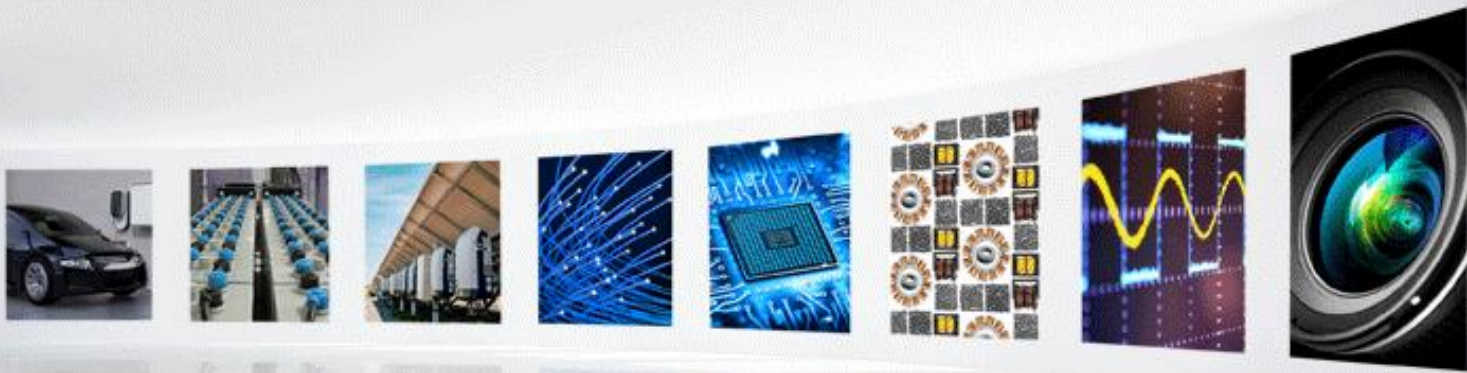


Chroma 17010 Series Battery Cell Test System V1.0

PM, **Rock Chang**

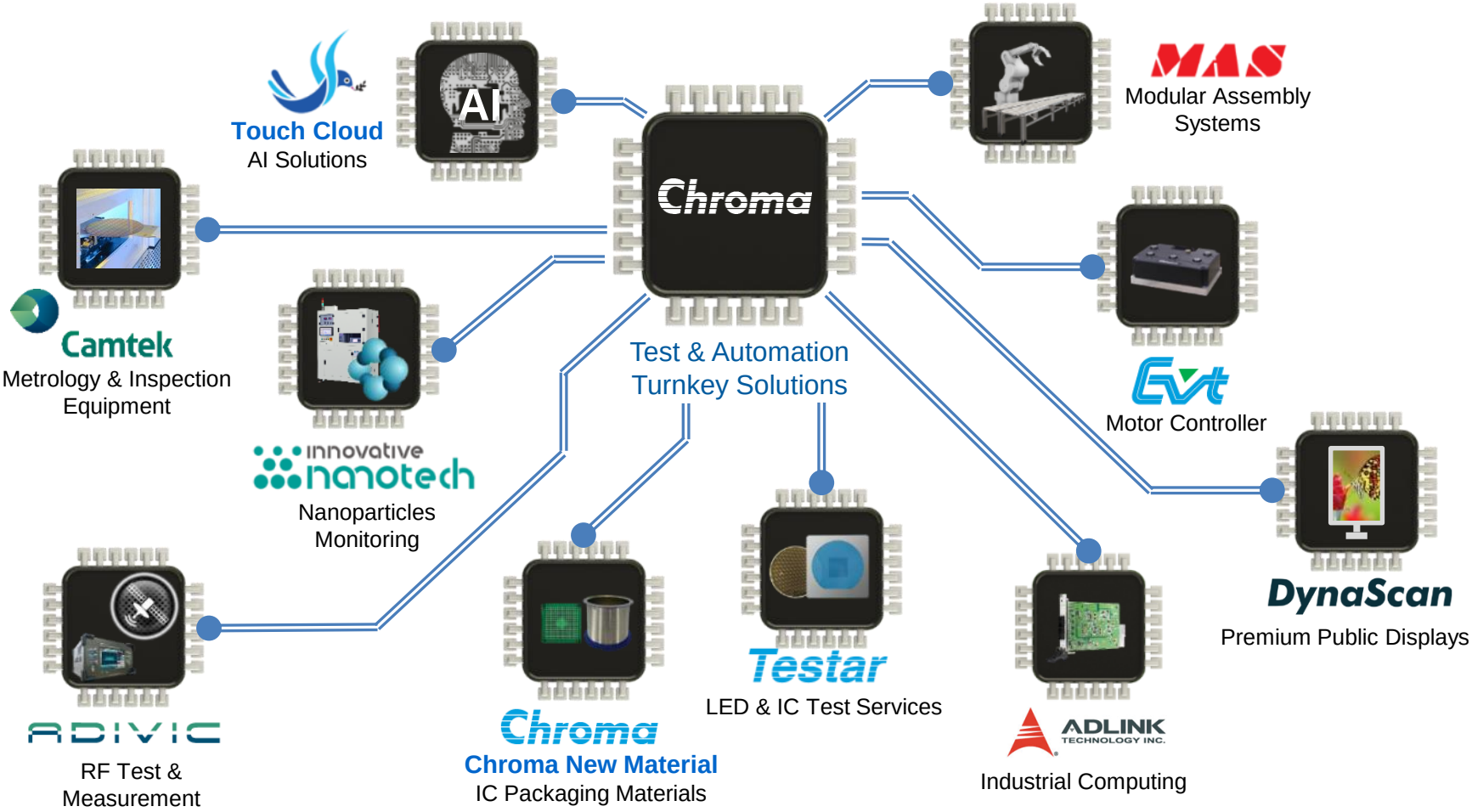
H1, 2021

Chroma ATE

0. Contents

Chroma 17010 Battery Cell Test System

1.0 Chroma Group



1.0 Chroma Global Operation Sites

50 Operation Sites

103 Distributors

EST. 1999

Netherlands:
Ede

EST. 2017

Germany:
Augsburg

EST. 2008

Japan:
Shin-Yokohama/
Nagoya/ Osaka

EST. 2018

Korea:
Pangyo

EST. 1993

United States:
Irvine, CA
Milpitas, CA
Chandler, AZ
Sherman, TX
Allentown, PA
Albany, NY

EST. 2001

United States:
Foothill Ranch, CA
Marlborough, MA
Detroit, MI
Mexico：
Ciudad Juarez

Taiwan: Taoyuan (Headquarters)

EST. 1998

China/ Shenzhen

EST. 1999

China/ Beijing

EST. 2000

China/ Shanghai

EST. 2001

China/ Dongguan

EST. 2003

Taiwan: Hsinchu

EST. 2009

Taiwan: Kaohsiung

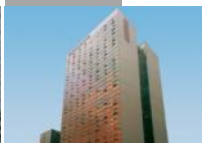
EST. 2006

China/ Suzhou

EST. 2011

China/ Xiamen

EST. 2011



China/ Chongqing

EST. 2016

Quantel：Singapore

Others:
India: New Delhi/ Mumbai/ Bangalore
Thailand: Bangkok
Vietnam: Hanoi/ Ho Chi Minh
Malaysia: Kuala Lumpur/ Penang
Philippines: Manila/ Cebu
Indonesia: Jakartar

Others: Qingdao/ Zhengzhou/ Xian/Hefei/ Chengdu/ Wuhan/ Hangzhou/ Changsha/ Guangzhou/ Hong Kong

1.0 Chroma Production Base

New Headquarters & Taoyuan Factory

104,141 m^2

(December, 2020)

Production Line:

- Module Line
- Instrument & ATS Assembly Line
- Mechatronics System Line

Taoyuan Hwaya Factory

17,233 m^2

Production Line:

- AI Line, SMT Line
- PCBA Line
- Module Line
- Instrument & ATS Assembly Line

Kaohsiung Factory

13,469 m^2

Production Line:

