic Capacitor Analyzer

LCR Meter
Programmable HF AC Tester



HF LCR Meter
Automatic Transformer Tester

Automatic Component Analyzer
Bias Current Source

Component Test Scanner

Selection Guides

LCR Meter Selection Guide				
Model	**Frequency Range**	**Impedance Range**	**Description**	**Page**
11020	100Hz, 120Hz, 1kHz	0.1pF ~ 4.00 F	High speed capacitance inspection	**12-7**
11021	100Hz, 120Hz, 1kHz, 10kHz	0.1mΩ ~ 100MΩ	Digital bin-sorting and comparator functions, up to 1kHz only optional	**12-4**
11021-L	1kHz, 10kHz, 40kHz, 50kHz	0.1mΩ ~ 100MΩ	Digital bin-sorting and comparator functions	**12-4**
11022	50/60/100/120/1k/10k/ 20k/40k/50k/100k Hz	0.01mΩ ~ 100MΩ	Digital high speed measurement in all test frequencies, excellent low-impedance measurement accuracy, bin-sorting and comparator functions	**12-5**
11025	50/60/100/120/1k/10k/ 20k/40k/50k/100k Hz	0.01mΩ ~ 100MΩ	Identical Model 11022, and add transformer testing function	**12-5**
11050 (New)	1KHz~10MHz	0.1mΩ ~ 100MΩ	wide range test frequency, high speed measurement, and excellent accuracy	**12-3**
11050-5M (New)	60Hz~5MHz	0.1mΩ ~ 100MΩ	wide range test frequency, high speed measurement, and excellent accuracy	**12-3**
1062A	40Hz~200kHz, 30 points	0.01mΩ ~ 100MΩ	Excellent low impedance measurement accuracy and comparator function	**12-6**
1075	20Hz~200kHz	0.01mΩ ~ 100MΩ	Excellent low impedance measurement accuracy and bin-sorting function	**12-6**
3252	20Hz~200kHz	0.1mΩ ~ 100MΩ	LCR + transformer testing and frequency characteristics analysis function Built-in 1A/8mA bias current source optional	**12-10**
3302	20Hz~1MHz	0.1mΩ ~ 100MΩ	Identical Model 3252 1MHz edition	**12-10**

Auto Transformer Test System Selection Guide				
Model	**Frequency Range**	**Impedance Range**	**Description**	**Page**
13350 + A133502	20Hz ~ 200kHz	0.1mΩ ~ 100MΩ	Transformer L/C/Z/DCR/Turns-ratio/Pin-short/ Balance scanning test function	**12-8**
3250 + A132501	20Hz ~ 200kHz	0.1mΩ ~ 100MΩ	Transformer L/C/Z/DCR/Turns-ratio/Pin-short/ Balance scanning test function	**12-10**
3250 + A132501	20Hz ~ 200kHz	0.1mΩ ~ 100MΩ	Transformer L/C/Z/DCR/Turns-ratio/Pin-short/ Balance scanning test function	**12-10**
3252 + A132501	20Hz ~ 200kHz	0.1mΩ ~ 100MΩ	Identical Model 3250 and add LCR Meter function	**12-10**
3302 + A132501	20Hz ~ 1MHz	0.1mΩ ~ 100MΩ	Identical Model 3252 1MHz edition	**12-10**
3312 + A132501	20Hz ~ 1MHz	0.1mΩ ~ 100MΩ	Identical Model 3302 and add Telecom parameter measurement function	**12-12**

Bias Current Source / Test System Selection Guide				
Model	**Frequency Range**	**Impedance Range**	**Description**	**Page**
1310	20Hz ~ 200kHz	0~10A	Economic type	**12-13**
1320	20Hz ~ 1MHz	0~20A	Programmable, and also can be controlled by Chroma 3252/3302 combined with Chroma 1320 to extend drive current	**12-13**
1320S	20Hz ~ 1MHz	0~20A	Slave (1320)	**12-13**
1320-10A	20Hz ~ 1MHz	0~10A	Identical 1320 10A edition, mainly used in PFC choke testing which higher DC resistance and the DC voltage dropped exceeds 6V	**12-13**
11300	20Hz~1MHz	0~300A	Intergration of 1320S with LCR Meter for large bias current testing of power choke	**12-14**

Electrolytic Capacitor Tester Selection Guide				
Model	**Primary Function**	**Test Signal**	**Description**	**Page**
11800	Ripple current tester	100Hz/120Hz/400Hz/1kHz, 0~30A DC Bias 0.5V~500V	For load life testing of electrolytic capacitor which used in power line rectifier	**12-17**
11801	Ripple current tester	20k~100kHz, 0~10A, DC Bias 0~500V	For load life testing of electrolytic capacitor which used in SMPS output filter	**12-17**
11810	Ripple current tester	20k~1000kHz, 0~10A, DC Bias 0~500V	For load life testing of high frequency MLCC, OS-CON, polymer capacitor that used by DC to DC converter	**12-17**
11200	Capacitor leakage current / IR meter	1.0~650V/800V, CC 0.5~500mA	For electrolytic capacitor leakage current and aluminum-foil W.V. testing	**12-18**
13100	Electrolytic capacitor analyzer	AC 100Hz/120Hz/1KHz/10kHz/ 20kHz/50kHz/100kHz, 1V/0.25V	For high and low frequency electrolytic capacitor I.Q.C.,F.Q.C. multi-parameter scanning testing (C/D/Z/ESR/LC)	**12-15**

Component Test Scanner Selection Guide				
Model	**Primary Function**	**Option**	**Description**	**Page**
13001	Scanner	A130007 40 channels scan module	For RJ-45 equipment, glass substrate, LCD glass substrate, printed circuit glass, PCB, EMI filter, ICT application. It could combined with Chroma 8800 Component ATE for process control and data collection	**12-22**

All specifications are subject to change without notice.

Milliohm Meter Selection Guide

Model	Primary Function	Test Range	Description	Page
16502	DC, Pulsed	0.001mΩ~2MΩ	Digital milliohm meter with bin-sorting, comparator function, reduce thermal EMF affection	**12-21**

HF AC Tester Selection Guide

Model	Primary Function	Option	Application Description	Page
11802	HF, HV, CV	A118031 HF HV 5kV/100mA max A118014 HF HV 2.5kV/200mA max A118017 HF HV 8kV/100kHz max	LCD inverter transformer (ceramic capacitor, cable, PCB) load life / withstanding voltage / breakdown voltage test	**12-19**
			EEFI, backlight load life / lamp current test	
			SMPS main transformer and active PFC choke load life test and electrical analysis	
			Medical equipment high frequency leakage current safety inspection	
			Automobile motor corona discharge inspection, analysis and production line	
	HF, HV, CV	Step-up current test module + specified resonant inductor/ capacitor	Ballast capacitor / inductor ignition voltage load life test	
	HF, HI, CC, Bias voltage	Ripple Voltage Test Module Chroma 11200 CLC / IR Meter (for DC voltage source with discharge function)	Snubber capacitor load life test	
	HF, CV, Bias current Temperature meter	Step-up current test module + AC/DC coupling test fixture Chroma DC power supply (for DC bias current) Chroma 12061 Digital Multimeter (for temperature measurement)	DC-DC converter SMD power choke temperature rising test (DC Bias current with AC ripple voltage) and electrical analysis	
	HF, HV, CV (or + DC source)	HF HV test module Option Chroma DC source*3	Function as HF HV AC +DC power source for FFI and SED device analysis	
11803	HF, CV, Bias current Temperature meter	Step-up current test module + AC/DC coupling test fixture Chroma DC power supply (for DC bias current) Chroma 12061 Digital Multimeter (for temperature measurement)	DC-DC converter SMD power choke temperature rising test (DC Bias current with AC ripple voltage) and electrical analysis	**12-19**
11805	HF, HI, Bias voltage	A118015 HF, HI 33V/30A max.	Snubber capacitor load life test	**12-19**
	HF, HV	A118018 HF, HV 1kV/1A max.	High voltage capacitor load life test	
11890	HF, HV, CV	A118031 HF HV 5kV/100mA max A118014 HF HV 2.5kV/200mA max	LCD inverter transformer(ceramic capacitor, cable, PCB) withstanding voltage test for production line	**12-19**
			Medical equipment high frequency leakage current safety inspection	
			Automobile motor corona discharge inspection for production line	
11891	HF, HV, CV	A118031 HF HV 5kV/100mA max A118014 HF HV 2.5kV/200mA max	Passive Component (inverter transformer, ceramic capacitor, cable, PCB etc.)	**12-19**
			High Frequency and High Voltage Load Life Test	

Automatic Test System Selection Guide

Model	Primary Function	Test Signal	Description	Page
1810	Magnetic Component Test System	DC Bias Current 60A max. HF AC Voltage 20kHZ~1MHZ	Power choke, Low Inductance Inductor	**12-23**
1820 (New)	Capacitor Test System	DC Bias Voltage 3kV max. HF AC Current 10kHz~200kHz	Film Capacitor	**12-24**
1870D (New) **1870D-12** (New)	Inductor Test & Packing Machine	Polarity test/Layer short test/BIAS current test/ Hipot test/ DCR test/LsQ test	Testing and packing for Chip inductor	**12-25**
1871 (New)	Inductor Layer Short ATS	5 tests simultaneously /2 test simultaneously	Layer short testing and sorting for Chip inductor	**12-26**
8800	Component ATS	L/C/R/Z/DCR/Turns-ratio/ Insulation Resistance (IR)	For RJ-45 equipment (including LAN Modules, Ethernet IC, PoE IC, etc.), glass substrate, LCD glass substrate, printed circuit glass (including touch panel, etc), PCB, EMI filter and ICT applications	**12-27**
8801	EDLC ATS	C (DC), internal resistance (DC), ESR (AC)	For Electrical Double Layer Capacitor on production lines	**12-29**
8802	EDLC LC Monitoring System	Leakage Current (LC)	For Electrical Double Layer Capacitor on production lines	**12-31**



KEY FEATURES

- Test Parameter : L/C/R/Z/Y/DCR/Q/D/ θ
- Test Frequency :
  1kHz ~ 10MHz (11050)
  60Hz ~ 5MHz (11050-5M)
- Test Level : 10mV ~ 5V
- Basic Accuracy : 0.1%
- 7ms fast speed measurement
- 3 kinds of output impedance modes
- Test signal monitoring function
- Compare & bin-sorting function
- Open/short zeroing & load correction function
- Detached measurement & display unit design
- Standard Handler, RS-232C, USB storage & external bias current control interface
- Optional GPIB or LAN interface

The Chroma 11050 series HF LCR Meter is a precision test instrument featured in measuring and evaluating the passive components with accuracy and fast speed. The measured items cover the primary and secondary parameters required for testing the inductance, capacitance, resistance, quality factor and loss factor of passive components. The HF LCR Meter has broad testing frequency ranges from 1KHz~10MHz/60Hz~5MHz that are suitable for analyzing the passive components' characteristics under different frequencies. Its 0.1% basic measurement accuracy not only makes the measured results show high stability but also high reliability. The fast 15ms measurement speed can effectively increase the productivity when working with the automated machines.

In addition to the excellent measurement features of other Chroma LCR Meters, the 11050 series also has a variety of convenient functions. It has 3 kinds of output impedance modes to satisfy the demands of measuring and working with other instruments. The flexible digital display allows adjustments to its best fit based on the testing resolution while the test signal monitoring function is able to view the voltage and current actually carried on the DUT. Also the timing settings of trigger delay, measure delay and average number of times allow the measurements to work closely with the automated machines to get the most accurate results within the limited testing time.

The detached design adopted by Chroma 11050 series uses dual CPU to process the testing and display. It not only increases the testing speed but also shortens the test leads' length when applying to the automated machines in improving the accuracy of high frequency measurement.

HANDLER RS-232

Another feature of Chroma 11050 series is complete interface configuration. The standard interfaces include Handler and RS-232C for hardware and software to set the test conditions, trigger measurement, judge test results and collect measured data. The USB interface is able to save the device settings and control the output of DC bias current source. GPIB and LAN are optional interfaces available for purchase as per user's demand for software communication.

Owing to the design of portable electronic communication products nowadays tends to be thin with low power consumption, the test frequency of power inductors is getting higher and that makes the equivalent series resistance of component become a critical indicator to identify good or bad products. The buffer capacitor plays an important role for overall circuit reliability and in order to work normally under high voltage transient environment, the equivalent series resistance has to remain at a very low level during high frequency. The Chroma 11050 series is focused on testing passive components under high frequency during development so that it is close to the user's actual requirements with enhanced key measurement functions. The accuracy enhancement of low impedance measurements strengthens the usability of Chroma 11050 series in high frequency testing applications.

Designed with extensive considerations and enhancements of key features, Chroma 11050 series HF LCR Meter is the best selection for product characteristics analysis, fast testing in automated production line or parts incoming/ outgoing management.

ORDERING INFORMATION

11050 : HF LCR Meter 1kHz~10MHz
11050-5M : HF LCR Meter 60Hz~5MHz
A110211 : Test fixture (DIP)
A110234 : Test leads (1M)
A110501 : : 4-Terminal SMD test fixture
A133509 : GPIB & Handler interface
A133510 : LAN & USB-H interface
B110500 : Extension test lead for automation (BNC to SMA, 1M)

SPECIFICATIONS		
Model	**11050**	**11050-5M**
Test Parameter	L, C, R, Z, Y, DCR, Q, D, θ	
Test Signal		
Test Frequency	1kHz ~ 10MHz ± (0.1% + 0.01Hz)	60Hz ~ 5MHz ± (0.1% + 0.01Hz)
Test Level	≦1MHz: 10mV ~ 5V; ± [(10 + fm)% + 10mV] >1MHz: 10mV ~ 1V; ± [(10 + fm)% + 1mV] fm: test frequency [MHz]	
Output Impedance	100Ω, 25Ω, OFF	
Measurement Display Range		
L	0.00001uH ~ 99.999MH	
C	0.00001pF ~ 999.999F	
R, Z	0.01mΩ ~ 9999.99MΩ	
DCR	0.01mΩ ~ 999.99MΩ	
Q, D	0.00001 ~ 99999	
θ	-90.00° ~ 90.00°	
Basic Accuracy		
Z	± 0.1%	
DCR	± 0.1%	
θ	± 0.04°	
Measurement Speed	Very Fast : 7ms, Fast : 15ms, Medium : 150ms, Slow : 295ms (1kHz)	
Communication Interface	RS-232C, Handler, USB storage, External bias current control, GPIB (option), LAN (option)	
Measurement Functions		
Trigger Mode	Internal, Manual, External, Bus	
Range Switching Mode	Auto, Hold	
Equivalent Circuit Mode	Series, Parallel	
Judgment	Compare, Bin-sorting	
Correction	Open/Short Zeroing, Load Correction	
Others		
Operating Environment	Temperature : 0°C ~ 40°C Humidity : 10% ~ 90%	
Power Consumption	60VA max.	
Power Requirement	100 ~ 240V ±10% , 47Hz ~ 63Hz	
Dimension (H x W x D)	230 x 428 x 290 mm / 9.06 x 16.85 x 11.42 inch	
Weight	Approx. 8 kg / 17.64 lb	

All specifications are subject to change without notice.



GPIB HANDLER RS-232 CE

KEY FEATURES

- Test frequencies:
  100Hz, 120Hz, 1kHz and 10kHz (9.6kHz) (11021)
  1kHz, 10kHz, 40kHz, 50kHz (11021-L)
- Basic accuracy: 0.1% (11021), 0.2% (11021-L)
- 0.1mΩ~99.99 MΩ measurement range, 4 1/2 digits resolution
- Lower harmonic-distortion affection
- Fast measurement speed (75ms)
- Standard RS-232 interface
- Optional GPIB & Handler interface
- Programmable trigger delay time is convenient for measurement timing adjustment in automatic production
- Bin-sorting function
- Comparator and pass/fail alarming beeper function
- Text mode 40x4 matrixes LCD display
- Friendly user interface
- Open/short zeroing
- On-line fireware refreshable (via RS-232)
- Input protection (1 Joule)

The Chroma 11021/11021-L LCR Meter are the most cost-effective digital LCR Meter, provides 100Hz, 120Hz, 1kHz, and 10kHz test frequencies for the 11021 and 1kHz, 10kHz, 40kHz, 50kHz test frequencies for the 11021-L. Standard RS-232 interface, optional GPIB & Handler interface, high speed and stable measurement capabilities enable the Chroma 11021/11021-L can be used for both component evaluation on the production line and fundamental impedance testing for bench-top applications.

The Chroma 11021/11021-L use lower harmonic-distortion phase-detection technology to reduce affection of measurement accuracy caused by hysteresis distortion in magnetic component or high dielectric-coefficient capacitor measurement, which is not provided in general low-end LCR Meters.

The 11021-L is the ideal selection for high frequency coil, core, choke, and etc. passive components incoming/outgoing material quality inspect and automatic production.

ORDERING INFORMATION

11021 : LCR Meter 1kHz
11021 : LCR Meter 10kHz
11021-L : LCR Meter
A110104 : SMD Test Cable #17
A110211 : Component Test Fixture
A110212 : Component Remote Test Fixture
A110232 : 4 BNC Test Cable with Clip#18
A110234 : High Frequency Test Cable
A110235 : GPIB & Handler Interface
A110236 : 19" Rack Mounting Kit
A110242 : Battery ESR Test Kit
A133004 : SMD Test Box
A165009 : 4 BNC Test Cable with Probe

SPECIFICATIONS

Model	11021	11021-L
Measurement Parameter		
Primary Display	L, C, R, |Z|	
Secondary Display	Q, D, ESR, Xs, θ	
Test Signals Information		
Test Level	0.25V / 1V , ±(10% + 3 mV)	50mV/ 1V, ±10%+3mV
Test Frequency	100Hz, 120Hz, 1kHz, 10kHz (9.6kHz)	1kHz, 10kHz, 40kHz, 50kHz
Frequency Accuracy	±0.25%	±0.02%
Output Impedance (Typical)	Varies as range resistors 25, 100, 1k, 10k, 100k	
Measurement Display Range		
Primary Parameter	L: 0.01μH ~ 9.999kH, C: 0.01pF ~ 99.99mF, R,|Z|: 0.1m. ~ 99.99MΩ	
Secondary Parameter	Q: 0.1 ~ 9999.9, D: 0.0001 ~ 9999.9, θ : -180.00°~ +180.00°	
Basic Accuracy *1	±0.1%	±0.2%
Measurement Time (1KHz) *2		
Fast	Freq = 1k/10kHz : 75ms Freq = 100/120Hz: 85ms	Freq = 1kHz/10kHz : 75ms Freq = 40kHz : 105ms Freq = 50kHz : 90ms
Medium	145ms	*3
Slow	325ms	*4
Trigger	Internal, Manual, External, BUS	
Display		
L, C, R, |Z|, Q, D, R, θ	40 x 4 (Character Module) LCD Display	
Function		
Correction	Open/Short zeroing	
Equivalent Circuit Mode	Series, Parallel	
Interface & Input/Output		
Interface	RS-232 (Standard), Handler & GPIB (Optional)	
Output Signal	Bin-sorting & HI/GO/LOW judge	
Comparator	Upper/Lower limits in value	
Bin Sorting	8 bin limits in %	
Trigger Delay	0 ~ 9999mS	
General		
Operation Environment	Temperature : 10°C ~ 40°C, Humidity < 90 % R.H.	
Power Consumption	50VA max.	
Power Requirement	90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz	
Dimension (H x W x D)	100 x 320 x 206.4 mm / 3.94 x 12.6 x 8.13 inch	
Weight	4 kg / 8.81 lbs	

Note*1 : 23±5°C after OPEN and SHORT correction, slow measurement speed. Refer to operation manual for detail measurement accuracy descriptions.
Note*2 : Measurement time includes sampling, calculation and judge test parameter measurement.
Note*3 : Freq.=1kHz/10kHz 145ms Freq.=40kHz 185ms Freq.=50kHz 150ms
Note*4 : Freq.=1kHz/10kHz 325ms Freq.=40kHz 415ms Freq.=50kHz 400ms



KEY FEATURES

- 0.1% basic accuracy
- Transformer test parameters (11025), Turns Ratio, DCR, Mutual Inductance
- 50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz test frequencies
- 21ms measurement time (≧100Hz)
- Agilent 4263B LCR Meter commands compatible
- 4 different output resistance modes selectable for non-linear inductor and capacitor measuring
- High resolution in low impedance(0.01mΩ) and high accuracy 0.3% till 100mΩ range
- Adjustable DC bias current up to 200mA (constant 25Ω) (11025)
- 1320 Bias Current Source directly control capability
- 0.01mΩ ~ 99.99MΩ wide measurement range (4 1/2 digits)
- Dual frequency function for automatic production
- BIAS comparator function
- Comparator function and 8/99 bin-sorting function
- Pass/fail judge result for automatic production
- Handler interface trigger edge (rising/falling) programmable
- Test signal level monitor function
- Standard GPIB, RS-232, and handler interface
- Open/short zeroing, load correction
- LabView® Driver

The Chroma 11022 and 11025 LCR Meters are the measurement instruments for passive components. They are applicable to the automatic manufacturers for passive components in material inspection. With the features of 21ms high-speed measurement and 0.1% accuracy, 11022 LCR Meter fulfills the requirements for fast production. Its functions of 8-level counting, 8/99 Bin-sorting, pass/fail judgment, and 50 sets of internal save and recall settings totally meet the production line requirements for easy operation.

The four impedance output modes can measure the results with the LCR Meters of other brands to get a common measurement standard. Chroma 11025 LCR Meter is compatible with HP 4263B LCR Meter IEEE-488.2 control interface and has three impedance output modes for selection. The measurement results can also be compared with other brand of LCR Meters. Chroma11022/11025 is the ideal selection for passive components quality assurance and automatic production.

GPIB HANDLER RS-232 CE

ORDERING INFORMATION

11022 : LCR Meter
11025 : LCR Meter
A110104 : SMD Test Cable #17
A110211 : Component Test Fixture
A110212 : Component Remote Test Fixture
A110232 : 4 BNC Test Cable with Clip#18
A110234 : High Frequency Test Cable
A110236 : 19" Rack Mounting Kit
A110239 : 4 Terminals SMD Electrical Capacitor Test Box (Patent)
A110242 : Battery ESR Test Kit
A110244 : High Capacitance Capacitor Test Fixture
A110245 : Ring Core Test Fixture
A113012 : Vacuum Generator for A132574
A113014 : Vacuum Pump for A132574
A132574 : Test Fixture for SMD power choke
A133004 : SMD Test Box
A133019 : BNC Test Lead, 2M (single side open)
A165009 : 4 BNC Test Cable with Probe

SPECIFICATIONS

Model	11022	11025
Test Parameter	L,C, R,|Z|, Q, D, ESR, X, θ	L,C, R,|Z|, Q, D, ESR, X, θ DCR4, M, Turns Ratio, L2, DCR2
Test Signals		
Level	10 mV~1V , step 10 mV; ±(10% + 3 mV)	
Frequency	50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz ; ±0.01%	
Output Impedance (Nominal Value)	Constant 107 x : 25Ω ; Constant 320 x : 100Ω Constant 106x: 2Ω ,for Z≧10Ω , 100mA (1V setting) for reactive load≦10Ω Constant 102x: 25Ω , for Z<1Ω , 100Ω for else	
DC Bias Current (Freq. ≧ 1kHz)	--	50mA max. for Constant 100Ω 200mA max for Constant 25Ω (AC level ≦ 100mV)
Measurement Display Range		
C (Capacitance)	0.001pF ~ 1.9999F	
L, M, L2 (Inductance)	0.001μH ~ 99.99k	
Z (Impedance), ESR	0.01mΩ ~99.99MΩ	
Q (Quality Factor) D (Dissipation Factor)	0.0001 ~ 9999	
θ (Phase Angle)	-180.00° ~ +180.00°	
Turns Ratio (Np:Ns)	--	0.9~999.99
DCR	--	0.01mΩ~99.99MΩ
Basic Measurement Accuracy *1	±0.1%	
Measurement Time (Fast) *2	21ms	
Interface & I/O		
Interface	handler (50pin), GPIB, RS-232	
Output Signal	Bin-sorting & HI/GO/LOW judge	
Comparator	Upper/Lower limits in value	
Bin Sorting	8/99 bin limits in %, ABS	
Trigger Delay	0~9999ms	
Display	240 x 64 dot-matrix LCD display	
Function		
Correction	Open/ Short zeroing, load correction	
Averaging	1~256 programmable	
Cable Length	0m, 1m, 2m, 4m	
Test Sig. Level Monitor	Voltage, Current	
Equivalent Circuit mode	Series, Parallel	
Memory (Store/ Recall)	50 instrument setups	
Trigger	Internal, Manual, External, BUS	
General		
Operation Environment	Temperature : 10°C~40°C Humidity : < 90 % R.H.	
Power Consumption	65VA max	
Power Requirements	90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz	
Dimension (H x W x D)	100 x 320 x 347.25 mm / 3.94 x 12.6 x 13.67 inch	
Weight	5.5 kg / 12.11 lbs	

Note*1 : 23 ± 5°C after OPEN and SHORT correction. Slow measurement speed. Refer to Operation Manual for detail measurement accuracy descriptions.
Note*2 : Measurement time includes sampling, calculation and judge of primary and secondary test parameter measurement.

All specifications are subject to change without notice.



KEY FEATURES

- Test frequency : 20Hz ~ 200kHz, 0.2% programmable test frequency (1075)
- Test frequency : 40Hz ~ 200kHz, 30 Steps (1062A)
- Basic accuracy : 0.1%
- 3 different output impedance modes, measurement results are compatible with other well-know LCR meters
- High resolution (0.01mΩ) and high accuracy 0.3% till 400mΩ range are the right tool for low inductance
- Large capacitance, and low impedance component measuring
- Single-function keys, clear LED display, easy to operate
- 0.01mΩ~99.999mΩ wide measurement range with 5 digits resolution
- Optional Handler & GPIB interface

GPIB HANDLER

- 8 bin sorting and bin sum count function (1075)
- Primary parameter: HI/GO/LO and secondary parameter: GO/NG judge result (1062A)
- Alarm for GO/NG judge result
- L/C/R/Z nominal value, upper limit %, lower limit %, Q/D/R/θ limit setting display (1062A)
- 10 bins sorting and bin sum count function (1075)
- Test signal level monitor function

The 1062A/1075 LCR Meters are the measurement instruments for passive components. They are applicable to the automatic manufacturers for passive components in material inspection and production line. This series of LCR Meters can fully fulfill the fast and accurate requirements for automatic production. The functions of 8-level counting, pass/fail judgment, and 10 sets of internal save and recall settings meet the production line requirements for speed and quality, thus make this series of LCR Metes the best measurement instruments for material and production line inspection for passive components.

ORDERING INFORMATION

1062A : Precision LCR Meter
1075 : LCR Meter
A110104 : SMD Test Cable #17
A110211 : Component Test Fixture
A110212 : Component Remote Test Fixture
A110232 : 4 BNC Test Cable with Clip#18
A110234 : High Frequency Test Cable
A110239 : 4 Terminals SMD Electrical Capacitor Test Box (Patent)
A110601 : GPIB & handler Interface
A133004 : SMD Test Box
A165009 : 4 BNC Test Cable with Probe



Model 1075

SPECIFICATIONS

Model	1062A	1075
Measurement Parameter		
Primary Display	L,C,R, Z, △%	L, C, R, Z△, △%
Secondary Display	Q, D, ESR, θ	
Test Signals Information		
Test Level	10mV~2.5V(non-106x mode),10mV/step	
Test Frequency	40 Hz~200 kHz, 30 steps	20 Hz~200 kHz, programmable
Frequency Accuracy	±0.01%	
Output Impedance(Typical)	Constant = 0 : Varies as range resistors; Constant = 1 : 25Ω ±5% Constant = 2 : 100Ω ±5% ; Constant = 3 : 2Ω , for impedance≧10Ω ; 100mA (1V setting), for inductive load ≦ 10Ω	
Measurement Display Range		
Primary Parameter	R, |Z| : 0. 01mΩ~9999.9MΩ , L: 0.0001μH~9999.9H, C: 0.0001pF~9999.9mF	
Secondary Parameter	Q,D: 0.0001~9999, θ : -90.00°~+90.00°, ESR: 0.01mΩ~9999kΩ , △% : 0.0001%~999.99%	
Basic Accuracy *1	±0.1%	
Measurement Time (Fast) *2		
Frequency≧1kHz	55 ms	
Frequency =120Hz	115 ms	
Frequency =100Hz	130 ms	
Trigger	Internal, External, Manual	
Display	L, C, R, |Z| : 5 digits Q, D, R, θ : 4 digits Freq./Voltage/Current : 3 digits D/Q Limit : 5 digits	L, C, R, |Z| : 5 digits Q, D, R, θ : 4 digits Freq./Voltage/Current : 3 digits Bin No./Range : 1 digits
Function		
Correction	Open/Short Zeroing	Open/Short zeroing, Load
Equivalent Circuit Mode	Series, Parallel	
Interface & Input/Output		
Interface	GPIB, Handler (24 pin)	GPIB ,Handler (24 pin)
Output Signal	Pass/Fail identification	Sorting Signal
Comparator	Upper limit/ Lower limit(%) setting	--
Bin Sorting	--	8 bin sorting (%)
Memory	1 set	10 set
General		
Operation Environment	Temperature : 10°C ~ 40°C, Humidity : < 90 % R.H.	
Power Consumption	55VA max.	
Power Requirement	90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz	
Dimension (H x W x D)	130 x 410 x 353 mm / 5.12 x 16.14 x 13.9 inch	
Weight	6.2 kg / 13.66 lbs	

1) Warm up time: >10 min. **2)** Environment temperature : 23±5°C **3)** OPEN/SHORT offset modification completed **4)** D < 0.1
Note*2 : Measurement time includes all of the time for UUT measurement, calculation and primary/secondary parameters identification.



KEY FEATURES

- Test frequencies: 100Hz, 120Hz, 1kHz
- Basic accuracy: 0.1%
- High measurement speed: 5ms in 1kHz, 15ms in 100Hz/120Hz
- Large LCD display (240x64 dot-matrix)
- Wide measurement range: 0.1pF ~ 3.999F
- Standard Handler interface
- Comparator and pass/fail alarming beeper function
- Setups backup function

HANDLER CE

The Chroma 11020 Capacitance Meter is a high-speed precision Capacitance Meter. Provides 100Hz, 120Hz, and 1kHz test frequencies. Measurement time is only 5 milliseconds in 1kHz, and less than 15 milliseconds in 100Hz and 120Hz test frequencies. Combine with 0.1% basic accuracy and standard Handler interface, enable the Chroma 11020 can be used on high speed production line for various capacitors.

ORDERING INFORMATION

11020 : Capacitance Meter
A110104 : SMD Test Cable #17
A110211 : Component Test Fixture
A110212 : Component Remote Test Fixture
A110234 : High Frequency Test Cable
A110236 : 19" Rack Mounting Kit
A110239 : 4 Terminals SMD Electrical Capacitor Test Box (Patent)
A110244 : High Capacitance Capacitor Test Fixture
A133004 : SMD Test Box

SPECIFICATIONS	
Model	**11020**
Test Parameter	Capacitance, Dissipation factor
Test Signals	
Test Level	1V(10% + 3mV)
Test Frequency	100Hz, 120Hz, 1kHz
Output Impedance	Varies as range resistors
Measurement Range	
C	0.1pF~3.999F(100Hz, 120Hz), 0.01pF~399.9μF(1kHz)
Basic Accuracy *1	±0.1%
Measurement Speed(Fast) *2	
C, Frequency ≧1kHz	5ms
C, Frequency =100Hz, 120Hz	15ms
D factor measurement	2ms
Trigger	Internal, External
Equivalent Circuit Mode	Series, Parallel
Interface&Input/Output	
Interface	Handler (24pin)
Output Signal	HI/GO/LO judge (Capacitor),GO/NG judge (D factor)
Comparator	Upper/Lower limits(%, ABS)
Display	240x64 dot-matrix LCD display
Correction Function	Zeroing
Averaging	1, 2, 4, 8, 16, 32, 64
Memory	1 instrument setups
General	
Operation Environment	Temperature:10˚C ~ 40˚C, Humidity : < 90 % RH
Power Consumption	65VA max.
Power Requirements	90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz
Dimension (H x W x D)	100 x 320 x 347.25 mm / 3.94 x 12.6 x 13.67 inch
Weight	5.5 kg / 12.11 lbs

Note*1 : The specification of accuracy is under the following conditions :
1) Warm up time : >10 min. **2)** Environment temperature : 23±5˚C **3)** OPEN/SHORT offset modification completed
Note*2 : Measurement time includes all of the time for UUT measurement, calculation and primary/secondary parameters identification.

All specifications are subject to change without notice.



KEY FEATURES

- Test frequency 20Hz ~ 200kHz
- Turn Ratio, Phase, L, Q, Lk, ACR, DCR, Cp, Pin short, Balance
- Basic accuracy : 0.1%
- Three different output impedance modes
- Scan unit/box including :
  - 20ch scan test unit
  - 80ch* scan box
  - C.T.* test fixture

KEY FEATURES

- Compensation for individual channel
- *Combine measurement unit with scanbox to reduce measurement errors
- *USB storage interface
- *10-100 LAN/ USB-H interface (option)
- *Built-in programmable 100mA bias current (RJ-45)
- *Test frequency, voltage and speed set separately
- *Fail Lock function
- *Auto Test function
- *Equipped with external standard test on 20ch scan test unit
- *Reduce the short-circuit loss in secondary side for leakage (Lk) test (A133502 20ch scan unit)
- *Short-circuit pin selectable for every test item
- *Multiple language: English & Simplified Chinese
- *RS232 interface compatible SCPI commands

* New features compared to Chroma 3250 Series

RS-232 GPIB CE

Acquired from many years of marketing experiences and cumulative results, Chroma 13350 is the newest generation of Automatic Transformer Tester that not only retains the merits of old 3250 model but also has many new functions including the combination of measurement unit and scan box to reduce measurement error caused by long wire, C.T. test fixture and 80/20 channels scan box support, USB interface for test conditions back-up, LAN communication interface, separate setting of test frequency/voltage/speed, Fail Lock function and Auto Test. It solves the performance and quality problems as well as human errors occurred on production line for the transformer industry today.

For instance: To reduce human errors on production line, the13350 Fail Lock function is able to lock the defect DUT (Device Under Test) when the test is done to prevent it from flowing out accidently. In order to cut down the time for placement, the 13350 Auto Test function can conduct test directly without pressing the trigger key. In addition, the 13350 adopts the design of dual CPU to increase the test speed by processing the measurement and display units simultaneously.

The compensation function of 13350 can do OPEN/SHORT for individual channel to solve the errors due to different layout on various fixtures.

13350 provides 20Hz-200kHz test frequency and scan test items to cover low voltage test parameters for various transformers including Inductance (L), Leakage (Lk) , Turn-Ratio, DC Resistance (DCR), Impedance (Z), Stray Capacity (C), Quality Factor (Q), Equivalent Series Resistance (ESR), Pin Short (PS), Winding Phase (PH) and Balance.

Applicable Test Options for Selection

A133502 20 Channels Scan Box

13350 uses split screen that allows the measurement unit to integrate the 20 channels scan box without using any connecting wires to reduce measurement errors. Furthermore, the 20 channels scan box has external standard test function that can perform verification test directly without any act of disassembly.

A133505 80 Channels Scan Box

13350 along with 80 channels scan box can mainly offer three different applications:

1) RJ-45 & LAN Filter test solution that can test up to 80 pins one time.
2) Transformer automation solution that can place 4 transformers on one carrier for scan test simultaneously.
3) Island-type production line planning that provides a time division multiplexing module to increase the equipment utilization rate.

A133506 C.T. (Current Transformer) Test Fixture

When the 13350 works with A133506 C.T. Test Fixture, it can measure the turns, inductance and DC resistance easily and rapidly by putting in the C.T. directly.

ORDERING INFORMATION

13350D : Automatic Transformer Tester - Display Unit
13350M-200k : Automatic Transformer Tester - Measurement Unit
A133502 : 20CH Scanning Box
A133505 : 80CH Scanning Box
A133506 : C.T. test fixture
A133507 : Connecting Conversion Unit (I/F of 80CH scan box / provide I/O control interface/1320 DC bias cable link / BNC terminals)
A133509 : GPIB Interface
A133510 : LAN & USB-H Interface
A133512 : Transformer Test Software
B133500 : Fiberglass Board (connecting A133502 with A132501 fixtures)



Model 13350 with A133505,A133507

SPECIFICATIONS		
Model		**13350**
Main Function		Transformer Scanning Test
Test Parameter		
Transformer Scanning		Turn Ratio, Phase, Turn, L, Q, Leakage L, Balance, ACR, Cp, DCR, Pin Short
Test Signals Information		
Test Level	Turn	10mV~10V, ±10% 10mV/step
	Others	10mV~2V, ±10% 10mV/step
Test Frequency	Turn	20Hz~200kHz, ± (0.1% + 0.01Hz), Resolution: 0.01Hz
	Others	20Hz~200kHz, ± (0.1% + 0.01Hz), Resolution : 0.001Hz (<1kHz)
Output Impedance	Turn	10Ω, when level≦2V / 50Ω, when level > 2V
	Others	Constant = OFF : Varies as range resistors Constant = 320X : 100Ω ±5% ; Constant = 107X : 25Ω ±5% Constant=106X : 100mA ±5% (1V setting); for inductive load less than 10Ω,10Ω ±10%, for impedance ≧10Ω
Measurement Display Range		
L, LK		0.00001μH~9999.99H
C		0.001pF~999.999mF
Q, D		0.00001~99999
Z, X, R		0.0001Ω~999.999MΩ
θ		-90.00°~ +90.00°
DCR		0.01mΩ~99.999MΩ
Turn,Ratio		0.01~99999.99 turns (Secondary voltage less than 100 Vrms)
Ratio (dB)		-39.99dB~+99.99dB (secondary voltage less than 100 Vrms)
Pin-Short		11 pairs, between pin to pin
Basic Accuracy		
L, LK, C, Z, X, Y, R, DCR		±0.1% (1kHz if AC parameter)
DCR		±0.5%
θ		±0.04°(1kHz)
Turn, Ratio (dB)		±0.5% (1kHz)
Measurement Speed (Fast)		
L, LK, C, Z, X, Y, R, Q, D, θ		50 meas./sec.
DCR		12 meas./sec.
Turn, Ratio (dB)		10meas./sec.
Judge		
Transformer Scanning		PASS/FAIL judge of all test parameters output from Handler interface, 100 bin sorting for Lk
Trigger		Internal, Manual, External
Display		Color 640x480 LCD panel
Equivalent Circuit Mode		Series, Parallel
Correction Function		Open/Short Zeroing, Load correction
Memory		15 instrument setups, expansion is possible via memory card
General		
Operation Environment		Temperature:10°C~40°C, Humidity: 10%~90% RH
Power Consumption		60 VA max.
Power Requirement		90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz (Auto Switch)
Dimension (H x W x D)		13350M : 58 x 280 x 300 mm / 2.28 x 11.02 x 11.8 inch 13350D : 45 x 140 x 225 mm / 1.77 x 5.51 x 10.03 inch
Weight		13350M : Approx. 3.5 kg / 7.71 lbs 13350D : Approx. 1.3 kg / 2.86 lbs

All specifications are subject to change without notice.



HANDLER PRINTER RS-232 GPIB CE

The 3250/3252/3302 Transformer Test System are the precision test systems, designed for transformer production line or incoming/ outgoing inspection in quality control process, with high stability and high reliability.

The 3250/3252 provide 20Hz-200kHz test frequencies, and 3302 provides 20Hz-1MHz test frequencies. In addition to transformer scanning test function, the 3252/3302 have LCR Meter function. In test items, The 3250/3252/3302 cover most of transformer's low-voltage test parameters which include primary test parameters as Inductance, Leakage Inductance, Turns-Ratio, DC resistance, Impedance, and Capacitance (between windings) etc.; secondary test parameters as Quality Factor and ESR etc.; and pin-short test function. High-speed digital sampling measurement technology combined with scanning test fixture (A132501) design, improve low-efficiency transformer inspection to be more accurate and faster.

The 3250/3252/3302 even provide several output impedance selection to solve inductance measurement error problem caused by different test current caused by different output impedance provided by different LCR Meters. And, equivalent turns-ratio calculated from measured inductance of windings is also provided to improve turns-ratio measurement error problem caused by large leakage magnetic flux in transformer with low permeability magnetic core.

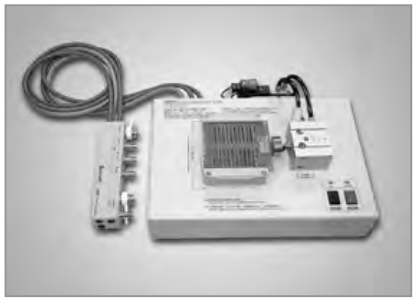
In addition to transformer scanning test function, the 3252/3302 have LCR Meter function, can be used in component incoming/outgoing inspection, analysis and automatic production line.

KEY FEATURES

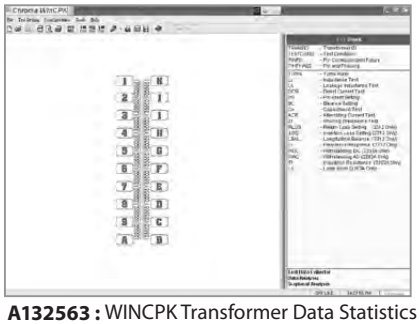
- Test frequency: 20Hz~200kHz/1MHz, 0.02% accuracy
- Basic accuracy: 0.1%
- Different output impedance modes, measurement results are compatible with other well-known LCR meters
- Enhanced Turn Ratio measurement accuracy for low permeability core
- Fast Inductance/ Turn Ratio measurement speed up to 80 meas./sec
- Fast DCR measurement speed up to 50 meas./sec
- Graphical and tabular display of swept frequency, voltage current and bias current measurements (3252/3302)
- Build-in 8mA bias for RJ45 transmission transformer saturation condition (option)
- Leakage inductance 100 bin sorting and balance of leakage inductance for TV inverter transformer
- ALC (Auto Level Compensation) function for MLCC measurement (3252/3302)
- Test fixture residual capacitance compensation for transformer inductance measurement
- 1320 Bias Current Source directly control capability (3252/3302)
- 320x240 dot-matrix LCD display
- Support versatile standard and custom-design test jigs
- Four-terminal test for accurate, stable DCR, inductance and turn ratio measurements
- Built-in comparator; 10 bin sorting with counter capability (3252/3302)
- Lk standard value with Lx measure value
- 4M SRAM memory card, for setup back-up between units
- Standard RS-232, Handler, and Printer Interface, option GPIB Interface for LCR function only
- 15 internal instrument setups for store/recall capability

ORDERING INFORMATION

3250 : Automatic Transformer Test System
3250 : Automatic Transformer Test System with 8mA Bias
3252 : Automatic Component Analyzer
3252 : Automatic Component Analyzer with GPIB interface
3302 : Automatic Component Analyzer
3302 : Automatic Component Analyzer with GPIB interface
3302 : Automatic Component Analyzer with 8mA Bias
3302 : Automatic Component Analyzer without Transformer Scan
A110104 : SMD Test Cable #17
A110211 : Component Test Fixture
A110212 : Component Remote Test Fixture
A110234 : High Frequency Test Cable
A110239 : 4 Terminals SMD Electrical Capacitor Test Box (Patent)
A113012 : Vacuum Generator for A132574
A113014 : Vacuum Pump for A132574
A132501 : Auto Transformer Scanning Box (3001A)
A132563 : WINCPK Transformer Data Statistics & Analysis Software for USB port
A132574 : Test Fixture for SMD power choke
A133004 : SMD Test Box
A133006 : 1A Internal Bias Current Source
A133019 : BNC Test Lead, 2M (singleside open)



A132501 :
Auto Transformer Scanning Box (3001A)



A132563 : WINCPK Transformer Data Statistics & Analysis Software for Model 3250/3252/3302



Model 3302

Test Fixture / Model		3250	3252	3302	3312
A132547	4-4mm Test Fixture	●	●	●	●
A132572	3.5/4mm Test Fixture	●	●	●	●
A132573	3.2/3.5mm Test Fixture	●	●	●	●
A132579	7.5-5mm Test Fixture	●	●	●	●
A132583	3.0-3.0mm Test Fixture	●	●	●	●
A132584	3.5-3.5mm Test Fixture	●	●	●	●
A132585	3.8-3.8 mm Test Fixture	●	●	●	●
A132586	3.0-4.0 mm Test Fixture	●	●	●	●

SPECIFICATIONS				
Model		**3250**	**3252**	**3302**
Main Function		Transformer Scanning Test	Transformer Scanning Test + LCR Meter	
Test Parameter				
Transformer Scanning		Turn Ratio, Phase, Turn, L, Q, Leakage L, Balance, ACR, Cp, DCR, Pin Short		
LCR METER		- -	L, C, R, |Z|, Y, DCR, Q, D, R, X, θ , Ratio (dB)	
Test Signals Information				
Test Level	Turn	10mV~10V, ±10% 10mV/step		
	Others	10mV~2V, ±10% 10mV/step		
Test Frequency	Turn	1kHz~200kHz, ± (0.1% + 0.01Hz), Resolution: 0.01 Hz		1kHz~1MHz, ±(0.1%+0.01Hz), Resolution : 0.01 Hz
	Others	20Hz~200kHz, ± (0.1% + 0.01Hz), Resolution : 0.001 Hz (<1kHz)		20Hz~1MHz, ±(0.1%+0.01Hz), Resolution 0.001 Hz (<1kHz)
Output Impedance Display	Turn	10Ω, when level≦2V / 50Ω, when level > 2V		
	Others	Constant = OFF : Varies as range resistors Constant = 320X : 100Ω ±5% ; Constant = 107X : 25Ω ±5% Constant=106X : 100mA ±5% (1V setting); for inductive load less than 10Ω,10Ω ±10%, for impedance ≧10Ω		
Measurement Display Range				
L, LK		0.00001μH~9999.99H		
C		0.00001pF~999.999mF		
Q, D		0.00001~99999		
Z, X, R		0.00001Ω~99.9999MΩ		
Y		0.01nS~99.9999S		
θ		-90.00°~ +90.00°		
DCR		0.01mΩ~99.999MΩ		
Turn,Ratio		0.01~99999.99 turns (Secondary voltage less than 100 Vrms)		
Ratio (dB)		-39.99dB~+99.99dB (seconding voltage less than 100 Vrms)		
Pin-Short		11 pairs, between pin to pin		
Basic Accuracy				
L, LK, C, Z, X, Y, R, DCR		0.1% (1kHz if AC parameter)		
Q, D		0.0005(1kHz)		
θ		0.03°(1kHz)		
Turn, Ratio (dB)		0.5% (1kHz)		
Measurement Speed (Fast)				
L, LK, C, Z, X, Y, R, Q, D, θ		80meas./sec.		
DCR		50meas./sec.		
Turn, Ratio (dB)		10meas./sec.		
Judge				
Transformer Scanning		PASS/FAIL judge of all test parameters output from Handler interface, 100 bin sorting for LK		
LCR METER		--	10 bins for sorting & bin sum count output from Handler interface/PASS/FAIL judge output from Handler interface	
Trigger		Internal, Manual, External		
Display		320x240 dot-matrix LCD display		
Equivalent Circuit Mode		Series, Parallel		
Correction Function		Open/Short Zeroing, Load correction		
Memory		15 instrument setups, expansion is possible via memory card		
General				
Operation Environment		Temperature:10°C~40°C, Humidity: 10%~90% RH		
Power Consumption		140 VA max.		
Power Requirement		90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz		
Dimension (H x W x D)		177 x 430 x 300 mm / 6.97 x 16.93 x 11.81 inch		
Weight		9.2 kg / 20.26 lbs		

Model	**A132501**
Standard Jig	20 pins
Test Contact pin	Four terminals contact
Control	
Button	START, RESET
Indicators	GO, NG
Solenoid Valve	
Pressure	0.15~0.7Mpa(1.5~7.1kgf/cm^2)
General	
Operation Environment	Temperature: 10°C~40°C, Humidity: 10%~90% RH
Power Consumption	40 VA max.
Power Requirement	90~264Vac, 47~63Hz
Dimension (H x W x D)	90 x 270 x 220 mm / 3.54 x 10.63 x 8.66 inch
Weight	3.2 kg / 7.05 lbs

All specifications are subject to change without notice.

Telecom Transformer Test System

Model 3312



HANDLER PRINTER RS-232 GPIB CE

KEY FEATURES

- Includes most test items in telecommunication transformer inspection.
- Programmable frequency : 20Hz~1MHz, 0.02% accuracy
- Basic accuracy : 0.1%
- 3 different output impedance modes, measurement results are compatible with other well-known LCR meters
- Enhanced Turn Ratio measurement accuracy for low permeability core
- ast Inductance/ Turn Ratio measurement speed up to 80 meas./sec
- Fast DCR measurement speed up to 50 meas./sec
- 1320 Bias Current Source directly control capability
- 320x240 dot-matrix LCD display
- Support versatile standard and custom-design test jigs
- Four-terminal test for accurate, stable DCR, inductance and turn ratio measurements
- Built-in comparator; 10 bin sorting with counter capability
- 4M SRAM memory card, for setup back-up between units
- Standard RS-232, Handler and Printer interface, option GPIB Interface for LCR function only
- 15 internal instrument setups for store/recall capability

The 3312 Telecom Transformer Test System is a precision test system, designed for telecom transformer production line or incoming/ outgoing inspection in quality control process, with high stability and high reliability.

The 3312 provides 20Hz-1MHz test frequencies. In addition to transformer scanning test function, the 3312 has LCR Meter function. In test items, The 3312 covers most of telecom transformer's low-voltage test parameters which include telecom test parameters as Return Loss (RLOS), Reflected Impedance (Zr), Insertion Loss (ILOS), Frequency response (FR), and Longitudinal Balance (LBAL) etc.; primary test parameters of general transformer as Inductance, Leakage Inductance, Turns-Ratio, DC resistance, Impedance, and Capacitance (between windings) etc.; secondary test parameters of general transformer as Quality Factor and ESR etc.; and pin-short test function. High-speed digital sampling measurement technology combined with scanning test fixture (A132501) design, improve low-efficiency telecom transformer inspection to be more accurate and faster.

The 3312 even provides several output impedance selection to solve inductance measurement error problem caused by different test current caused by different output impedance provided by different LCR Meters.

ORDERING INFORMATION

3312 : Telecom Transformer Test System
A110104 : SMD Test Cable #17
A110211 : Component Test Fixture
A110212 : Component Remote Test Fixture
A110234 : High Frequency Test Cable
A110239 : 4 Terminals SMD Electrical Capacitor Test Box (Patent)
A132501 : Auto Transformer Scanning Box
A133004 : SMD Test Box
A133006 : 1A Internal Bias Current Source

SPECIFICATIONS		
Model		**3312**
Main Function		Transformer Scanning Test + LCR Meter
Test Parameter		
Transformer Scanning		Turn Ratio (TR), Phase, Turn Inductance (L), Quality Factor (Q), Leakage Inductance (LK), Inductance Balance (BL), ACR, Capacitance, DCR, Pin Short, Return Loss (RLOS), Insertion Loss (ILOS), Frequency Response (FR), Longitudinal balance (LBAL)
LCR Meter		L, C, R, IZI, Y, DCR, Q, D, R, X, θ
Test Signals Information		
Test Level	Turn, ILOS, Fr,LBAL	10mV ~ 10V, ±10% 10mV/step
	Others	10mV ~ 2V, ±10% 10mV/step
Test Frequency	Turn	1kHz ~ 1MHz, ± (0.1% + 0.01Hz), Resolution : 0.01 Hz
	Others	20Hz ~ 1MHz, ± (0.1% + 0.01Hz), Resolution: 0.001 Hz (<1kHz)
Output Impedance	Turn, ILOS, Fr,LBAL	10Ω, when level ≦ 2V; 50Ω, when level > 2V
	Others	Constant = OFF : Varies as range resistors Constant = 320X : 100Ω ±5% Constant = 107X : 25Ω ±5% Constant = 106X : 100mA ±5% (1V setting), for inductive load less than 10Ω, 10Ω ±10%, for impedance ≧ 10Ω
Measurement Range		
Lx, x		0.00001μH ~ 9999.99H
C		0.00001pF ~ 999.999mF
Q, D		0.00001 ~ 99999
Z, X, R		0.00001Ω ~ 99.9999MΩ
Y		0.01nS ~ 99.9999S
θ		-90.00° ~ +90.00°
DCR		0.01mΩ ~ 99.999MΩ
Turn		0.01 ~ 99999.99 turns (Secondary voltage less than 100 Vrms)
Pin-Short		11 pairs, between pin to pin
RLOS, ILOS, FR		-100dB ~ +100dB
LBAL		0dB ~ +100dB
Basic Accuracy		
L, LK, C, Z, X, Y, R, DCR		±0.1% (1kHz if AC parameter)
Q, D		±0.0005 (1kHz)
θ		±0.03% (1kHz)
Turn		±0.5% (1kHz)
RLOS		N/A (Zr : ±0.1%)
ILOS, FR, LBAL		±0.5dB
Measurement Speed (Fastest)		
L, LK, C, Z, X, Y, R, Q, D, θ		80meas./sec.
DCR		50meas./sec.
Turn, RLOS, ILOS, LBAL		10meas./sec.
Judge		
Transformer Scanning		PASS/FAIL judge of all test parameters output from Handler interface
LCR Meter		10 bins for sorting & Bin sum count output from optional Handler interface PASS/FAIL judgement output from standard Handler interface
Trigger		Internal, Manual, External
Display		320x240 dot-matrix LCD display
Equivalent Circuit Mode		Series, Parallel
Correction Function		Open/Short Zeroing, Load correction
Memory		15 instrument setups, expansion is possible via memory card
General		
Operation Environment		Temperature: 10°C ~ 40°C,Humidity: 10%~90% RH
Power Consumption		140 VA max.
Power Requirement		90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz
Dimension (H x W x D)		177 x 430 x 300 mm / 6.97 x 16.93 x 11.81 inch
Weight		9.2 kg / 20.26 lbs



KEY FEATURES
Model 1310

- Frequency response : 20Hz~200kHz
- 0.001A~10.00A, 90W output capability
- Forward / Reverse current switching capability
- Bias current sweep (2~11points), automatic or manual trigger, for core characteristics analysis
- 16x2 LCD text display
- 0.001Ω~199.99Ω DCR measurement capability
- Long term continued maximum power output capability
- Excellent protection circuit, keep L Meter from damage as bias current was broken abnormally

KEY FEATURES
Model 1320

- Frequency response : 20Hz~1MHz
- 0.001A~20.00A, 150W output capability, maximum 100Adc extendable with 1320S
- Forward / Reverse current switching capability
- Standard GPIB, Handler interface
- Bias current sweep (2~21points), automatic or manual trigger, for core characteristics analysis
- Direct controlled by LCR Meter 3302/3252/11022/11025
- 16x2 LCD text display
- 0.01mΩ~199.99Ω DCR measurement capability
- 50 internal instruments setups for store/recall capability
- Single bias current output timer capability (24 hours)
- Long term continued maximum power output capability
- Excellent protection circuit, keep L Meter from damage as bias current was broken abnormally

The 1320 Bias Current Source output can be controlled by LCR Meter Model 3302/3252/11022/11025 directly. The 1320S connected externally can output current up to 100A. The bias current scan frequency triggered automatically or manually can analyze the iron core characteristics in inductor for quality inspection and product feature analysis. They are the best measurement instruments combination for inductor test.

ORDERING INFORMATION

1310 : Bias Current Source 0~10A
1320 : Bias Current Source 0~20A
1320-10A : Bias Current Source 0~10A
1320S : Bias Current Source (Slave)
A113011 : 4 Terminals Test Cable with Clip
A115001 : Foot Switch #10

Model 1320/1320-10A



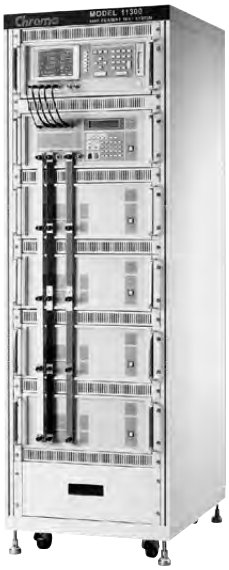
Model 1320S

SPECIFICATIONS

Model		1310	1320	1320S	1320-10A
Bias Current Source					
Output Current		0.00~10.00Adc Forward/Reverse	0.00~ 20.00Adc Forward/Reverse 100A extendable when linked with 1320S	0.00~20.00Adc(Slave) Forward/Reverse *2	0.00~10.00Adc Forward/Reverse
Accuracy		0.000A~1.000:1%+3mA 1.01A~10.00A:2%	0.000A~1.000A : 1% +3mA 1.001A~5.00A:2% 5.01A~20.00A:2% 20.1A~20.0(1+X)A:3% *1	3%	0.000A~1.000A:1%+3mA 1.001A~5.00A:2% 5.01A~10.00A:2%
Scan Test		Manual or Auto, 2~11 steps	Manual or Auto, 2~21 steps	---	Manual or Auto, 2~21 steps
Frequency Response		20Hz~200kHz	20Hz~1MHz	20Hz~1MHz	20Hz~1MHz
Maximum Power Continued Output Allowable Time		> 24 hours (below 40˚C)			
Timer		---	0~24 hours	---	0~24 hours
Delay time		---	0.0~100.0 sec/step, adjustable	---	0.0~100.0 sec/step, adjustable
DCR Meter Accuracy & Resolution					
DCR Range	20mΩ	---	2% + 0.07mΩ, 0.01mΩ	---	2%+ 0.07mΩ,0.01mΩ
	200mΩ	---	2% + 0.2mΩ, 0.1mΩ	---	2% + 0.2mΩ,0.1mΩ
	2Ω	3% + 0.002Ω,0.001Ω	3% + 0.002Ω,0.001Ω	---	3%+ 0.002Ω,0.001Ω
	20Ω	3% + 0.03Ω, 0.01Ω	3% + 0.02Ω, 0.01Ω	---	3%+0.02Ω, 0.01Ω
	200Ω	3% + 0.3Ω, 0.1Ω	3% + 0.2Ω, 0.1Ω	---	3% + 0.2Ω, 0.1Ω
DCV Display					
Display Range		---	0.00V~10.00Vdc	---	0.00V~20.00Vdc
Accuracy		---	2% + 0.05Vdc	---	2% + 0.05Vdc
Display		16 x 2 text dot matrix LCD		---	16 x 2 text dot matrix LCD
General					
Operation Environment		Temperature : 10˚C~40˚C, Humidity : 10%~90 % RH			
Power Consumption		250VA max.	650VA max.	600VA max.	650VA max
Power Requirements		90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz			
Dimension (H x W x D)		132 x 410 x 351 mm / 5.2 x 16.14 x 13.82 inch	177 x 430 x 450 mm / 6.97 x 16.93 x 17.72 inch		
Weight		8.8 kg / 19.38 lbs	17.5 kg / 38.55 lbs	15.5 kg / 34.14 lbs	17.5 kg / 38.55 lbs

Note*1 : X is the number of linked 1320S
Note*2 : 1320S is a slave current source of 1320

All specifications are subject to change without notice.



