Chroma

Advancing Excellence

Electric Vehicle Test Solutions

Components/EVSE/Batteries/E-Propulsion

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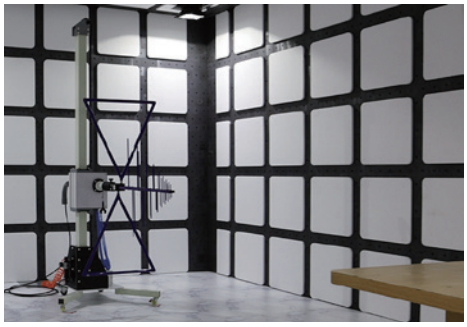
Founded in 1984, Chroma ATE Inc. is a global supplier of automated test equipment, providing precision measurement instruments and automated test systems (ATS) essential for product development across the electronics industry. Our testing technologies integrate seamlessly with production line automation solutions and intelligent manufacturing systems (IMS), enabling us to deliver comprehensive, integrated Test and Automation Turnkey Solutions that fulfill the growing demand for one-stop service.

Chroma has cultivated deep expertise in the electric vehicle (EV) sector over many years. We have established strong, long-term partnerships with leading automakers and key EV component suppliers - including battery manufacturers. In the field of EV power electronics testing, Chroma offers a full spectrum of solutions covering battery cells, battery modules, battery packs, battery management systems (BMS), on-board chargers, DC-DC converters, EV chargers (EVSE), wireless charging systems, and electrical safety compliance.

In addition to nurturing hundreds of R&D engineers across a wide range of technical disciplines, Chroma invests heavily each year in exploring new domains to maintain its technological leadership. Drawing on our core technologies in power electronics and optics, we are committed to developing innovative testing solutions tailored to emerging market trends. For 40 years and counting, our dedication to accuracy, reliability, and unique product capabilities has been key to earning the trust and continued support of our valued customers worldwide.

Manufacturing Capability and Service Support


E-Propulsion Testing Lab


EMC Lab - Electromagnetic Wave Testing


Highly Accelerated Life Testing Equipment


Smart Auto Production Line


High Power Burn-In Testing


Customized Assembly


Automated Test Equipment and Software


Calibration Lab

Local Support and Services

EV Power Electronic Integrated Test Solutions

OBC/DC-DC Converter ATS | 8000

On-Board Chargers (OBC) convert grid power into DC current to charge the on-board energy storage device. In addition to all the functions of the general OBC, the Bi-directional OBC (BOBC) can also output the stored power for applications such as V2L, V2V, and V2G. The DC/DC converter converts the high voltage DC power to low voltage for the auxiliary power output of the EV battery.

Chroma has a complete line of AC and DC power load products. We provide automatic test systems for OBCs and DC/DC converters that verify the performance and safety of your products according to their characteristics and test requirements. The systems are especially suitable for R&D verification, QA and production lines of EV parts manufacturers and EV factories.

Key Features

- ☑ Built-in standard test items compliant with QC/T 895, GB/T 24347, GB/T 40432, SAE J2894 standard requirements that can be loaded directly without reprogramming
- ☑ Panel controllers with standard wiring solve wiring difficulties, improve reliability and shorten test time
- ☑ Provides CAN and CAN FD communication interfaces, supports event-triggered and time-triggered
- ☑ DBC file loading allows convenient retrieval of CAN signal parameters
- ☑ Live counters, CRC, UDS functionality
- ☑ AC charging signal simulation functionality (Control Pilot, Proximity Contact)

X-in-1 ATS | 8000

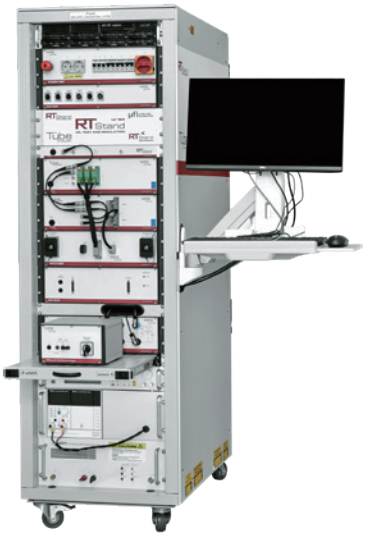
The X-in-1 design trend for electric vehicle powertrains includes various functions such as OBC, DC/DC Converter, MCU, PDU, and VCU. Depending on different needs, there are various integration methods, offering advantages like cost reduction and simplified in-vehicle layout design. Chroma provides a complete range of AC and DC power load products and a flexible power test software platform. The automatic test system can be optimized according to the test requirements of the device under test, meeting customer needs in R&D verification, quality assurance, and production line scenarios.

Key Features

- ☑ Provides customized automatic switching fixtures to improve test efficiency
- ☑ Provides CAN and CAN FD communication interfaces, supports event-triggered and time-triggered
- ☑ DBC file loading allows convenient retrieval of CAN signal parameters
- ☑ Live counters, CRC, UDS functionality
- ☑ AC charging signal simulation functionality (Control Pilot, Proximity Contact)
- ☑ DC charging signal simulation functionality (CCS, CHAdeMO, GBT)
- ☑ Motor resolver signal simulation functionality

LV124/LV148 ATS | RTStand Pro ATS

LV124 and LV148 are common reliability standards among various automotive manufacturers. Their purpose is to simulate various operational scenarios for automotive components, such as power, environment, mechanical, climate, and lifespan. These standards apply to a wide range of automotive electronics, from simple car lights and wipers to complex Advanced Driver Assistance Systems (ADAS). The main goal of power testing items is to execute power failure scenarios on the device under test, such as voltage changes, instantaneous interruptions, voltage drops, pulses, short circuits, and overcurrents, in order to verify system functionality and classify behavior. RTStand Pro can execute a broad range of common LV124/LV148 waveforms and test scenarios. Users can perform both automatic and manual tests, and integrate third-party equipment to expand test coverage—making for a reliable and standardized environment for both R&D and quality assurance testing.



Key Features

- ☑ Built-in power test items from mainstream car manufacturers' LV124/LV148 specifications for automatic testing, such as VW80000, GMW3172, and ISO 16750-2
- ☑ Supports up to 96 power pins and 14 pins of CAN, LIN
- ☑ Capable of simulating communication/power interruptions (e.g., VW80000 E13), with support for high-speed data protocols including 100Base-T1, 1000Base-T1, GMSL, and GMSL2
- ☑ Supports master/slave test architecture and third-party equipment (e.g., temperature chamber)
- ☑ Real-time recording of test data with instant chart report generation

Motor Control Unit ATS | 8000

Chroma's Motor Control Unit ATS can test the inverter's control panel and drive board, and perform end-of-line (EOL) tests of finished products. The system can test important parameters of the inverter to prevent immobility and unintended movement. This automated test system integrates simulators for DC power supplies, RL loads and inverters for various specifications. In addition to measurement of general electrical parameters, the system can also simulate and verify whether the product responds correctly to failure, to ensure that it operates normally before assembly to the vehicle.

Key Features

- ☑ One-button automated test solution supports reprogramming of test items to meet different requirements
- ☑ Supports periodic CAN/CANFD transmission
- ☑ Can be customized to meet various testing requirements such as voltage, temperature, electrical signal, communication, protection, and fault injection

Battery Simulator | 17020/17040/17040E/62000D

The 17020/17040/17040E Regenerative Battery Pack Test Systems and the 62000D bidirectional power supply provide a battery simulator to test battery packs as well as the devices connected to the battery. If the supplier's battery is not yet in place when designing and developing the product, the battery simulator can be used to confirm that the system performs as expected. Users can also program the battery's SOC (state of charge), download different battery curves, and test the product's charging/discharging behavior to evaluate the compatibility between product and battery. Test applications include automotive 48V Mild-Hybrid systems, start-stop 12V systems, motor drivers, and on-board chargers.

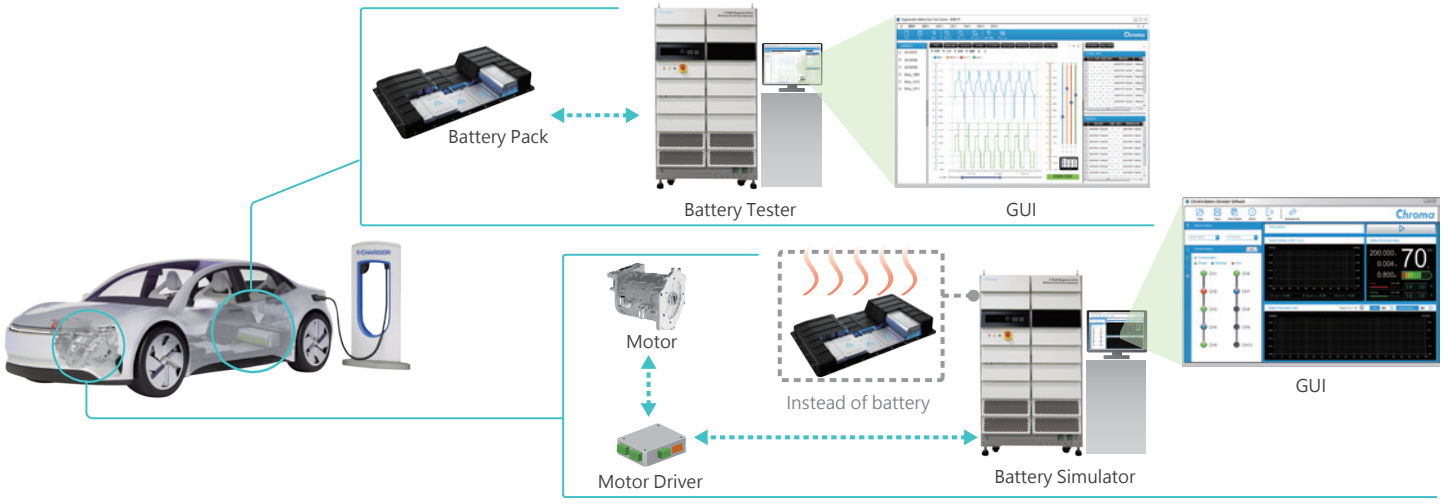
62000D Series | 17020 | 17040 | 17040E

Key Features

- ☑ Battery pack output voltage control
  - Simulate and control the battery pack output voltage by setting voltage, capacity and SOC
  - Intelligent efficiency calculation function
  - Battery pack pre-charge simulation
- ☑ Battery pack configuration setup: Import battery cell data to change battery pack characteristics
- ☑ Battery cell curve import function: Import battery cell data to simulate real battery status