- Mechatronics System Line

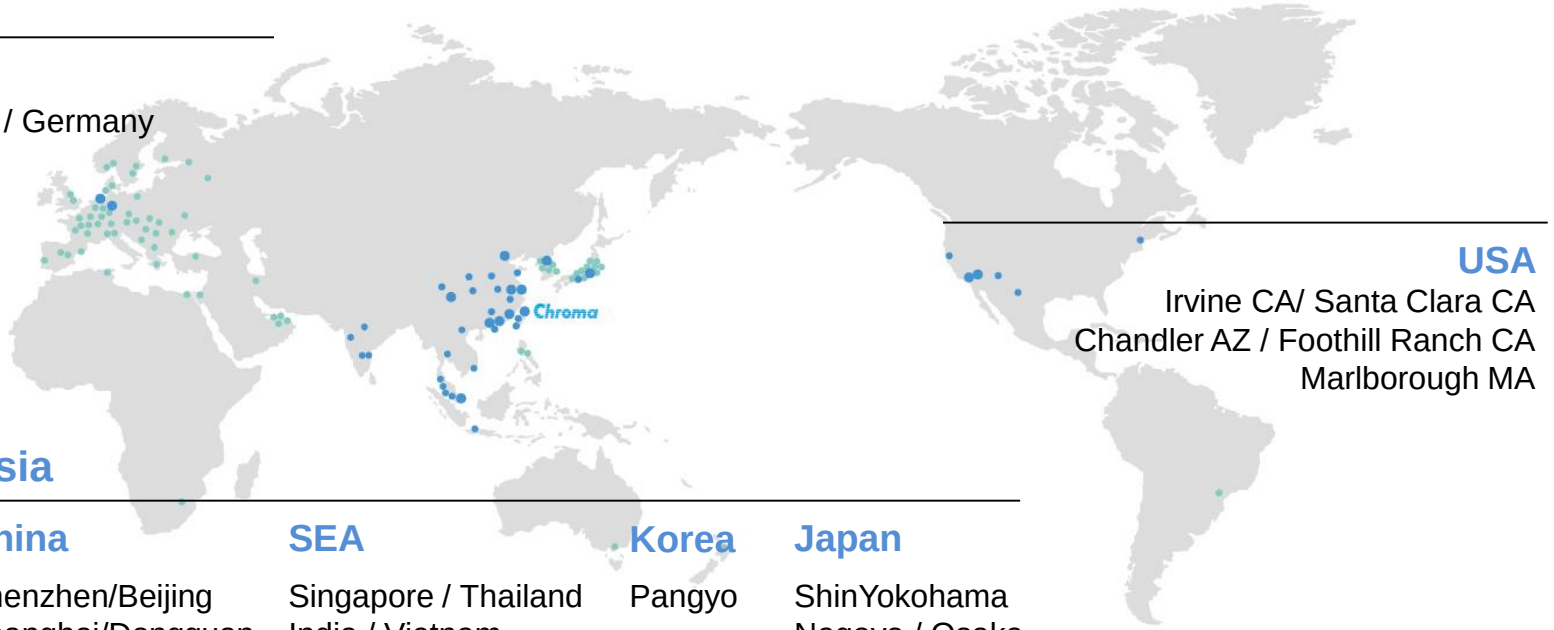
QUALITY ISO 9001 CERTIFICATION

QUALITY ISO 13485 CERTIFICATION

QUALITY ISO 26262 CERTIFICATION

QUALITY ISO/IEC 17025 CERTIFICATION

1.0 Chroma Global Service



Europe
Netherlands / Germany

USA
Irvine CA/ Santa Clara CA
Chandler AZ / Foothill Ranch CA
Marlborough MA

Asia

China
Shenzhen/Beijing
Shanghai/Dongguan
/Suzhou

SEA
Singapore / Thailand
India / Vietnam
Philippines

Korea
Pangyo

Japan
ShinYokohama
Nagoya / Osaka

Chroma 17010 Series

Desktop Type Testers

Model 17216 series

Model 17216M and 17208M series

	Model	Current Range	Voltage Range	Min Dis Voltage	Channel Number
New	17216-6-6	1mA/0.6A/1.2A/6A	0-6V	1.5V	16
New	17216-6-12	1mA/1.2A/2.4A/12A	0-6V	1.5V	16
	17216M-10-6	0.2mA/6mA/0.2A/6A	0-10V/0-5V/±5V	0V	16
	17216M-6-12	0.1A/1A/3A/12A	0-6V	0V	16
	17208M-6-30	1mA/0.1A/10A/30A	0-6V	0V	8

Chroma 17010 series

High Precision Test Systems

Energy Recycling

New

(10V/6A)

(6V/12A)

(6V/30A)

New

(6V/60A)

New

(6V/100A-1200A)

Chroma 17010 series

High Precision Test Systems

17010 System	Current Range	Voltage Range	0V Dis	Energy Recycling	CH Number
6V/6A	1mA/0.6A/1.2A/6A	0-6V	--	--	16-96
6V/12A	1mA/1.2A/2.4A/12mA	0-6V	--	--	16-96
10V/6A	0.2mA/6mA/0.2A/6A	0-10V/0-5V/±5V	◎	--	16-96
6V/12A	0.1A/1A/3A/12A	0-6V	◎	--	16-96
6V/30A	1mA/0.1A/10A/30A	0-6V	◎	--	8-64
6V/60A	0.5A/5A/15A/60A	0-6V	◎	--	8-64
6V/100A	25A/50A/100A	0-6V	--	◎	12-48
6V/200A	50A/100A/200A	0-6V	--	◎	6-24
6V/300A	75A/150A/300A	0-6V	--	◎	4-16
6V/400A	100A/200A/400A	0-6V	--	◎	3-12
6V/600A	150A/300A/600A	0-6V	--	◎	2-8
6V/1200A	300A/600A/1200A	0-6V	--	◎	1-4

Chroma 17010 series

High Precision Test Systems

17010 System	Model	Sampling Time 10mS	Sampling Time 50mS	Sampling Time 100mS	Data-logger
6V/6A	17216-6-6	< 32CHs	< 64CHs	< 96CHs	<96CHs
6V/12A	17216-6-12	< 32CHs	< 64CHs	< 96CHs	<96CHs
10V/6A	17216M-10-6	< 32CHs	< 64CHs	< 96CHs	<96CHs
6V/12A	17216M-6-12	< 32CHs	< 64CHs	< 96CHs	<96CHs
6V/30A	17208M-6-30	< 32CHs	< 48CHs	< 64CHs	<96CHs
6V/60A	17208M-6-60	< 32CHs	< 48CHs	< 64CHs	<96CHs
6V/100A	17212M-6-100S	< 36CHs	< 48CHs	--	<96CHs
6V/200A	17212M-6-100S	< 24CHs	--	--	<96CHs
6V/300A	17212M-6-100S	< 16CHs	--	--	<96CHs
6V/400A	17212M-6-100S	< 12CHs	--	--	<96CHs
6V/600A	17212M-6-100S	< 8CHs	--	--	<96CHs
6V/1200A	17212M-6-100S	< 4CHs	--	--	<96CHs

Note 1: Each channel can be equipped with up to 4CH data logger

Chroma 17010 series

Benchtop Battery Cell Testers

Key Features:

High Voltage Accuracy
±0.015% of F.S.

High Current Accuracy
±0.02% of F.S. (Max Range)
±0.04% of F.S. (Others)

Multi-current Range
4 Ranges

Fast Current Response Time
500μS (10%-90%)

Fast Sampling Time
10mS

Trans. Sampling Function
1mS Sampling

Chroma 17010 series

High Precision Test System

- Model 17216-6-6

Key Features:

Wide Voltage Range
0-6V

Multi-current Range
1mA/0.6A/1.2A/6A

High Voltage Accuracy
±0.015% of F.S.

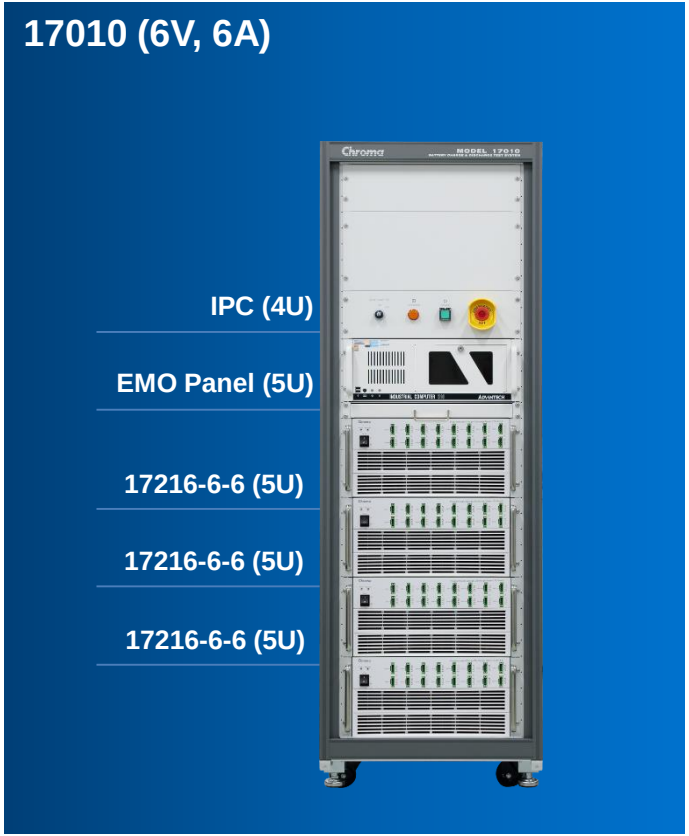
High Current Accuracy
±0.02% of F.S.(6A Range)

Fast Current Response Time
<500μS (10%-90%)

Fast Sampling Time
10mS

Trans. Sampling Function
1mS Sampling

Current accuracy: ±0.04% of F.S. (Others)



Chroma 17010 series

High Precision Test System

- Model 17216-6-12

Key Features:

Wide Voltage Range
0-6V

Multi-current Range
1mA/1.2A/2.4A/12A

High Voltage Accuracy
±0.015% of F.S.

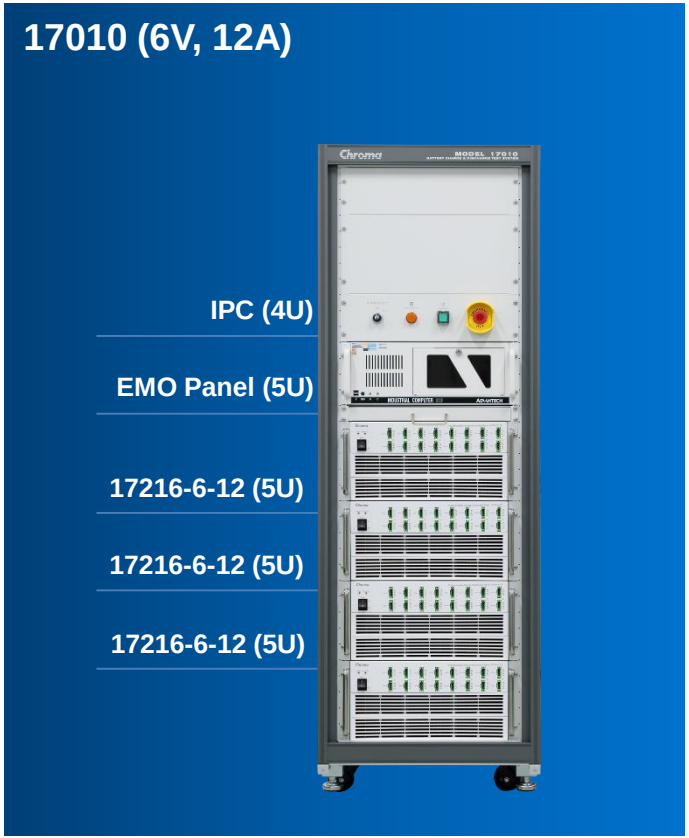
High Current Accuracy
±0.02% of F.S.(12A Range)

Fast Current Response Time
<500μS (10%-90%)

Fast Sampling Time
10mS

Trans. Sampling Function
1mS Sampling

Current accuracy: ±0.04% of F.S. (Others)



Chroma 17010 series

High Precision Test System

- Model 17216M-10-6

Key Features:

Built-in Multi-voltage Range
0-10V/0-5V/±5V

Multi-current Range
200μA/6mA/200mA/6A

High Voltage Accuracy
±0.015% of F.S.