300A

KEY FEATURES

- High efficiency, forward / reverse current switching capability and sweep function
- High stability, frequency response from 20Hz to 1MHz
- High accuracy, 3% output current accuracy
- Expansion capabilities, up to 300A
- Vertical design, easy to maintain
- Flexible modular test system
- Multi-channel intakes in the front panel of rack and multi-fans exhausts in the back of rack
- Multi-function four terminal test fixture
- Low ESR (< 10m ohm) design for connecters between bias current sources
- Windows® based software



19" Rack 20U for Model 11300

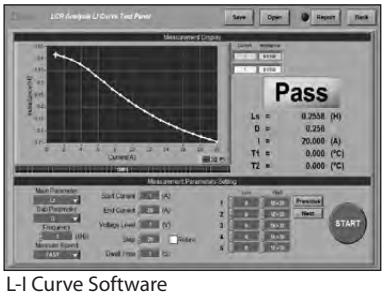
RS-232 CE

Chroma 11300 bias current test system is an integration test system of LCR Meter and Bias Current Source.

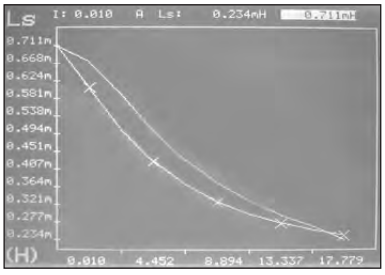
It consists of Chroma 3252/3302 series Automatic Component Analyzer and Chroma 1320 series Bias Current Source. The Chroma 1320 series bias current source output can be controlled by Chroma 3252/3302 LCR meter directly. The bias current output capacity can be selected up to 300A to satisfy various testing in R&D, QC, QA, and production applications.

The connector between bias current sources is low ESR (<10m ohm) design to reduce heat effect and get more accurate measurement result. The multi-function four terminal test fixture supports various DUT, include SMD DUT and DIP ring core DUT.

This system provides power choke characteristic sweep graph analysis through Windows® base software or sweep function of the meter. The bias current scan triggered automatically or manually can analyze the iron core characteristics in inductor for quality inspection and product feature analysis. The Chroma 11300 is a just right test solution for magnetic choke and core used in various power supply.



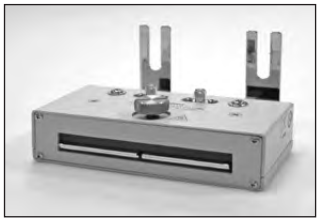
L-I Curve Software



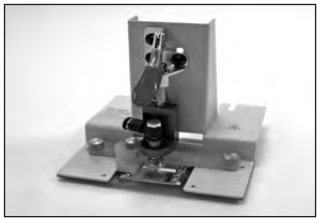
Graphical Bias Current Characteristic Analysis

ORDERING INFORMATION

11300 : Bias Current Test System
A113008 : Four terminal test fixture for DIP 100A
A113009 : Four terminal test fixture for SMD 60A (combined with A113008)
A113010 : Four terminal PCB for SMD 100A (combined with A113008)
A113012 : Vacuum Generator for A113009
A113014 : Vacuum Pump for A113009
A113017 : LCR Analysis Software
LCR Meter : Refer to 3252, 3302
Bias Current Source : Refer to 1320, 1320S
A800004 : 19" rack 20U/35U/41U for Model 11300



A113008 :
Four terminal test fixture for DIP 100A



A113009 :
Four terminal test fixture for SMD 60A (combined with A113008)

SPECIFICATIONS						
Model	**11300**					
Output Bias Current	20A	40A	60A	80A	100A	100A~300A
LCR Meter						
Model 3252/3302	•	•	•	•	•	*
Bias Current Source						
Model 1320	•	•	•	•	•	*
Model 1320S		1 Set	2 Sets	3 Sets	4 Sets	*
General						
19"Rack	20U			35U		*
Power Requirements	180~264Vac, 47~63Hz					*

* Call for availability



KEY FEATURES

- C meter provides Z/C/D/Q/ESR parameters for test
- Available 7 test frequencies from 100~100kHz for selection
- 0.1% basic measurement accuracy
- The thin-film withstand voltage results can be displayed in graph by converting them to an actual rising curve
- CPK calculation function for 1000 capacitor test results that is convenient for analyzing the production capability
- 320 x 240 dot-matrix LCD display
- 200 sets of internal memories and 4M SRAM interface card for saving and recalling the parameter settings
- Designed for100mΩ range with accuracy measurement up to 0.1mΩ
- Non-Relay switch is built in. It is safe and reliable as the discharge circuit is close to the fixed power
- Perform electric polarity test before charge to avoid the danger of explosion
- Softpanel for leakage current data statistics analysis
- Equipped with RS-232, printer and scanner controller interfaces
- Meet the test regulation of EIAJ RC-2364A
- A131001 scan box has four terminals designed for measuring accurate high frequency and low impedance (200 Vmax)

PRINTER RS-232

The Chroma 13100 Electrolytic Capacitor Analyzer is a general measurement instrument designed for analyzing the features of electrolytic capacitors. It has multiple functions that can be programmed based on the capacitor features by altering the settings to test metal oxidization thin-film withstand voltage, capacitor leakage current, capacitance, dissipation factor, impedance and equivalent serial resistance, etc.

Used with the special designed sequential switch test box A131001, it can complete the test for multiple capacitors or aluminum foil rapidly, accurately and simultaneously in a short time without changing any test wire.

The report printing function is capable of printing the test results correctly and completely; and the built-in data calculation function can compute the test data of the product instantly for CPK analysis. To avoid the inefficient calculation process done manually, a test software application is also available for you to create a quality report easily. It meets the EIAJ RC-2364A regulations for electrolytic capacitor test and is a test instrument of choice.

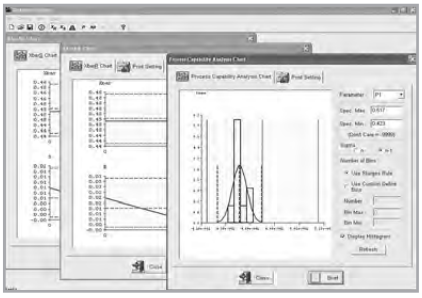
Chroma A131001 is a sequential switch test box of ten channels specially designed for Chroma 13100. Each test socket on the test box is implemented with Kelvin measurement, which is suitable for the precise measurement requirement for low impedance and low leakage current. With the SCAN function in 13100 it is able to control the C, D, Q, Z, ESR and LC tests for electrolytic capacitor to be done consecutively without switching the capacitor manually. This increases the test efficiency significantly as it costs only 1/10 of the original test time.

ORDERING INFORMATION

13100 : Electrolytic Capacitor Analyzer
A131001 : 10 Channels Switching Test Fixture
A131002 : 4T BNC to BNC Lead



A131001 : 10 Channels Switching Test Fixture (200 Vmax)



13100 Softpanel

All specifications are subject to change without notice.

SPECIFICATIONS	
Model	**13100**
Main Function	C Meter/Leakage Current Tester/Foil WV Tester/Scanner Controller
C Meter	
Test Parameter	Cs-D, Cs-Q, Cs-ESR, Cp-D, Cp-Q, |Z|-ESR, |Z|-θ
Test Signals	
Level	1.0V/0.25V, ±10%
Frequency	100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 50kHz, 100kHz; ±0.01%
Source Ro	25Ω, 100Ω, 25Ω/C.C, 100Ω/25Ω four mode selectable
Measurement Display Range/ Basic Accuracy *1	
C	0.001pF ~ 1.9999F / ±0.1%
Z, ESR	0.01mΩ ~ 99.99MΩ / ±0.1%
D, Q	0.0001 ~ 9999 / ±0.0005
θ	-90.00° ~ +90.00° / ±0.03°
Measurement Speed *2	
Fast/Medium/Slow	Freq. = 100Hz 120Hz : 55ms / 120ms/ 750ms; Freq 1kHz : 35ms / 60ms / 370ms
Function	
Correction	Open / Short zeroing
Averaging	1~99 times
Test Signal Monitor	Vm, Im
Leakage Current Tester	
Test Parameter	LC, IR
Test Signals	
Voltage	1.0 V ~ 100 V, step 0.1 V;101V~650 V, step 1V; (0.5% + 0.2V)
Charge Current Limit	V ≦ 100V: 0.5mA~500mA; V>100V: 0.5mA~150mA; step 0.5mA; (3% + 0.05mA)
Measurement Display Range/ Basic Accuracy *3	
LC (Leakage Current)	0.001μA ~ 99.9mA/ ±(0.3% +0.005μA)
Measurement Speed	45ms
Function	
Correction	Null zeroing
Averaging	1 ~ 99 times
Test Voltage Monitor	Vm: 0.0 V ~ 660.0V; (0.2%+0.1V)
Charge/ Dwell Timer	0 ~ 999 sec.
Foil WV Tester	
Test Parameter	Tr (Rise Time), Vt (Foil Withstand Voltage), Plot [logT, Vm]
Test Signals	
Voltage Limit	650 V typical
Constant Charge Current	0.5mA~100mA, step 0.5mA; (3% +0.05mA)
Test Display Range	
Tr (Rise Time)	0.05 ~ 120.00 sec.
Charge Voltage	0.1V ~ 660.0V
Plot [logT, Vm]	220 plots; Vm: 1.5~10 x Vf
Test Time	30 ~ 600 sec.
Scanner Controller	
Controllable Fixture	Chroma A131001
Test Parameter	C parameter pair x 2, LC parameter x 1
Sample Number	1~1000 pcs.
Function	
Correction	Fixture Open/ Short/ Null zeroing
Comparison Limit	Upper, Lower
Statistics	Maximum, Minimum, Average (X bar), Cpk
Interface	RS-232, Printer, Scanner Control Interface
Display	320 x 240 dot-matrix LCD display
Memory (Store/Recall)	
Internal	200 instrument setups
4M SRAM card (Option)	200 instrument setups (for copy and backup)
Trigger	Internal, Manual, BUS, Scanner
General	
Operation Environment	Temperature 0°C~40°C, Humidity < 90 % RH
Power Consumption	400 VA max.
Power Requirement	90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz
Dimension (H x W x D)	177 x 430 x 301.4 mm / 6.97 x 16.93 x 11.87 inch
Weight	14 kg / 30.84 lbs

Note*1 : 23±5°C after Open and Short correction, slow measurement speed, refer to Operation Manual for detail measurement accuracy descriptions
Note*2 : 23±5°C after Null correction, average exceeds 10 times, refer to Operation Manual for detail measurement accuracy descriptions
Note*3 : C/D meter in range >1Ω, refer to Operation Manual for detail



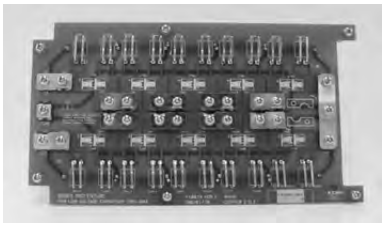
KEY FEATURES

- Digital constant current output and constant peak voltage output control function
- Four terminal contact test jig design, ensure accurate monitoring of voltage dropped on capacitors under test (patent pending)
- Paired cooper-foil wiring test cable to reduce voltage drop on the current driving loop and to ensure accurate monitoring of ac level dropped on capacitors under test (patent pending)
- 0-500 V DC bias voltage source, 0.3% basic accuracy
- 0.01~30A, 100Hz/120Hz/400Hz/1kHz AC ripple current source, (±0.5% reading+0.1% of range) basic accuracy (Model 11800)
- 0.01~10A, 20kHz~100kHz AC ripple current source, 2% basic accuracy (Model 11801)
- 0.03~10A, 20kHz~1MHz AC ripple current source (Model 11810)
- Monitoring software (option) for multiple Ripple Current Testers
- Lower power consumption and lower electricity cost
- Large LCD display (320 x 240 dot-matrix)
- Alarm for indicating of normal or abnormal test termination, Tested time will be recorded if the test is terminated abnormally. An automatic discharge is always performed after test termination
- Standard RS485 interface is provided for computer monitoring
- Optional 20-fixtures Series or Parallel test jigs
- Digital timer inside
- CE marking (Model 11800/11801)

The Chroma 11800/11801/11810 Ripple Current Tester is a precision tester designed for electrolytic capacitors load life testing. Provides constant ripple current output and constant peak voltage (Vpeak = Vdc + Vac_peak) output digital control function. Let load life testing for electrolytic capacitors becomes easier and more reliable. And, The Chroma 11800/11801/11810 use excellent output amplifier design technology to reduce power consumption and internal temperature rising. For long time testing requirement, it can reduce electricity cost and perform high stability. The Chroma 11800/11801/11810 is a just right test solution for electrolytic quality evaluation.



Model 11801



A118029 : SMD Series Test Fixture for Low Voltage



A118010 : Monitoring Software for 11801/11800

ORDERING INFORMATION

11800 : Ripple Current Tester 1kHz
11801 : Ripple Current Tester 100kHz
11810 : Ripple Current Tester 1MHz
A118004 : Series Test Fixture
A118005 : Parallel Test Fixture
A118010 : Monitoring Software for Model 11800/11801
A118028 : Series Test Fixture for Low Voltage
A118029 : SMD Series Test Fixture for Low Voltage
A118030 : PCB for SMD Capacitor

SPECIFICATIONS

Model		11800	11801	11810
Ripple Current Source				
Current Output Range		0.01~30A	0.01~10A	0.03~10A, *3
Frequency		100Hz/120Hz/400Hz/ 1kHz ±0.1%	20kHz~100kHz	20kHz~1MHz
Accuracy *1	0.010A~0.199A	± (0.5% of reading + 0.1% of range)	± (3% + 0.005 A)	0.03~0.39A, ±(3% + 0.01 A), *2
	0.20A~1.99A		± (2.5% + 0.05 A)	
	2.0A~10A		± (2% + 0.2 A)	0.40~10.0A, ±(2% + 0.05 A), *2
	10.0A~30A		--	
Ripple Voltage Output Range		90Vrms / 10Arms, 30Vrms / 30Arms	15Vrms maximum	
DC Bias Voltage Source				
Voltage Output Range		DC 0.5 ~ 500V, ± (0.3% + 0.05V)		
Charge Current		200mA, 40W Maximum		
Signal Monitor Parameter Accuracy				
Irms (Ripple Current)	0.001A~0.199A	± (0.5% of reading + 0.1% of range)	± (2% + 0.005 A)	0.030A~0.399A: ±(3% +0.01A),*2, *3
	0.20A~1.99A		± (2% + 0.05 A)	
	2.0A~10A		± (2% + 0.2 A)	0.400A~10.00A: ±(2% +0.05A),*2, *3
	10.0A~30A		--	
Vpeak (Normally, set to capacitor rated voltage)		Vpeak =Vdc + Vac_peak		
Vdc (DC Bias Voltage)		± (0.3% + 0.05V)		
Vrms (Ripple Voltage)		0~1.99V, ± (0.3% of reading + 0.5% of range) 2.00~19.99V, ± (0.3% of reading + 0.1%of range) 20.00V~200.0V, ± (0.3% of reading + 0.1%of range)	± (1% + 0.005V)	± (1% + 0.01V) *2
Control Function				
Timer		1 min~10000 hour, 30min error per year		
Interface		RS-485 (Standard)		
Display		320 x 240 dot-matrix LCD display		
Operation		Start, Stop, Continue		
Protection		OCP, OTP, Over Load		
General				
Operation Environment		Temperature : 10°C~40°C, Humidity : < 90 % RH		
Power Consumption		3000 VA max.	700 VA max.	1000VA max.
Power Requirement		198 ~ 242Vac, 47 ~ 63Hz		
Dimension (H x W x D)		221.5 x 440 x 609.8 mm / 8.72 x 17.32 x 24.01 inch	353.6 x 440 x 609.8 mm / 13.92 x 17.32 x 24.01 inch	221.5 x 440 x 609.8 mm / 8.72 x 17.32 x 24.01 inch
Weight		54 kg / 118.94 lbs	60 kg / 132.16 lbs	40 kg / 88 lbs

Note*1 : 23 ± 5°C
Note*2 : Multiple accuracy for test frequency 20~100kHz (x 1), 101~500kHz (x 2.5), 501kHz~1MHz (x 5)
Note*3 : Frequency > 500kHz : 0.10~10.0A only **Note*4 :** Frequency > 500kHz : 0.100~10.00A only

All specifications are subject to change without notice.



KEY FEATURES

- Electrolytic capacitor leakage current test function
- Insulation Resistance (IR) test function
- Constant current DC power source with discharge function
- Forward voltage function for Diode, LED, Zener Diode and Varistor
- Surge voltage test function for electrolytic capacitor (JIS C5101/5102/5140/5141)
- Option contact check function to improve test reliability
- Basic accuracy: 0.3%
- Aluminum-foil withstand voltage and rise-time test function (For EIAJ RC-2364A)
- Precision low constant current charge capability (0.5mA ± 0.05mA, meet EIAJ RC-2364A requirement for withstand voltage testing of lower WV aluminum-foil)
- Large charge current (500mA) capability to fasten charge speed
- 1.0V ~ 650V / 800V DC voltage source

GPIB HANDLER RS-232 CE

- 0.001uA - 20.00mA leakage current test range with 4 digits resolution
- Standard RS-232 interface
- Optional GPIB & Handler interface
- Digital timer inside
- Comparator and pass/fail alarming beeper function
- Large LCD display (240 x 64 dot-matrix)
- Friendly user interface
- Easy use graphic user interface : softpanel (Option)

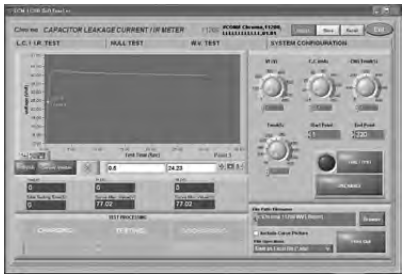
The Chroma 11200 Capacitor Leakage Current/IR Meter is Chroma's newest digital leakage current meter. Provides DC 1~650 V, 0.5mA~500mA (150mA for V>100V) DC power source or DC 1~800V, 0.5mA~500mA (50mA for V>100V) DC power source. Mainly used for electrolytic capacitor leakage current testing, and aluminum-foil withstand voltage testing (EIAJ RC-2364A). And also can be used for active voltage checking or leakage current testing of absorber, Zener diode, and Neon lamp etc.

Contact failure between a DUT and the measurement plane of an automatic component handler is a factor for compare error in production line testing. Contact check using the built-in measurement function (option) improves the accuracy and efficiency of comparing.

Standard RS-232 interface, optional GPIB & Handler interface, high speed and stable measurement capabilities enable the Chroma 11200 can be used for both component evaluation on the production line and fundamental leakage current testing for bench-top applications.

ORDERING INFORMATION

11200 : Capacitor Leakage Current / IR Meter 650V
11200 : Capacitor Leakage Current / IR Meter 800V
11200 : Capacitor Leakage Current / IR Meter with contact check function 650V
A110235 : GPIB & Handler Interface
A110236 : 19" Rack Mounting Kit
A112001 : Triangle Test Fixture
A112004 : Softpanel for Model 11200



A112004 : Softpanel of Model 11200

SPECIFICATIONS

Model		11200 (650V)	11200 (800V)
Main Function		Capacitor Leakage Current / IR Meter	
Test Parameter		LC, IR	
Test Signals Information			
Voltage		1.0 V~100 V, step 0.1 V; 101V~650 V,step 1V; ±(0.5% + 0.2V)	1.0 V~100 V, step 0.1 V; 101V~800V,step 1V; ±(0.5% + 0.2V)
Charge Current Limit		V ≦ 100V: 0.5mA~500mA, 50W max. V > 100V: 0.5mA~150mA, 97.5W max. step 0.5mA; ±(3% + 0.05mA)	V ≦ 100V: 0.5mA~500mA, 50W max. V > 100V: 0.5mA~50mA, 40W max. step 0.5mA; ±(3% + 0.05mA)
Measurement Display Range		LC : 0.001μA~20.00mA	
Basic Measurement Accuracy *1		LC Reading : ±(0.3% + 0.005μA)	
Measurement speed (Ext. Trigger, Hold Range, Line Frequency 60Hz)	Fast	77 ms	
	Medium	143 ms	
	Slow	420 ms	
Function			
Correction		Null zeroing	
Test Voltage Monitor		Vm: 0.0 V~660.0V; ±(0.2% of reading + 0.1V)	Vm: 0.0 V~900.0V; ±(0.2% of reading + 0.1V)
Charge Timer		0~999 sec.	
Dwell Timer		0.2~999 sec.	
Foil WV Tester			
Test Parameter		Tr (Rise Time), Vt (Foil Withstand Voltage)	
Test Signals	Voltage Limit	650 V typical	800V typical
	Constant Charge Current	0.5mA~150mA, step 0.5mA; ±(3% of reading + 0.05mA)	0.5mA~50mA, step 0.5mA; ±(3% of reading + 0.05mA)
Test Display Range	Tr (Rise Time)	0.05~600.0 sec.	
	Charge Voltage	0.1V~660.0V	0.1V~900.0V
Test Time		30~600 sec.	
Interface		RS-232(Standard), Handler, GPIB (Optional)	
Display		240 x 64 dot-matrix LCD display	
Trigger		Internal, External, Manual, BUS	
General			
Operation Environment		Temperature : 10°C~40°C Humidity : < 90 % RH	
Power Consumption		400 VA max.	
Power Requirement		90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz	
Dimension (H x W x D)		100 x 320 x 346.1 mm / 3.94 x 12.6 x 13.63 inch	
Weight		8 kg / 17.62 lbs	

Note*1 : 23 ± 5°C after null correction. Refer to Operation Manual for detail measurement accuracy descriptions.



Programmable HF AC Tester
Model 11802/11803/11805
HF Hipot Tester
Model 11890
HF HV Load Life Tester
Model 11891

KEY FEATURES

- HF HV Load Life Test (CV and CC mode)
- HF Withstand Voltage Test (CV and CC mode)
- HF Breakdown Voltage Test (CV mode)
- Test frequency: 20kHz ~1MHz
- Wide output voltage and current range while combine with different module (Module is customized and based on the tester's power)
- Output voltage and current monitor
- Programmable output voltage waveform control
- Cycle count mode or time count mode for load life test timer
- Lower power consumption and lower temperature rising design
- Large LCD display (320 x 240 dot-matrix)
- Built-in digital timer

RS-485 HANDLER CE

Chroma 11802 Series Programmable High Frequency AC Tester is a digital controlled high frequency AC source platform, can be combined with high frequency voltage/current step-up module to provide high voltage/high current. Chroma 11802 Series output test frequency is 20kHz~200kHz, which cover application frequency range for various SMPS, LCD inverter and etc.

Chroma 11802 Series provides digital functions, like programmable sine-wave output voltage controller to simulate the operation condition for DUT, and cycle count mode or timer mode for load life test, etc. Chroma 11802 Series uses tracking DC source inside for output amplifier to reduce power consumption and lower temperature rising. It reduces electricity cost and improves stability for long time testing. It is the best choice to perform quality verification for various electronic components which used under high frequency, like LCD Inverter and module, high voltage capacitors, primary of SMPS main power, CCFl, HCFl, and EEFl etc.

Chroma 11890 is the best tester for production line of HF HV electronic components withstanding voltage test, like LCD inverter transformer, ceramic capacitor, cable, PCB, automatic motor corona discharge inspection and medical equipment high frequency leakage current safety inspection.
Chroma 11891 is a tester with only function HF HV Load Life Test (CV and CC mode). It is suitable for passive component load life test.

ORDERING INFORMATION

11802 : Programmable HF AC Tester 500VA
11803 : Programmable HF AC Tester 800VA
11805 : Programmable HF AC Tester 1000VA
11890 : HF Hipot Tester 500VA
11891 : HF HV Load Life Tester 500VA

H.F. Current Step-up Module
- **A118011 :** 10V/50A max.
- **A118015 :** 33V/30A max.
- **A118019 :** 16V/30A max.
- **A118037 :** 30V/25A max.

H.F. Voltage Step-up Module
- **A118014 :** 2.5kV/200mA max.
- **A118016 :** 250V/2A max.
- **A118017 :** 8kV/60mA max.
- **A118018 :** 1kV/1A max.
- **A118031 :** 5kV/100mA max. (with shielding)
- **A118032 :** 1kV/500mA max.
- **A118034 :** 2.5kV/400mA max.

APPLICATION LIST

Model	Primary Function	Option	Application Description
11802	HF, HV, CV	A118013 HF HV 5kV/100mA max A118014 HF HV 2.5kV/200mA max A118017 HF HV 8kV/100kHz max A118031 HF HV 5kV/100mA max + shielding	LCD inverter transformer (ceramic capacitor, cable, PCB) load life / withstanding voltage / breakdown voltage test
			EEFl, backlight load life / lamp current test
			SMPS main transformer and active PFC choke load life test and electrical analysis
			Medical equipment high frequency leakage current safety inspection
			Automobile motor corona discharge inspection, analysis and production line
	HF, HV, CV	Step-up current test module + specified resonant inductor/ capacitor	Ballast capacitor / inductor ignition voltage load life test
	HF, HI, CC, Bias voltage	Ripple Current Test Module Chroma 11200 CLC / IR Meter (for DC voltage source with discharge function)	Snubber capacitor load life test
	HF, CV, Bias current Temperature meter	Step-up current test module + AC/DC coupling test fixture Chroma DC power supply (for DC bias current) Chroma 12061 Digital Multimeter (for temperature measurement)	DC-DC converter SMD power choke temperature rising test (DC Bias current with AC ripple voltage) and electrical analysis
	HF, HV, CV (or + DC source)	HF HV test module Option Chroma DC source	Function as HF HV AC +DC power source for FFI and SED device analysis
11803	HF, CV, Bias current Temperature meter	Step-up current test module + AC/DC coupling test fixture Chroma DC power supply (for DC bias current) Chroma 12061 Digital Multimeter (for temperature measurement)	DC-DC converter SMD power choke temperature rising test (DC Bias current with AC ripple voltage) and electrical analysis
11890	HF, HV, CV	A118013 HF HV 5kV/100mA max A118014 HF HV 2.5kV/200mA max A118031 HF HV 5kV/100mA max + shielding	LCD inverter transformer(ceramic capacitor, cable, PCB) withstanding voltage test for production line
			Medical equipment high frequency leakage current safety inspection
			Automobile motor corona discharge inspection for production line
11805	HF, HI, Bias voltage	A118015 HF, HI 33V/30A max.	Snubber capacitor load life test
	HF, HV	A118018 HF, HV 1kV/1A max.	High voltage capacitor load life test
11891	HF, HV, CV	A118013 HF HV 5kV/100mA max A118014 HF HV 2.5kV/200mA max	Passive Component (inverter transformer, ceramic capacitor, cable, PCB etc.)
			High Frequency and High Voltage Load Life Test

All specifications are subject to change without notice.

SPECIFICATIONS						
Model		**11802**	**11890**	**11891**	**11805**	**11803**
AC Output						
Frequency	Range (rms)	20kHz~200kHz, step 1kHz			10kHz~200kHz, step 1kHz	20kHz~1MHz, step 1kHz
Frequency accuracy	accuracy	±0.02%				
Output Voltage	Range (rms)	165V maximum, step 1 V				1~143V, step 1 V
	accuracy	±(5% of setting + 0. 5V)				
	reading	±(4% of reading + 0. 5V)				
Output Current	Range (rms)	0.01A ~ 3.10A			0.05A ~ 6.20A	5.6A maximum
	accuracy	±(5% of setting + 0.5A)				
	reading	±(4% of reading + 0.5A)				
Maximum Output Power		500VA			1kVA	800VA
Output mode	HF HV Load Life Test (CV)	●		●	●	●
	HF HV Load Life Test (CC)	●		●	●	●
	HF WV Test (CV)	●	●		●	●
	HF WV Test (CC)	●			●	●
	HF Breakdown Voltage Test	●			●	●
Control Function						
Timer	Load Life Test	1 min ~ 10000 hour, 30min error per year				
	WV Test	0.1 sec ~ 999.9 sec				
General						
Operation Environment		Temperature : 10˚C~ 40˚C, Humidity : < 90% RH				
Power Consumption		2700 VA max.			3000 VA max.	2700 VA max.
Power Requirement		198 ~ 242Vac, 47 ~ 63Hz				
Dimension (H x W x D)		241.5 x 440 x 609.8 mm / 8.72 x 17.32 x 24.01 inch				
Weight		32 kg /70.48 lbs				

Modules						
	Tester			**Specification of Modules**		
	11802/ 11890/ 11891	**11805**	**11803**	**Voltage Output**	**Max. Current Output**	**Frequency (kHz)**
H.F. Current Step-up Modules						
A118011	●			0.1V~10V, ±(5% of setting + 0.05V) *2	2.5A~50A, ±(4% of setting + 0.05A) *2	200 kHz
A118015		●		0.5V~33V, ±(5% of setting + 0.15V) *2	0.2A~30A, ±(4% of setting + 0.1A) *2	200 kHz
A118019	●			0.2V~16V, ±(5% of setting + 0.1V) *2	0.2A~30A, ±(4% of setting + 0.1A) *2	200 kHz
A118037			●	0.50V~30V, ±(4% of reading + 0.3V)	0.5A~25.0A (500kHz), 0.5A~15.0A (1MHz), ±(3% of setting + 0.2A)	1 MHz
H.F. Voltage Step-up Modules						
A118014	●			0.05kV~2.50kV, ±(5% of setting + 0.01kV) *2	1mA~200mA, ±(4% of setting + 0.3mA) *2	200 kHz
A118016	●			5V~250V, ±(5% of setting + 1V) *2	0.01A~2A, ±(4% of setting + 5mA) *2	200 kHz
A118017	●			0.05kV~8.00kV, ±(5% of setting + 0.02kV) *2	60mA (100kHz)	200 kHz
A118018		●		0.05kV~1.00kV, ±(5% of setting + 0.01kV) *2	0.01A~1A, ±(4% of setting + 3mA) *2	200 kHz
A118031	●			0.05kV~5.00kV, ±(5% of setting + 0.01kV) *2	0.5mA~100mA, ±(4% of setting + 0.3mA) *2	200 kHz
A118032	●			0.05kV~1.00kV, ±(5% of setting + 0.01kV) *2	2.5mA~500mA, ±(4% of setting + 1mA) *2	200 kHz
A118034		●		0.01kV~2.5kV, ±(5% of setting + 0.01kV) *2	1.5mA~400mA, ±(4% of setting + 0.2mA) *2	200 kHz

Note*1 : Under rated load and voltage correction is well performed
Note*2 : For test frequency above 100kHz, multiply the accuracy error by 2 times

Milliohm Meter

Model 16502



KEY FEATURES

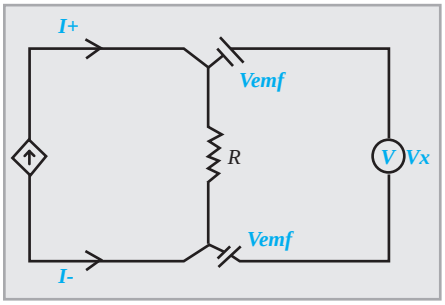
- Basic accuracy : 0.05%
- Pulsed test current output mode is used to reduce thermal EMFs affection on milliohm measurement
- DC test current output mode is used to fasten measurement speed for inductive DUT
- Dry-circuit test current output mode (limited Max. 20mV) is used to measure such contact resistances where the maximum open-circuit voltage must be limited to 50mV
- Temperature correction (TC function) regardless of material or temperature
- Useful temperature conversion function for motor/ coil evaluation
- 4 channels R scan with balance check function for fan motor (combined with A165017 option)
- 0.001mΩ~1.9999MΩ wide measurement range with 4½ digits resolution
- Standard RS-232 interface
- Optional GPIB & Handler interface
- Bin-sorting function
- Comparator and pass/fail alarming beeper function
- Large LCD display (240 x 64 dot-matrix)
- Friendly user interface
- LabView® Driver

The Chroma 16502 Milliohm Meter is Chroma's newest digital Milliohm Meter. 0.001mΩ~1.9999MΩ wide measurement range. DC, Pulsed, and Dry-circuit test current driving modes, enable the Chroma 16502 can be properly used in DC resistance measurement for various inductive components (coil, choke, and transformer winding etc.), cable, metallic contact (connector, relay switch etc.) and conduction materials.

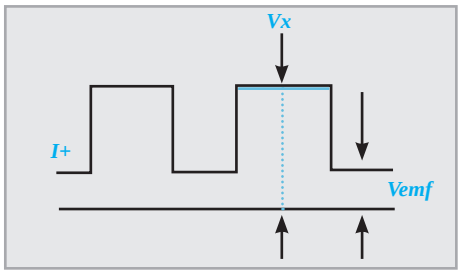
Using the A165014 Temperature Compensation Card with A165015 PT100 Temperature Probe, resistance values measured at ambient temperature can be corrected by applying a thermal coefficient so that the display shows the corresponding resistance values at any other temperature with temperature correction function. Temperature increase (△t) is obtained and displayed by converting resistance measurements and ambient temperature with convenient temperature conversion function. This function is especially useful for verifying motor windings or coils, where the maximum temperature increase needs to be determined when current is applied.

Pulsed ± function application includes power choke, switch/Relay contract, multi-braided twisted wires, metallic foil or conductive material, thermo-sensitive material (fuse, thermistor sensor) etc. Dry Circuit function application includes switch /relay contract, thermo-sensitive material (fuse, thermistor sensor) etc. DC+ function application includes high inductance DUT, like primary of transformer (multi-turn) measurement with Measurement Delay Function to avoid the test current not produced that effect by high inductance DUT during test period.

Standard RS-232 interface, optional GPIB & Handler interface, high speed and stable measurement capabilities enable the Chroma 16502 can be used for both component evaluation on the production line and milliohm measurement for bench-top applications.



Vemf = Thermoelectric EMFs



Vx - Vemf = IR Vemf = Thermoelectric EMFs

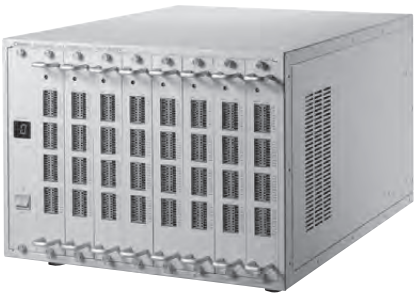
ORDERING INFORMATION

16502 : Milliohm Meter
A110235 : GPIB & Handler Interface
A110236 : 19" Rack Mounting Kit
A113012 : Vacuum Generator for A165018
A113014 : Vacuum Pump for A165018
A165013 : GPIB and Handler Interface with Temperature Compensation
A165014 : Temperature Compensation Card
A165015 : PT100 Temperature Probe
A165016 : Pin Type Leads (flat)
A165017 : 4 Channels R Scanner
A165018 : Test Fixture for SMD Power Choke
A165019 : Pin Type Leads (taper)
A165022 : Four Terminal Test Cable

SPECIFICATIONS		
Model		**16502**
Range Basic Measurement Accuracy *1;Test Current		
20mΩ		±(0.1% of reading + 0.03 % of range) ; 1A typical
200mΩ		±(0.05% of reading + 0.03 % of range) ; 100mA typical
2Ω		±(0.05% of reading + 0.03 % of range) ; 10mA typical
20Ω		±(0.05% of reading + 0.03 % of range) ; 1mA typical
200Ω		±(0.05% of reading + 0.02 % of range) ; 1mA typical
2kΩ		±(0.05% of reading + 0.01 % of range) ; 1mA typical
20kΩ		±(0.1% of reading + 0.01% of range) ; 100μA typical
200kΩ		±(0.2% of reading + 0.01 % of range) ; 10μA typical
2MΩ		±(0.3% of reading + 0.01 % of range) ; 1μA typical
Test Signal		
Drive Mode		DC+, DC-,Pulsed+, Pulsed -, Pulsed ±, Stand by
Dry Circuit		Open Circuit Voltage less than 20mV; for 200mΩ, 2Ω, 20Ω ranges only
Measurement Time *2		
Fast		65ms
Medium		150ms
Slow		650ms
Temp. Correction / Conversion Function		
Temperature Measurement Accuracy (Option)	-10.0˚C ~ 39.9˚C	±(0.3% of reading+0.5˚C) *3
	40.0˚C ~99.9˚C	±(0.3% of reading+1.0˚C) *3
Temp. Sensor Type (Option)		PT100/ PT500
Interface & I/O		
Interface		RS-232(Standard) , GPIB, Handler (Optional)
Output Signal		Bin-sorting & Pass/Fail judge
Comparator		Upper/Lower limits in value
Bin Sorting		8 bin limits in %, ABS
Trigger Delay		0~9999ms
Trigger		Internal, Manual, External, BUS
Display		240 x 64 dot-matrix LCD display
Correction Function		Zeroing
General		
Operation Environment		Temperature : 10˚C~40˚C,Humidity : < 90 % R.H.
Power Consumption		80 VA max.
Power Requirement		90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz
Dimension (H x W x D)		100 x 320 x 346 mm / 3.94 x 12.6 x 13.62 inch
Weight		4.2 kg / 9.25 lbs

Note*1 : 23 ± 5˚C after Zeroing correction. Slow measurement speed. Refer to Operation Manual for detail measurement accuracy descriptions.
Note*2 : Measurement time includes sampling, calculation and judge test parameter measurement.
Note*3 : Not include temp. sensor accuracy

All specifications are subject to change without notice.



KEY FEATURES

- Support component test scanning
- Support 8 slots for plug-in (removable), up to 320 channels for one unit
- Option A130007 40 channels scan module, input up to 500VDC for IR test without switching
- Max. 8 salve units for multiple scanner (master/slave interface)
- Support Chroma LCR meter
- Support Chroma 3302/3252/11025 turn ration function
- Support 11200 CLC/IR meter for IR test
- Standard RS-232, GPIB and USB interface
- 13001 can be installed in Chroma Component ATE model 8800
- Support ICT applications

GPIB RS-232 USB CE

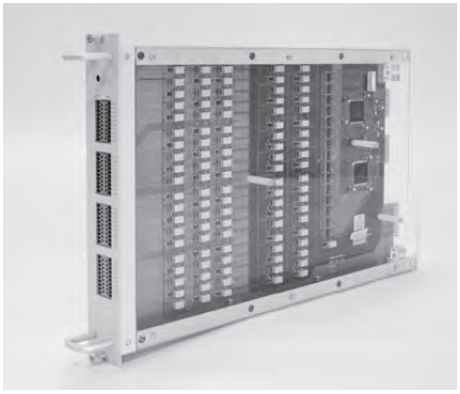
In the recent years, component is more complicated and more multiple. It makes all tests be performed which are very complicated and different. The problem is not only the course is complicated and apt to make mistakes, but also the manpower cost more.

Chroma 13001 can perform switch and scan test for L, C, R etc measurement combine with LCR Meter (Chroma model 3302/3252/11022/11025) include turn ration if the model has and IR test combine with Chroma 11200 CLC/IR Meter. It also offers short function for leakage inductance measurement. One unit could plug-in modules up to 8 slots. It is up to 320 channels for one unit if combined with 8 of option A1130007 40 channels module. It provides master and slave designed and up to 8 salve units for multiple scanner. User can control the output test circuit through RS-232, GPIB or USB interface.

Chroma 13001 can be installed in Chroma 8800 Component ATE for DUT which a lot of procedures to test like RJ-45 equipment, glass substrate, LCD glass substrate, printed circuit glass, PCB, EMI filter ICT application. The 8800 ATS can save the manpower cost, reduce the mistake, data management to improve quality and efficiency.

ORDERING INFORMATION

13001 : Component Test Scanner
13001 : Component Test Scanner (Slave)
A130000 : 6 BNC Test Lead
A130001 : 4 BNC Test Lead
A130002 : IR Test Lead
A130005 : Long Test Lead
A130007 : 40 Channels Scan Module



A130007 : 40 Channels Scan Module

SPECIFICATIONS	
Model	**13001 (MASTER & SLAVE)**
Mode	SCAN
Interface (Master only)	RS-232 , USB , GPIB
General	
Operation Environment	Temperature: 0˚C ~ 45˚C, Humidity: 15% to 80% R.H@≦ 40˚C
Power Consumption	150VA Max. (with rated load)
Power Requirements	90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz
Dimension (H x W x D)	310 x 440 x 573 mm / 12.2 x 17.32 x 22.56 inch
Weight	21 kg / 46.26 lbs (13001 main frame only, without module)

MODULE SPECIFICATIONS	
Module	**A130007**
Channel	40
Port	80
Max. voltage without switch	DC 500V
	AC 10V
Max. Current without switch	DC 1000mA
	AC 100mA



GPIB RS-232 RS-485

Magnetic component's heat comes from copper loss and iron loss. The copper loss caused by flowing current and wire resistance. The iron loss including Hysteresis Loss and Eddy Current Loss, mainly comes out from AC current. The inductance of magnetic component will drop unexpectedly if the temperature gets too high.

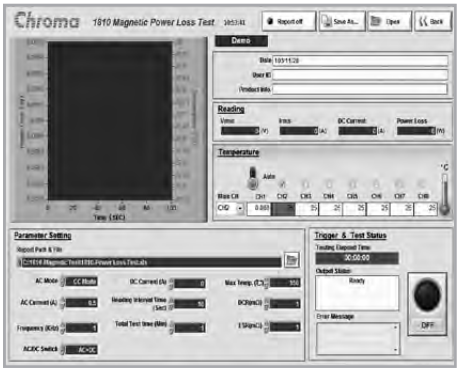
Chroma 1810 is a test system for detecting the power loss of magnetic component. It provides DC current and AC voltage to the component, and it has a temperature sensor detects the temperature on component. The analysis reports will record the result in computer by using test program. These statistic analysis reports are important for researching and quality control department.

ORDERING INFORMATION

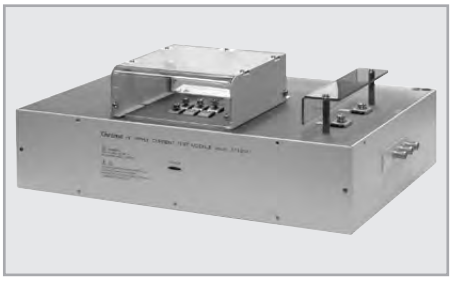
1810 : Magnetic Component Test System
HF AC Tester : Refer to Chroma Model 11802, 11803
DC Source : Refer to Chroma Model 62012P-80-60
Thermal/Multi-Function Data Logger : Refer to Chroma Model 51101-8
A118016 : H.F. Voltage Step-up Module - 250V/2A max.
A118019 : H.F. Current Step-up Module - 16V/30A max.
A118037 : H.F. Current Step-up Module - 30V/25A max.
Oscilloscope : Tektronix TDS3012C

KEY FEATURES

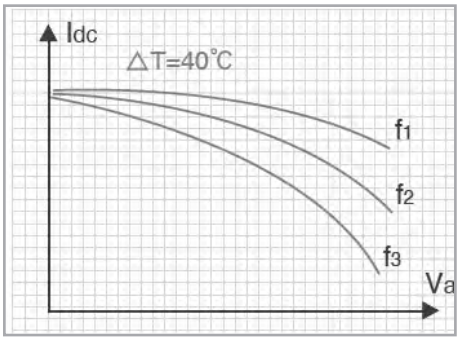
- Sine Wave Voltage : 20kHz~1MHz
- 60A max DC Bias Current
- Power Loss Detection
- Temperature Detection
- Statistic Report with Software Control
- Customized test module



Test program



A118037 : H.F. Current Step-up Module



Load Current (Idc) and AC Voltage (Vac) Curve

All specifications are subject to change without notice.



RS-232 RS-485 USB

By higher withstanding voltage and lower ESR than electrolytic capacitors, the superior load life characteristic of film capacitors are suitable to be applied mainly in green energy industries such as Photovoltaic, Electric Vehicle, and wind power. When applying on circuits, high frequency large current may rise up capacitors' temperature and reduce their usable life. If the current withstanding and heat dissipation are not well-structured in the internal circuit, capacitors can even be burned. Therefore, observe the temperature rising characteristic under actual working condition is the best way to evaluate the endurance and reliability of film capacitors. It is also the verification and analysis capabilities that the capacitor manufacturers must have.

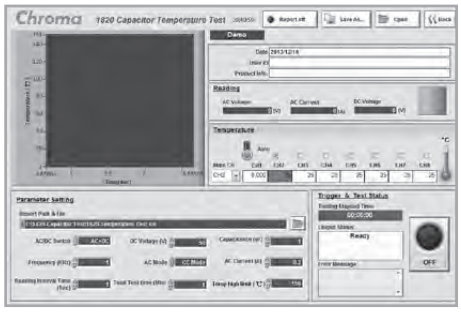
Chroma 1820 ia able to provide the test condition of adding high frequency AC current on DC high voltage that DC bias voltage can up to 5kV and AC current frequency is from 1kHz to 20kHz / 10kHz to 200kHz with 1kVA / 2kVA maximum output power. It measures the multi-point temperature accurately by 8-channel temperature data logger. In addition to the standard test modules available for choosing, we also provide the customized module evaluation and design service for the requirements of mass current test applications. The control software specially developed for this system can set the test conditions, record the test data, provide the test report, and reflect the change of temperature rising by showing the real-time temperature curve.

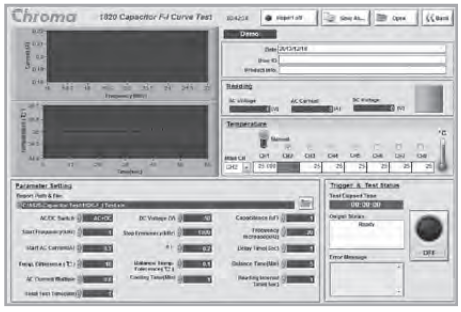
By the function design of the software, Chroma 1820 can not only do the long-time temperature rising test based on users' setting test condition, but also increase or decrease the AC current and switch the test frequency by product temperature rising situation for evaluating the maximum withstanding current under different application frequencies. Whatever characteristic improvement and evaluation for product research & development, or quality verification and check for IQC, Chroma 1820 is the best platform to analyze the endurance and reliability of capacitors.

KEY FEATURES

- High frequency sine wave current : 1kHz~20kHz 10kHz~200kHz
- DC bias voltage : 5000V max.
- Capacitor endurance & temperature rising test
- Capacitor withstanding current test (frequency sweep)
- Support with software control
- Customized test module

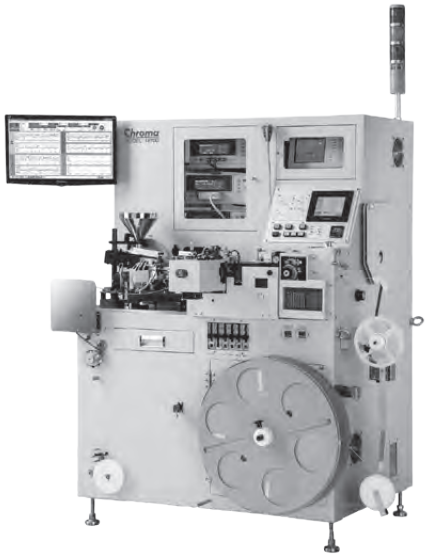
Softpanel





ORDERING INFORMATION

1820 : Capacitor Test System
11805 : Programmable HF AC Tester
11200 : Capacitor Leakage Current/IR Meter 800V
51101-8 : Thermal/Multi-function Data Logger 8ch
A118015 : HF Current Step-up Module 33V/30A max.
A118018 : HF Voltage Step-up Module 1kV/1A max.
A118034 : HF Voltage Step-up Module 2.5kV/400mA max.
Glassman LT5R400 : HV DC Power Supply 5kV



KEY FEATURES

- Test and packing speeds from 200ppm to 1,800ppm
- Provides 4 test stations based on test requirements for users to select desired test items
- Complete list of test items: Polarity, Layer Short Circuit, IR, DCR, Ls & Rs (Q value), Bias current
- Patented high-speed polarity reversing design ensures that products on the conveyor all have the same polarity
- Each test station has an independent NG (No Good) product collection box for later quality analysis
- Circular load plate design eliminates dropped inductors
- Equipment is fast, stable and safe
- Exclusive data collection software designed for test and packing machines for monitoring product quality in real time

Automated Production for Power Inductors

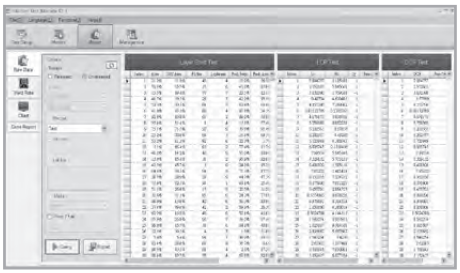
A power inductor is one of the most common and demanding components in magnetic and electrical products. As production capacity is rather large compared to other components, high-speed testing equipment is essential to meet measurement requirements. The basic static electrical characteristics tests for power inductor production lines include Ls, Q/ACR, DCR, polarity, withstand voltage insulation, layer short and BIAS Current tests. Chroma is able to provide fully automated production test solutions for power inductors.

The Chroma 1870D Series are high-speed test and packaging machines designed specifically for wafer-type power inductors with testing speeds up to 1,800ppm. It combines the power inductor "must test" parameters of each test station with exclusive data collection software for analyzing production data to improve productivity and quality control.

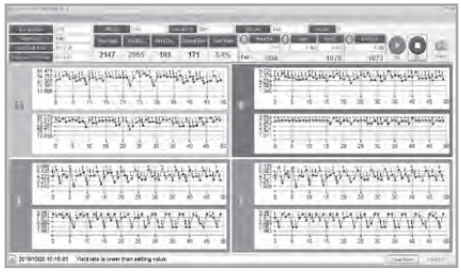
Graphic User Interface



1870D Software testing parameters settings



1870D Software report



1870D Software production monitoring

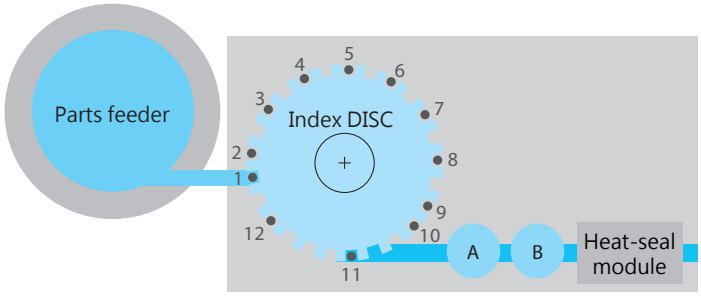
ORDERING INFORMATION

1870D : Inductor Test & Packing Machine
1870D-12 : Inductor Test & Packing Machine



1870D-12

1870D / 1870D-12 Configuration Diagram and Stations Depiction



Stations

1. Feeding detect
2. Polarity test
* 3. Polarity reverse
4. Layer short test (works with 19301A)
   Insulation resistance test (works with 11200)
   Bias current test (works with 11300)
5. NG inductor discharge for station 4
6. Winding resistance test (works with 16502)
7. NG inductor discharge for station 6
8. Inductor/quality factor test
   (works 11050 Series /3302)
9. NG inductor discharge for station 8
10. Good inductor receiver
11. Move to packing tape
12. Clean remaining inductors

A. Reserved for number spraying station
B. Reserved for automatic optical inspection station

* Choose one from three alternatives to work with installation testing for the 4th station

1870D Application Size Maximum Productivity										Unit : pcs/min
WxD (mm)	3.2 x 2.5		2.5 x 2.0		2.0 x 1.6 / 2.0 x 1.2			1.6 x 0.8		
H (mm)	1.2	1.0	1.2	1.0	1.2	1.0	0.8	1.0	0.8	0.6
Single-sided electrode	600	600	800	800	800	800	1,000	800	800	1,200
Five-sided electrodes	900	900	1,200	1,200	1,500	1,500	1,500	1,500	1,500	1,800

*The maximum productivity listed above does not include layer short testing, insulation resistance testing, or bias current testing.
* Production efficiency >1,200 pcs/min with paper tape used for packing. Do not use plastic tape.

1870D-12 Application Size Maximum Productivity					Unit : pcs/min
WxD (mm)	4.0x4.0	6.0x6.0	8.0x8.0	10.0x10.0	12.0x12.0
Single-sided electrode	250	200	150	100	80

All specifications are subject to change without notice.



KEY FEATURES

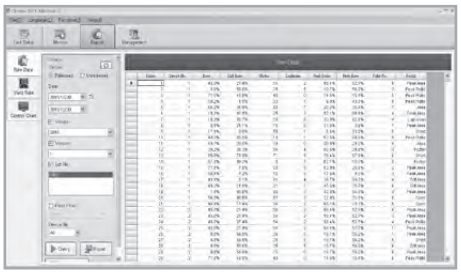
- Test speeds from 200ppm to1,500ppm
- Provides from 2 to 5 test stations for ATS selections based on testing requirements
- Equipped with inductance measurement contact check and voltage difference compensation functions
- Patented testing probe with "Four wire system" design to test voltage's authenticity and stability
- Tested NG inductors are collected to a separate box by failed item for bad process model and cause analysis
- Circular load plate design to eliminate dropped inductors
- Exclusive data collection software designed for layer short automatic test system for monitoring product quality in real time

The Chroma 1871 is an inductor layer short automatic test system with production capacity up to 1,500ppm for mass production applications. The 1871 ATS provides multiple test items for users to select from. It won't be idled even if it was installed during the initial development stage with lower production capacity.

Graphic User Interface



1871 Software testing parameters settings



1871 Software report

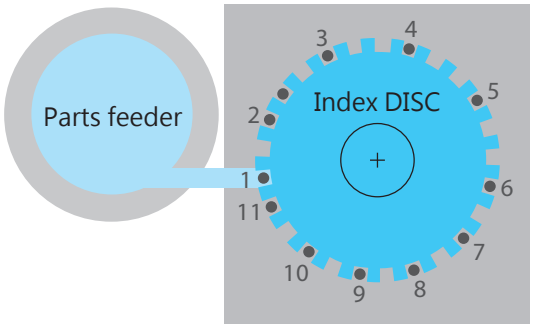


1871 Software production monitoring

ORDERING INFORMATION

1871 : Inductor Layer Short ATS

18701 Configuration Diagram and Station Depiction



Stations

1. Feeding detect
2. Layer short test station 1 (works with 19301A)
3. Layer short test station 2 (works with 19301A)
4. Layer short test station 3 (works with 19301A)
5. Layer short test station 4 (works with 19301A)
6. Layer short test station 5 (works with 19301A)
7. Good inductor receiver
8. Area NG inductor discharge
9. Laplacian NG inductor discharge
10. Contact check NG inductor discharge
11. Clean remaining inductors

* Layer short test stations 3 to 5 are reserved when 2 stations are selected.

1871 Application Size Maximum Productivity										Unit : pcs/min
WxD(mm)	3.2 x 2.5		2.5 x 2.0		2.0 x 1.6 / 2.0 x 1.2			1.6 x 0.8		
H(mm)	1.2	1.0	1.2	1.0	1.2	1.0	0.8	1.0	0.8	0.6
Single-sided electrode	600	600	800	800	800	800	800	800	800	800
Five-sided electrodes	900	900	1,200	1,200	1,500	1,500	1,500	1,500	1,500	1,500

* The test condition for the above is pulse 1.0 with 5 stations of layer short testing.



GPIB RS-232 RS-485 CE

In recent years, as components become more complicated and multi-channel along with other complex problems, the cost of tests has skyrocketed for manufacturers. Chroma 8800 component automatic test system (ATS) is developed to effectively help manufacturers reduce the test cost and product risk. This system is able to complete all measurements and tests in one single test program. This powerful feature save time and reduce human operation errors that decrease the enterprise risk due to improper tests. The employment of open architecture software provides users a flexible, powerful and cost-effective automated test system that is deemed the best solution for component tests.

Chroma 8800 component automatic test system integrates different test instruments in the system based on test requirements. The open architecture software offers corresponding solutions by various test programs and products that give customers highly flexible test combinations. In addition, user expandable test items are provided for editing if new requirements arise.

This automatic test system uses a unique test command optimization technology to prevent the repetitive control commands from sending to the system hardware devices. This technology improves the system test speed dramatically. Users create new test items based on their requirements using the test item editor. The users can expand the test items as needed.

The system's integrated statistical and management functions generate various test statistical reports and performing system administration. Statistical reports are very important in factories for research and design (R/D) evaluation, quality assurance (QA) verification and production tests. Chroma 8800's Window 2000/XP environments provide test engineers with a dedicated components automatic test system in a familiar Windows environment and allows accesses to resources provided by Windows.

Chroma 8800 component automatic test system can combine different testers and hardware according to the test requirements. For instance, Chroma 13001 performs multi-channel scan test for inductance, capacitance and resistance along with turn ration (if applicable) measurements when combining with the LCR Meters like Chroma 3302/3252/11022/11025. The 8800 can do IR test as well as leakage inductance measurement that is designed specially for short-circuit when combining with Chroma 11200 CLC/IR Meter. Chroma 13001 Component Test Scanner supports up to 320 channels per unit when 8 optional A1130007 40-channel scan modules are installed. Up to 8 slaves of Chroma 13001 can be expanded externally for an 8800 component ATS and up to 2880 channels (1 master plus 8 slaves) can be tested to fulfill the requirements for multi-channel tests.

KEY FEATURES

- Open architecture software
  - Expandable hardware support
  - Support instruments equipped with GPIB/RS-232 or RS485 interface
  - User editable test library (test Items)
  - User editable test programs
  - Statistical report
  - User privilege control
  - Test item/ program release control
  - Activity log
  - Support barcode reader
- Test command editor helps to improve test speed
- Comprehensive hardware modules provide highly accurate, repetitive measurements
- High test throughput by system test items
- High test throughput generated by system test items
- Cost effective
- Hardware expandable upon request
- Windows ® 2000/ XP based software

* Test items can be customized or created via the test item editor based on the requirements of various UUTs.