Battery Simulator SoftPanel (A170202)

- ☑ Supports high-power pre-charge and post-discharge control
- ☑ Configurable battery SOC



AC/DC EVSE ATS | 8000

Because of international differences in charging interfaces and communication protocols, the EV charging interfaces can be broadly divided into four regions (by connector type) and four major standards (CCS, GB, CHAdeMO, and NACS).

This Chroma 8000 AD/DC EVSE test system integrates all the related testing equipment, including AC/DC source, AC/DC load, power meter, DSO, digital meter, and simulators and test items that meet national charging standards. The built-in test items include communication protocols between the charging device and EV. This ensures that the charging device can switch smoothly between different modes as required by the EV’ s situation, to maintain its functionality and safety. This system is suitable for R&D, validation and end-of-line (EOL) testing.

AC EVSE ATS

Key Features

- ☑ Built-in standard test items compliant with GB/T18487.1, GB/T27930, GB/T34657, CHAdeMO, SAEJ1772, IEC618151-1/-23, ISO15118, and DIN70121.
- ☑ Electrical characteristics testing, insulation testing, communication protocol testing, and realistic simulation of the actual operation of the EVSE
- ☑ Able to simulate the open/short state of each signal line during charging to verify the EVSE's corresponding protection and response time
- ☑ Supports periodic/uninterrupted CP, CAN and PLC transmission
- ☑ Supports V2G discharge and multi-gun intelligent distribution test scenarios, as well as various EV charging curve simulations

DC EVSE ATS

Mobility EVSE ATS | 8000

The EVSE needs to use electronic detection and signal control technology to properly charge and communicate with the car. At the same time, the electrical energy transferred to the car needs to be measured for billing. In order to maintain optimal operation of the EVSE and to avoid damaging the battery, periodic diagnostic tests are required.

Chroma provides a customized mobile diagnostic test system specifically designed for EVSE verification. It can measure whether the signals and electrical operations are up to standards and provide reports of test results.

Key Features

- ☑ Customizable system configuration and software interface tailored to customer needs
  - Maximum power/voltage: 18kW/1200V.
  - Simultaneously supports multiple AC/DC charging interfaces: SAEJ1772, GB, CCS, CHAdeMO, NACS, etc.
  - Voltage/current accuracy specifications: <0.1%.

Mobility EVSE Test Application

EV Charging Compatibility ATS | 8000

At present, the supply chains of EVs and charging devices are different in terms of both development and production. Even when both sides follow the same standards, discrepancies in their interpretations often lead to communication failures that prevent charging altogether.

To tackle this problem, Chroma offers the Chroma 8000 EV Charging Compatibility ATS, which integrates all the required equipment: an AC/DC source, power meter, DSO, digital meter, simulators and test items that meet the international charging standards. The built-in test items include:

1. EVSE simulation based on various standards, used to test if the EV functions correctly and reacts properly when a signal error occurs.
2. Testing the EV's response using the limit value of signals transmitted by EVSE as specified in the standards, ensuring compatibility with various types of EVSE.

AC/DC Charging Compatibility ATS

Using real AC-DC EVSE to test charging compatibility carries several risks

- ☑ Test waveforms cannot be saved immediately for repeated verification
- ☑ When the test results in a fail, it is unclear whether the problem lies with the EVSE or the car
- ☑ When the EVSE malfunctions, damage to the vehicle is hard to avoid
- ☑ The EVSE becomes obsolete and must be entirely replaced when national standards are modified

Advantages of using the Chroma test system

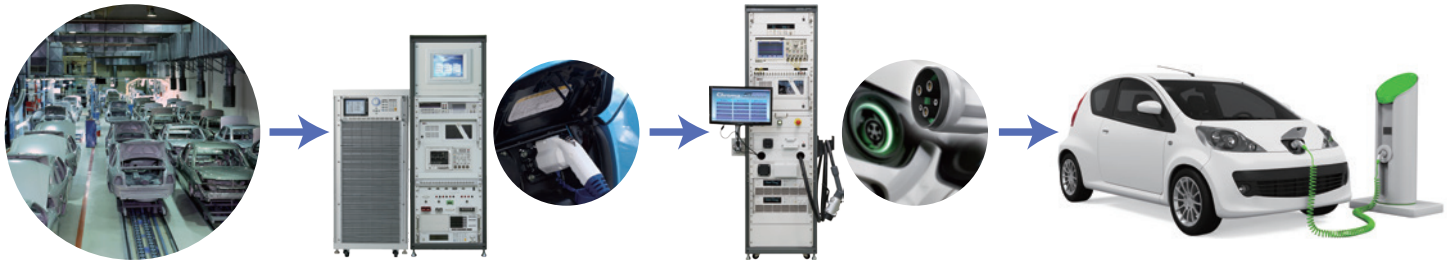
- ☑ Perform repetitive testing according to various international standards
- ☑ Includes test data storage and real-time analysis tools
- ☑ Automatically disconnects to protect the vehicle in case of charging issues
- ☑ Built-in standard test cases with customizable test parameters and procedures

EV AC/DC Charging EOL ATS

Key Features

- ☑ Built-in standard test items compliant with test standards such as GB/T18487.1, GB/T 27930, GB/T 34657.1&.2, GB/T 34658, CHAdeMO, SAEJ1772, IEC 61851, DIN70121, ISO15118
- ☑ Provides electrical characteristics tests such as communication protocol tests and simulation of real EVSE operation
- ☑ EVSE signal values can be set to normal, limit, and out-of-spec for compatibility testing
- ☑ Simulates the open/shorted state of each signal line during charging to verify the EV's safety mechanisms and response time
- ☑ Supports periodic/uninterrupted CP, CAN and PLC transmission

EV Assembly Line (Charging Compatibility) Test Solution



Production Line | AC Charging Testing | DC Charging Testing

EV Wireless Charger ATS | 8000

Wireless electric vehicle charging (WEVC) is an emerging EV charging technology that can be applied to charging systems equipped with automated driving and wireless power transfer (WPT) technologies. Compared to conventional cable chargers, WEVC is safer and more convenient without risk of wearing out the charging connector or harming the operator. Just like bidirectional on-board chargers, modern WPT technology can convert the DC power in the energy storage device to AC power paralleled to the public power grid.

Chroma offers a dedicated automated test solution for wireless EV chargers. Tailored to the specific characteristics and testing requirements of each product, the system verifies both functionality and safety. It is ideal for EV component manufacturers as well as R&D, quality assurance, and production teams at automotive OEMs, and has already been adopted by leading global EV brands and accredited testing laboratories.

Key Features

- ☑ Paired with Chroma's WPT test platform, the system provides 3-axis or 6-axis automated tests to reduce time of misalignment and charging efficiency test
- ☑ Compliant with SAE J2954 and IEC61000-4-11 for testing voltage dips and short interruptions
- ☑ Compliant with SAE J2954 and EN60204-1 for testing and simulating AC input voltage distortion waveforms
- ☑ Compliant with GB/T 38775 and SAE J2954 for metallic foreign object detection (FOD) automated test applications

3-axis WPT Test Platform

6-axis WPT Test Platform

EV Wireless Charging ATS 8000

ATS Software Platform | Power Pro

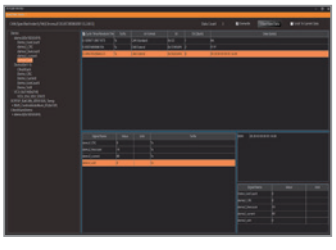
The Chroma 8000 ATS is equipped with PowerPro, a widely adopted software platform that runs on Windows 7, 10, and 11, and provides users with an open software architecture. Test engineers can configure the hardware as desired, program the test items, perform PASS/FAIL tests automatically, and generate reports for analysis.