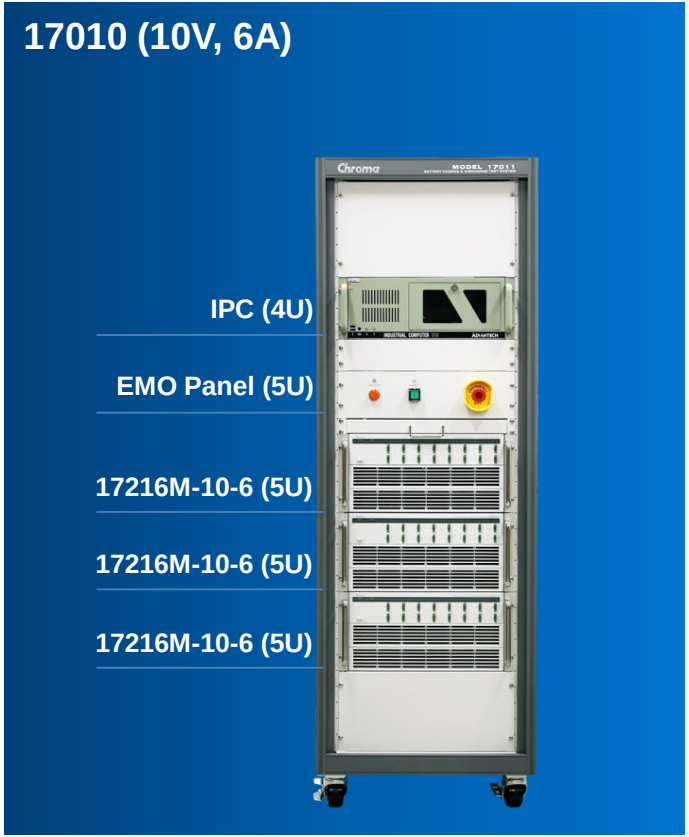
High Current Accuracy
±0.02% of F.S.

Fast Current Response Time
<100μS (10%-90%)

Fast Sampling Time
10mS

Trans. Sampling Function
1mS Sampling

Low Noise
<70dB



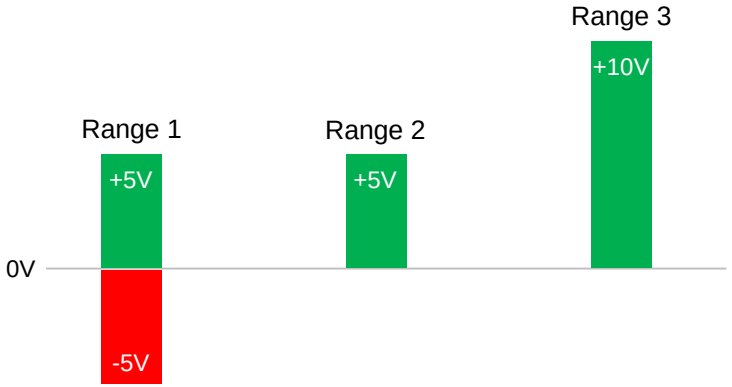
Chroma 17010 series

High Precision Test System

- Model 17216M-10-6

The 17216M-10-6 is a built-in three voltage ranges tester. It supports the voltage range required for the development of multiple battery types at once, which include symmetric cells, half cells, full cells and bipolar cells. Each voltage range can be switched by software.

(Model 17216M-10-6)



Symmetric cells (-5V - +5V): Liquid or solid electrolyte research:
Half cells and full cells (0V-5V): Negative, positive material research
Bipolar solid state batteries (0V-10V): Stackable cell research

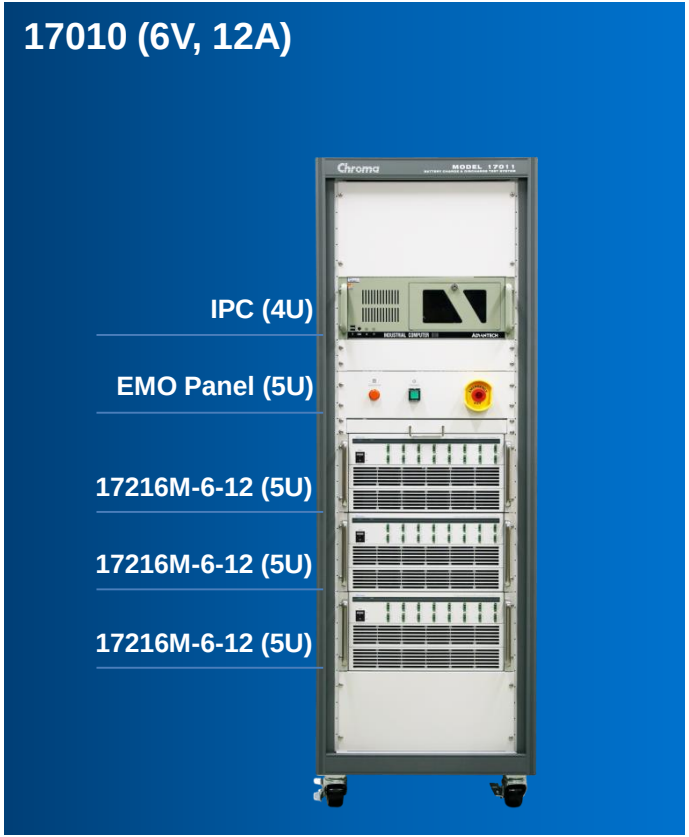
Chroma 17010 series

High Precision Test System

- Model 17216M-6-12

Key Features:

Wide Voltage Range **0-6V**	Multi-current Range **100mA/1A/3A/12A**
High Voltage Accuracy **±0.015% of F.S.**	High Current Accuracy **±0.02% of F.S.**
Fast Current Response Time **<250μS (10%-90%)**	Fast Sampling Time **10mS**
Trans. Sampling Function **1mS Sampling**	0V Discharge **Built-in -2V**



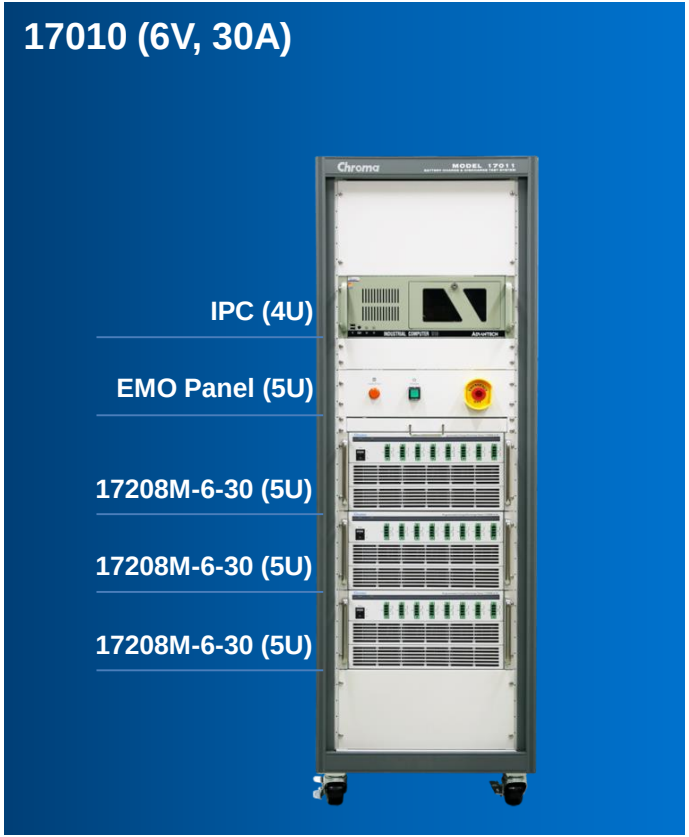
Chroma 17010 series

High Precision Test System

- Model 17208M-6-30

Key Features:

Wide Voltage Range **0-6V**	Multi-current Range **1mA/100mA/10A/30A**
High Voltage Accuracy **±0.015% of F.S.**	High Current Accuracy **±0.02% of F.S.**
Fast Current Response Time **<250μS (10%-90%)**	Fast Sampling Time **10mS**
Trans. Sampling Function **1mS Sampling**	0V Discharge **Built-in -2V**



Chroma 17010 series

High Precision Test System

- Model 17208M-6-60

Key Features:

Wide Voltage Range **0-6V**	Multi-current Range **500mA/5A/15A/60A**
High Voltage Accuracy **±0.015% of F.S.**	High Current Accuracy **±0.02% of F.S.**
Fast Current Response Time **<250μS (10%-90%)**	Fast Sampling Time **10mS**
Trans. Sampling Function **1mS Sampling**	0V Discharge **Built-in -2V**