APPLICATIONS

- RJ-45 equipment (including LAN modules, Ethernet IC, PoE IC) test
- Glass substrate test (including solar panel)
- LCD glass substrate test
- Printed circuit glass (including touch panel) test
- PCB test
- EMI filter test
- Rechargeable battery test
- ICT applications

ORDERING INFORMATION

8800: Component Automatic Test System
LCR Meter : Refer to Model 11022 / 11025 / 3302 / 3252 series
Scanner : Refer to Model 13001 series
Scan Module : Refer to Model A130007 series
IR Meter : Refer to Model 11200 series
A800005 : PCI BUS GPIB Card (National Instrument)

All specifications are subject to change without notice.

SPECIFICATIONS

Accurate and highly reliable hardware devices :

System Controller	
Model	**PC/IPC**
CPU	Pentium III 600 or faster
SRAM	256KB
DRAM	128MB or higher
Hard drive	2.1GB or higher
CD-ROM	24X or faster
Monitor	15"
Keyboard	101 keys
I/O	Mouse/Print port
System Interface	GPIB/RS-232
GPIB board	NI-PCI GPIB Card

Capacitor Leakage Current/ IR Meter		
Model		**11200 (650V)**
Main Function		Capacitor Leakage Current / IR Meter
Test Parameter		LC, IR
Test Signals Information		
Voltage		1.0 V~100 V, step 0.1 V; 101V~650 V, step 1V; ±(0.5% + 0.2V)
Charge Current Limit		V ≤ 100V: 0.5mA~500mA V > 100V: 0.5mA~150mA, 65W max. step 0.5mA; ±(3% + 0.05mA)
Measurement Display Range		LC : 0.001μA~20.00mA
Basic Measurement Accuracy *1		LC Reading : ±(0.3% + 0.005μA)
Measurement speed (Ext. Trigger, Hold Range, Line Frequency 60Hz)	Fast	77 ms
	Medium	143 ms
	Slow	420 ms
Function		
Correction		Null zeroing
Test Voltage Monitor		Vm: 0.0 V~660.0V; ±(0.2% of reading + 0.1V)
Charge Timer		0~999 sec.
Dwell Timer		0.2~999 sec.

Note*1 : 23 ± 5˚C after Null correction. Refer to Operation Manual for detail measurement accuracy descriptions.

LCR Meter	
Model	**11022**
Test Parameter	L,C, R,|Z|, Q, D, ESR, X, θ
Test Signals	
Level	10 mV~1V, step 10 mV; ±(10% + 3 mV)
Frequency	50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz ; 0.01%
Measurement Display Range	
C (Capacitance)	0.001pF~1.9999F
L, M, L2 (Inductance)	0.001μH~99.99kH
Z (Impedance), ESR	0.01m~99.99MΩ
Q (Quality Factor) D (Distortion Factor)	0.0001~9999
θ (Phase Angle)	-180.00˚~ +180.00˚
Measurement Accuracy *1	±0.1%
Measurement Time (Fast) *2	21ms

Note*1 : 23 ± 5˚C after OPEN and SHORT correction. Slow measurement speed. Refer to Operation Manual for detail measurement accuracy descriptions.

Note*2 : Measurement time includes sampling, calculation and judge of primary and secondary test parameter measurement

Component Test Scanner	
Model	**13001 (MASTER & SLAVE)**
Mode	SCAN
Interface (Master only)	RS-232 , USB , GPIB
General	
Operation Environment	Temperature: 0˚C ~ 45˚C, Humidity: 15% to 80% R.H@≦ 40˚C
Power Consumption	150VA Max. (with rated load)
Power Requirements	90 ~ 132Vac or 180 ~ 264Vac, 47 ~ 63Hz
Weight	Approx.20Kg (13001 main frame only, without module)
Size(WxHxD)	About 430mm x 311mm x 570mm

Module	A130007
Channel	40
Port	80
Max. voltage without switch	DC 500V
	AC 10V
Max. Current without switch	DC 1000mA
	AC 100mA

Other hardware devices :

■ Digital Multimeter (Chroma 12061 / Agilent-34401A / Keithley 2000), other types or brands of DMM supported upon request

■ Digital Storage Oscilloscope (TDS-3000 / 5000 / 7000 series), other types or brands of DSO supported upon request



KEY FEATURES

- Suit for electrical double layer capacitor production line automatic test, test parameter includes Static Capacitance and Internal Resistance (IR and ESR) (for EIAJ RC-2377 Test Method of Electrical Double Layer Capacitor)
- Open architecture software
  - Expandable hardware support
  - Support GPIB instruments&RS-232/RS485 interface
  - User editable test library
  - User editable test programs
  - Statistic report
  - User authority control
  - Release control
  - Activity log
  - Multi-UUT test capability for single-output PSU
  - Support barcode reader
- Measurement function: C/ IR / ESR (For EIAJ RC-2377)
- High test throughput
- Synchronized measurement in multi-channel reduce the test time
- One DC source and one DC load design
- Hardware protect circuit
- Microsoft® Word based evaluation report or UUT characterization
- Cost effective
- Other hardware expandable upon request
- Windows® 2000/ XP based software

GPIB

The Chroma Electrical Double Layer Capacitor Automatic Test System model 8801 is the ultimate solution for EDLC (electrical double layer capacitor) testing. The system includes a various range of hardware choice such as DC Sources, Electronic Loads, Timing Analyzer and LCR Meter. This flexibility combined with its open architecture software platform gives users a flexible, powerful and cost effective test system for almost all range of EDLC.

The Chroma 8801 EDLC ATS uses a unique test command optimization technology to prevent repetitive control commands from being sent to the system hardware devices. This improve test speed dramatically and makes the Chroma 8801 an ideal choice for both high speed production applications as well as design verification.
The Chroma 8801 EDLC ATS includes a sophisticated test executive which includes pre-written test items for standard EIAJ RC-2377 EDLC tests. User may also create new test items by using a special test item editing function, which users the capability to expand the test library unlimitedly.

This open architecture software also includes statistic and management functions, making the system capable to generate various test documents and performing system administration. Because the statistical reports are critically important in modern factories for R/D evaluation, QA verification and production tests, these functions are an integral part of the system.

Working under Window 2000/XP the model 8801 provides test engineers with a dedicated EDLC test system in an easy-to-learn Windows environment and allow access to resources provided by Windows.

This auto test system uses the unique test command optimization technology to prevent the repeating control commands from sending to the system hardware devices. This improves the system test speed dramatically and makes Chroma 8801, which uses open software architecture, but still highly efficient as optimized auto test system.

ORDERING INFORMATION

8801 : EDLC Automatic Test System
80611N : Timing/Noise module
5004ATM : System Controller
A880100 : EDLC 10 Channels C/IR Scanner
A800005 : PCI BUS GPIB Card (National Instrument)
DC Load Module : Refer to Model 6330A Series
DC Source : Refer to Model 62000P Series
LCR Meter : Refer to Model 11022

All specifications are subject to change without notice.

SPECIFICATIONS

Accurate and highly reliable hardware devices :

System Controller	
MODEL	**PC/IPC**
CPU	Pentium III 600 or faster
SRAM	256kB
DRAM	128MB or higher
Hard drive	2.1GB or higher
CD-ROM	24X or faster
Monitor	15"
Keyboard	101 keys
I/O	Mouse/Print port
System Interface	GPIB/RS-232
GPIB board	NI-PCI GPIB Card

LCR Meter	
Model	**11022**
Test Parameter	L,C, R,|Z|, Q, D, ESR, X, θ
Test Signals	
Level	10 mV~1V, step 10 mV; ±(10% + 3 mV)
Frequency	50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz ; 0.01%
Measurement Display Range	
C (Capacitance)	0.001pF~1.9999F
L, M, L2 (Inductance)	0.001μH~99.99kH
Z (Impedance), ESR	0.01m~99.99MΩ
Q (Quality Factor) D (Distortion Factor)	0.0001~9999
θ (Phase Angle)	-180.00°~ +180.00°
Measurement Accuracy *1	±0.1%
Measurement Time (Fast) *2	21ms

DC Source	
MODEL	**62000P Series**
Power rating	600, 1200W
Voltage range	0-100V/600V
Programmable current limit	Yes
Programmable OV point	Yes
Analog programming	Yes
Remote sensing	Yes
Line-drop compensation	5V

* Please refer to respective product catalogs for detail specifications.

Timing/Noise Analyzer	
MODEL	**6011**
NO. of input module	Up to 10
Noise measurement range	2V/0.4V
Low Pass Filter	Up to 20MHz
Input circuit	Differential input
Timing range	0~16/0~64 second/up to 8365 second
NO. of trigger input	4 sets
NO. of comparator	2 Input module
Controllable TTL bits	16 output
Controllable floating relay	6
NO. of multiplex input	10
NO. of multiplex output	2 for DMM & 2 for DSO

Electronic Load	
MODEL	**6330A Series**
Load mode	CC/CR/CV
Power rating	30-1200W
Voltage range	1-500V
Current range	Up to 240A
Slew rate	Up to 10A/μs
Measurements	Voltage/Current
Monitoring output	No
Current share measurement	No
Noise measurement	No
Voltage sense input	Yes
Sync dynamic	Yes

* Please refer to respective product catalogs for detail specifications.

Note*1 : 23 ± 5°C after OPEN and SHORT correction. Slow measurement speed. Refer to Operation Manual for detail measurement accuracy descriptions.
Note*2 : Measurement time includes sampling, calculation and judge of primary and secondary test parameter measurement

Other hardware devices :

■ Digital Multimeter (Chroma 12061/Agilent-34401A/Keithley 2000), other types or brands of DMM supported upon request
■ Digital Storage Oscilloscope (TDS-3000/5000/7000 series), other types or brands of DSO supported upon request



KEY FEATURES

- Suit for electrical double layer capacitor leakage current long time test
- Test parameter includes leakage current
- Charge / discharge current limit function
- Voltage programmable, 0.9A maximum charge/ discharge per-channel
- 1μA ~ 100mA, 0 ohm input resistance leakage current meter
- Multi-tank control capability
- Up to 200 channels per-tank
- Sequence timing control
- Windows base control soft-panel
- Leakage Current, charge current and discharge current limit value programmable
- Leakage current GO/NG indication on fixtures

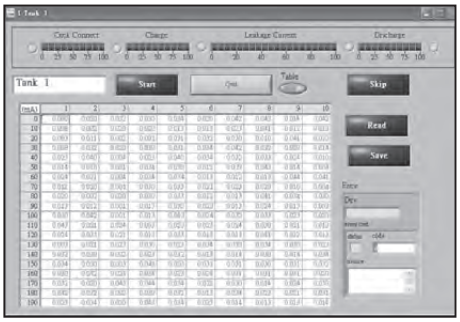
* Detail specification could be depended by customer requirement

The Chroma Electrical Double Layer Capacitor Leakage Current Monitoring System model 8802 is the ultimate solution for EDLC (electrical double layer capacitor) leakage current testing. The system includes modular monitoring boxes, and a control software to offer friend and flexible setup and multi-tank control, and a high power switching-mode rectifier (SMR) power supply. The design is adaptable for long time of EDLC leakage current test and huge amount of EDLC.

The System includes modular monitoring boxes. The monitoring box offers various range of leakage current meter from 1μA – 100mA. Each channel has individual 0 ohm input resistance leakage current meter. It suits the EDLC's low internal resistance characteristic and avoid that the meter existent effect inaccuracy leakage current measured. The box offers three circuits, charge, discharge and leakage current measurement circuit. Operators can finish the whole process in one system. Charge and leakage current circuit have design for reducing the charge voltage alterable affection and increasing charge full voltage time. It offers 1A maximum charge / discharge per channel. The box offers leakage current GO/NG indications in front panel for each channel. The leakage current GO/NG indications will be automatic latched before enter discharge mode. Operators are easy to see every DUT test result for picking up pass or fail.

The System includes Windows® base control soft-panel. The soft-panel has multi-tank control capability. It offers sequence timing control base on one tank with setup time for charge, measurement leakage current, and discharge. The process bar is easy for operators to see the test process. Operators can set current limit values of leakage current, charge current, and discharge current through the soft-panel. The system has 2.5V – 5.0V charge voltage programmable capability.

The system includes a high power switching-mode rectifier (SMR) power supply. It offers a static state charge voltage to reduce the tiny voltage variation to speed up the leakage current result arrive and increate the leakage current accuracy.



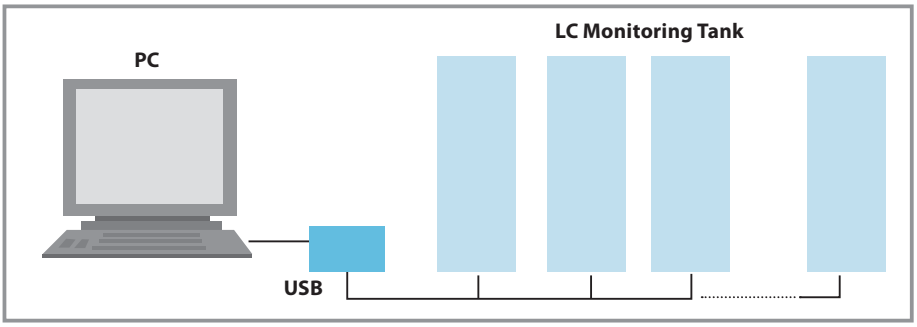
Monitoring Soft-Panel
*Leakage Current Reading Value from Software only for Reference

ORDERING INFORMATION

8802 : EDLC Leakage Current Monitoring System
A880200 : EDLC 20CH LC Monitoring Box
DC Power Supply : Refer to Model 67300 Series*

* Please refer detailed information to Model 67300 Series

Chroma 8802 EDLC LC Monitoring System



All specifications are subject to change without notice.

SPECIFICATIONS

Leakage Current Monitoring Box*

Model		**A880200**
Main Function		EDLC Charge / Leakage Current / Discharge Monitoring Box
Charge Information		
Charge Voltag (from DC Power Supply 67300 Series)		2.5 ~ 6.0V, Step 0.1V, ±(1%)
Charge Current Limit		0.1A ~ 0.9A Per Channel, Step 0.1A; ±(10% +0.05A); 18A max Per Box
Leakage Current Judgment		
Accuracy *1		
Range	Normal Mode	
0.11mA	0.001mA~0.109mA	±(8% of reading +3% of range), Step 0.001mA;
1.1mA	0.11mA~1.09mA	±(8% of reading +3% of range), Step 0.01mA;
11mA	1.1mA~10.9mA	±(8% of reading +3% of range), Step 0.1mA;
110mA	11mA~110mA	±(8% of reading +3% of range), Step 1mA;
Indication		LED (Red Light for Fail)
Discharge Information		
Current Limit		0.1A ~ 0.9A Per Channel, Step 0.1A; ±(10%+0.05A); 18A max Per Box
General		
Operation Environment		Temperature: 10˚C ~ 40˚C Humidity: < 90%RH
Power Consumption		1000VA max
Power Requirement		180 ~ 264Vac, 47 ~ 63Hz
Dimension (H x W x D)		131 x 428 x 613 mm / 5.16 x 16.85 x 24.13 inch

Note*1 : 23±5˚C after Null correction. Refer to the Operation Manual for detail measurement accuracy description

*Detail specification could be depend by customer requirement

Options of Passive Component Test Instruments

OPTIONS / MODEL		11021	11022	11025	1061A	1062A	1075	11020	3250	3252	3302	3312
A110104	SMD Test Cable	●	●	●	●	●	●	●	●	●	●	●
A110211	ComponentTest Fixture	●	●	●	●	●	●	●	●	●	●	●
A110212	Component Remote Test Fixture	●	●	●	●	●	●	●	●	●	●	●
A110232	4 BNC Test Cable with Clip #18	●	●	●	●	●	●					
A110234	High Frequency Test Cable	●	●	●	●	●	●	●	●	●	●	●
A110235	GPIB & Handler Card	●										
A110236	19" Rack Mounting Kit	●	●	●				●				
A110239	4 Terminals SMD Electrical CapacitorTest Box (Patent)		●	●	●	●	●	●		●	●	●
A110242	Battery ESR Test Kit	●	●	●								
A110244	High Capacitance Capacitor Test Fixture		●	●				●				
A110245	Ring Core Test Fixture		●	●								
A118030	PCB for SMD Capacitor		●	●	●	●	●	●		●	●	●
A132501	Auto Transformer Scanning Box (7.5~5mm Test Fixture)								●	●	●	●
A132574	Test Fixture for SMD Power Choke		●	●						●	●	
A133004	SMD Test Box	●	●	●	●	●	●	●	●	●	●	●
A133019	BNC Test Lead, 2M (single side open)	●	●	●	●	●	●	●		●	●	●
A165009	4 BNC Test Cable with Probe	●			●	●	●					

OPTIONS / MODEL		1310	1320	11300	13100	11800	11801	11810	11200	16502
A110235	GPIB & Handler Card								●	●
A110236	19" Rack Mounting Kit								●	●
A113008	4 Terminals Test Fixture for DIP 100A		●	●						
A113009	4 Terminals Test Fixture for SMD 60A		●	●						
A113010	4 Terminals PCB for SMD 100A		●	●						
A113011	4 Terminals Test Cable with Clip	●	●							
A115001	Foot Switch #10	●	●							
A118004	Series Test Fixture					●	●	●		
A118005	Parallel Test Fixture					●	●	●		
A118028	Series Test Fixture for Low Voltage						●	●		
A118029	Series Test Fixture for Low Voltage						●	●		
A118030	PCB for SMD Capacitor						●	●		
A131001	10 Channels Switching Test Fixture				●					
A165013	GPIB and Handler Interface with Temperature Compensation									●
A165014	Temperature Compensation Card									●
A165015	PT100 Temperature Probe									●
A165016	Pin Type Leads (flat)									●
A165017	4 Channels R Scanners									●
A165018	Test Fixture for SMD Power Choke									●
A165019	Pin Type Leads (taper)									●
A165022	4 Terminals Test Cable									●

All specifications are subject to change without notice.

Options of Passive Component Test Instruments

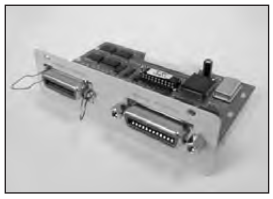

A110104

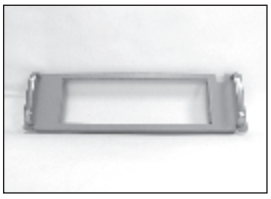

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A110212


A110232


A110234

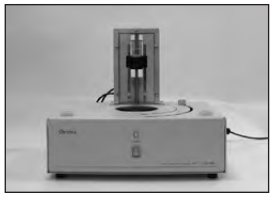

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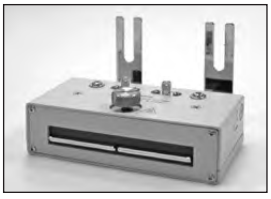

A110236


A110239


A110242


A110244

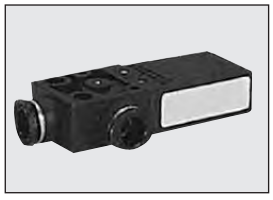

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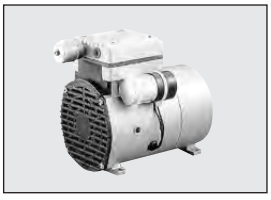

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A113009 (with 113008)

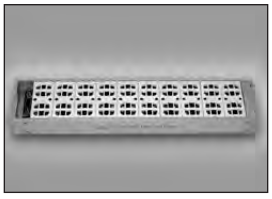

A113010


A113011

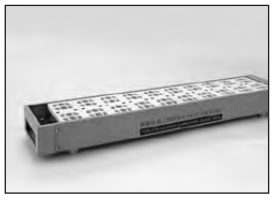

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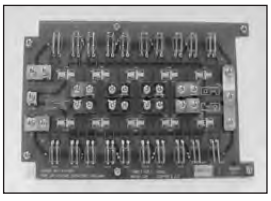

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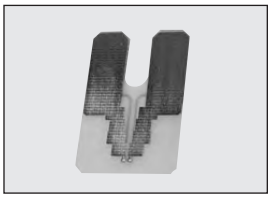

A115001


A118004


A118005

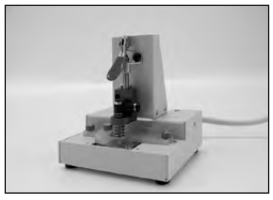

A118028


A118029


A118030

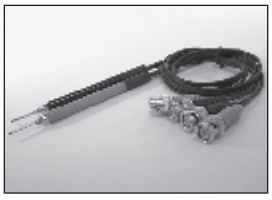

A131001


A132501

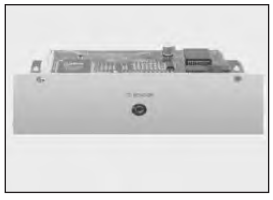

A132574


A133019


A133004


A165009


A165013


A165014


A165015


A165016


A165017


A165018


A165019

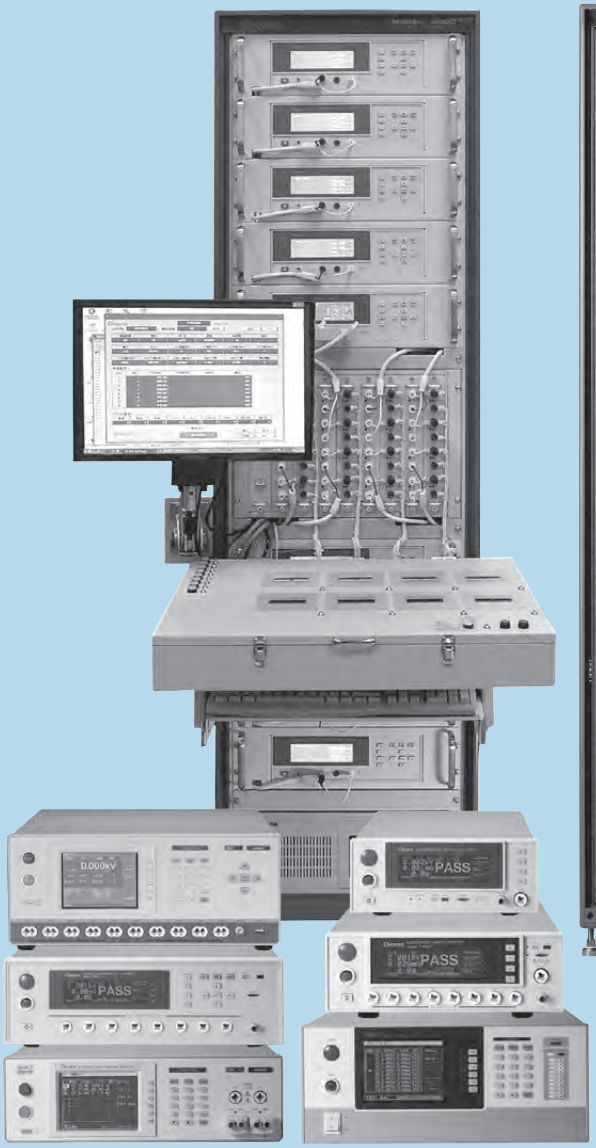

A165022

All specifications are subject to change without notice.

Electrical Safety Test Solution

Selection Guides 13-1
Multi-function Electrical Analyzer 13-3
Hipot Tester 13-9
Impulse Winding Tester 13-14
Electrical Safety Test Scanner 13-17
Ground Bond Tester 13-19
Calibrator 13-20
Automatic Test System 13-21
Options of Electrical Safety Test Instruments 13-24

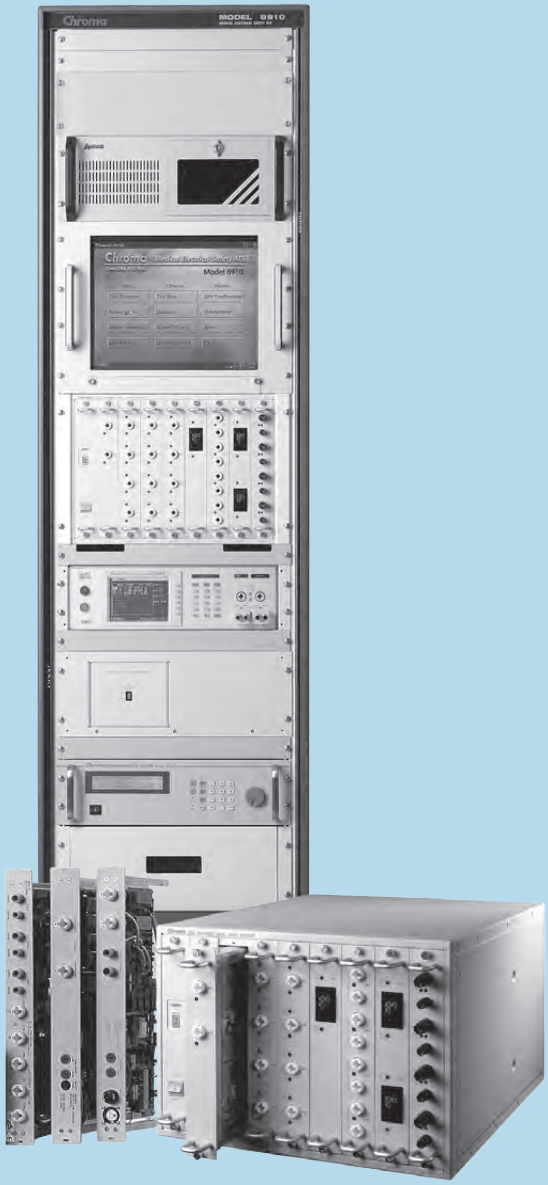
High Capacitance Electrolytic Capacitor ATS



Electrical Equipment ATS



Medical Electrical Safety ATS



Multi-function Electrical Analyzer

Hipot Tester

Electrical Safety Test Scanner



Calibrator



Impulse Winding Tester



Ground Bond Tester

Electrical Safety Tester Selection Guide – Main Function

Model	AC/DC HIPOT			Insulation Resistance		Ground Bond		Leakage Current Test *1	Impulse Winding Test	Others	Page
	AC/DC output	Cutoff current	Flashover Detection	DC output	Range	Current	Range	Power Capacity			
19020 (CE)	5kVac 6kVdc	AC:10mA DC:5mA	AC:20mA DC:10mA	1kV	50GΩ	-	-	-		10/4 channels	**13-9**
19032 (CE)	5kVac 6kVdc	AC:40mA DC:12mA	AC:20mA DC:10mA	1kV	50GΩ	30A 60A*2	510mΩ*3	300V / 20A max.*2			**13-3**
19032-P (CE)	5kVac 6kVdc	AC:100mA DC:25mA	AC:20mA DC:10mA	1kV	50GΩ	40A	510mΩ*3	300V / 20A max.*2		500VA Floating Output	**13-3**
19035 (CE)	5kVac 6kVdc	AC:30mA DC:10mA	AC:15mA DC:10mA	5kV	50GΩ	-	-	-		DCR 8 ports scanner	**13-5**
19036 (CE)	5kVac 6kVdc	AC:100mA DC:25mA	AC:20mA DC:10mA	5kV	50GΩ	-	-	-	6kV	10 ports scanner	**13-7**
19052 (CE,TUV, UL)	5kVac 6kVdc	AC:30mA DC:10mA	AC:15mA DC:10mA	1kV	50GΩ	-	-	-			**13-10**
19053 (CE)	5kVac 6kVdc	AC:30mA DC:10mA	AC:15mA DC:10mA	1kV	10GΩ	-	-	-		8 ports scanner	**13-10**
19054 (CE,TUV, UL)	5kVac 6kVdc	AC:30mA DC:10mA	AC:15mA DC:10mA	1kV	10GΩ	-	-	-		4 ports scanner	**13-10**
19055 (CE)	5kVac 6kVdc	AC:100mA DC:25mA	AC:20mA DC:10mA	5kV	50GΩ	-	-	-		500VA Floating Output, corona detection	**13-11**
19056 (CE)	10kVac	AC:20mA	20mA	-	-	-	-	-			**13-12**
19057 (CE)	12kVdc	DC:10mA	10mA	5kV	50GΩ	-	-	-			**13-12**
19057-20 (CE)	20kVdc	DC:5mA	10mA	5kV	50GΩ	-	-	-			**13-12**
19071 (CE,TUV, UL)	5kVac	AC:20mA	AC:15mA	-	-	-	-	-		AC only	**13-13**
19073 (CE,TUV, UL)	5kVac 6kVdc	AC:20mA DC:5mA	AC:15mA DC:5mA	1kV	50GΩ	-	-	-			**13-13**
19301A (CE)									1kV	0.1μH min.	**13-14**
19305 (CE)									6kV	10μH min.	**13-16**
19305-10 (CE)									6kV	10 ports scanner	**13-16**
19572 (CE)	-	-	-	-	-	45A	510mΩ*3				**13-19**

Note *1 : Leakage current Test is required by standards of Electrical Appliances, Medical Equipment, IT products, and Video/Audio Appliances etc. (IEC 60065, 60335, 60601, 60950 etc.)

Note *2 : Options

Note *3 : It depends on current output

All specifications are subject to change without notice.

Electrical Safety Tester Selection Guide - Sub-Function and Remote																		
Model	Sub-Function										Remote							Page
	OSC	GFI	PA	GC	Smart Start	Scan	HFCC	HVCC	HSCC	Sub-Step	RS232	RS485 RS422	GPIB	9 pin D-SUB	Handler	USB	LAN	
19020	●		●								●		●		●			13-9
19032	●		●		●	●					●		●	●				13-3
19032-P	●	●	●		●	●					●		●		●	●		13-3
19035	●	●	●			●				●	●		●		●			13-5
19036	●	●	●			●	●		●	●	●				●	●	●	13-7
19052	●	●	●	●	●						●		●	●	●			13-10
19053	●	●	●	●	●	●					●		●	●				13-10
19054	●	●	●	●	●	●					●		●	●				13-10
19055	●	●	●			●	●				●		●	●	●	●		13-11
19056	●	●	●				●	●			●		●	●				13-12
19057			●				●	●			●		●	●				13-12
19057-20			●				●	●			●		●	●				13-12
19071	●	●	●	●	●									●				13-13
19073	●	●	●	●	●						●	●		●				13-13
19301A											●				●	●	●	13-14
19305											●				●	●	●	13-16
19305-10			●			●					●				●	●	●	13-16

Calibrator Selection Guide				
Model	Primary	Function Calibrator Level	Description	Page
9102	Hipot Calibrator	AC 6Kv / DC 10kV / ACI/DCI 200mA / GB 32A, 100mΩ / IR 1000MΩ	For Hipot testing equipment calibration and verification	13-20



KEY FEATURES

- Floating Output Design meet EN50191 (19032-P)
- 500VA Power Rating (19032-P)
- Five instruments in one: AC Hipot, DC Hipot, Insulation Resistance, Ground Bond and Leakage Current (Option)
- Twin-Port™ function (Patent)
- Programmable output voltage to 5kV AC and 6kV DC
- Insulation resistance to 50GΩ/1000V DC
- Ground bond up to 30A (Option up to 40A / 60A)
- Open/Short check(OSC)
- ARC detection (Flashover)
- Password Protected front panel lockout
- Storage of 50 Tests Setups with 100 groups recall
- Optional dynamic leakage current auto scanning (A190305/A190306/ A190308/ A190350)
- Standard RS-232 Interface
- Standard GB Offset KIT, SCANNER Interface
- Optional GPIB Interface
- Optional Bar-code Scanner
- Optional EST software for test programming, data mining, statistic
- CE mark

GPIB RS-232 CE

KEY FEATURES - A190308 / A190350

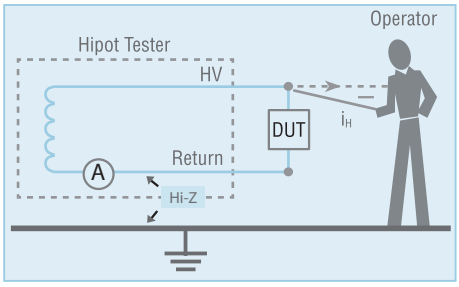
- Plug in to 19032/19032-P for Hipot, Line Leakage Auto Scan
- Five Different Kinds Human Body RC Network
- Four measurements mode : Normal, Reverse, Single Fault Normal, Single Fault Reverse
- Up to 20A Line Input Current Capability
- Build in A/D and Calibration Data Memory Easy to Install
- Multiple Display Mode Voltage-LC, Amp-LC, VA-LC
- Earth LC, Enclosure LC, Patient LC and Patient Auxiliary LC Test

The 19032/19032-P are 5 in 1 Production Safety Analyzer. It can perform AC/DC Hipot, insulation resistance, grounding resistance and dynamic leakage current 5 safety test functions for electronic products. The dynamic leakage current scan device can be connected externally or built in to 19032 Series. It is capable of measuring the complicate safety requirements with easy installation and operation, and is the finest auto safety tester to increase production test efficiency.

Model 19032/19032-P have Twin-Port™ and OSC function to minimize the test time greatly; along with the super large screen display and intelligent operation mode, 19032 is the most powerful single unit for auto safety tester.

ORDERING INFORMATION

19032-P : Electrical Safety Analyzer 500VA
19032 : Electrical Safety Analyzer
A190301 : 8HV Scanning Box
A190302 : 5HV/3GC Scanner
A190303 : 3HV/5GC Scanner
A190304 : 8HV Scanner
A190305 : Line Leakage Current Scanner (generally)
A190306 : Hipot/Line Leakage/Probe Scanner (10A)
A190308 : Hipot/Line Leakage/Probe Scanner (20A)
A190313 : 500VA Isolation Transformer
A190314 : 1000VA Isolation Transformer
A190316 : Dummy Load
A190334 : Ground Bond 40A (19032)
A190336 : 8HV/8GB Scanning Box
A190337 : Ground Bond 60A (19032)
A190338 : 19001 EST Software
A190343 : 19" Rack Mounting Kit (19032)
A190344 : HV Gun
A190349 : Universal Corded Product Adapter
A190350 : HV/LC/LAC/DC Probe Scanner (20A)
A190353 : 4HV/4GC Scanner
A190355 : 19" Rack Mounting Kit (19032-P)
A190356 : GPIB Interface (19032-P)
A190508 : GPIB Interface (19032)
A190708 : ARC Verification Fixture



Floating output



19032

INTERNAL SCANNER FUNCTION FOR MODEL 19032/19032-P

Option		Hipot		GB		LC						
No.	Name	Ports	Voltage Max.	Ports	Current Max.	Power output	Reading	LC probe	Earth LC	Touch LC	Patient LC	Patient Aux LC
A190301	9030A (Ext.)	8 ports	5KVac 6KVdc	-	-	-	-	-	-	-	-	-
A190336	9030AG	8 ports		8 ports	40A	-	-	-	-	-	-	-
A190302	6000-01	5 ports		3 ports	30A	-	-	-	-	-	-	-
A190303	6000-02	3 ports		5 ports	30A	-	-	-	-	-	-	-
A190304	6000-03	8 ports		-	-	-	-	-	-	-	-	-
A190353	6000-11	4 ports		4 ports	40A *1	-	-	-	-	-	-	-
A190305	6000-04	L+N to E P to S		-	-	300V 10A	RMS	-	●	-	-	-
A190306	6000-05			-	-	300V 10A	RMS	P1&P2	●	●	●	●
A190308	6000-07			-	-	300V 20A	RMS	P1&P2	●	●	●	●
A190350	6000-08			-	-	300V 20A	RMS & Peak	P1&P2	●	●	●	●

Note*1 : GB Max Current 40A for Model 19032-P, and 30A for Model 19032

All specifications are subject to change without notice.

SPECIFICATIONS

Model	19032	19032-P
Mode	**ACWV/DCWV/ IR/ GB/ LC**	
Withstanding Voltage Test		
Output Voltage	DC : 0.05 ~ 6kV, AC : 0.05 ~ 5kV	
Load Regulation	≦ (1% +5V)	≦ (2% of setting +0.1% of full scale)
Voltage Regulation	2V	
Voltage Accuracy	±(1% of reading+0.1% of full scale)	±(2% of setting +0.1% of ull scale)
Cutoff Current	DC : 12mA , AC : 40mA	DC : 25mA , AC : 100mA
Current Resolution	0.1 μA DC ; 1 μA AC	
Current Accuracy	±(1% of reading +0.2% of full scale)	±(2% of reading +0.5% of range)
Output Frequency	50Hz ~ 600Hz	
Test Time	0.3 ~ 999 sec , continue	
Ramp Time	0.1 ~ 999 sec, Off	
Fall Time	0.1 ~ 999 sec, Off	
Waveform	Sine wave	
Insulation Resistance Test		
Output Voltage	DC : 0.05 ~ 1kV	
Voltage Resolution	2V	
Voltage Accuracy	±(1% of reading + 0.5% of full scale)	±(2% of reading + 0.5% of full scale)
IR Range	0.1MΩ ~ 50GΩ	
Resistance Resolution	0.1MΩ	
Resistance Accuracy	5% typical	
Ground Bond Test		
Output Current	AC : 1 ~ 30A	AC : 3 ~ 40A
Current Accuracy	±(1% of setting + 1% of full scale)	±(2% of setting + 0.1% of full scale)
GR Range	10mΩ ~ 510mΩ	
Resistance Resolution	0.1mΩ	
Resistance Accuracy	± (1% of reading + 0.1% of full scale)	± (1% of reading + 0.1% of full scale)
Test Method	4 wires	
Flashover Detection		
Setting Mode	Programmable setting	
Detection Current	AC, DC : 1~30mA	AC : 20mA, DC : 10mA
Secure Protection Function		
Ground Fault Interrupt	-	0.5mA ±0.25mA AC
Floating Output to ground	-	<3mA, front output only (meet EN50191)
Panel Operation Lock	Present password	
Interlock	YES	
GO/NG Judgment Window		
Indication,Alarm	GO : Short sound,Green LED NG : Long sound, Red LED	
Data Hold	Least tests data memories	
Memory Storage	50 setups with up to 100 groups recall	
Interface		
Interface	9pin D-sub I/O control / RS-232 / GPIB (Optional)	
General		
Operation Environment	Temperature : 0˚C ~ 40˚C, Humidity : 20 % ~ 80 % RH	
Power Consumption	No load : < 100 W With rated load : 800 W	No load : < 100W Rated load : 1000W Maximum load : 1200W
Power Requirements	90~132Vac or 180~264Vac, 47~63Hz	
Dimension (H x W x D)	133 x 430 x 470 mm / 5.24 x 16.93 x 18.66 inch	133 x 430 x 500 mm / 5.22 x 16.93 x 19.69 inch
Weight	25.5 kg / 56.17 lbs	24 kg / 52.86 lbs
Cetification	CE	CE

Model	A190305~A190350 * (6000-04~08)
Support Mode	**AC/DC/IR/LC**
DUT Input Power Capacity	AC : 300V / 10A / 20A max.
Short Protection	20A, 250V fuse for DUT shorted.
Measurement Mode	
Input Characteristic	DC ~ 1MHz Input Impedance : 1M//20pF
Measurement Mode	Normal, Reverse, Single Fault Normal, Single Fault Reverse
Measurement Devices (Five measure device)	UL 544 NP, UL 544 P, UL 1563, UL 60601-1, IEC60601-1, UL 3101-1, UL/IEC 60950, UL 1950-U1*, UL 2601-U1*, IEC60990
Probe Connection	Line to Ground, Line to P2, P1 to P2
HI-LO Limit	
LC HI-LO Limit	0 ~ 9.99mA, 1 μ A resolution
Current HI-LO Limit	0 ~ 19.99Amp*
VA HI-LO Limit	0 ~ 4400VA
VA Resolution	0.1VA

*Different options have different specification

Model	A190350 (6000-08)
Special Functions	LC DC Measurement U1, U2 (UL-1950) Hot Swap



Model 19035
19035-M
19035-S

FUNCTIONS

- 5KVAC & 6KV DC Hipot Test
- 0.1MΩ~50GΩ /5kV IR Test
- 50mΩ~100kΩ DCR Test
- 8 Channel Scanner

KEY FEATURES

- SUB-STEP Function
- Open / Short Check (OSC)
- High Speed Contact Check (HSCC)
- Flashover Detection
- Key Lock Function
- RS-232 Interface (standard*1)
- GPIB & HANDLER (optional)
- Friendly Interface
- CE Mark



GPIB RS-232 HANDLER CE

Wound Component Testing Solution

The quality verification test items for Wound Component consist of AC/DC Hipot tests, Insulation Resistance (IR) test and Impulse Winding test. Chroma integrates above tests into 19035 Wound Component EST Scanner series performing safety tests for motor, transformer, heater related wound products. The wound component manufacturers in quality verification testing not only have reliable quality but also control product quality efficiently.

The 19035 Series support 5kVac/6kVdc high voltage output to conform with withstand test requirement for Wound Component, its maximum output current can up to 30mA. Insulation Resistance (IR) test measurement range is 1MΩ to 50GΩ and voltage output can up to 5kV. DCR can measure basic specification for Wound Component and also check the connection before testing safety withstand.

The 19035 Series also include powerful functions in Flashover detection and Open/ Short Check (OSC) as well as programmable voltage, time parameters, etc. for various DUTs features to promote testing reliability and product quality.

Applications

The 19035 is a comprehensive safety tester designed for motor, transformer, heater related wound component requirements. Most of wound components are equipped with multiple winding such as 3-phase motor, dual winding transformer, and etc.. The 19035 can be used to reach multiple points completion in one test by 8-channels scanning instead of switching test point manually. It saves test time and human cost.

The 19035 provides OSC and DCR functions to verify if bad contact or short circuit happened during test procedure. It solves the Wound Components of motor, transformer, etc occurred contact problems, so that test quality greatly enhanced and the life of test device prolonged.

ORDERING INFORMATION

19035 : Wound Component EST Scanner
19035-M : Wound Component EST Scanner
19035-S : Wound Component EST Scanner
A165015 : PT100 temperature probe
A190347 : GPIB & Handler & temperature interface
A190348 : RS-232 interface
A190351 : 8ch-16ch HV box for 19035
A190358 : Handler indicator
A190359 : 16ch HV external scanning box (H,L,X)
A190702 : 40KV HV test probe



A190351 : 8CH-16CH Scan Box



A190359 : 16ch HV External Scanning Box (H,L,X)

All specifications are subject to change without notice.

SPECIFICATIONS				
Model		**19035**	**19035-M**	**19035-S**
Mode		ACV / DCV / IR / DCR -8CH	ACV / DCV / IR / DCR -8CH	ACV / DCR -8CH
Channel Programming		H/L/X in 8CHs	H/X in CH 1,2,3,5,6,7 ; L/X in CH 4,8	H/L/X in 8CHs
Withstanding Voltage Test				
Output Voltage		AC:0.05 ~ 5KV, DC : 0.05 ~ 6kV		AC:0.05 ~ 5KV
Load Regulation		≦(1% of setting + 0.1% of full scale)		
Voltage Resolution		2V		
Voltage Accuracy		±(1% of setting + 0.1% of full scale)		
Cutoff Current		AC : 30mA, DC : 10mA		
Current Resolution		AC : 1 μA, DC : 0.1 μA		
Current Accuracy		±(1% of reading + 0.5% of range)		
Output Frequency		50Hz / 60Hz		
Test / Ramp / Fall / Dwell Time		0.3 ~ 999 sec., continue / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off		
Waveform		Sine wave		
Insulation Resistance Test				
Output Voltage		DC : 0.05 ~ 5kV		--
Voltage Resolution		2V		--
Voltage Accuracy		1% of setting + 0.1% of full range		--
IR Range		0.1MΩ ~ 50GΩ		--
Resistance Resolution		0.1MΩ		--
Resistance Accuracy	≧1000V	1MΩ ~ 1GΩ : ± (3% of reading + 0.1% of full range) 1GΩ ~ 10GΩ : ± (7% of reading + 2% of full range) 10GΩ ~ 50GΩ : ± (10% of reading + 1% of full range)		--
	500V~1000V	0.1MΩ ~ 1GΩ : ± (3% of reading + 0.1% of full range) 1GΩ ~ 10GΩ : ± (7% of reading + 2% of full range) 10GΩ ~ 50GΩ : ± (10% of reading + 1% of full range)		--
	< 500V	0.1MΩ ~ 1GΩ : ± 3% of reading + (0.2*500/Vs)% of full scale		--
Scanner Unit		8 ports, ±phase (4W DCR only 4 ports)		
DC Resistance Measurement				
Test Signal		<DC 10V. < DC 140mA		
Measurement mode		2 terminals (2W) / 4 terminals(4W) measurement selectable ; Range : 50mΩ~500kΩ		
Measurement Accuracy (2W/ 4W)	1Ω (4W only)	-- / ±(0.5% of reading + 0.5% of range)		
	10Ω	± (2% of reading + 0.5% of range) / ± (0.5% of reading + 0.05% of range)		
	100Ω	± (2% of reading + 0.5% of range) / ± (0.5% of reading + 0.05% of range)		
	1kΩ	± (2% of reading + 0.5% of range) / ± (0.5% of reading + 0.05% of range)		
	10kΩ	± (2% of reading + 0.5% of range) / ± (0.5% of reading + 0.05% of range)		
	100kΩ	± (2% of reading + 0.5% of range) / ± (0.5% of reading + 0.05% of range)		
Flashover Detection				
Setting Mode		Programmable setting		
Detection Current		AC : 1mA ~ 15mA, DC : 1mA ~ 10mA		
Secure Protection Function				
Fast Output Cut-off		0.4ms after NG happen		
Ground Fault Interrupt		0.5mA ±0.25mA AC, ON/OFF		
Panel Operation Lock		Present password		
Interlock		YES		
GO/NG Judgment Window				
Indication, Alarm		GO : Short sound, Green LED; NG : Long sound, Red LED		
Data Hold		Least tests data memories		
Memory Storage		50 instrument setups with up to 20 test steps		
Interface		RS-232*1 (Standard), RS-232*1 or GPIB & Handler & Temperature interface (Optional)		
General				
Operation Environment		Temperature: 0˚C ~ 45˚C, Humidity: 15% to 95% R.H@≦40˚C		
Power Consumption		500VA		
Power Requirements		90~132Vac or 180~264Vac, 47~63Hz		
Dimension (H x W x D)		133x430x470mm/5.24x16.93x18.50 inch		
Weight		Approx.20 kg/44.09 lbs		



KEY FEATURES

- 5 in 1 composite analyzer scanner (ACW / DCW/ IR / IWT / DCR)
- 5kV AC/6kV DC Hi-pot test
- 5kV Insulation Resistance test
- Impulse Winding Tester (IWT)
- IWT high sampling rate(200MHz)
- 10 channels 4-wire DCR test
- △ /Y motor DCR calculation
- L/Q test with Chroma 3252/3302 (option)
- HSCC (High Speed Contact Check)
- Support max. 40 channels scanning test
- Automatic data export
- English, Traditional Chinese and Simplified Chinese User Interface
- USB waveform storage& Hand copy function
- Graphic color display
- Standard LAN,USB,RS232, HANDLER interface
- GFI (Ground Fault Interrupter) for bod protection

Chroma 19036 is the industry's first test device that combines the functions of impulse tester and hipot analyzer for testing the impulse of wound components. The tester has 5kVac/6kVdc high voltage output and 6kV impulse voltage that can comply with the wound components test demands by providing maximum 10 channels output for multichannel scanning tests to save time and labor costs.

The quality verifications of wound components include AC/DC hipot test, IR test and impulse winding test. Chroma integrates the above tests into 19036 Wound Component EST Analyzer that can perform safety tests on wound products like motors, transformers and heaters to verify their quality with efficiency.

Since the poor insulation of coil often causes layer short, cross-line short and pin short, layer short circuit test is required for coils as the reason could be initial design error, poor fabrication process or bad insulation material. Moreover, the wound components for safety tester need to be tested with Impulse Winding Tester (IWT) to check the insulation ability of windings. It can measure multiple test points in one test instead of switching test points manually.

Combining with impulse winding test function the 19036 has 6kV impulse voltage, AREA SIZE COMPARISON, DIFFERENTIAL AREA COMPARISON, FLUTTER DETECTION, LAPLACIAN DETECTION , and △Peak ratio judgment that are effective methods for detecting poor coil insulation.

19036 is equipped with a patented 4-wire test port that has both Drive and Sense in compliance with hipot specification to provide 10 channels of 4-wire test functions. Up to 40ch of scanning test can be conducted when 19036 is configured with 16ch scan box.

19036 also has HSCC functions to check for any bad contact prior test. It can solve the test fail problems caused by motor or transformer bad contact and improve the test quality as well as prolong the test equipment life。

The motor test standard such as UL 1004-1 requires high power safety tester. For the user that needs to test large leakage current or perform large equipment electrical safety tests, Chroma 19036 that has the capability of outputting and measuring AC 100mA/ DC 20mA with high power hipot tests and other safety tests integrated into one is the most suitable device to bring the maximum benefit to production line and quality assurance. The 500VA design is also compliant with IEC/UL for output power requirements.

Product Applications

Rotating Motor Component: △/Y-type Motor, Fan , Rotor/Stator

The application of motors from EV motor, server motor to actuator motor and fan, impulse test, hipot tests and DC resistance tests need to be performed in the fabrication process to ensure the product quality. The JB/T 7080 GB mechanical industry standards and regulations are followed for tests.

The DCR measurement on the 19036 can perform four-wire test and each single endpoint can cover Drive and Sense for 10 independent channels to test 3 DUTs in one scan. It improves the production capacity. Each channel can be set to high voltage output / reference port / close separately.

Test Items for Y-type Motor

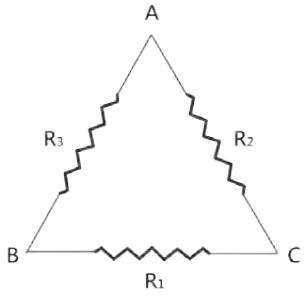
- HSCC / OSC
- DCR Test



- Impulse Test
- Hi-pot –Sub step test

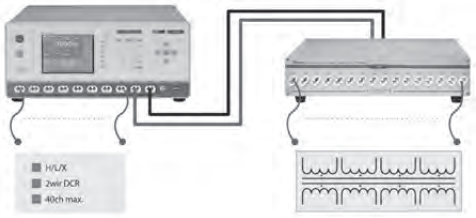
Winding of △-type and Y-type Motor

To solve the problem of unable doing DCR measurement on the △-type and Y-type motor winding (no center-tapped), Chroma 19036 adds △-type and Y-type motor winding DCR calculation function to get the value of R1,R2 and R3 directly.



40 Channels Scanning Test

A190359 scanner has 16 test channels and each of them can set to H (high voltage output), L (reference point) or Off . The combination of 19036 and A190359 can apply to in small amount but diversified DUTs or with multiple PINs as well as cell type production line to complete all test within one station.



ORDERING INFORMATION

19036 : Wound Component EST Analyzer
A165015 : PT100 temperature probe
A190359 : 16ch HV External Scanning Box
A190361 : Wound Component EST Software
A190362 : 16ch 4-wire HV External Scanning Box
A190363 : 4-wire test cable with clip
A190364 : 4-wire test cable with bare wire (1.5m)
A190365 : 4-wire test cable with bare wire (3m)

All specifications are subject to change without notice.

SPECIFICATIONS		
Model		**19036**
AC/DC Withstanding Test		
Output Voltage		AC: 0.05~5.0kV / DC : 0.05~6.0kV
Load Regulation		≦(1% of output + 0.1% of full scale)
Voltage Accuracy		± (1% of setting + 0.1% of full scale)
Voltage Resolution		2V
Cutoff Current		AC: 0.001mA~120mA (Voltage ≦4kV)
		AC: 0.001mA~100mA (Voltage >4kV)
		DC: 0.0001mA~20mA
Current Accuracy		± (1% of reading + 0.5% of range)
Test Timer		Test time:0.3 ~ 999 sec., and continue
		Ramp / Fall / Dwell time:0.1 ~ 999 sec., and off
Output Frequency		50Hz / 60Hz
Waveform		Sine wave
Insulation Resistance Test		
Output Voltage		DC : 0.050 ~ 5.000kV, Steps:0.002kV
Load Regulation		≦(1% of output + 0.1% of full scale)
Voltage Accuracy		± (1% of setting + 0.1% of full scale)
IR Range		0.1MΩ ~ 50GΩ
Resistance Accuracy	>1kV	1MΩ ~ 1GΩ : ± (3% of reading + 0.1% of full range)
		1GΩ ~ 10GΩ : ± (7% of reading + 2% of full range)
		10GΩ ~ 50GΩ : ± (10% of reading + 1% of full range)
	≧0.5kV and ≦1kV	0.1MΩ ~ 1GΩ : ± (3% of reading + 0.1% of full range)
		1GΩ ~ 10GΩ : ± (7% of reading + 2% of full range)
		10GΩ ~ 50GΩ : ± (10% of reading + 1% of full range)
	<0.5kV	1MΩ ~ 1GΩ : ± (5% of reading + (0.2*500/Vs)% of full scale)
Impulse Winding Test		
Applied Voltage, Step, and Energy		0.1 ~ 6kV ,10V Step ,Max 0.21 Joules
Inductance Test Range		More than 10uH
Sampling Speed		10bit / 5ns (200MHz)
Sampling Range		11 Range
Pulse Number		Pulse Number: 1~32, Dummy Pulse Number: 0~9
Detection Mode		Area / Differential Area ； Flutter/ Laplacian Detection/ △Peak ratio
DC Resistance Measurement		
Test Signal		<DC 10V , <DC 200mA
Measurement Range		0.1mΩ ~ 500kΩ
Measurement Accuracy	100mΩ	± (0.5% of reading + 1% of full range)
	1Ω	± (0.5% of reading + 0.2% of full range)
	10Ω	± (0.5% of reading + 0.05% of full range)
	100Ω	± (0.5% of reading + 0.05 % of full range)
	1kΩ	± (0.5% of reading + 0.05 % of full range)
	10kΩ	± (0.5% of reading + 0.05 % of full range)
	100kΩ	± (0.5% of reading + 0.05 % of full range)
Flashover Detection		
Detection Current		Programmable setting AC : 20mA ； DC : 10mA
Contact Check Function		
Contact Check		OSC (open/short check)
		HFCC (High Frequency Contact Check)
		HSCC (High Speed Contact Check)
Electrical Hazard Protection Function		
Ground Fault Interrupt		0.5mA ±0.25mA AC, ON/OFF
Key Lock		Yes (password control)
Interlock		YES
Indication, Alarm		GO : Short sound, Green LED; NG : Long sound, Red LED
Memory Storage		200 sets, max. 60 steps per set
Interface		
Standard : RS232, Handler ,USB , LAN interface		
General		
Operation Environment		Temperature: 0˚C ~ 45˚C, Humidity: 15% to 95% R.H@≦ 40˚C
Power Consumption		No Load: <150W ; Rated Load: <1000W
Power Requirements		90 ~ 264Vac, 47 ~ 63Hz
Dimension (W ×H ×D)		428 × 177 × 500mm / 16.850 x 6.969 x 19.685 inch
Weight		26kg / 57.32 lbs



KEY FEATURES

- 10/4 channels in one design
- 10 sets of sync output and measurement
- AC/DC/IR 3 in 1 EST test
- Master/Slave link - 10 units max.
- Programmable V-output and limits
- OSC (Open/Short Check)
- Flashover detection
- 1MΩ~50GΩ insulation resistance test
- Standard RS-232 / Handler interface
- Optional GPIB interface
- Large LCD panel
- Panel lockup function
- Easy operating interface
- CE Mark
- High Efficiency Hipot Test Solution

High Efficiency Hipot Test Solution

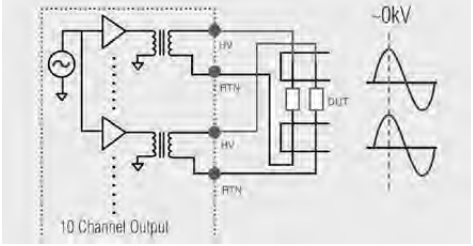
Hipot test is one of the major test items in electrical safety test. All electrical components and products including transformers, capacitors, power supplies, chargers and home appliances all require hipot test.

With more than 20 years experience in developing the instruments for test and measurement, Chroma creates the 19020 multi-channel hipot tester with a brand new architecture. It can measure the hipot leakage current of all channels at the same time and conduct tests on 100 DUTs at most simultaneously.

There is no need to purchase various Hipot testers to save the production line space if Chroma 19020 is in use. Its one time multi-channel test can increase the efficiency of electrical regulatory test. It improves the productivity and reduces the risk of test for the products that require hipot test only.

Chroma 19020 also has powerful functions in Flashover detection and Open/Short Check. It contains several international patents and is the best tool for electrical regulatory hipot test as not only reliable quality can be obtained, highly efficient test platform can be created.





19020-synchronized output

GPIB RS-232 HANDLER CE

World's First Sync Hipot Test (Patent Registered)

Chroma 19020 has equipped with the world's first sync hipot test function that one single unit can perform 10 channels sync output and measurements simultaneously. Maximum 10 units (master & slave) can be controlled to have 100 channels in total. They can be grouped for output to avoid creating voltage difference due to adjacent tests as well as to improve the productivity.