Key Features

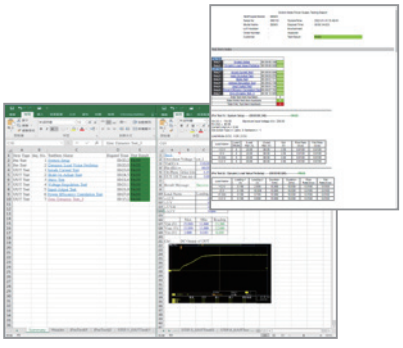
- ☑ Expandable hardware support
- ☑ Supports GPIB/RS232 instruments and RS485/CAN Bus interface
- ☑ Editable test items
- ☑ Editable test programs
- ☑ Editable reports
- ☑ User authority and release control
- ☑ Operation log
- ☑ Supports Shop Floor Control
- ☑ Remote monitoring via internet

Software Main Panel

Customized Operating Panel

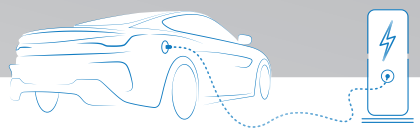


CAN Monitor



Test Reports

Electrical Safety Testing



Most EV drivers use their car every day. To ensure that they can keep doing this safely, electrical safety testing is essential. EV operating environments require electrical safety testing to cover the power system, the charging system, the power wiring, the charging cable, the charging connector and the EVSE, all of which play a critical role in safeguarding the performance and safety of the vehicle.

Standards

- ☑ Insulation resistance test (ISO 6469-1, GB/T 18384)
- ☑ Withstand voltage test (ISO 6469-3, GB/T 18384)
- ☑ Continuity test for potential equalization (ISO 6469-3, GB/T 18384)
- ☑ Optocoupler test (IEC 60747-5-5, VDE0884)
- ☑ Related standards: UL 2202, UL 2251, ECE R100, UL 2580, GB/T 18488.1

19501 Series

19032-P

Partial Discharge Tester 19501 Series

- ☑ Provides partial discharge tests for isolated gate driver ICs, optocouplers, isolation transformers, IGBT modules and substrate materials to detect abnormalities

19200

Electrical Safety Analyzer 19032-P

- ☑ Combines ACV/DCV hi-pot test, insulation resistance (IR) test, ground bond GB) test, dynamic leakage current test (LC) and dynamic function test
- ☑ Chroma's new Open Short Check function ensures that the DUT is properly connected to the tester

Electrical Safety Test Scanner 19200

- ☑ Relay control and Module system
- ☑ Supports WV/IR/GB testing and functional testing

Electrical Safety ATS | 8900

Compared with general electrical product testing, electrical safety testing for EVs requires more comprehensive test items and multi-point measurement. The Chroma 8900 Electrical Safety ATS integrates multiple test and multi-point measurement functions to complete all tests in one single connection.

Wound Component EST Analyzer 19036

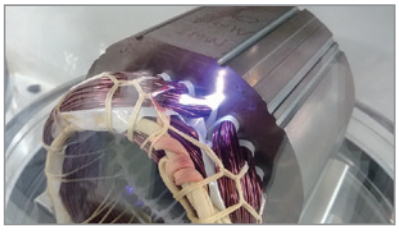
- ☑ 5-in-1 composite analyzer (ACWV/DCWV/IR/Impulse/DCR)
- ☑ Hi-pot test: 5kVac/6kVdc
- ☑ Insulation Resistance (IR) test: 5kV
- ☑ Impulse Winding Test (IWT): 6kV
- ☑ DCR measurement: 2mΩ to 2MΩ
  - 10-channel 4-wire DCR measurement
  - △/Y motor's DCR calculation of each phase
- ☑ L/Q measurement with model 3252 (option)

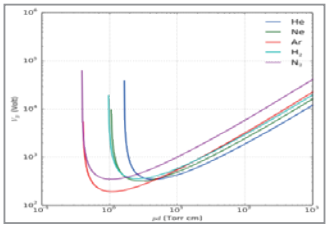
19036

8900

Motor Stator Test System | 1920

The motor stator is the heart of the electric vehicle. Its quality is directly related to the driver's safety. In addition to the basic electrical safety testing for EV motor stators (AC hi-pot, DC hi-pot, insulation resistance, layer short circuit, and DC resistance), the 1920 can also be used with a vacuum cap to detect pinholes in a vacuum environment (about 1-1.5 Torr) to improve the quality, lifespan, and safety of the motor stator.



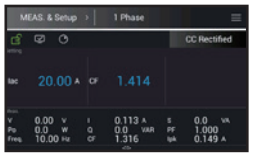


1920

As electric vehicle (EV) power conversion systems move toward bidirectional designs, the focus is shifting to higher efficiency, high-voltage conversion, and increased power density—all closely integrated with battery charging and discharging functions. Chroma offers a wide range of high-power grid simulators, bidirectional DC power supplies, and regenerative DC and AC loads. Feeding power back to the grid saves energy and equipment space, and reduces carbon emissions. The equipment is suitable for simulation testing of EV components such as bidirectional vehicle chargers, motor drivers, and AC/DC EVSE, and can be integrated into automatic test systems.

Regenerative Grid Simulator 61800 Series

61815
15kW/3U height



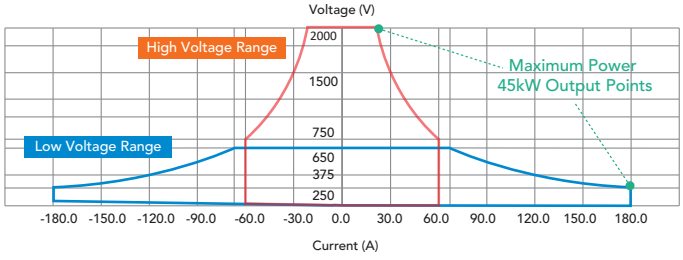
Regenerative AC Load
in 1-Phase Mode

Regenerative AC Load
in 3-Phase Mode

- ☑ Output characteristics:
  - 61809/61812/61815: 0-350V, DC, 30Hz-100Hz
  - 61830/61845/61860: 0-300V (Optional 400V/800V), DC, 30Hz-100Hz
  - 61800-100: 0-300V (Optional 500V/900V), DC, 30Hz-100Hz
  - 61800-100 (800VLN): 0-800V, DC, 45Hz-100Hz
- ☑ Up to 1.47MVA in parallel (61800-100)
- ☑ Four-quadrant AC power supply with efficient energy recycling
- ☑ AC grid simulation and optional regenerative AC load enable V2G/V2H/V2L testing

Programmable Bidirectional DC Power Supply 62000D Series

62000D-HL
45kW/4U height



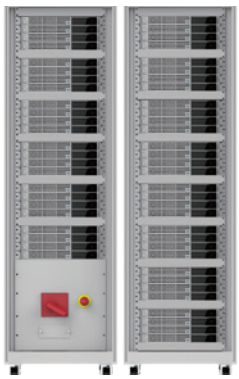
8x Wider Output Range with Two Selectable Ranges
(62000D-HL models)

- ☑ Output characteristics: 6kW-45kW/0-100V, 600V, 1200V, 1300V , 1800V , 2000V/0-540A
- ☑ High power density: 6kW/12kW/18kW in 3U height, 30kW/36kW/45kW in 4U height
- ☑ Dual ranges in one click switching, achieving 8x ultra-wide output range (62000D-HL models)
- ☑ Supports battery simulator and fuel cell simulator
- ☑ Easy master/slave parallel & series operation, up to 1.8MW output
- ☑ Two-quadrant operation: source and regenerative load functions
- ☑ Supports high-voltage automotive standard LV123 Pre-test
- ☑ Applications: charge-discharge testing and longevity testing, bidirectional car chargers, DC-DC converters, energy storage, PCS, motor driver DC-AC power supplies and regenerative testing

Programmable DC Power Supply 62000E Series

RJ45

Remote Web Control Interface

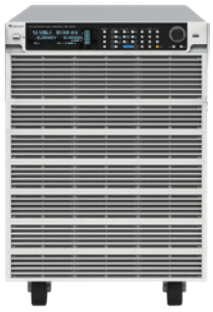


- ☑ 3ch output models (1U height): Power rating: 1.7kW/CH; Voltage rating: 40V/60V/80V/100V/230V/300V/450V/600V
- ☑ Single output models (1U height): Power rating: 1.7kW/3.4kW/5kW; Voltage rating: 40V/60V/80V/100V/230V/300V/450V/600V/800V/1000V/1200V
- ☑ Master/slave parallel up to 20kW
- ☑ Fixed or Auto-ranging output models
- ☑ Standard USB/LAN interfaces, optional APG/CAN FD/GPIB interfaces
- ☑ Suitable for EV component testing, active/passive components, D2D modules, batteries and other multi-channel power supply applications

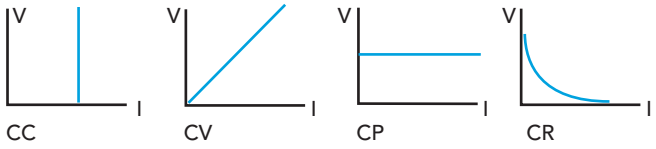
Regenerative DC Electronic Load
63700 Series

- ☑ Output characteristics:
  6kW-18kW
  0-100V, 600V, 1200V, 1800V/0-540A
- ☑ High power density: 18kW in 3U
- ☑ CC, CR, CV, CP modes
- ☑ Master/Slave parallel control mode with power up to 180kW
- ☑ Regenerative up to 93% efficiency
- ☑ 3-phase 4-wire universal AC power: 200-480Vac
- ☑ Suitable for long-term durability testing of on-board chargers and fuel cell systems

Programmable DC Electronic Load
63200A Series



- ☑ Output characteristics:
  0-24kW/0-150V/0-600V/0-1200V/0-2000A
- ☑ CC, CR, CV, CP modes
- ☑ Master/Slave parallel control mode with power up to 240kW
- ☑ User-defined waveforms
- ☑ Up to 20kHz high-speed dynamic load simulation
- ☑ Up to 60 units synchronized control
- ☑ Suitable for testing automotive components such as D2D, OBC, relay, temperature control MCU, car generator, fuse, harness, wiper, fuel cell AC impedance and battery inrush current

