

Programmable DC Electronic Load

MODEL 6310 SERIES

Key Features :

- Max Power: 200W, 100W×2(Dual), 30W & 250W, 300W, 600W, 1200W
- Wide range 1-500V operating voltage

Configuration :

- Up to 8 channels in one mainframe, fit for testing multiple output SMPS
- Parallel load modules up to 1200W for high current and power application
- Synchronization with multiple loads
- GPIB/RS-232C Interface

Load Control :

- Flexible CC, CR, CV operation modes
- Dynamic loading with speed up to 20KHz
- Fast response of 0.32 mA/μS - 10A/μS slew rate
- Minimum input resistance allowing load to sink high current at low voltage
- Real time power supply load transient response simulation and output measurement
- User programmable 100 sequential front panel input status for user-friendly operating
- High/Low limits of testing parameters to test GO/NG

Measurement :

- 15-bit precision voltage and current measurement with dual-range selection
- Remote sensing capability
- Short circuit test
- Self-test at power-on

Regulatory Compliance :

- CE marking



PROGRAMMABLE DC ELECTRONIC LOAD MODEL 6310 SERIES

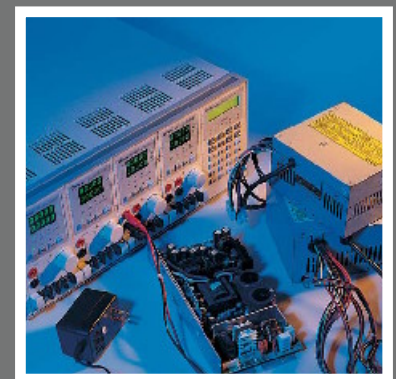
Chroma Programmable DC Electronic Load 6310 series is suitable for the test and evaluation of multi-output AC/DC power supply, DC/DC converter, charger and power electronic components and good for application in areas such as research and development, production, and incoming inspection. The system is configured by plugging the user selectable load modules into the system mainframe, and operated using the keypad on the front panel of the instrument or the remote controlled instructions via RS-232C or GPIB interface.

The 6310 series offers 8 types of modular loads with power ranging from 100 watts to 1200 watts, current from 0.5mA to 240A, and voltage measurement from 0.5mV to 500V. Each load is isolated and floating, programmable in dual current range and measuring voltage range, and capable of synchronizing with other modules for control operation. The load can be operated in constant current, constant voltage, and constant resistance.

The 6310 series can simulate a wide range of dynamic loading applications. The loading waveform is programmable in slew rates, load levels, duration and conducting voltage. Furthermore, up to 100 sets of system operating status can be stored in EEPROM and recalled instantly for automated testing application.

Real time measurement of voltage and current is integrated into each 6310 load module using a 15-bit precision measurement circuit. The user can perform on line voltage measurement and adjustment, or simulate short circuit test using the simple keypad on the front panel. Additionally, the 6310 series offers an optional remote controller for automated production line.

The 6310 series has self-diagnosis routine to maintain instrumental performance all the time. It is also protected against OPP, OCP, OVP, OTP, and reverse polarity to guarantee quality and reliability for even the most demanding engineering testing and ATE application.

