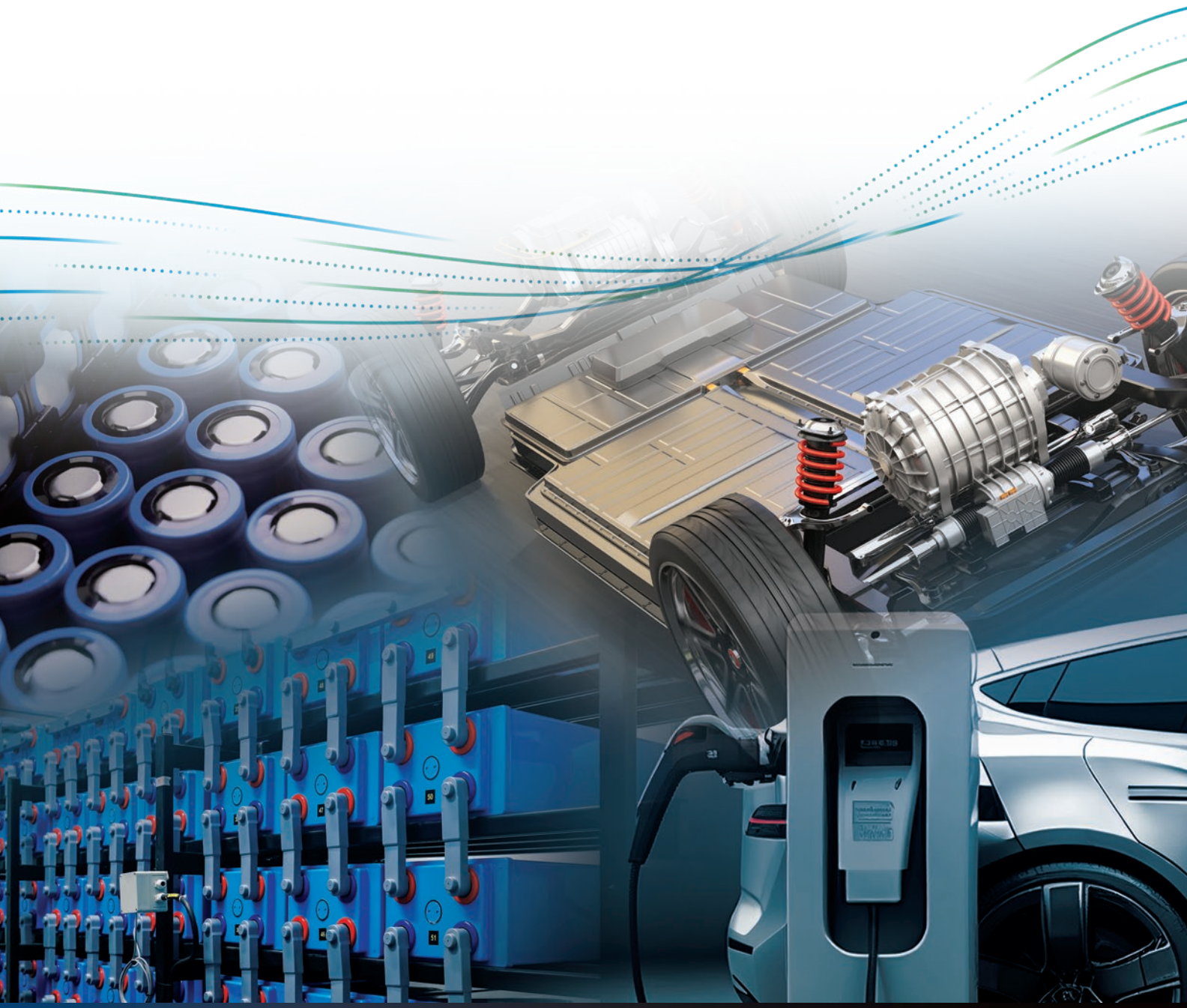
Chroma

POWER CONVERSION

Automated Test Systems and Test Instrumentation



Automated Test Systems

Benchtop R&D | Design Validation | High Speed Production

Expert engineering, integration, and delivery of cost-effective automated test equipment (ATE) and software platforms designed to fit your technical requirements. Built into each automated test system is Chroma's 40 years of expertise, precision instrumentation, pre-written test libraries, and local program management with global support. From EV applications to battery cycling to electrical safety, our test systems will maximize your time, improve your validation process, and increase your throughput.

Hardware Expertise

What sets us apart is that we also manufacture best in class programmable COTS instrumentation ideal for power input/output terminal testing and dynamic simulation. This in-depth knowledge we have with instruments designed for automation ensures we can deliver a test system with a far better understanding of the hardware than a typical integrator.

Fully Customizable Code-Free System Software

Power Pro and Battery Pro are feature-rich, expandable automated test platform that give you control without spending your valuable time programming. Designed for power conversion applications, Power Pro provides an extensive library of pre-written commonly used tests, which you can edit without entering a single line of code. Battery Pro is an intuitive, multi-channel platform designed for cell to pack level charge-discharge testing with real-time monitoring.

Custom Test Fixtures

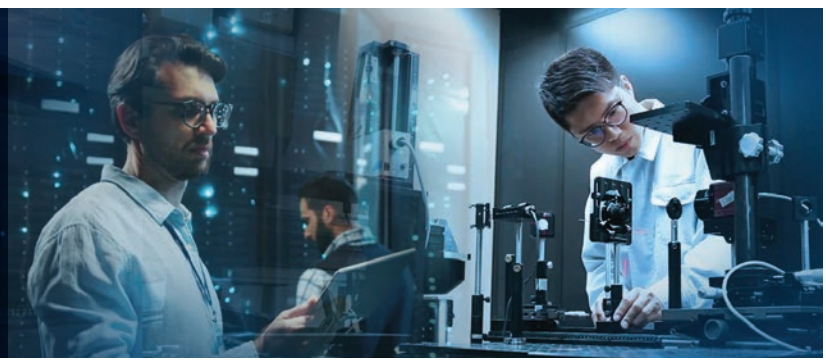
For a complete turnkey solution, we can also design and fabricate custom test fixtures for your units under test. Our fixtures provide a reliable, repeatable test environment and receive the same support as our systems.

Worldwide Support

Chroma places highly trained technical service and support teams in key locations all over the world. You can be sure your automated test systems will be supported wherever they are deployed.