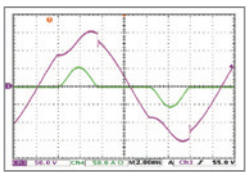


Regenerative AC Electronic Load
63800R Series

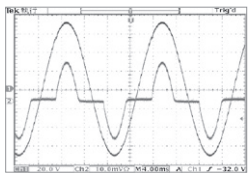
- ☑ Output characteristics:
  9kVA-15kVA
  30Vrms-350Vrms
  30-100Hz
- ☑ Choose between single-phase and three-phase modes
- ☑ Constant Current (CC), Constant Power (CP), Constant Resistance (CR), Constant Apparent Power (CS) functions
- ☑ Rectified Mode simulates nonlinear impedance loading characteristics
- ☑ Lead/Lag Mode simulates inductive and capacitive impedance loading characteristics
- ☑ Master/Slave up to 150kVA in 3-phase mode
- ☑ Suitable for durability testing of AC EVSE

Programmable AC/DC Electronic Load
63800 Series

- ☑ Output characteristics:
  1.8kW-4.5kW
  50Vrms-350Vrms
  45-440Hz
- ☑ Measurement: V, I, PF, CF, P, Q, S, F, R, Ip+/-, THDv
- ☑ Master/Slave up to 67.5kW in 3-phase mode
- ☑ Able to simulate rectified RLC Load mode and suitable for AC voltage distortion VTHD% and dynamic and protection parameters of bidirectional OBCs and AC charging stations (V2H functionality)



Rectified RLC Mode Simulation



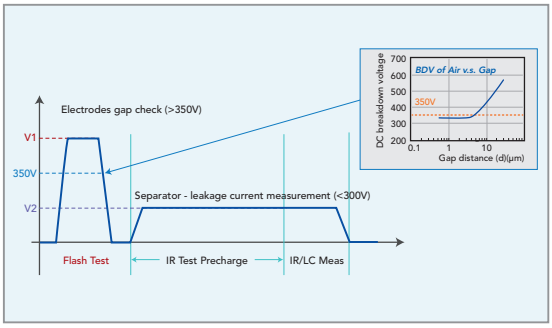
Crest Factor Set-up

Battery Cell Insulation Tester | 11210

The Chroma 11210 is suitable for lithium-ion battery (dry cell) insulation testing. It features a unique electrical flashover and +Flash Test function to check the effective distance between the electrodes and detect excessive leakage current. This can greatly reduce the risk of fires caused by the negative electrode material inflating and metallic particles piercing the separator when charging lithium-ion batteries used in products such as EVs, energy storage systems (ESS), and electronic appliances.

Key Features

- ☑ Test voltage: up to 1kV (DC)
- ☑ Charge current: 50mA max.
- ☑ Wide range of Leakage Current (LC) measurement (1pA to 20mA)
- ☑ Fast measurement (20ms)
- ☑ Partial discharge (PD)/Flashover detection for inspection on potential internal short circuits
- ☑ Built-in +Flash Test function
- ☑ Built-in fast contact check function
- ☑ Automatic test with sequence: charge → dwell → test → discharge
- ☑ Applicable to various capacitance LC/IR tests
- ☑ Can also measure the withstand voltage margin of multi-layer ceramic capacitors (MLCCs), solid state capacitors, high-voltage electrolytic capacitors and insulating materials



Application of Chroma 11210 + Flash Test function during inspection of Li-ion Battery insulation quality

Battery Reliability Test System | 17010H

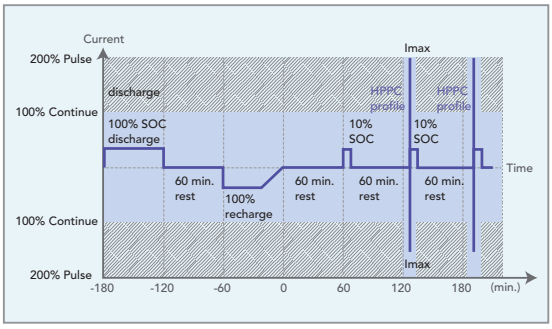
The 17010H's energy recovery circuit architecture offers a marked improvement over traditional switching power supply equipment. It features high measurement accuracy and precision, high-speed current response, zero-crossover time for charge/discharge conversion, as well as multiple current ranges. These characteristics enhance the accuracy of battery cell capacity tests, improve performance parameter validation, and facilitate realistic dynamic current and power testing. In addition, Chroma 17010H features a powerful 30-second 200% pulse current output function. For instance, a unit with a single-channel continuous current of 300A can produce a 30-second 600A pulse current. This provides a highly cost-effective and space-saving solution for applications such as power capability and DC internal resistance testing, which require short but high-rate test currents.

Designed with the diversity of battery cell products and experiments in mind, Chroma 17010H features a channel parallel function with a continuous current up to 2400A and a pulse current up to 4800A. The performance of paralleled channels remains unchanged, with the exact same precision specifications and no response delay, significantly enhancing the equipment's applicability.

25U Rack 36URack 42U Rack

Key Features

- ☑ High accuracy: ±0.015% of F.S.
- ☑ High precision: ±0.005% of F.S.
- ☑ 3 current ranges
- ☑ Fast current response: <1.5ms
- ☑ Charge and discharge with zero crossover time
- ☑ Max. 200% pulse current
- ☑ Channel parallel output up to 4800A
- ☑ Efficient recycling of discharged energy (75%)
- ☑ High speed data logging (10ms)
- ☑ High single point transient sampling rate (1ms)
- ☑ Level 2 V. Protection
- ☑ Integrable data logger and chamber
- ☑ Compliant with IEC and GB/T standards

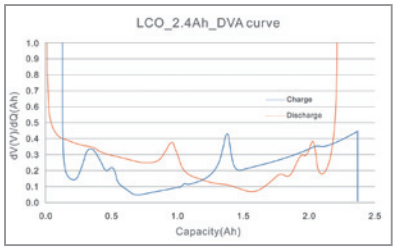


Pulse Output High Current & High Power Function

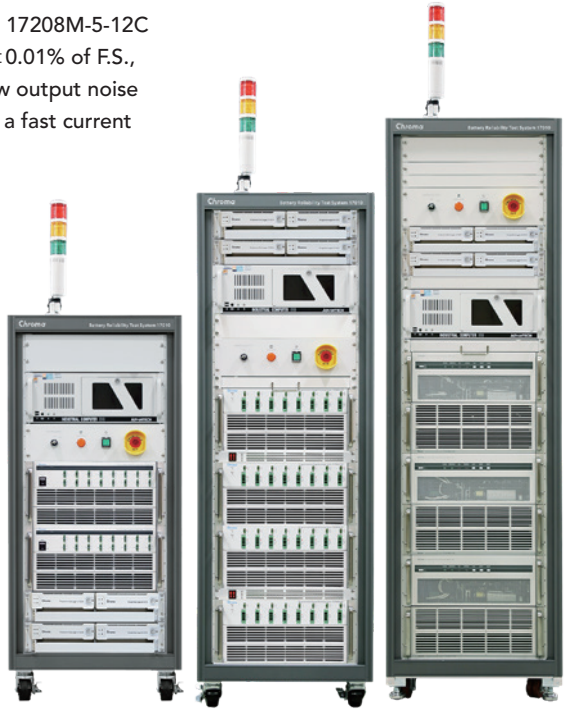
Battery Reliability Test System | 17010

The 17010 series is specifically developed for battery cell degradation analysis, featuring the 17208M-5-12C ultra-high precision charge and discharge testing equipment. It offers an accuracy of up to ±0.01% of F.S., precision of ±0.001% of F.S., and 24-bit ultra-high resolution, providing high linearity and low output noise measurement results to ensure precise and stable data for long-term testing. It also features a fast current response speed of <100μs and zero crossover distortion during the charge and discharge process, delivering an ideal dynamic current output waveform.

To improve energy efficiency, the equipment for high current tests above 100A includes an energy recovery function, offering advantages such as space-saving, high efficiency, low heat generation, and low operating costs. This makes it particularly suitable for power testing and cycle life evaluation of automotive battery cells. Additionally, to test the durability and safety of lithium battery cells under non-ideal power conditions, the 17010 series offers an optional 100Hz-20kHz ripple current superposition test, as well as explosion-proof temperature chambers and customized fixture integration solutions.



17208M-5-12C DVA Curve


25U Rack　36U Rack　41U Rack

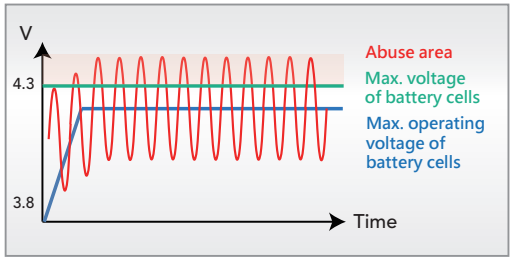
Key Features

- ☑ High measurement Precision ±0.01% of F.S.
- ☑ High measurement Accuracy ±0.001% of F.S.
- ☑ High sampling rate up to 10ms
- ☑ High single point transient sampling rate up to 1ms
- ☑ Channel parallel output up to 1200A
- ☑ Energy recovering during discharge (AC/DC bi-directional regenerative series)
- ☑ Waveform simulation (current/power modes)
- ☑ Ripple current superposition test function (optional)
- ☑ Multi-level safety protections
- ☑ Compliant to IEC and GB/T standards

17208M-5-12C　17208M-6-60　17216M-10-6

Ripple Current Test Solution

Chroma's ripple current test solution involves superimposing an AC current with a frequency between 100Hz and 20kHz onto the 17010 system (model 17212M-6-100S). This allows you to simulate the behavior of an electric vehicle (EV) inverter or the heating effect of AC current delivered from a charging station (EVSE) to the battery.