ORDERING INFORMATION

19020 : Multi-channel Hipot Tester
19020-4 : Multi-channel Hipot Tester (4CH)
19021 : Multi-channel Hipot Tester (AC)
19021-4 : Multi-channel Hipot Tester (AC/4CH)
19022 : Multi-channel Hipot Tester (DC/IR)
19022-4 : Multi-channel Hipot Tester (DC/IR/4CH)
19023-8-20 : Multi-channel Hipot Tester (8kVAC/4CH)
A190200 : 19" Rack Mounting Kit for 19020 Series
A190201 : 3-way Scanner Box (10CH)
A190202 : 3-way Scanner Box (4CH)
A190203 : 19020 Series Hipot Tester software
A190508 : GPIB Interface
* HV cable is option for customize requirement

SPECIFICATIONS

Model	19020	19021	19022	19023-8-20
Mode	**ACV/DCV/IR/ Multi-channel**	**ACV/ Multi-channel**	**DCV/IR/ Multi-channel**	**ACV/ Multi-channel**
Withstanding Voltage Test				
Output Voltage	AC : 0.05 ~ 5kV, DC : 0.05 ~ 6kV	AC : 0.05 ~ 6kV	DC : 0.05 ~ 8kV	AC : 0.05 ~ 8kV
Load Regulation	≦(1% of setting + 0.1% of full scale)			
Voltage Resolution	2V			
Voltage Accuracy	±(1% of setting + 0.1% of full scale)			
Cutoff Current	AC : 0.01~10mA, DC : 0.001~5mA	AC : 0.01 ~ 8mA	DC : 0.001 ~ 3.5mA	AC : 0.01 ~ 20mA
Current Resolution	AC : 1 μA, DC : 0.1 μA			
Current Accuracy	1% of setting +0.5% of full scale			
Output Frequency	50Hz / 60Hz			
Flashover Detection	AC : 1mA ~ 20mA ; DC : 1mA ~ 10mA , step 0.1mA			
Test Time	0.03 ~ 999.9 sec, continue			
Ramp Time	0.1 ~ 999.9 sec, off			
Fall Time	0.1 ~ 999.9 sec, off			
Dwell Time	0.1 ~ 999.9 sec, off			
Waveform	Sine wave			
Insulation Resistance Test				
Output Voltage	DC : 0.05 ~ 1kV	-	DC : 0.05 ~ 1kV	-
Voltage Resolution	2V			
Voltage Accuracy	±(2% of setting + 0.5% of full range)			
IR Range	1MΩ ~ 50GΩ			
Resistance Accuracy	≥ 500V	1MΩ ~ 1GΩ : ± 3% of reading + 0.1% of full range 1GΩ ~ 10GΩ : ± 7% of reading + 0.2% of full range 10GΩ ~ 50GΩ : ± 10% of reading + 1% of full range		
	< 500V	1MΩ ~ 1GΩ : ± 3% of reading + (0.2*500/Vs)% of full scale		
Test Time	0.3 ~ 999.9 sec, continue			
Memory Storage				
Save/Recall	30 instrument setups with up to 10 test steps can be stored into and recalled from the internal memory			
Secure Protection Function				
Fast Output Cut-off	0.4ms after NG happen			
Panel Operation Lock	Present password			
Interlock	YES			
GO/NG Judgment Window				
Indication, Alarm	GO : Short sound, Green LED NG : Long sound, Red LED			
Data Hold	Least tests data memories			
Memory Storage	30 instrument setups with up to 10 test steps			
Interface				
RS-232 & Handler (Standard), GPIB (Optional)				
CANBus & data control interface are used for Max. 10 units of master & slaves connection				
General				
Operation Environment	18 to 28°C (64 to 82°F), 70% RH. Maximum relative humidity 80% for temperature up to 31°C (88°F) Decreasing linearly to 50% relative humidity at 40°C (104°F)			
Power Consumption	Standby : < 250W ; With rated load : <1000W			
Power Requirements	90~264Vac ; 47~63Hz			
Dimension (HxWxD)	190x430x607 mm/7.48x16.93x23.90 inch			
Weight	Approx.40 kg/88.18lbs			

All specifications are subject to change without notice.



KEY FEATURES

- 3 in 1 Tester : AC, DC, IR
- Programmable output voltage to 5kV AC and 6kV DC
- Trip current programmable to 30mA AC and 10mA DC
- Insulation resistance to 50GΩ/1000V DC
- Built-in 8 channel SCANNER (19053 only)
- Built-in 4 channel SCANNER (19054 only)
- Open/Short Check (OSC)
- Ground Fault Interrupt (GFI)
- ARC detection (Flashover)
- Storage of 50 Tests Setups with 100 Steps per setup

- Optional transformer test fixture (19053 only)
- Standard RS-232 Interface
- Optional GPIB Interface

The Chroma Hipot Tester 19052/19053/19054 provides 3 models to choose. The 19052 includes AC/DC/IR Hipot testing and insulation resistance (IR) measurements, the 19053 which combines both AC and DC Hipot tests and IR measurements with 8HV scan channel capability into a single compact unit, and the 19054 which combines both AC and DC Hipot tests and IR measurements with 4HV scan channel capability into a single compact unit. The front panels of the fevers make them easy to operate. Digital display and user friendly control allows test parameters and limits to be set easily without the high voltage activating.

ORDERING INFORMATION

19052 : Hipot Tester (AC/DC/IR)
19053 : Hipot Tester (AC/DC/IR/8CH SCAN)
19054 : Hipot Tester (AC/DC/IR/4CH SCAN)
A190344 : HV Gun
A190512 : Auto Control TR. Scan Box (3002B)
A190508 : GPIB Interface
A190517 : 19" Rack Mounting Kit for Model 19052/19053/19054
A190518 : Hipot Tester software
A190702 : 40kV HV Test Probe
A190704 : Start Switch
A190708 : ARC Verification Fixture



A190512 : Auto Control TR. Scan Box (3002B)

SPECIFICATIONS

Model			19052	19053	19054
Mode			ACV/DCV/IR	ACV/DCV/IR/SCAN	
Withstanding Voltage Test					
Output Voltage			AC : 0.05 ~ 5kV, DC : 0.05 ~ 6kV		
Load Regulation			≦ (1% + 5V)		
Voltage Resolution			2V		
Voltage Accuracy			±(1% of reading + 5 counts)		
Cutoff Current			AC : 30mA, DC : 10mA		
Current Resolution			AC : 1μA, DC : 0.1μA		
Current Accuracy			±(1% of reading + 5 counts)		
Current Frequency			50Hz/ 60Hz		
Test Time			0.3 ~ 999 sec, continue		
Ramp up Time			0.1 ~ 999sec, off		
Waveform			Sine wave		
Insulation Resistance Test					
Output Voltage			DC : 0.05 ~ 1kV	DC : 0.05 ~ 1kV	
Voltage Resolution			2V	2V	
Voltage Accuracy			±(1% of reading + 5 counts)		
IR Range			1MΩ~ 50 GΩ	1MΩ~ 10 GΩ	
Resistance Resolution			0.1MΩ	0.1MΩ	
Resistance Accuracy	≧ 500V	1MΩ~2.5GΩ	±(5% of reading + 2% of full scale)		
		2.2GΩ~50GΩ	±(15% of reading + 1% of full scale)		
	< 500V	0.1MΩ~250MΩ	±(10% of reading + 2% of full scale)		
		0.22GΩ~50GΩ	±(15% of reading + 1% of full scale)		
Scanner Unit			--	8 ports, ±phase	4 ports, ±phase
ARC Detection (Flashover)					
Setting Mode			Programmable setting		
Detection Current			AC : 1mA ~ 15mA, DC : 1mA ~ 10mA		
Secure Protection Function					
Fast Output Cut-Off			0.4 ms after NG happen		
Fast DC discharge			0.2 sec		
Ground Fault Interrupt (GFi)			0.5mA ± 0.25mA AC, Close		
Panel Operation Lock			Present password		
Continuity Check			1Ω± 0.2Ω, Off		
GO/NG Judgment Window					
Indication, Alarm			GO: Short sound, Green LED; NG: Long sound, RED LED		
Data Hold			Least tests data memories		
Memory Storage			99 steps or 99 groups for total 500 memory locations		
Remote Connector					
Real Panel connector			Input : Start, Stop, Interlock (at 11 pin terminal block only) ; Output : Under test, Pass, Fail		
General					
Operation Environment			Temperature: 0˚C ~ 40 ˚C, Humidity: ≦ 80 % RH		
Power Consumption			No load: <100 W, With rated load: ≦ 500 W max.		
Power Requirement			100V / 120V / 220V(AC ± 10%) / 240V(AC + 5% ˜ -10%), 50 / 60 Hz		
Dimension (H x W x D)			105 x 320 x 400 mm / 4.13 x 12.6 x 15.75 inch		
Weight			15 kg / 33.4 lbs	15.4 kg / 33.92 lbs	16.5 kg / 36.34 lbs
Certification			UL, TUV, CE	CE	UL, TUV, CE

All specifications are subject to change without notice.



FUNCTIONS

- Hipot
  - AC 5kV/100mA
  - DC 6kV/25mA
- Insulation
  - 5kVmax
  - 1MΩ~50GΩ

KEY FEATURES

- 500VA output rating
- Floating output complies with EN50191
- Corona Discharge Detection (CDD, 19055-C)
- Flashover Detection
- Discharge Level Analysis (DLA)
- Open Short Check (OSC)
- High Frequency Contact Check (HFCC)
- Ground Fault Interrupt
- Standard RS-232 & HANDLER interface
- Option GPIB interface
- Key lock when fail
- Programmable voltage & test limit
- Support A190301 8HV Scanning Box

APPLICATIONS

Motor : The 19055 Series Hipot Analyzers with 500VA output rating can be used to test and analyze the withstand voltage of high power and leakage current for the products like motor stators and rotors with high parasitic capacitance. Corona detection can be used for turn-to-turn or turn-to-ground test to avoid winding insulation failure from corona discharge.

Transformer : When using a power transformer under the normal voltage, a primary side corona discharge could cause the adjacent components to be damaged if occurred. Thus, the function of Corona Discharge Detection (CDD) of 19055-C can be used to detect if there is any corona discharge occurred to improve the product quality.

High Voltage Capacitor, Photocoupler & Insulation Material : If any gaps, voids or impurities appeared when doing molding in the manufacturing process, the insulation capability may be affected. The Corona Discharge Detection (CDD) equipped by 19055-C is able to defect if there is any corona discharge occurred to enhance the product quality.

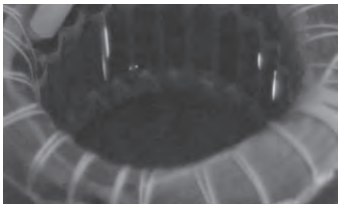
Chroma 19055 Series Hipot Analyzers are designed for hipot tests and analysis. The tests of AC/DC/IR can be programmed in 5kV/100mA with 500VA output rating which complies with the EN50191 requirements. (Please refer to the application notes for more detail information.)

The 19055-C has not only the AC/DC/IR tests but also a new measurement technology - Corona Discharge Detection (CDD) that can detect the following via the Discharge Level Analysis (DLA).
- Corona discharge Start Voltage (CSV)
- Flashover Start Voltage (FSV)
- BreakDown Voltage (BDV)

GPIB RS-232 USB HANDLER CE

As to the Contact Check during Hipot test, Chroma 19055 Series is equipped with a new function of High Frequency Contact Check (HFCC) besides the Open Short Check (OSC). By conducting the Contact Check during Hipot test, it can increase the test reliability and efficiency significantly.

For convenience use, Chroma 19055 has large LCD screen for operation and judgment. In addition, the GFi human protection circuit and Floating safety output prevent the operators from electrical hazard.



Chrona Discharge in motor

ORDERING INFORMATION

19055 : Hipot Analyzer (AC/DC/IR)
19055-C : Hipot Analyzer (AC/DC/IR with Corona discharge detection)
A190301 : 8HV Scanning Box
A190355 : 19" Rack Mounting Kit
A190356 : GPIB Interface
A190708 : ARC (Flashover) Verification Fixture

SPECIFICATIONS			
Model			**19055/19055-C**
Mode			ACV / DCV / IR
Withstanding Voltage Test			
Output Voltage			AC : 0.05 ~ 5KV, DC : 0.05 ~ 6KV
Load Regulation			≦(1% of setting + 0.1% full range)
Voltage Accuracy			±(1% of setting + 0.1% full range)
Voltage Resolution			2V
Cutoff Current			AC : 100mA ; DC : 25mA
Current Accuracy			± (1% of reading + 0.5% of range)
Current Resolution			AC : 1μA, DC : 0.1μA
Output Frequency			50Hz ~ 600Hz
Test/Ramp/Fall/Dwell Time			0.3 ~ 999 sec., continue / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off
Waveform			Sine wave
Insulation Resistance Test			
Output Voltage			DC : 0.05 ~ 5kV
Voltage Resolution			2V
Voltage Accuracy			±(1% of reading + 0.1% of full scale)
IR Range			0.1MΩ ~ 50GΩ
Resistance Resolution			0.1MΩ
Resistance Accuracy	>1kV	1MΩ ~ 1GΩ	± (3% of reading + 0.1% of full scale)
		1GΩ ~ 10GΩ	± (7% of reading + 2% of full scale)
		10GΩ ~ 50GΩ	± (10% of reading + 1% of full scale)
	0.5kV ~1kV	1MΩ ~ 1GΩ	± (3% of reading + 0.1% of full scale)
		1GΩ ~ 10GΩ	±(7% of reading + 2% of full scale)
		10GΩ ~ 50GΩ	± (10% of reading + 1% of full scale)
	<500V	0.1MΩ ~ 1GΩ	± (3% of reading + (0.2 x 500/Vs)% of full scale)
Flashover Detection			
Setting Mode			Programmable setting
Detection Current			AC: 20mA;DC: 10mA
Contact Check Function			
HFCC			High frequency contact check
OSC (open/short check)			600Hz, 0.1s
Electrical Hazard Protection Function			
Floating output design			Leakage current <3 mA
Fast Output Cut-off			0.4ms after NG happen
Ground Fault Interrupt			0.5mA ±0.25mA AC, ON/OFF
Panel Operation Lock			Present password
Interlock			YES
GO/NG Judgment Window			
Indication, Alarm			GO : Short sound, Green LED ; NG : Long sound, Red LED
Memory Storage			100 sets, max. 50 steps per set
Interface			
Interface			RS-232, Handler interface (Standard), GPIB interface (Optional)
General			
Operation Environment			Temperature: 0˚C ~ 45˚C, Humidity: 15% to 95% R.H@≦ 40˚C
Power Consumption			500VA
Power Requirements			90~132Vac or 180~264Vac, 47~63Hz
Dimension (H x W x D)			130 x 430 x 500 mm / 5.12 x 16.93 x 19.69 inch
Weight			Approx. 20kg / 44.09 lbs

All specifications are subject to change without notice.



GPIB RS-232 USB HANDLER CE

Chroma 19056/19057 Hipot Analyzer is an equipment specially designed for testing and analyzing ultra-high withstand voltage. The series of models include 10kVac/12kVdc/20kVdc with maximum AC20mA/DC10mA output can perform AC/DC withstand voltage and insulation resistance tests with contact check during production line test. In addition to the patented OSC (Open Short Check), High Voltage Contact Check is added to test the components with high insulation capability when high voltage outputs to improve the testing reliability and efficiency.

The Hipot Analyzer provides high withstand voltage analysis for optical couplers, HV relays, HV switches and PV modules, which have better insulation capability.

Charge and discharge are required for capacitive components when doing DC withstand voltage test. The Hipot Analyzers have fast charge function that can increase the production test efficiency .

KEY FEATURES

- 10kV AC & 20kV DC withstand voltage test
- 0.1MΩ~50GΩ insulation impedance test
- BDV (BreakDown Voltage test)
- HVCC (High Voltage Contact Check)
- OSC (Open Short Check)
- GFI (Ground Fault Interrupt) human protection circuit
- Fast charge/discharge function
- Programmable output & test limit
- Standard RS232 & HANDLER interface
- Optional GPIB interface
- Key lock function

ORDERING INFORMATION

19056 : Hipot Analyzer AC10kV
19057 : Hipot Analyzer DC12kV/IR
19057-20 : Hipot Analyzer DC20kV/IR
A190316 : Dummy Load
A190355 : 19" Rack mounting kit
A190356 : GPIB interface
A190519 : HV contact check box (HVCC)
A190702 : 40kV HV test probe
A190708 : ARC verification fixture

SPECIFICATIONS

Model			19056	19057	19057-20
Mode			ACV	DCV / IR	DCV / IR
Withstanding Voltage Test					
Output Voltage			AC: 0.1~10kV	DC: 0.1~12kV	DC : 0.1 ~ 20kV
Load Regulation			± (1% of output + 10V), Rated load		
Voltage Accuracy			± (1% of setting + 0.1% of full scale), 10V resolution		± (1.5% of setting + 0.1% of full scale), 10V resolution
Voltage Regulation			2V		
Cutoff Current			0.01~20mA	0.001~10mA	0.001~5 mA
Current Accuracy			0.100mA~2.999mA : ±(1% of reading + 0.3% of full range) 3.00mA~20.00mA : ±(1.5% of reading + 0.3% of full range)	±(1% of reading + 0.5% of full range)	
Current Resolution			AC : 1 μA, DC : 0.1 μA		
Output Frequency			50Hz / 60Hz		
Test/Ramp/Fall/Dwell Time			0.3 ~ 999 sec., continue / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off / 0.1 ~ 999 sec., off		
Waveform			Sine wave		
Insulation Resistance Test					
Output Voltage			-	DC : 0.1 ~ 5kV	
Voltage Resolution			-	2V	
Voltage Accuracy			-	1% of setting + 0.5% of full scale	1.5% of setting + 0.5% of full scale
IR Range			-	0.1MΩ ~ 50GΩ	
Resistance Resolution			-	0.1MΩ	
Resistance Accuracy	≧0.5kV	1MΩ ~ 1GΩ	-	± (3% of reading + 0.5% of full scale)	
		1GΩ ~ 10GΩ		± (5% of reading + 1% of full scale)	
		10GΩ ~ 50GΩ		± (10% of reading + 1% of full scale)	
	<0.5kV	1MΩ ~ 1GΩ		± 5% of reading + (0.5*300/Vs)% of full scale	
Flashover Detection					
Setting Mode			Programmable setting		
Detection Current			AC : 20mA	DC : 10mA	DC : 10mA
Contact Check Function					
Contact Check			OSC (open/short check) HVCC(High Voltage contact check)	HVCC(High Voltage contact check)	HVCC(High Voltage contact check)
Electrical Hazard Protection Function					
Ground Fault Interrupt			0.5mA±0.25mA AC, ON/OFF	-	-
Key Lock			Yes (password control)		
Interlock			YES		
GO/NG Judgment Window					
Indication, Alarm			GO : Short sound, Green LED; NG : Long sound, Red LED		
Memory Storage			100 sets ,max. 50 steps per set		
Interface			Standard-RS232, Handler interface ,USB , SCAN ; Optional - GPIB interface		
General					
Operation Environment			Temperature: 0˚C ~ 45˚C ; Humidity: 15% to 95% R.H@≦ 40˚C		
Power Consumption			500VA		
Power Requirements			90~132Vac or 180~264Vac, 47~63Hz		
Dimension (HxWxD)			130x430x500 mm/5.12x16.93x19.69 inch		
Weight			28kg / 61.7 lbs		



KEY FEATURES

- Compact size Hipot tester
- Three instruments in one: AC Hipot, DC Hipot, Insulation Resistance (19073)
- Open/Short Check (OSC)
- ARC detection (Flashover)
- Provide reliable and stable test results
- Storage of 10 Tests Setups with 60 Steps per setup
- Ground Fault Interrupt (GFI)

Chroma 19070 series are the smallest Hipot Testers currently available in the world. Its super mini size is easy to carry and the large LCD display is suitable for viewing measurement results. These sophisticate Hipot Testers are most applicable to safety test for electronic components.

ORDERING INFORMATION

19071 : Hipot Tester (AC)
19073 : Hipot Tester (AC/DC/IR)
A190344 : HV Gun
A190701 : Remote Control Box
A190702 : 40kV HV Test Probe
A190704 : Start Switch
A190706 : 19" Rack Mounting Kit for Model 19070 series
A190708 : ARC Verification Fixture



A190701 : Remote Control Box



A190702 : 40kV HV Test Probe

SPECIFICATIONS				
Model			**19071**	**19073**
Mode			ACV	ACV/DCV/IR
Withstanding Voltage Test				
Output Voltage			AC : 0.05 ~ 5kV	AC : 0.05~ 5kV, DC : 0.05 ~ 6kV
Load Regulation			≦(1% + 5V)	
Voltage Resolution			2 V	
Voltage Accuracy			±(1.0% of reading + 5 counts)	
Cutoff Current			AC : 0.1mA ~ 20mA	AC : 0.1mA ~ 20mA, DC : 0.01mA ~ 5mA
Current Resolution			AC : 1μA, DC : 0.1μA	
Current Accuracy			±(1.0% of reading + 5 counts)	
Current Frequency			50Hz/ 60Hz	
Test Time			0.3 ~ 999 sec, continue	
Ramp up Time			0.1 ~ 999 sec, off	
Waveform			Sine wave	
Insulation Resistance Test				
Output Voltage			-	DC : 50 ~ 1000 V
Voltage Resolution			-	2V
Voltage Accuracy			-	±(5% of reading + 5 counts)
Resistance Accuracy	≧ 500V	1MΩ ~ 1000MΩ	-	± (4% of reading + 5 counts)
		1GΩ ~ 10GΩ		± (7% of reading + 5 counts)
		10GΩ ~ 50GΩ		± (12% of reading + 5 counts)
	< 500V	0.1MΩ ~ 1000MΩ		± (7% of reading + 5 counts)
ARC Detection				
Setting Mode			Programmable setting	
Detection Current			AC : 1mA ~ 20mA, DC : 1mA ~ 5mA	
Secure Protection Function				
Fast Output Cut-off			Approx. 0.4mS, after NG happen	
Fast Discharge			Approx. 0.2S, Typical	
Ground Fault Interrupt			0.5mA ± 0.25mAac (ON), OFF	
Continuity Check			0.1Ω ~ 5.0Ω ± 0.2Ω, GC MODE	
Panel Operation Lock			Yes	
GO/NG Judgment Window				
Indication, Alarm			GO: Short sound; NG: Long sound	
Data Hold			Least tests data memories	
Step Hold			Step signal trigger ON / OFF	
Memory Storage			10 tests setups with 60 steps pre setup	
General				
Operation Environment			Temperature: 0˚C ~ 40 ˚C, Humidity: ≦ 80 % RH	
Power Consumption			No load : < 60 W, With rated load : ≦ 300 W	
Power Requirement			100V / 120V / 220V / 240V, 50 / 60 Hz	
Dimension (H x W x D)			105 x 270 x350 mm / 4.13 x 10.74 x 13.78 inch	105 x 270 x350 mm / 4.13 x 10.63 x 13.78 inch
Weight			11 kg / 24.23 lbs	
Certification			UL, TUV, CE	

All specifications are subject to change without notice.



KEY FEATURES

- 10V~1000V impulse voltage test, with 0.25V test resolution
- High impulse test sampling rate (200MHz), 10bits
- <35mS high speed mode (P1.0)
- Inductance contact check function
- Inductance differential voltage compensation function
- Apply to High/low inductance test (0.1uH~100uH)
- Breakdown voltage analysis function
- Low voltage range to increase the sensibility of waveform analysis (32V/64V/128V/256V/ 512V/1024V)
- Traditional Chinese/Simplified Chinese/ English user interface
- USB port for storing waveform & screen capture
- Graphical color display
- Standard LAN,USB and RS232 interfaces

The Chroma 19301A Impulse Winding Tester applied with high/low inductance test technology has 1000V impulse voltage and 200MHz high speed sampling rate that can satisfy most of the power inductors test requirements for wide range of inductance products from 0.1uH to 100uH. The built-in Area Size Comparison, Differential Area Comparison, FLUTTER value, LAPLACIAN value, ΔPeak ratio , and Resonant Area functions are able to inspect the coils for poor insulation effectively.

The inspection of winding components includes electrical characteristics and safety withstand voltage tests. Commonly poor insulation of coils is the root for causing layer short and output pin short-circuited during usage. The reason could result from bad initial design, poor molding process or deterioration of insulating materials; therefore, adding the coil layer short test to winding components has its necessity.

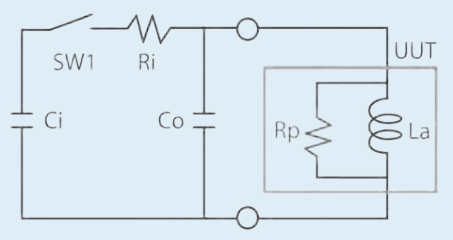
The Chroma 19301A is an equipment specifically designed for testing winding components utilizing a high voltage charged micro capacitor (low test energy) and coil under test to form an RLC parallel resonant. Analyzing the oscillation decayed waveform via a high speed and sophisticated sampling process technique can successfully detect the coils with poor insulation, also provide withstand voltage tests on winding quality and cores for power inductor components.



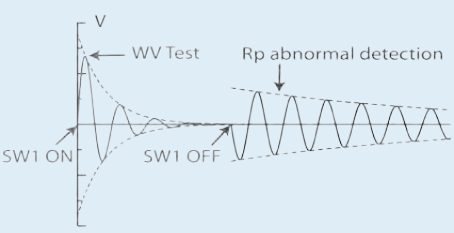
LAN RS-232 HANDLER USB CE

Δ Peak Ratio

The Δ Peak Ratio detection, which can detect the abnormal value of resistance (Rp) of the test object, is Chroma's characteristic testing technique. There might have a small damage inside the inductor before any tests. This inductor might be able to pass the withstand voltage test (Hi-pot test), but it will fail the LS/Q or Rp test easily by using LCR meter. While the SW1 is on, the instrument is doing the withstand voltage test (WV Test). After the SW1 is off, the instrument is using the Δ Peak Ratio detection to detect the item with abnormal Rp value, which can be detected by observing the damping decay rate.



Rp Schematic Diagram

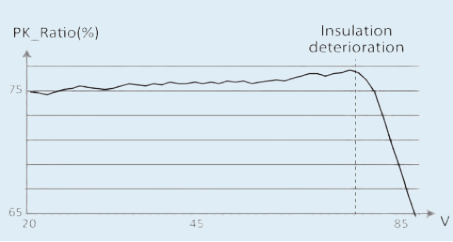


Δ Peak Ratio Waveform

Breakdown Voltage (B.D.V)

The Breakdown Voltage test function of Chroma 19301A uses the voltage slew rate to detect if the Area Size and Laplacian are over the set value and test the coil withstand voltage by setting the start/end voltage and the slew rate. The R&D engineers can perform the product analysis and research to improve the weakness spot of coil via this function.

The breakdown voltage test has added the Δ Peak Ratio detection and automatic data output functions. Chroma 19301A is able to recode all the test results in its temporary memory during the test, and save those results into USB flash drive after the test. User can analyze the insulation deterioration issue by creating a chart of voltage versus Rp in Excel file from those test results.



BDV vs. Rp

Contact Check (Patent)

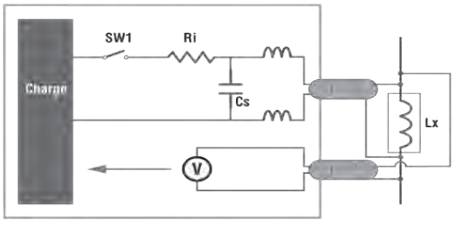
To avoid poor contact or open circuit that made the fixture probe to flash due to maximum internal voltage output and cause the DUT to be damaged, the Chroma 19301A will perform Contact Check before testing to prolong the probe's life.

High/Low Inductance Products Testing

Besides the low inductance products testing technology, the Chroma 19301A also covers the testing for high inductance products from 0.1uH ~ 100uH. The internal inductance detection function is a very convenient operation that enables the user to learn the amount of DUT inductance, switch to proper range for testing and perform comparison under a proper waveform. A single layer short tester combined with the high/ low inductance product testing application not only shortens the time for equipment change when switching the product line but also reduces the factory facility expense .

4-Wire Test

Since the voltage detection of common 2-wire layer short test device is inside the current loop, the measured voltage is quite different from the DUT for low inductance measurement. The Chroma 19301A uses dual coaxial 4-wire detection to significantly improve the voltage accuracy for correct test results.



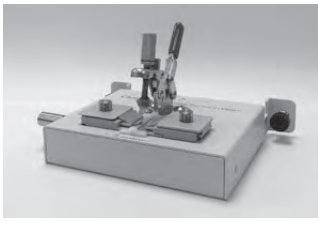
Product Application

High Speed Automatic Testing Application

The low inductance applied to smart phone or tablet PC tended to be slim and light on the appearance. Since fully automatic testing and packing devices are adopted for inductance production, high speed tester equipment is required to satisfy the high speed production. To fulfill this test application, the Chroma 19301A is equipped with high speed and dual coaxial 4-wire test functions that can reduce the impact of wiring length and work with the layer test automation machine to bring greater efficiency to customers.

SMD Power Choke Test Fixture

The size of low inductance Power Choke is quite small and to facilitate the testing of layer short, Chroma has developed an SMD Power Choke 4-side test fixture (patent) that can work with the 19301A inductance difference voltage compensation to assist the product developer or QA staff in improving the test efficiency .

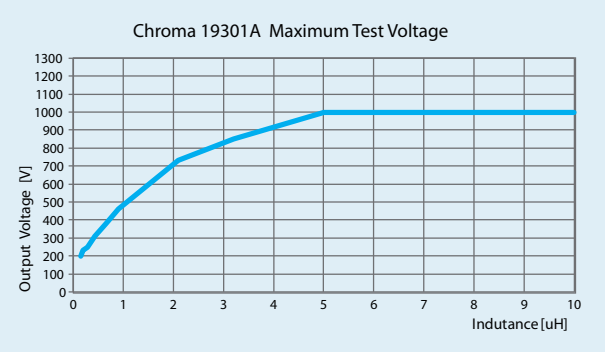


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SPECIFICATIONS	
Model	**19301A**
Channel	1ch
Applied Voltage(Vpeak), Step	10V~1000V, 1V (Note1,2)
Test Inductance Range	0.1uH~100uH
Voltage Accuracy	± [1 % of setting x (1 + 0.5 uH/Lx) + 2% of range]
Sampling Speed	10bit / 5ns (200MHz)
Sampling Range	8 Range : 0, 1, 2, 3, 4, 5, 6, 7
Pulse Number	Pulse Number: 1~32, Dummy Pulse Number: 0~9
Screen Display Resolution	640× 480 Dots (VGA)
Waveform Display Range	Colors Display 512×256 Dots
Detection Mode	Area / Differential Area ; Flutter Value / Laplacian Value / ΔPeak ratio / Resonant Area
Test Time	Pulse 1.0 : <35mS ; +20~70mS/pulse (charge interval time 20mS~70mS programmable) ; +45mS when screen on
Electrical Hazard Protection Function	
Key Lock	Yes (password control)
Interlock	Yes
Indication, Alarm	GO : Short sound, Green LED; NG : Long sound, Red LED
Interface	RS232, Handler ,USB , LAN interface
General	
Operation Environment	Temperature: 0˚C ~ 45˚C, Humidity: 15% to 95% R.H@≦ 40˚C
Power Consumption	No Load: <150VA ; Rated Load: <1000VA
Power Requirements	100~240Vac, 50 / 60Hz
Dimension (W × H ×D)	177 x 428 x 500mm / 16.85 x 6.97 x 19.69 inch
Weight	26kg / 57.32 lbs

Notes

* Suggest to use Chroma's standard test wire, overlong test wire would influence maximum output voltage.
* The maximum test voltage of using standard 1m test wire is as below:



ORDERING INFORMATION

19301A : Impulsing Winding Tester
A193001 : SMD Choke Test Fixture
A193002 : 1m Test Wire + Test Clip
A193003 : : 1m Test Wire + Flat Head Cutting
A193004 : 1m Test Cable BNC to BNC (including BNC Male Connector x 2)

All specifications are subject to change without notice.



LAN RS-232 HANDLER USB CE

特點

- High impulse test sampling rate (200MHz),10bits
- 6kV impulse voltage test
- Breakdown voltage analysis function
- High speed test
- 10 channels output (19305-10)
- Support max. 40channels scanning test
- Traditional Chinese/Simplified Chinese/ English user interface
- USB port for storing waveform & screen capture
- Graphical color display
- Standard LAN,USB and RS232 interfaces

The Chroma 19305 series Impulse Winding Tester included with one channel(19305) and 10 channels output (19305-10), the 19305 series has 6kV impulse voltage and 200MHz high speed sampling rate to improve sensitivity of discharge detection. To test more than 10uH, the built-in Area Size Comparison, Differential Area Comparison, FLUTTER value, LAPLACIAN value, and ΔPeak ratio functions are able to inspect the coils for poor coil insulation.

The inspection of winding components includes electrical characteristics and safety withstand voltage tests. Commonly poor insulation of coils is the root for causing layer short and output pin short-circuited during usage. The reason could result from bad initial design, poor process or deterioration of insulating materials; therefore, adding the coil layer short test to winding components has its necessity.

The impulse winding test is to impose a non-destructive, high speed and low energy voltage impulse on the DUT (Device Under Test) to analyze/compare the equivalent waveform of yield and defect products for good and no good judgment. The main function of impulse winding test is to discover the potential defects such as layer short, corona or partial discharge that is difficult to find in wound components in early phase.

The Chroma 19305 series is an equipment specifically designed for testing winding components utilizing a high voltage charged micro capacitor (low test energy) and coil under test to form an RLC parallel resonant. Analyzing the oscillation decayed waveform via a high speed and sophisticated sampling process technique can successfully detect the coils with poor insulation. Analyzer can perform impulse tests on wound components like motors, transformers wound products. Not only reliable quality but also efficient product control would be obtained when implementing it to quality verification by wound component test.

The Chroma 19305-10 can providing maximum 10 channels output for multichannel scanning tests to save time and labor costs in the manufacturers.



Model 19305-10

Five kinds of waveform judgement for testing

- Area Size
- Differential Area
- Flutter Value
- Laplacian Value
- ΔPeak ratio

Product Application

Transformer, Motor, Generator, Ignition Coil, Relay, Solenoid Valve, Inductance and other coils.

ORDERING INFORMATION

19305 : Impulse Winding Tester
19305-10 : Impulse Winding Tester (10ch)
A190359 : : 16ch HV External Scanning Box



A190359 : 16ch HV External Scanning Box

SPECIFICATIONS		
Model	**19305**	**19305-10**
Channel	1ch	10ch
Applied Voltage, Step, and Energy	100V ~ 6000V 10V Step	
Inductance Test Range	More than 10uH	
Sampling Speed	10bit / 5ns (200MHz)	
Sampling Range	11 Range : 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11	
Pulse Number	Pulse Number: 1~32 Dummy Pulse Number: 0~9	
Detection Mode	Area / Differential Area ; Flutter Value / Laplacian Value / ΔPeak ratio	
Electrical Hazard Protection		
Key Lock	Yes (password control)	
Interlock	Yes	
Indication, Alarm	GO : Short sound, Green LED ; NG : Long sound, Red LED	
Interface		
	RS232 ,USB , LAN interface	
General		
Operation Environment	Temperature : 0˚C ~ 45˚C Humidity : 15% to 95% R.H@≦ 40˚C	
Power Consumption	No Load : <150W Rated Load: <1000W	
Power Requirements	100~240Vac, 50 / 60Hz	
Dimension (H xW xD)	177 x 428 x 500 / 16.85 x 6.97 x 19.69 inch	
Weight	26kg / 57.32 lbs	



GPIB RS-232 USB CE UL

Removable and Master/Slave design

Because different products have different requirements and test procedures, Chroma 19200 offers different scanning modules for combinations. These modules are: AC LINE module, GENERAL module, AC LINE2 module. EARTH module, GB&GBF module and SWITCH module. Due to different modules have different functions, users are able to combine different modules for your needs.

High / Low voltage circuit insulation

Most of products have to perform Electrical Safety Test (high voltage) and Function Test (low voltage). Chroma 19200 supports high and low voltage isolation by SWITCH module. User can combine high and low voltage tests like LCR measurement, power performance and function test for one sequence in one station and data collecting. That improves test efficiency and reduces occurred test risk.

KEY FEATURES

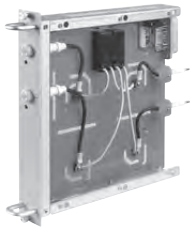
- Support Electrical Safety Test Scanning
- Support High / Low voltage circuit insulation (Switch module)
- Support 8 slots for plug-in (removable)
- Max. 9 slaves for multiple scanners (master/slave interface)
- Standard RS-232 and USB interface
- Optional GPIB interface
- CE Mark
- 19200 can be installed in Chroma Electrical Equipment ATS model 8900

In recent years, International Electrotechnical Commission (IEC) in order to make consumers safer while using the electrical products, join more requirements to test in the standard. It makes electric to fit requirements by all tests be performed which are very complicated and different. The problem not only the course is complicated and apt to make mistakes, but also the manpower costs more.

Chroma 19200 can perform high / low voltage switch and scan all safety tests by EST Analyzer (Chroma 19032) inputs such as withstanding test; Some modules support 20A for Leakage Current test and Function Test; GB & GBF modules support 40A and Ground Floating.

Chroma 19200 can be installed in Chroma 8900 electrical equipment ATS for DUT which needs a lot of procedures to test like medical equipment, medical power, UPS, motor, etc., ATS can save the manpower cost , reduce the mistake, data management to improve quality and efficiency.

MODULE DESCRIPTION


AC LINE MODULE


AC LINE2 MODULE


GENERAL MODULE


EARTH MODULE


SWITCH MODULE


GB MODULE


GBF-1 MODULE


GBF-2 MODULE

SPECIFICATION (MASTER & SLAVE)	
Model	**19200**
Mode	SCAN
Withstanding Voltage Test Scan	
Max. Voltage	AC : 5kV, DC : 6kV
Insulation Resistance Test Scan	
Max. Voltage	DC : 5kV
Ground Bond Test Scan	
Max. Current	40A
Leakage Current Test Scan	
Max. Voltage	AC 300V
Max. Current	20A
Interface	RS-232 , USB (Standard), GPIB (Optional)
General	
Operation Environment	Temperature: 0˚C ~ 45˚C ; Humidity: 15% to 95% R.H@≦ 40˚C
Power Consumption	500VA
Power Requirements	90~132Vac or 180~264Vac, 47~63Hz
Dimension (H x W x D)	310.8 x 438 x 495 mm / 12.24 x 17.24 x 19.49 inch
Weight	35 kg / 77.09 lbs
Certification	CE

All specifications are subject to change without notice.

MODULE SPECIFICATION									
Module Name		**AC LINE**	**GENERAL**	**AC LINE2**	**EARTH**	**GB**	**GBF-1**	**GBF-2**	**SWITCH**
Port No.		2	4	4	4	4	2	4	8
HIGH/LOW switch		●	●	●	●	●			
Max. Voltage		5KVac 6KVdc	5KVac 6KVdc	5KVac 6KVdc	5KVac 6KVdc	15V peak	5KVac 6KVdc	5KVac 6KVdc	5KVac 6KVdc
Max. current		20A	100mA	100mA	100mA	40A	40A	40A	100mA
Test Item	**Function Type**								
WVAC/WVDC/IR Test	HIGH	●	●	●					
	LOW	●	●	●	●				
GB Test	Drive ±, Sense ±					Earthed 4 channels set + or -	Floating 1 channels	Floating 2 channels	
LC Test	LINE	●							
	NEUTRAL	●							
	SENSE HIGH		●	●					
	SENSE LOW		●		●				
	EARTH		●	●	●				
	LINE2			●					

Note*1 : GB, GBF-1 and GBF-2 only can be used on frame #0
Note*2 : GBF-1 and GBF-2 have GB floating function
Note*3 : The GENERAL, ACLINE2, EARTH modules have flexible design which can be exchanged flexibly by terminals for different tests

ORDERING INFORMATION

19200 : Electrical Safety Test Scanner (Master)
19200 : Electrical Safety Test Scanner (Slave)
A190349 : Universal corded product adapter
A190508 : GPIB Interface
A192000 : AC LINE module
A192002 : AC LINE2 module
A192003 : GENERAL module
A192004 : EARTH module
A192005 : GB module
A192006 : GBF-1 module
A192007 : GBF-2 module
A192008 : SWITCH module
A192010 : Power entry adapter of GBF module
A192011 : Blank Plate



The 19572 are instrument dedicated to measure the grounding resistance within the range of 0.1~510mΩ. Its compact and easy to operate feature is most suitable for the grounding test in production line. By supplying high reliability and stability test results with built-in resistance compensate function; it is an economical and useful grounding tester.

KEY FEATURES

- Wide resistance measurement range : 0.1 ~ 510 mΩ
- High performance AC current output : 45 A
- Compact size ground bond tester
- Provide reliable and stable test results
- Built-in resistance compensation function
- Standard RS-232 interface
- Optional GPIB Interface
- Compatible with the model 19070 series Hipot Tester

ORDERING INFORMATION

19572 : Ground Bond Tester
A190701 : Remote Control Box
A195702 : GPIB Interface

SPECIFICATIONS	
Model	**19572**
Mode	Ground Bond
Grounding Resistance Test	
Output Current	AC : 3 ~ 45A
Resolution	3 ~ 30A, 0.01A / 30.1 ~ 45A, 0.1A
Current Accuracy	±(1.5% of setting + 0.5% of full scale)
Output Frequency	50Hz / 60Hz
Resistance Range	0.1 ~ 510 mΩ
Resistance Resolution	(R display counts/ I display counts) ≧ 0.2, Resolution: 1mΩ (R display counts/ I display counts) < 0.2, Resolution: 0.1mΩ
Resistance Accuracy	±(2% of reading + 0.5% of full scale)
Offset	A predetermined value can be subtracted from the measured value and the result of subtraction can be display The result of subtraction can be compared with a Good/NO Good judgment reference value, and the result of comparison can be use for the Good/NO Good judgment
Offset Range	0 ~ 100mΩ
Test Time	0.5 ~ 999 sec., continue
Waveform	Sine wave
GO/NG Judgment	A no-good judgment is made when a resistance greater than the high limit value Is detected. A no-good judgment is made when the output current is cutout and a no-good Alarm signal is delivered. If no abnormal state is detected during the test time, a good judgment is made and a good signal is deliver.
Limit	Hi-Limit : 0.1 ~ 510mΩ; Low-Limit : off, 0.1mΩ ~ Hi-Limit Value, 510mΩ max.
General	
Operation Environment	Temperature : 0˚C ~ 40 ˚C, Humidity : ≦ 80 % RH
Power Consumption	No load(Ready state) : < 100 W, With rated load : ≦ 880W max.
Power Requirement	100V / 120V / 220V (AC ± 10%) / 240V (AC -10% ~ +5%), 50 / 60 Hz
Dimension (H x W x D)	105 x 320 x 400 mm / 4.13 x 12.60 x 15.75 inch
Weight	16 kg / 35.24 lbs
Certification	UL, CE

All specifications are subject to change without notice.



GPIB RS-232 CE

KEY FEATURES

- Adequate for versatile testers
- Precise designed standard calibration kit
- Stable & accurate calibration equipment
- Standard GPIB Interface and RS-232 Interface

The 9102 Hipot Calibrators is specially designed standard devices for instrument calibration lab. The 9102 can simulate multiple loads and apply to various Hipot testers. These calibration equipment can save manufacturers a great deal of regular calibration fee.

ORDERING INFORMATION

9102 : Hipot Calibrator

SPECIFICATIONS		
Model	**9102**	
Withstanding Voltage Test		
Voltage Meter		
Range	AC : 2kV / 6kV, DC : 2kV / 10kV	
Accuracy	AC : 0.3 % + 6 counts, DC : 0.2% + 2 counts	
Resolution	0.1V / 1V	
Current Meter		
Range	200 μ A / 2mA / 20mA / 200mA	
Accuracy	AC : 0.3% + 6counts, DC : 0.2% +2 counts	
Resolution	10 nA/ 100nA/ 1 μ A/ 10 μ A	
Dummy Load (1.2kV max.)	36mA : 33.3kΩ, 100W ; 24mA : 50kΩ, 80W 12mA : 100kΩ, 30W ; 4.8mA : 250kΩ, 10W 2.4mA : 500kΩ, 7W ; 0.12mA : 10MΩ, 1W	
Grounding Resistance Test		
Voltage Meter		
Range	AC : 6V (0.050V ~ 6.000V)	
Accuracy	AC : 0.3% + 6 counts	
Resolution	1 mV	
Current Meter		
Range	AC : 45A (0.500A ~ 45.000A)	
Accuracy	AC : 0.3% + 6 counts	
Resolution	10 mA	
Dummy Load	45A Max. : 100 mΩ, 250W	
Insulation Resistance Test		
Standard Resistance(1.2kV max.)	Value	Accuracy
	1000 MΩ	2%
	90.9 MΩ	1%
	9.9 MΩ	1%
General		
Operation Environment	Temperature: 0˚C ~ 40˚C, Humidity : ≦ 80% RH	
Power Requirement	100V / 120V / 220V / 240V, 50 / 60 Hz	
Dimension (H X W X D)	89 x 430 x 400 mm / 3.5 x 16.93 x 15.75 inch	
Weight	8 kg / 17.62 lbs	



Because the requirement in standard of the electric product increase day by day,, the testing cost then increasing . In order to help the manufacturer Reduce testing cost and products risk effectively, Chroma provide 8900 electrical equipment auto test system (ATS) be the best solution by program the test of the complicated procedure like the medical equipment safety and function test and instrument safety and function test.

8900 electrical equipment ATS can completion that amount measurement and test procedure in once automatically.This strong function not only can be report formatted simply, but reduce the careless mistake of the artificial writing and improper test. Chroma 8900 electrical equipment ATS is suitable for all electrical equipment test solution within Electrical Safety Test.

Chroma 8900 electrical equipment ATS solve the Electrical Safety Test and special FUNCTION test solution. The system can combine different testers in the system accordding with different test request what your need. The software is all open architecture structure which can offer the corresponding program and the most flexible test item in accordance with special test procedure to the customer for special products.

The all open architecture software of 8900 systems includes the strong report editor and generator, statistical analysis and functions of management. Management of various types of different test reports and operation that these functions make the system have the ability to control quality and reduce risk. These statistical analysis and report function are indispensable for quality control and product line testing in a modern electrical manufacturer.

FUNCTIONS

- Support electrical safety test and function test scanning :
  - AC/DC WV Test
  - IR Test
  - GB Test
  - LC Test (all types)
  - Function test
- Expandable Measurement function
  - LCR Meter
  - AC/DC Source
  - DC Load
  - Power Analyzer
  - Timing/Noise Analyzer
  - DMM
  - Oscilloscope
  - Other with GPIB or RS-232 device

KEY FEATURES

- Open architecture software
- Expandable hardware
- Editable test library
- Editable test programs
- Editable and Test Item
- Editable reports
- Statistic report
- User authority control
- Activity log
- Support Barcode reader

APPLICATIONS

- House Appliance
- SMPS/Charger/UPS
- Motor Function Test
- Large EL Capacitor
- PCB
- Medical Device
- Line Transformer

ORDERING INFORMATION

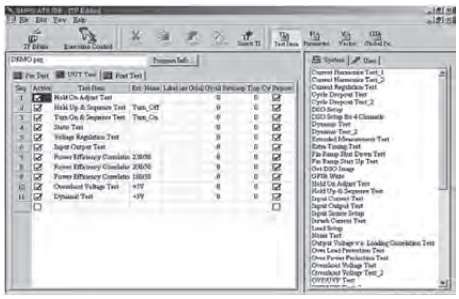
System		
8900	Electrical Equipment ATS	
Instrument		
Electrical Safety Analyzer	Refer to Model 19032-P	
Leakage Current Test Module	6000-05(10A) and 6000-08(20A) for 19032-P	
Multi Channel Module	6000-01 (3GC/5HV), 6000-02 (5GC/3HV), 6000-03 (8HV), for 19032-P	
Isolation Transformer	500VA (A190313)/ 1000VA(A190314)	
Electrical Safety Test Scanner	Refer to Model 19200	
Scan Modules for 19200	AC Line Module(A192000)	General Module (A192003)
	AC Line2 Module(A192002)	Earth Module (A192004)
	GB Module(A192005)	GBF-1 Module (A192006)
	GBF-2Module(A192007)	Switch Module (A192008)
LCR Meter	Refer to Model 11022, 11025	
AC Source	Refer to Model 6500, 61500, 61600, 61700 series	
DC Source	Refer to Model 62000P Series	
Power Analyzer	Refer to Model 6633 series	
Power Meter	Refer to Model 66200 series	
DC Load	Refer to Model 6310A, 63200, 6330A series	
Timing/Noise Analyzer	6011/80611	
Timing/Noise module	6011N/80611N	
Cable and Accessory		
A600009	GPIB Cable (200 cm)	
A600010	GPIB Cable (60cm)	
A800005	PCI BUS GPIB Card (National Instrument)	

All specifications are subject to change without notice.

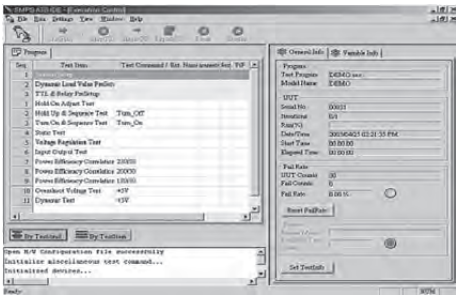


GPIB CE

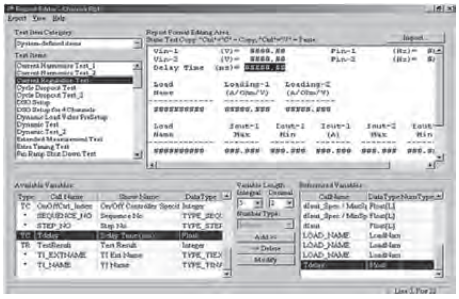
Soft Panel



Test Program Editing



Running GO/NOGO



Test Report Editing



Statistical Report

KEY FEATURES

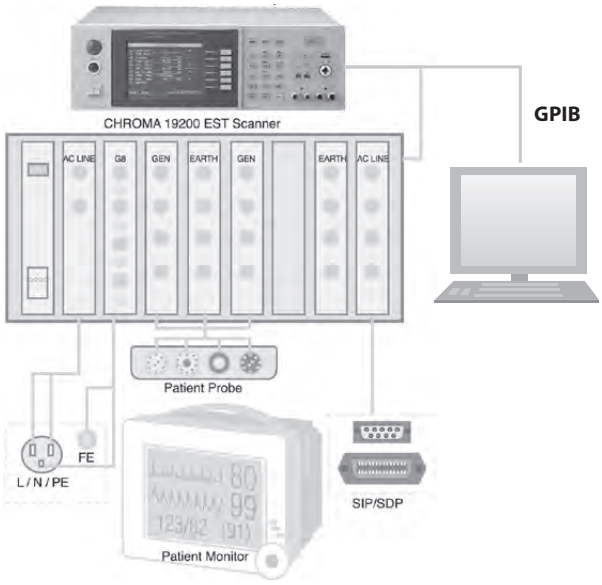
- Support electrical safety test and function test scanning :
  - AC/DC WV Test
  - IR Test
  - GB Test
  - Earth Leakage Current
  - Enclosure Leakage Current
  - Patient Leakage Current
  - Patient Auxiliary Leakage Current
- Support customize function test (option)
- Open architecture software
- Automatically generate and save test report

The safety standard of medical equipment is very strict. Because the medical equipment keeps in touch with the health of the doctor and patient frequently, make several Electrical safety tests can't be ignored especially leakage current test which has already become the most important test in electrical safety test.

The leakage current test of medical equipment includes four kinds - ELC, ECLC, PLC, PALC - to test besides AC/DC/IR/GB test. Additionally, normal / reverse / single fault normal / single fault reverse four powers and earth switch, let medical equipment safety test difficulty and complexity further.

Chroma 19200 can allocate different modules for special medical equipment test reach flexible and time saving. Chroma 19200 with 8900/8910 test system can store test procedure and result via computer for data mining and researching of line manager and Quality control department.

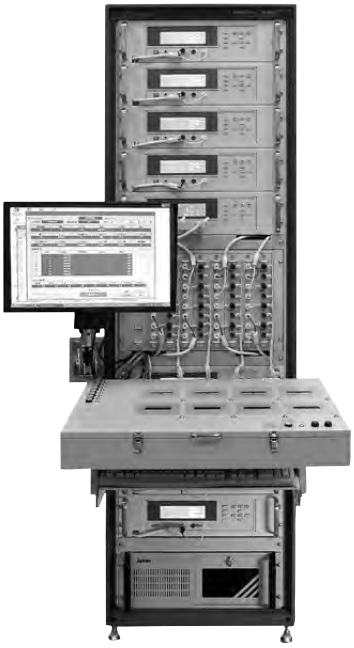
CHROMA 19032-P EST Analyzer



ORDERING INFORMATION

System		
8910	Medical Electrical Safety ATS base on 8900	
Main Instrument		
Electrical Safety Tester	Refer to Model 19032-P	
Leakage Current Test Module	6000-08 (20A) for 19032-P	
Multi Channel Module	6000-01 (3GC/5HV), 6000-02 (5GC/3HV), 6000-03 (8HV), for 19032-P	
Isolation Transformer	500VA (A190313)/ 1000VA(A190314)	
Electrical Safety Test Scanner	Refer to Model 19200	
Scan Modules for 19200	AC Line Module(A192000)	General Module (A192003)
	AC Line2 Module(A192002)	Earth Module (A192004)
	GB Module(A192005)	GBF-1 Module (A192006)
	GBF-2Module(A192007)	Switch Module (A192008)
AC Source	Refer to Model 6400, 6500, 61500, 61600, 61700 series	

High Capacitance Electrolytic Capacitor ATS Model 1911



The system is a aluminum electrolytic capacitor with high capacitance designed for measuring LC and C/D/Z/ESR. It provides the best test solution to high capacity electrolytic capacitor with data record function. The general users spend longer time to wait LC test in testing high capacitance electrolytic capacitor. The system can install 8 electrolytic capacitors maximum at a time to enhance 8 times of productivity. It will sound an alarm after the test is completed. The operating personnel process other operations to increase the time efficiency in testing.

The screen consists of DUT model number and lot number information. The software will automatically bring out DUT test specifications which includes LC test voltage, Dwell time, current limit and C/D/Z/ESR value. Count Pass/Fail ratio at the lowermost of main program for analysis convenience of production line engineer.







KEY FEATURES

- Test parameter LC/C/D/Z/ESR
- Test 8 electrolytic capacitors
- Constant current for test leakage current
- Special test clip fix DUT
- Testing specification from program management
- Test report auto generate
- Statistic analysis
- Software interface easy to operate

ORDERING INFORMATION

1911 : High Capacitance Electrolytic Capacitor ATS

SPECIFICATIONS

Accurate and highly reliable hardware devices :

Capacitor Leakage Current/ IR Meter		
Model		**11200 (650V)**
Main Function		Capacitor Leakage Current / IR Meter
Test Parameter		LC, IR
Test Signals Information		
Voltage		1.0 V~100 V, step 0.1 V; 101V~650 V, step 1V; ±(0.5% + 0.2V)
Charge Current Limit		V ≤ 100V: 0.5mA~500mA V > 100V: 0.5mA~150mA, 97.5W max. step 0.5mA; ±(3% + 0.05mA)
Measurement Display Range		LC : 0.001 μA~20.00mA
Basic Measurement Accuracy *1		LC Reading : ±(0.3% + 0.005 μA)
Measurement speed (Ext. Trigger, Hold Range, Line Frequency 60Hz)	Fast	77 ms
	Medium	143 ms
	Slow	420 ms
Function		
Correction		Null zeroing
Test Voltage Monitor		Vm: 0.0 V~660.0V; ±(0.2% of reading + 0.1V)
Charge Timer		0~999 Sec.
Dwell Timer		0.2~999 Sec

Scanner	
Model	**19200**
Swith Module *1	
Channels	8ports, 4HV relays
Isolation Voltage	max up to DC 6KV / AC 5KV
Max Current	40A
GB Module *2	
Channels	4 Channels Driver & Sense
Max Current	40A

LCR Meter	
Model	**11022**
Test Parameter	L,C, R,|Z|, Q, D, ESR, X, θ
Test Signals	
Level	10 mV~1V, step 10 mV; ±(10% + 3 mV)
Frequency	50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz ; ±0.01%
Measurement Display Range	
C (Capacitance)	0.001pF~1.9999F
L, M, L2 (Inductance)	0.001 μH~99.99kH
Z (Impedance), ESR	0.01mΩ~99.99MΩ
Q (Quality Factor) D (Distortion Factor)	0.0001~9999
θ (Phase Angle)	-180.00°~ +180.00°

Note*1 : Swith module for leakage current measure
Note*2 : GB module for C/D/Z/ESR measure

All specifications are subject to change without notice.

