Programmable
DC Electronic Load

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.

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 to1200W for high current and power application
- Synchronization with multiple loads
- GPIB/RS-232C Interface

Load Control :

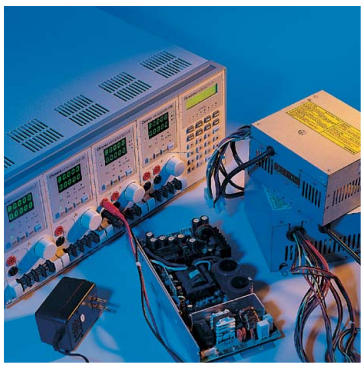
- Flexible CC, CR, CV operation modes
- Dynamic loading with speed up to 20KHz
- Fast response of 0.32 mA/μS - 10A/μS slew rate
- Minimum input resistance allowing load to sink high current at low voltage
- Real time power supply load transient response simulation and output measurement
- User programmable 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



Chroma

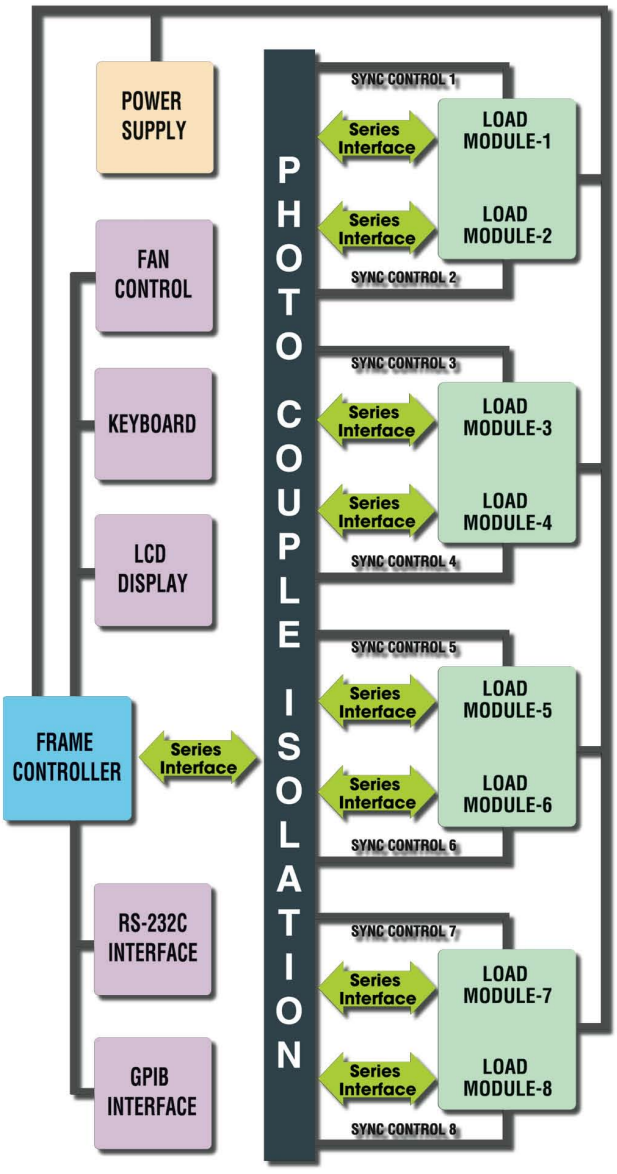
Total Satisfaction

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



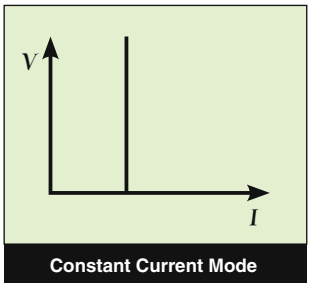
2. *Modular Load Design*

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.

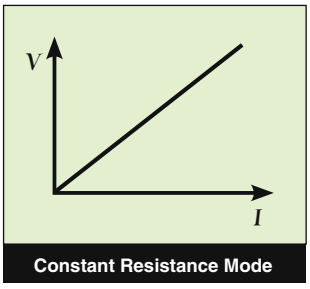
The 6310 family offers 8 types of load modules ranging from model 63101 with 200 watts power to model 63112 with 1200 watts power. Each model is designed with specific applications in mind. In the world, model 63102 and 63107 are the only dual-input load in one load module, capable of controlling loading 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*

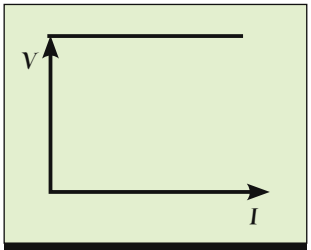
The 6310 load modules operate in constant current, constant resistance, or constant voltage to satisfy a wide range of test requirements. For example, the test of battery charger can be simulated easily by setting the load to operate in constant voltage mode.