Evaluating the Impact of Ripple on Lithium-ion Battery Degradation

Key Features

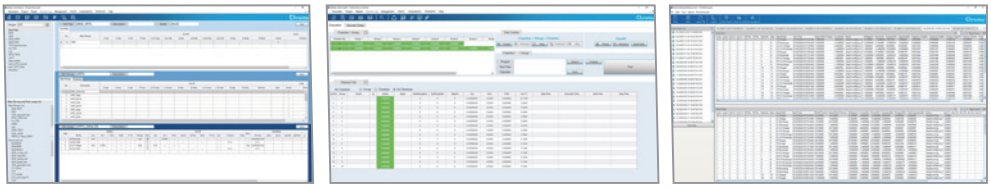
- ☑ Ripple frequency from 100Hz to 20kHz, amplitude up to 75App or 1000App, and up to 2000App in parallel (customizable)
- ☑ Independent AC and DC circuits, minimizing impact on DC charging and discharge cut-off judgment
- ☑ Ripple current superimposition in various CC, CV, and CP charging and discharging modes

BATTERY LEx Software

Battery Lab Expert (Battery LEx) is a comprehensive test software platform specifically developed for the Chroma 17010. It offers three key features and a rich set of tools for a variety of applications.

Key Features

- ☑ Group testing: each group can control up to 96 channels and execute up to 50,000 steps
- ☑ Variable editing: use data from the external data logger for flexible programming and complex applications
- ☑ Chamber integration: real-time monitoring of chamber status and protection mechanisms through DI/DO expansion


Battery Lab Expert (Battery LEx) Software

High Power Regenerative Battery Pack Test System | 17040 & 17040E

The Chroma 17040 Regenerative Battery Pack Test System is a high precision system specifically designed for secondary battery module and pack tests. It has an energy regenerativefunction to greatly reduce power consumption during discharge. Besides its economic benefits, it also solves the intractable problem of heat generated in the operating space and meets the requirements of environmental protection. The system has built-in parallel channels and a dynamic driving profile simulation function that increases operating efficiency and flexibility. The driving profile simulation is in line with the ISO, IEC, UL and GB international testing standards.

17040 System 250kW

Key Features

- ☑ Supports CC/CV/CP/DCIR charging/discharging modes
- ☑ Dynamic power or current waveforms simulate the drive cycle or any real road application
- ☑ Current response speed (0 to 90%): 1ms
- ☑ Current slew rate: 2ms (-90% to 90%)
- ☑ Fastest report sampling speed: 1ms (Waveform mode)
- ☑ System integration capability: temperature chamber, multi-channel voltage/temperature data logger, and BMS
- ☑ Auto bidirectional voltage source with optional battery simulator function
- ☑ Battery discharge energy recovery with >90% efficiency

Key Features - 17040 System

- ☑ Voltage: 60-1000V
- ☑ Current: 0-1500A
- ☑ Power: 0-600kW
- ☑ High accuracy current/voltage measurement
  ± (0.05% of reading + 0.05% of full scale)
  ± (0.02% of reading + 0.02% of full scale)

Key Features - 17040E System

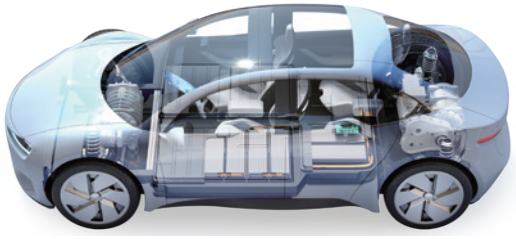
- ☑ Voltage: 30-1700V/5-850V
- ☑ Current: 0-7200A
- ☑ Power: 0-2.4MW
- ☑ High accuracy current/voltage measurement
  ± (0.05% of range)
  ± (0.02% of reading ± 0.02% of full scale)

17040E System
200kW/1700V/400A

17040E System
200kW/850V/600A

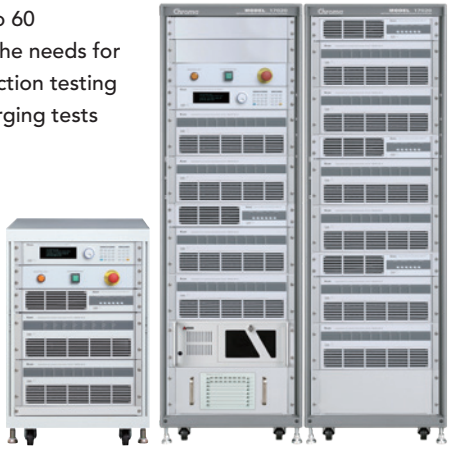
- ☑ Supports loading simulations of real vehicle current waveforms
- ☑ Dynamic battery discharge and charge function
- ☑ Supports up to 10ms periodic CAN Bus communication via BMS
- ☑ Supports DBC file import for CAN signal reading and calling
- ☑ Supports UDS diagnostic service command set

Battery Pack | Battery Tester | GUI



Regenerative Battery Pack Test System | 17020 & 17020E & 17020C

The 17020 series can be flexibly configured according to user testing requirements, supporting up to 60 channels, with options for independent operation or parallel operation. This system not only meets the needs for battery module design verification and long-term lifespan testing but is also suitable for mass production testing of battery modules. Its independent multi-channel architecture design supports charging and discharging tests for multiple battery groups with different characteristics. Channels have parallel functionality, allowing users to flexibly expand power according to battery product specifications, significantly enhancing the flexibility and applicability of the equipment.



17020 System for flexible and customized configuration

- ☑ Charge/discharge modes: CC, CV, CP
- ☑ Dynamic charge/discharge current waveforms to simulate the drive cycle or actual application
  - Ability to import current waveforms from an Excel file and save a maximum of 720,000 points to memory
  - Maximum charge and discharge current switching speed of 10ms
- ☑ Built-in DCIR function (IEC61960-2004)
- ☑ Battery discharge energy recovered to grid with up to 85% efficiency when rated power is over 20%

Key Features - 17020

- ☑ Power Range: 600W/1.25kW/2.5kW/5kW/10kW/20kW/30kW/50kW/60kW per channel
  Voltage Range: 20V/60V/100V/200V/500V per channel
  Current Range: up to 2600A (parallel)
- ☑ High accuracy current/voltage measurement:
  ±(0.1% of reading + 0.05% of range) ; ±(0.02% of reading + 0.02% of full scale)

17020E System
for mass production cycle test

Key Features - 17020E

- ☑ Power Range: 10kW/20kW/30kW/40kW/50kW/60kW/70kW/80kW per channel
  Voltage Range: 60V/100V/200V per channel
  Current Range: 100A/200A/300A/400A/500A/600A/700A/800A (parallel)
- ☑ High accuracy current/voltage measurement:
  ±(0.1% of reading + 0.05% of range) ; ±(0.02% of reading ± 0.02% of full scale)

Key Features - 17020C

- ☑ Power Range: 10kW/20kW/30kW/40kW/50kW/60kW/70kW/80kW
  Voltage Range: 150V
  Current Range: 100A/200A/300A/400A/500A/600A/700A/800A (parallel)
- ☑ High accuracy current/voltage measurement:
  ±(0.05% of full scale) ; ±(0.02% of full scale)

17020C System for
flexible channel customization

Regenerative Battery Pack Test System | 17050

The 17050 series is designed for flexible configuration of Source/Load equipment, meeting testing needs from R&D to mass production. Developed with a bidirectional power supply at its core, it effectively reduces energy loss and improves energy efficiency. Its modular configuration is flexible and highly expandable, helping to reduce development costs, shorten product development cycles, and quickly respond to market demands, maintaining competitiveness.

- ☑ Voltage: 0-200V
- ☑ Current: 540A per channel
- ☑ Power: 36kW per channel
- ☑ Supports 4 channels for independent or parallel operation
- ☑ Dynamic power or current waveforms simulate the drive cycle or any real road application
- ☑ System integration capability: temperature chamber, multi-channel voltage/temperature data logger, and BMS
- ☑ Open database design, supporting Battery Management Systems (BMS) and Manufacturing Execution Systems (MES)

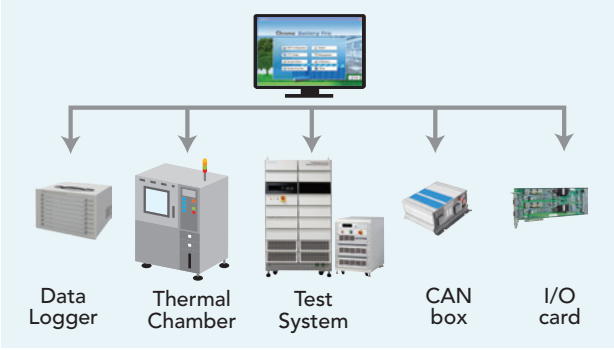
17050 System

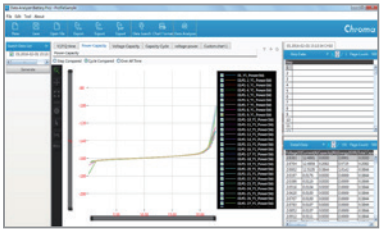
* Specifications defined by power equipment functionality

Battery Charger and Discharge Test Software Platform | Battery Pro & Battery Pro X

Battery Pro is a software platform specifically developed for testing secondary battery packs with multilingual interface support (English/Traditional Chinese/Simplified Chinese) that can be used by the 17040E, 17040, 17020 and 17020E systems. It features real-time status monitoring, an intuitive graphical UI, user authority management, fault record tracking, security detection, and data storage and recovery during power failure. The system can integrate temperature chamber, data logger, and communication interface devices through Battery Pro, and read external parameters to enable protection or cut-off conditions during the charging or discharging process.