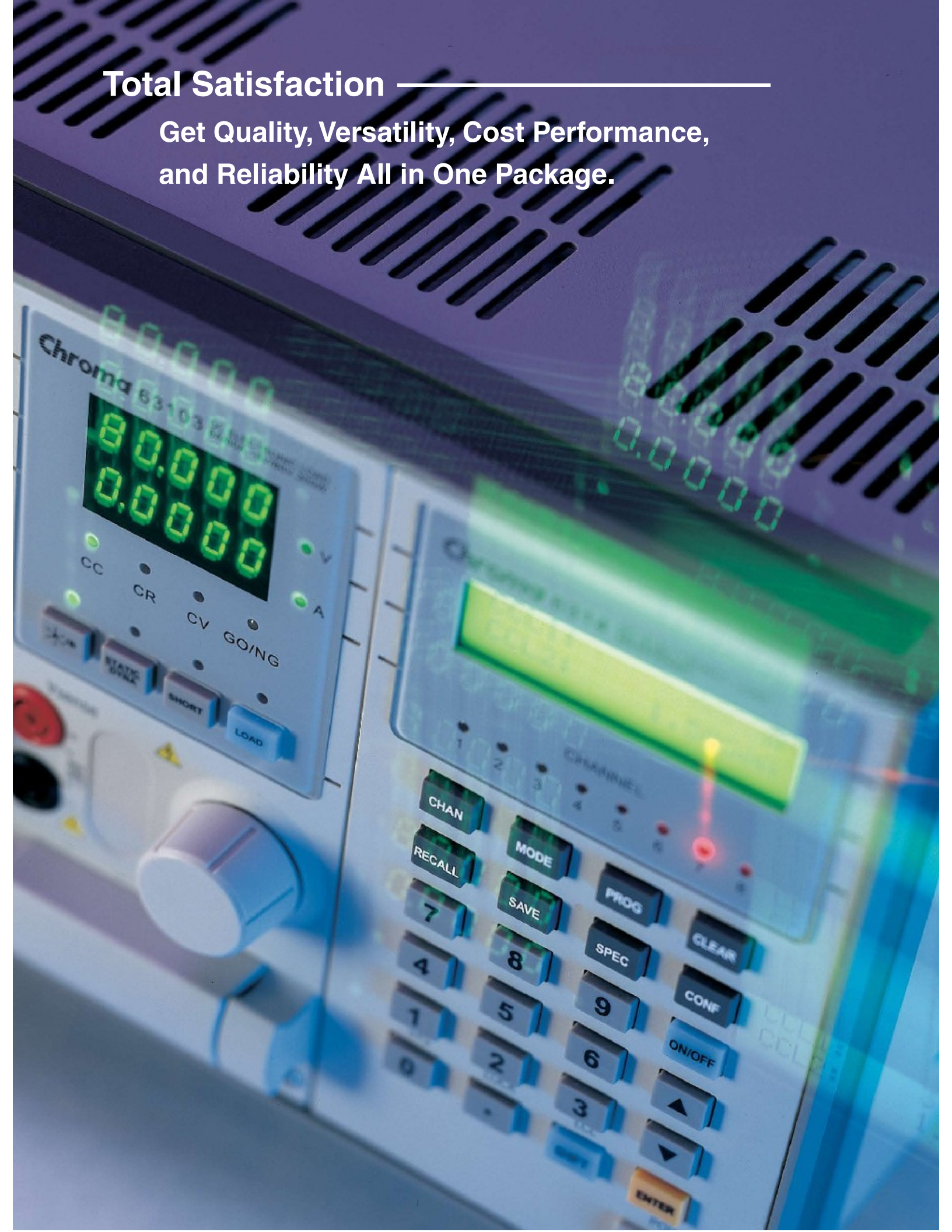


Chroma



Total Satisfaction

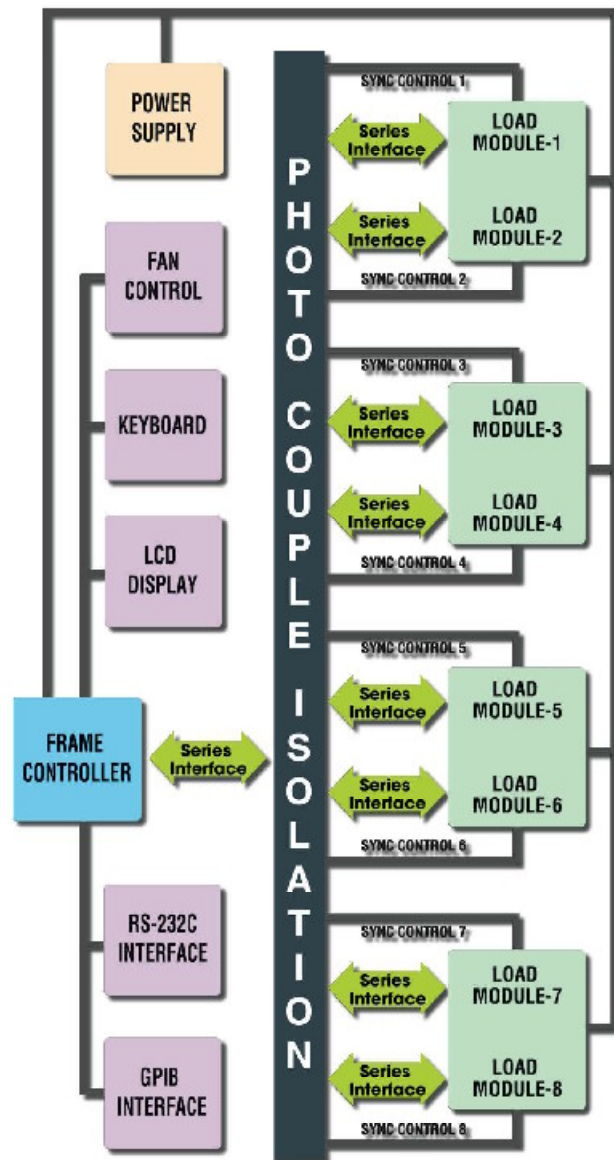
Get Quality, Versatility, Cost Performance,
and Reliability All in One Package.