Peace of Mind

Overall system testing and calibrations are performed prior to shipment. We provide all user's manuals, supporting documentation, and a point of contact for support. All systems are backed by factory one year no-cost warranty support. We offer various methods of training from offsite to online.



EV and EVSE Solutions

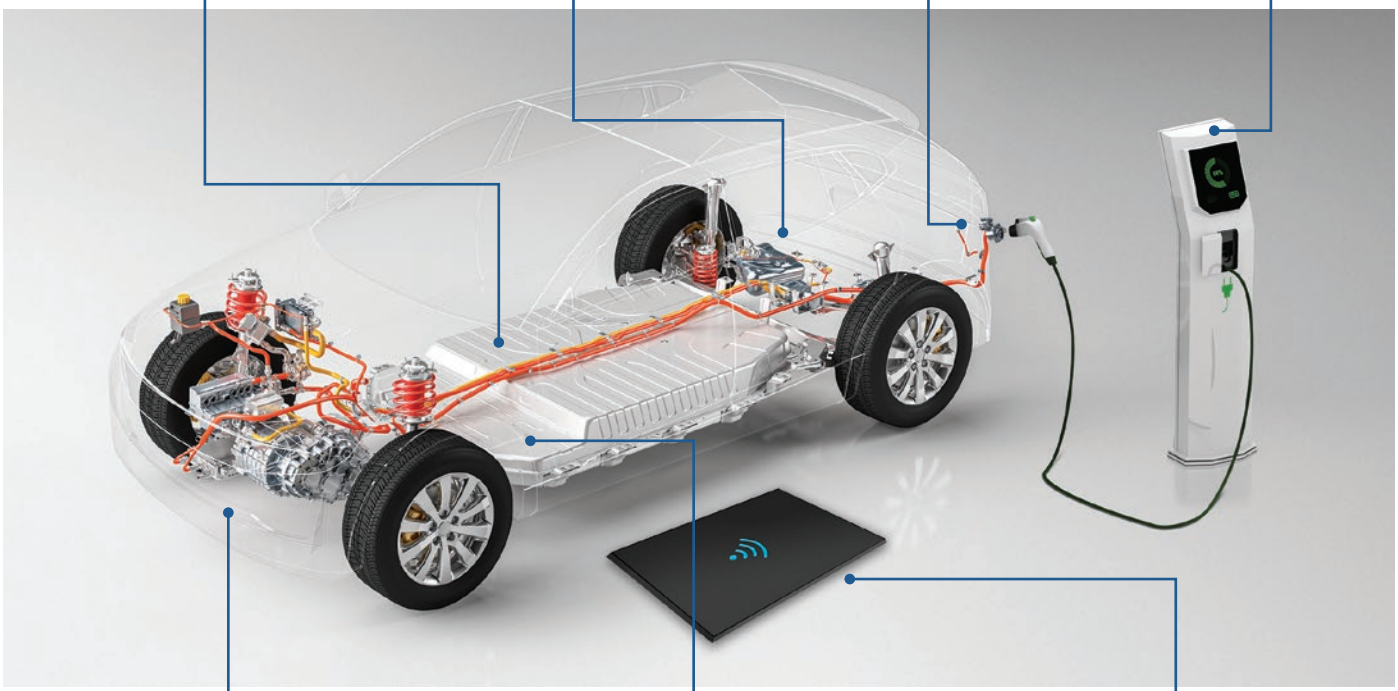
For 40 years, Chroma has accumulated a wealth of knowledge and skills through participating in the power electronics related testing industry, providing professional testing solutions such as EVSE (electric vehicle power supply equipment), charging pile, on board charger, DC/DC converter, motor driver and other related power electronic devices.

Battery Turnkey Solution

OBC/DC-DC Converter ATS

EV Charging Compatibility ATS

EVSE ATS

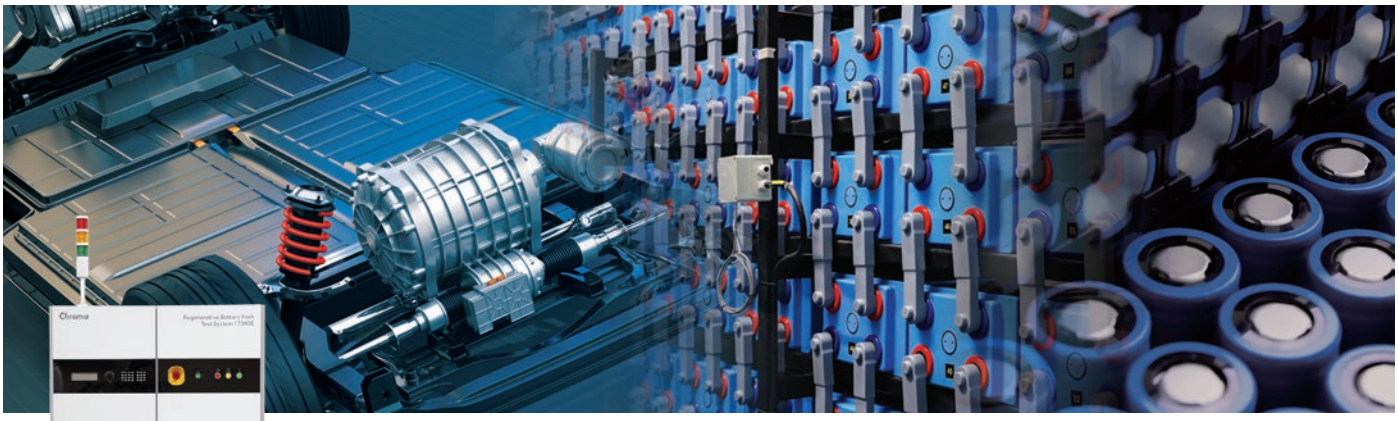


Dyno ATS

Power HIL ATS

Wireless Charger ATS

Battery: Cell, Module, Pack Testing



17040E

17040

Regenerative Battery Pack Test System

Chroma 17040 and 17040E Regenerative Battery Pack Test Systems are high-precision systems specifically designed for secondary battery module and pack tests. The energy regenerative function reduces power consumption during discharge, and ensures a stable power grid without generating harmonic pollution on other devices- even under dynamic charge and discharge conditions.

Where traditional equipment discharges waste energy in the form of heat, Chroma 17040E can recycle the electric energy discharged by the battery module back to the grid, thus reducing waste energy and alleviating HVAC requirements.