2.0 17010 System Overview

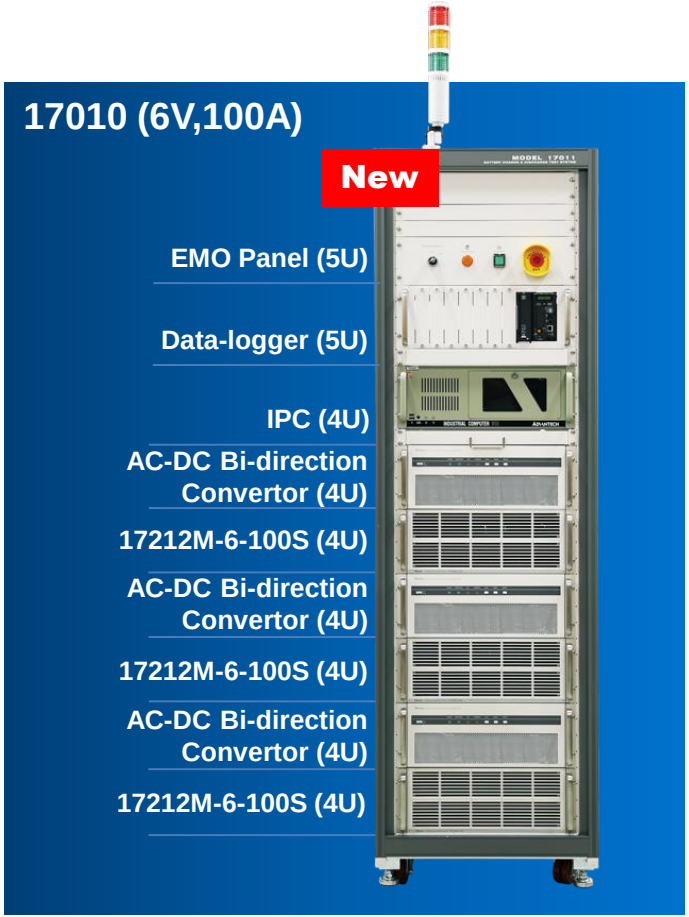
Chroma 17010 series

High Precision Test System

- Model 17212M-6-100S

Key Features:

Wide Voltage Range **0-6V**	Multi-current Range **25A/50A/100A**
High Voltage Accuracy **±0.02% of F.S.**	High Current Accuracy **±0.05% of F.S.**
Fast Current Response Time **<1mS (10%-90%)**	Fast Sampling Time **10mS**
Trans. Sampling Function **1mS Sampling**	Peak Current Function **120% 30S in 60S**
Energy Recycling Function **Up to 80% (DC to DC)**	Chg & Dis Switching Time **Cross-zero**



Chroma 17010 series

Data-logger

- Hioki 8423 and 8948 (Optional)

Measurements	Type	Range	Resolution	Accuracy
Temperature	T-type(100C)	-100°C to +100°C	0.01°C	±(0.05% of Rdg. + 1)˚C
	T-type(500C)	-200°C to +500°C	0.05°C	
	T-type(2000C)	-200°C to +1350°C	0.1°C	
	K-type(100C)	-100°C to +100°C	0.01°C	
	K-type(500C)	-200°C to +400°C	0.05°C	
	K-type(2000C)	-200°C to +400°C	0.1°C	
Voltage	Voltage(100mV)	±0.15V	5μV	±0.1% of F.S.
	Voltage(1V)	±1.5V	50μV	
	Voltage(10V)	±15V	500μV	
Pressure	KH11-CDY	-0.1250MPa - +1.0000 Mpa	--	--
	KH11-ADY	-0.0375MPa - +0.3000 Mpa		
	KH11-2DY	-0.2500MPa - +2.0000 MPa		

Hioki Data-logger

Chroma 17010 series

Auto Calibrator

- Model A170103 (Optional)

Q2 Release

Key Features:

Multi-Channels
16CHs

Wide Current Range
0A-120A

Automatic Calibration
Channels and Ranges Auto Switching

Using High Accuracy Current Shunt
Current Accuracy ±0.01% of F.S.

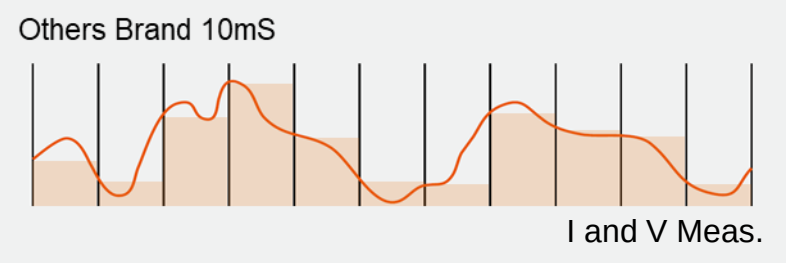
Using High Accuracy DMM
Voltage Accuracy ±0.0045% of F.S.+ 40μV

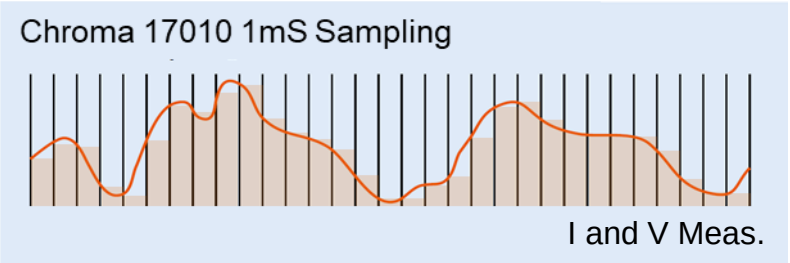
Chroma 8200
Auto Export Report

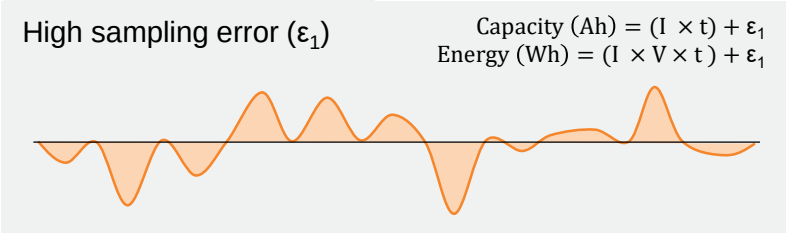
Chroma 17010 series

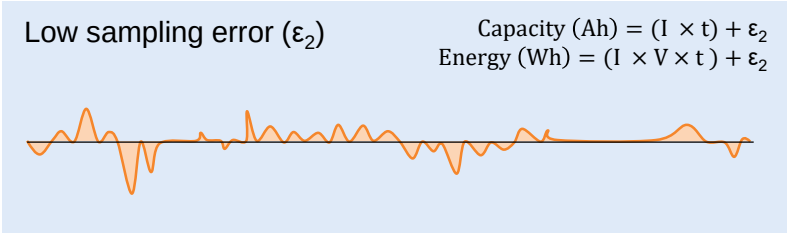
HIGH-SPEED HARDWARE SAMPLING CAPABILITY (1mS)

The Chroma 17010 has 1mS high-speed hardware sampling capability of voltage and current, which can reduce the calculation error of capacity (Ah) and energy (Wh) in long-term dynamic durability test.







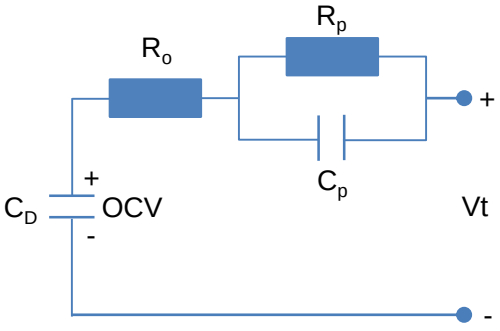


The minimum report record time is 10mS

Chroma 17010 series

BUILT-IN 1mS TRANSITION SAMPLING FUNCTION

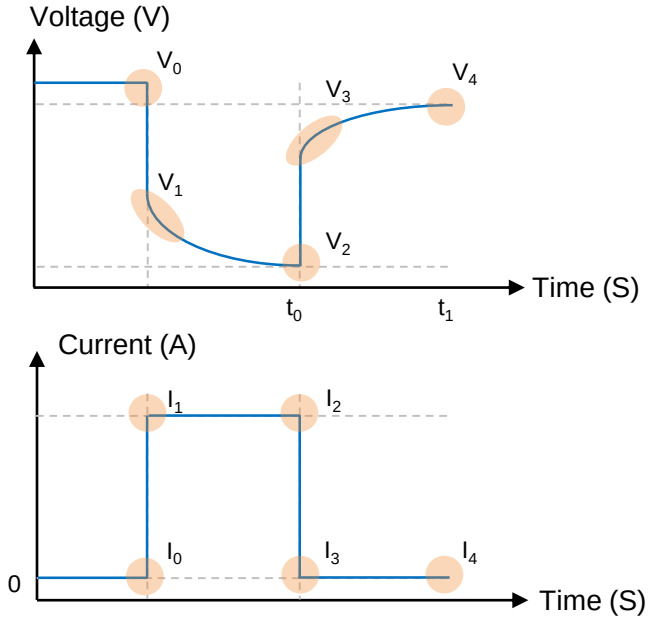
The Chroma 17010 has variables sampling function with 1mS. The setting timing of control step includes before of the start, the end and 1mS-100mS interval time after start.



Battery equivalent circuit model

$$DCIR = Ro + Rp$$

where Ro is the ohmic resistance and Rp is the polarization resistance



DC Internal Resistance:

$$R_o(\Omega) \cong \frac{V_0 - V_1}{I_1 - I_0} = \frac{V_3 - V_2}{I_2 - I_3}$$

$$DCIR(\Omega) \cong \frac{V_0 - V_2}{I_2 - I_0} = \frac{V_4 - V_2}{I_2 - I_4}$$

Battery Thermal Effect:

$$P(W) = I^2 \times DCIR$$

Peak Power Capability:

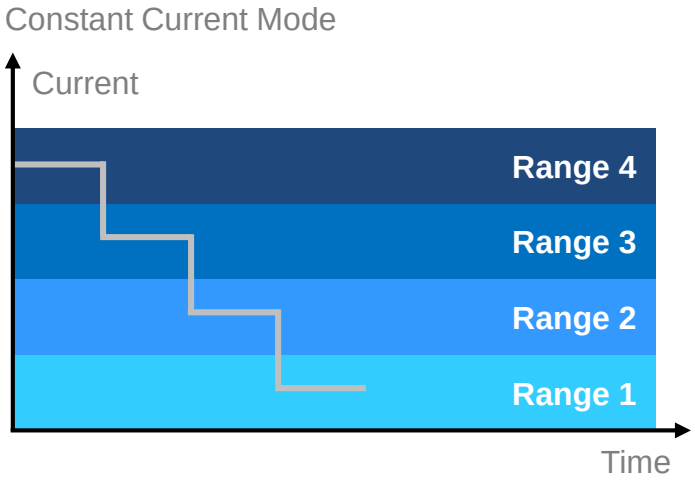
$$P_{dis}(W) == \frac{Vmin(OCV_{dis} - Vmin)}{DCIR_{dis}}$$