1. Versatile System Configuration

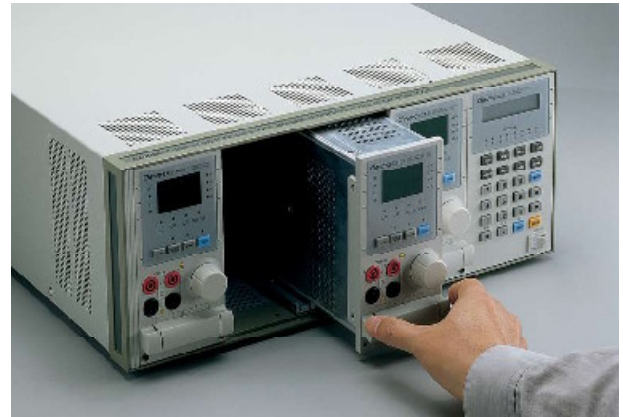
Chroma 6310 Programmable Electronic Load integrates microprocessing capability into each load module and mainframe as the system operates in parallel processing mode to optimize the speed and control among multiple load modules. All load modules are configured to work synchronously, and testing can be carried out simultaneously at multiple output to simulate real life application.

6310 SYSTEM BLOCK DIAGRAM



2. Modular Load Design

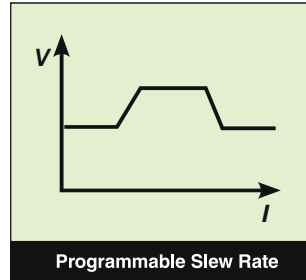
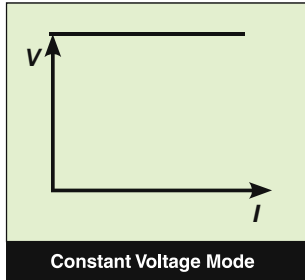
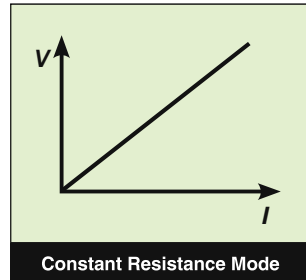
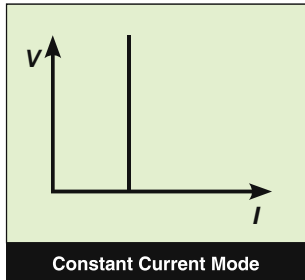
The Chroma 6314 1200W and 6312 600W electronic load mainframes accept the user-installable 6310 series load modules for easy system configuration and fit 19" instrument rack. The 6314 holds four 63102 load modules at most to offer 8-channel 100W input load with standard front-panel inputs. It fits for testing multiple output switch power supply. Additionally, GO/NG output port is useful for UUT's pass/fail judgement on automated production line. All modules on the 6314/6312 mainframe share a common GPIB address to synchronize and speed up the control of load modules and read-back of operating data.



The 6310 family offers 8 types of load modules ranging from model 63101 with 200 watts power to model 63112 with 1200 watts power. Each model is designed with specific applications in mind. In the world, model 63102 and 63107 are the only dual-input load in one load module, capable of controlling loading up to 50A and measuring voltage up to that of 0.5mV, and well-suited for testing lower power, high precision DC/DC converter. Model 63105 and 63108 are designed to operate up to 500 V in high voltage testing application. Model 63112 sinks a maximum current of 240A, and is the most cost-effective in high power testing application.

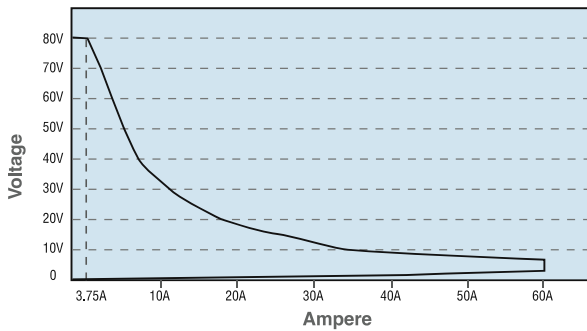
3. Application of Specific Load Simulation

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

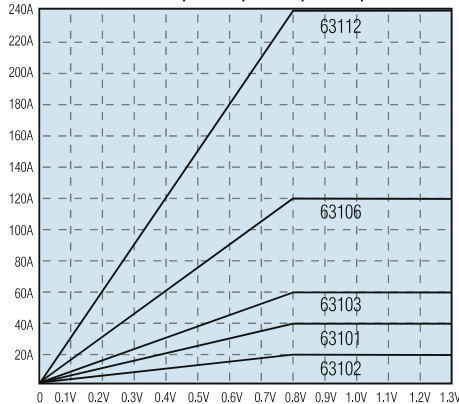


Each load module is designed with state-of-the-art technology and connects all power MOSFET devices parallel to insure high accuracy load control with minimum drift of less than 0.1% +0.1% F.S. of the current setting. The FET technology accomplishes minimum input resistance and enables the load to sink high current even at very low voltage. For example, model 63103 is capable of sinking 60A at 1V output, and well-suited for testing the new 3.3V low voltage power supplies. Low voltage operation, down to zero volt, is possible at correspondingly reduced current level.