Battery Module and Cell Test Systems

Chroma 17010and 17010H system provide two design architecture types. The linear circuit series produce low output noise and high measurement accuracy, suitable for reliability evaluation of small and medium-sized energy storage components in development. The regenerative AC/DC bidirectional series features fit standard product life evaluation as well as medium and large-sized energy storage products or battery cell testing.

16CH Battery Cell Simulator

Chroma 87001 Battery Cell Simulator is a high precision, programmable, and bidirectional DC power source with both voltage source and current source functions. In addition, the model can be used as a multi-channel DC power supply or an electronic load as well.

Battery Simulation Software

Testing battery-connected devices with an actual battery can be cost or time prohibitive, especially if multiple channels are required. Our Battery Simulation software is used to validate device functions during development instead of an actual battery or batteries. Automotive applications include motor drivers, OBC, DC-DC convertors or chargers, and products along the DC bus.

Power Pro Software

C8000 EVSE Tester

Spend Your Valuable Time Testing, Not Coding

Power Pro is a feature-rich, expandable automated test platform that gives you control without spending your valuable time programming and allowing you to get your product to market faster. It is designed to generate tests designed for power conversion applications easily. Power Pro provides a library of over 100 pre-written commonly used tests you can edit without entering a single line of code for various applications such as AC/DC, DC/DC, PV Inverter Testing, BMS, etc. Reports are hassle-free and include extended reporting capabilities, statistic and management functions, test document generation, and system administration.

Diversified report function (HTML/Excel)

Chroma 8000 Software Platform

Power Pro includes extended reporting capabilities, statistic and management functions, test document generation, and system administration. The unique report wizard and generator provide the total solution for any documentation requirement. It allows users to integrate different types of presentations, like tabular test data, DSO waveform, and correlation charts in M/S Word format.

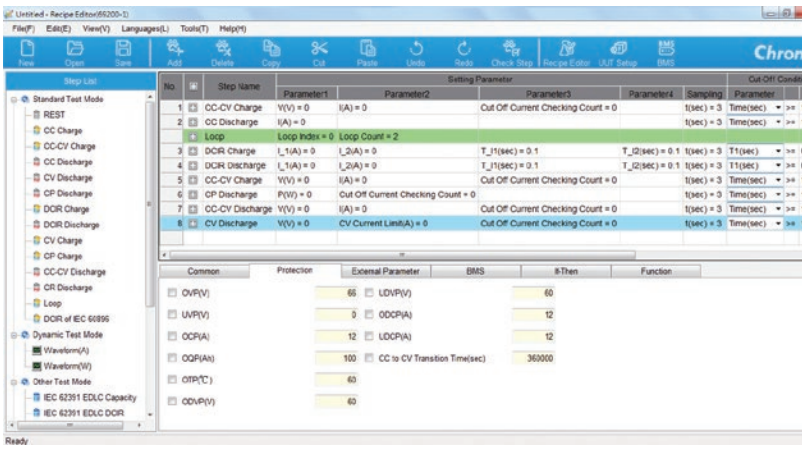
Users may also edit and store report formats for future use, thus saving time creating test reports. The Statistic function provides off-the-shelf statistical reporting tools. All the test conditions defined in the test program and the test readings can be stored and analyzed by the statistic report function. The report and raw data may be printed out or stored in a file.

KEY FEATURES

- Open Architecture Software Platform
- Statistical Report
- On-line Control Function
- Expandable Hardware Support
- Activity Log
- Master/Slave Control Mode
- Support GPIB Instruments & RS232/RS485/CAN Bus Interface
- User Editable Test Library
- User Editable Test Programs
- User Editable Reports
- User Authority Control & Release Control
- Support Bar-Code Reader
- Support Shop-floor Control
- Remote Monitoring Via Internet
- Test Command Optimizer Helps to Improve Test Speed
- Capable to Test PCB Level to Complete for any UPS Applications
- Comprehensive Hardware Modules Provide High Accuracy & Repetitive Measurements

Battery Pro Software

Battery Pro is an intuitive, multi-channel platform designed for cell to pack level charge-discharge testing with real-time monitoring. The software is item driven with built-in tests – meaning no programming is required at all. Users can read data from the BMS controller which also includes thermal chamber control. Battery Pro supports Chroma's regenerative battery cyclers and provides a safe and stable testing environment.



Supported Systems

Battery Pro test environment supports our 17020 and 17040 systems and is also designed to meet the various requirements of 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.

KEY FEATURES

- Real-time multi-channel battery pack status browsing
- Icon Manager: Test status of each channel is managed through different icons, easy to read and understand
- Authority management: Sets the user's authority for operation
- Fault record tracking: It records the abnormal state of each channel independently
- 255 charge/discharge conditions
- Sets dual layer loops (cycle & loop) with 9999 loops per layer
- Cut-off conditions
  - Time/ Capacity/ Voltage/ Current/ Temperature
  - Data Acquisition from data logger (option)
  - Data Acquisition from BMS (option)
- Protection
  - OVP/UVP/OCP/OTP/OQP
  - Data Acquisition from data logger (option)
  - Data Acquisition from BMS (option)
  - Turn the main loop off for safety issues of AC line
  - ΔV protection / ΔI protection for internal short of battery pack
  - ΔV period protection / ΔI period protection
  - CC-CV transition time

Programmable Power Instruments

Bidirectional DC Power

Designed for both single-phase and multiple phase measurements of AC power signals and related parameters common to most electronic products.

Grid Simulators

Full 4-quadrant, fully regenerative, AC power source that emulates grid characteristics for testing to standards such as IEEE 1547 / IEC 61000-3-15 / IEC 62116.

DC Power Supplies

Our programmable DC power supplies are commonly used in DC-DC converter, PV inverter, telecom, battery charger, EV / automotive, burn-in, and plating/electrolysis testing.

AC Power Sources

Programmable AC Power and Regenerative Grid Simulators with a wide range of voltage, current, and power for simulating AC mains and line fault conditions.

AC/DC Electronic Loads

Chroma AC 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.

Hipot Testers & Analyzers

Hipot testers or dielectric withstand testing instruments are used for conducting electrical safety tests on electrical components and products to make certain they are in compliance with IEC, UL, TUV, CSA, EN, and other electrical safety requirements.

Bidirectional DC Sources & Loads

62450D-200HL Bidirectional DC Source
45kW/2000V/180A (4U)

Bidirectional DC Power Supplies

Our new programmable bidirectional DC power supplies provide both source and load characteristics. Applications include testing power components in electric vehicles as well as bidirectional on-board chargers (BOBC), bidirectional DC converter, and DC-AC motor drivers and can be used to perform power conversion tests of lithium ion batteries in both charge and discharge directions.