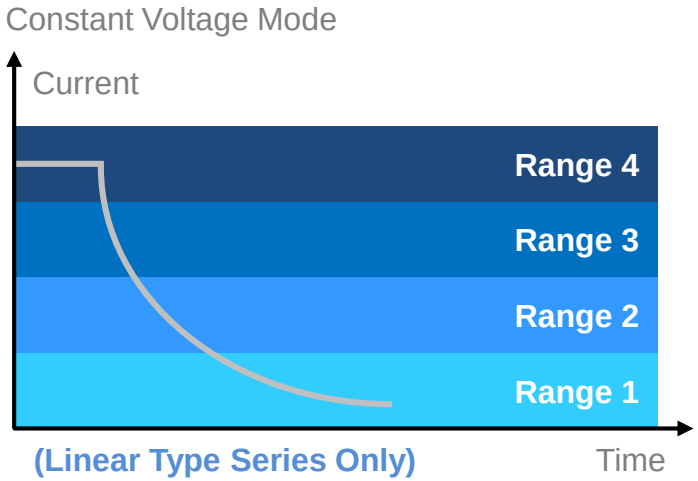
$$P_{chg}(W) == \frac{Vmax(OCV_{chg} - Vmax)}{DCIR_{chg}}$$

Chroma 17010 series

BUILT-IN MULTIPLE CURRENT RANGES TO IMPROVE MEASUREMENT ACCURACY

The 17010 has built-in multiple current ranges and high accuracy specifications up to ±0.02% of F.S.. The software could automatically selects the appropriate range according to the current setting value. Even in CV mode, the current can be automatically switched and the current output will not be interrupted during the test.





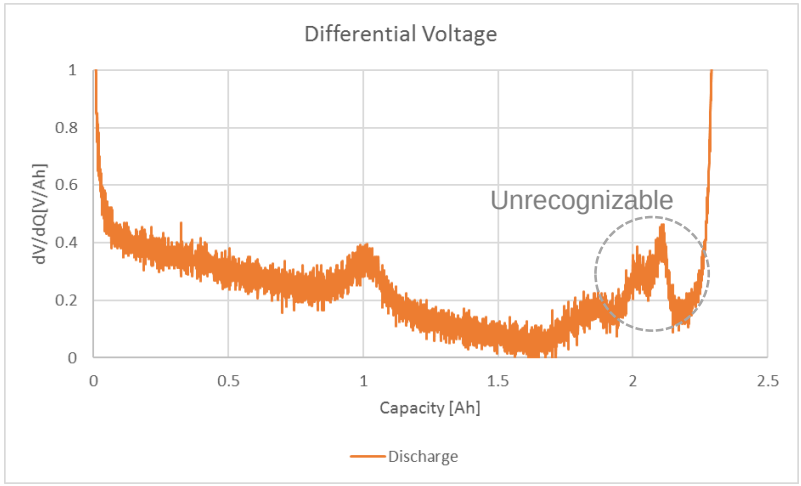
3.0 Key Feature of 17010 System

Chroma 17010 series

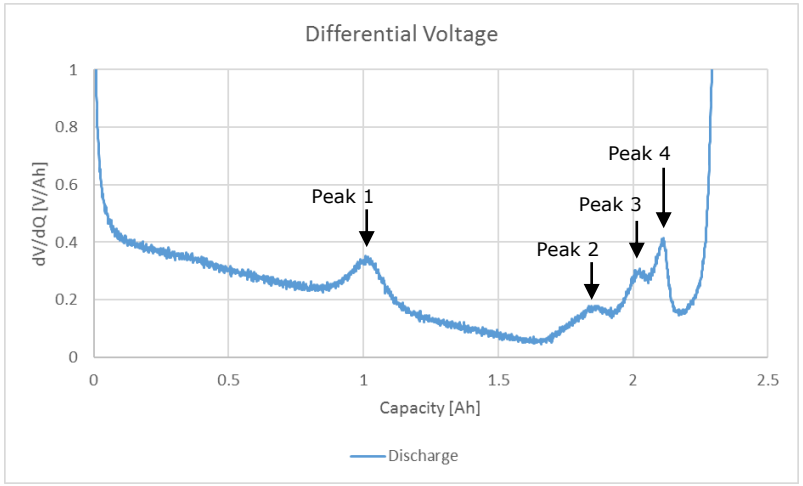
HIGH-PRECISION VOLTAGE DIFFERENTIAL CURVE

The 17010 linear circuit model has low output noise and high precision. It can be used to obtain high quality differential voltage analysis (DVA) curves. The clear characteristic peaks can accurately study the aging mechanism of lithium-ion batteries.

Others Brand



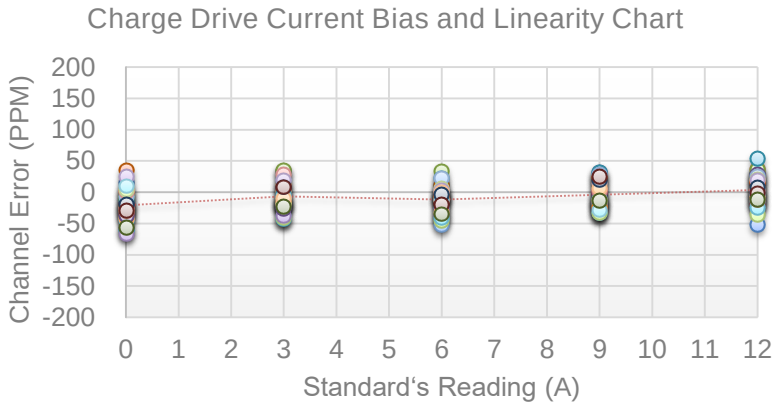
Chroma 17010 (Linear Circuit Type)



Chroma 17010 series

GOOD LINEARITY, LOW NOISE AND HIGH ACCURACY

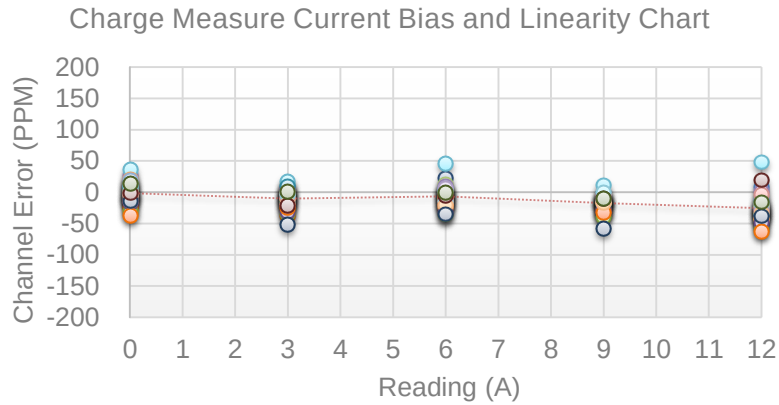
Model 17216M-6-12



Error at	AVG :	STDEV :	MIN :	MAX :	Linearity of Range
0.012 A	-21 ppm	24 ppm	-68 ppm	35 ppm	OFFSET : -18
3 A	-7 ppm	22 ppm	-43 ppm	35 ppm	SLOPE(ppm/mA) : 21
6 A	-12 ppm	21 ppm	-53 ppm	34 ppm	
9 A	-4 ppm	21 ppm	-34 ppm	33 ppm	
12 A	4 ppm	23 ppm	-51 ppm	54 ppm	

These data was collected from 32 test channels

Model 17216M-6-12



Error at	AVG :	STDEV :	MIN :	MAX :	Linearity of Range
0.012 A	-1 ppm	17 ppm	-37 ppm	36 ppm	OFFSET : -1
3 A	-10 ppm	15 ppm	-51 ppm	16 ppm	SLOPE(ppm/mA) : -22
6 A	-7 ppm	17 ppm	-35 ppm	45 ppm	
9 A	-17 ppm	13 ppm	-58 ppm	11 ppm	
12 A	-25 ppm	23 ppm	-63 ppm	48 ppm	

Chroma 17010 series

PROFESSIONAL CALIBRATION LABORATORY AND SERVICE

Chroma's affiliated Calibration Laboratory is recognized by the Taiwan Accreditation Foundation (TAF) with an ISO/IEC 17025 accreditation.

ISO/IEC 17025 (0245)
Certification Electrical and Time Frequency

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Chroma Ate Inc.
Electrical and Time and Frequency Calibration Laboratory
68 Huaya 1st Road, Guishan, Taoyuan 33383, Taiwan

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2017,CNS 17025:2018
Accreditation Number	:	0245
Originally Accredited	:	November 01, 1995
Effective Period	:	November 01, 2019 to October 31, 2022
Accredited Scope	:	Calibration Field, see described in the Appendix

Chang-Lin Wang
Chang-Lin Wang
President, Taiwan Accreditation Foundation
Date: September 18, 2019

P1, total 11 pages

ISO/IEC 17025 (0583)
Certification Physical

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

Chroma Ate Inc.
Physics Calibration Laboratory
68 Huaya 1st Road, Guishan, Taoyuan 33383, Taiwan

is accredited in respect of laboratory

Accreditation Criteria	:	ISO/IEC 17025:2017 / CNS 17025:2018
Accreditation Number	:	0583
Originally Accredited	:	November 15, 1999
Effective Period	:	November 15, 2020 to November 14, 2023
Accredited Scope	:	Calibration Field, see described in the Appendix