MODEL 63103 INPUT CHARACTERISTICS



**LOW VOLTAGE CHARACTERISTICS(TYPICAL)
Model 63101/63102/63103/63106/63112**

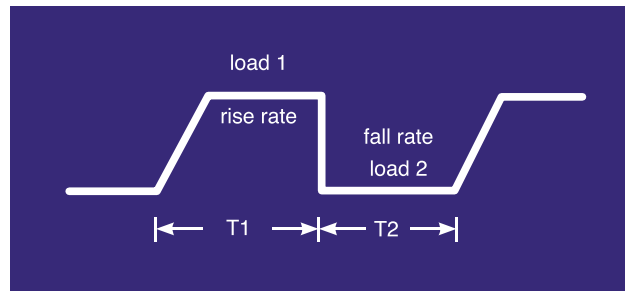


Note: All specifications are measured at load input terminals. (Ambient Temperature of +25°C)

The 6310 load module uses photo coupler for isolation between the output and control sections, thus each load is isolated and floating. The user can use multiple load modules independently to test multi-output power supplies, or parallel them in high power testing application.

4. Dynamic Loading and Control

Modern electronic devices operate at very high speed, and perform well in the transient and dynamic response of power devices. To satisfy these testing applications, the 6310 loads offer high speed, programmable dynamic load simulation and control capability never achieved before. The figure below shows the programmable parameters of the 6310 load modules :

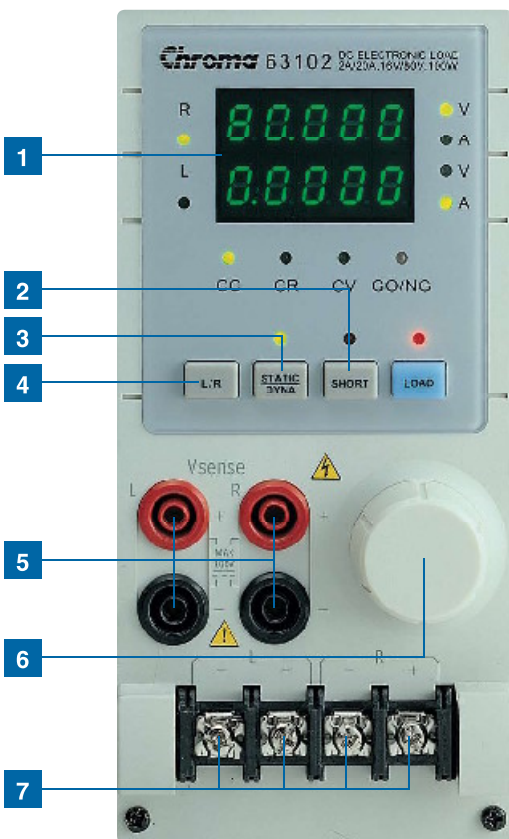


The programmable slew rate makes the simulation of transient load change demanded by the requirement of real life application possible. The 6310 internal waveform generator is capable of producing maximum slew rate at $10A/\mu S$, and dynamic cycling up to 20KHz. Its dedicated remote load senses and controls circuit to guarantee minimum waveform distortion during continuous load changes.