High Transient Response

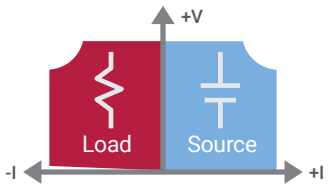
High Power Density 45kW/4U

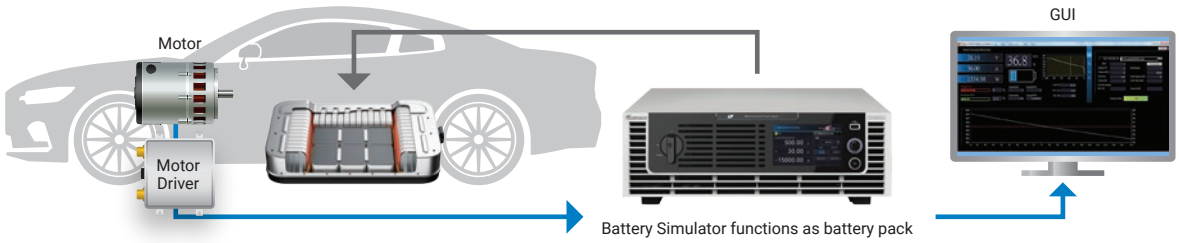
High Precision Measurement

DC Power Supply + Regenerative Load

2-In-1: Bidirectional DC Power Supply and Regenerative Load

Chroma 62000D has a bidirectional switch power supply design that offers two-quadrant operation enabling both DC power supply output and regenerative DC loading. The absorbed energy feeds back to the grid with a conversion efficiency up to 93% and can operate in constant voltage, constant current, and constant power modes. The 62000D two-in-one bidirectional DC power supply saves space, reduces energy loss and heat dissipation, and is easier to wire and configure.





Battery Simulation Function

Chroma 62000D is a bidirectional DC power supply that can be charged or discharged by an external power source. With the operation of software, the 62000D become battery simulators that can simulate operation at different capacity (SOC) or import specific battery characteristics V-I curves. It can evaluate the product under different battery capacities or with different battery characteristics. 62000D is suitable for testing various products such as BOBC, PCS, ESS or motor drivers.

Regenerative DC Electronic Load

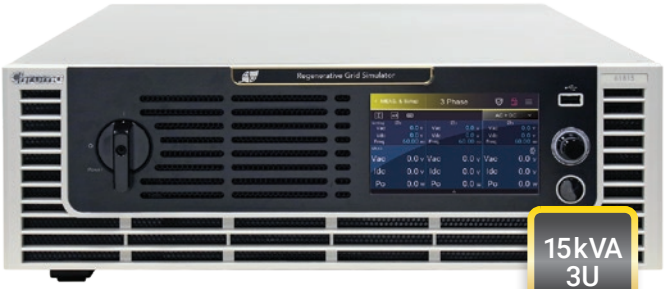
The 63700 Series offers high power density within a compact 3U form factor, with power ratings reaching up to 18kW per unit and currents of up to 120A. Users can parallel up to 10 units* for a maximum power of 180kW and a maximum current of 1,200A. Voltage options include 600V, 1,200V, and 1,800V.

These regenerative DC loads can simulate a wide range of load characteristics while also feeding energy back to the grid, providing an efficient and sustainable solution that reduces test environment temperatures, HVAC power consumption, and power conversion electricity costs.

Regenerative AC Sources & Loads

9kVA - 105kVA Regenerative Grid Simulators

Designed for PV inverter, Smart Grid and EV test applications, the 61800 Regenerative Grid Simulator is a full 4-quadrant, fully regenerative, programmable AC power source with advanced features for compliance, safety, and product verification testing. Power can both sink and source from the UUT seamlessly to support a multitude of applications. In cases where the UUT sources current, a detection circuit will sense the excess power and recycle it back to the grid. Using state-of-the-art digital control technology the 61800 can deliver up to 330VAC at output frequencies ranging from 30Hz to 100Hz. The AC+DC feature allows for applications that require a DC offset bias.



61815 Regenerative Grid Simulator

61800 Series

Also available in 30,45,60, and 100kVA units

KEY FEATURES

- Output Power: 61809: 9kVA, 61812: 12kVA, 61815: 15kVA
- Output voltage: 0~350V
- Output frequency: 30Hz~100Hz / DC
- High Power Density 15kVA in 3UH
- Intuitive Touch Panel Interface
- User selectable single phase or three phase output
- Full 4-quadrant, fully regenerative up to 100% of output current rating
- Specifically designed for EV, PV inverter and Smart Grid related test applications
- Programmable slew rate settings for voltage and frequency
- Programmable voltage and current limits
- Turn on, turn off phase angle control
- Synchronize TTL signal of voltage changing
- LIST, PULSE, STEP mode functions for testing Power Line Disturbance (PLD) simulation

Regenerative AC Electronic Load

Chroma 63800R Series offers AC electronic loads with regenerative capability, featuring three models with power ratings of 9kVA, 12kVA, and 15kVA. This series boasts a high power density design, providing a maximum load capacity of 15kVA within a compact 3U chassis. To accommodate higher power rating test requirements, you can parallel multiple units for increased load capacity while utilizing master-slave control.

The Chroma 63800R Series presents a highly efficient energy-saving solution with its regenerative feature, making it ideal for a broad spectrum of renewable energy applications, including ESS, hybrid PV inverters, AC EVSE, and bidirectional on-board chargers (BOBC) for V2L and V2H applications.

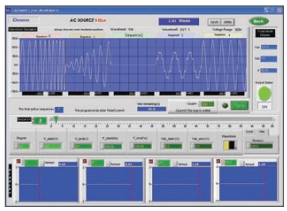
Programmable AC Power

Programmable AC Sources

The 61500 series defines a new standard in high performance AC power sources. It's equipped with powerful features such as power line disturbance simulation, programmable output impedance, comprehensive measurement functions and optional regulation test software. These features make the 61500 series ideal for commercial, power electronics, avionics, military and regulation test applications from bench-top testing to mass production.