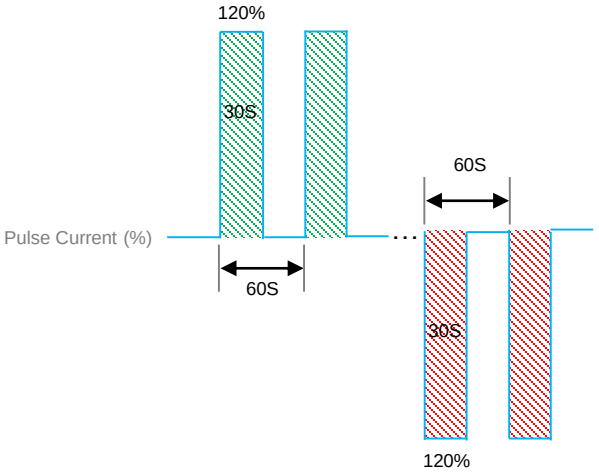
Chang-Lin Wang
Chang-Lin Wang
President, Taiwan Accreditation Foundation
Date : September 21, 2020

P1, total 3 pages

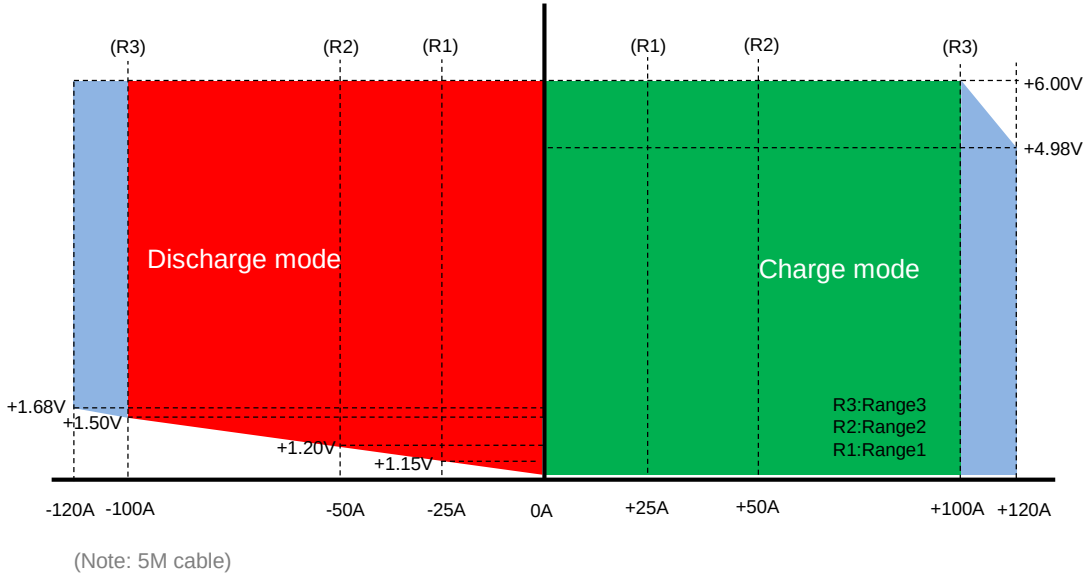
Chroma 17010 series

120% PEAK CURRENT OUTPUT CAPABILITY

The 17212M-6-100S has the super current/power mode, which means it can output 120% constant current/constant power for a maximum 30S within 60S.



Super Mode Function



(Note: 5M cable)

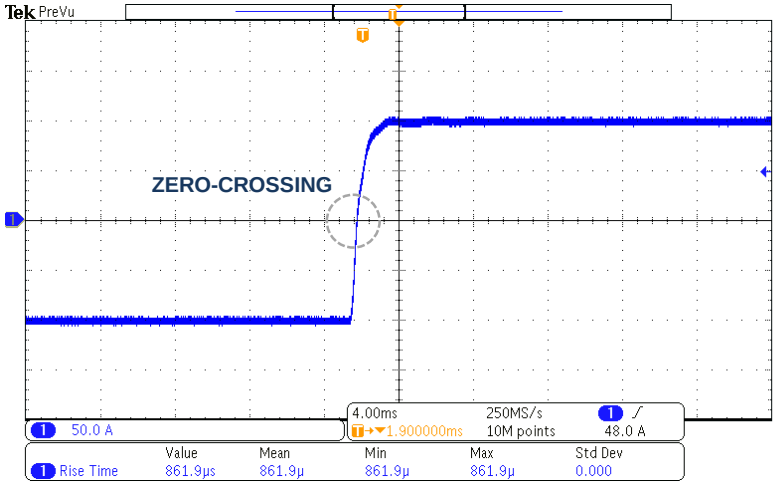
17212M-6-100S Output Capability

Chroma 17010 series

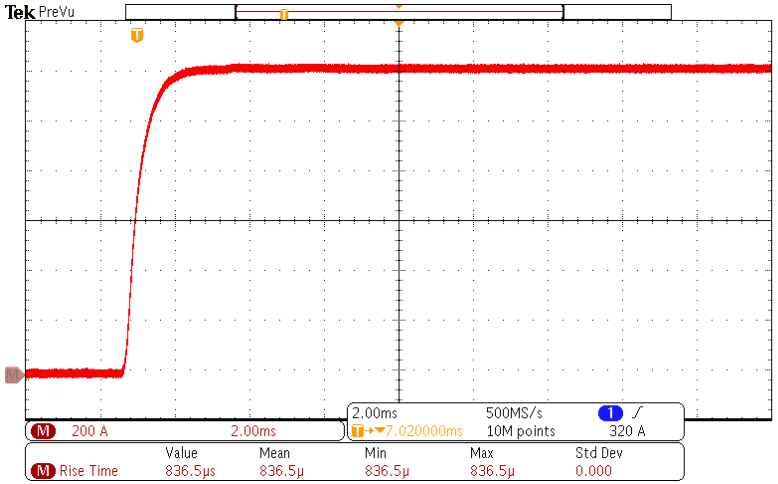
ZERO-CROSSING HIGH-SPEED CURRENT RESPONSE CAPABILITY

The 17010 linear circuit model has a current response speed of <250μS. The energy recovery series can be paralleled to 1200A and can maintain a current response speed of <1mS under good wiring conditions, and providing a more ideal current output waveform without switching delay time.

17212M-6-100S Switching Time (-90% to +90%) <1mS



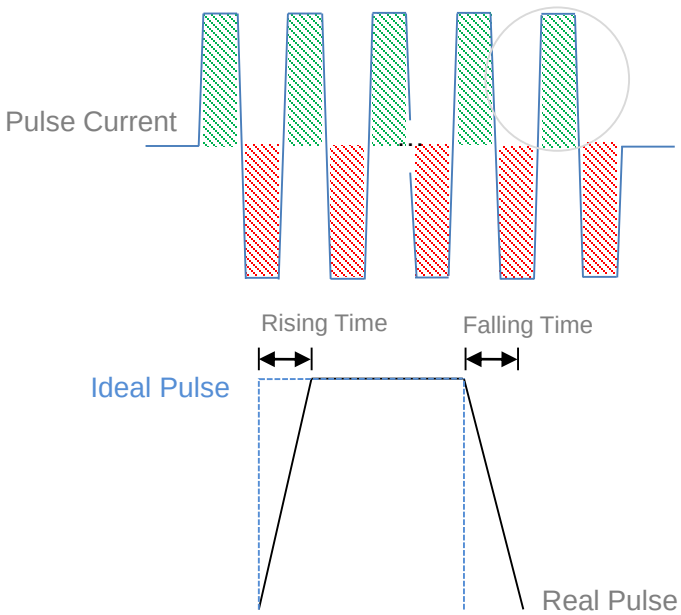
17212M-6-100S Rise Time (0A to 1200A) <1mS



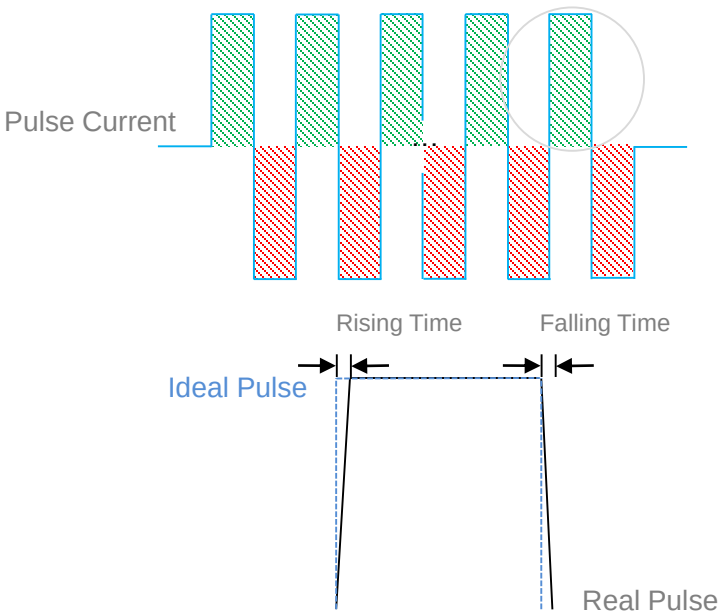
Chroma 17010 series

HIGH-SPEED CURRENT RESPONSE REDUCES CAPACITY AND ENERGY CALCULATION ERRORS

Others Brand (10mS Rising Time)



Chroma 17010 (<1mS Rising Time)

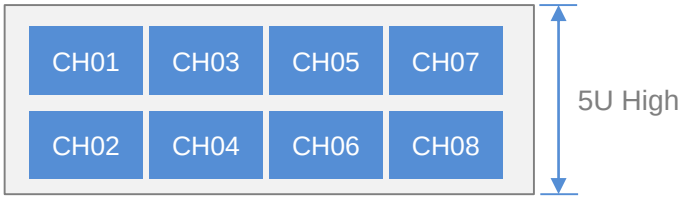


Chroma 17010 series

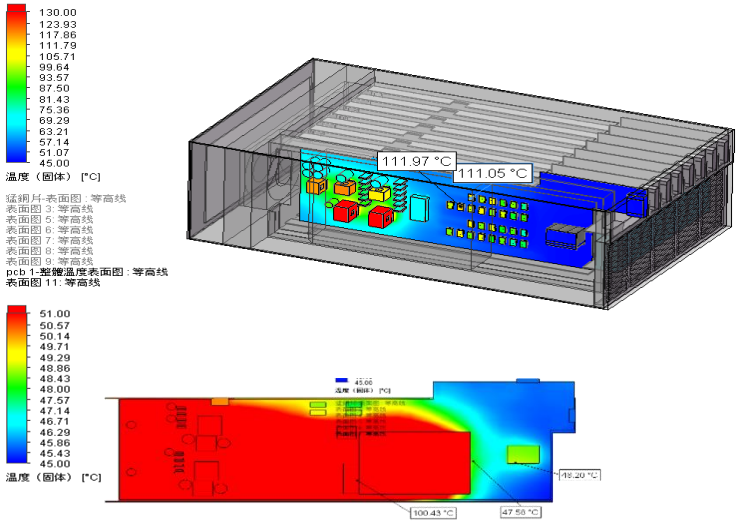
HIGH POWER DENSITY COMES FROM EXCELLENT HEAT FLOW DESIGN TECHNOLOGY

High power density and excellent heat flow design technology can maximize the number of test channels in a limited volume and maintain the stability of measurement accuracy.