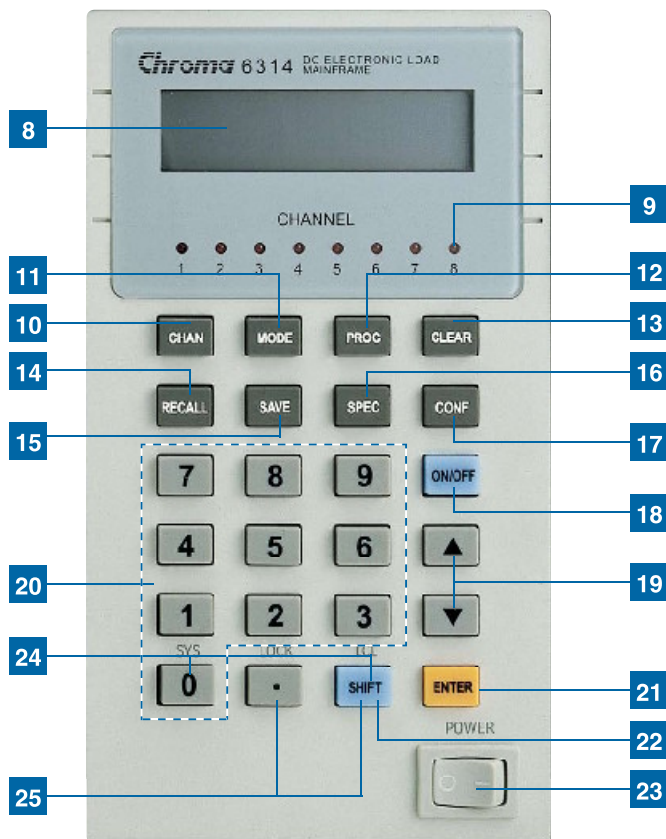
5. Powerful Measurements

Each 6310 load module has integrated a 15-bit precision A/D converter for voltage measurement with an accuracy of 0.05% +0.05% full scale. The built-in resistive load current sensing circuit is capable of measuring current in an accuracy of 0.1%+0.1% full scale. Also, short circuit can be simulated. All measurement is done using remote sensing to eliminate any error due to voltage drop along the measurement path. The user can also select a full setting range of voltage and current measurement according to application requirements.

PANEL OVERVIEW



Load Module



Mainframe Controller

- | | |
|---|--|
| <p>1 LED indicator</p> <p>2 SHORT key : To apply a short circuit across the input</p> <p>3 STATIC / DYNA key : To select static or dynamic test mode</p> <p>4 L / R key : To select left or right channel of input load (63102, 63107)</p> <p>A / B key : To select static A or B load (other models)</p> <p>5 V terminal : To measure the UUT's output voltage using remote sense</p> <p>6 Rotary knob : To adjust load setting continuously</p> <p>7 Load terminal</p> <p>8 LCD display</p> <p>9 LED indicator : To display the channel at which load is set</p> <p>10 CHAN key : To select input load channel</p> <p>11 MODE key : To select the operation mode of CC, CR, or CV</p> <p>12 PROG key : For program data setting</p> | <p>13 CLEAR key : Clear the currently edited data</p> <p>14 RECALL key : To recall the front panel input status from memory</p> <p>15 SAVE key : To save the front panel input status into memory</p> <p>16 SPEC key : To set up High/Low limits for GO/NG test</p> <p>17 CONF key : To set the configuration</p> <p>18 ON / OFF key : To enable or disable the load input</p> <p>19 Up / Down key : To select the next or previous display in edit mode</p> <p>20 Numeric Key : For data setting</p> <p>21 ENTER key : To confirm editing data on the instrument</p> <p>22 SHIFT key : As LOCAL Key when in remote mode</p> <p>23 Power switch</p> <p>24 SHIFT + 0 key : System function</p> <p>25 SHIFT + · key : Lock function</p> |
|---|--|

A MULTIPLE SELECTION FOR MULTIPLE OUTPUT SPS TEST APPLICATION

Product Lineup

MODEL	Power	Operation Voltage	Current
63101	200W	1-80V	40A
63103	300W	1-80V	60A
63106	600W	1-80V	120A
63112	1200W	1-80V	240A
63102	100W X 2	1-80V	20A (Dual Channels)
63107	250W & 30W	1-80V	40A & 5A (Dual Channels)
63105	300W	2.5-500V	10A
63108	600W	2.5-500V	20A

Modern switching power supplies get more complicated with more outputs and control signals for PC or system requirements. Such as ATX power supply needs more channels in a load to simulate or test the output than the traditional AT power supply. No doubt, you really need a new solution for your test application! Chroma offers a broad selection of load modules and at most an 8-channel load in a standard mainframe. It is fit for any kinds of power supplies that require different Power, Current or Voltage, and also for testing the multiple output switching power supply.



A more efficient solution to testing the single output AC to DC or DC to DC converters by synchronization control with multiple loads for testing 8 UUTs at one time.