Single- or three-phase programmable
AC Power Source 61509

List Mode:
Voltage transient programming



Distorted Waveform Editor

POWER RATING: up to 90kVA, single or three phase output

VOLTAGE RANGE: 0-175V/0-350V/Auto

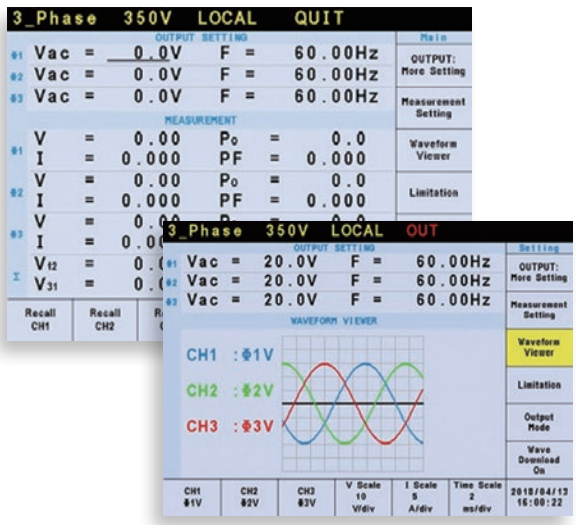
FREQUENCY: DC, 15Hz-2kHz (5kHz optional)

KEY FEATURES

- Single-phase or three-phase output selectable
- Programmable slew rate setting for changing voltage and frequency
- Programmable voltage and current limit
- High output current crest factor inrush current testing
- Turn on and 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 and inter-harmonics waveform synthesizer
- Comprehensive measurement capability including current harmonics
- Analog programmable interfaces
- Remote interface: GPIB, RS-232, USB, and Ethernet
- Higher output power capability by implementing master-slave parallel output function

Comprehensive Measurements

Chroma programmable AC power sources have built-in 16-bit measurement circuits and firmware utilities to measure true RMS voltage, current, true power, apparent power, reactive power, power factor, current crest factor, repetitive peak current, and inrush current. Using advanced DSP technology, the 61500 series can measure THD and up to 50 orders of current harmonics. The 5.7" Color LCD provides users with easy to operate interfaces by integrating parameters and functions on single display pages. The panels are also capable of voltage and current measurement waveform displays.

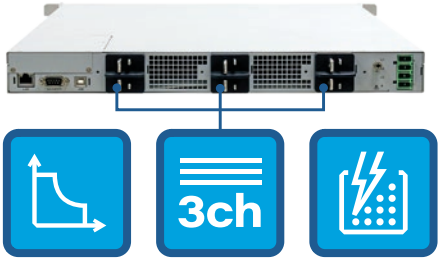


Programmable AC Power Sources

Model	Low Power	High Power	Single- or Three-Phase	Regen Grid Simulator Single- or Three-Phase
				Also available in 30,45,60, and 100kVA units
	61500/61600	61511, 61512	61507,08,09	61809,12,15
Power Rating	500VA / 1.5kVA / 2kVA / 4kVA	12kVA / 18kVA	3kVA / 4.5kVA / 6kVA	9kVA-15kVA / Parallel up to 1MW
Voltage Ranges	0-150V/0-300V/Auto	0-150V/0-300V/Auto	0-175V/0-350V/Auto	0-350V
Frequency	DC, 15Hz-1kHz	DC, 15Hz-1.5kHz	DC, 15Hz-2kHz (5kHz opt.)	30Hz-100Hz/DC
Remote Interface	GPIB, RS-232C USB, Ethernet (opt)	GPIB, RS-232, USB, Ethernet	GPIB, RS-232, USB, Ethernet	USB, LAN, GPIB, CAN (optional)
LIST, PULSE, STEP modes	✔	✔	✔	✔
Programmable voltage and current limit	✔	✔	✔	✔
Programmable slew rate setting	✔	✔	✔	✔
Harmonic synthesizer (up to 50)	✔	✔	✔	✔
Turn on/off phase angle control	✔	✔	✔	✔
Comprehensive measurements, including current harmonics	✔	✔	✔	✔
Analog programmable interfaces	Optional	✔	✔	
Optional Graphic User Interface	✔	✔	✔	✔

Programmable DC Power

62000E back panel



Auto Ranging Output | 3-Channel Output | High Power Density

Programmable DC Power Supply

Chroma 62000E Series programmable DC power supply provides a single channel of 1.7kW, 3.4kW, 5kW and three channels of 1.7kW output configured in 1U chassis with industry-leading high power density design. The series is comprised of 28 models with fixed-range output and auto-range output with output current ratings up to 22.5A and voltage ratings up to 1200V.

KEY FEATURES

- CV/CC priority
- Auto sequencing programming
- High-precision measurement
- High speed transient response <1ms
- Low output ripple & noise
- Intuitive and user-friendly touch-control screen
- Standard USB/LAN interfaces
- Optional APG/CANFD/GPIB, and master/slave parallel control interfaces
- AC input : 1-phase/3-phase 200~240Vac or 3-phase 380~400Vac

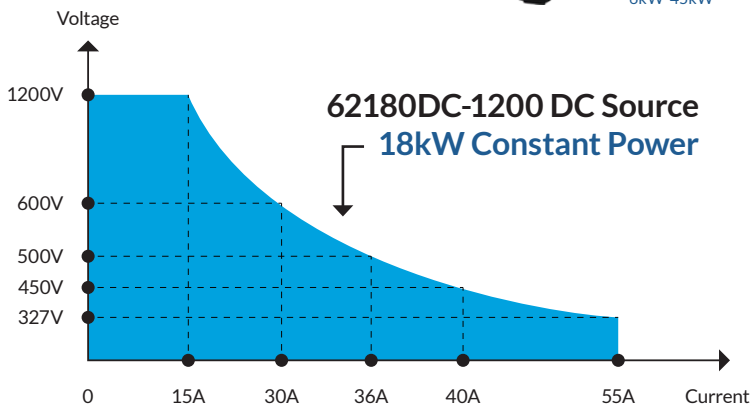
High-Power DC Power Supply 62000DC

62000DC programmable DC supplies include 4 different models with industry leading power density at 18kW in 3U of vertical rack space. Models range from 6kW to 18kW, output current ratings up to 540A, and voltage ratings up to 1200VDC. The master/slave feature allows for up to 10 models to be paralleled easily and safely up to 180kW.