Battery Pro main panel

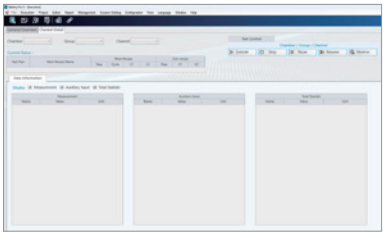


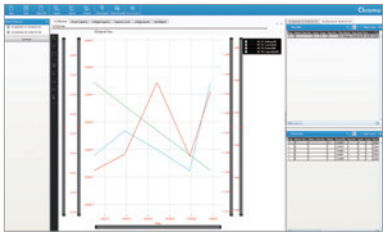

Comprehensive reports


Real time monitoring multi-channel panel

Battery Pro X is a newly developed, comprehensive, professional software platform by Chroma, designed for testing secondary battery packs. This platform is compatible with the Chroma 17020C system, providing seamless integration and reliable performance. Battery Pro X features advanced functionalities, including real-time status monitoring, intuitive graphical management, multi-level access control, detailed fault record tracking, and enhanced safety detection mechanisms. Other features include built-in test steps for simplified operation, customizable cut-off settings based on BMS variables, and robust data storage for secure management of test results. Additionally, Battery Pro X is equipped with a reliable recovery mechanism to save critical data during unexpected power outages, offering a dependable and efficient solution for battery testing applications.

Battery Pro X Main Panel


Charge/Discharge Test Program Editor

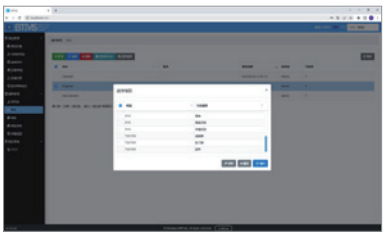

Real time Monitoring Multi-channel Panel

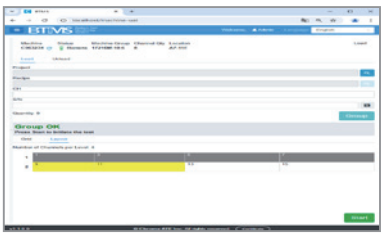
Battery Lab Management System Solutions

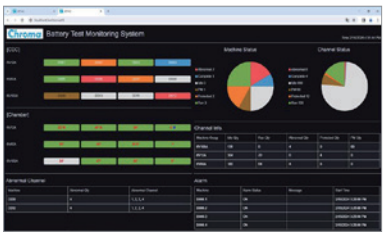
Battery Test Monitoring System | 17091

BTMS (Battery Test Monitoring System) is a battery test system monitoring platform developed for battery labs that enhances convenience and work efficiency. It has four main features:

- ☑ Centralized management: BTMS centrally manages accounts, authorities, and recipes, simplifying test system maintenance.
- ☑ Equipment group management: battery test systems are grouped according to model and specification, so that users can better understand the capacity and usage status of various equipment.
- ☑ Unified on-site operation user interface: BTMS provides loading and unloading user interfaces. Operators scan barcodes to record the process, simplifying on-site operations and improving efficiency.
- ☑ Real-time monitoring: Users can connect to the BTMS via a browser for remote control and status monitoring, and easily view testing progress and equipment status.







Battery Management System | 8700

The Battery Management System (BMS) is responsible for monitoring and managing battery performance. It typically includes voltage measurement functions to prevent over-discharge, overcharge, over-temperature, and other abnormal conditions. Many functions are gradually added in the wake of technology development. Common functions include voltage measurement, communication, SoC and SoH estimation, abnormality warning and protection, equalization (passive or active), other control circuits (such as battery loop relay control), temperature and current measurement, and diagnostics.

The Chroma 8700 BMS ATS is a test system for verifying battery management systems integrated within battery packs. It is equipped with a multi-channel battery cell simulator, high-precision real current and high voltage source, programmable temperature simulator and isolation resistance simulator. The system can be configured to support master/slave and centralized architecture based on the DUT's specific needs.

Integrated BMS Test System (32S)

Key Features

- ☑ Battery cell simulator
  - Cell state simulation test and calibration: 5V/ 5A/ 16CH
- ☑ High-precision real current source
  - Current testing and calibration: charge/discharge current 600A or larger
- ☑ High-precision voltage source
  - High voltage testing and calibration: 450V/600V/1000V
- ☑ Temperature simulator
  - Temperature testing and calibration
- ☑ Insulation resistance simulator
  - Insulation measurement circuit test and calibration: insulation resistance simulation under high voltage 1000V
- ☑ On-board charger signal simulation: CC, CC2, CP signal, PWM crash signal
- ☑ Customizable test items
- ☑ BMS communication tests

Distributed BMS Test System (96S)

16CH Battery Cell Simulator 87001

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. A single simulator has 16 channels; the voltage and current of each be set separately via the software interface.

- ☑ Battery cell simulator mode: Can simulate 240 cells in series/2 cells in parallel battery pack configurations
  - Channel power 25W; channel voltage 5V (in series); channel current 5 (up to 10A in parallel)
- ☑ 4 current ranges (0-250μA/0-500mA/0-5A/0-9A super modes)
  - 0-250μA: Used to determine whether the leakage current is too large
  - 0-500mA: For passive balanced line test requirements
  - 0-5A/9A: For active balanced line test requirements
- ☑ Control the battery cell simulator remotely with the SoftPanel software
  - Individually adjust the voltage of each battery cell string
  - Set the voltage change procedure: OVP/UVP/OVP release/UVP release test
- ☑ Control commands and interfaces:
  - SCPI command via Ethernet port
  - CANbus commands via CAN bus cable
  - Command delivery time: 10ms (varies depending on unit configuration)

Multichannel Real-time Monitoring Panel

Battery Pack EOL ATS | 8720

The Chroma 8720 ATS can be applied to testing battery packs in the end of line (EOL) phase. The system's comprehensive Pass/Fail tests cover the mechanism assembly process, pressure insulation, BMS communication, internal high-voltage relay parts, battery balance, and temperature measurement, all before the product reaches the end of the production line.

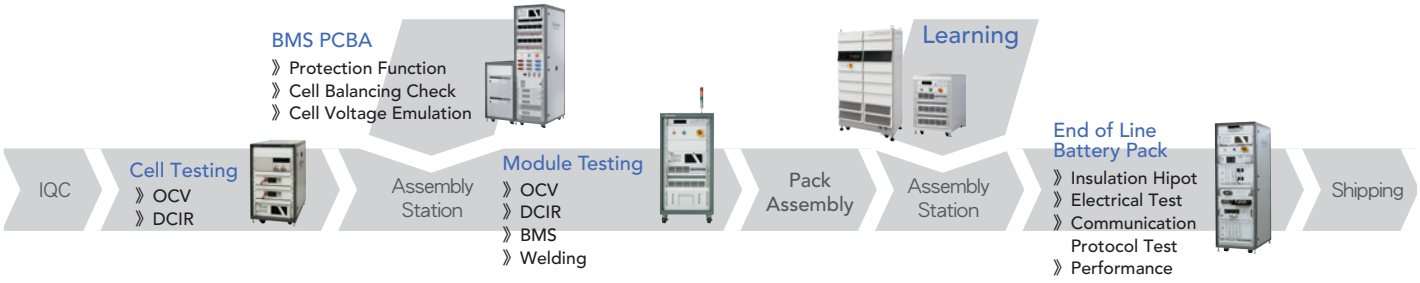
The application of this test solution is not limited to production lines. It can also be used to carry out a comprehensive inspection of the incoming battery packs near the end of the R&D phase or on EVs and energy storage stations. Automated tests minimize human error and ensure personal safety, which is crucial for EVs, electric scooters, and battery modules for energy storage systems

Key Features

- ☑ One-stop integrated safety testing reduces number of times battery packs are loaded and unloaded
- ☑ Charge and discharge power range: 5kW - 600kW
- ☑ Standard test items: insulation test, version detection, software refresh, controller addressing, fault code detection, battery pack mode switching, temperature sensor detection, battery voltage detection, read and clear, insulation monitoring detection, voltage withstand test, signal line function detection, insulation resistance test, AC EVSE charging test, DC EVSE charging test, Y capacitance test
- ☑ Automated switch for testing in an automated production line
- ☑ Automatically upload traceability report when integrated with Manufacturing Execution System (MES)

Battery Module / Battery Pack Production Line Test Process

Chroma provides customized automated test systems for each station in battery pack production lines in close cooperation with automation companies, to perform high-efficiency production verification including cell sorting tests, module assembly inspection, BMS PCBA tests, and battery EOL tests.