63102 x 4

SPECIFICATIONS

Model	63101		63102(100Wx2)		63103		63105	
Power	20W	200W	20W	100W	30W	300W	30W	300W
Current	0-4A	0-40A	0-2A	0-20A	0-6A	0-60A	0-1A	0-10A
Voltage	1-80V		1-80V		1-80V		2.5-500V	
Min. Operation Voltage (DC)*1	1.0V at 4A	1.0V at 40A	1.0V at 2A	1.0V at 20A	1.0V at 6A	1.0V at 60A	2.0V at 1A	2.0V at 10A
Constant Current Mode								
Range	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A	0~1A	0~10A
Resolution	1mA	10mA	0.5mA	5mA	1.5mA	15mA	0.25mA	2.5mA
Accuracy	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.	0.1%+0.1%F.S.	0.1%+0.2%F.S.
Constant Resistance Mode								
Range	0.0375Ω~150Ω (200W/16V) 1.875Ω~7.5kΩ (200W/80V)		0.075Ω~300Ω (100W/16V) 3.75Ω~15kΩ (100W/80V)		0.025Ω~100Ω (300W/16V) 1.25Ω~5kΩ (300W/80V)		1.25Ω~5Ω (300W/125V) 50Ω~200kΩ (300W/500V)	
Resolution	12 bits		12 bits		12 bits		12 bits	
Accuracy	150Ω: 0.1Ω + 0.2% 7.5kΩ: 0.01Ω + 0.1%		300Ω: 0.1Ω + 0.2% 15kΩ: 0.01Ω + 0.1%		100Ω: 0.1Ω + 0.2% 5kΩ: 0.01Ω + 0.1%		5kΩ: 20mΩ + 0.2% 200kΩ: 5mΩ + 0.1%	
Constant Voltage Mode								
Range	1~80V		1~80V		1~80V		2.5~500V	
Resolution	20mV		20mV		20mV		125mV	
Accuracy	0.05% ± 0.1%F.S.		0.05% ± 0.1%F.S.		0.05% ± 0.1%F.S.		0.05% ± 0.1%F.S.	
Dynamic Mode								
Dynamic Mode	C.C. Mode		C.C. Mode		C.C. Mode		C.C. Mode	
T1 & T2	0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS		0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS		0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS		0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS	
Accuracy	1uS/1mS+100ppm		1uS/1mS+100ppm		1uS/1mS+100ppm		1uS/1mS+100ppm	
Slew Rate	0.64~160mA/μS	6.4~1600mA/μS	0.32~80mA/μS	3.2~800mA/μS	0.001~0.25A/μS	0.01~2.5A/μS	0.16~40mA/μS	1.6~400mA/μS
Resolution	0.64mA/μS	6.4mA/μS	0.32mA/μS	3.2mA/μS	0.001A/μS	0.01A/μS	0.16mA/μS	1.6mA/μS
Min. Rise Time	10μs (typical)		10μs (typical)		10μs (typical)		24μs (typical)	
Current	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A	0~1A	0~10A
Resolution	1mA	10mA	0.5mA	5mA	1.5mA	15mA	0.25mA	2.5mA
Current Accuracy	0.4%F.S.		0.4%F.S.		0.4%F.S.		0.4%F.S.	
Measurement Section								
Voltage Read Back								
Range	0~16V	0~80V	0~16V	0~80V	0~16V	0~80V	0~125V	0~500V
Resolution	0.5mV	2.5mV	0.5mV	2.5mV	0.5mV	2.5mV	4mV	16mV
Accuracy	0.05% + 0.05%F.S.		0.05% + 0.05%F.S.		0.05% + 0.05%F.S.		0.05% + 0.05%F.S.	
Current Read Back								
Range	0~4A	0~40A	0~2A	0~20A	0~6A	0~60A	0~1A	0~10A
Resolution	0.125mA	1.25mA	0.0625mA	0.625mA	0.1875mA	1.875mA	0.032mA	0.320mA
Accuracy	0.1% + 0.1%F.S.		0.1% + 0.1%F.S.		0.1% + 0.1%F.S.		0.1% + 0.1%F.S.	
Protective Section								
Over Power Protection	≒ 20.8W	≒ 208W	≒ 20.8W	≒ 104W	≒ 31.2W	≒ 312W	≒ 31.2W	≒ 312W
Over Current Protection	≒ 4.08A	≒ 40.8A	≒ 2.04A	≒ 20.4A	≒ 6.12A	≒ 61.2A	≒ 1.02A	≒ 10.2A
Over Temperature Protection	≒ 85°C		≒ 85°C		≒ 85°C		≒ 85°C	
Over Voltage Protection	≒ 81.6V		≒ 81.6V		≒ 81.6V		≒ 510V/127.5V	
General								
Short Circuit								
Current	-	≒ 40A	-	≒ 20A	-	≒ 60A	-	≒ 10A
Voltage (CV)	-	0V	-	0V	-	0V	-	0V
Resistance (CR)	-	≒ 0.0375Ω	-	≒ 0.075Ω	-	≒ 0.025Ω	-	≒ 1.25Ω
Input Resistance (Load Off)	100kΩ (Typical)		100kΩ (Typical)		100kΩ (Typical)		100kΩ (Typical)	
Temperature Coefficient	100PPM/°C (Typical)		100PPM/°C (Typical)		100PPM/°C (Typical)		100PPM/°C (Typical)	
Power	Supply from 6314 Mainframe		Supply from 6314 Mainframe		Supply from 6314 Mainframe		Supply from 6314 Mainframe	
Dimensions (WxHxD)	81 x 172 x 495 mm		81 x 172 x 495 mm		81 x 172 x 495 mm		81 x 172 x 495 mm	
Weight	4.2 Kg		4.2 Kg		4.2 Kg		4.2 Kg	
Operating Range	0~40°C		0~40°C		0~40°C		0~40°C	
EMC & Safety	CE		CE		CE		CE	