62000DC
6kW-45kW

KEY FEATURES

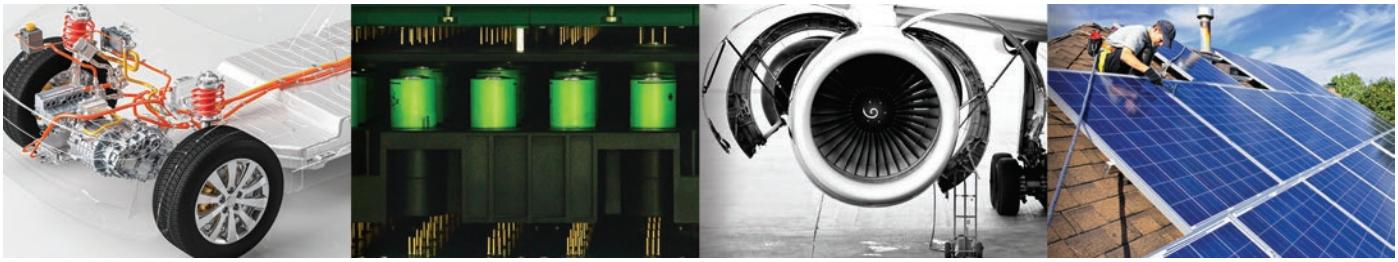
- Easy master/slave parallel & series *1 operation up to 540kW
- Wide range of voltage & current combinations in constant power
- Auto sequencing programming
- Voltage & current slew rate control
- High speed transient response <1.5ms
- Low output noise and ripple
- Intuitive and user-friendly touch control screen



62000H-S

Solar Array Simulating DC Supplies

The 62000H-S programmable Solar Array Simulator provides simulation of Voc (open circuit voltage) up to 1800V and Isc (short circuit current) up to 30A. 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, which are both needed for MPPT performance evaluation on PV inverter devices.



Programmable DC Power Supplies

Model	 Programmable DC Power	 Benchtop Auto-ranging	 Constant Power	 Modular - Hot Swap	 Solar Array Simulator	 High Power
	62000E	62000L	62000P	62000B	62000H-S	62000DC
Power Rating	1.7kW/3.4kW/5kW	108W / 150W	600W, 1200W, 2400W, 5000W	Up to 1.5kW per module - up to 120KW per system	2kW / 5kW / 10kW / 15kW	6kW/12kW/ 18kW
Voltage Ranges	0 - 1200V	0 - 60V	0 - 600V	1 - 150V	150V/600V/1000V & 1800V	0 - 1200V
Current Ranges	22.5A max.	0 - 7A	0 - 120A	Up to 2000A (System)	0-40, 1500A (System)	up to 540A
High-speed Programming		✔	✔			✔
Precision V&I Measurements	✔	✔	✔		✔	✔
Current sharing for parallel operation with Master/Slave Control	✔	✔	✔	✔	✔	✔
Ideal for Burn-in & Electrolysis	✔		✔	✔	✔	✔
Voltage & Current Slew Rate Control	✔		✔		✔	✔
Standard Analog Programming interface	✔	✔	✔	✔	✔	✔
Fast transient response solar array simulation					✔	
Static & dynamic MPPT efficiency test					✔	
Optional Graphic User Interface	✔	✔	✔	✔	✔	✔

Electronic Loads

Modular Electronic DC Load

The new generation 63600 DC Electronic Loads provide an innovative Dynamic Sweep mode with Vpk measurements that can be run independently on each module or in parallel for high power loading. Also allows for three measurement ranges for precise voltage and current measurements making it ideal for ENERGY STAR® testing requirements. The 63600 also provides an enhanced feature, User Defined Waveform (UDW), to simulate the actual current profiles and waveforms.

Loaded 5 bay mainframe 63600

Module Load Design

KEY FEATURES

- Voltage and current waveform digitizer on each channel
- Unique constant CZ allows for non-linear load simulations
- Current down to zero voltage, full current to 0.4VDC
- High speed transient generator and user defined waveforms
- Labview graphical user interface
- GPIB, RS232, USB and Ethernet

Ultra Low Voltage DC Load

Simulate Loading Characteristics of AI Microprocessors

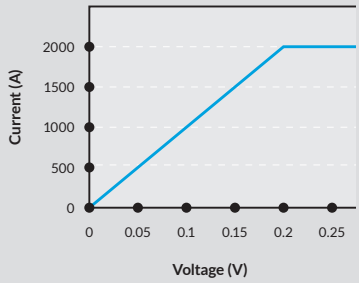
The 63202A-20-2000 Ultra Low Voltage DC Electronic Load is designed for testing VRM, VRD, POL Converter, and embedded D2D converters. These modules provide suitable supply voltage for the Central Processing Unit (CPU) and Graphics Processing Unit (GPU). The 63202A-20-2000 features outstanding low voltage characteristics with a minimum operating voltage of 0.2V and a maximum rated current of 2 000A. It can load current even in the range below 0.2V to 0V.

The new generation of 63202A-20-2000 DC loads introduces a low inductance copper bar design, reducing internal inductance and impedance, and enhancing response speed. It is suitable for applications in power supply products below 1.0V. The output copper bar includes additional porous locking attachment points, addressing convenience issues with attachments.

AI Chip Simulator
2000A @0.2 Vdc

KEY FEATURES

- Voltage range: 0 ~ 20V
- Current range: 2,000A max.
- 2,000A@0.2V (typical) low voltage operating characteristics
- Output Low inductance copper bar design
- CC dynamic frequency up to 25kHz
- User defined waveform
- Low inductance cable (Option)