Chroma 17010 System



Others Brand

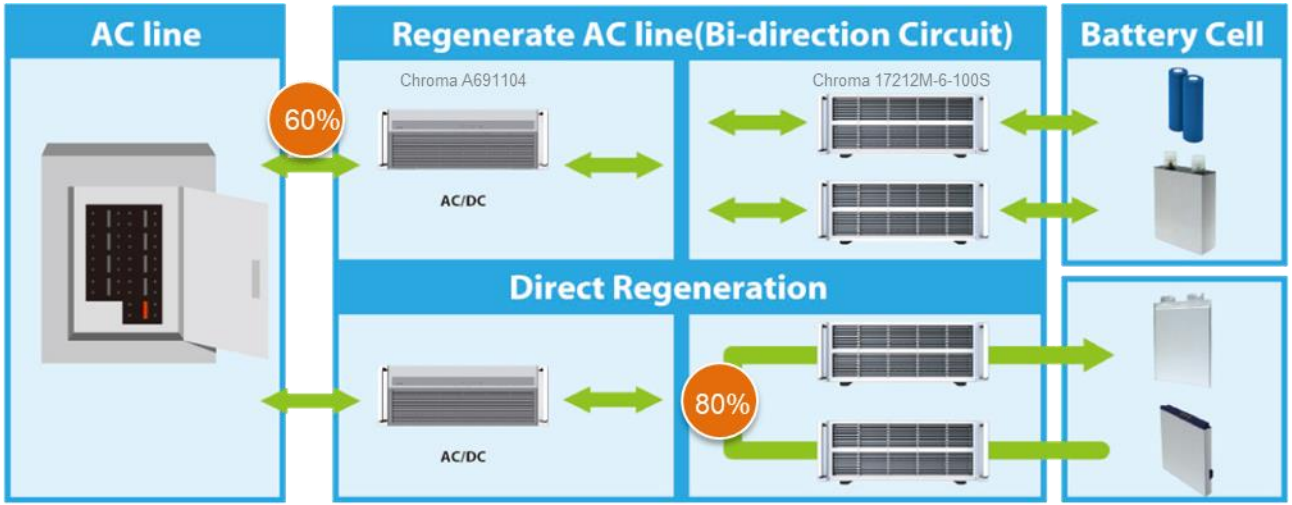


Heat Flow Simulation

Chroma 17010 series

DISCHARGE ENERGY RECOVERY CAPABILITY (17212M-6-100S)

The discharge channel's energy is directly recovered to the charging channel, and the efficiency is about 80%. When the all channels are discharged, the system will indirectly transfer its energy back to the AC grid, and the recovery efficiency is about 60%.



Efficiency calculation does not consider cable loss

3.0 Key Feature of 17010 System

Chroma 17010 series

BUILT-IN MULTIPLE PROTECTION FUNCTIONS IN THE SYSTEM (LEVEL 1)

Item	Protection Functions	Response Time	Activated by
V(V)	Over Voltage(V) Protection 1 Under Voltage(V) Protection 1	1mS	DSP
V(V)	Over Voltage(V) Protection 2 (OVP 1 + 10mV) Under Voltage(V) Protection 2 (UVP 1 - 10mV)	1.28S	FPGA
V(V)	+ΔV Protection -ΔV Protection	1mS	DSP
I(A)	Max |I(A)| Protection	1mS	DSP
I(A)	+ΔI Protection -ΔI Protection	1mS	DSP

Item	Protection Functions	Response Time	Activated by
Q(Ah)	Over Capacity(Ah) Protection Under Capacity(Ah) Protection	1mS	DSP
E(Wh)	Over Energy(Ah) Protection Under Energy(Ah) Protection	1mS	DSP
T(˚C)	Over Temp.(˚C) Protection	100mS	DSP
Time(S)	CC-CV Trans. Time Limit CP-CV Trans. Time Limit	1mS	DSP

Chroma 17010 series

LEVEL 2 PROTECTION FUNCTIONS (OPTIONAL)

Each channel of the system can be equipped with an independent mater relay for voltage and temperature monitoring with upper and lower limit protection. The protection alarm can stop the equipment output or emergency power off according to the safety engineering design, providing a second level of the system protection.

Customized system design for secondary protection:

Plan A

Voltage upper/lower limit protection alarm → cut off the output
Temp. upper/lower limit protection alarm → cut off the output

Plan B

Voltage upper/lower limit protection alarm → cut off the AC power contactor
Temp. upper/lower limit protection alarm → cut off the AC power contactor

Voltage and Temp. Meter

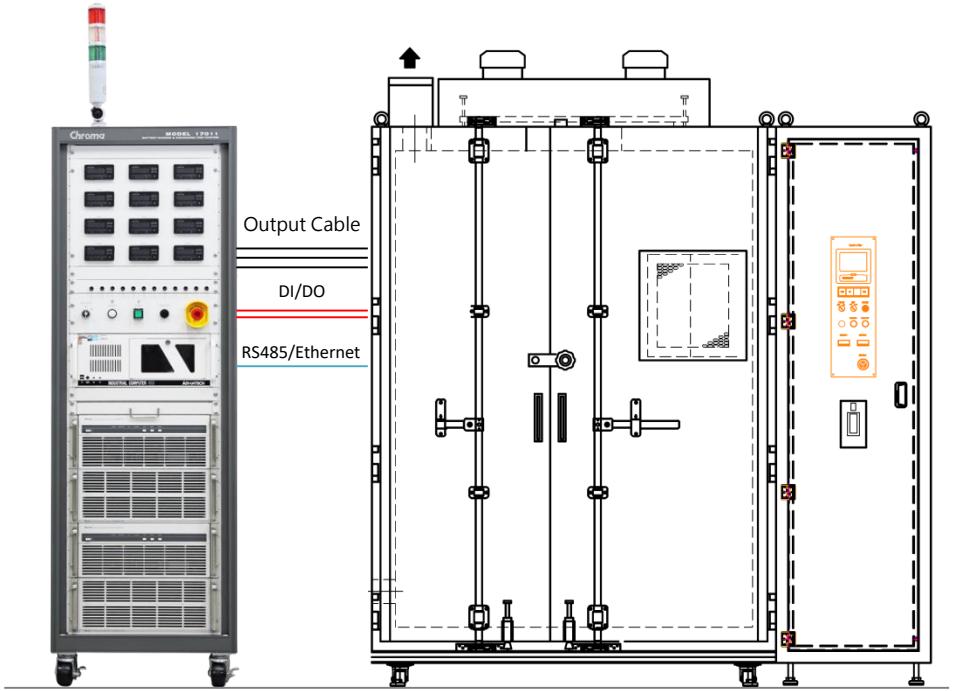
3.0 Key Feature of 17010 System

Chroma 17010 series

OTHERS PROTECTION FUNCTIONS IN THE SYSTEM

- System Rack Temp. Limit Protection
- System Rack Door Open Protection
- AC Voltage Fluctuations Protection
- IPC/Data-logger/E-Chamber Disconnection Protection
- E-Chamber Protection Functions:

Safety Item	Standby	Operation	Alarm
System Light	Green	Orange	Red
Door Open	No Action	Paused	Inter-locked
OTP (Level 1)	Alarm	Alarm	Alarm
OTP (Level 2)	Fire EXTIR Active	Fire EXTIR Active	Fire EXTIR Active
Smoke Detection	Fire EXTIR Active	Fire EXTIR Active	Fire EXTIR Active
Gas Detection	Alarm	Alarm	Alarm
Pressure Relief	Alarm	Alarm	Alarm



Chroma 17010 series

SEMI-AUTOMATIC SOLUTIONS FOR PRODUCT TRIAL PRODUCTION

Chroma can design the test cabinet which has functions such as in-place detection, automatic clamping and fire protection, and provides semi-automatic solutions for product trial production.

Clamping System and Fire Detection Sensor

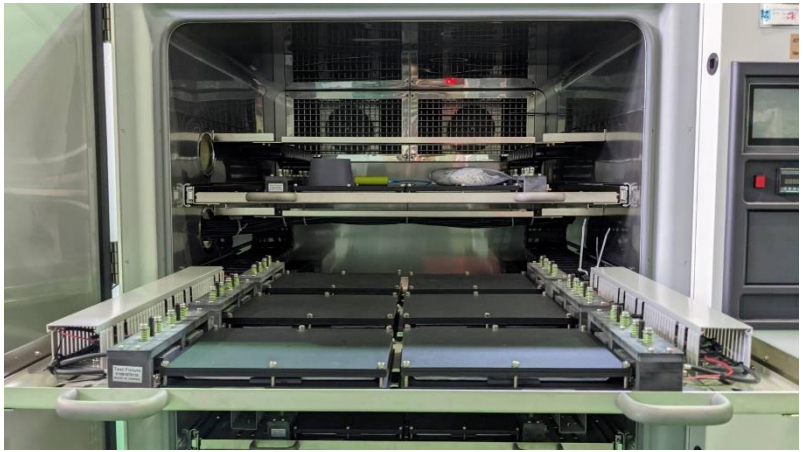
Cabinet and 17010 System

Chroma 17010 series

TRAY SYSTEM ENGINEERING DESIGN FOR RELIABILITY TESTING

The centralized tray system design can maximize the use of space, increase the number of test DUTs, and maintain the uniformity of test temperature.