Mainframe Model	6312	6314
Dimensions(WxHxD)	275x177x543mm	439x177x543mm
Weight	15kg	22kg

6310 Series Programmable DC Electronic Load Family



SPECIFICATIONS

Model	63106		63107(30W & 250W)			63108		63112		
Power	60W	600W	30W	30W	250W	60W	600W	120W	1200W	
Current	0~12A	0~120A	0~5A	0~4A	0~40A	0~2A	0~20A	0~24A	0~240A	
Voltage	1~80V		1~80V			2.5~500V		1~80V		
Min. Operation Voltage (DC)*1	1.0V at 12A	1.0V at 120A	1.0V at 5A	1.0V at 4A	1.0V at 40A	2V at 2A	2V at 20A	1.0V at 24A	1.0V at 240A	
Constant Current Mode										
Range	0~12A	0~120A	0~5A	0~4A	0~40A	0~2A	0~20A	0~24A	0~2400A	
Resolution	3mA	30mA	1.25mA	1mA	10mA	0.5mA	5mA	6mA	60mA	
Accuracy	0.1% +0.1%F.S.	0.1% +0.2%F.S.	0.1% +0.1%F.S.	0.1% +0.1%F.S.	0.1% +0.2%F.S.	0.1% +0.1%F.S.	0.1% +0.2%F.S.	0.1% +0.1%F.S.	0.1% +0.2%F.S.	
Constant Resistance Mode										
Range	12.5mΩ~50Ω (600W/16V) 0.625Ω~2.5kΩ (600W/80V)		0.3Ω~1.2kΩ (30W/16V) 15Ω~60kΩ (30W/80W)		0.0375Ω~150Ω (250W/16V) 1.875Ω~7.5kΩ (250W/80V)		0.625Ω~2.5kΩ (600W/125V) 25Ω~100kΩ (600W/500V)		6.25mΩ~25Ω (1200W/16V) 0.3125Ω~1.25kΩ (1200W/80V)	
Resolution	12 bits		12 bits		12 bits		12 bits		12 bits	
Accuracy	50Ω: 0.4Ω + 0.5% 2.5kΩ: 0.04Ω + 0.2%		1.2kΩ: 0.1Ω + 0.2% 60kΩ: 0.01Ω + 0.1%		150Ω: 0.1Ω + 0.2% 7.5kΩ: 0.01Ω + 0.1%		25kΩ: 50mΩ + 0.2% 100kΩ: 5mΩ + 0.1%		25Ω: 0.8Ω + 0.8% 1.25kΩ: 0.08Ω + 0.2%	
Constant Voltage Mode										
Range	1~80V		1~80V			2~500V		1~80V		
Resolution	20mV		20mV			125mV		20mV		
Accuracy	0.05% ± 0.1%F.S.		0.05% ± 0.1%F.S.			0.05% ± 0.1%F.S.		0.05% ± 0.1%F.S.		
Dynamic Mode										
Dynamic Mode	C.C. Mode		C.C. Mode			C.C. Mode		C.C. Mode		
T1 & T2	0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS		0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS			0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS		0.025mS~10mS/Res:1μS 1mS~30S/Res:1mS		
Accuracy	1uS/1mS+100ppm		1uS/1mS+100ppm			1uS/1mS+100ppm		1uS/1mS+100ppm		
Slew Rate	0.002~0.5A/μS	0.02~5A/μS	0.8~200mA/μS	0.64~160mA/μS	64~1600mA/μS	0.32~80mA/μS	3.2~800mA/μS	0.004~1A/μS	0.04~10A/μS	
Resolution	0.002A/μS	0.02A/μS	0.8mA/μS	0.64mA/μS	64mA/μS	0.32mA/μS	3.2mA/μS	0.004A/μS	0.04A/μS	
Min. Rise Time	10μs (typical)		10μs (typical)			24μs (typical)		10μs (typical)		
Current	0~12A	0~120A	0~5A	0~4A	0~40A	0~2A	0~20A	0~24A	0~240A	
Resolution	3mA	30mA	1.25mA	1mA	10mA	0.5mA	5mA	6mA	60mA	
Current Accuracy	0.4%F.S.		0.4%F.S.			0.4%F.S.		0.4%F.S.		
Measurement Section										
Voltage Read Back										
Range	0~16V	0~80V	0~16V	0~80V	0~16V	0~80V	0~125V	0~500V	0~16V	0~80V
Resolution	0.5mV	2.5mV	0.5mV	2.5mV	0.5mV	2.5mV	4mV	16mV	0.5mV	2.5mV
Accuracy	0.05% + 0.05%F.S.		0.05% + 0.05%F.S.			0.05% + 0.05%F.S.		0.05% + 0.05%F.S.		
Current Read Back										
Range	0~12A	0~120A	0~5A	0~4A	0~40A	0~12A	0~20A	0~24A	0~240A	
Resolution	0.375mA	3.75mA	0.15625mA	0.125mA	1.25mA	0.375mA	0.625mA	0.75mA	7.5mA	
Accuracy	0.1% + 0.1%F.S.		0.1% + 0.1%F.S.			0.1% + 0.1%F.S.		0.15% + 0.15%F.S.		
Protective Section										
Over Power Protection	≅62.4W	≅624W	≅31.2W	≅31.2W	≅260W	≅62.4W	≅624W	≅124.8W	≅1248W	
Over Current Protection	≅12.24A	≅122.4A	≅5.1A	≅4.08A	≅40.8A	≅2.04A	≅20.4A	≅24.48A	≅244.8A	
Over Temperature Protection	≅85°C		≅85°C			≅85°C		≅85°C		
Over Voltage Protection	≅81.6V		≅81.6V			≅510V		≅81.6V		
General										
Short Circuit										
Current	-	≅120A	-	-	≅40A	-	≅20A	-	≅240A	
Voltage (CV)	-	0V	-	-	0V	-	0V	-	0V	
Resistance (CR)	-	≅0.0125Ω	-	-	≅0.0375Ω	-	≅0.625Ω	-	≅0.00625Ω	
Input Resistance (Load Off)	100kΩ (Typical)		100kΩ (Typical)			100kΩ (Typical)		100kΩ (Typical)		
Temperature Coefficient	100PPM/°C (Typical)		100PPM/°C (Typical)			100PPM/°C (Typical)		100PPM/°C (Typical)		
Power	Supply from 6314 Mainframe		Supply from 6314 Mainframe			Supply from 6314 Mainframe		Supply from 6314 Mainframe		
Dimensions (WxHxD)	162 x 172 x 495 mm		81 x 172 x 495 mm			162 x 172 x 495 mm		324 x 172 x 495 mm		
Weight	8.4 Kg		4.2 Kg			8.4 Kg		16.8 Kg		
Operating Range	0~40°C		0~40°C			0~40°C		0~40°C		
EMC & Safety	CE		CE			CE		CE		