Programmable AC
Electronic Load

Regenerative
AC & DC Electronic Load

High Power
DC Electronic Loads

Modular
DC Electronic Load

Benchtop
DC Electronic Load

Electronic Loads

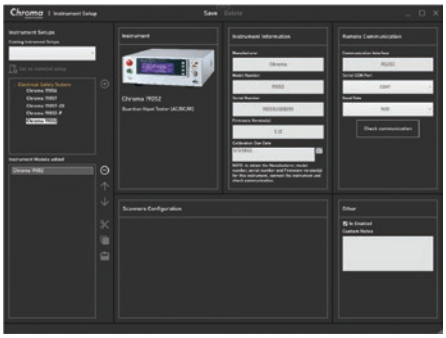
Model	AC		DC			
	Programmable AC Load	Regenerative AC Load	Regenerative DC Load	High Power DC Load	Modular DC Load	Benchtop DC Load
	63800	63800R	63700	63200A	63600	63000
Power Rating	1800W / 3600W / 4500W	9kVA, 12kVA, 15kVA	6kW, 12kW, 18kW	2kW - 24kW, up to 240kW	100W, 300W, 400W	250W, 350W
Voltage Range	50V – 350Vrms	30Vrms – 350Vrms	0 – 1,800V	0-20V* / 0-150V / 0-600V / 0-1200V	0 - 600V	150V
Current Range	Up to 45Arms	0 – 35Arms	Up to 120A	Up to 2000A	Up to 80A per module	Up to 60A
Dynamic Loading	45 – 440Hz	30 – 100Hz	10ms – 100s	25kHz* / 50kHz	50kHz	25kHz
Remote Interface	RS-232, GPIB	USB, LAN(std) GPIB, CAN(opt)	USB, LAN(std) GPIB,CAN(opt)	USB (std), GPIB/ Ethernet/CAN	USB (std) GPIB, Ethernet (opt)	USB (std), GPIB/ Ethernet/LXI
Max Channels per Mainframe	1	3	1	1	10	1
Master/Slave Parallel Control	✔	✔	✔	✔	✔	
Synchronize with Multiple Loads	✔	✔	✔	✔	✔	
Load Modes	CC, CR, CP, RCL, InRush	CC, CR, CP, RCL, InRush, Lead & Lag PF	CC, CR, CV, CP, CZ	CC, CR, CV, CP, CZ	CC, CR, CV, CP, CZ	CC, CR, CV, CP, CZ
Programmable Slew Rate	✔	✔	✔	✔	✔	✔
Constant Impedance Mode	✔	Lead & Lag PF	✔	✔	✔	✔
V & I Digitizer				✔	✔	✔
User Defined Waveforms				✔	✔	✔
Optional Graphic User Interface	✔	✔	✔	✔	✔	✔

* Indicates Chroma 63202A-20-2000 spec.

Electrical Safety Testing

Sentinel Test Systems

Designed specifically for automated medical device testing to IEC60601-1 and IEC60601-2-49 (Multifunctional Patient Monitoring Equipment) standards. An integration of Chroma's best in class test equipment and powerful CaptivATE automation software, Sentinel Systems accommodate Class I, Class II, mains and internally powered medical devices. Depending on your requirements, Sentinel Systems are available in three cost-saving and efficient configurations.



CaptivATE Automation Software

CaptivATE provides an electrical safety test solution for accurately performing automated hipot, leakage current and functional tests. Testing is made simple and fast by automatically downloading the test setup, conducting the required measurements and outputting the test results.

CaptivATE supports

- IEC 60601-1
- Chroma 19200 / Matrix 8000
- Multi-level password protection
- Microsoft SQL Server
- NI-USB 6525 Digital I/O
- IQOQ Protocol Documentation

Electrical Safety Analyzer – 19032

The 19032 performs six dielectric tests in one unit including: AC/DC Hipot, Insulation Resistance, Ground Bond, Leakage Current and Dynamic Function tests for compliance testing of IEC, UL, TUV, CSA, EN and other standards. The time-saving TwinPort™ feature performs Hipot and Ground Bond simultaneously cutting time for these tests in half.

Multi-Channel Test Systems

Hybrid EST Scanner – 19035

The Chroma 19035 Series supports 5kVac/6kVdc high voltage output to conform with withstand voltage test requirements and has a maximum output current up to 30mA. The Insulation Resistance (IR) test measurement ranges from 1MΩ to 50GΩ, and voltage output can be up to 5kV; while the DCR test can measure low voltage resistance and test circuit connections (contact check) before the withstand voltage test is performed.

16-40 Channels for Switch Testing

The A190359 scanner has 16 test channels and each of them can be set to H (High voltage, Hi), L (High voltage, Lo) or X (Open). The combination of 19035 and A190359 can apply high voltage to multiple points on a DUT, or apply high voltage to multiple DUTs at once. This setup reduces total test time and limits the need for operators to move leads in between tests, which helps decrease user error.

A190359 scanner

Specialty Testers— Component Testing

Battery Cell Insulation Tester – 11210

Chroma 11210 battery cell insulation tester is an instrument used for accurately measuring leakage current (LC) and insulation resistance (IR) of battery jelly-roll/dry-cell as well as other insulation materials. In addition to standard LC/IR measurement, the 11210 has a unique function that detects partial discharge (PD) or flashover that may have occurred inside the insulation material during the high voltage insulation testing process.

Battery Cell Surge Tester – 19311

Designed for testing the insulation quality between the positive and negative plates of a lead-acid battery cell, the 19311 applies a high voltage surge/impulse before the electrolyte injection process effectively decreasing defective rates in production. Chroma has given the surge tester an output voltage that can reach up to 6kV, has four terminal measurement, and a sampling rate of 200MHz.

Partial Discharge Tester – 19501-K

The Chroma 19501-K Partial Discharge Tester is an instrument equipped with AC hipot test and partial discharge detection functions, providing 0.1kV~10kV of AC output, 0.01μA~ 300μA of leakage current, and 1pC~2000pC partial discharge detection range for measurement. It is specifically designed for testing high voltage semiconductor components and high insulation materials.

Wound Component EST Analyzer – 19036

The industry's first Wound Component Electrical Safety Test (EST) Analyzer that combines impulse winding, AC/DC hipot, insulation resistance and DC resistance test measurement functions. Chroma's 19036 Wound Component EST Analyzer has 5kVac/6kVdc high voltage output, 5kV insulation resistance, 6kV layer short impulse voltage and 4-wire DC resistance measurement with a maximum output of up to 40 channels.

Multi-Channel Hipot Tester – 19020

The Guardian 19020 comes equipped with the world's first sync hipot test function. A single unit can operate 10 channels with synchronized output and measurements simultaneously. Up to 10 units (master & slave) can be controlled simultaneously to have 100 channels in total. These can be grouped for output to avoid creating voltage differences due to adjacent tests as well as to improve productivity.