Options of Electrical Safety Test Instruments

FIXTURES AND ACCESSORIES

No.	Description	19020	19032	19032-P	19035	19036	19052	19053 19054	19055	19071 19073	19572	19056 19057 19057-20	19305-10
* A190301	8HV Scanning box (5KV max) (9030A)		●	●					●				
* A190313	500VA Isolation Transformer		●	●									
* A190314	1000VA Isolation Transformer		●	●									
* A190316	Dummy Load (3KV/25A)	●	●	●	●	●	●	●	●	●	●	●	
A190321	GPIB Interface		●	●									
* A190334	Ground Bond 40A		●										
* A190336	8HV/8GB Scanning Box (9030AG)		●	●									
* A190337	Ground Bond 60A		●										
A190338	19001 EST Software		●	●									
A190343	19" Rack Mounting Kit for 19032		●		●								
* A190344	10kV HV Gun		●	●	●		●	●		●		●	
A190346	RS-232 Cable for Impulse Winding Tester Connection				●								
A190347	GPIB & Handler Interface				●								
A190348	RS-232 Interface for 19035				●								
* A190349	Universal Corded Product Adapter		●	●									
* A190351	8ch-16ch HV box for 19035				●								
A190355	19" Rack Mounting Kit			●					●				
A190356	GPIB Interface for 19032-P			●					●				
A190359	16 channel HV External Scanning Box (H, L, X)				●	●							●
* A190362	16 channel 4 wire HV External Scanning Box (H, L, X)					●							
A190506	RS422 Interface												
A190508	GPIB Interface	●					●	●			●		
* A190512	Auto Transformer Scan Box (3002B)				●			●					
A190517	19" Rack Mounting Kit						●	●					
* A190701	Remote Control Box									●	●		
* A190702	40KV HV Probe		●	●	●		●	●	●	●		●	
* A190704	Start Switch		●	●	●		●	●	●	●	●	●	
A190706	19" Rack Mounting Kit									●			
* A190708	ARC Verification Fixture	●	●	●	●	●	●	●	●	●		●	

(*) see pictures below



A190301



A190313



A190314



A190316



A190334



A190336



A190337



A190344



A190349



A190351



A190362



A190512



A190701



A190702



A190704

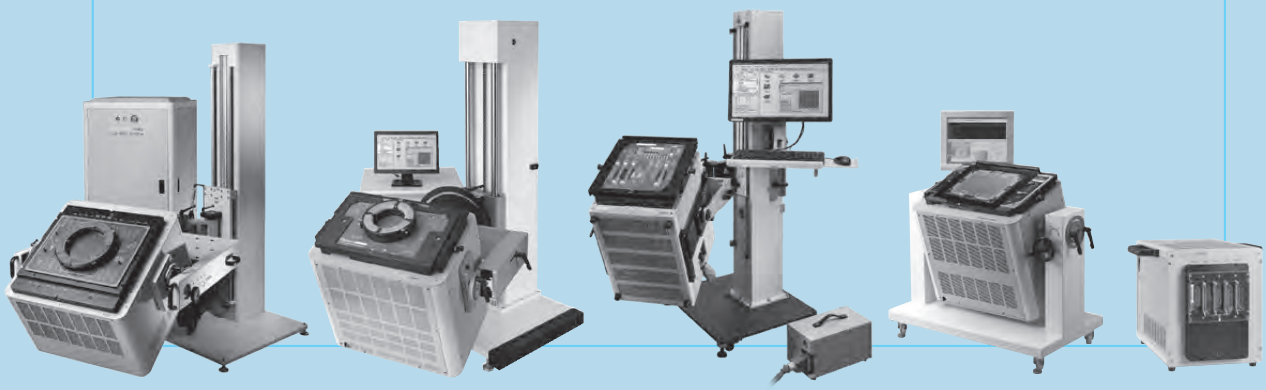


A190708

Semiconductor/IC Test Solution

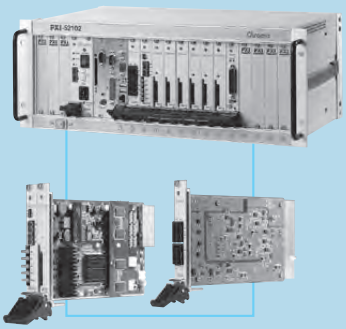
Selection Guide 14-1
VLSI Test System 14-3
SoC/Analog Test System 14-8
Programmable Pin Electronics Module 14-14
Four-quadrant DUT Power Supply 14-15
Final Test Handler 14-16
System Level Test Handler 14-20
Other Application Test Handler 14-24

VLSI Test System



SoC/Analog Test System





Programmable Pin Electronics Module
Four-quadrant DUT Power Supply

Final Test Handler



Hybrid Single Site Test Handler



Full Range Active Thermal Control Handler



Quad-site Test Handler



Octad-site Test Handler



RF Solution Integrated Handler

System Level Test Handler

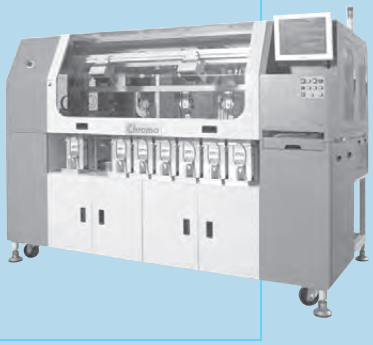


Hybrid Single Site Test Handler



Tabletop Single Site Test Handler





Automatic System Function Tester

Other Application Test Handler



Die Test Handler



Miniature IC Handler



Test-In-Tray Handler



CMOS Image Sensor Inspection System

Selection Guide - VLSI Test System 3360 Series							
	STDPS	**STPMU**	**LXUVI**	**LFUVI**	**HVREF**	**HVREF-48**	**PAGE**
V Range	± 10 V	± 48 V	± 10 V	24 V	± 60 V	± 48 V	--
I Range	± 2 A	± 100 mA	± 500 mA	± 1.5A	± 2 A	± 500mA	--
Channel	8 /board	8 /board	16 /board	4 /board	8 /board	8 /board	--
Slot	DPS slot	PMU slot	I/O slot	I/O slot	I/O slot	I/O slot	--
EPB Module	None	None	None	None	Yes	None	--
Accuracy	± 1.5mV	± 1.25mV	± 1.0mV	± 0.5mV	± 1.5mV	± 1.5mV	--
3360-D	--	--	O	--	--	--	**14-1**
3360-P	S	S	O	O	O	O	**14-2**

Selection Guide - VLSI Test System 3380 Series							
	MXDPS	**MXUVI**	**MXREF**	**MLDPS**	**MLDPS-16**	**Remark**	**PAGE**
V Range	± 16 V	± 12 V	± 48 V	12 V/± 6 V	12 V/± 6 V	--	--
C Range	± 2 A	± 1 A	± 250 mA	± 1 A (± 6V)	± 1 A (± 6V)	--	--
Channel	8 /board	16 /board	16 /board	32 /board	16 /board	--	--
Slot	S slot	S / IO slot	S / IO slot	S / IO slot	S / IO slot	--	--
4 wires VI	Yes	Yes	Yes	Yes	Yes	1 -S/2CH	--
Current Gain	None	Yes (4A)	Yes (1A)	Yes (8A)	Yes (8A)	--	--
3380D	O	O	O	O	S	--	**14-3**
3380P	O	S	O	O	O	--	**14-4**
3380	O	O	O	O	O	Flexible	**14-5**

S : Standard O : Option -- : None

Selection Guide - SoC/Analog Test System						
	DPS	**HDDPS**	**PMU**	**VI45**	**PVI100**	**PAGE**
V Range	±16V	±12V	±16V	±45V	±100V (±50V)	--
I Range	800mA	1A	250mA	100mA	2A (4A)	--
Channels	16	48	2	32	8	--
Slot	DPS	DPS	None	I/O slot	I/O slot	--
3650-CX	O	--	O	O	O	**14-8**
3650	O	--	O	O	O	**14-10**
3650-EX	X	O	O	O	O	**14-12**

Selection Guide - SoC/Analog Test System			
	ADDA	**HDADDA**	**PAGE**
Fs Max	500KHz	500KHz	--
Resolution	16 Bit	16 Bit	--
Channels	1	32	--
Slot	None	I/O slot	--
3650-CX	O	--	**14-8**
3650	O	O	**14-10**
3650-EX	--	O	**14-12**

S : Standard
O : Option
-- : None

All specifications are subject to change without notice.

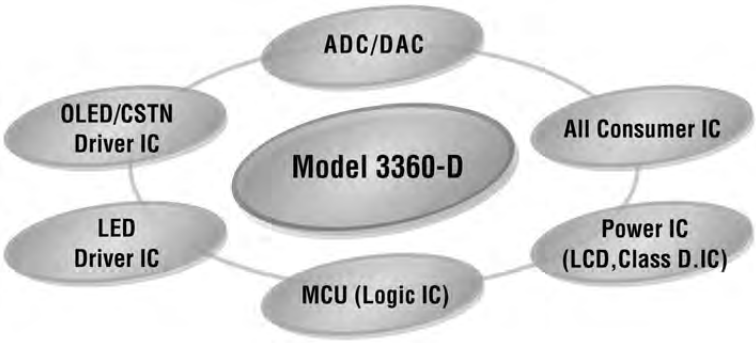
Selection Guide - Final Test Handler							
Temperture condition			**Final Test**				
			3110	**3110-FT**	**3160/3160A**	**3180**	**3240-Q**
Hot	Ambient	Ambient	O	O	O	O	O
	High Temperature (General Heater)	~150˚C±3˚C	O	--	O	O	--
		~125˚C±3˚C	O	--	O	O	O
ATC	Tri-Temperature (TEC Control)	-40˚C~125˚C±2˚C	O	O	--	--	--
		-40˚C~150˚C±2˚C	O	--	--	--	--
		~-55˚C	O	--	--	--	--
	High Temperature (ATC : Active Thermal Control)	~135˚C±2˚C	O	--	--	--	--
PTC	Passive cooling (PTC : Passive Thermal Control)	＜300W, ＜85˚C	O	--	--	--	--
PAGE			**14-20**	**14-16**	**14-17**	**14-18**	**14-19**

Selection Guide - System Level Test Handler						
Temperture condition			**System Level Test**			
			3110	**3111**	**3240**	**3260**
Hot	Ambient	Ambient	O	O	O	O
	High Temperature (General Heater)	~150˚C±3˚C	O	--	--	O
		~125˚C±3˚C	O	O	O	O
ATC	Tri-Temperature (TEC Control)	-40˚C~125˚C±2˚C	O	--	--	O
		-40˚C~150˚C±2˚C	--	--	--	--
		~-55˚C	O	--	--	O
	High Temperature (ATC : Active Thermal Control)	~135˚C±2˚C	O	--	--	O
PTC	Passive cooling (PTC : Passive Thermal Control)	＜300W, ＜85˚C	O	--	--	O
PAGE			**14-20**	**14-21**	**14-22**	**14-23**

O : Option
-- : None



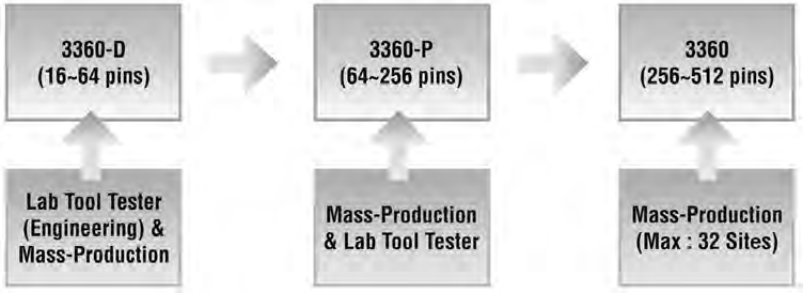
The Full Application Functions – Logic, ADDA, LCD, LED, Power, ALPG, Match···etc



KEY FEATURES

- 50/100 MHz clock rate
- 50/100 Mbps data rate
- 256 I/O digital I/O pins
- Up to 256 sites parallel testing
- 32/64/128M pattern memory
- Various VI source
- Flexible HW-architecture (Interchangeable I/O, VI, ADDA,)
- Real parallel trim/match function
- Time & Frequency Measurement Unit (TFMU)
- AD/DA test (16/24bits option)
- SCAN test option (max 1G M/chain)
- ALPG test option for embedded memory
- STDF tools support
- Test program/pattern converter (J750, D10, S50, E320, SC312, V7, TRI-6020)
- User friendly Windows 7 environment
- CRAFT C/C++ programming language
- SW (Software) same as 3360 & 3360P
- D-M Probe-card compatible with 3360P DM probe-card
- C-M DUT-card compatible with 3360D/3360P C-M DUT-card (FT/CP)

3360-D Bridge Test Development to Mass-Production

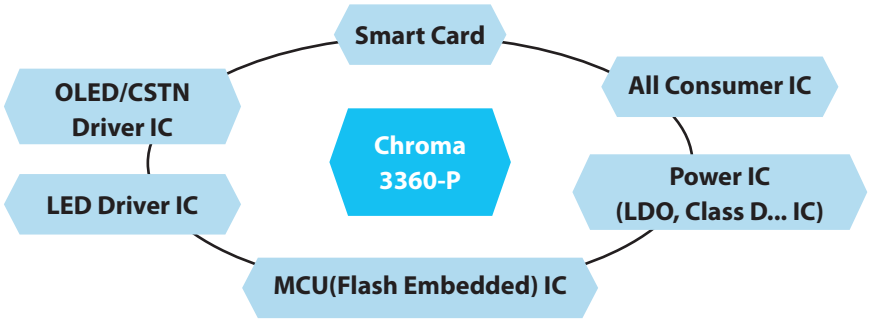


SPECIFICATIONS	
Model	**3360D (I/O)**
Test Rate	25/50MHz
Pin Channels	32/64 Pins
Pattern Memory	8M (16M Option)
Parallel Testing Capability	Max 8 DUTs
Edge Placement Accuracy	± 625ps
Resource Per Pin Architecture	Yes
DPS (±16V, ±400 mA)	8
PMU (±16V, ±100 mA)	8
PPMU (-2V ~ +7V, ±25 μA)	Per Pin
Programmable Load (Active Load)	Per Pin (± 35 mA)
Windows Environment	Windows® XP
Programming Language	C\C++
Test Option	
LCD Channel (±80V)	Max 32 LCD Output Pins
AD / DA Converter Test Option	4 AWG / DGT (16 Bits AWI board)
STPHI/GPIB	TTL (Handler) / GPIB (Prober)
SCAN Option	512M / IO board
ALPG Memory Test Option	16X, 16Y, 16D
System and Dimension	
Power consumption	Max. 1KVA (90~240 Vac - 1phase 3W)
Only Test Head	W330 x D560 x H390 mm (Max. 35 Kg)

All specifications are subject to change without notice.



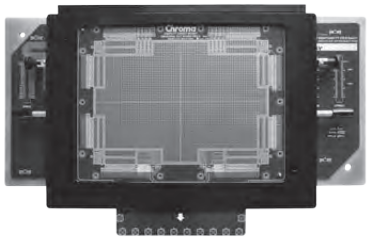
The Full Functions - Logic, LCD, LED, ADDA, Power, ALPG, SCAN, Match... etc.



KEY FEATURES

- 25/50 MHz clock rate
- 25/50 Mbps data rate
- 256 I/O channels
- 8/16 M pattern memory
- Flexible HW configuration (Interchangeable I/O, VI, ADDA, and LCD)
- Max 32 DUTs parallel testing
- Real parallel trim/Match function
- Time & Frequency Measurement Unit(TFMU)
- Test program/pattern converter (V7, TRI6020, V50, E320, SC312, D10, J750, ITS9K, TS670)
- AD/DA test option
- SCAN test option (max 512M/chain)
- ALPG test option for embedded memory
- STDF tools support
- User friendly Windows XP environment
- CRAFT C/C++ programming language

Engineering Board Available for Test Development on-the-spot & Ready for Direct-mount Solution



3360P FT Direct-mount Solution



3360P CP Direct-mount Solution



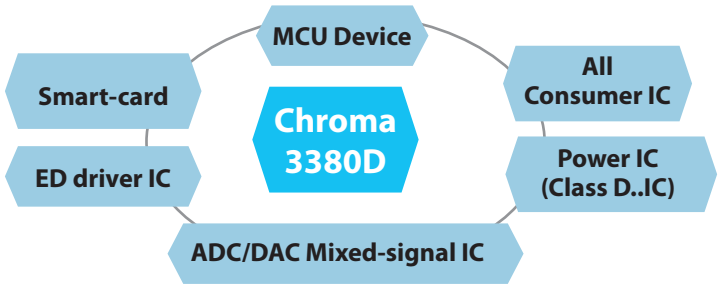
SPECIFICATIONS	
Model	**3360P (I/O)**
Test Rate	25/50MHz
Data Rate	25/50Mbps
Logic I/O Channels	Max. 256 Pins
Pattern Memory	8M (16 M option)
Parallel Testing Capability	Max. 32 DUTs
EPA	± 625ps
Resource Per Pin Architecture	Yes
DPS (± 10V, ± 2 A)	8
PMU (± 48V, ±100mA)	16
PPMU (± 0.5V ~ 6.5V, ± 35mA)	Per Pin
TFMU function (Max 400Mhz)	Per Pin
Programmable Active Load (±35mA)	Per Pin
Windows Environment	Windows XP
Programming Language	C\C++
Test Option	
Hi-V (LCD- 80V) Channel	Max. 224 LCD pins
AD / DA Converter Test Option	4 AWG / 4 DGT (16 Bits)
Mixed-Signal Test Option (PXI)	24bits / 200 MS/s(14bits)
LXUVI (DPS ± 10V, ± 500 mA)	16 CH / board
LXREF(DPS ± 48V, ± 250 mA)	16 CH / board
HVREF-48(DPS ± 48V, ± 500 mA)	8 CH / board
HV100(-6V ~+100V, ± 250 mA)	8 CH / board (with EPB option)
HVREF (DPS ± 60V, ± 1A)	8 CH / board (with EPB option)
SCAN Option	512M / board
ALPG Memory Test Option	16X, 16Y, 16D
System And Dimension	
Power Consumption	Max. 3KVA
Only Test Head	W640 x D470 x H639 mm (Max. 90 Kg)

All specifications are subject to change without notice.



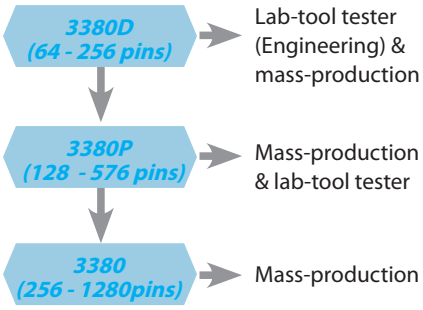
The Full Application Functions

Logic, ADDA, LCD, LED, Power, ALPG, Match, and etc.



3380D Linking for mass-production

C-M Kits : Compatible with 3360D/3360P C-M FT/CP & D-M Kits : Compatible 3360P D-M probe card





3380D Cable-Mount FT /CP solution



3380D Direct-mount CP solution

KEY FEATURES

- 100 MHz clock rate
- 50/100 MHz data rate
- 256 I/O digital I/O pins
- Up to 256 sites Parallel testing
- 32/64/128M Pattern Memory
- Various VI source
- Flexible HW-architecture (Interchangeable I/O, VI, ADDA,)
- Real parallel Trim/Match function
- Time & Frequency Measurement Unit (TFMU)
- AD/DA test (16/24bits option)
- SCAN test option (max 1G M/chain)
- ALPG test option for embedded memory
- STDF tools support
- Test program/pattern converter (J750, D10, S50, E320, SC312, V7, TRI-6020)
- User friendly Windows 7 environment
- CRAFT C/C++ programming language
- SW (Software) Same as 3360 & 3360P
- D-M Probe-card compatible with 3360P DM Probe-card
- C-M DUT-card compatible with 3360D/3360P C-M DUT-card(FT/CP)
- Direct mount fixture can be compatible with 3360P probe-Card
- Cable mount fixture can be compatible with 3360D & 3360P

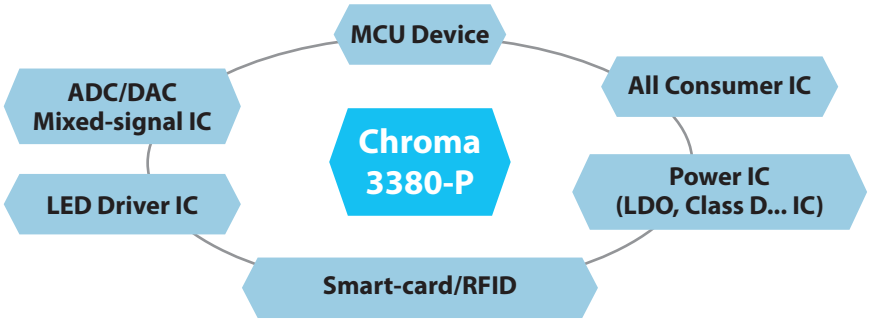
SPECIFICATIONS	
Standard Specification	**3380D**
Clock Rate	50/100 Mhz
Data Rate	50/100 Mbps
Pin Channels	256 Pins
Pattern Memory	32M(S) / 64 & 128M (option)
Parallel Testing Capability	256 DUTs
EPA	± 500ps
Resource Per Pin Architecture	Yes
VI source	8CH : MXDPS, 16CH : MLDPS-16(S) / MXUVI / MXREF, 32CH : MLDPS
PMU(± 48V, ± 100 mA)	16 Channels /board
HV-Pins driver (+5.9V to +13.5V)	4 channels /board
PPMU (-2V~+ 6V, ± 32 mA)	Per Pin (FIMV/FVMI)
Programmable Active Load (± 12 mA)	Per Pin
TFMU (Time/Freq Measure unit:Max 400Mhz)	Per Pin
Free-run Clock (Max: 200Mhz)	Per Pin
Windows Environment	Windows 7
Programming Language	C/C++
3380D Test Option Specification	
AD/DA Converter Test Option (MXAWI/MXAWI2)	4 AWG/ 4 DIG (16/24bits)
Mixed- Signal test option (PXI)	24bits, 200MS/s
MXUVI (DPS ± 12V, ± 1A, CG ± 4A)	16 Channels /board
MXDPS (DPS ± 16V, ± 2A)	8 Channels /board
MXREF (DPS ± 48V, ± 250mA, CG ± 1A)	16 Channels /board
MLDPS (DPS + 12V/± 500mA, ± 6V/± 1A , CG max ± 8 A)	32 Channels /board
SCAN Option	1G bits/ chain
ALPG Memory Test Option	16X, 16Y, 16D /board
3380D System And Dimension	
Power consumption Max	2KVA (VI Option to Max. 3KVA)
Test Head	W365 x D586 x H412 mm (Max:45Kg)
Power Box	W220 x D372 x H187 mm (Max:15Kg)

Note 1: "Cable-Mount" as standard, "Direct-Mount" as option.

All specifications are subject to change without notice.

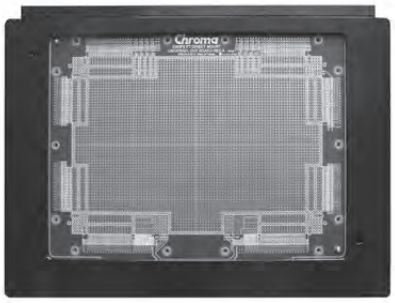


Most Flexible Configuration for Various Devices

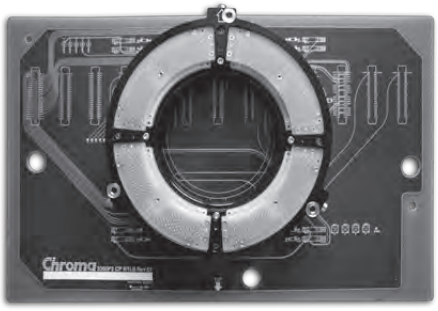


CP/FT Direct/Cable Mount Solutions

CP/FT Direct/Cable Mount Solutions available from engineering to Production;
Maintain Compatibility to 3360 & 3360P



3380-P FT Direct-mount



3380-P CP Direct-mount

KEY FEATURES

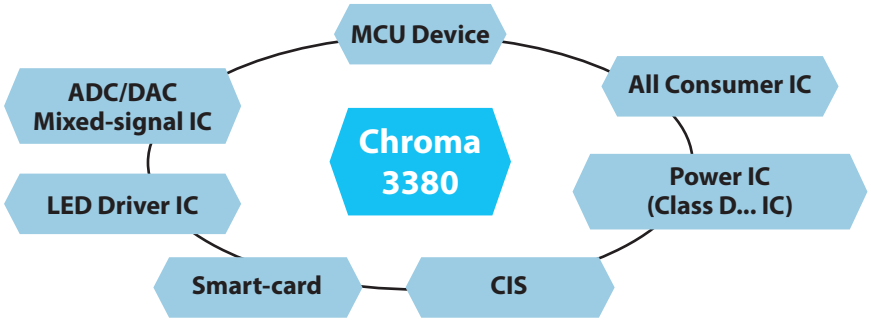
- 50/100 Mhz clock rate
- 50/100 Mbps data rate
- 512 digtial I/O pins (Max 576 digtial I/O pins)
- Up to 512 sites parallel testing
- 16/32M pattern memory
- Various VI source
- Flexible HW-architecture (Interchangeable I/O, VI, ADDA)
- Real parallel trim/Match function
- Time & Frequency Measurement Unit (TFMU)
- AD/DA test option
- SCAN test option (max 1G/chain)
- ALPG test option for embedded memory
- STDF tools support
- Test program/pattern converter (J750, D10, V50, E320, SC312, V7, TRI-6020, ITS9K)
- User friendly Windows 7 environment
- CRAFT C/C++ programming language
- Software same as 3360 & 3360-P

SPECIFICATIONS	
Model	**3380P**
Clock Rate	50 / 100Mhz
Data Rate	50 / 100Mbps
I/O Channels	512 Pins (Max:576Pins)
Pattern Memory	16M / 32M(Option) 2X: 32M / 64M(option)
Parallel Testing Capability	512 DUTs
EPA	± 500ps
Resource Per Pin Architecture	Yes
VI source	8CH: MXDPS, 16CH: MXUVI/MXREF, 32CH: MLDPS
PMU(± 48V, ± 100 mA)	16 Channels /board
HV-Pins driver (+5.9V to +13.5V)	4 channels /board
PPMU (-2V~+ 6V, ± 32 mA)	Per Pin (FIMV/FVMI)
Programmable Active Load (± 12 mA)	Per Pin
TFMU (Time/Freq Measure unit:Max 400Mhz)	Per Pin
Free-run Clock (Max: 200Mhz)	Per Pin
Windows Environment	Window 7
Programming Language	C\C++
Test Option	**Specification**
AD/DA Converter Test Option	4 AWG / 4 DIG (16 bits)
Mixed- Signal test option (PXI)	24bits, 200MS/s
MXUVI (DPS ±12V, ± 1A, CG max : ±4A)	16 Channels /board
MXDPS (DPS -8V~+16V, ±2A)	8 Channels /board
MXREF (DPS ±48V, ±250mA, CG max : ±1A)	16 Channels /board
MLDPS (DPS +12V/±500mA, ±5V/±1A, CG max : ±4/8A)	32 Channels /board
SCAN Option	1G bits/ chain
ALPG Memory Test Option	16X, 16Y, 16D /board
System And Dimension	
Power Consumption	Max : 3KVA
Only Test Head	W640xD470XH639 mm (Max:100Kg)

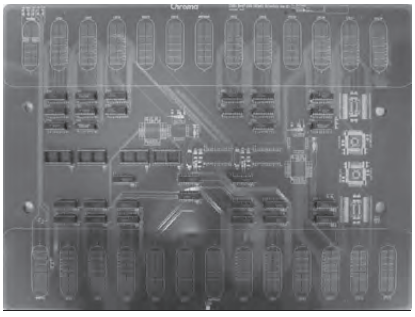
*** Note 1:** "Direct-Mount" as Standard, "Cable-Mount" as Option



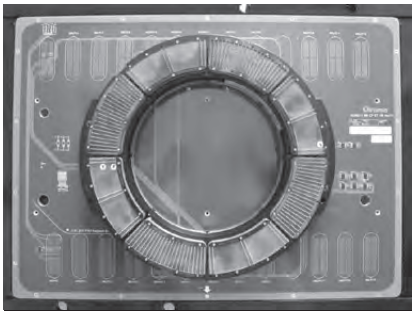
Rich Functions and Wide Coverage : Logic, MCU, ADDA (Mixed-signal); Power, LED driver, Class D; CIS, SCAN, ALPG, Match..etc



CP/FT Direct mount solutions available from engineering to production; CP maintain compatibility to J750



3380 FT Direct-mount



3380 CP Direct-mount (compatibility with J750)

KEY FEATURES

- 50/100 MHz clock rate
- 50/100 Mbps data rate
- 1024 I/O pins (Max :1280 I/O pins)
- Up to 1024 sites Parallel testing
- 32/64 M pattern memory
- Various VI source
- Flexible HW-architecture (Interchangeable I/O, VI, ADDA,)
- Real parallel trim/match function
- Time & frequency measurement unit (TFMU)
- High-speed time measurement unit (HSTMU)
- AD/DA test option
- SCAN test option (max 1G M/chain)
- ALPG test option for embedded memory
- STDF tools support
- Test program/pattern converter (J750, D10, V50, E320, SC312, V7, TRI-6020, ITS9K)
- User friendly windows 7 environment
- CRAFT C/C++ programming language
- SW (Software) same as 3380P & 3360P

SPECIFICATIONS	
Model	**3380**
Clock Rate	50 / 100Mhz
Data Rate	50 / 100Mbps
I/O Channels	1024 Pins (Max:1280 Pins)
Pattern Memory	16M / 32M (Option)2X: 32M / 64M (option)
Parallel Testing Capability	1024 DUTs
EPA	± 500ps
Resource Per Pin Architecture	Yes
VI source	8CH : MXDPS, 16CH : MXUVI/MXREF, 32CH : MLDPS
PMU (± 48V, ± 100 mA)	32 Channels
HV-Pins driver (+5.9V to +13.5V)	4 channels /board
PPMU (-2V~+ 6V, ± 32 mA)	Per Pin (FIMV/FVMI)
Programmable Active Load (± 12 mA)	Per Pin
TFMU (Time/Freq Measure unit:Max 400Mhz)	Per Pin
Free-run Clock (Max: 200Mhz)	Per Pin
Windows Environment	Window 7
Programming Language	C\C++
3380 Test Option	**Specification**
AD/DA Converter Test Option	4 AWG / 4 DIG (16 bits)
Mixed- Signal test option (PXI)	24bits, 200MS/s
MXUVI (DPS ±12V, ± 1A, CG max : ±4A)	16 Channels /board
MXDPS (DPS -8V~+16V, ±2A)	8 Channels /board
MXREF (DPS ±48V, ±250mA, CG max : ±1A)	16 Channels /board
MLDPS (DPS +12V/±500mA, ±5V/±1A, CG max : ±4/8A)	32 Channels /board
SCAN Option	1G bits/ chain
ALPG Memory Test Option	16X, 16Y, 16D /board
System And Dimension	
Power Consumption	Max : 8KVA
Test Head	W714 x D717 x H458 mm (Max : 165Kg)
Main Frame	W766 x D700 x H1562 mm (Max : 160Kg)

*** Note *1:** "Direct-Mount" as Standard

All specifications are subject to change without notice.

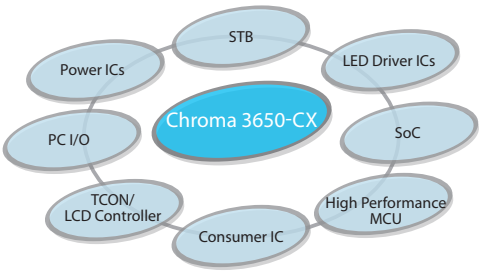


KEY FEATURES

- 50 / 100MHz; 200Mhz (MUX) Clock Rate
- 50 / 100Mbps; 200 Mbps (MUX) Data Rate
- Up to 256 digital I/O pins
- 16/32 (option) MW vector memory
- 16/32 (option) MW pattern instruction memory
- Per-pin timing/PPMU/frequency measurement
- Up to 4-32 16-bit ADDA channels option
- SW configurable scan chains in 1024M depth or up to 32 scan chains/board
- ALPG option for memory test
- Up to 16 high-voltage pins
- 16 high-performance DPS channels
- Overall timing accuracy < ±550ps
- 8 ~ 32-CH / board for VI45 analog option
- 2 ~ 8-CH / board for PVI100 analog option
- Microsoft Windows® XP OS
- C++ and GUI programming interface
- CRISP, full suite of intuitive software tools
- Air-cooled, All-in-one design and space-saving footprint
- Cable mount / Direct mount

APPLICATIONS

- MCU/MCU + Embedded Memory
- NAND Flash Controller
- PC I/O
- Switch ICs
- Smart Power Management Devices
- Mixed Signal, Digital and Analog ICs
- ADC/DAC/CODEC ICs
- Consumer ICs
- Engineering, Wafer Sort and Final Test
- Power ICs
- LED Driver ICs



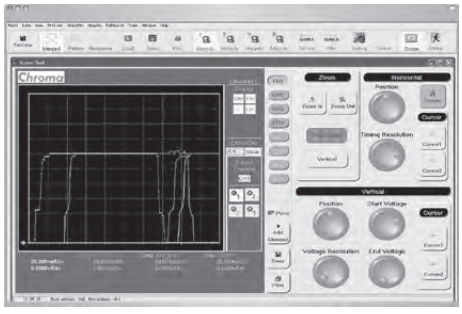
Chroma 3650-CX brings you the low cost and high performance test solution

3650-CX adopts the all-in-one design to provide a compact size ATE with very low cost, high accuracy and high throughput for customers to save the cost and raise the profit. With the versatile test capabilities and powerful software tools, 3650-CX is designed for MCU, NAND flash controllers, the peripheral devices of PC, switch devices, LED driver ICs, power ICs and consumer SoC devices.

CRISP, the powerful system software for 3650-CX

The 3650-CX features powerful suite of software tools using Chroma Integrated Software Platform, CRISP. It not only provides the rapid test developing functions, CRISP also covers all needs for test debugging, production and data analysis. Base on the Microsoft Windows XP® operation system and C++ programming language, CRISP provides powerful, easy-to-use, intuitive and fast-runtime GUI tools for users. The CRISP includes test plan debugger, pattern editor, waveform tool, scope tool, pin margin, Shmoo, wafer map, histogram, STDF tool, datalog and etc.





All-in-one design and compact size to save the floor space

With the air-cooled and zero footprint tester-in-a-test-head design, 3650-CX delivers high throughput in a highly integrated package for minimum floor space. With an optional manipulator, 3650-CX can be used in both package and wafer sort test.

Peripheral

The 3650-CX provides multiple drivers for communications with handler and prober by GPIB and TTL interface. The supported handlers or probers include SEIKO-EPSON, SHIBASOKU, MULTITEST, ASECO, DAYMARC, TEL, TSK and OPUS II, and so forth.

All specifications are subject to change without notice.

• Continued on next page ➟

SPECIFICATIONS	
Model 3650-CX	
Clock Rate	50 / 100Mhz; 200Mhz (MUX mode)
Data Rate	50 / 100Mbps; 200Mbps (MUX mode)
Pattern Memory Size	16 / 32M (Option)
Overall Timing Accuracy	±550ps (Window), ±450ps (Edge)
Software /Programming Language / OS	CRISP/ C++ / Windows XP
Pin Electronics Board	LPC
IO Channels	64-pin / Board X 4 Boards / System
Vector Depth	16 / 32M per pin
Drive VIL / VIH	-2 ~ +6V / -1.9 ~ +7V
Maximum Driver Current	50mA (static) / 100mA (dynamic)
Comparator VOL / VOH	-2 ~ +7V
Compare Modes	Edge, Window
EPA (Drive / IO / Compare)	±300ps / ±300ps / ±300ps
Dynamic Load Current	±35mA
Timing Sets	32 sets per pin
Timing Edges	6 (2 Drive, 2 Drive & IO, 2 Compare)
Rate / Edge Resolution	125 / 62.5ps
Waveform Sets	32 sets per pin
Waveform Format	4096 Timing-Waveform Combination Changes on-the-fly
Utility Pin Relay Control	64 (8 / Board), 128 bit relay board option available
PPMU/Frequency Measurement Unit (OSC)	per pin
DUT Power Supply	DPS
Channels	16-CH / Board X 1 Boards / System
Voltage Range	±8V, ±16V
Maximum Output Current	0.8A / 1-CH
Current Gang Channels	8
Precision Measurement Unit	PMU
Channels	2-CH / Board X 4 Boards / System
Voltage Range	±2.5V, ±8V, ±16V
Current Range	±800nA ~ ±250mA
Options	
ADDA/HD-ADDA	
Channels	1 ADDA CH / LPC or 32 CH HD-ADDA / board
AWG / Digitizer	per channel
Resolution / Max. Conversion Rate	ADDA: 16-bit / 500KHz ; HD-ADDA: 16 Bit 500KHz
Voltage Range	±2.5V / ±4.5V / ±9V
Algorithm Pattern Generator (ALPG)	X = 16, Y = 16 / D = 16
Scan	1 / 2 / 4 / 8 / 16 / 32 scan chains, Max 1024M depth
VI45	
Channels	8 ~ 32-CH / Board
Voltage / Current Range	±45V / ±100mA
Current Ganged Channels	4 buses for 8 channels, x2 – x8, 800mA max
TMU	per channel
PVI100	
Channels	2 ~ 8-CH / Board
Voltage / Current Range	±100V / ±2A , ±50V / ±4A
Current Ganged Channels	x2 – x8, 32A max
TMU	per channel
System and Dimension	
Power Consumption	3.5KW Max
Cooling System	Forced Air Cooling
Frame Size	L 643 x W369 x H 760 mm
Weight	130Kg

All specifications are subject to change without notice.



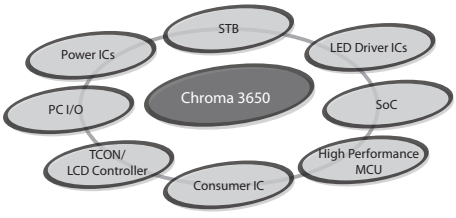
50/100 MHz

KEY FEATURES

- 50 / 100MHz; 200Mhz (MUX) Clock Rate
- 50 / 100Mbps; 200Mbps (MUX) Data Rate
- Up to 512 digital I/O pins
- 16/32 (option) MW vector memory
- 16/32 (option) MW pattern instruction memory
- Per-pin timing/PPMU/frequency measurement
- Up to 8-32 16-bit ADDA channels option
- SW configurable scan chains in 1024M depth or up to 32 scan chains/board
- ALPG option for memory test
- Up to 32 high-voltage pins
- 32 high-performance DPS channels
- Overall timing accuracy < ±550ps
- 8 ~ 32-CH / board for VI45 analog option
- 2 ~ 8-CH / board for PVI100 analog option
- MRX option for 3rd party PXI instruments
- Microsoft Windows® XP OS
- C++ and GUI programming interface
- CRISP, full suite of intuitive software tools
- Test program and pattern converters for other platforms
- Accept DIB and probe card of other testers directly
- Support STDF data output
- Air-cooled, small footprint tester-in-a-test-head design

Chroma 3650 brings you the most cost-effective SoC tester

Chroma 3650 is an SoC tester with high throughput and high parallel test capabilities to provide the most cost-effective solution for fabless, IDM and testing houses. With the full functions of test, high accuracy, powerful software tools and excellent reliability, 3650 has the versatile test capabilities for high-performance microcontroller, analog IC, consumer SoC devices, and wafer sort applications.



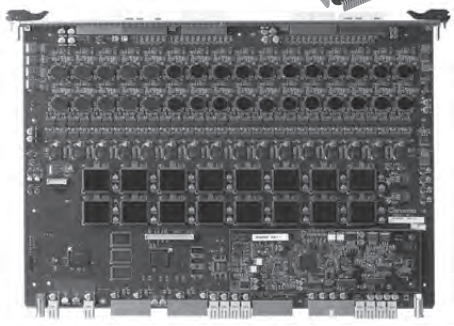
High performance in a low-cost production system

The 3650 achieves lower test cost not only by reducing the cost of tester system but also by testing more devices faster and the high parallel test capability. With the Chroma PINF IC and the sophisticated calibration system, 3650 has the excellent overall timing accuracy within ±550ps. The pattern generator of 3650 has up to 32M pattern instruction memory. By having the same depth as the vector memory, Chroma 3650 allows to add pattern instruction for each vector. Moreover, the powerful sequential pattern generator provides the variety of pattern commands to meet the demands of complex test vectors. The true test-per-pin architecture and the flexible site mapping with no slot boundaries are designed for multi-site test with high throughput. Up to 512 digital pins, 32 device power supplies, per-pin PMU and the analog test capability, 3650 delivers a combination of high test performance and throughput with cost-effective test solution.

High parallel test capability

The powerful, versatile parallel pin electronics resources of 3650 can simultaneously perform identical parametric tests on multiple pins. The 3650 integrates 64 digital pins onto one single LPC board. In each LPC board, it contains 16 high performance Chroma PINF ICs which supports 4 4 channels timing generator. The integration of local controller circuitry manages resources setup and result readout, and therefore cuts the overhead time of the system controller. With the any-pin-to-any-site mapping design,3650 provides up to 32 sites high throughput parallel testing capabilities to enlarge the mass production performance with more flexible and easy layout.





64 channel Digital Pin Card

Flexibility

The semiconductor industry is a fast moving one, and capital equipment
must be built to outlive several device generations and applications. With varieties of available options, such as AD/DA converter test, ALPG for memory test, high voltage PE, multiple scan chain test, VI45 & PVI100 analog options, Chroma 3650 makes sure that it will serve you for years to come.

Moreover, Chroma 3650 platform architecture allows development of focused instruments by third-party suppliers that can be easily added for specific applications. It can stretch the boundaries of test by covering a broader range of devices than ever before possible in a low-cost production test system.



CP Docking Solution for other Tester Platform

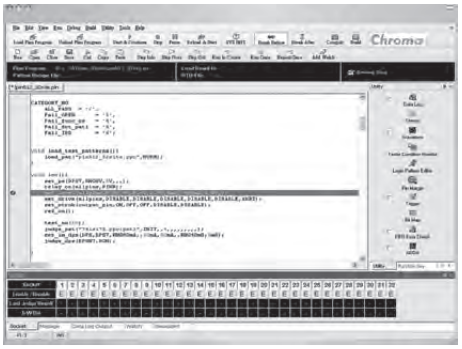
Powerful suite of software tools – CRISP

The 3650 features the powerful suite of software tools using Chroma Integrated Software Platform, CRISP. Not only provides the rapid test development function, CRISP covers all needs for test debugging, production and data analysis. The CRISP integrates the software functions of test development, test execution control, data analysis and tester management together. Based on the Microsoft Windows XP® operation system and C++ programming language, CRISP provides the powerful, easy-to-use, intuitive, and fast-runtime GUI tools for users. In the Project IDE tool, test developer can easily shift between standard template, user-defined template and C++ code-based editor to create their test program quickly and automatically scale to multi-site for parallel test. Besides, CRISP also provides the test program and test pattern converters to facilitate the test conversion from other tester platforms to 3650.

For the test program execution controller, user can select the System Control tool or Plan Debugger tool for normal mode or debugging mode. In the Plan Debugger tool, user can control the execution of test program by setting break point, step, step-into, step-over, resume execution, variable-watch and variable-modify, etc. For the test debugging and data analyzing purposes, 3650 provides abundant software utility tools. Datalog, Waveform and Scope tools are designed to support the measured data and digital waveform display. To find the parametric margin, SHMOO and Pin Margin tools can easily accomplish debug



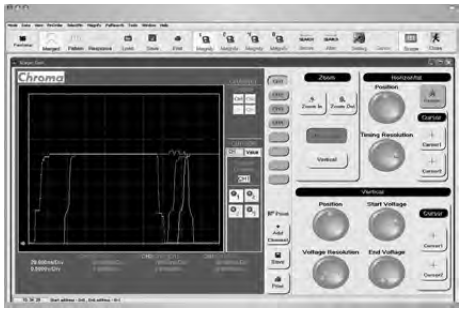
System Control



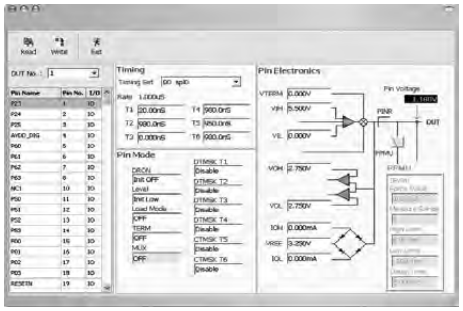
Test Program Debugger

• Continued on next page ➟

All specifications are subject to change without notice.



Scope Tool



Channel Debugger

by auto-mode or manual-mode execution. Besides, the Wafer Map, Summary, Histogram and STDF tools are very helpful and powerful for collecting the test results and analyzing the parametric characterization. As for the Test Condition Monitor and Pattern Editor tools, they provide the superior functions for run-time debugging to change the test conditions or pattern data without breaking the test or modifying the source files. Besides, CRISP also prepares the ADDA tool and Bit Map tool for the analog and ALPG option. Using the ADDA tool, user can not only see the AD/DA test result by graphic tool, user can also create the ADC pattern easily.The full suite of powerful GUI tools will definitely meet the various purposes for test debugging and test report.

The OCI tool is the solution of CRISP for mass production.Easy-and-correct operation is the most important request for production run. Programmer can customize the setup of OCI tool by the Production Setup tool to meet the production environment requirement in advance. Then, what an operator has to do is just to select the planned process to start the mass production.

Peripheral

The 3650 provides multiple drivers for communications with handler and prober by GPIB and TTL interface. The supported handlers or probers include SEIKO-EPSON, SHIBASOKU, MULTITEST, ASECO, DAYMARC, TEL, TSK and OPUS II, and so forth. In addition to provide the convenient converter tools for test platform migration, 3650 provides the adaptor board solution for existed tester platform to save the cost of users. Through theadaptor board solution, Chroma 3650 can accept the DIB and probe card of other testers directly to save the cost for making the new load boards and probe cards.

Small footprint

With the air-cooled and small footprint tester-in-a-test-head design, 3650 delivers high throughput in a highly integrated package for minimum floor space. A mainframe cabinet contains the power distribution units and the space for third-party instruments. With an optional manipulator, 3650 can be used in both package and wafer test.

Application support

Chroma offers the application support solutions to its new and established customers to accurately meet user needs. On request Chroma can provide customized support designed around your specific needs. Whether you need ramp up production, want to capitalize on emerging market opportunities, enhance productivity, lower testing costs with innovative strategies, Chroma worldwide customer support staff is committed to generate timely and efficient solution for you.

SPECIFICATIONS	
Model	**3650**
Clock Rate	50 / 100Mhz; 200Mhz (MUX mode)
Data Rate	50 / 100Mbps; 200Mbps (MUX mode)
Pattern Memory Size	16 / 32M (Option)
Overall Timing Accuracy	±550ps (Window), ±450ps (Edge)
Software /Programming Language / OS	CRISP/ C++ / Windows XP
Pin Electronics Board	LPC
IO Channels	64-pin / Board X 8 Boards / System
Vector Depth	16 / 32M per pin
Drive VIL / VIH	-2 ~ +6V / -1.9 ~ +7V
Maximum Driver Current	50mA (static) / 100mA (dynamic)
Comparator VOL / VOH	-2 ~ +7V
Compare Modes	Edge, Window
EPA (Drive / IO / Compare)	±300ps / ±300ps / ±300ps
Dynamic Load Current	±35mA
Timing Sets	32 sets per pin
Timing Edges	6 (2 Drive, 2 Drive & IO, 2 Compare)
Rate / Edge Resolution	125 / 62.5ps
Waveform Sets	32 sets per pin
Waveform Format	4096 Timing-Waveform Combination Changes on-the-fly
Utility Pin Relay Control	64 (8 / Board), 128 bit relay board option available
PPMU/Frequency Measurement Unit (OSC)	per pin
DUT Power Supply	DPS
Channels	16-CH / Board X 2 Boards / System
Voltage Range	±8V, ±16V
Maximum Output Current	0.8A / 1-CH
Current Gang Channels	8
Precision Measurement Unit	PMU
Channels	2-CH / Board X 8 Boards / System
Voltage Range	±2.5V, ±8V, ±16V
Current Range	±800nA ~ ±250mA
Options	
ADDA	
Channels	1 ADDA CH / LPC or 32 CH HD-ADDA / board
AWG / Digitizer	per channel
Resolution / Max. Conversion Rate	ADDA: 16-bit / 500KHz ; HD-ADDA: 16 Bit 500KHz
Voltage Range	±2.5V / ±4.5V / ±9V
Algorithm Pattern Generator (ALPG)	X = 16, Y = 16 / D = 16
Scan	1 / 2 / 4 / 8 / 16 / 32 scan chains / LPC maximum 1024 / 2048M scan depth
VI45	
Channels	8 ~ 32-CH / Board
Voltage / Current Range	±45V / ±100mA
Current Ganged Channels	4 buses for 8 channels, x2 – x8, 800mA max
TMU	per channel
PVI100	
Channels	2 ~ 8-CH / Board
Voltage / Current Range	±100V / ±2A , ±50V / ±4A
Current Ganged Channels	x2 – x8, 32A max
TMU	per channel
MRX	Mixed Resource BoX
No of slots	10 slots per chassis (max 2 chassis)
Instruments	PXI-based instruments
System and Dimension	
Power Consumption	5.5KW / forced air cooling
Test Head Dimension (L X W X H)	800 X 744 X 612 mm
Mainframe Dimension (L X W X H)	850 X 850 X 1680 mm

All specifications are subject to change without notice.



KEY FEATURES

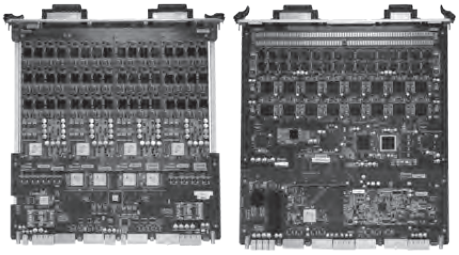
- 10 interchangeable slots for digital, analog and mixed-signal applications
- 50/100 MHz clock rate, 100/200 Mbps data rate
- Up to 512 sites parallel test
- Up to 1024 digital I/O pins
- 32/64 MW vector memory
- Up to 32 CH PMU for high precision measurement
- Per-pin timing/ PPMU/ frequency measurement
- Scan features to 4G depth / 32 scan chains
- ALPG option for memory test
- Switching timing accuracy ±300ps
- Up to 64 CH high-voltage pins
- 96 CH high density DPS
- 32 CH HDADDA mixed-signal option
- 8~32 CH VI45 analog option
- 2~8 CH PVI100 analog option
- MRX option for 3rd party PXI/PXIe applications
- Microsoft Windows® 7 OS
- C++ and GUI programming interface
- CRISP, full suite of intuitive software tools
- Test program and pattern converters for other platforms
- Accept DIB and probe card of other testers directly
- Support STDF data output
- Air-cooled, small footprint tester-in-a-test-head design

High parallel test capability

The powerful, versatile parallel pin electronics resources of 3650-EX can simultaneously perform identical parametric tests on multiple pins. 3650-EX integrates 128 digital pins into one slot. In each LPC board, it contains high performance Chroma PINF ICs which supports timing generation. The integration of local controller circuitry manages resources setup and result readout, and therefore cuts the overhead time of the system controller. With the any-pin-to-any-site mapping design, 3650-EX provides up to 512 sites high throughput parallel testing capabilities to enlarge the mass production performance with more flexible and easy layout.

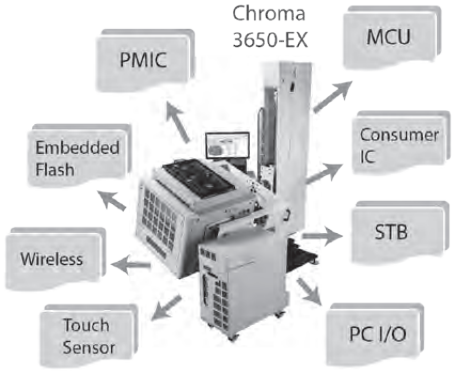
Flexibility

Semiconductor manufacturing is a fast moving industry; more and more devices are highly integrated with various functions. Capital equipment must be built to outlive several device generations and applications. With varieties of available options, such as AD/DA converter test, ALPG for memory test, high voltage PE, multiple scan chain test, VI45 & PVI100 analog test options and HDADDA mixed-signal test options, Chroma 3650-EX can provide a wide coverage for customer to test different kind of devices with flexible configurations. Moreover, Chroma 3650-EX platform architecture allows development of focused instruments by third-party suppliers that can be easily added for specific applications. It can stretch the boundaries of test by covering a broader range of devices than ever before possible in a low-cost production test system.



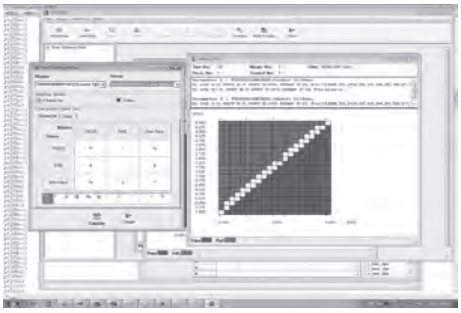
128-Channel Logic Pin Card

48-Channel High Density Device Power Supply

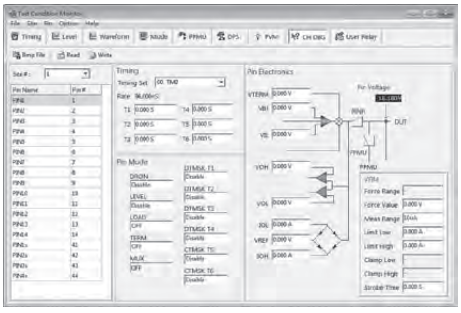


Powerful suite of software tools – CRISP

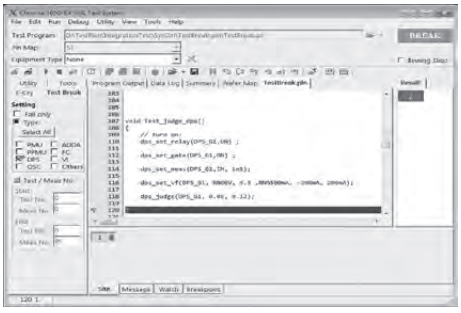
3650-EX features the powerful suite of software tools using Chroma Integrated Software Platform(CRISP). Not only provides the rapid test development function, CRISP covers various tools for test debugging, production and data analysis. CRISP integrates software functions of test program development, test execution control, data analysis and tester management together. Based on the Microsoft Windows 7® operation system and C++ programming language, CRISP provides the powerful, easy-to-use, intuitive, and fast-runtime GUI tools for users. In the Project IDE tool, test developer can easily shift between standard template, user-defined template and C++ code-based editor to create their test program quickly and automatically scale to multi-site for parallel test. Besides, CRISP also provides the test program and test pattern converters to facilitate the test conversion from other tester platforms to 3650-EX.



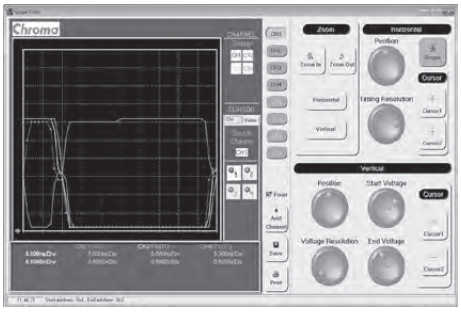
Shmoo tool



TCM tool



System Control



Scope Tool

All specifications are subject to change without notice.

Chroma 3650-EX brings you the most cost-effective SoC tester

Chroma 3650-EX is specifically designed for high-throughput and high parallel test capabilities to provide the most cost-effective solution for fabless, IDM and testing houses. With the full functions of test capability, high accuracy, powerful software tools and excellent reliability, 3650-EX is ideal for testing consumer devices, high-performance microcontrollers, analog devices and SoC devices.

From design to production

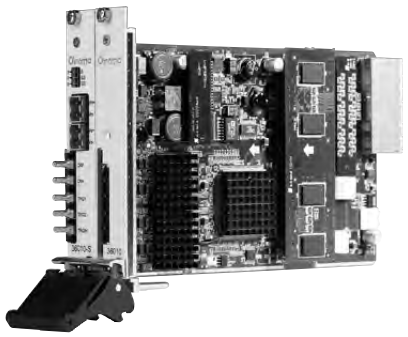
Chroma 3650-EX build-in MRX solution can support PXI instrumentation which can provide users wider coverage to different kind of applications. For those users use PXI instrumentation for their design validation and verification, they can move PXI instrumentation directly to 3650-EX for production. There will be less uncorrelated issues happened on design stage and production by using the same PXI instrumentation. Chroma 3650-EX had successfully integrated several PXI solutions like Audio, Video and RF applications not only on hardware integration, also for build-in libraries and tools in software to help users control PXI instrumentation more easily and enable accelerated test program development, reducing product time to market.

SPECIFICATIONS	
Model	**3650-EX**
Digital IO Channels	1024 Channels
Test Speed	50/100MHz (2/4 Edges), 200MHz (Mux)
Multi-site Test Capability	Maximum 512 sites
Software / Programming language/ Operating System	CRISP / C++ / WINDOWS 7
Logic Pin Card	**HDLPC**
IO Channels	64 / 128 CH per board
Pattern Memory	32 / 64M vector Depth
Drive VIL / VIH	-1.5 ~ +6.4V/-1.4 ~ +6.5V
Maximum Drive Current	50mA (static) / 100mA (dynamic)
Comparator VOL / VOH	-1.5 ~ +6.5V
Comparator Modes	Edge, Window
EPA (Drive / IO / Compare)	±300ps / ±300ps / ±300ps
Dynamic Load Current	±25mA
High Voltage Driver	4 channels per 64 IO / 0V ~ 15V, maximum 64 CH per system
Timing Edges	6 (2 Drive, 2 Drive & IO, 2 Compare)
Rate / Edge resolution	125ps / 62.5ps
Utility Pin Control	8 utility bits per 64 IO, maximum 128 bits per system
SCAN	1 / 2 / 4 / 8 / 16 / 32 scan chains, maximum 4G depth
Algorithm Pattern Generator (ALPG)	X = 16, Y = 16 / D = 16
Precision Measurement Unit	**PMU**
Number of channels	2 CH per 64 IO / maximum 32 CH per system
Voltage Range	±2.5V, ±8V, ±16V
Current Range	±800nA ~ ±250mA
Device Power Supply	**HDDPS**
Number of channels	48 CH per board / maximum 96 CH per system
Voltage Range	±6V, ±12V
Maximum Output Current	1A / 6V, 500mA / 12V
Current Gang Channels	x2 ~ x6, Maximum 6A
Mixed-signal options	**HDADDA**
Number of channels	32 CH per board / maximum 64 CH per system
Sampling Rate	500 KHz
Resolution	16 Bit
Voltage Range	±2.5V / ±4.5V / ±9V
Analog Options	**VI45**
Number of channels	8~32 CH per board
Voltage / Current Range	±45V / ±100mA
Current Ganged Channels	x2 ~ x8, 800mA maximum
AWG / DVM / TMU	1~4 CH AWG / 1~4 CH DVM / 8~32 CH TMU
Analog Options	**PVI100**
Number of channels	2~8 CH per board
Voltage / Current Range	±100V / ±2A , ±50V / ±4A
Current Ganged Channels	x2 ~ x8, 32A maximum
AWG / DIG / DVM / TMU	2~8 CH AWG / 2~8 CH DIG / 2~8 CH DVM / 2~8 CH TMU
Mixed-signal and RF Box	**MRX**
Number of slots	18 PXI / PXIe compatible slots
System and Dimension	
Power consumption / Cooling	Maximum 10.8KW / Forced air cooling
Test Head Dimension (L x W x H)	800 x 744 x 806 mm
Mainframe 2 Dimension (L x W x H)	680 x 352 x 730 mm

All specifications are subject to change without notice.

Programmable Pin Electronics Module

Model 36010



The 36010 is a 100MHz programmable pin electronic module designed for characterizing, validating and testing digital and mixed signal IC or electronics. Each module consists of a Sequence Pattern Generator and Logic Pin Electronics Card containing 8 channels. The 36010 module is expandable to provide up to 64 channels hardware resource for various purposes. Besides, based on the per-pin architecture, each channel is equipped with 32M vector memory, 32 sets of clocks, 32 sets of waveforms and one PMU channel. It provides fast and accurate testing, with same performance and features as other stand ATE equipment.

KEY FEATURES

- Standard PXI/PXIe-Hybrid compatible Bus type
- 100MHz maximum data rate
- 8 channels with per-pin, per-cycle bidirectional control
- Scalable architecture to provide up to 64-pin
- 32M sequence command memory
- More than 17 pattern sequence commands
- Per-pin architecture
- 32M vector memory per pin
- 32 sets of clock and waveform per pin
- Waveforms changes on-the-fly
- Programmable tri-level driver in 610uV resolution
- One high voltage driver per board
- Per-channel PMU
- Per-channel timing measurement unit
- Support scan pattern function
- Windows 2000/XP operating system
- Support LabView and LabWindows
- Proprietary software tools option

APPLICATIONS

- Logic and mixed signal validation and test
- Digital pattern generator and vector capture
- Consumer IC and electronics test
- Logic test subsystem for DC and RF ATE

Sequence Pattern Generator

The Sequence Pattern Generator of the 36010 module provides more than 17 sequence commands including "jump", "match", "loop", "repeat" and etc. to control the flow of pattern execution. It equips with 32M sequence command memory, which allows each vector to has its own sequence command to control the flow of pattern execution flexibly. Besides, each Sequence Pattern Generator can support up to 8 Logic Pin Electronics Cards, which means it can support up to 64 I/O channels and performs testing on 8 DUT simultaneously.