Tray System Engineering Design (800L Chamber)



Pouch Cell Fixtures

Chroma 17010 series

TRAY SYSTEM ENGINEERING DESIGN FOR LIB RELIABILITY TESTING

Multi-channels Tray System

Small Sized Chamber with Tray System

Oven with Tray System

Chroma 17010 series

TRAY SYSTEM ENGINEERING DESIGN FOR LIB RELIABILITY TESTING

Pouch Cell Test Rack

Cylindrical Cell Test Rack

Chroma 17010 series

ENGINEERING DESIGN OF TEST FIXTURE (CYLINDRICAL BATTERY)

Specially designed fixture for cylindrical cell, including 18650, 26650 and 21700, with a maximum current of up to 60 A.

Key Feature:

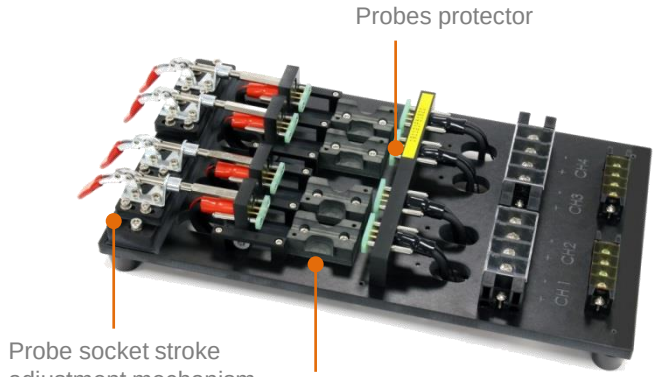
Maximum Continuous Current
60A (4CHs/8CHs)

Fire-resistant Material
PF

Multi Probes Module/CH
IDI SH-3 Probes (27A Cont.) x 3Sets

Probes Protector
FR4

Contact Module Stroke Adjustment Mechanism
Supporting 18650/26650/21700



Cylindrical Cell Fixture(4/8CHs)

Chroma 17010 series

ENGINEERING DESIGN OF TEST FIXTURE (POUCH CELL)

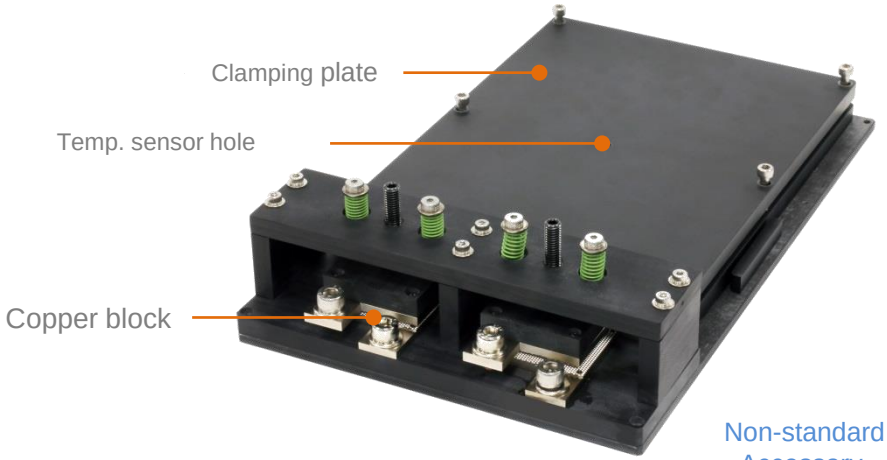
Specially designed fixture for large pouch cell, the maximum current is up to 200A.

Key Feature:

High Current Design
Up to 200A

Fire-resistant Material
PF

Spring Down Mechanism
Diamond Cut Copper Block X 2Sets



Non-standard Accessary

Pouch Cell Fixture

Chroma 17010 series

ENGINEERING DESIGN OF TEST FIXTURE (PRISMATIC CELL)

Specially designed fixture for VDA type batteries, with a maximum current of up to 300 A.

Key Feature:

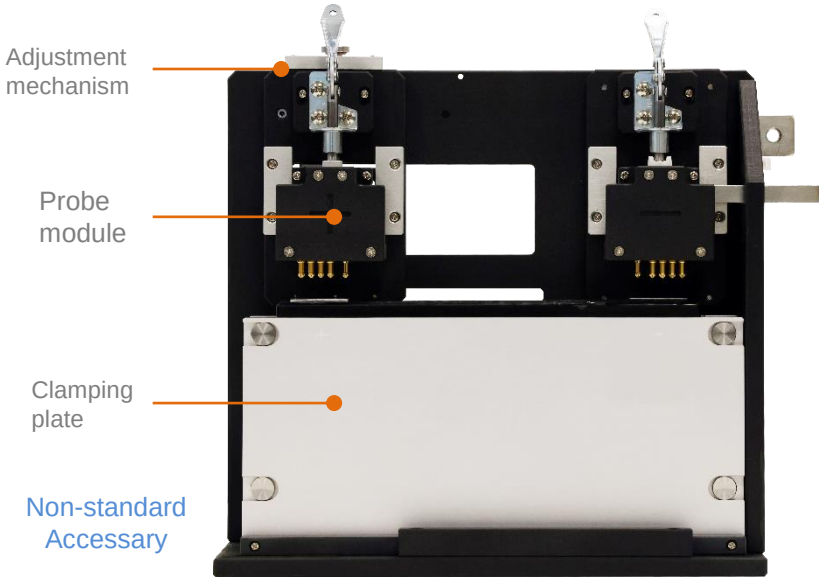
High Current Design
300A

Fire-resistant Material
PF

Multi Probes Module/CH
INGUN Probe Pins

Probes Protector
PF

Horizontal Stroke Adjustment Mechanism
Supporting VDA Cells



Prismatic Cell Fixture

Chroma 17010 series

ENGINEERING DESIGN OF TEST FIXTURE (COIN CELL)

The coin cell fixture is designed for CR23xx size batteries, each fixture can test 8 batteries (four-terminal measurement)

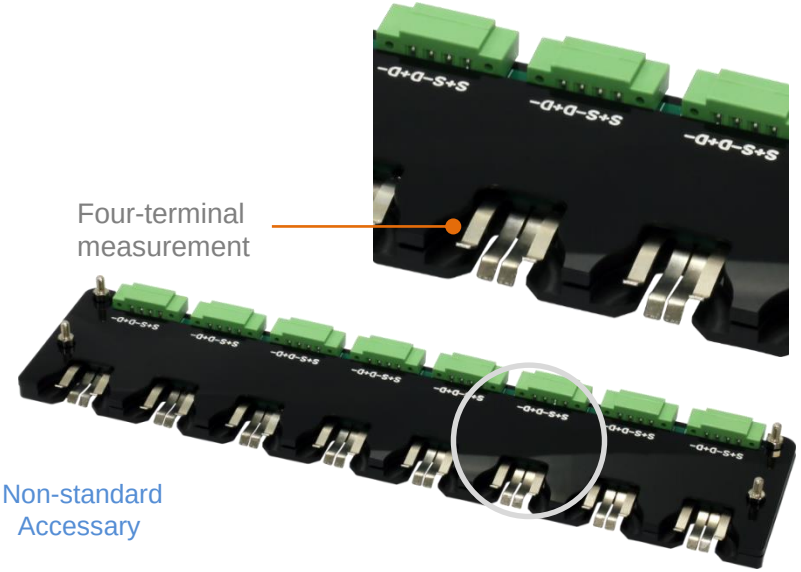
Standard Accessary

CR16XX (1CH)

CR23XX (1CH)

Four-terminal measurement

Non-standard Accessary



CR23XX (8CH)

4.0 International Standards for LIB Performance Test

Chroma 17010 series

High Precision Test System
is designed for LIB reliability and performance test

IEC 62620 Standards for Industrial Applications

- Stationary applications: telecom, UPS, ESS, emergency power and similar applications.
- Motive applications: fork-lift truck, golf cart, AGV, railway, and marine, excluding road vehicles.

6.3.1 Discharge performance at +25˚C
6.3.2 Discharge performance at low temperature
6.3.3 High rate permissible current
6.4.0 Charge (capacity) retention and recovery
6.5.2 Internal D.C. resistance
6.6.1 Endurance in cycles
6.6.2 Endurance in storage at constant voltage (permanent charge life)

4.0 International Standards for LIB Performance Test

Chroma 17010 series

High Precision Test System
is designed for LIB reliability and performance test

IEC 61960 and GB/T18287 Standards for Portable Applications

- Portable applications : smart phone, tablet, Bluetooth earphones and similar applications.
- Movable applications: notebook, CD player, and similar applications.

7.3.1 Discharge performance at +20˚C
7.3.2 Discharge performance at -20˚C
7.3.3 High rate discharge performance at +20˚C
7.4.0 Charge (capacity) retention and recovery
7.5.0 Capacity recovery after storage
7.6.0 Endurance in cycles
7.7.0 Internal D.C. resistance

4.0 International Standards for LIB Performance Test

Chroma 17010 series

High Precision Test System
is designed for LIB reliability and performance test

IEC 62660-1 /-2 /-3 Standards for xEV Applications

7.2 Capacity (Part 1-3)
7.3 SOC adjustment (Part 1-3)
7.4 Power (Part 1)
7.5 Energy (Part1)
7.6 Storage test (Part1)
7.7 Cycle life test (Part1)
7.8 Energy efficiency test (Part1)

4.0 International Standards for LIB Performance Test

Chroma 17010 series

High Precision Test System
is designed for LIB reliability and performance test

USABC Test Manuals for xEV Applications

3.2 Static capacity test
3.3 Constant power discharge tests
3.4 Hybrid pulse power characterization test
3.5 Self-discharge test
3.6 Cold cranking test
3.7 Thermal performance test
3.8 Energy efficiency test
3.9 Life testing
3.10 Charge-sustaining cycle life tests
3.11 Charge-depleting cycle life test profile
3.12 Calendar cycle life test

Driving Innovation to Success

Thank You!

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