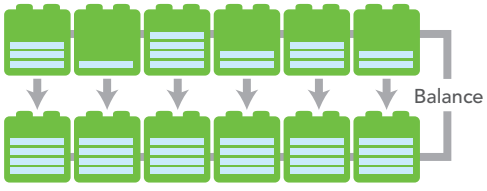


Battery Balance Maintenance ATS | 8700

When battery packs are used or deployed for an extended period of time, functional test and maintenance are required to extend battery cell life. The Chroma 8700 Balance ATS can inspect the battery module, cell internal resistance and voltage status in the battery pack to ensure the internal unit is in good condition. In addition, it has module/battery cell independent charging and discharging for balance as well as temperature status monitoring functions.

Key Features

- ☑ Module/battery cell independent charging and discharging
  - Battery state simulation test and calibration: 1V-5V (cell),1V-80V (module) / 20A
- ☑ Module/battery DCIR inspection
  - Compliant with IEC61690 DCIR test standard
- ☑ Module/cell capacity inspection
  - Verify the capacity of each module/cell
- ☑ Module/cell voltage inspection
  - Verify the voltage of each module/cell



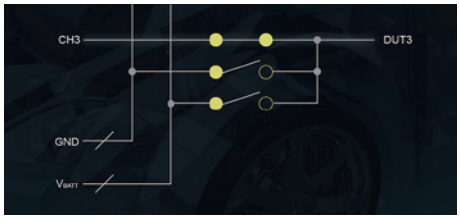
Battery Pack Power HIL Testbed | 8610

Designed for development of battery modules and packs, the Chroma 8610 testbed features real-time hardware and software with an open architecture, enabling advanced testing capabilities. Besides basic test functions like importing of vehicle driving cycles, CAN signal monitoring, fault injection, insulation measurement, and EV supply equipment (EVSE) charging simulation, the testbed can also execute critical compound scenarios for real vehicles and composite operating conditions with high risk of failure (e.g. physical and communication signal errors during cyclic discharge). This feature-rich toolset greatly improves R&D efficiency by enabling in-depth tests on battery packs before entering the real car validation stage.

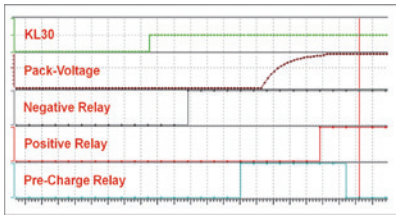
Key Features

- ☑ Integrated real-time system and FIU hardware, to simulate fault injection and improve ISO 26262 functional safety testing
- ☑ Supports various Simulink real-time models import, to verify on-road battery dynamic charging and discharging through standard driving conditions like NEDC and WLTP
- ☑ Supports CAN, CAN FD, LIN, and RS-485 communication interfaces
- ☑ Real-time monitoring of timing sequences, incl. high power relay open/close, initial power output, CAN signal
- ☑ Extensive modular hardware, to ensure test accuracy and repeatability; expandable according to users' needs
- ☑ Supports upper-level automated test software through ASAM XIL and ASAM XIL-MA
- ☑ Independent PLC real-time system monitoring, to ensure safety during testing
- ☑ Integrated DC EVSE charge interfaces, incl. CAN Bus and PLC signals, for various compatibility tests
- ☑ Integrated Hi-Pot safety analyzer, to measure and compare battery insulation and grounding status

GUI



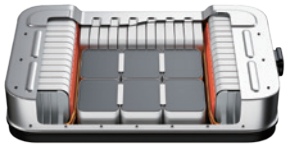
Fault Injection



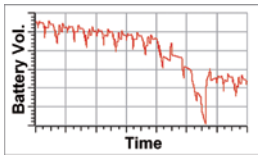
Timing Control & Measurment

Integrated Testbed 8610 | Battery Cycler 17040E

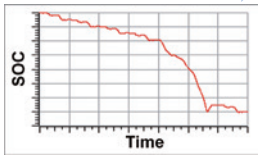
Alarm



EV model



SOC v.s. Time



Voltage v.s. Time

Key-on

Start Timing Sequence Detection

OBC and DC-DC Converter Power HIL Testbed | 8620

Chroma ATE introduces the 8620 OBC and DC-DC Converter Power HIL Testbed, equipped with comprehensive testing capabilities for EV charging and powertrain components. The system's flexible hardware configuration allows it to meet DUT specific testing requirements. Options include programmable DC power supplies, programmable DC electronic loads, digital power meters, and oscilloscopes.This versatile tetbed supports various system architectures and provides advantages such as scalability and platform sharing.

The Chroma 8620 is specifically designed for the R&D of on-board chargers (OBC) and DC-DC converters. It features user-friendly software with graphical UIs for monitoring and control, manual and automated testing, and automated test report generation. This suite of capabilities meets the needs of high-volume, repeatable testing, enhancing both test coverage and efficiency.

Key Features

- ☑ Supports customized hardware configuration, platform sharing, and expansion
- ☑ Flexible software platform
  - Intuitive user interfaces for monitoring and operation
  - Manual testing capabilities
  - Automated test program editing
  - Automated test report generation
  - Supports LabVIEW, C/C++, Python, .NET languages
  - Supports data recording
- ☑ Supports CAN, CAN FD, LIN, and RS-485 communication
- ☑ Integrated real-time system and fault injection unit for comprehensive ISO 26262 functional safety test
- ☑ Supports importing Simulink-based vehicle models to verify dynamic performance with NEDC, WLTP, etc. driving patterns
- ☑ Supports advanced automated test software through ASAM XIL and ASAM XIL-MA
- ☑ Independent PLC monitoring system to ensure testbed safety

On-Board Charger (OBC)

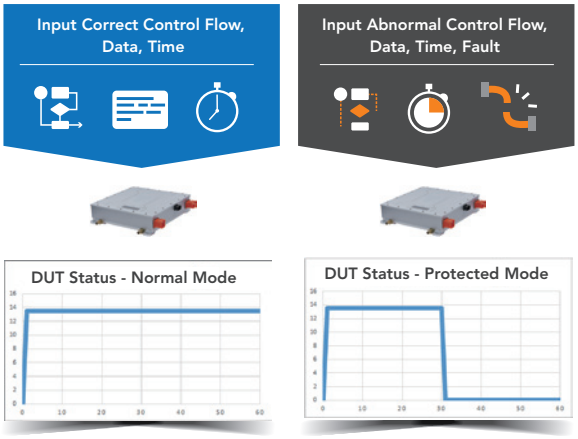
Regulation Testing

1. AC input voltage/frequency range test
2. Three-phase AC voltage phase deviation test
3. Start input surge current test
4. DC output voltage/current/power limiting test
5. DC output voltage/current error test
6. DC output voltage ripple factor test
7. Start output overshoot test
8. Output load dump test
9. Power factor test
10. Charging efficiency test
11. AC/DC input over and under voltage protection test
12. Phase loss protection test
13. Over temperature protection test
14. Other*

DUT Functional Testing

1. CAN basic communication function test
2. Input linear regulation test
3. Output load regulation test
4. Input frequency limit test
5. Power-on frequency limit test
6. Static power test
7. Input voltage limit test
8. Power-on input voltage limit test
9. Communication abnormality test
10. Signal fault injection testing
11. Charging process abnormality test
12. Other*

* Ask for a complete list



DC-DC Converter

Regulation Testing

1. Efficiency test
2. Rated power test
3. Voltage control error test
4. Current control error test
5. Overshoot and recovery time testing
6. Quiescent current test
7. Output voltage ripple coefficient test
8. Input/output over/under voltage protection test
9. Output short circuit protection test
10. Over temperature protection test
11. Other*

DUT Functional Testing

1. CAN basic communication function test
2. Input linear regulation test
3. Output load regulation test
4. Input linearity/output load regulation combined test
5. Online output voltage adjustment test
6. Input voltage limit test
7. Power-on input voltage limit test
8. Output voltage rise/fall time test
9. Signal fault injection testing
10. Other*

* Ask for a complete list

BMS Power HIL Testbed | 8630

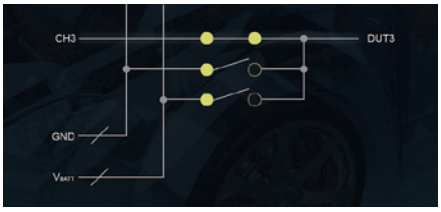
Chroma 8630 BMS Power HIL Testbed is designed specifically for BMS research and development. Combining a real-time system with an open software architecture, the testbed provides users with a flexible and powerful dynamic test system capable of performing test items such as charge/ discharge testing, dynamic voltage and current measurement and calibration, battery balance testing, CAN signal measurement and control, fault injection, insulation measurement, and EVSE charging simulation.

The versatile testbed allows for a wide range of customizable setups to simulate and verify the most critical and high-risk composite scenarios in the EV's environment (such as communication and physical signaling failures during cyclic discharge). In-depth testing of the BMS without the need for a real vehicle or battery pack significantly increases development efficiency.