Logic Pin Electronics Card

In each Logic Pin Electronics Card, it adopts Chroma® PINF ICs on it to achieve high timing accuracy and flexible waveform output functions. The per-pin timing generator provides 32 sets of clock containing 6 programmable edges. As for the per-pin waveform generator, it provides each digital I/O channel 32 sets of programmable waveform with the change-one-the-fly feature. In the analog function, the Logic Pin Electronics card has the tri-level driver and comparator with 610uV programmable resolution. It also equips with active load, per-pin PMU and high voltage driver functions. Moreover, the 36010 supports scan pattern function for scan test.

Proprietary Software, CRISP

In addition to support the LabView and LabWindows environments, Chroma® also provides the proprietary software option, CRISP. To cover the various requirements for the IC debugging, CRISP contains lots of software modules. Running on the Microsoft Windows XP® operation system and using C++ as the test program language, CRISP provides users the flexible, easy-to-use and fast-runtime GUI software to meet the various demands. The project IDE tool makes it easy to create the test program quickly. In the test program debugging stage, CRISP provides the suite of debugging software tools for user, which includes Plan Debugger, Datalog, Waveform, Scope, SHMOO, Pin Margin, Wafer Map, Summary, Histogram, STDF, Test Condition Monitor, Pattern Editor, and so on.

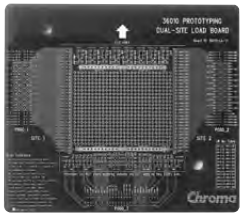
ORDERING INFORMATION

36010 : Programmable Pin Electronics Card
A360100 : Sequence Pattern Generator
A360101 : Load Board Test Fixture
A360102 : 250W/48V DC Power Supply
Universal Load Board
CRISP System Software

SPECIFICATIONS

Model	36010
Test Rate	50/100MHz
Channels Per Board	8 (Scalable to 64 channels)
Vector Depth	32M
Sequence Control Memory	32M
Number of Sequence Control Command	17
Parallel test capability	8
Timing Generator Per Pin	
No. of Edges	6 edges / pin (2 Driver, 2 Driver & I/O, 2 Strobe)
No. of Timing Sets	32 sets / pin
Rate / Edge Setting Resolution	125ps / 62.5ps
Rate Setting Range	20nS → 1mS
Waveform Generator Per Pin	
No. of Waveform Sets	32 sets / pin
Driver	
VIL/VIH Range	-1.5V~+5.9V / -1.4V~+6V
VIL/VIH Accuracy	±5mV@VIH ≧ VIL+200mV
Output Current (Static/Dynamic)	±50mV/±100mA
Output Impedance	50±5Ω
Comparator	
VOL/VOH Range	-1.5V ~ +6V
VOL/VOH Accuracy	±15mV

Programmable Load	
IOL/IOH Range	±12mA
IOL/IOH Accuracy	±25uA
VREF Setting Range	-1.5V ~ +6V
VREF Accuracy	±50mV
High Voltage Driver	
HV Channel	1 HV channels / board
VIL/VIH Range	0V ~ +13.5V
VIL/VIH Accuracy	±20mV
VIL/VIH Output Current	±60mA
Scan Chain	
Chain number / LPC	1/2/4
Size per chain	256M/128M/64M
PPMU	
Channel Number	1 channel / 1 pin
Voltage Force Range	-1.5V ~ +6V
Current Measured Range	32mA/2mA/200μA/20μA/2μA
Current Forced Range	32mA/2mA/200μA/20μA/2μA
Voltage Measured Range	-1.5V ~ +6V
Power and Dimensions	
Power Consumption	25W per Slot
Size	PXI 3U Standard Board (Extendable)
Cooling System	Standard PXI Chassis Fan (Forced Air Cooling)



Universal Load Board



Load Board Test Fixture

All specifications are subject to change without notice.



KEY FEATURES

- 4 channels in a PXI/PXIe-Hybrid compatible Bus type
- +5V/-2V and +10V/-2V force ranges
- 16-bit voltage force resolution
- 18-bit current measurement resolution
- 6 selectable ranges from 5uA to 250mA for current measurement
- Programmable current clamp function
- Ganged function available for larger current
- Board-to-board isolation
- Windows 2000/XP operating system
- Support LabView and LabWindows
- Proprietary software tools for data analysis

APPLICATIONS

- Logic and mixed signal validation and test
- Consumer IC and electronics test
- DUT Power Supply

The 36020 is a four-quadrant programmable DUT power supply in a single-slot 3U PXI module. Each 36020 features 4 channels with the ability to source voltage and measure current. There are two selectable voltage ranges, +5V/-2V and +10V/-2V, with 16-bit resolution for programming the voltage output. In order to provide better accuracy, 36020 provides six selectable current ranges including ±5μA, ±25μA, ±250μA, ±2.5mA, ±25mA and ±250mA with 18-bit resolution for the current measurement functionality. Moreover, the board-to-board isolation design makes it possible to source the larger voltage than 10V by the series connection with multiple 36020 modules. The versatile supply rails and high accuracy make 36020 an excellent general-purpose, four-quadrant power supply for design validation and manufacturing test application. Especially, the extraordinary accuracy in the small current measurement makes the 36020 very suitable for semiconductor IC test.

Power Supply with Precision Source and Measurement Capability

The 36020 uses a combination of switching and linear regulation to provide the excellent voltage source and accuracy. It has the ability to source voltage from each of its four outputs. It can be programmed in 113μV steps on the +5V/-2V range and 189μV steps on the +10V/-2V channels. As a current measure unit, it can measure in minimum 47.6pA resolution on each channel in the ±5μA current range. You can use this impressive level of current resolution in many power supply applications.

Proprietary Software, CRISP

In addition to support the LabView and LabWindows environment, Chroma® provides the front panel tool of the 36020 for users to quickly troubleshoot or debug. Users can monitor or refer the setting of the 36020 through this front panel tool. Besides, Chroma® also provides the proprietary software option, CRISP, for the 36020 to meet the demands of users for various purposes. Based on Microsoft Windows XP® operation system and C++ programming language, CRISP provides the powerful, easy-to-use, intuitive, and fast-runtime GUI tools for users. For the test debugging and data analyzing purposes, CRISP provides users the abundant software modules for the 36020, including Datalog, SHMOO, Summary, Histogram, STDF and Test Condition Monitor.

ORDERING INFORMATION

36020 : Four-quadrant DUT Power Supply
CRISP System Software



SPECIFICATIONS		
Model		**36020**
Input		**PXI Internal Power**
Channel Number		4
Voltage Source		
Range		VR1: +10v/-2v VR2: +5v/-2v
Resolution		16bits
Accuracy		± 0.1%+4.64mV
Noise		3mVrms
Current Measurement		
Range		±5μA, ±25μA, ±250μA, ±2.5mA, ±25mA, ±250mA
Resolution		18bits
Accuracy	250mA	± 0.2%+200μA
	25mA	± 0.15%+20μA
	2.5mA	± 0.15%+2μA
	250μA	± 0.15%+200nA+1nA/V
	25μA	± 0.15%+150nA+1nA/V
	5μA range	± 0.15%+50nA+1nA/V
Slew Rate		5v/25μs
Load Regulation		2mV
Load Transient		
Time Response		100μs
Voltage Response		50mv
Overshoot/Undershoot		<3%
Clamp Flag Response		100μs
Clamp Resolution		10bits
Protection Function / Alarm Flag		Short current limit Clamp alarm flag
Max Stable Load Capacitance		100μF

All specifications are subject to change without notice.

Full Range Active Thermal Control Handler Model 3110-FT



KEY FEATURES

- Temperature Test from -40~125˚C
- Final Test
- 3x3 mm~45x45 mm Package
- Contact Force Control 1~10 kg (Optional)
- Up to 4 Output Trays
- Remote Control Operation
- Yield Monitor
- Intelligent Auto Retest & Auto Retry
- Real-time Tray Status

Ideal for characterization and test development, the Chroma 3110-FT is an innovative pick & place system for IC testing in Final Test. The system is capable of handling a vast variety of device types and sizes ranging from 3x3 mm to 45x45 mm. To further increase productivity, the 3110-FT offers an optional remote control function allowing operation of the handler from any location with an internet connection. Equipped with 2 auto output tray stacks and 2 manual output trays, the 3110-FT will maximize the loading and unloading capacity to save cost and time all within a 1.4 m^2 floor space.

The 3110-FT can be configured to support virtually any industry standard communication interface and provide different docking options for various testers. It is also capable of supporting thermal test environments from -40˚C to 125˚C which will insure the durability of the devices. With a user-friendly graphic interface and quick device change setup, changeover is short and easy further increasing flexibility and productivity.

SPECIFICATIONS

Model	3110-FT
Dimensions (WxDxH)	1000 mm x 1350 mm x 1900 mm (signal tower excluded)
Weight	900 kg
Facility	Power : AC200V, Single Phase, 50/60Hz, 8.8 KVA Max. Compressed Air : 0.5 MPa or higher (dray and clean air) Flow Rate : 800 L/min, constant supply
Applicable Device	Type : QFP, SOP, TSSOP, QFN, BGA Package Size : 3x3 mm to 45x45 mm Package Height : 0.5 mm to 5 mm Lead / Ball pitch : 0.5 mm / 0.4 mm and above
Category	4 categories (2 auto, 2 manual)
Contact Method	Direct Contact / Drop and Press
Contact Force	50 kgf (standard) 1 to 10 kgf, ±10% (optional)
Temperature Range	-40~125˚C (contact head accuracy ±2˚C, Pre-soak and Post-recovery buffer accuracy ±10˚C)
Rotator	±90°
Interface	Standard : RS-232,TCP/IP Option : GPIB, TTL
Index Time	6 sec. (Excluding tester communication time)
Jam Rate	1/3,000



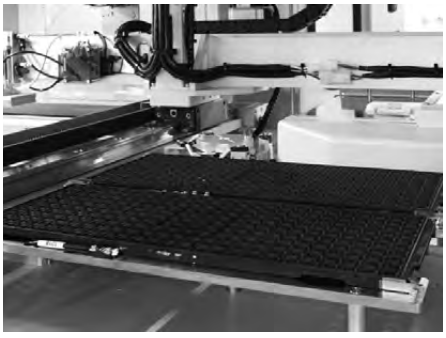
Loading



Pre-soak and Post-recovery



Rotator



Binning

ORDERING INFORMATION

3110-FT : Full Range Active Thermal Control Handler

Quad-site FT Test Handler

Model 3160/3160A



KEY FEATURES

- 9Kpcs throughput
- Programmable pitch probes
- Side mount available
- Air damper buffer to reduce contact force impact
- Intelligent shuttle IC leftover check
- Yield monitor (individual contact head)
- Universal Change kits
- ESD enhanced
- In line 1x4 flexible DUT configuration (Model 3160)
- In line 1x4 & matrix 2x2 flexible DUT configuration (Model 3160A)
- Auto empty (option) (Model 3160A)
- Active thermal control cystem (cption) (Model 3160A)
- Motor arm Z (Model 3160A)
- Side knock cylinder (Model 3160A)

The Chroma 3160/3160-A Handler is productive pick & place system for high volume multi-site IC testing. Saving floor space, time and cost, the 3160/3160-A can increase production productivity and efficiency with its innovative design. The system is configurable for Single, Dual or Quad test sites and can be upgraded to provide an Active Thermal Control (ATC) System to test the DUT up to 150˚C.

The Chroma 3160/3160-A is also capable of handling various package sizes and types then bins them according to customer specified test results. The system has a reliable handling mechanism, is compatible with standard Conversion Kits and has a streamlined automation sequence, which results in high throughput with low jam rate. Its precisely adjustable contact force, fine alignment positioning and various device sensors also reduces unexpected device damage and helps extend test socket lifetime while maintaining or increasing production yields.

SPECIFICATIONS		
Model	**3160**	**3160-A**
Dimension (WxDxH)	1700 mm x 1300 mm x 2000 mm	1800 mm x 1380 mm x 2050 mm
Weight	Approx. 900 kg	Approx. 1200 kg
Facility	Power : AC220, 50 / 60Hz Single Phase, 10KVA Max. Compressed Air : 0.5MPa or more (dry & clean air), Consumption 120l/min, constant supply	
Applicable Device	Package Carried on Type : BGA, QFP, CSP, PLCC, TSOP, PGA, and etc. Package Size : 3 mm x 3 mm to 50 mm x 50 mm	
Contact Mode	Direct Contact / Drop and Press	
Interface	Standard TTL Option GPIB, RS232	Standard TTLx2 & GPIBx1 Option RS232, TCPIP
Multiple Site	4 sites (In line 1 x 4 pitch X =40mm)	4 sites : support both in-line type and matrix type In line 1 x 4 pitch X = 40mm / 57.15mm / 60mm Matrix 2 x 2 pitch XY = 57.15 x 63.5mm / 80 x 60mm
Contact Area	Test Site : Single, Dual, Quad sites (in-Line) Test Head Area : 550 mm (from socket center) Height : 1000 mm (900/1, 100mm option)	
Index Time	0.4 sec (excluding tester communication time)	0.38 sec (excluding tester communication time)
Jam Rate	1/8000	1/10000
Applicable Tray	JEDEC	
Category	6 categories (3 auto, 3 manual)	
Binning	16 bin signal for TTL	
Contact Force	50 kgf (accuracy ±1kgf)	80 kgf (accuracy ±1kgf)
Temperature	Operating Mode : Ambient	
High Temperature (Option)	Operating Mode : 40˚C~ 150˚C (Heating Time : within 30 min.) Accuracy : Contact Head ± 3˚C, Pre-heater ± 5˚C (90˚C~130˚C)	
SOCKET CCD (Option)	--	CCD checks socket and prevents double stack of parts in the socket

Note * : Optional temperature up to 135˚C/150˚C

ORDERING INFORMATION

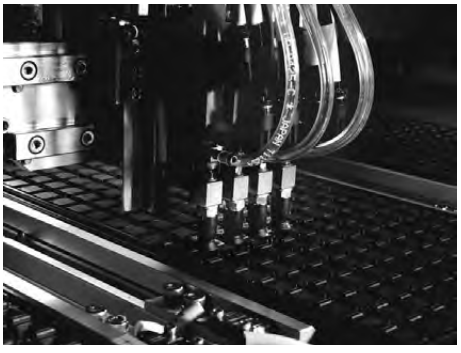
3160 : Quad-site FT Test Handler
3160A : Quad-site FT Test Handler



Loading



Test One Shut



UnLoading



Model 3160A

All specifications are subject to change without notice.



KEY FEATURES

- Up to x8 Parallel Test Sites
- Up to 9000 UPH
- Flexible Test Site Configuration
- Dampened Contact Force
- Contact Force Auto Learning
- 3x3 mm ~ 50x50 mm Packages
- Temperature Test from Ambient ~ 150 ˚C
- Intelligent Auto Retest & Auto Retry
- Yield Monitor

The Chroma 3180 Handler is a productive pick & place system for high volume multi-site IC testing. Saving floor space, time and cost, the 3180 can increase production productivity and efficiency with its innovative design. The system is configurable for single, dual, quad or octal test sites and can be upgraded to test the DUT up to 150 ˚C.

The Chroma 3180 is also capable of handling various package sizes and types then bins them according to customer specified test results. The system has a reliable handling mechanism, is compatible with standard Conversion Kits and has a streamlined automation sequence, which results in high throughput with low jam rate. Its precisely adjustable contact force, fine alignment positioning and various device sensors also reduces unexpected device damage and helps extend test socket lifetime while maintaining or increasing production yields.

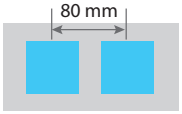
SPECIFICATIONS

Model	3180
Dimension (WxDxH)	1860 mm x 1380 mm x 2050 mm
Weight	Approx. 1300 kg
Facility	Power : AC220, 50/60 Hz Single-Phase, 10 KVA Max. Compressed Air : 0.5 MPa or higher (dry and clean air) Flow Rate : 120 L/min., constant supply
Applicable Device	Type : BGA, QFP, CSP, QFN, Flip chip, TSOP, etc. Package Size : 3 mm x 3 mm to 50 mm x 50 mm *
Contact Mode	Direct contact / Drop and Press
Interface	Standard : TTL, GPIB Option : RS232, TCPIP
Multiple Site	Octal Sites (4x2) Matrix Quad Sites (2x2) In-line Quad Sites (4x1)
Contact Area	Test Head Area : 600 mm (from socket center) Docking Height : 1100 mm (1000/1200mm option)
Index Time	0.4 sec (excluding tester communication time)
Jam Rate	1/10,000
Category	6 categories (3 auto, 3 manual)
Contact Force	Up to 120 kgf
Mounting Type	Direct mount / Side Mount
Applicable Tray	JEDEC
Throughout (Max.)	Up to 9000 UPH (Illustrated by BGA 4x6, 20x37 tray matrix)
High Temperature (Option)	Operating Range : ~ 150˚C (Heating time < 30 min.) Accuracy : Contact Head ± 3 ˚C, Pre-heater ± 5 ˚C

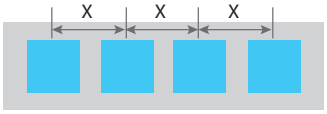
* Maximum package size may vary due to test site pitch

TEST SITE CONFIGURATION

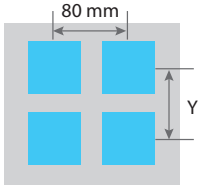
Dual-site



Quad-site

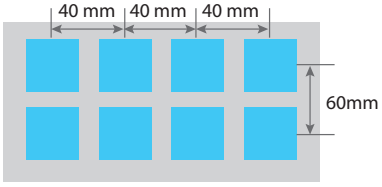


X = 40 / 57.15 / 60 mm

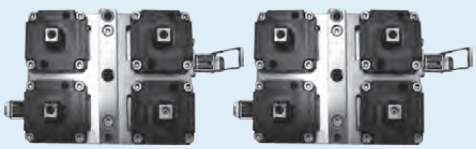


Y = 60 / 36 / 63.5 mm

Octal-site



KIT CONFIGURATION



Quick Fit Kit (standard)

ORDERING INFORMATION

3180 : Octal-site FT Test Handler



KEY FEATURES

- Cost-effective Integrated RF Solution
- Customized RF Isolation Chamber with Integrated Tester Docking
- Up to 120 mm Test Site Pitch
- Up to x8 Parallel Test Site
- 3x3 mm ~ 45x45 mm Package
- Precise Positioning
- Compatible with JEDEC and EIAJ tray

The Chroma 3240-Q is a unique and innovative handler with integration of RF/Wireless isolation chamber. The system is configured for up to octal-site with individual isolation for true parallel test. With a streamlined automation sequence, precise Pick & Place system, flexible test site configuration, high throughput and low jam rate, the 3240-Q is ideal for RF/Wireless production test.

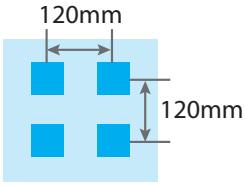
The Chroma 3240-Q is also capable of handling various package sizes and types, accurately binning according to customer specified test results. With automatic Input/Output tray stacks, the 3240-Q can accommodate both JEDEC and EIAJ tray standards. Optional temperature control extends the test capability to provide high temperature testing up to 150˚C.

SPECIFICATIONS

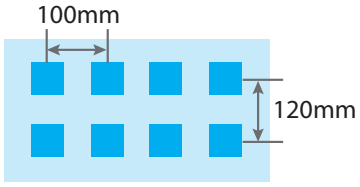
Model	3240-Q
Dimension (WxDxH)	1360 mm x 1390 mm x 1930 mm
Weight	900kg
Facility	Power : AC200V, Single phase 50/60Hz, 10 KVA Max. Compressed Air : 0.5 MPa or higher (dray and clean air) Flow Rate : 150 L/min, constant supply
Applicable Device	Type : CSP, BGA, Gull Wing Package Package Size : 3 mm x 3 mm to 40 mm x 40 mm Package Height : 0.5 mm to 5 mm Lead / Ball pitch : 0.5 mm / 0.4 mm and above
Category	3 categories (1 auto, 2 manual)
Applicable Tray	JEDEC or EIAJ
Index Time	4 sec.
Contact Method	Direct Contact / Drop and Press
Contact Force	Up to 50 ± 1 kgf
Test Site Configuration	4 sites, 2x2, Pitch X = 120 mm, Y = 120mm 8 sites, 4x2, Pitch X = 100 mm, Y = 120mm
PCB Same Site Isolation	-63dB
PCB Different Site Isolation	-91.5dB
Chamber Far Field Isolation	2.4GHz : -80dB @ Distance >250mm (=2*λ2.4GHz)
Jam Rate	1/5,000
Interface	GPIB
Hot Temperature (Option)	Operating Range : Ambient ~ 125˚C (Heating Time < within 30 min.) Accuracy : Contact Head ± 3˚C, Pre-heater ± 5˚C

TEST SITE CONFIGURATION

Quad-site



Octal-site



RF CHAMBER ILLUSTRATIONS

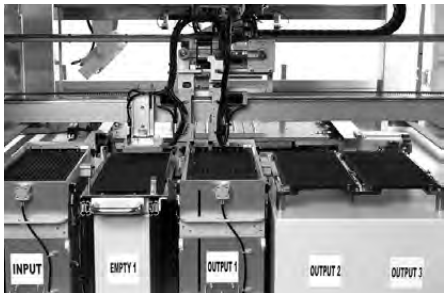


Bottom Cover

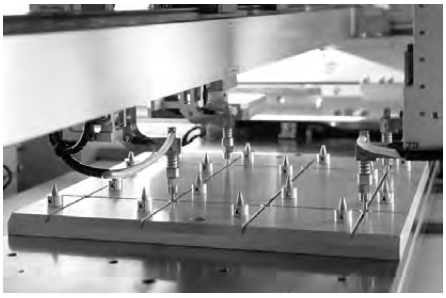


Top Cover





Loading



Pre-alignment

ORDERING INFORMATION

3240-Q : RF Solution Integrated Handler

All specifications are subject to change without notice.

Hybrid Single Site Test Handler

Model 3110



SPECIFICATIONS	
Model	**3110**
Dimensions (WxDxH)	900 mm x 1250 mm x 1800 mm (Signal Tower excluded)
Weight	75 0 kg
Facility	Power : AC 220V, 50/60 Hz Single-phase Maximum Power Consumption : 3.0KVA Max Controller Circuit: 1.0 KVA Max. Heater Circuit : 2.0 KVA (Option)
Compressed Air	Dry Air of 5.0 kg/cm2 (0.49 Mpa) or higher, constant supply
Applicable Device	Type : BGA series, μ BGA, QFP series, QFN, Flip-Chip, TSOP Package Size : 3 mm x 3 mm to 55 mm x 55 mm Depth : 0.5 mm to 5 mm Lead / Ball pitch : 0.4 mm / 0.5 mm and above
Interface	Standard : RS-232,TCP/IP Option : GPIB and TTL
Jam Rate	1/3000
Categories	4 Categories (128 bin signals for RS232)
Contact Force	80 kgf (Accuracy ±1kgf), 125Kgf (Option)
Temperature	Operating Mode : Ambient
Tri Temp Control (Option)	Temperature Range : -40˚C ~ 135˚C ± 2˚C (-55˚C ~150 ˚C Option)
ATC Module (Option)	Temperature Range : Ambient ~ 135˚C ± 2˚C (150˚C Option)
Unity PTC (Option)	Temperature Range : ~ 85 ˚C (up to 300W Heat Dissipation)
Cooling Pipe (Option)	Temperature Range : ~ 85 ˚C (up to 125W Heat Dissipation)
Advantage	ECD function (Easy-edit communication define) Single Movement Retest Contact pick and place system Yield control (Average yield of socket) Continue Fail
Option	Remote Control Rotation (±90 degree) Auto Load / Unload : 1 input / 2 unload (with 2 manual unload) Fixed Load / Unload : 1 input / 4 unload

KEY FEATURES

- FT + SLT Handler – Two In One
- Perfect for Device Engineering Characterization Gathering and Analysis
- Auto Tray Load/unload & Device Sorting capability
- Without socket damage issue
- Air damper for good contact balance
- Shuttle remain IC check function
- Camera for real time system monitoring
- Optional Tri-temp IC test function (-55˚C ~ 150˚C)
- High power cooling function (option)
- Diskless download function (option)

Chroma 3110 is a sigle site pick & place IC handler which supports various types of package such as QFP, QFN, TSOP, BGA, μ BGA and CSP, etc. The handler uses P & P technology to pick up devices from JEDEC trays, move them to the test site. The 3110 consists system level tests that are designed to fully exercise programs as a whole and check all integrated elements function properly. It is capable to handle tri-temperature test environment since ambient to thermal or low temperature.

In addition to the capability of handling 3x3mm to 55x55mm devices, the machine is equipped with 1 auto stacks and 2 manual bin plates to maximize the loading and unloading capacity. It features a user-friendly graphic user interface based on Windows system and also provides interfaces for docking with various testers.

ORDERING INFORMATION

3110 : Hybrid Single Site Test Handler
3100-TT : Tri-temp Control (option)
3100-A : Active Thermal Control Module (option)
3100-P : Unity Passive Thermal Control (option)
3100-C : Cooling Pipe (option)

Final Test Configuration


3110 with tester


3110 with tri-temp chamber & tester

System Level Test Configuration


3110 with tri-temp chamber


3110 with module board

Chroma Thermal Control Solutions	Products	Capability	Configurations					
			Test Plug Design	Dry Air	Standalone Water Chiller	Chamber	TEC Controller	External Piping
Active Thermal Control Solution	3100- TT	-55˚C ~ 150 ˚C ± 2˚C	Heat Exchanger+TEC (Peltier)	Yes	Yes	Yes	Yes	Yes
	3100-A	Ambient ~ 135 ˚C ± 2˚C	Water Chiller Cooling+TEC (peltier)	No	Yes	No	Yes	Yes
			Closed-loop Liquid Cooling+TEC (peltier)	No	No	No	Yes	No
Passive Cooling System	3100-P	~ 85˚C (< 300W Heat Dissipation)	Closed-loop Liquid Cooling	No	No	No	No	No
	3100-C	~ 85˚C (<125W Heat Dissipation)	Cooling Pipe	No	No	No	No	No

All specifications are subject to change without notice.

Tabletop Single Site Test Handler

Model 3111



KEY FEATURES

- 600 mm (W) x 565 mm (D) x 800 mm (H)
- JEDEC trays (2)
- IC packages: 5x5 mm to 45x45 mm
- Software configurable binning
- Air damper contact
- Optimizes IC force balance
- Maximize test socket lifetime
- Double stack protection
- Continuous automated re-test
- Real time system camera monitoring

The Chroma 3111 Tabletop Single Site Test Handler is an automated Pick & Place system ideal for engineering and test development of IC System Level Testing (SLT). The 3111 system is capable of handling a vast variety of device types and sizes ranging from 5x5mm to 45x45mm.

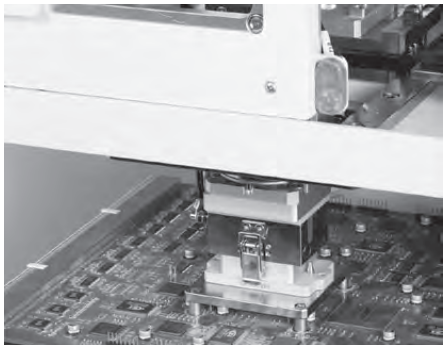
To maximize productivity, the 3111 offers a remote function allowing handler control from any distant location through an internet connection. Equipped with two software allocatable JEDEC trays, the 3111 maximizes the engineering test capability saving cost and time, all within a 60 cm^2 table space. A user-friendly graphic interface (Windows™) system provides a quick and easy device setup, change or changeover simplifying the process and increasing efficiency.



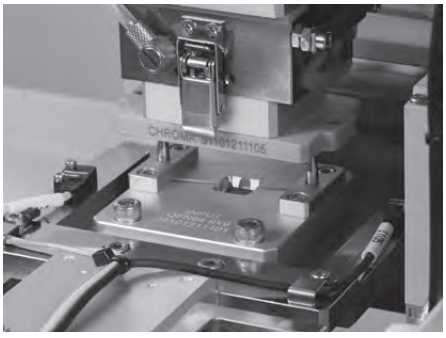
CE

SPECIFICATIONS	
Model	**3111**
Dimension (WxDxH)	600 mm x 565mm x 800 mm (Signal Tower excluded)
Weight	Net Weight 80 kg
Facility	Power : AC 220V-240V, 50Hz/60Hz, single-phase,2.3kva Dry Air of 5.0 kg/cm^2 (0.49 MPa) or higher, constant supply
Device Type	Type: BGA series, _BGA, QFP series, QFN, Flip-Chip, TSO Package size : 5 mm x 5 mm to 45 mm x 45 mm Thickness : 0.5 mm to 5 mm Lead / Ball pitch : 0.4 mm / 0.5 mm and above
Test Site	Single site
Jam Rate	1/3000
Tray Classification	1 Category
Tray	JEDEC
Binning	128 software bins
Rotator	±90 degree
Contact Force	10 kgf - 50 kgf (±1kgf)
Contact Mode	Direct Contact / Drop and Press
Tester Interface	Standard : RS-232, TCP/IP Option : GPIB
Socket CCD (Option)	CCD checks socket to prevent double stack of parts in the socket

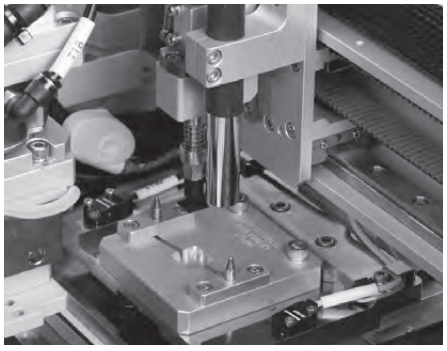
Note 1 : 3111 alarm mail function is available by e-mail server setting



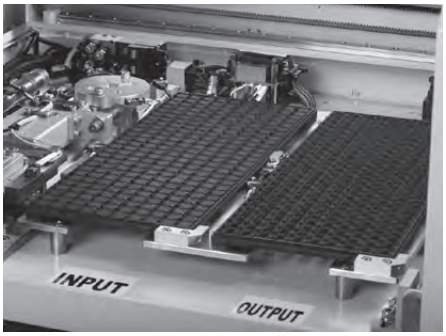
Test Site



Shuttle



Positioning



Category

ORDERING INFORMATION

3111 : Tabletop Single Site Test Handler

All specifications are subject to change without notice.



KEY FEATURES

- Reliable high-speed pick & place handler
- Auto contact-force learning
- Gull wing package capability
- No socket damage
- Air damper for contact balance
- IC-in-socket protection
- NS-5000/6000 change kits compatible

Chroma 3240 is an innovative handler for high volume/multi-site IC testing at system level. It is capable of handling packages of various types including QFP, TQFP, BGA, PGA, etc. The handler uses pick and place technology to pick up devices from JEDEC trays, move them to the test site, then move them to the appropriate bin after test. It features a 90-degree device rotation which is required for various pin one orientations.

Chroma 3240 can test up to 4 devices in parallel at high temperature with ATC (Auto Temperature Cooling) ranging from 50˚C to 125˚C.



SPECIFICATIONS	
Model	**3240**
Dimension (WxDxH)	1640 mm x 1190 mm x 1774 mm (Excluding Signal Tower)
Weight	Net Weight 800kg
Facility	Power : AC 220V , 50/60 Hz Single-phase Maximum Power Consumption : 3.0 KVA Max Controller Circuit : 3.0 KVA Max. Heater Circuit : 1.0 KVAMax.
Compressed Air	Dry Air of 5.0 kg/cm^2 (0.49 Mpa) or higher constant supply
Vacuum Source	Built-Diaphragm Vacuum Pump : Pumping Volume 100 L/min Ultimate Pressure : 100 Torr Max.
Applicable Device	Package Type : BGA series , µGA, PGA, QFP series, CSP, BCC, QFN , Flip-Chip , TSOP Package size : 7 mm x 7 mm to 40 mm x 40 mm Depth : 0.9mm to 5mm Lead / Ball pitch : 0.4mm / 0.5mm and above Weight : 0.2g to 20g
Multiple Testing Layout	4 sites (Pitch 400 mm)
Index Time	2.1 sec (Excluding test communication time) / One site cycle time : 3.2 Sec.
Jam Rate	1/3000 pcs
Applicable Tray	Type : Input / Empty Tray : 130 mm ~ 143 mm (D) by 310 mm ~ 330 mm (W) Output Tray : 135 mm ~ 150 mm (D) by 290 mm ~ 330 mm (W) Capacity : Input / Empty Tray : Elevator with 210 mm stroke (JEDEC) Output Tray 1, 2, 3 : Elevator with 210 mm stroke (JEDEC)
Categories	3 Categories (Max. 128 bin signals with RS-232)
Contact Area	Test Site Pitch : 400mm Test Module Dimensions : 400 mm x 400 mm
Contact Force	Max. 50 kgf (Accuracy ±1kgf)
High Temperature (Option)	Operating Mode : Room Temperature / High Temperature Temperature Range : ~125˚C (Heat-up time : Within 30 min) Accuracy : Pre-heater Buffer ±5˚C , Contact Area ± 3˚C
Tester Interface	Standard : TTL Option : RS-232, GPIB
Special Function	Tray map fit for producion analysis Universal kit design Change over time within 15 min. ECD function (Easy -edit Communication Define) for various equipment Two Tray (Color tray) mode available Continue Fail Alarm Auto Z function Yield Control (Average yield of socket) Yield Monitor (Per contact head plug) ATC (Auto Temperature Cooling) High Temperature Function

ORDERING INFORMATION

3240 : Automatic System Function Tester



Automatic System Function Tester

Model 3260



KEY FEATURES

- Reliable high-speed pick & place handler
- Auto contact-force learning
- Gull wing package capability
- No socket damage
- Air damper for contact balance
- IC-in-socket protection
- Invention patent 190373, 190377, 1227324 & 125307
- Thermal Control Configurations
  - Tri Temp Control
  - Close-Loop Active Thermal Control (ATC) Module
  - Unity PTC (Passive Thermal Control)

Chroma 3260 is an innovative handler for high volume/multi-site IC testing at system level. It is capable of handling packages for various types including QFP, TQFP, BGA, PGA, etc. The handler uses pick and place technology to pick up devices from JEDEC trays, move them to the test site, then move them to the appropriate bin after test.

Chroma 3260 can test up to 6 devices in parallel at high temperature with ATC (Auto Temperature Cooling) ranging from -40˚C to 125˚C.



SPECIFICATIONS

Model	3260	
Dimension (WxDxH)	2570 mm x 1360 mm x 1780 mm	
Weight	1300 kg	
Facility	Power : AC 220, 50/60 Hz Single-Phase Maximum Power Consumption : 6.0 KVA Max Controller Circuit : 3.0 KVA Max Heater Circuit : 3.0 KVA (Option)	
Compressed Air	Dry Air of 5.0 kg/cm^2 (0.49 Mpa) or higher, constant supply	
Vacuum Source	Build-in Diaphragm Vacuum Pump: Pumping Volume : 100 L/min Ultimate Pressure : 100 Torr (-13.3 Kpa) Max.	
Applicable Device	Type : BGA series, μ BGA, Pga, QFP series, CSP, BCC, QFN, Flip-Chip, TSOP Outer dimensions: 4 mm x 4 mm to 45 mm x 45 mm Lead / Ball pitch : 0.4 mm / 0.5 mm and above	
Multiple Testing Layout	6 sites (Pitch 400 mm)	
Index Time	3.0 sec (excluding test communication time)/ One site cycle time : 3.5 Sec	
Ram Rate	1/5000 pcs	
Applicable Tray	JEDEC and EIAJ	
Categories	4 categories (6 categories for option)	
Contact Force	Max. 60 Kgf (accuracy ± 1kgf) by servo motor (80 Kgf for Option)	
Soak Hot Temperature (Option)	Operating Mode : Room Temperature / High Temperature Temperature Range : 50˚C to 150˚C (Heat-up time: Within 30 min) Accuracy : Pre-heater Buffer ± 5˚C, Contact Area ± 3˚C Cooling Head : 10˚C + 5˚C	
Temperature Control (Option)	Operating Mode : Room Temperature / Cold Temperature Temperature Range : room temperature ~ -55˚C Accuracy : Contact Area ± 3˚C	
	Tri Temp Control (Option)	Temperature Range : -40˚C ~ 125˚C ± 2˚C (150˚C Option) or -55˚C ~ 135˚C ± 2˚C (150˚C Option)
	ATC Module (Option)	Temperature Range : Ambient ~ 135˚C ± 2˚C (150˚C Option)
	Unity PTC (Option)	Temperature Range : ~ 85 ˚C (up to 300W Heat Dissipation)
Tester Interface	Standard : RS-232 Option : GPIB, USB and TTL	
Features	Universal kit design ECD function (Easy-edit communication define) Two tray (Color tray) mode available Continuous fail retest function Real pick and place system Yield control (Average yield of socket) Yield monitor (Per contact head plug) System Invention Patent No.: 190373 Process Invention Patent No.: 190377	
Option	CCD camera for device orientation detection Socket sensor / Socket CCD RF Shielding Box : 55db for PCIe, 80~90db for PCI/USB/RS232 Rotator (90 degree) Fault Auto Correlation Test (FACT) Built in Continuity Test (BICT) PoP handling capacity	

ORDERING INFORMATION

3260 : Automatic System Function Tester



All specifications are subject to change without notice.



KEY FEATURES

- Reliable Pick&Place bare die test handler
- Multi-plate input and automated test sorting capability
- Omni-directional adjustable probe stage (X/Y/Z/ θ)
- Stage remain die check function
- x12 output tray and programmable output binning
- Real time yield control monitor (Per Dut)
- Real time probing status monitoring

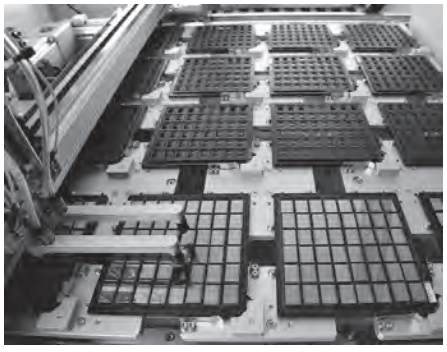
Chroma 3112 is a productive pick and place handler for high volume single or multi-site bare die testing. It is capable to handle various of bare die. The handler 3112 uses P&P technology to pick up bare die from chip tray, move them to the test stage and bin them upon sorting result. High throughput with low jam rate is the consequence result from the reliable handling mechanism and functionality outfit. The remain die check function reduce unexpected damages occurred.

The automation of testing and sorting techniques that applied to the bare die testing, not only in the production efficiently, reducing human resources and ensuring the test quality, but also reducing the testing defect rate.

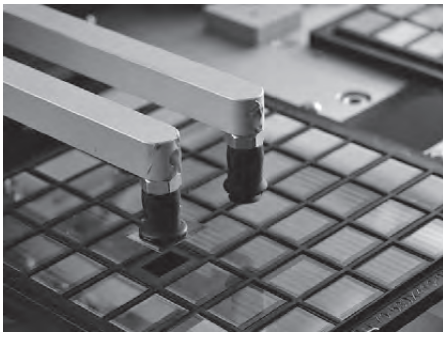


3112 tabletop handler

SPECIFICATIONS	
Model	**3112**
Dimension (WxDxH)	1020 mm x 870mm x 1300 mm
Weight	Net Weight < 250 kg
Facility	Power : Single-phase, AC 220V, 60 Hz / 2.4KVA Compressed Air : Dry Air of 5.0 kg/cm^2 (0.5 Mpa) or higher, constant supply
Application Die Size	5 x 5 mm to 15 x 15 mm
Test Site Number	Single site ; Dual site
Input Loader	4 manual tray
Number of sorting catagories	12 manual output tray (128 bin software bins)
Probe Card Outside Dimension	4470 x 5620 mil (113.5 x 142.7 mm) * Probe card provide by customer
Carrier Tray Outside Dimension	Standard size : 101.4 x 101.4 mm
Contact Force	Max. 10 kgf
Probe Alignment (X / Y / Z / θ)	Manual alignment by probing stage
Interface	Standard : RS 232 Optional : GPIB
UPH	> 360 (Test Time : 7 sec.) Cycle Time : 4.5 sec. Index Time : 5 sec.
Jam Rate	1/2000 (exclude any sticky residue)
Change Over Time	< 10 min.



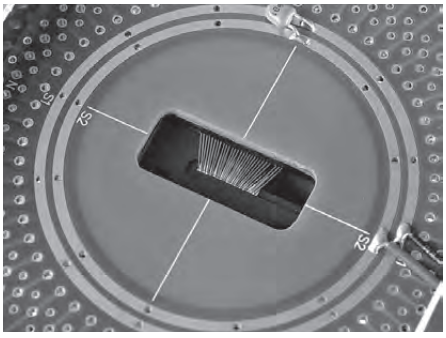
Loading



Picking Up



Positioning



Testing

ORDERING INFORMATION

3112 : Die Test Handler

All specifications are subject to change without notice.

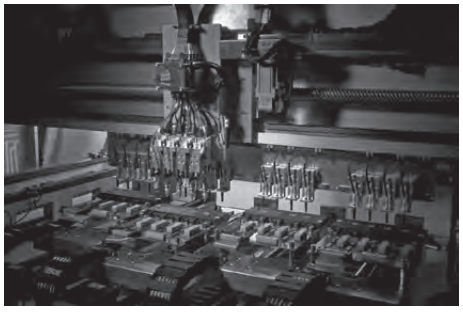


KEY FEATURES

- High throughput for CIS Testing
- Reliable high-speed pick & place handler
- 3x3 mm miniature device handling capability
- Air damper for contact balance
- Socket damage free

Chroma 3270 is an innovative handler for high volume/multisite miniature IC testing, especially for CIS Testing (CMOS Image Sensor), at system level. It is capable of handling devices of a large variety of package types including QFP, TQFP, BGA, PGA, etc. The handler uses pick and place technology to pick up devices from JEDEC trays, move them to the test site, then move them to the appropriate bin after test.

Chroma 3270 can handle 16 devices for parallel test at ambient temperature to high temperature 50˚C

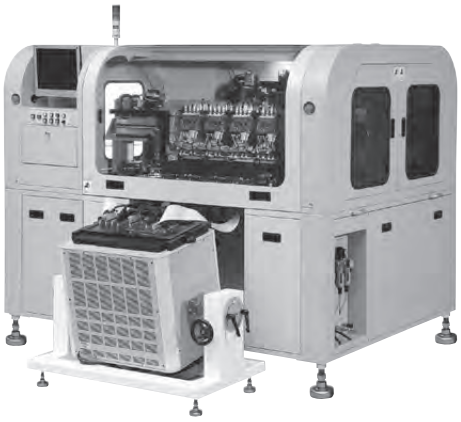


SPECIFICATIONS

Model	3270
Dimension (WxDxH)	2100 mm x 1540 mm x 1720 mm
Weight	Net Weight 1300 kg
Facility	Power : AC220V ± 10%, 50/60 Hz 3-Phase Maximum power consumption : 12KVA, 20A Compressed Air : Dry air of 5.0 kg/cm^2 (0.49 Mpa) or higher, constant supply
Applicable Device	Type : BGA series, µBGA, PGA, QFP series, CSP, WCSP, PLCC, QFN, TSOP Outer dimensions : 3 mm x 3 mm to 14 mm x 14 mm Lead / Ball pitch : 0.4 mm / 0.5 mm above
Multiple Test Sites	16 sites
Index Time	5 sec (Exclude power and communication time)
Cycle Time	One site cycle time 6 sec (4 site simultaneously, tray pitch fixed)
Jam Rate	1/2000 pcs
Applicable Tray	Standard tray size : JEDEC 135.9 mm(W) x 315 mm(L) Tray thickness : 7.62 mm
Categories	5 Categories, 1 Auto, 4 Fixed (accepts 128 bin signals for RS-232)
Contact Force	Max. 50 kgf (Accuracy force ±1kgf)
High Temperature (Optional)	Operating mode : room temperature / high temperature Temperature setting range : Ambient to 50˚C
Tester Interface	Standard : RS-232

ORDERING INFORMATION

3270 : Miniature IC Handler



All specifications are subject to change without notice.



KEY FEATURES

- Tester & Handler Integration
- Test 120pcs micro SD in parallel
- Test-in-Tray, no pick & place arm before sorting
- UPH = 5400 with 70 sec test time
- SD Protocol Aware Tester
- DC Measurements
- 32MB Buffer Memory per site
- Microsoft Windows XP OS
- Software provides tray map and binning information
- Compact Size: 164cm X 79cm X 180cm
- Options:
  - 3rd party test tools
  - Change Kits for mini SD, SD and MMC
  - Loading Content

The Chroma 3280 is an innovative integration system for testing and handling SD cards in parallel without picking any part before sorting. SD Protocol Aware and Focused DC tests in the 3280 brings a revolutionary test methodology to all SD cards (include MMC). The benefit to customers is lower manufacturing cost from the high throughput of the 3280. The compact size of 3280 also saves floor space in the manufacturing facility.

The cost sensitivity involved with consumer products challenges traditional final test methodology. To reduce the cost to consumers, manufacturers must recognize the fact that SD cards are built upon Known Good Die (KGD). This recognition will narrow the tester's focus to assembly related defects rather than retesting KGD. A new focused tester that tests for assembly will be smaller and less expensive than traditional solutions. That smaller size then allows for more parts to be tested in parallel in a reduced area, further reducing the unit of test cost. Additionally, the high yield of SD cards using KGD leads to a small footprint Test-in-Tray mechanism. This integrated combination of tester and handler with a reduced footprint facilitates low cost solution of the Chroma 3280.

Chroma 3280 provides a high throughput solution to SD cards manufacturers

Test-In-Tray provides the most efficient method to move DUTs from input site to test site without the use of a pick-and-place arm. The average index time from input stack to test hive about 10 seconds for 120pcs micro SD cards.

High Parallel Test A Test Hive is integrated into Chroma 3280 which provides the capability to test 120pcs micro SD cards simultaneously. Typically, it takes 70 seconds test time for 120pcs 1GB micro SD card.

Pick Up Reject SD card Only By using the Test-In-Tray and high yield SD cards, the Chroma 3280 only picks up defective devices from the sorting tray to the reject tray and replaces the good devices from the buffer tray to the sorting tray. Assuming a 98% yield rate only need to be removed 2~3 devices from the sorting tray. Therefore, the average sorting time is less than the average testing time. That also enables the testing and sorting to be concurrent, so sorting will be completed before testing.



Test-in-Tray

Firecracker II

The design circuit of the Firecracker II is identical to a single test circuit (Fire Channel) in the test hive of the Chroma 3280. The Firecracker II provides a very convenient tool for generating a test program off line. Users can plug in micro SD, mini SD, SD and MMC devices on the left side of the cartridge. USB connector is located at the right side of the cartridge. USB connector is located at the right side of the Firecracker II which can be connected with a USB cable to communicate with a portable device such as a notebook computer.



Test Coverage

SD Protocol Aware Tests

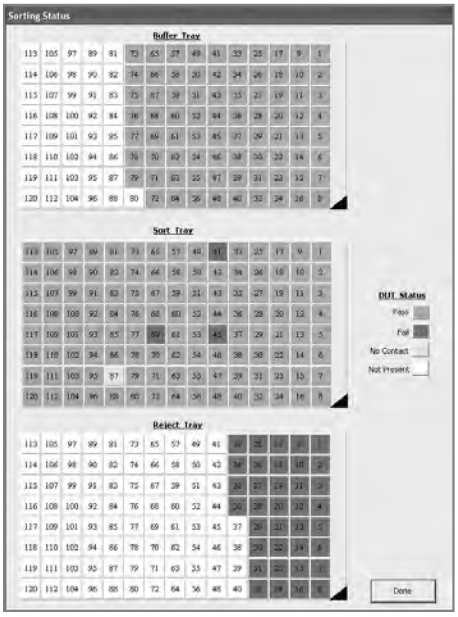
- Check CID Reg
- Check CSD Reg
- Check OCR Reg
- Check SCR Reg
- Check SD Status
- Functional Test

DC Measurements

- Open/Shorts
- ESD Diodes
- Power Up Idd
- Leakage

Software Functions

- Password control system for user privileges management
- Provide safety detecting alarm system
- Auto alarm for binning time-out error
- Visual display for error jam area
- Provide off-line mode for dummy running
- Real-time testing result display
- Individual DUT enable and disable control
- Yield display for each output tray
- Real-time UPH display
- Multiple yield stop monitor functions
- Loading device counter control
- Door-opened interrupt protecting function
- Emergency stop control
- Keep alarm log for over 30 days



Sorting Status

SPECIFICATIONS	
Model	**3280**
System	Test-In-Tray Handler
Basic Specification	Temperature Control Range : Ambient Tray Input: 1 Auto Stack. Output Tray : 1 Auto Stack Test hive interfaced with Tester Tester integrated into Handler One Pick & Place arm, one buffer tray and one reject tray
Tester	Chroma TnT Production Test Tool Skymedi Production Test Tool By Customer Request: Phison, Silicon Motion & InCOMM
Change Kit	One micro SD change kit per handler SD, Mini SD and MMC (optional)
Facility	Power : 220VAC ± 10%, 50/60 Hz, single phase, less than 4KW Compressed Air : 0.5MPa
Applicable Package	micro SD mini SD, SD and MMC (Optional)
Applicable Tray	Standard tray size: JEDEC 135.9mm(W)x 315mm(L) Applicable tray thickness: 7.62mm
Dimensions and Weight Limit	1640 mm (W) x 790 mm(D) x 1800 mm(H); WEIGHT: 650KG
Index Time and Throughput	Max. UPH = 42,000, when test time is 0 UPH = 5400, when test time is 70 sec with DUTs better than 97% yield
Pick & Place Arm	X Arm Max. Speed: 2.9 M.P.S. Y Arm Max. Speed: 3.75 M.P.S. Regular Sorting Speed: 6 sec per failed DUT Sorting concurrently occurs with testing
Device Contact method	960 Pogo Pins each insertion 7.1 Newton per DUT 8 Pogo pins per DUT Current Motor Max. Force: 320KG F
Test Interface	Standard : RS-232, USB Option : Ethernet
Loader and Un-loader Capacity	Input Tray Stacker : 1 Automatic with 30 JEDEC Trays Output Tray Stacker : 1 Automatic with 30 JEDEC Trays
System Jam Rate	Less than 1/5000 devices
Kit conversion time	Less than 5 min. for SD products Change Kit Setting File is saved in handler. Any necessary software and hardware adjust within 1 minute

ORDERING INFORMATION

3280 : Test-In-Tray Handler

All specifications are subject to change without notice.

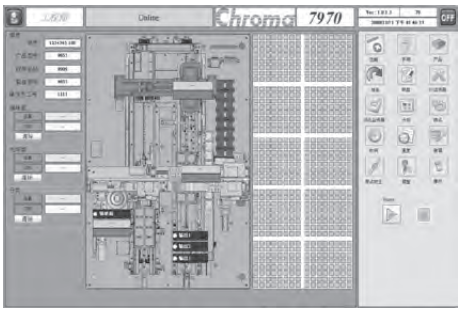
CMOS Image Sensor Inspection System Model 7970



Chroma 7970 CMOS Image (CIS) Sensor Inspection System is an automatic inspection system for tray-based CMOS image sensor. There are five main stations in Chroma 7970: loader, ball side inspector, optical side inspector, sorter and unloader. Each station can operate simultaneously to increase inspection time.

The appearance feature of image sensor and defects on it can be clearly conspicuous by using advanced illumination technology. Illumination condition can be adjusted depended on the type of image sensor. Applied with high speed camera and software algorithms, the throughput can reach UPH 6600 for 4mmX4mm chip size.

In addition, Chroma 7970 owns a friendly user interface to reduce user's learning time. All of inspection information, like tray map, station condition, is visualized for easy reading.

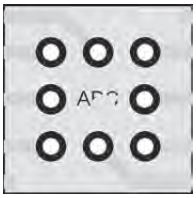
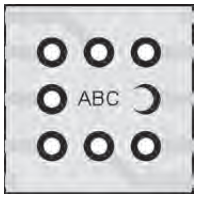
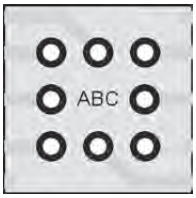
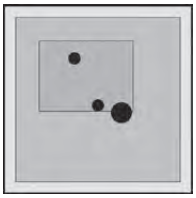
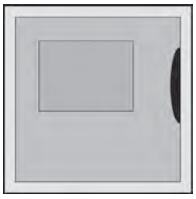
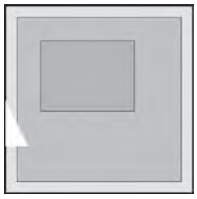
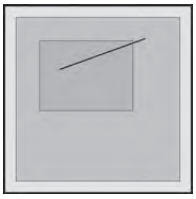


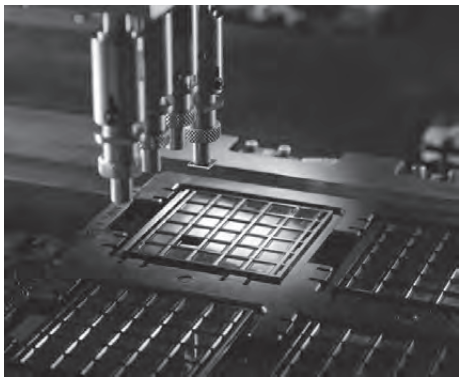
ORDERING INFORMATION

7970 : CMOS Image Sensor Inspection System

KEY FEATURES

- High speed tray-based CMOS image sensor inspection system
- Complete chip appearance inspection including glass and ball side of the chip
- On-fly acquisition can get clear images and reduce processing time.
- Multi-nozzles pick & place technology (patented) to improve throughput
- Advance and flexible illumination modules are suitable for specific defect mode
- Adjustable inspection criteria can be set for different type of the chip

Marking Defect	Ball Defect	Lead Defect	Blemish
			
Over Glue	**Chipping**	**Broken Glass**	**Scratch**
			



SPECIFICATIONS	
Suitable IC and Package Type	
Applicable Package	Jedec tray, chips need to be carried in chip tray
Chip Size	2.5mm x 2.5mm to 10mm x 10mm
Package Type	CSP
Inspector Spec	
Inspection Section	Ball side inspector unit X 1, optical side inspector unit X 2
Resolution	Ball side inspector: 12um, optical side inspector: 6um
Throughput	UPH Over 6600, base on 4mmX4mm chip size, 90% yield
Loader/ Unloader and Sorting	
Tray Stacker	Input and output, motor control, elevator stroke >= 200mm
Sorting Buffer	8 chip trays for good chip, 16 chip trays for fail chip categories
Facility Requirement	
Power Input	220VAC ± 10%, 50/60 Hz, 3 phase 5 line, 5 KW
Compressed Air	300 Liter/min @ 5 KG/cm2 (0.49Mpa)
General Spec	
Dimension (W x D x H)	1200 mm x 1600 mm x 2100 mm
Weight	800 kg

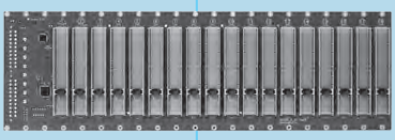
General-purpose Chassis & Backplane 15-1
High Precision Source Measure Unit 15-2
Device Power Supply 15-5
Programmable DC Power Supply 15-6
Extension Card 15-7
CompactPCI Power Supply 15-8



General Purpose Chassis



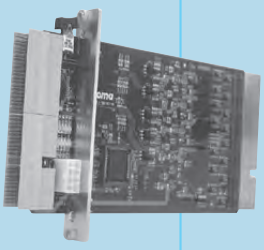
Device Power Supply



PXI Backplane



Programmable DC Power Supply



Extension Card



High Precision
Source Measure Unit



cPCI Power Supply



8/14/18-Slot

KEY FEATURES- CHASSIS

- High-capacity 8-slot/14-slot/18-slot PXI/cPCI backplane
- Low-profile 4U rugged design
- Easily convertible for rack or bench used
- 51 CFM for 3/4/6 high pressure tube-axial fans
- 175W/ea plug-in power supply
- Removable fans and air filter
- Optional DC (24V) input configuration available
- Comprehensive EMC shielding

KEY FEATURES- BACKPLANES

- Compliant With PXI Specification R2.0
- Accepts Both PXI and CompactPCI (PICMG 2.0 R3.0) 3U Modules
- Standard 3U Form Factor
- Two ATX Sockets and Screw Terminals for +3.3V, +5V, +12V & -12V DC Output Connection
- 64-Bit PCI BUS On P1 & P2, Supports N-1 BUS- Mastering I/O Slots. (N : Slots)
- System Controller Slot Is Located In Slot 1
- Trigger Controller Slot Is Located In Slot 2, Providing Individual Triggers To All Other Peripherals
- Dimension :
  - 8-slot / 227.3mm x 128.7 mm x 3.2 mm
  - 14-slot / 337.5mm x 128.7mm x 3.2mm
  - 18-slot / 420.6mm x 128.7mm x 3.2mm

Chassis

The PXI-52100 platform features the industry-standard, 8-slot/14-slot/18-slot PXI/ CompactPCI backplane integrated into a 3U Eurorack enclosure with a bay for removable power supplies.

With hot pluggable power supplies and optional battery packs, 52100 offers the widest application range of all chassis on the market.

Mounting attachment locations allow the PXI-52100 to be mounted against a wall or bulkhead, with the card cage extended in front for easy access to adapter card. The rear of the card cage is enclosed to protect the backplane from contamination as well as provide shielding for RFI/ EMI.

PXI Systems Alliance

Power Supplies

The PXI-52100 chassis accepts removable power supply modules of the cPWR series. The power connector is a PCI 47M 400A1 connector, compliant with PICMG 2.11 Power Interface Specification standard, a mechanically and electrically roBust connector.

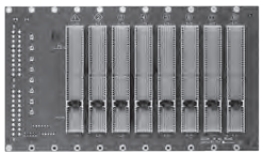
Backplanes

PXI (PCI eXtensions for Instrumentation) defines a rugged PC platform for measurement and instrumentation. PXI products are compatible with the CompactPCI industrial computer standard but offer additional features, such as environmental specifications, software requirements, and built-in timing and triggering. Moreover, PXI backplane provides configuration control and longer product lifetimes than typical desktop design.