Safety Testers & Hipot Analyzers

Electrical Safety Analyzer
Guardian 19032 / 19032-P
500VA

Multichannel
Hipot Tester
Guardian 19020

Hybrid EST Scanner
19035

Hipot Tester
Guardian 19052, 19053,
19054, Sentry 19071,
19073

Hipot Analyzer 500VA
Guardian 19055, 19055-C

High Voltage
Hipot Analyzer
Guardian 19056, 19057

Model	Electrical Safety Analyzer Guardian 19032 / 19032-P 500VA	Multichannel Hipot Tester Guardian 19020	Hybrid EST Scanner 19035	Hipot Tester Guardian 19052, 19053, 19054, Sentry 19071, 19073	Hipot Analyzer 500VA Guardian 19055, 19055-C (CDD)	High Voltage Hipot Analyzer Guardian 19056, 19057
Mode (Model Specific)	AC / DC / IR / GB / LC / Dynamic Function	AC or AC / DC / IR	AC / DC / IR / DCR -8CH	AC / DC / IR or AC / DC / IR / SCAN	AC / DC / IR	AC or DC / IR
Channels	1 (up to 64 opt)	10 (up to 100)	8 (up to 40 opt.)	1, 4 or 8	1, 8 (opt)	1
Output Voltage	AC : 0.05 - 5kV DC: 0.05 - 6kV	AC: 0.05 - 5kV DC: 0.05 - 6kV	AC: 0.05 - 5kV DC: 0.05 - 6kV	AC: 0.05 - 5kV DC: 0.05 - 6kV	AC: 0.05 - 5kV DC: 0.05 - 6kV	DC:01 – 12kV (19057) DC:01 – 20kV (19057-20)
Cutoff Current	DC: 12mA, AC: 40mA DC: 25mA, AC:100mA (19032-P)	AC: 0.01 - 10mA DC: 0.001 - 5mA	AC: 30mA DC: 10mA	AC: 0.1 - 30mA, DC: 0.01 - 10mA **(19052, 19053, 19054)** AC: 0.1mA - 20mA DC: 0.01mA - 5mA **(19071, 19073)**	AC: 5kV/100mA (4kV/120mA) DC: 25mA	AC: 20mA (19056) DC: 10mA (19057)
Insulation Resistance Test	0.1MΩ - 50GΩ / 1kV max	1MΩ - 50GΩ / 1kV max	0.1MΩ - 50GΩ / 5kV Max	19052: 1M-50GΩ 19053/4: 1M-10GΩ **(19052, 19053, 19054)** 1MΩ - 50GΩ / 1kV max **(19073 only)**	0.1MΩ - 50GΩ / 5kV max	0.1MΩ - 50GΩ / 5kV max
GO/NG Judgment Window	✔	✔	✔	✔	✔	✔
Remote Interface	RS232, Handler (std, USB only on 19032-P); GPIB (opt)	RS-232, Handler, GPIB (std)*CANBUS & DCI used for Max. 10 units master/slave connections	RS-232, GPIB, Handler	RS-232 (std) GPIB (opt) on 19052, 53, 54	RS-232, Handler (std), GPIB (opt)	RS-232, Handler, USB, Scan (std), GPIB (opt)
OSC (Open / Short Check)	✔	✔	✔	✔	✔	✔
Flashover Detection	✔	✔	✔	✔	✔	✔
Contact Check Function / GFI	OSC / GFI	OSC	OSC	OSC / GFI	HFCC / GFI	HVCC, HFCC / GFI
Certification	UL/TUV/CE	CE	CE	CE, UL, TUV (most models)	CE	CE

Ground Bond Tester – 19572

The 19572 is an instrument dedicated to measuring grounding resistance within a range of 0.1~510mΩ. Its compact size and easy operation makes it perfect for testing in a production line. Since it supplies highly reliable and stable test results with a built-in resistance compensation function, the 19572 is an economical and useful ground bond tester.

LCR, IR, & Milliohm Meters

RF LCR Meter – 11090-030

Chroma 11090-030 RF LCR Meter provides a high-frequency measurement and evaluation solution for passive components such as SMD chip inductors and RF filters. With a testing frequency of up to 300MHz, this instrument not only meets the increasing demand for nominal frequency testing of components like POL or small DC-DC converters, but also addresses quality anomalies that can only be detected at ultra-high frequencies. Additionally, it can fulfill common 100MHz impedance testing needs for components like EMI filters and ferrite beads.

LCR, IR, Milliohm Meters

Model	 60Hz ~ 30MHz LCR Meters	 100Hz ~ 50 kHz LCR Meters	 50Hz ~ 100kHz LCR Meters	 Capacitor Leakage Current/IR Meter	 RF LCR Meter
	11050	11021 / 11021-L	11022 / 11025	11200	11090-030
Test Parameters	L, C, R, Z, Y, DCR, Q, D, ø	Primary: L, C, R, | Z | Secondary: Q, D, ESR, Xs, ø	L, C, R, | Z |, Q, D, ESR, X, ø DCR4, M, Turns Ratio, L2, DCR2 (11025 only)	LC / IR	Z, øz, Y, øy, R, X, G, B, Ls, Lp, Cs, Cp, Rs, Rp, D, Q
Test Frequency	75kHz - 30MHz (11050-30) 1kHz - 10MHz (11050) 60Hz - 5MHz (11050-5)	100Hz, 120Hz, 1kHz, 10kHz (9.6kHz) (11021) 1kHz, 10kHz, 40kHz, 50kHz (11021-L)	50Hz, 60Hz, 100Hz, 120Hz, 1kHz, 10kHz, 20kHz, 40kHz, 50kHz, 100kHz	Only DC	100kHz~300MHz
Test Levels	10mV - 5V	0.25V / 1V (11021) 50mV / 1V (11021-L)	10 mV - 1V , step 10 mV	1.0 - 100V, step 0.1V: 101 - 650V or 800V, step 1V	
Basic Accuracy	0.1%	0.1% (11021) 0.2% (11021-L)	0.1%	0.3%	± 0.8% % (typical ± 0.45%)
Measurement Time	15mS - 295mS	75mS	21mS	77mS - 420mS	0.5/0.9/2.1/3.7 (ms)
Output Impedance Modes	100Ω, 25Ω, OFF	Varies as range resistors 25Ω, 100Ω, 1kΩ, 10kΩ, 100kΩ	2Ω, 10Ω, 25Ω, 100Ω	Varies as range resistors	
Adjustable DC Bias Current	✔	✔	11025 only		
Test Signal Monitoring Function	✔		✔	✔	✔
Output Signal	Compare, Bin-sorting	Bin-sorting & HI/GO/LOW judge	Bin-sorting & HI/GO/LOW judge	HI/GO/LOW judge	Bin-sorting & Pass/Fail judge
Open/short zeroing & load correction function	✔	✔	✔	Open Correction	✔
Detached measurement & display unit design	✔				
Lower Harmonic-distortion affection		✔			
Remote Interface	RS-232C, Handler, USB storage, Ext bias current control (std) GPIB, LAN (opt)	RS-232 (std) Handler & GPIB (opt)	Handler (50pin), GPIB, RS-232	RS-232 (std) Handler & GPIB (opt)	Handler, RS-232C, GPIB, LAN, USB, USB (USBTMC)

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