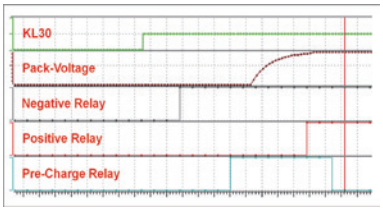
Key Features

- ☑ Up to 1200V battery module simulation voltage
- ☑ Up to 900A battery module simulation current, actual verification and calibration of SOC, SOH and other BMS parameters
- ☑ Battery cell simulation hardware single channel power of 25W/5V/5A, average cell voltage response time <10ms
- ☑ Test BMS protection mechanisms for OVP, UVP, OCP, OTP or UTP under static or dynamic conditions
- ☑ Integrated NTC temperature sensor resistance and insulation resistance simulation
- ☑ Dynamic verification of active and passive balancing strategies for battery cells
- ☑ Real-time monitoring of high battery voltage relay open/close, initial power output, CAN signal and other timing sequences
- ☑ Supports CAN, CAN FD, LIN, and RS-485 interfaces
- ☑ Integrated real-time system and fault injection unit for comprehensive ISO26262
- ☑ Supports importing Simulink-based vehicle models to verify dynamic performance with NEDC, WLTP, etc. driving pattern
- ☑ Supports advanced automated test software through ASAM XIL and ASAM XIL-MA
- ☑ Independent PLC monitoring system to ensure the safety of the testbed

GUI



Fault Injection



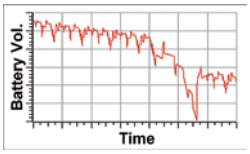
Timing Control & Measurment

EV model

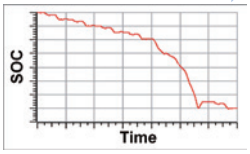
Battery model

BMS Testbed 8630

Alarm



SOC v.s. Time



Voltage v.s. Time

Communication

Start Timing Sequence Detection

E-Propulsion Test System | 1210 & 1220

Chroma 1210 & 1220 E-propulsion Test System is suitable for performance calibration and verification of vehicle power systems. The versatile software is capable of loading high-fidelity dynamic vehicle models for simulation and verification of electrical and mechanical components. The manual and automatic operating interfaces offer flexibility and convenience to synchronously record essential system parameters such as voltage, current, power, rotational speed, torque, and temperature, which are used to calculate the efficiency of the motor and controller and generate the torque curve graph. With four-quadrant operation capability, the E-propulsion Test System can maintain constant torque load below the rated speed (zero speed or even reverse rotation) and constant power above the rated speed. The test bench frame has been developed especially for the requirements of dynamic applications. The modularized mounting bracket makes it easy to fit the fixtures onto motors of various sizes.

Key Features

- ☑ Power HIL testing for motors, motor drivers, transmissions, and electric drive systems
- ☑ Various motor mounting options
- ☑ Integrated system safety features
- ☑ Compatible with various Simulink-based real-time vehicle models. Enables dynamic performance validation at full-vehicle level using international standards like NEDC, WLTP
- ☑ Supports motor vibration characterization
- ☑ Allows for locked rotor (stall) testing with manual or automatic settings
- ☑ Supports DUT communication via CAN, CAN FD, EtherCAT
- ☑ Compatible with high/low-temp climate chambers and water cooling systems
- ☑ Includes flow control module for water cooling system
- ☑ Compliant with:
  - GB/T 18488.1-2015
  - GB/T 18488.2-2015
  - GB/T 29307-2022
  - Industry-developed test standards

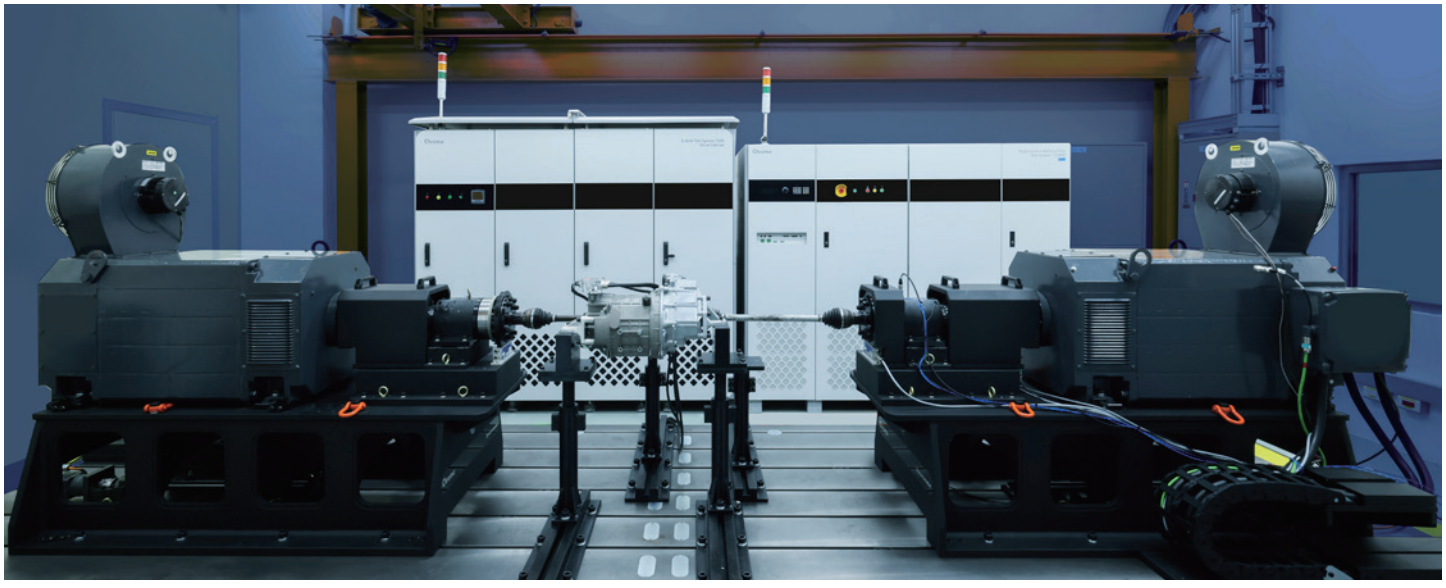
E-Propulsion Test System 1210

Key Features - 1210

- ☑ Power up to 600kW
- ☑ Rotational speed up to 25,000rpm
- ☑ Integrated high-speed bearing box.
- ☑ Supports motor endurance testing.
- ☑ Specifications can be customized according to requirements

Key Features - 1220

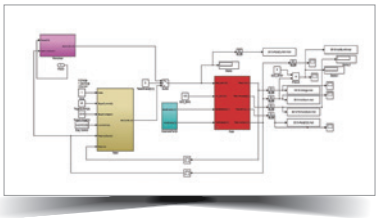
- ☑ Power up to 219kW (single-side)
- ☑ Rotational speed up to 3,300rpm
- ☑ Torque up to 2,988Nm (single-side))
- ☑ Test platform and DUT fixture adjustable in XYZ directions
- ☑ Specifications can be customized according to requirements



E-Axle Test System 1220

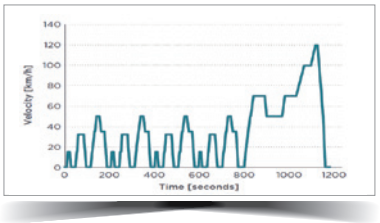
Real-Time System Hardware in the Loop

Load / Pedal Command Dyno Setpoint



Vehicle Model

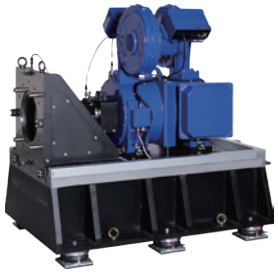
Software UI



Consumption Pattern

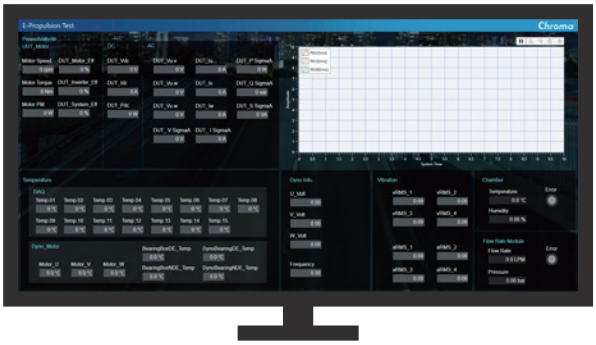
RT Controller

Battery Emulator



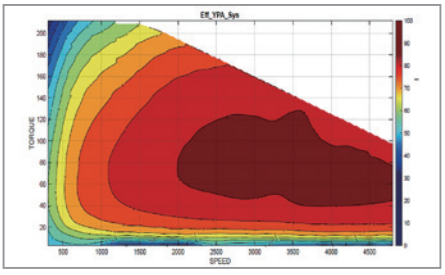
E-propulsion Dynamometer

System Control Interface

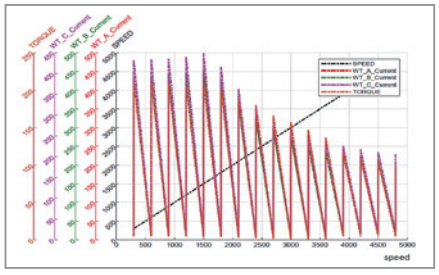


Data Monitor Interface

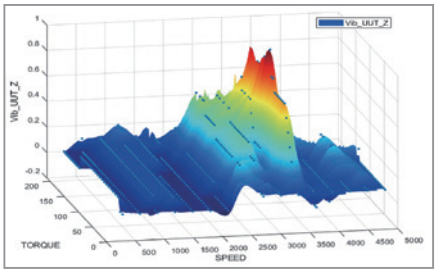
Test Report Output



System Efficiency Map



Test Result



3D Report Output

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