NOTE*1 : Low voltage operation, under one volt, is possible at correspondingly reduced current level.
 Operating temperature range is 0°C to 40°C. All specifications apply for 25°C±5°C, except as noted.
 All specifications are subject to change without notice.

ORDERING INFORMATION

6312: Mainframe for 2 Load Modules
 6314: Mainframe for 4 Load Modules
 63101: Load Module 40A/80V/200W
 63102: Load Module 20A/80V/100Wx2 channels
 63103: Load Module 60A/80V/300W

63105: Load Module 10A/500V/300W
 63106: Load Module 120A/80V/600W
 63107: Load Module 5A&40A/80V/30W&250W
 63108: Load Module 20A/500V/600W
 63112: Load Module 240A/80V/1200W

A630002: GPIB Interface for Model 6314, 6312
 A631001: Remote Controller
 A631002: Test Fixture
 A631004: Softpanel

Developed and Manufactured by :

CHROMA ATE INC.
 致茂電子股份有限公司

HEADQUARTERS
 66, Hwa-Ya 1st Rd., Hwa-Ya
 Technology Park, Kuei-Shan Hsiang,
 Taoyuan Hsien 33383, Taiwan
 Tel: +886-3-327-9999
 Fax: +886-3-327-8898
 http://www.chromaate.com
 E-mail: chroma@chroma.com.tw

U.S.A.
CHROMA ATE INC. (U.S.A.)
 7 Chrysler Irvine, CA 92618
 Tel: +1-949-421-0355
 Fax: +1-949-421-0353
 Toll Free: +1-800-478-2026

EUROPE
CHROMA ATE EUROPE B.V.
 Morsestraat 32,
 NL-6716 AH Ede,
 The Netherlands
 Tel: +31-318-648282
 Fax: +31-318-648288

CHINA
CHROMA ELECTRONICS (SHENZHEN) CO., LTD.
 8F, No.4, Nanyou Tian An
 Industrial Estate, Shenzhen,
 China PC: 518054
 Tel: +86-755-2664-4598
 Fax: +86-755-2641-9620

Distributed by:

Worldwide Distribution and Service Network
 6310-200706-PDF