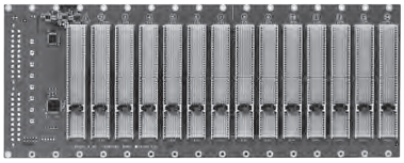
PXI backplane is designed for instrumentation computer. Its architecture makes rapid repair by board substitution possible and system upgrades and changes are greatly simplified, with minimum resulting system downtime.

SPECIFICATIONS			
Chassis	**52101**	**52102**	**52105**
Backplane	• 3U-sized; PXI backplane • Compliant with PXI Specification R2.0 • PXI and CompactPCI (PICMG 2.0 R3.0) 3U modules		
Accessible Slots	8 slots	14 slots	18 slots
Power Supply	Output: 175W max. x 2 sets		Output: 175W max. x 4 sets
	• AC Input: 90V to 264V • DC Input: 18V to 36V		
BUS Width	64-bit		
Rack Mounting	4U, 19" EIA format		
Cooling Capacity	Slot cooling capacity in worst-case slot is 50W		
Module Cooling	Forced air circulation (positive pressurization)	Forced air circulation (positive pressurization)	Forced air circulation (positive pressurization)
	via 51 cfm (x3)	via 51 cfm (x4)	via 51 cfm (x6)
Slot Airflow Direction	P1 to P2, bottom of module to top of module		
Module Cooling Fan MTBF	75,000+hr		
Weight	8.5kg	9.5kg	13.5kg
Dimensions (WxDxH) mm	• Desktop: 442.2 x 257.8 x 192.1		• Desktop: 442.2 x 481.2 x 192.1
	• Rack-mount: 482.6 x 257.8 x 177.0		• Rack-mount: 482.6 x 481.2 x 177.0
Operating Temp.	0˚C ~ 55˚C		
Storage Temp.	-20˚C ~ 70˚C		
Humidity	10 ~ 95% @ 40˚C, non-condensing		
Packaged Vibration	5 ~ 100Hz: 0.015G2/Hz; 100 ~ 200Hz: -6 dB/Oct; 200 Hz: 0.0038 G2/Hz		
Unpackaged Vibration	5 ~ 55 ~ 5Hz 0.38mm Peak to Peak		
Drop Test	Falling Height: 76 cm; Falling: 1 corner/3 edges/6 faces		
Shock Test (Operating)	Acceleration: 10G; Pulse width: 11ms; Pulse shape: half sine wave; No. of shock: 3 shocks for bottom side		

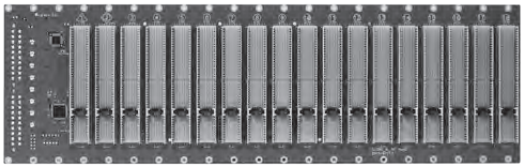
ORDERING INFORMATION		
	Chassis (w/Backplane)	AC Power Supply (Input 110/220Vac)
52101-1/52102-1	1	2
52105-1	1	4
52101-A	8-Slot, 3U 64-Bit PXI Backplane	
52102-A	14-Slot, 3U 64-Bit PXI Backplane	
52105-A	18-Slot, 3U 64-Bit PXI Backplane	



52101-A : 8-slot backplane

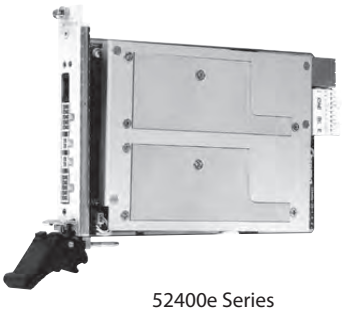


52102-A : 14-slot backplane



52105-A : 18-slot backplane

All specifications are subject to change without notice.



52400e Series

KEY FEATURES & FUNCTIONS

- PXI Express Peripheral Module (X1 PCI Express Link) (Model 52400e Series)
- Four quadrant operation
- 18-bit source/measure resolution (multiple selectable ranges)
- Low output noise
- High measurement speed (100k s/S)
- High output slew rate
- Optional measurement log
- DIO/Trigger bits
- Output profiling by hardware sequencer
- Programmable output resistance
- Floating & Guarding output
- 16 Control Bandwidth Selection
- Master / Slave operation
- Driver with LabView/LabWindows & C/C# API
- Softpanel GUI

APPLICATIONS

- Semiconductor Test
- LED / Laser Diode Test
- Battery Test
- Transistor Test
- Solar Cell Test
- Electric Vehicle Test
- Avionics Test
- Power Electronics Test
- Sensor Test

The Chroma 52400e is a series of 3U PXI Express module that can host 2 programmable source/measure channels, while 52400 is a series of 3U PXI module hosting 2 programmable source/measure channels. They are designed for highly accurate source or load simulation with precision voltage with precision voltage and current measurement.

The SMU combines four-quadrant operation with precision and high speed measurement. This makes the SMU an ideal instrument in many parametric test applications ranging from ICs, two-leaded components such as sensors, LEDs, laser diodes, transistors, to solar cells, batteries and many other electronic devices.



52400e/52400 Series

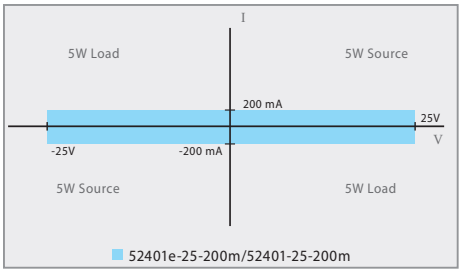
PXI Systems Alliance

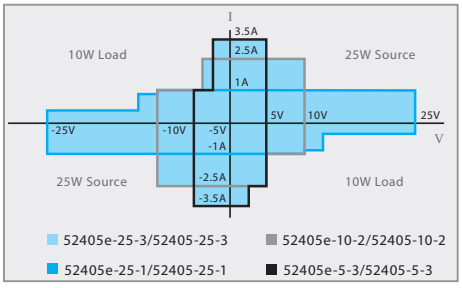
The 52400e/52400 series feature: 16 selectable control bandwidths to ensure high speed output and stable operation; multiple source/measure ranges with an 18-bit DAC/ADC to provide the best resolution and accuracy available with a sampling rate up to 100K s/S; programmable internal series resistance for battery simulation; ±force, ±sense and ±guards lines to avoid leakage current and reduce settling time -- especially useful for low current test applications.

The 52400e/52400 series have patented hardware sequence engine that uses deterministic timing to control each SMU. The sequencer's on-board memory can store up to 65535 sequencer commands and 32k measurement samples per channel, allowing cross module/card synchronization and latency free output control and measurement. No PC communication is required during execution of the hardware sequencer test process.C, C#, LabView, LabWindows APIs and versatile soft front panels come standard with each SMU. The back connectors are compatible with both PXIe and hybrid chassis. All of these features enable easy integration to PXIe or PXI-hybrid systems designed for a wide range of applications.

Four Quadrant Operation

All 52400e/52400 series SMUs support four quadrant operation for applications that require a reverse voltage/current source or load. During a load operation, the module is limited by the PXI chassis' standard of 20W heat dissipation per slot. Shown below are the quadrant diagrams with the operating regions of the Chroma PXIe/PXI SMUs.

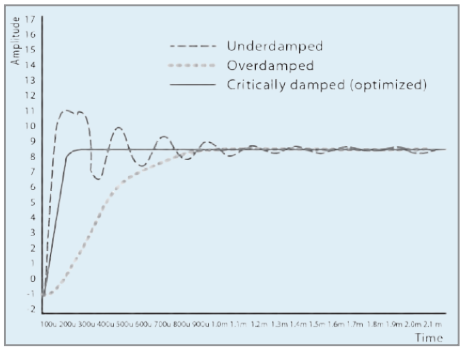




Control Bandwidth Selection

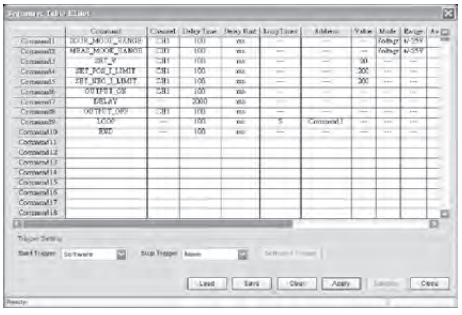
To reduce test times, Chroma's SMUs are designed for fast response providing high speed output voltage and current. The impedance of the DUT, fixture, or cabling may cause loop instability under voltage or current source mode. An unstable loop can cause saturation, oscillation, or even damage the DUT.

To prevent system instability, the 52400e/52400 series SMUs provide 16 user selectable control bandwidths, eliminating the need for external capacitors or inductors placed near the DUT. This results in faster output rise time, reduced voltage ripple and noise, and reduced transient response. The control bandwidth can be modified via software to maximize test flexibility and minimize downtime when changing DUTs.



Unique Hardware Sequencer

The Chroma Hardware Sequencer is a powerful tool that can predefine commands as instrument executable steps. This allows latency free control and measurement since no PC interaction is required during execution. Once the instrument receives the start trigger, it will execute step commands in the sequencer table line by line or as defined by the trigger. Shown below are the soft panels for the SMU in hardware sequencer mode (left) and direct operation mode (right).



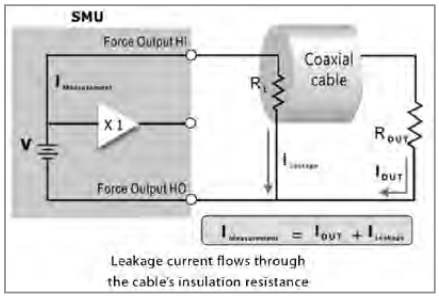


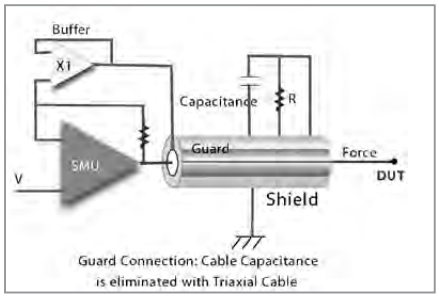
Versatile Soft Front Panel

Guarding for Low Current Application

Guarding is an important technique for very-low current measurements. Guarding reduces leakage current error and decreases settling time. This is achieved by keeping the potential of the guard connector at the same potential as the force conductor, so current does not flow between the force and guard conductors. Guarding also eliminates the cable capacitance between the SMU and DUT.

The Chroma 52400e series features two ±guard wires per channel, resulting in faster and more accurate measurements.





Master/Slave Operation

For maximum flexibility, the 52400e/52400 series SMUs support Master/Slave operation when higher current under FVMI (Force Voltage Measure Current) mode is required. To ensure accurate current sharing between modules and maximum performance, Master/Slave operation is only allowed between SMUs of the same model number.

Current sharing is achieved by one channel operating as the Master under FVMI mode while the Slaves operate in FIMV mode. The Master channel is programmed in voltage mode while the Slaves are set to current mode. The Slaves will follow the Master's set voltage. The wiring diagram for current sharing in master/slave control is shown to the right.

SPECIFICATIONS						
Model Name	**52401e-6-1 52401-6-1**	**52401e-25-200m 52401-25-200m**	**52405e-5-3 *1 52405-5-3 *1**	**52405e-10-2 *1 52405-10-2 *1**	**52405e-25-1 *1 52405-25-1 *1**	**52405e-25-3 *1 52405-25-3 *1**
Slots	1					
Output Channels	4	2				
Source	3W x 4	5W x 2	25W x 2			
Load	1.8W x 4	5W x 2	10W x 2			
Input Voltage	Backplane Power	External 48VDC source required *2				
Input Current	2.5A Max	0.7A Max	2.2A Max			
Output Isolation	Isolated but share common LO	Isolated	Isolated by External Power Supply			
Bit Resolution	16 Bits	18 bits				
Programmable Loop Bandwidth	8 steps	16 steps				
Settling Time	<30µSec, typically					
Force Voltage anges	±6V	±25V, ±10V, ±5V, ±2.5V, ±1V, ±500mV	±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV	±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV	±25V, ±12.5V, ±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV	±25V, ±12.5V, ±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV
Force Current Ranges	±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA	±200mA, ±20mA, ±2mA, ±200uA, ±20uA, ±2uA, ±200nA	±3.5A, ±2.5A, ±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA	±2.5A, ±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA	±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA	±3.5A(≤5V), ±2.5A(≤10V), ±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA
Measure Voltage Ranges	±6V	±25V, ±10V, ±5V, ±2.5V, ±1V, ±500mV, ±250mV, ±100mV, ±50mV, ±25mV, ±10mV, ±4mV	±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV	±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV	±25V, ±12.5V, ±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV	±25V, ±12.5V, ±10V, ±5V, ±2V, ±1V, ±500mV, ±200mV, ±100mV
Measure Current Ranges	±1A, ±100mA, ±10mA, ±100uA, ±10uA	±200mA, ±20mA, ±2mA, ±200uA, ±20uA, ±2uA, ±200nA	±3.5A, ±2.5A, ±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA	±2.5A, ±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA	±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA	±3.5A(≤5V), ±2.5A(≤10V), ±1A, ±100mA, ±10mA, ±1mA, ±100uA, ±10uA, ±1uA

• Continued on next page ➡

All specifications are subject to change without notice.

Model Name	52401e-6-1	52401e-25-200m	52405e-5-3 *1	52405e-10-2 *1	52405e-25-1 *1	52405e-25-3 *1
Force Voltage Accuracy	0.02% reading + 0.01% F.S.	0.05% reading + 0.0076% F.S. (≥500mV Range) 0.02% reading + 25uV (<500mV Range)	0.05% reading + 0.008% F.S. (≥500mV Range) 0.05% reading + 25uV (<500mV Range)			
Force Current Accuracy	0.1% reading + 0.1% F.S. (1A Range) 0.05% reading + 0.05% F.S. (<1A Range)	0.05% reading + 0.05% F.S. (≥2uA Range) 0.05% reading + 200pA (<2uA Range)	0.1% reading + 0.1% F.S. (>1A Range) 0.05% reading + 0.05% F.S. (≤1A Range)			
Measure Voltage Accuracy	0.02% reading + 0.01% F.S.	0.05% reading + 0.0076% F.S. (≥500mV Range) 0.05% reading + 25uV (<500mV Range)	0.05% reading + 0.008% F.S. (≥500mV Range) 0.05% reading + 25uV (<500mV Range)			
Measure Current Accuracy	0.1% reading + 0.1% F.S. (1A Range) 0.05% reading + 0.05% F.S. (<1A Range)	0.05% reading + 0.05% F.S. (≥2uA Range) 0.05% reading + 200pA (<2uA Range)	0.1% reading + 0.12% F.S. (>1A Range) 0.05% reading + 0.05% F.S. (≤1A Range)			
Wideband Source Noise	< 30 mV pp 20Mhz BW No Load					
Measurement Sampling Rate	600K Samples/s	100K Samples/s				
Output Connection	5 Wires (± Force, ± Sense, +Guard)	6 Wires (±Force, ±Sense, ±Guard)				
Measurement Log	32K Samples/channel					
Output Profiling	65535 Steps					
Trigger Input	Programmable 4 Ch	1 Ch	Programmable 8 Ch			
Trigger Output						
Floating Output	No	Channel Isolated				
Master/Slave Mode	Yes	No	Yes			
Programmable Resistance	Yes	No	Yes			
Regulatory Compliance	CE/FCC					

Note *1 : If chassis has less than 38.2W/slot, then the below output limitations apply.
2.5Amp range = 50% on duty cycle, 500mSec maximum continuous on time
3.5Amp range = 40% on duty cycle, 500mSec maximum continuous on time (1250mSec off during maximum on time case)
If the PXI-SMU card is over temperature, it will automatically disconnect output to protect the unit.
Note *2 : Required Voltage Range 48V ± 5% ; Required Voltage Noise ≤ 100mVpp
All specifications are subject to change without notice.

ORDERING INFORMATION

52401e-6-1: High Precision Source Measurement Unit, 6V/1A
52401e-25-200m : High Precision Source Measurement Unit, 25V/200mA
52405e-5-3 : High Precision Source Measurement Unit, 5V/3.5A
52405e-10-2 : High Precision Source Measurement Unit, 10V/2.5A
52405e-25-1 : High Precision Source Measurement Unit, 25V/1A
52405e-25-3 : High Precision Source Measurement Unit, 25V/3.5A
A524006 : External AC-DC Power Adapter (drives up to 3x 52401e or 1x 52405e SMUs)
A524011 : High Power External AC-DC Adapter (drives up to 3x 52405e SMUs)
A524009 : 52405e Output Triaxial Cable



KEY FEATURES

- 4 Isolated channels of ±6V, 1 A (max)
- 20-bit measurement resolution
- Low output noise
- Maximum sampling rate of 600 KS/s
- Deterministic output by hardware sequencer
- Programmable output resistance
- 8 selectable control bandwidths
- Master/Slave operation
- Drivers with LabVIEW/ LabWindows & C/C# API
- Soft panel GUI
- PXI Express Peripheral Module (X1 PCI Express Link)

APPLICATIONS

- Semiconductor
- Components Manufacturing

PXI Systems Alliance

Chroma 52310e series is a programmable PXI-Express DPS (Device Power Supply) Card designed for high-accuracy and reliable output power for device test applications. Its compact size, easy level of integration, and high flexibility make the 52310e series ideal for multi-channel power supplies.

Chroma 52310e series features 8 selectable control bandwidths to ensure high speed output and stable operation; multiple current measurement ranges with a 20-bit DAC/ADC provide the highest resolution and accuracy with a sampling rate up to 600K S/sec; programmable internal series resistance for battery simulation.

Chroma 52310e DPS series has a patented hardware sequence engine that has deterministic timing to control each DPS channel. The sequencer's on-board memory can store up to 1024 sequencer commands and 32k measurement samples per channel.

Each 52310e DPS card can be configured to load-share by connecting channels in parallel. This enables users to achieve higher output currents on the same card.

A versatile soft front panel and C / C# / LabVIEW / LabWindows APIs are provided for rapid test development and deployment. The back connector is compatible with both PXIe and hybrid chassis slots. All of these features enable easy integration to PXIe or PXI-hybrid systems designed for a wide range of applications.

Chroma 52310e series programmable device power supplies are designed specifically for test applications that demand precision output voltage/current and tightly coupled measurement capabilities. It provides a cost-effective solution ideal for a broad range of design and production applications such as semiconductor and components manufacturing.

ORDERING INFORMATION

52314e-6-1 : Device Power Supply

SPECIFICATIONS	
Model	**52314e-6-1**
Slot	1
Output Channels	4
Source Power	6W peak (3W continuous) x 4
Max. Current	1A Max (Surge capability)
Input Voltage	PXI-Express backplane power
Output Isolation	Isolated, but share a common LO
Bits Resolution	20 bits for measurement; 16 bits for programming; 16 bits for current clamping
Programmable Loop Bandwidth	8
Force Voltage Ranges	±6V
Measure Voltage Ranges	±6V
Measure Current Ranges	1A, 100mA, 10mA, 1mA, 100uA, 10uA
Force Voltage Accuracy	0.02% reading + 0.01% F.S.
Measure Voltage)Accuracy	0.02% reading + 0.01% F.S.
Measure Current Accuracy	0.1% reading + 0.1% F.S. (1A) 0.05% reading + 0.05% F.S. (<1A)
Output Voltage Ripple & Noise	<50mV pp 20MHz BW Full Load
Measurement Sampling Rate	600K Samples/second for both V & I
Programming Output Resistance	Up to 1 ohm (1A range); Up to 10 ohm (100mA range)
Output Ganging	Channels must be on the same DPS card (1A range only)
Output Connection	4-Wire (±Force / ±Sense)
Measurement Log	32K Samples per channel
Output Profiling	1024 Steps per channel
Digital In	Programmable 4 CH
Digital out	
Master/Slave Mode	Yes
Programmable Resistance	Yes
Control Interface	PXI-Express
Regulatory Compliance	CE/ FCC

* Unless otherwise noted, specifications are only valid under the following conditions:
Ambient temperature 23 °C ± 5 °C; After 30 minutes warm-up period; Self-calibration performed within the last 24 hours.

All specifications are subject to change without notice.



0~48VDC/2AMP/60W

KEY FEATURES

- Dual Isolated outputs; 0-48VDC/ 2A MAX./ 60W, programmable
- Direct Universal AC input via front panel (Model 52914)
- External Trigger function
- Programmable current limit
- Over voltage, over current and short circuit protection
- Remote Voltage Sense
- 16 Bit read back voltage and current at output
- Supplies can be connected in series

Chroma 52912/52914 programmable DC power supplies are designed specifically for test applications that demand precise output voltage/current and tightly coupled measurement capabilities. Chroma 52912/52914 provides you a good return on investment. The versatile design and world-class performance of Chroma 52912/52914 make them ideal for a broad range of design and production applications in markets as diverse as communications, semiconductor, and components manufacturing.

Measurement Function

In operation, the measurement capabilities include quickly sourcing I/V and then measuring I/V automatically without processor intervention. The 52912/52914 has built-in hardware sequence list that can execute command and store data in FIFO without processor action. With the tight integration of a Chroma 52912/52914, you'll get high speeds for high throughput and high measurement accuracy and repeatability for yield integrity.

Power Levels

The 52912/52914 Programmable power supplies provide two independent and isolated 60W (MAX) power supplies, and each channel is programmable from 0-48VDC to a maximum of 2.0 Amps. The 52912/52914 include programmable current limit to protect critical UUT's from excessive current, output will automatically switch into constant current mode when limit is reached. For greater power or voltage applications, channels can be connected in series.

Input Power

To avoid excess power draw from the PXI backplane, the 52912 draws input power (+56VDC) via front panel connections. This approach not only minimizes power required from the backplane but also maintains complete isolation between backplane logic and power conversion circuitry for noise immunity. For applications where +56VDC is not available, Chroma 52912 provides an optional AC-DC adapter which allows the instrument to be operate from 100~240VAC mains. Chroma 52914 incorporates the AC-DC converter circuit on board. Universal power (100~240VAC) is applied to the front panel directly in order to produce the dual isolated programmable outputs.

Compliant to PXI and cPCI Standards

The 52912/52914 Programmable power supplies comply with the latest PXI Revision 2.0 specifications of the PXI System Alliance (PXISA) as well as the CompactPCI specifications as defined by the PCI Industrial Computer Manufacturing Group (PICMG). Thus, the 52912/52914 may be used in either PXI or CompactPCI mainframes.

ORDERING INFORMATION

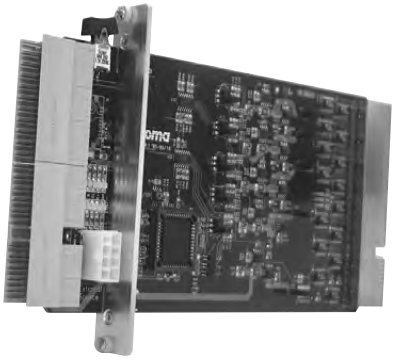
52912 : PXI/cPCI Programmable DC Power Supply (DC Input)
52914 : PXI/cPCI Programmable DC Power Supply (AC Input)
A529102 : AC/DC Adapter (for Model 52912)



A529102

SPECIFICATIONS

Model	52912 (CE)	52914
Dimensions	1-Slot, 10x16cm	3-Slot, 10x16cm
Output		
Voltage/Current/Power	Channel #1 : 0 ~ 48VDC, 2A MAX., 60W Channel #2 : 0 ~ 48VDC, 2A MAX, 60W	
Voltage Accuracy	0.5% of programmed value ±50mV	
Voltage setting resolution	12 Bits	
Line Regulation	0.1%	
Load Regulation	0.1% (10% to 90% load change)	
Transient Response (20MHz)	Peak transient less than 150mV and return to within 5% less than 2ms following 20% load change. (Test Condition: 24V@1.44A~1.8A, 48V@0.8A~1A) at 25˚C	
Current Limit Accuracy	0.5% ± 50mA (12 Bits Resolution)	
Read back	Voltage: ±0.2% of Reading + 60mV Current: ±0.5% of Reading + 10mA	
Rise Time	< 50 ms (10% ~ 90%)	
Efficiency	84% typical	
Measurement Function		
Maximum sampling rate	5K S/s of each channel	
Input Impedance	5kΩ	
Trigger sources	Software, external	
Buffer size	2K samples per channel	
Data transfers	Polling	
Sequence Function		
Trigger sources	Software, external	
Input Impedance	3.78kΩ	
Buffer size	256 command words per channel	
Input		
DC Input	Isolated + 56VDC (dual)	--
AC Input	100V ~ 240VAC, 50 or 60 Hz (Optional A529102)	100 ~ 240VAC, 50 or 60 Hz
Software API	• VISA compatible via National Instrument's VISA 2.5 or above • 20 Windows DLL's API	
PCI Data BUS	PCI V2.2 compliant, 33MHz, 32 Bits	
Operating Temperature	0˚C ~ 55˚C	
Operating Humidity	10% ~ 90 % relative	
Storage Temperature	-30˚C ~ 70˚C	
Isolation		
Channel to Channel	500V	
Channel to Chassis	500V	
Standards	• PXISA PXI 2.0 • PICMG 2.0 R3.0 CompactPCI	



KEY FEATURES

- Extend PXI backplane signals
- 3U 64-bit PXI extension card available for hot swapping PXI card
- Extend PXI BUS to outside of chassis, easy for inspection
- Able to use voltage meter to measure the power consumption of +5V, +3.3V, +12V,-12V and VIO
- Use Jumper to control the cutoff current
- Power is controlled by mechanical switches
- Provide external power device
- Provide short circuit protection

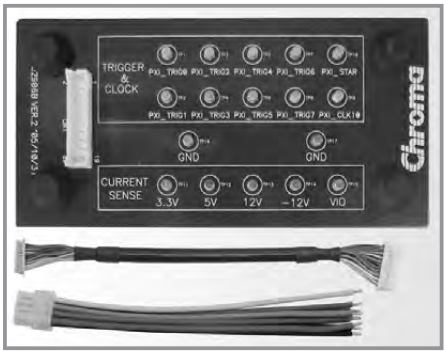
PXI Systems Alliance

The function of PXI extension card is to extend the PXI backplane signal outside of the chassis. Inserting the PXI card to extension card can easily check or measure the PXI card's signal under power on condition, which resolves the problems of inconvenient inspection due to the PXI card inside the chassis for RD or maintenance personnel. PXI extension card is able to isolate the voltage and signals sent to the PXI card for hot swap when the system is powered on. Every time the extension card activates it can supply the power required for PXI initialization. It eliminates the need for rebooting PC when users read and re-write the configuration files.

PXI extension card allows users to measure the voltage consumption power of PXI standard 5 sets voltage easily using the voltage meter. The extension card has over current protection circuit that can prevent the system backplane and other related components from damage once the PXI card malfunctions. Jumpers on the extension card are available for users to define the current range for protection; in addition an outward power connector is attached to supply the power externally instead of using the backplane power.

ORDERING INFORMATION

52906 : Extension Card



Test Board

SPECIFICATIONS	
Model	**52906**
BUS	PXI / Compact PCI 32 or 64 bit
Input Requirement	5V at 250 mA, 12V at 100 mA, -12V at 100 mA
Input for UUT	From chassis or the external power, configurable by jumpers for each power source
Output Current Limit Protection	5V, up to 5 Amps, 3 limitations jumper selectable 3.3V, up to 3 Amps, 3 limitations jumper selectable VIO, up to 2 Amps, 3 limitations jumper selectable 12V, up to 1.25 Amps, 3 limitations jumper selectable -12V, up to 1 Amp, 3 limitations jumper selectable
Output Voltage Drop	0.07 volts drop for every 1 Amp drawn for 5V, 3.3V; 0.1 volts drop for every 1 Amp drawn for VIO; 0.25 volts drop for every 1 Amp drawn for 12V; 0.15 volts drop for every 1 Amp drawn for -12V
Propagation Delay	Less than 500 pico-seconds from the PC BUS to the UUT. (Switch propagation delay is rated at 250 Pico-seconds)
UUT ON-OFF Controls	Via SPDT switch on-board
Outputs	Current draw by the UUT can be measured at connector J5 for 5V, 3.3V, 12V, -12V and VIO. Each volt represents 1 Amp.
Current Sense Accuracy	Typical below 10% for 5V, 3.3V, 12V, and VIO; below 15% for -12V
Mechanical Dimensions	100 x 220 mm (3U high)

All specifications are subject to change without notice.



175W

KEY FEATURES

- Eurorack-compatible module design
- Input: 100V ~ 240Vac, 18V ~ 36Vdc
- Hot-swappable
- N+1 redundant
- Remote sense on main output (+5V, +3.3V)
- Efficiency 73%
- Build-in EMI protection
- EMI Meets EN55022/FCC Class A
- Overvoltage protection
- Short circuit protection on all outputs
- Over temperature output
- Compliant with PICMG 2.11 (47-pin)
- Status LEDs indicate power OK or fault
- Current sharing on main output (+5V and +3.3V)
- Worldwide Safety Approval including UL, CSA, CE Marking

The cPWR-59100 series features models of hot swappable, front access power supplies for 3U CompactPCI platform. It utilizes switching technology and high power density design as well to achieve its small size and large power output. Optionally, two or more power supplies can be used to implement current sharing, N+1 redundancy, and fault-tolerance systems.

ORDERING INFORMATION

cPWR-59102 : 3U cPCI Power Supply, AC 110/220V input, 175W
cPWR-59104 : 3U cPCI Power Supply, DC 24V input, 175W

SPECIFICATIONS		
Model	**59102**	**59104**
Power Capacity	175W	175W
Input Range		
Voltage	100 ~ 240 Vac	18 ~ 36 Vdc
Frequency	50 ~ 60 Hz	--
Max. Inrush Current	20A (110Vac)	20A
P.F.C.	20.97	--
Protections	Over Voltage, Low Voltage, Surge	
Output Range		
Efficiency	73% (typical)	
Voltage	V1(+5V) / V2(+3.3V) / V3(+12V) / V4(-12V)	
Max. Current	25A/25A/3A/1A	
Hold-up Time	20 ms	5 ms
Voltage Regulation	±1% (V1, V2), ±3% (V3, V4)	
Line Regulation	±0.3%	
Current Sharing	±5%	
Noise and Ripple	1% peak-peak or 50mV whichever is greater	
Over Load Capacity	≦120% continuous and Shutdown when over current occur	
Transient Response	Peak transient less than 200mV and returns to within 1% less than 300 μS following 25% load change (V1, V2, V3)	
Remote Sense	Total voltage compensation for cable losses with 150mV respect to output.	
Voltage Drop	<5% @ Hot-swap (V1, V2, V3), Load > 20%	
Protections	Over Voltage(V1, V2), Low Voltage, Over Current, Over Temperature, Hot-swap, Short	
Minimum Load	V1 (2A), V2 (1A)	
I/O Interface		
Display and Status	Normal Indication (Green LED) / Fault Indication (Red LED)	
Power Connector	47 pins: Positronic PC147M400A1 or PCIH47M400A1	
Safety and EMS		
Safety	UL 1950 / cUL 1950 / EN 60950	
EMI	EN 55022 ClassA	
EMS	EN55024: 1998 IEC 61000-4-2: 1995 ESP IEC 61000-4-3: 1995 RS IEC 61000-4-4: 1995 EFT/B IEC 61000-4-5: 1995 Surge IEC 61000-4-6: 1995 1996 CS IEC 61000-4-8: 1993 Power Frequency Magnetic Field IEC 61000-4-11: 1994 Volge and Interruption Measurement	
CE Mark	Yes	
Others		
Operating Temperature	0˚C ~ 40˚C (Full-load)	
Storage Temperature	-40˚C ~ 85˚C	
Operating Humidity	0 ~ 95% (non-condensing)	
Cooling	At least 12 C.F.M. air flow is required	
Audible Noise	< 40 dBA	
Dimensions	H (3U) x W (8HP) x D (172.8 mm)	
Weight	0.85 Kg	

General Purpose Test Solution

Thermal/Multi-function Data Logger 16-1
TEC Controller 16-4
6½ Digital Multimeter 16-7
GNSS Signal Simulator 16-9
GPS Simulator 16-10
Wireless Test Station 16-11
RF Recorder/Player 16-12
Wireless Communication Test System 16-13



Thermal/Multi-function Data Logger



TEC Controller



6½ Digital Multimeter



GNSS Signal Simulator



GPS Simulator



Wireless Test Station



RF Recorder/Player



Wireless Communication Test System



8/64 channels

KEY FEATURES

- Models with 8 and 64 channels on-line data recording. Multi-sets linked to a PC for hundreds of channels are doable
- Support B, E, J, K, N, R, S, and T type thermal couples with ITS-90 defined temperature range
- Individual channel cold junction compensation with < ±0.3˚C accuracy
- Temperature resolution up to 0.01˚C, error down to ±(0.01% of reading+0.3˚C)
- VA-480 voltage adaptor : Voltage range ±480VDC ; Resolution 1mV ; Accuracy 0.1% of reading+1mV
- VA-10 voltage adaptor : Voltage range ±10VDC ; Resolution 100uV ; Accuracy 0.05% of reading+500uV
- 1000VDC channel to channel isolation, full protection for testing points with charge and guarantee for accurate measurements
- Thermal couple open circuit detection
- PC-based operation with powerful software for recording and analyzing data
- 8 channel model is USB powered. No battery or external power supply is required

It is a general requirement to record temperatures, voltages, currents, and many physics quantities during research, product development, productions, and quality assurance processes. The number of record channels can be a simple one to several complicated set of hundreds. Thermal/multi-function data loggers are prefect solutions to serve for these measurement and tracking needs.

There are several measurement products in the market to perform such a large-scale and extensive time varying recording. Some are expensive, some are limited in accuracy or resolution, and some have low immunity to interference. Chroma thermal/multi-function data loggers are by far the most cost-effective solutions for versatility, accuracy, stability, and interference immunity among this category.

Chroma thermal/multi-function data loggers measure temperatures, voltages, and currents with high accuracy and resolutions. For example, they support 8 types of thermal couples measurement with ITS-90 defined temperature range at 0.5˚C accuracy and 0.01˚C resolution*, while most data loggers in the market are at 1 ˚C accuracy and 0.1˚C resolution*. Chroma loggers are with 1000VDC channel to channel isolation, which means they can attach thermal couples to objects with high electricity, such as batteries, solar cells, working PCB, etc., and still get correct data. Many competitors are just malfunctioned or even damaged in those cases. Data retrieve in Chroma loggers are in a parallel architecture, while most of competitors use a sequential multiplexing method. This means data rate per channel is quick and constant for Chroma loggers, while others become much slower when number of channels is bigger.



8 channels

Using Chroma thermal/multi-function data loggers, customers get confidence in measured data and high Performance/Cost ratio. Most of all, we can help in certain cases that our competitors fail, and only Chroma succeeds.

* Thermocouple error excluded. Please see specification list for detail.

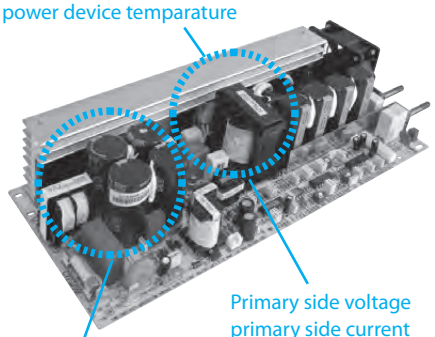
1000VDC channel to channel isolation

In developing or qualifying some electronic devices, tracking records of temperatures/voltages/currents are required. Many cases there can be high voltage difference between measured points. A switching power supply, for example, is required to measure the primary side voltage/current, secondary side voltage/current, and key component temperatures. Unfortunately, many data loggers including some leading brands are incapable to handle such a high voltage difference between both sides. Few hundred voltage difference can mess up their measurement totally, or even kills their loggers.

Chroma thermal/multifunction data loggers are perfect for the measurements in a situation with charge and high voltage difference. The feature of 1000VDC channel to channel isolation makes them immune to voltage difference between any two channels. One just attaches thermal couples or wires on the device or conducting pads and gets accurate data.

Another case can be battery system tests. One needs to know the voltage and temperature of each cell. For other data loggers, often the voltages cannot be measured properly in the cascade configuration. The thermal couple attachment is another issue needing special care. All these problems are easily solved using Chroma thermal/multi-function data loggers for the high channel to channel isolation.

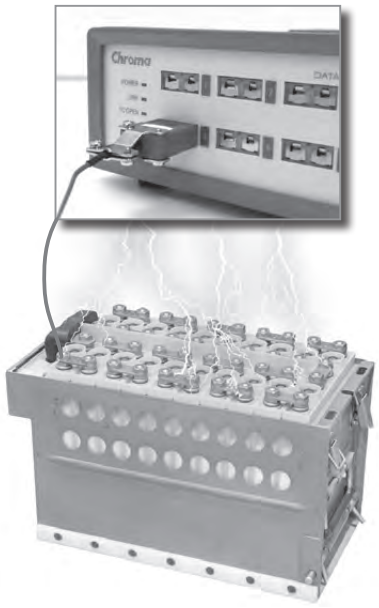
Coil temperature
power device temparature



Primary side voltage
primary side current

Secondary side voltage
Secondary side current

Multi-channel Data Logger



0.5˚C accuracy and 0.01˚C resolution

For the same or even lower prices, Chroma thermal/multi-function data logger offers higher accuracy and better resolution than our competitors do. While most of data loggers are at 1˚C accuracy and 0.1˚C resolution, Chroma data loggers are 1 order better than theirs. It is always true the more accurate and seeing more details, the better for measurements.

In order to achieve such high accuracy and resolution, Chroma implements individual CJC for each channel. High bit-count A-to-D converters and advanced noise suppression circuit makes outstanding performance for these data loggers. The best of all is that customers can enjoy better specifications without paying more.

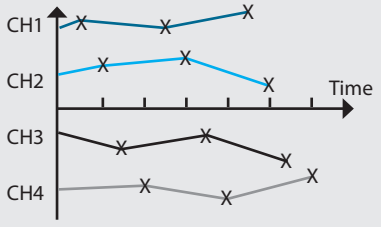
Precise temperatures can be critical in thermal conductivity measurements, chemical processes, and biologic experiments. Testing a heat pipe, for example, often requires resolving <1˚C temperature difference between evaporation and condensing zones. Some liquid crystals can change their properties drastically with a very small temperature variation at critical temperatures.

Constant data rate per channel

Most of data loggers in the market use a multiplexing circuit structure. All channels share a bandwidth which means the more active channels, the slower data rate per channel will be. Chroma data loggers use a parallel data retrieving circuit structure. No matter how many channels are active, the data rate can be as fast as 5 samples per second per channel.

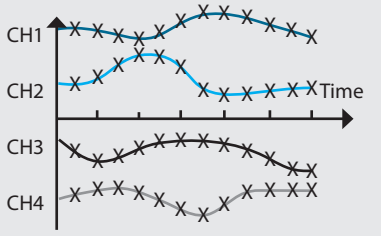
All specifications are subject to change without notice.

The benefit of constant data rate can be profound for recording large number of channels. For tens of channels, total data bandwidth of Chroma data logger can be several times larger than that of other data loggers. Some other data loggers can become too slow and lose details. They can miss recording critical changes happen in a short time. Chroma data loggers greatly reduce this possibility.



What other data loggers see,
more channels, slower rate each channel

$$\text{Sample rate per channel} = \frac{\text{bandwidth}}{\text{number of channels}}$$



What CHROMA data loggers see
constant rate each channel.

Sample rate per channel = constant

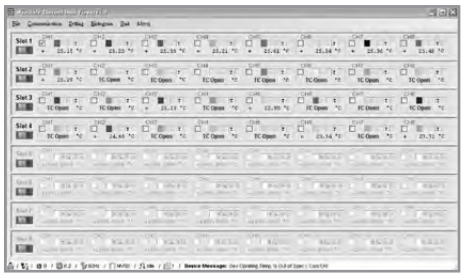
Powerful data recording and analyzing through a PC

Personal computers and Notebooks are powerful for their fast calculation and data processing capability, friendly graphic user interface, and huge hard disk storage. While operation of many other data loggers are limited by their small display and memory, Chroma data loggers link to PCs or Notebooks for direct display, analyses, and storage.

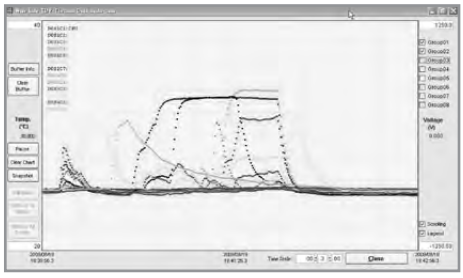
Using the PC software, one can see the detail of all the curves, change drawing time and range scales, create marks, zoom in selected sections, and perform difference calculations, all in few simple steps. The PC RAM is used as buffer to store every data since the logger is powered on, making data tracking back possible without opening the record file. Size of data recording is determined by hard disk free space, which is almost unlimited.



Main panel



Data panel



Data Histogram

Applications

- Automotive & Aircraft
- Electrical & Electonics
- Solar Energy
- Power
- Machinery
- Iron & Steel
- Metals & Mining
- Oil & Gas
- Water & Waste
- Chemical
- Pharmaceutical & Food
- Others

SPECIFICATIONS			
Model		**51101-8 51101C-8**	**51101-64 51101C-64**
Thermocouple			
Thermocouple T-type	-200 to 400˚C	51101 Series : ±(0.01% of reading +0.3) ˚C *1 51101C Series : ±(0.01% of reading +0.8) ˚C *1	
Thermocouple K-type	-200 to 1372˚C		
Thermocouple B-type	250 to 1820˚C		
Thermocouple E-type	-200 to 1000˚C		
Thermocouple J-type	-210 to 1200˚C		
Thermocouple N-type	-200 to 1300˚C		
Thermocouple S-type	-50 to 1760˚C		
Thermocouple R-type	-50 to 1760˚C		
Thermocouple Jacks		B, E, J, K, N, R, S, or T mini-type	
Thermocouple Connector		B, E, J, K, N, R, S, or T mini-type	
Temperature Reading			
Number of Inputs		8	64
Temperature Sensor Type		Thermocouple : B, E, J, K, N, R, S, T	
Temperature Scale		ITS-90	
Temperature Resolution		±0.01 ˚C	
Temperature Accuracy *1*2		51101 Series : ±(0.01% of reading +0.3) ˚C 51101C Series : ±(0.01% of reading +0.8) ˚C	
CJC Error		51101 Series : ± 0.3˚C 51101C Series : ± 0.8˚C	
Maximum Sample Rate		5 sample/sec.	
Channel to Channel Isolation		1000VDC/750 Vrms	
Input Resistance		5MΩ	
Thermocouple break detection current		100 nA	

Model	51101-8 51101C-8	51101-64 51101C-64
Digital I/O		
Number of Digital I/O	--	4 differential digital inputs and outputs
Digital Input	--	1 trigger input(DI0) and 3 general purpose inputs
Digital Input- High Input Voltage	--	3 ~ 30 V
Digital Input- Low Input Voltage	--	< 0.8 V
Digital Input- High Input Current	--	0.8 ~ 13.1 mA
Digital Input- Low Input Current	--	<10 μA
Digital Input- Terminal Resistor	--	2.2KΩ
Digital Output Configuration	--	transistor switch
Digital Output- External Supply Voltage	--	<30 V
Digital Output- ON-state Voltage	--	<1.5 V
Digital Output- ON-state Current	--	<400 mA
Digital Output- OFF-state Current	--	<2.1 μA
Digital Output- Power Dissipation per Output	--	<0.6 W
Isolation Voltage	±250 V	
Communication		
RS-232	--	Half Duplex, DB-9 female connector
USB	USB2.0 (full speed device) ; USB B-type connector	
LAN	--	10/100 Mbps
Power Specifications		
Power Requirement	4.5~5.5 V	11.4~12.6 V
Maximum Power Consumption	1.2W	18 W
Physical Specifications		
Dimensions (WxDxH)	135.3 x 186 x 51.7 mm	277 x 200.7 x 233 mm
Weight for Main Frame	1.2 Kg	2.4 Kg
Weight per Sensor Card	--	0.15 Kg
Weight (Main Frame + 8 Sensor Card)	--	3.6 Kg
Environmental specifications		
Operating Temperature *1*2	0~50˚C	
Humidity	< 80 %RH	
Power Adaptor Input Voltage	--	90 to 260 VAC
Power Adaptor Input Frequency	--	47 to 63 Hz
Main Frame DC Input	--	12.6 V/1.5 A
Thermocouple Differential Input Voltage Limit	±1.2 V	±1.2 V
Operating Temperature	0~50˚C	
Storage Temperature	-20~60˚C	
Storage Humidity	80 %RH	

Voltage Reading		
Voltage Input Type	VA-480 Voltage Adaptor	VA-10 Voltage Adaptor
Voltage Resolution	1mV	100uV
Voltage Input Range	±480VDC	±10VDC
Voltage Input Accuracy	±(0.1% of reading + 1mV)*3	±(0.05% of reading + 500uV)*3
Input Resistance	1MΩ	300 KΩ

Current Reading	
Current Input Type	IA-3 Current Adaptor
Current Resolution	1mA
Current Input Range	±3A
Current Input Accuracy	±(1% of reading + 1mA)


Voltage/Current Adaptor


Thermocouple

Note *1 : Measure after heat equilibrium is reached and the uncertainty of thermocouple itself is excluded. Operating temperature within 20˚C to 30˚C range.
Note *2 : For operating temperature out of range from 20˚C to 30˚C, additional error ±[(0.01% of reading + 0.03˚C) x (T-25˚C)] will be added. T is the ambient temperature.
Note *3 : Under MV_8 filtering mode
Note *4 : Model 51101-64/51101C-64 with LAN module

ORDERING INFORMATION

51101-8 : Thermal/Multi-Function Data Logger - 8 channel
51101C-8 : Thermal/Multi-Function Data Logger - 8 channel
51101-64 : Thermal/Multi-Function Data Logger - 64 channel
51101C-64 : Thermal/Multi-Function Data Logger - 64 channel

A511000 : VA-480 Voltage Adaptor (option)
A511001 : IA-3 Current Adaptor (option)
A511002 : VA-10 Voltage Adaptor (option)
A511003 : 8-port sensor card with package
A511004 : C8-port sensor card with package

All specifications are subject to change without notice.



150W/300W/800W

KEY FEATURES

- Bidirectional driving with 150W (24V/8A), 300W (27V/12A), or 800W (40V/20A) output
- Filtered PWM output with >90% driving power efficiency while maintaining linear driving with current ripples<20 mA
- Temperature reading and setting range -70 to 250˚Cwith 0.01˚Cresolution and 0.3˚C absolute accuracy
- Short term stability (1 hour) ±0.01˚C and long term stability ±0.05˚C with optimal PID control
- Feature true TEC large signal PID auto tune for best control performance
- 2 T-type thermal couple inputs, one for control feedback and the other for monitor and offset, providing versatile control modes
- RS232 serial communication port for PC remote operation and thermal data recording
- Powerful and user-friendly PC program available
- Perfect matching all Chroma designed temperature controlled platforms

A thermoelectric cooler (TEC) module is a solid state device which can control heat flux using current. First discovered in the 19th century and called the Peltier effect, TEC’ s operate by electrical current flow between two dissimilar conductors. Depending on the direction of the flow heat will be either absorbed or released. This technology is very useful for small scale temperature control; providing fast temperature response and ultra-high temperature stability. TEC temperature control equipment is also very compact and energy efficient in comparison to conventional thermal chambers. TECs have the added advantage of control case temperatures directly and have mechanical moving parts.

Chroma's Model 54100 series of advanced TEC Controllers provide an excellent temperature monitoring engine via two thermal couple inputs. The cold junction of the engine is internally stabilized to 0.001˚C, providing 0.01˚C temperature resolution. The TEC driver circuit within the 54100 uses a filtered PWM architecture which provides much higher drive currents over ordinary PWM drivers and provides smooth current modulation which is critical for electro-magnetic sensitive measurements.

Another important feature of Chroma's 54100 TEC Controllers is its true auto tune function providing for optimum control and temperature response. Stability down to the temperature resolution of 0.01˚C is regularly achieved regardless of the size and geometry of thermal platforms.

High TEC driving capability is another merit of Chroma's 54100 controllers. Currently two modles are available (150W and 300W) with 800W under development. More TEC driving power means wider temperature range, faster temperature response, and larger platform applications. For comparable accuracy and stability, Chroma offers one of the best TEC driving power-to-price ratio in the market.

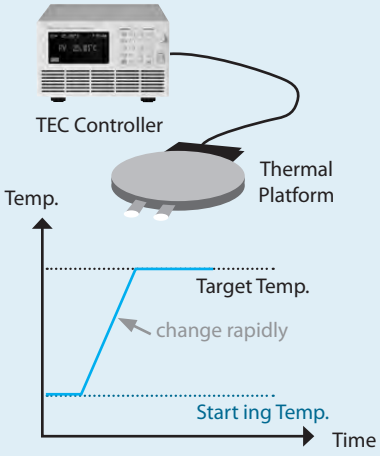
* Operation temperature range of platform is independent with TEC controller range, and proper platform design should be considered to obtain certain temperature.

Excellent Thermal response, temperature precision, and control stability

TEC module is a bi-directional heat pump controlled by current. So a temperature control system with TEC modules can reach temperatures higher or lower than ambient. Compared with traditional temperature control methods, the 54100 provides a compact, fast responding, solution to thermal control applications.

Chroma's Advanced TEC Controller is specially designed for optimal performance. Changing temperature from one value to another rapidly without overshoot are primary benefits of the 54100 series. Effects of thermal perturbations by the unit-under-test can even be minimized up to 100W on/off, by the 54100 and often reduces temperature variation to less than 1˚C within few seconds. If temperature stability is concerned, Chroma's Advanced TEC Controllers offer 0.01˚C stability in almost most applications.

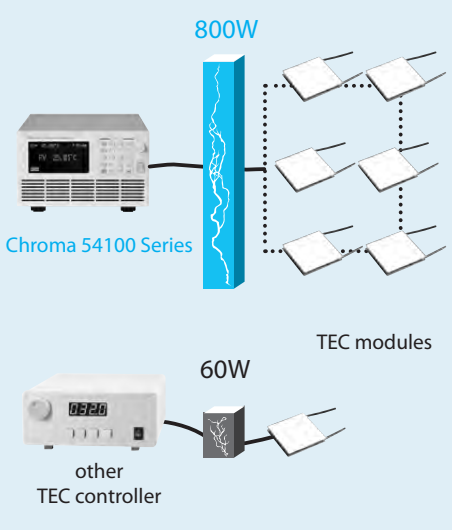
Using Chroma's TEC methord, speed of heating and cooling is about 5~60˚C per minute.



High Driving Capability

There were many low output power TEC controllers on the market mainly for small devices and small scale lab tests. As technologies grow, higher TEC driving power is required in many modern applications. For example, testing solar cells larger than 4 inch square from -20˚C to 85˚C requires more than 100W driving power and thermal loads of sunlight can add 30W or more. Designers of high power LEDs must have great concern about their thermal properties. 30 W-LED module testing from -20˚C to 150˚C also demands high driving power.

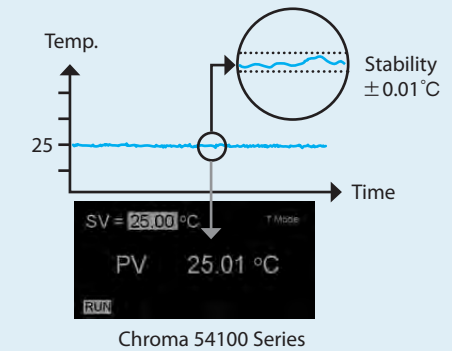
Chroma's Advanced TEC Controllers can deliver 150W, 300W, 800W driving power, satisfying needs of both small to large platforms. Another benefit of high driving power is that in many applications several units can be driven from a single TEC controller reducing costs and test times.



High temperature accuracy and resolution

TEC controllers using thermal couples currently on the market usually have accuracy of only about 1˚C and poor resolution (0.1˚C). This is inadequate for many modern applications. For example, rating solar cell power efficiency requires temperature accuracy much better than 1˚C since phase changes of some solar materials can occur within 0.1˚C or less. Some biochemical process can be very sensitive to temperature variations as well. Thermal resistance measurements of heat pipes often results in a temperature deviation much less than 1˚C. Some high resolution TEC controllers are using different types of temperature sensors, such as RTD, temperature IC, or thermistors. Unfortunately, these temperature control methods often cannot provide direct case temperate control/contact and can be too bulky for measuring at the point of interest.

Chroma's Advanced TEC Controllers are thermal couple based and with temperature accuracy* 0.3˚C and resolution down to 0.01˚C. Users can take advantage of a wide range of thermal couple for easy measurement setup, while maintaining high accuracy and resolution. This means users can achieve test results with high repeatability, high accuracy, and therefore high confidence.



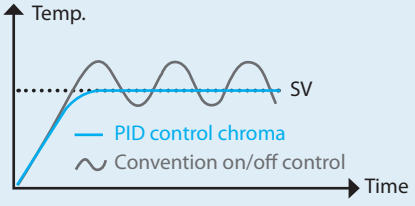
Chroma 54100 Series

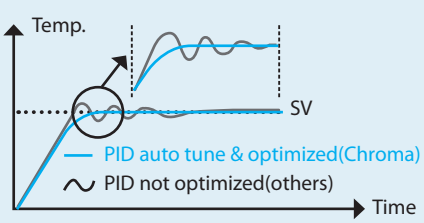
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True large-signal PID / auto tune for TEC control

PID control is an important feature for a good controller. The PID parameters basically describe the dynamic response of a system and can be very different from one to another. A guarantee of successful control cannot be achieved without setting proper PID parameters and setting PID parameters manually is very time consuming. Chroma 54100 provides an advanced PID auto tune feature making PID setting fast, repeatable and easy.

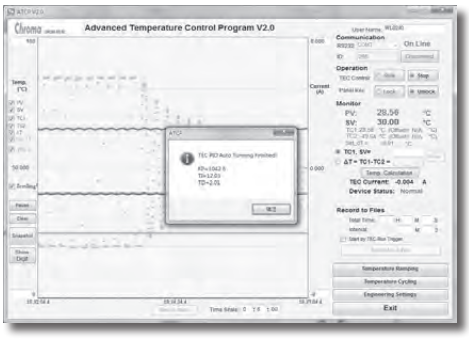
Many other TEC controllers use a small signal and one-directional temperature transient to find PID parameters. This auto tune method is OK for heater only temperature control, but is not always successful for TEC control. In order to truly match the thermal response of a TEC control system, Chroma's Advanced TEC Controllers use a large-signal and bi-directional driving method for PID auto tune. This proprietary method results in the superb temperature control behavior which is fast, precise, and very stable. While some other TEC controllers require a set of PID parameters for every 20˚C interval, Chroma's Advanced TEC Controllers need only a set of optimal PID parameters (usually auto tuned at 40~50˚C) to cover all operation from -40 to 150˚C.

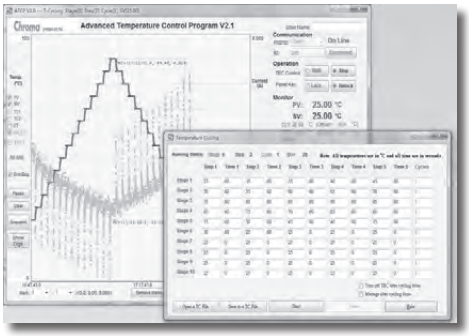


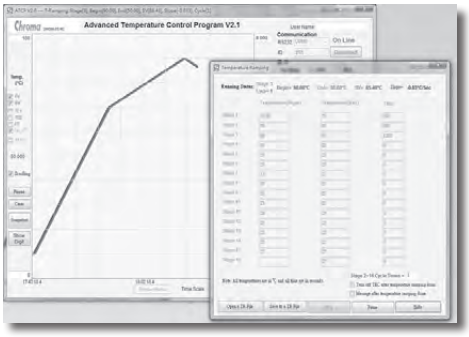


Soft Panel

Available for Chroma's Advanced TEC Controller are graphical softpanels which allow for intuitive control and measurements. Viewing TEC current and temperature vs. time curves, recording data to a file, and running temperature cycling, ramping sub-programs, etc., are all provided. PID parameters, current limit, and other important settings can also be read and set from a pop-up setup windows.

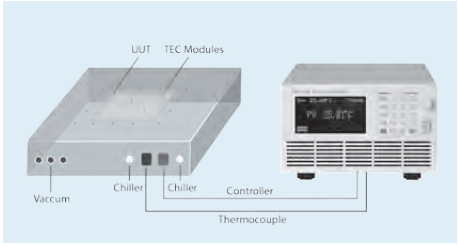






High Efficiency Standard Platforms

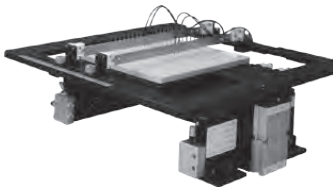
There are numerous TEC platforms be developed by Chroma for sue with the 54100 TEC Controllers. Such platforms include LEDs, solar cells, e-paper, burn-in, and many others. As shown below each are designs to provide a wide temperature range with typical temperature stability of 0.01˚C.



TEC Platform Architecture



E-paper



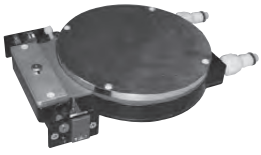
Solar Cell



LED Integrated Sphere



Micro Projector



Wafer Chuck



General Platform

All specifications are subject to change without notice.

SPECIFICATIONS				
Model		**54115-24-8**	**54130-27-12**	**54180-40-20**
TEC Output Voltage		24VDC	27VDC	40VDC
TEC Output Current		8A	12A	20A
TEC Driving Output Power		150W	300W	800W
Temperature Control				
Setting Temperature Range		-49 to 149˚C		- 70 to 250˚C *1
Setting Temperature Resolution		0.01˚C		
Temperature Control Stability	Short Term	≦0.01˚C		
	Long Term	≦0.05˚C		
Temperature Monitoring				
Monitoring Temperature Range		-49 to 149˚C		- 70 to 250˚C *1
Temperature Sensor Type		T-type thermocouple		Standard : T-type thermocouple Optional : K-type thermocouple
Monitoring Temperature Resolution		0.01˚C		
Monitoring Temperature Relative Accuracy		<±0.3˚C		
Monitoring Temperature Absolute Accuracy		< ±(0.3+0.002×|T-25|) ˚C		
Environmental				
Working Temperature		5~45˚C		
Humidity		< 80 % RH		
Power Requirement		90 to 240 VAC, 50/60 Hz		
Maximum Power Consumption		330W	550W	1400W
Fuse		3A/250V	5A/250V	12A/250V
PC Communication Port		RS-232 Half Duplex		RS-232 Half Duplex ; USB2.0 ; LAN 10/100Mbps
Storage Temperature		-20~60˚C		
Storage Humidity		80%R H		
Dimensions (WidthxDepthxHeight)		362 x 286 x 131.2 mm / 14.3 x 11.3 x 5.17 inch		241 x 441 x 135 mm / 9.5 x 17.4 x 5.3 inch
Weight		6.3 kg / 13.9 lbs	6.6 kg / 14.6 lbs	9.5 kg / 20.9 lbs

Note *1 : Platform temperature range is highly relating to the structure and design and will need to apply external elements to reach extreme conditions. To reach below -30 degree, it will need extra coolant. To reach beyond 150 degree, other heating material will need to be considered.

Note *2 : The temperature control stability depends on not only the controller but also platform and environment. The PID parameters must be optimized for the platform. Avoid any liquid or air turbulence around the platform. Attach the temperature feedback thermocouple firmly with good thermal conductivity. Shield for electromagnetic interference if necessary. Extremely high control temperature stability can be achieved with all these issue taken care.

Note *3 : Monitoring Temperature Relative Accuracy is defined as the temperature difference between the two thermocouples reading the same thermal point. It is the working ambient temperature, which must be thermal balance within 20~30˚C, and exclude thermocouples error for controller specifications to be guaranteed. If the operation temperature is out of 20~30˚C, the specification will be modified to < ±(0.3+0.002×|T-25|), where T here is the working ambient temperature.

ORDERING INFORMATION

54115-24-8 : TEC Controller 150W
54130-27-12 : TEC Controller 300W
54180-40-20 : TEC Controller 800W
A541151 : TEC Thermal Platform for LED integrated sphere
A541152 : TEC Thermal Platform for LED burn-in
A541153 : TEC Thermal Platform for LED wafer
A541154 : TEC Thermal Platform for e-paper
A541155 : TEC Thermal Platform for solar cell



54115-24-8 / 54130-27-12



KEY FEATURES

- 6½ digits resolution
- 11 types of measurement characteristics
  - DC voltage/current (1000V/3A max)
  - AC voltage/current (750V/3A max)
  - Resistance 2 or 4-wire ohms measurement
  - Period & frequency
  - Diode & continuity
  - Temperature (RTD)
- Various math functions
  - NULL
  - Max/Min/Avg
  - High/Low limit
  - Percentage/Ratio/ MX+B
  - dB/dBm
- DC voltage accuracy : 0.0015%
- AC voltage accuracy : 0.04%
- Optional Multi-point TC Scanner Card (10ch), multi-point scanner card (10/20ch)
- Measurement and data transmission up to 2000 readings/sec (4½)
- Up to 2000 readings memory storage
- Standard SCPI control
- Standard USB & GPIB interface, support USBTMC
- Software control support
  - Chroma 12061 software
  - LabView® Driver

Fast & High Performance

The 12061 6½ Digital Multimeter has assorted settings of resolution, integration time and ranges that allow users to optimize the configuration of measurement speed, resolution and accuracy when in individual measurement test mode.

The 12061 has built-in a high speed, low interference A/D converter with a maximum speed of 2000 rdgs/s it is the best solution for high speed measurement.

Individual Application

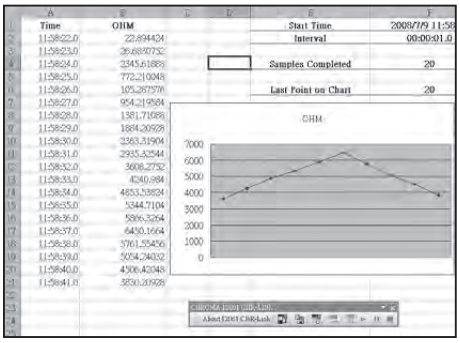
Chroma 12061 equipped with 11 types of measurement functions containing DC voltage/ current, AC voltage/current, resistance 2/4-wire ohms, period, frequency, diode, continuity and temperature as well as diverse math functions of NULL, Max/Min/Avg, High/Low limit, High/Low limit, Percentage/Ratio/MX+B, dB/dBm and etc. Along with trigger and memory function, Chroma 12061 is the right tool for you to perform the basic measurement.

Test System Application

For user's convenience Chroma supports various software and hardware for different control platforms.

- Chroma 12061 TOOL : It is a real-time display interface for value monitoring. It can log data and output in CSV format for analysis.

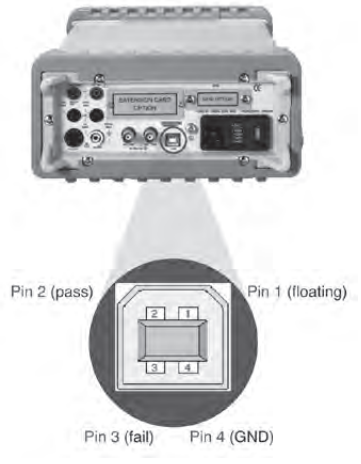
- Chroma 12061 LINK : It can send the data to PC directly in real time and save it to EXCEL or WORD format file as well as create the data pattern. Test engineers can use ActiveX components to control the 12061 using SCPI commands.



Application Softpanel - CHROMA 12061 LINK

PASS/FAIL signal output

Chroma 12061 can provide PASS/FAIL signal to system by USB port (either communication or PASS/FAIL signal) with high/low limit set. USB type B female connect to system with signal (1 floating/ 2 PSS/ 3 FAIL/ 4 GND) in 2ms low and please disable USB interface. If result over the high/low limit, the beeper will alarm and signal output. (Beeper can be off)



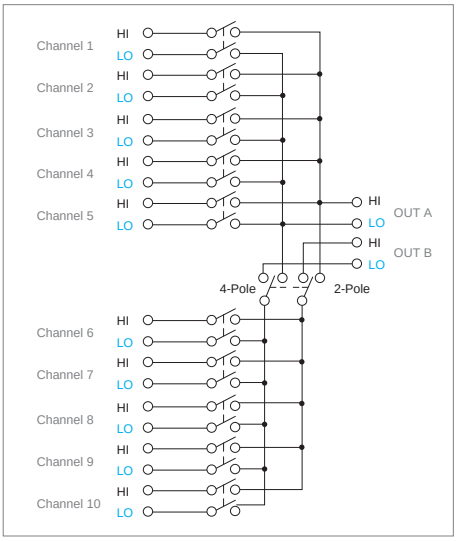
Multi-Point Scanner Card (10CH/20CH)

Chroma 6½ Digital Multimeter supports Multi-point Scanner Card which is a scanning measurement tool not supported by most of the 6½ Digital Multimeters in the field.

Multi-point Scanner Card offers multiplexing ten two poles (ACV, ACI, DCV, DCI, Resistance, Period, Frequency) that can be installed to the extension card option directly on the rear panel.



Scanner Card Configuration



Multi-Point TC Scanner Card (10ch)

The multi-point temperature scanning card has multiple functions including 2-wire/4-wire resistance, AC/DC voltage/current, frequency, period and temperature measurements. As cold junction compensation is equipped for temperature measurement, it increases the measurement accuracy greatly. In addition, it can scan the temperature of 10 different channels that can be applied extensively to electronic devices and industrial studies for temperature measurement

ORDERING INFORMATION

12061 : 6½ Digital Multimeter
A120000 : Multi-point Scanner Card (10ch)
A120001 : Thermal-measurement Adapter
A120002 : Multi-point Scanner Card (20ch)
A120003 : HV Probe (1000:1)
A120004 : Multi-point TC Scanner Card (10ch)

All specifications are subject to change without notice.

SPECIFICATIONS

Model	12061		
DC Voltage			
Range	Resolution	Input Resistance	1 year accuracy ±(reading%+range%) (23°C±5°C)
100.000mV	0.1μV	>10GΩ	0.0050 + 0.0035
1.000000V	1.0 μV		0.0040 + 0.0007
10.00000V	10 μV		0.0035 + 0.0005
100.0000V	100 μV	10MΩ	0.0045 + 0.0006
1000.000V	1mV		0.0045 + 0.0010
DC Current			
Range	Resolution	Shunt Resistance	1 year accuracy ±(reading%+range%) (23°C±5°C)
10.00000mA	10nA	5.1Ω	0.050 + 0.020
100.0000mA	100nA		0.050 + 0.005
1.000000A	1μA	0.1Ω	0.100 + 0.010
3.00000A	10μA		0.120 + 0.020
AC RMS Voltage			
Range	Resolution	Frequency (Hz)	1 year accuracy ±(reading%+range%) (23°C±5°C)
100.0000mV	0.1μV	3 ~ 5	1.00 + 0.04
		5 ~ 10	0.35 + 0.04
		10 ~ 20K	0.06 + 0.04
		20K ~ 50K	0.12 + 0.05
		50K ~ 100K	0.60 + 0.08
		100K ~ 300K	4.00 + 0.50
1.000000V ~ 750.000V	1.0μV ~ 1mV	3 ~ 5	1.00 + 0.03
		5 ~ 10	0.35 + 0.03
		10 ~ 20K	0.06 + 0.03
		20K ~ 50K	0.12 + 0.05
		50K ~ 100K	0.60 + 0.08
		100K ~ 300K	4.00 + 0.50
AC RMS Current			
Range	Resolution	Frequency (Hz)	1 year accuracy ±(reading%+range%) (23°C±5°C)
1.000000A	1μA	3 ~ 5	1.00 + 0.04
		5 ~ 10	0.30 + 0.04
		10 ~ 5K	0.10 + 0.04
3.000000A	1.0μA	3 ~ 5	1.10 + 0.06
		5 ~ 10	0.35 + 0.06
		10 ~ 5K	0.15 + 0.06
Resistance (4W Measurement)			
Range	Resolution	Test Current	1 year accuracy ±(reading%+range%) (23°C±5°C)
100.0000Ω	100μΩ	1mA	0.010 + 0.004
1.000000kΩ	1mΩ	1mA	0.010 + 0.001
10.00000kΩ	10mΩ	100μA	0.010 + 0.001
100.0000kΩ	100mΩ	10μA	0.010 + 0.001
1.000000MΩ	1Ω	5μA	0.010 + 0.001
10.00000MΩ	10Ω	500nA	0.040 + 0.001
100.0000MΩ	100Ω	500nA	0.800 + 0.010
Diode Test			
Range	Resolution	Test Current	1 year accuracy ±(reading%+range%) (23°C±5°C)
1.00000V	10μV	1mA	0.010 + 0.020

Continuity Test			
Range	Resolution	Shunt Resistance	1 year accuracy ±(reading%+range%) (23°C±5°C)
1000.00Ω	100mΩ	1mA	0.010 + 0.030
Frequency and Period			
Range	Frequency (Hz)		1 year accuracy ±(reading%+range%) (23°C±5°C)
100mV ~ 750V	3 ~ 5		0.1
	5 ~ 10		0.05
	10 ~ 40		0.03
	40 ~ 300K		0.01

Measurement Characteristics	
Math Functions	NULL, min / max / average, dBm, dB, MX+B, RATIO, %, limit test (with TTL output)
Measurement Noise Rejection 60Hz(50Hz)	DC CMRR : 140 dB: AC CMRR : 70 dB
Integration Time & Normal Mode Rejection NMRR	10 plc/167 ms (200 ms) : 60 dB 1 plc/16.7 ms (20 ms) : 60 dB
DC Voltage	Input bias current : 25°C < 30pA Input protection : 1000V
DC Current	Input protection: External 3 A 250V fuse
AC Voltage	Input impedance: 1 MΩ parallel with 100 pF Input protection: 750Vrms all ranges
AC Current	Input protection: External 3 A 250V fuse
Resistance	Maximum lead resistance (4-wire): 10% of range per lead for 100Ω and 1kΩ ranges. 1kΩ per lead on all other ranges. Input protection: 1000 V all ranges
Continuity/Diode	With audible tone Continuity threshold: Selectable from1Ω to 1000Ω
Temperature	RTD: 2-wire, 3-wire and 4-wire measurement Temperature Conversion: IEC751, Callendar-Van Dusen
External Control	
Samples/Trigger	1 ~ 50,000
Trigger Delay	0 ~ 3600 sec.
Memory	2000 readings
Standard Complier	SCPI (IEEE-488.2), Agilent 34401
Interface	USB, GPIB
General	
Power Consumption	25VA max.
Power Requirements	100 V/120 V/220 V/240 V, 45 Hz ~ 440 Hz
Dimensions (HxWxD)	88.6 x 213.6 x 346.9 mm
Operating Temperature	0°C to 50°C
Weight	Approx. 4.36 kgs

Multi-point TC Scanner Card A120004	
Maximum AC Voltage	110V rms or 155V peak, 100kHz, 1A switched, 30VA (resistive load)
Maximum DC Voltage	110V, 1A switched, 30VA (resistive load)
Connector Type	Screw terminal, #22 AWG wire size
Common Mode Voltage	200V peak btw any terminal and earth
Max. Voltage btw Any Two Terminals	160V peak
Thermocouple	K type (-200°C ~ 1372°) ± 1.5°C (Other type refer to the detailed specifications)



KEY FEATURES

- Selectable GPS/GLONASS Satellite Vehicle and Navigation Data
- Adjustable RF levels from -85dBm to -145dBm in 0.1dB steps
- Provided calibration output level from -25dBm to -85dBm
- Embedded OCXO for accurate clock
- Embedded Doppler function
- Industry-leading stability, quality and reliability
- Verify operational integrity of GPS/GLONASS receivers quickly
- Small size, easy to operation

APPLICATIONS

- Evaluation of GPS products quality / accuracy
- Evaluation of GPS receiver sensitivity
- Mobile phone GPS function test
- Performance evaluation of receiver and module design
- Verify operational integrity of GPS receivers and module

Chroma 49003 Satellite Signal Simulator is a new generation of test instruments, the advantages of combining traditional instruments and new architecture designed in full compliance with the standards of the GPS and GLONASS testing will subvert the traditional concept of the test system.

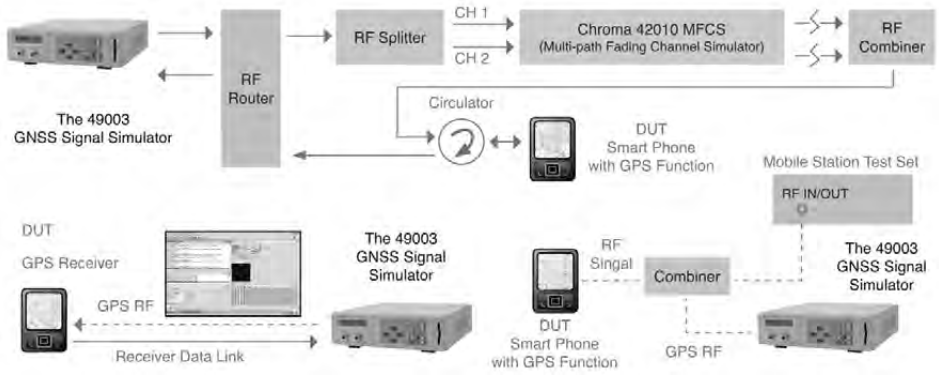
The Chroma 49003 power output with high accuracy (resolution 0.1dB), built-in high-stability 10.22MHz OCXO (GLONASS) and 10.23 MHz OCXO (GPS) to provide the best signal quality, on-demand single channel type satellite navigation data output and humanized operation interface, in full compliance with the testing requirements of the production line. The light volume and scalable satellite series design concept, with the contact and non-contact fixtures can be a variety of test environments, such as miniaturized test system, portable test system, as well as a small amount of diverse testing requirements, it can meet your any testing requirements.

The Chroma 49003 retains the advantages of traditional instruments to facilitate the operation and the high stability of the system, multi-functional, high-quality and economical price, will be the best choice of the measurement works.

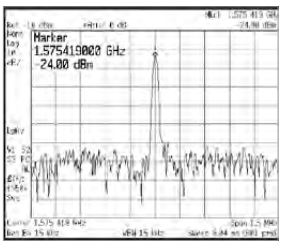
ORDERING INFORMATION

49003 : GNSS Signal Simulator Platform
Additional Options and Accessories
A490030 : GPS Flat Antenna
A490031 : RF Coaxial Cable
A490032 : GPS / GLONASS Dual Mode Flat Antenna
A490033 : 50 ohm Terminator (N Type)
A490034 : GPS Signal Module
A490035 : GLONASS Signal Module

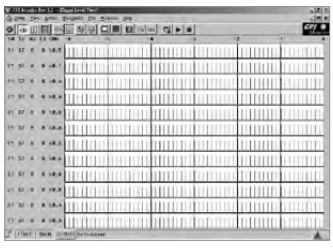
Application-Configuration Proposed for Multi-mode Handset Measurement



SPECIFICATIONS	
Model	**49003**
RF Signal	
Output Center Frequency	GPS Signal Module : 1575.42MHz (L1 band), optional GLONASS Signal Module : 1598.0625MHz-1605.375MHz (L1 band), optional
RF output level	-85 to -145dBm
Calibration RF output level	-25 to -85dBm
Resolution	0.1dB
Power Accuracy	±1dB
RF Output impedance	50Ω
Spurious (in GPS/GLONASS band)	Less than -30dBc
Carrier phase noise	0.1 rad RMS@10 to 10KHz
Baseband Signal	
Modulation method	BPSK
Oven crystal oscillator frequency accuracy	Less than $5X10^{-10}$ per day
OCXO Stability	Less than $5X10^{-9}$ -20 to +70˚C
C/A Code	GPS Signal Module : 1.023 MHz (1023 bit gold code), optional GLONASS Signal Module : 0.511MHz (3135.029354 cycles/chip), optional
Channels	GPS Signal Module : SV1~SV32, optional GLONASS Signal Module : SV1~SV24, optional
Navigation Data	50BPS
RF Output Connectors	N-Type female RF out & Cal. out
Other signals available	LCD keypad RS-232
General	
Power supply	AC Input Voltage: 90V to 265V, 47 to 63 Hz Input line Current: 0.2A Max. Max. Output Rating: 250W
Weight	5.5 Kg
Dimensions	318mm (W) x 320mm (D) x 100mm (H)
Operating Temperature	0 to 45˚C
Operating Humidity	20 to 90%



RF Carrier


GPS Monitor


C/N Testing


A490031


A490030/A490032


A490033

All specifications are subject to change without notice.



MP6220

KEY FEATURES

■ Frequency Characteristics
- Frequency Range : 1575.42MHz
- Warm-up time (typical) : 30 minutes
- Frequency Accuracy : +/-100ppb maximum
- Temperature stability : +/-100ppb maximum
- Aging (Per year) : +/-100ppb maximum, (Per day) : +/-1 ppb maximum

■ Channels
- Number : 1CH, 8CH
- Navigation data : GPS C/A @1.023MHz with 50bps
- Modulation : BPSK

■ Spectral purity
- Phase Noise@1KHz offset : Harmonic : RF Output Characteristics
- High power normal output level : -55dBm ~ -90dBm
- Low power normal output level : -90dBm ~ -160dBm
- Channel Attenuation range (refer normal output level : -31.5dB ~ 0dB)

※Power level ranged from -55 dBm to -145 dBm in 1 dB step, -145 dBm to -160dBm in 0.5 dB step.

SPECIFICATIONS	
Model	**ADIVIC MP6220**
Amplitude Resolution	1dB step
Amplitude Accuracy	Output Impedance : 50 ohms
Doppler Shift	±30KHz (1CH option)
Voltage Standing Wave Ratio	1575.42MHz
Overload protection on RF output	
Maximum reverse RF power	1W maximum
Maximum DC input	±50 VDC
Environmental	
Operating temperature	0 to 50 ˚C
Relative Humidity	10% to 90%
Storage temperature	-20 to 70 ˚C
Relative Humidity	5% to 95%

ORDERING INFORMATION

ADIVIC MP6220 : GPS Simulator



Model ADIVIC MP5000



MP5000

KEY FEATURES

- Support testing on 802.11ac, 802.11/a/b/g/n standards
- Support 120MHz VSA measurement B/W (16-bit 160MSPS ADC)
- Support automated mass-production turnkey software
- Easy-to-use GUI application for RD/QA purpose
- PC open system architecture with VSA/VSG all-in-one-box
- Signal measurement engine resides at the tester side
- Capable of customer generated I/Q waveform file transmission

The MP5000 wireless test station is designed to test WLAN products for both R&D/QA and manufacturing purpose. The MP5000 supports 802.11ac, and 802.11a/b/g/n standards. It equips the high performance processor architecture as well as the optimized algorithm to speed up the testing time, in addition, the MP5000 equips high quality VSA (Vector Signal Analyzer) and VSG (Vector Signal Generator) for signal measurement and signal generating. The MP5000 wireless test station provides a user friendly GUI program which allows the user to easily measure the incoming WLAN signal with only a few mouse clicks. The supported measurement items include EVM, power, frequency error, phase error, IQ imbalance and etc. The MP5000 contains a rich set of pre-generated 802.11a/b/g/n/ac waveform files to provide high quality WLAN test signals to the DUT.

Moreover, a built-in waveform generator allows the user to generate arbitrary 802.11a/b/g/n/ac test signals as well. The MP5000 also supports automated mass-production turnkey software by customer request.



Graphic User Interface

SPECIFICATIONS	
RF Analyzer (Note *1)	
Input Frequency Range	2150~2600 MHz, 4900~6000 MHz
RF Port number	2 Ports
IF bandwidth	120 MHz
Max input power	+30 dBm peak, +20 dBm average
Input power accuracy @(+20 to -75 dBm)	±0.75 dB (±0.5 dB Typ) ±1.0 dB@ 0 ˚C ~ 50 ˚C
Phase Noise	< -100dBc: 1 KHz offset @2.4 GHz < -9 5dBc: 1 KHz offset @5.8 GHz
LO Leakage (after self-c alibration)	<-50 dBc
sideband image (IQ-imbalance) @after self-calibration	<-50dBc @ 2.4GHz, -10dBm <-50dBc @ 5.8GHz, -10dBm
Third order input inter-modulation distortion(IMD3)	< -70dBc@-10 dBm
Input Return loss	> 10 dB 2150~2600 MH z > 12 dB 4900~6000 MH z
ADC resolution	16 Bits
Sample rate	160 MS/s
Initial achievable accuracy	±50 ppb maximum (OCXO)@25 ˚C, after 60 minutes warm up
Temperature stability	±20 ppb maximum(OCXO) @0 ˚C ~ 50 ˚C
Aging	±1 ppb / day maximum (OCXO) ±100 ppb / yr maximum (OCXO)
Operating Temperature	0 ˚C to 50 ˚C
Operating Voltage	100 V to 240 V
Warm - up time	> 30 minute
RF Generator (Note *1)	
Output Frequency Range	4900~6000 MHz , 2150~2600 MHz
IF bandwidth	120 MHz
Max Output power@ CW	+10 dBm @ 2150~2600 MHz +7 dBm @ 4900 ~ 6000 MHz
Power Accuracy@(0 to -95 dBm)	±0.75 dB (± 0.5 dB Typ) ±1.0 dB @ 0 ˚C ~ 50 ˚C
Phase Noise	Phase noise < -100 dBc: 1 KHz offset @ 2.4 GHz Phase noise < -95 dBc: 1 KHz offset @ 5.8 GHz
LO leakage(DC offset) @after self-calibration	< -50 dBc @ 2.4 GHz, -10 dB m < -50 dBc @ 5.8 GHz, -10 dB m
sideband image (IQ-imbalance) @after self-calibration	< -50 dBc @ 2.4 GHz, -10 dB m < -50 dBc @ 5.8 GHz, -10 dB m
Third order inter -modulation distortion(IMD3)	<-60dBc@-10dBm(two -13dBm Tone)
Return loss	> 10 dB 2150 ~ 2600 M Hz > 12 dB 4900 ~ 6000 M Hz
DAC resolution	16 Bits
Sample rate	960 MS/s
Initial achievable accuracy @ 25 ˚C, after 60 minutes warm up	± 50 ppb maximum (OCXO)
Temperature stability @ 0 ˚C ~ 50 ˚C	± 20 ppb maximum (OCXO)
Aging	±1 ppb / day maximum (OCXO) ±100 ppb / yr maximum (OCXO)
Operating Temperature	0 ˚C to 50 ˚C
Operating Voltage	100 V to 240 V
Warm-up time	> 30 minute

Note *1 : Test condition Temperature : 15 ˚C ~ 35˚C, Voltage : 100 V to 240 V

ORDERING INFORMATION

ADIVIC MP5000 : Wireless Test Station

All specifications are subject to change without notice.



MP7600

Benefits

- Shorten design-in schedule because of evitable time-wasting virtual field testing
- Flexible bandwidth extension with the availability of interconnection between instruments
- Passive and active input ports enable receiving different power signals
- Recording fluctuated spectrum is feasible via MAGC function
- High spectrum sensitivity performance because of low noise floor (< -165 dBm/Hz)
- Precise measurement in accordance with excellent spurious response.
- High resolution in order to avoiding unnecessary distortion as recording and playback
- Diminish space limitation during recording via remote control with 10 MHz sync. port
- Swapable SSD enables prolonged recording
- In support of various worldwide communication standards
- Instinctive control by user-friendly GUI

KEY FEATURES

- Adjustable bandwidth from 1 MHz to 100 MHz
- Frequency coverage from 300 KHz to 6.0 GHz
- 250 MSPS ADC sampling rate
- 16-Bit ADC, DAC resolution
- 1PPS, IRIG-B support (Optional)
- Additional traces for maximum/ minimum holds
- 20+ makers for easy signal identification
- Data formats compatible to MATLAB
- Software utility support including I/ Q data extractor and File segment
- Matrix System supports 7 units sync (Optional)
- 4 X 2.5" SSD internal drive bays (4 X 480 GB by default, 4 X 1 TB upgradable)

ADIVIC RF Recorder/Player Overview

MP7 series is a specific RF measurement instrument which is able to capture signals in the air and faithfully playback. To carry out field testing and performance testing, MP7 series are excellent assistance with fast signal analysis for all existing communication standards and modulation schemes regardless digital and analogue. In addition, it also allows users to precisely record and investigate the wanted signals, adjacent channel signals, noise/ fading signals and any other distortion signals accordingly by means of excellent performance against spurious signals.

MP7200 is basic version for spectrum analysis within 25 MHz bandwidth. MP7300 is specialized for the requirement of simultaneous two-channel recording/playback. MP7600 is the most powerful version with wider bandwidth and compact housing for contemporary wireless communication standards.

SPECIFICATIONS

Model	ADIVIC MP9000 RF Player	ADIVIC MP7200 RF Recorder/Player	ADIVIC MP7300 RF Recorder/Player	ADIVIC MP7600 RF Recorder/Player
TFT Touch Screen	Resistive	Capacity	Capacity	--
Frequency	25MHz~2.7GHz	25MHz~2.7GHz	300KHz~3.0GHz	300KHz~6GHz
Bandwidth	25MHz	25MHz (20MHz Guaranty BW)	45MHz	100MHz
Sample Rate	100MS/s	100MS/s	250MS/s	250MS/s
Resolution RX/TX	14 bit	14/14 bit	16/14 bit	16 bit
Recorder Channel	-	1	1/2	1
Playback Channel	1	1	1/2	1
Diversity function	No	No	Yes (Diversity option)	No
Trigger function	No	Yes	Yes	Yes
10MHz Clock In/Out	No	No	Yes	Yes
SWAP Hard Disk	Yes	Yes	Yes	Yes
SSD	Option	Standard	Standard	Standard
Power	AC 100~250V	AC 100~250V	AC 100~250V	12V
Size	L:36 x W :34 x H : 20 cm	L : 36 x W : 34 x H : 22.9 cm	L : 45 x W : 44 x H : 26.4 cm	35.6 x 30.2 x 10.2 cm
Weight	17 kg	14.3 kg	depends on configuration	9 kg

ORDERING INFORMATION

ADIVIC MP7200 : RF Recorder/Player 25MHz~2.7GHz
ADIVIC MP7300 : RF Recorder/Player 25MHz~3.0GHz
ADIVIC MP7600 : RF Recorder/Player 300KHz~6.0GHz



MP9000

APPLICATIONS

Multi-Standards RF Communication Testing

■ GPS
- 6CH, 8CH GPS Model
- RF Level -55dBm to -160 dBm
- Global City Library
- Location editor
- Almanac upgradeable
- 1 Channel GPS Model
- RF Level -55dBm to -160dBm
- Almanac data
- Doppler Control ±30KHz

■ RF Player
- Perfect solution for DTV, GPS, Radio and many RF communications
- Field testing signal source
- Performance testing signal source
- Supports Frequency ranged from 300K-2.7GHz
- Adjustable bandwidth 25MHz

■ DTV
- DVB-T/H
- ATSC
- DTMB
- ISDB-T
- RF level +10dBm to -110dBm
- Noise Generator

■ FM RDS
- FM 76 to 108MHz
- RF level -10 to -120dBm
- FM Mono
- FM Stereo
- RDS
- RBDS
- RDS TMC / RBDS TMC
- RDS Feature - Alternative Frequency / Enhance Other Network / Radio Text Plus

■ Audio Analyzer
- RX :
  AC Level, Noise, Distortion, S/N, Frequency response, Total Harmonic Distortion THD+N, SINAD
- TX :
  CW mode, Multi Tone, 20Hz-20KHz Sweepmode

Introduction

ADIVIC proudly introduces the new model - MP9000 RF Station. MP9000 provides a platform that adopts different wireless communication modules into variety of combinations for different purposes & standard require-ments of tests including GPS, FM RDS/TMC, DTV, Audio Analyzer and all one way communication standard.

The MP9000 allows the users to implement single or multiple standards testing, such as concurrent paral-lel testing and sequence-based testing. MP9000 is sophisticated for R&D applications, and the user friendly GUI also makes it ideal for production line applications. By bringing in the concept of one does all, MP9000 would greatly benefit the customers with dramatic time saving and high-level of cost-effectiveness.

Operation

An easy-to use GUI and an integrated 10.2" Touch panel fully conform with one of its designations to provide an user-friendly environment which allows the users to easily control the MP9000 functionalities. Speaking of compatibility, the USB and Ethernet ports are implemented to allow the users to easily integrate the MP9000 into the production-line ATE for production test purpose covering the semi-product (PCBA) and end product test.

RF Player Option

ADIVIC RF PLAYER is an exquisite RF- engineering tool for both field testing and performance testing. It has the capability of replacing many expensive instruments from one RF communication to another. It is by far the only instrument which crosses over RF communication standards from the past, the present and the future. RF PLAYER is meant for all existing RF communications, for all modulation schemes, for analogue and digital.MP9000 plays the streams recorded from the ADIVIC's RF Recorders.



SPECIFICATIONS	
Model	**ADIVIC MP9000**
System	
Processor	Intel Core 2 Duo Series
Memory	DDRII 667 2GB
System storage	SATAII 320G HDD or above
Power supply	AC 100 to 240V, 50/60Hz
Operating temperature	0 to 50˚C
Operating humidity	0% to 95% RH (Non Condensation)
Storage temperature	-20 to +80˚C
Dimensions	360(L) x 340(W) x 200(H) mm
Weight	Approx.17Kgw
OS system	
Windows XP Professional User interface	
10.2 inch TFT color LCD	
Touch Screen	
External Interface	
USB 2.0 Port x 4	
eSATA x 1	
Ethernet LAN Port (10BASE-T / 100BASE-TX / 1000BASE-T) x 1	

ORDERING INFORMATION

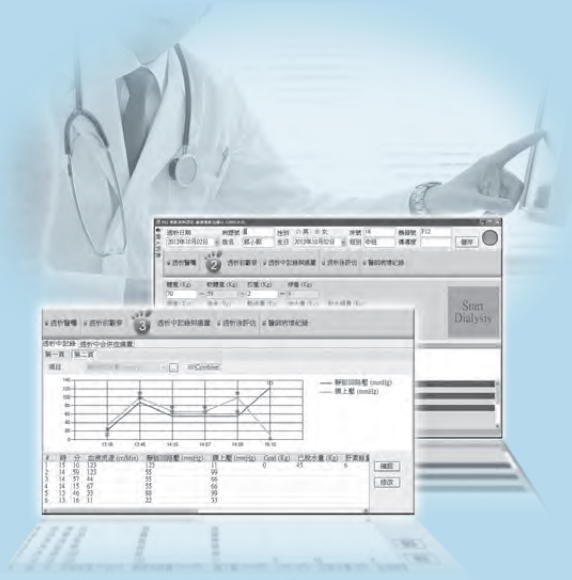
ADIVIC MP9000 : Wireless Communication Test System

All specifications are subject to change without notice.

Manufacturing Execution System (MES) 17-1
Hemodialysis Management System (HDMS) 17-3
Fast Easy Player 17-4



Manufacturing Execution System



Hemodialysis Management System



Fast Easy Player

Industry 4.0



KEY FEATURES

- Complete Production Process Trace
  - Traceability
- Full Production Information Monitoring
  - WIP Control
- Equipment /PLC Automatic Connectivity
  - Computer Integrated Manufacturing: CIM
  - Equipment Automation Program: EAP
- Professional Quality Control System
  - Statistical Process Control: SPC
  - Corrective Action Report: CAR
  - Out of Control Action Plan: OCAP
- Manufacturing Equipment Management
  - Equipment Management System: EMS
  - Overall Equipment Effectiveness: OEE
- Real-time Report
  - Yield Rate Report
  - WIP Report

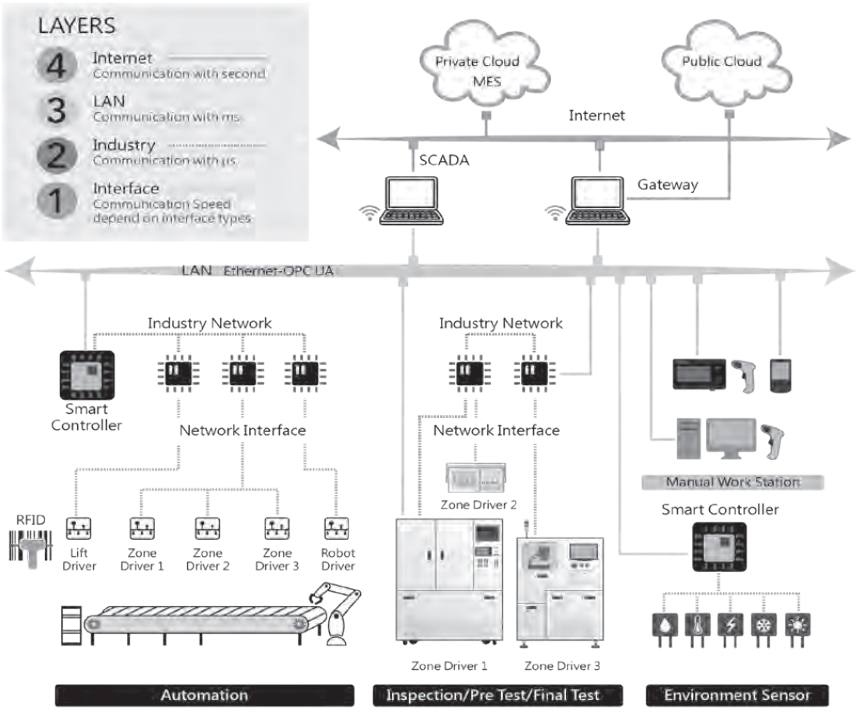
The New Generation of MES - The Core System of Automated Factories

As the key of smart factory, Manufacturing Execution System (MES) plays an important role of integrating automation. The trend of modern factory is heading toward automated production. Traditional MES, which focuses on only collecting data and report analysis, cannot meet the requirements of automation era. New generation of MES is the core system of automated factories that not only retains the original scope but also covers the functions of CIM, EAP, equipment connectively, and integrating robotic arms to meet the objectives of factory automation by gaining massive data analysis in real time to improve product quality and customer satisfaction, at the same time, reducing the production cost and maximize the benefits of enterprise.



Sajet MES - The Best Choice of Smart Factory System

Chroma, not only the professional MES system provider but also the world-class test & measurement equipment and automated production line manufacturer, has abundant technology and experiences in MES and automated equipment integration that can provide you the best manufacturing execution system solution of new generation.



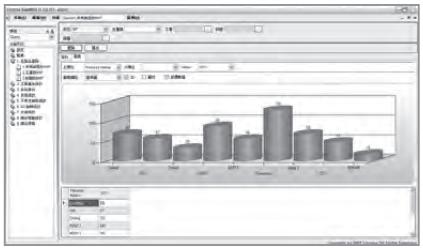
Complete Production Process Trace - Traceability

The manufacturing process information contained in Sajet MES can assist the factory to process work orders, monitor workstations, track and manage inventory as well as to conduct quality inspection and exception conditions management. The precision allows users to find out the lot number, delivery date and quantity of passive components used in a product from the supplier. It can also use the lot number to trace back the shipped products for locations and quantities to reduce the loss caused by defect components. The traceability feature can solve the problems rapidly is the best helper for factory management.



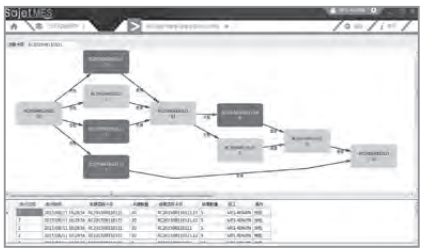
Full Production Information Monitoring-WIP Control

Sajet MES provides flexible routing management that allows users to plan different routes based on the products, control the quantity of yield and defective goods, manage reworked products and calculate the pass-through rate. The complete traceability data collection and production line information are fully controlled by Sajet MES to increase the production efficiency and reduce production costs.



Flexible Routing Management - LOT Control

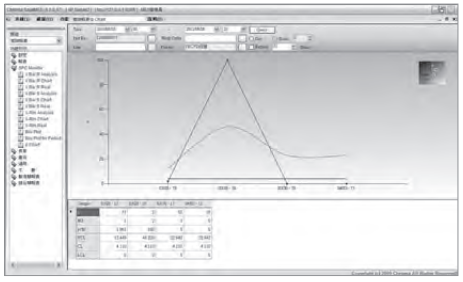
Sajet MES also provides the function of flexible routing control. Users can do different route management according to different products, at the same time support different demands of controlling products, work orders, and lots as the management objectives. Also, users can easily structure production types on diverse operation interfaces of different industries, providing prediction and abnormality handling system, so as to control abnormality efficiently.

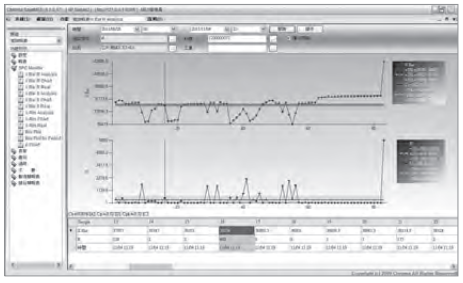


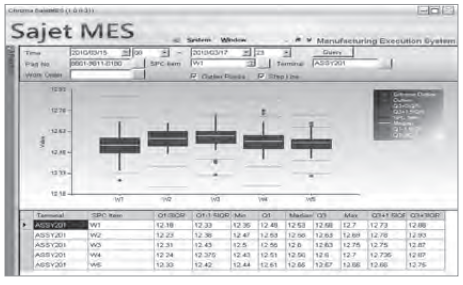
All specifications are subject to change without notice.

Professional Quality Control System - SPC, CAR, OCAP

Sajet MES is not just a professional factory manufacturing management solution but also has specialized quality control system and on-line SPC control that allow users to check the data collected on-line. It can perform measurements, control chart analysis (ex: CPK, X-R, X-S Chart etc.), defect analysis and exception handling by setting up the channel for error notification via Email to supervisors and sending alerts in voice or chart colors to improve the quality of production as well as reduce the risks.







Manufacturing Equipment Management - EMS, OEE

Sajet MES is capable of collecting the workstation status to give the supervisor and on-site personnel to monitor the workstation status in real time, log its maintenance status and query the information of device, including:
- Device failure analysis
- Device utilization rate
- Failure frequency analysis
- Device maintenance time analysis...etc.

Users can use PCs or display board to manage the processing workstation easily.



Real-time Report - Yield Rate Report,WIP Report

Sajet MES has powerful MES database technology in the industry that can be online in real time to administer every work item precisely. The report generator developed by Chroma is applicable for complete report query and real time report generation. Various mobile devices like smart phone, PDA and Pad can be used to query the report and get the factory status immediately. It can integrate into BI (Business Intelligence) in the enterprise so that the manager can view the report of production line thoroughly.



Complete Hardware Integrated Solution Satisfies Various Needs

■ Integration of Various Devices
- Various test equipment of Chroma
- Manufacturing database online control program development and implementation

■ Barcode Printing Device and Sensor Switch
- Long/short range optical switching system
- Various industrial barcode printer

■ Mobile Application Management Device
- PDA, Tablet Computer (iOS/Windows/Android)
- Wireless Scanner, wireless terminal, and etc.

■ Other Electromechanics and Factory Devices
- Temperature controller, electronic scale
- PLC, connectable device (Scanner), and etc.

■ Optical Scanning
- Various handheld 1 & 2 dimension gun type barcode scanner
- RFID Reader, fixed barcode scanner system

■ Industrial Network Peripherals
- Data collector, IPC
- TCP/IP, RS232, USB signal converter, and etc.

■ Display Device Management
- Various production efficiency kanban
- Factory notice kanban, Pick To Ligh, and etc.

■ Automatic Equipment
- Automatic labeling machine, laser engraving machine, and etc.
- Fully automatic test equipment solution

ORDERING INFORMATION

List of Systems and Functional Modules

Basic Modules
Data Center
Work Order Manager
Barcode Center
TGS Server (Data Collection)
Repair
Rework
Quality Control
Packing
Run Card Manager (R/C)
WIP IN/OUT Tracking
Report

Other Systems
Real-time SPC
Work Hour System
Global RMA System
Computer Numerical Control (CNC)
Warehouse Management System
Material and Pull System (MMPS)
ANDON System

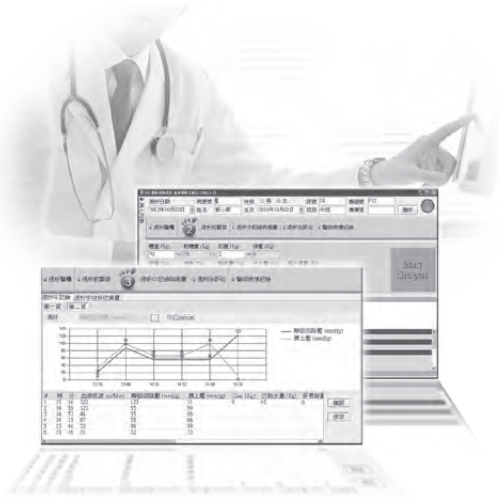
Note : Independent modules

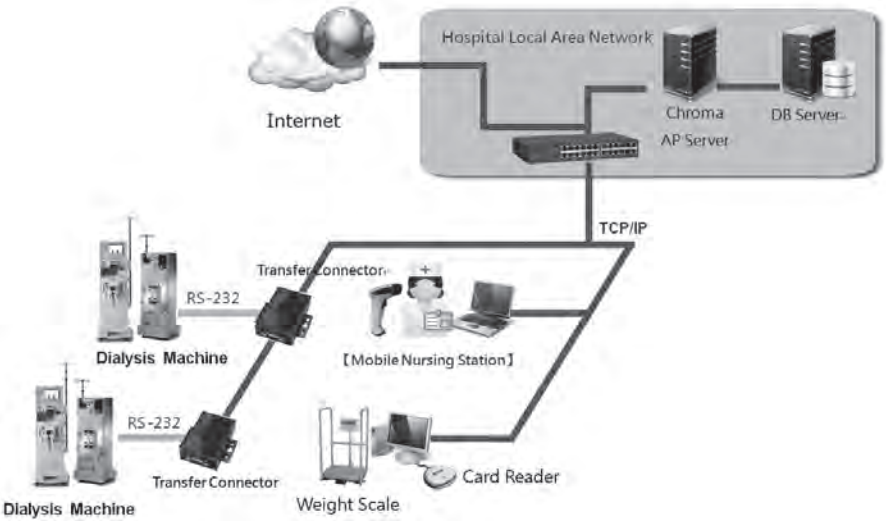
Smary Factory Modules
App Report
Computer Integrated Manufacturing, PLC Handshaking Centre (CIM/PHC)
Equipment Automation Program (EAP)
Equipment Management System (EMS/OEE)
Formation Measurement System (FMS)
Fast Easy Player (FEP)
Recipe Management System (RMS)

Note : Independent modules

Optional Modules
ERP/MES Interface
Automated Test Eqiipment (ATE)
Incoming Quality Control (IQC)
Tooling Manager
Alarm System
SMT Feeding System
Shipping
Material Warehouse
Return Merchandise Authorization (RMA)
e-Kanban (Real-time Display Board)

Note : Subsidiaries of basic modules





KEY FEATURES

- Digital Sickbed Arrangement Management
- e-Hemodialysis Record
- Accurate Weight Scale Management
- HOPE Auto-Uploading Management
- Digitalize Medical Records Management
- HD Visualized Data Analysis

Chroma HDMS is Your Best Choice

HemoDialysis Management system integrates related software and hardware, saving medical personnels' time on organizing all the paper work. Also, it helps to decrease the possible error that might be happened during the process of hand-writing document. Through the automatic process on the system, we can get more completed data, at the same time, enhancing medical and nursing data integration.

HD Visualized Data Analysis

The system can also produce short, medium, and long term related hemodialysis data and reports, so as to be the analysis of medical and nursing research, providing a basis to improve medical quality.



Digital Sickbed Arrangement Management

Through digital sickbed arrangement, it's easier to manage all the sickbed arrangement. The user interface is clear and useful for the administrator to control the entire situation, without spending lots of time on complicated paper work.



e-Hemodialysis Record

All the data on dialysis machine will be automatically uploaded to the Chroma AP Server. The system will automatically help to fill in related reports. Not only nursing staffs can save lots of time doing complicated hand-writing document but also keep the complete data for the future references and inquiry.

Accurate Weight Scale Management

In order to decrease inconvenience and possible error of hand-writing process, the number of weight scale can be automatically uploaded to the system, which reaches the goal of "PAPERLESS".

HOPE Auto-Uploading Management

So as to reduce repeatedly key-in data, users can conduct the doctors' orders and upload it to HOPE on HDMS. Any computers that connect to the hospital local area network can inquire the medical records and conduct doctors' orders through the authorized permission.



Digitalize Medical Records Management

Digital medical records gradually replace the traditional paper medical records, including eyesight, hearing, and past medical history. It becomes more convenient to inquire patients' medical records.



Lists of Systems and Functional Modules

Basic Modules

- Data Center
- Medical Records
- Dialysis Machine
- HemoDialysis
- Sickbed Arrangement
- Report

Optional Modules

- Weight Scale
- HOPE Uploading
- HIS Connection
- Doctor Patrol
- Peritoneal Dialysis
- NIS Connection
- PACS Management

Complete Hardware Integrated Solution Satisfies Various Needs

- HemoDialysis Device
- Dialysis Machine Connection NPort
- Various Handheld 1&2 Dimension Gun-Type Barcode Scanner
- Mobile Application Management Device: PDA, Tablet Computer, and etc.

All specifications are subject to change without notice.



KEY FEATURES

- Broadcast through Wi-Fi
- Log in on web browser
- Modularize interface setting / Flexibly adjust layout
- Integrate multiple ways to connect external database
- Voluntarily define the chart and diagram
- Platform controls the area and setting of each screen

APPLICATIONS

- Real-time information broadcast through Wi-Fi in hospitals, retail stores, and public environments
- Real-time broadcast of factory production efficiency kanban through Wi-Fi
- Real-time broadcast of factory eSOP through Wi-Fi
- Real-time broadcast of above messages on mobiles and tablets through Wi-Fi

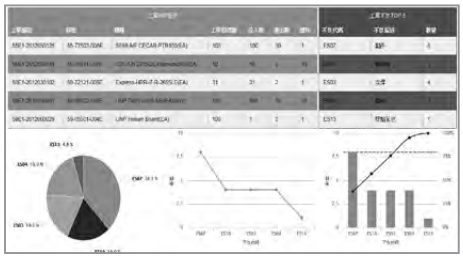
Setting Up & Installment

- Connect the display devices through HDMI
- Internal Android platform on AP
- Fast hardware setup
- Setup can be finished under environment with Wi-Fi Connect to SQL server easily



User Interface

- With function of display of dashboard, scrolling text, bulletin board, pictures rotator, date, time, weather, embedded web page and etc
- Voluntarily adjust the layout according to actual needs
- Multiple templates can be set at the same time, and display on different monitors



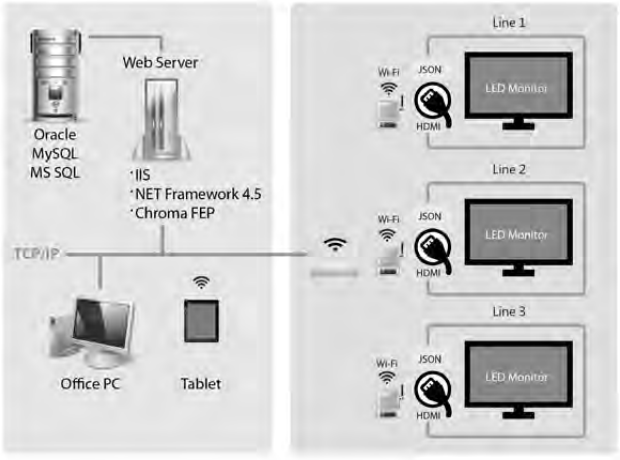
Picture Files Maintenance

- User can easily upload pictures by dragging
- Create a group upon existed folders
- Support different formats of pictures
- Set pictures display order and time interval



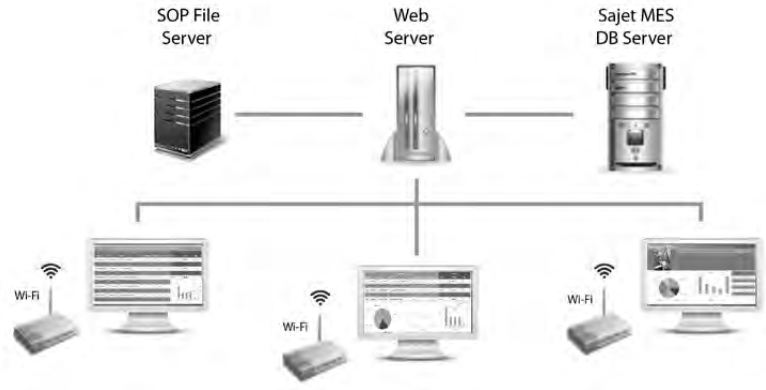
System Architecture- Establish eKanban through Wi-Fi

The new generation of Chroma eKanban solution integrates HDMI interface and different kinds of digital display monitors under Android platform. It helps to deliver real-time information to display monitors through Wi-Fi in factories. Moreover, it is easy to set up the layout configuration on Web interface so as to upload and broadcast real-time kanban information to factories, hospitals, retail stores, and public environments, providing the best choice of visual management solution.



Factory Layout- One platform can manage all the kanbans

Chroma FEP can establish new kanban according to different area configurations, setting up template through one single managing platform. Each functional module can be configured by dragging. The configurable functions include picture files, weather information, clock, scrolling text, dashboard, chart and diagram, bulletin board, table, and embedded web page, providing managers integrated kanban information.



Turnkey Test & Automation Solution

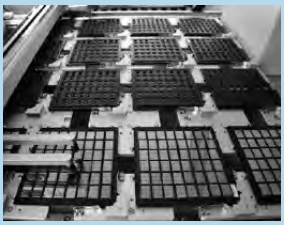
Assembly & Test Automation Solutions 18-1

Smart Conveyor 18-2

Selection Guide		
Assembly & Test Automation	**Applications**	**Page**
Flat Panel Display Burn-in & Testing	LCM, LCD & other flat panel displays	**5-11**
Packaged LED Test Sorter & Tapper	Packaged LEDs	**6-5**
LED Lighting Automatic Assembly & Testing	LED light bulbs & tubes	**6-11**
Photovoltaic Automatic Testing & Sorting	Solar wafers & cells	**8-3**
Battery Cell Formation & Assembly	Lithium Ion & lithium polymer secondary batteries	**11-1**
Passive Component Test & Packing	Inductors	**12-25**
IC Automatic Testing & Sorting	especially for CIS Testing (CMOS Image Sensor), capable of handling devices of a large variety of package types including QFP, TQFP, BGA, PGA, etc.	**14-25**
Smart Conveyor	Manufacturing transportation	**18-2**

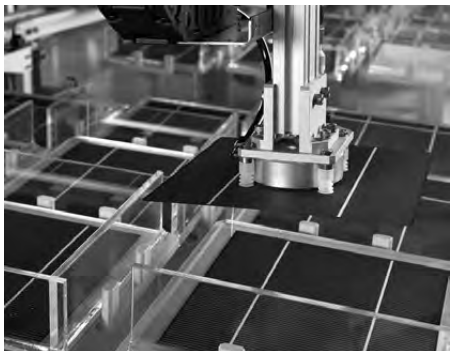




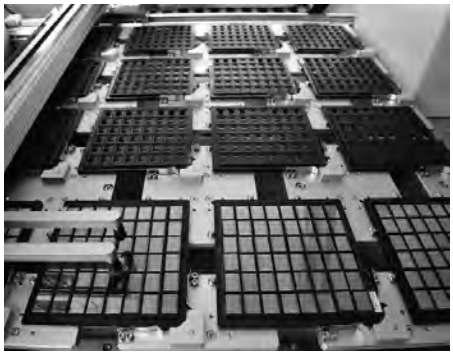

02
03



Assembly & Test Automation Solutions









APPLICATIONS

- Flat Panel Display Burn-in & Testing
- LED Lighting Automatic Assembly & Testing
- Photovoltaic Automatic Testing & Sorting
- Battery Cell Formation & Assembly
- Passive Component Testing & Packing
- IC Automatic Testing & Sorting
- 3C Device Automatic Assembly

Chroma is a world leading supplier of precision Test and Measurement instrumentation.

Utilizing in-house automated handling and manufacturing execution system (MES) expertise, Chroma specializes in integrated and fully automated turn-key electronic test and manufacturing solutions for technologies including FPD (Flat Panel Display), video and color, LED/lighting, photovoltaic, Li-battery, passive components, semiconductor/IC, etc.

ORDERING INFORMATION

* Call for customized availability

Inquire Now !

All specifications are subject to change without notice.



KEY FEATURES

- Modular architecture
- Hybrid Operating mode
- Reconfigurable line layout
- Intelligent lifter
- High speed pick and place
- Autonomous material routing

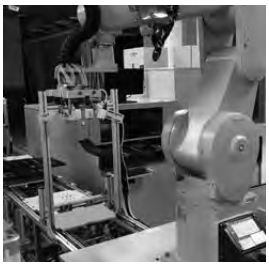
To fulfill the need of complete test solutions from the market, Chroma not only provides test and measurement instruments, but also integrates with automated systems and manufacturing execution systems as turnkey solutions, which bring more value and service to customers and help customers in terms of time saving, cost saving, and one-stop full service.

ORDERING INFORMATION

5703 : Smart Conveyor

* Call for customized availability

Inquire Now !



Barcode binding



Lift up and lift down



Pick and place



Sorting

Customer Support & Service



Chroma offers total solutions in selling the highest quality instrumentation available and service. That begins with the first call to Chroma and continues after the sale through long-term product support. Our sales and service personnel work closely to help you make the best selections for your applications. Then we help you maximize your investment by ensuring optimum equipment performance. All this is accomplished through customer support programs ranging from training to product installations and a variety of maintenance plans.

WARRANTY SERVICE

CHROMA ATE INC. warrants its instruments against all defects in workmanship and material. If you should experience a problem with your instrument, our technicians are available to help you over the phone, or find the nearest service support for timely repair.

CALIBRATION AND REPAIR SERVICE

Whatever your test and measurement hardware support needs, Chroma can provide a reliable, cost-effective support selection that you can trust to reduce downtime and get you back to Business swiftly.



HALT & HASS System

• Instrument Calibration

Keep your equipment operating with maximum precision: Chroma's calibration services are all traceable to national and international standards.

- On-site Calibration for All Major Instrument Brands
- Service Center Instrument Calibration

• Instrument Repair

Chroma offers a variety of flexible choices to maximize instrument uptime, with just the coverage you need for repair.

- Instrument Repair Agreements
- Instrument Standard Repair

• Test System Calibration and Repair

Maximize test system uptime. Chroma has flexible, custom-configurable service and support package, available on select solutions for your specific needs.

- On-site System Calibration
- On-site System Repair



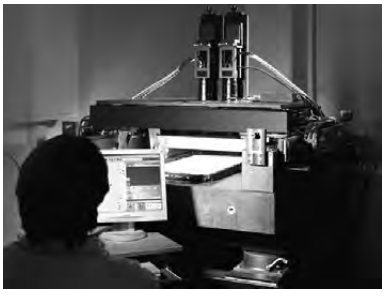
Radiation Test



Conduction Test



ESD Test



Optical Laboratory



Programmable Temperature & Humidity Chamber

For detail customer support services, please visit our website at www.chromaate.com

• Service Warranty

Chroma's service is unconditionally warranted for 90 days, except for disposables such as batteries and lamps, abuse and damage. All calibrations are traceable to National Standards like CNLA.

CUSTOMER-SITE INSTALLATIONS

Chroma provides on-site installations for most Chroma-configured systems. Your Chroma service person will set up your product to meet all operating specifications. Contact your local sales and service office or sales agency for more information.



PRODUCT UPGRADE

Older instruments may be upgraded in order to extend the life of the product on your bench or in your system. Upgrades include adding options or new functions, and/or updating firmware.

REPLACEMENT PARTS

Reduce your inventory and free up your technical staff by taking advantage of our repair exchange modules and board assemblies. Simply call or FAX in your purchase order and Chroma will send you a replacement part.

TRAINING

Chroma provides formal training courses to help you get up to speed and make the most of our products.





TECHNICAL SUPPORT

Chroma provides high quality technical support on applications, operation, measurement specification, hardware, and software, by expert Application engineers. Contact us for more information.

LONG TERM PRODUCT SUPPORT

Chroma supports its instruments for a period of five to ten years beyond the end of production (depending upon the instrument), and wherever possible, we make an effort to support our instruments for much longer time.

CUSTOMIZED SERVICES

In addition to Taiwan headquarters, we not only distribute oversea branch offices but also supply customized serviecs to meet various customs and cultures. In Europe, our customers can inspect instruments' demonstrations easily on the CBC (Chroma Business Coach) which works as a dynamic show-room instead of taking long Business trips. If you are interested in this service, please contact our Europe branch office directly.







Global Service Network

The areas and distributors are listed in alphabetical order.

HEADQUARTERS

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