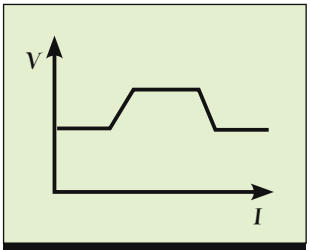
Constant Current Mode



Constant Resistance Mode



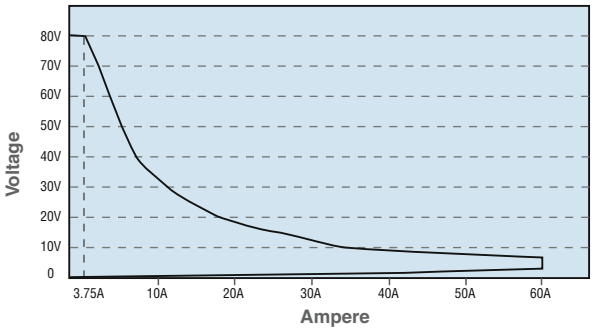
Constant Voltage Mode



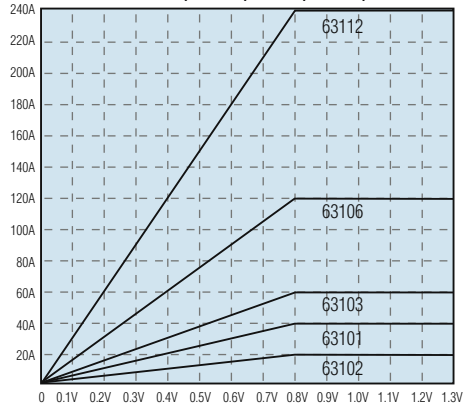
Programmable Slew Rate

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

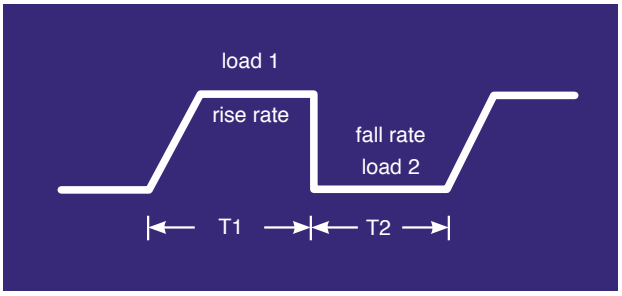


Note: All specifications are measured at load input terminals. (Ambient Temperature of +25°C)

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 :

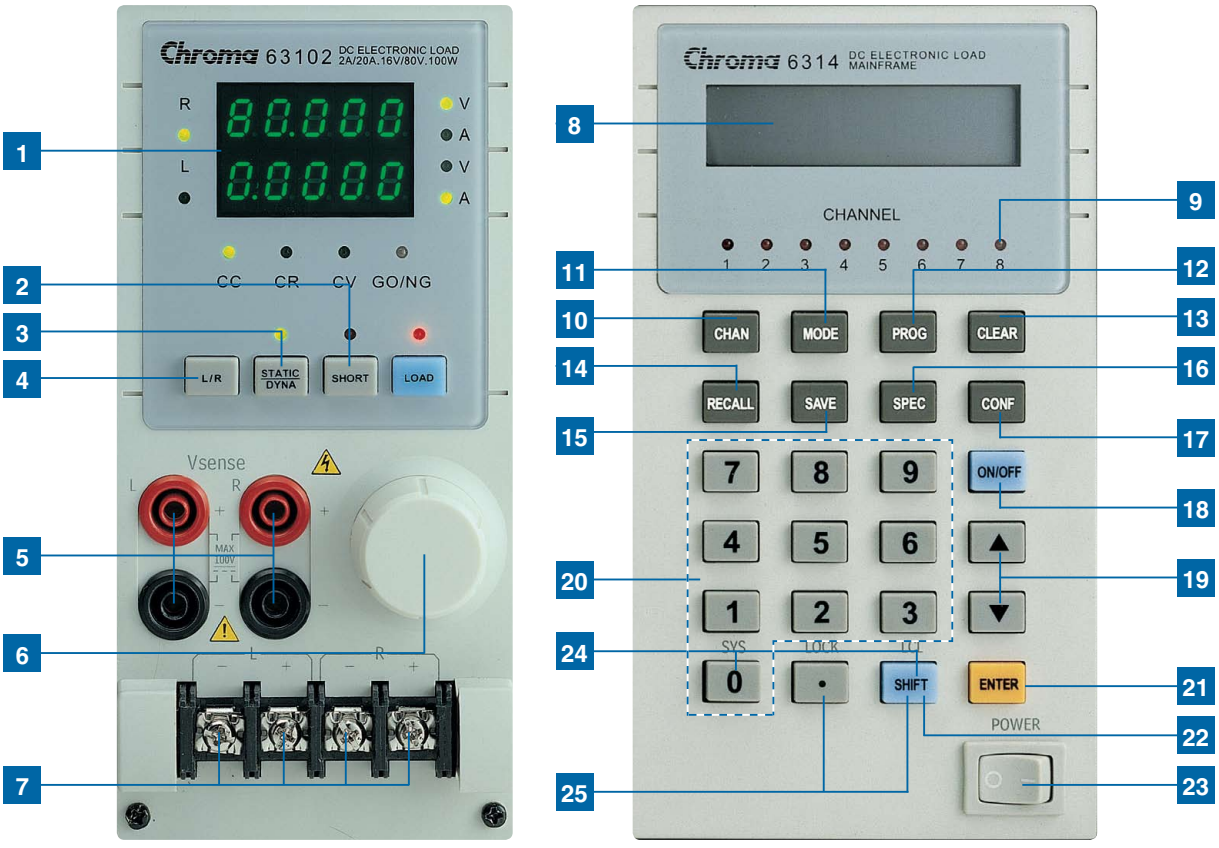


The programmable slew rate makes the simulation of transient load change demanded by the requirement of real life application possible. The 6310 internal waveform generator is capable of producing maximum slew rate at 10A/μS, and dynamic cycling up to 20KHz. Its dedicated remote load senses and controls 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**

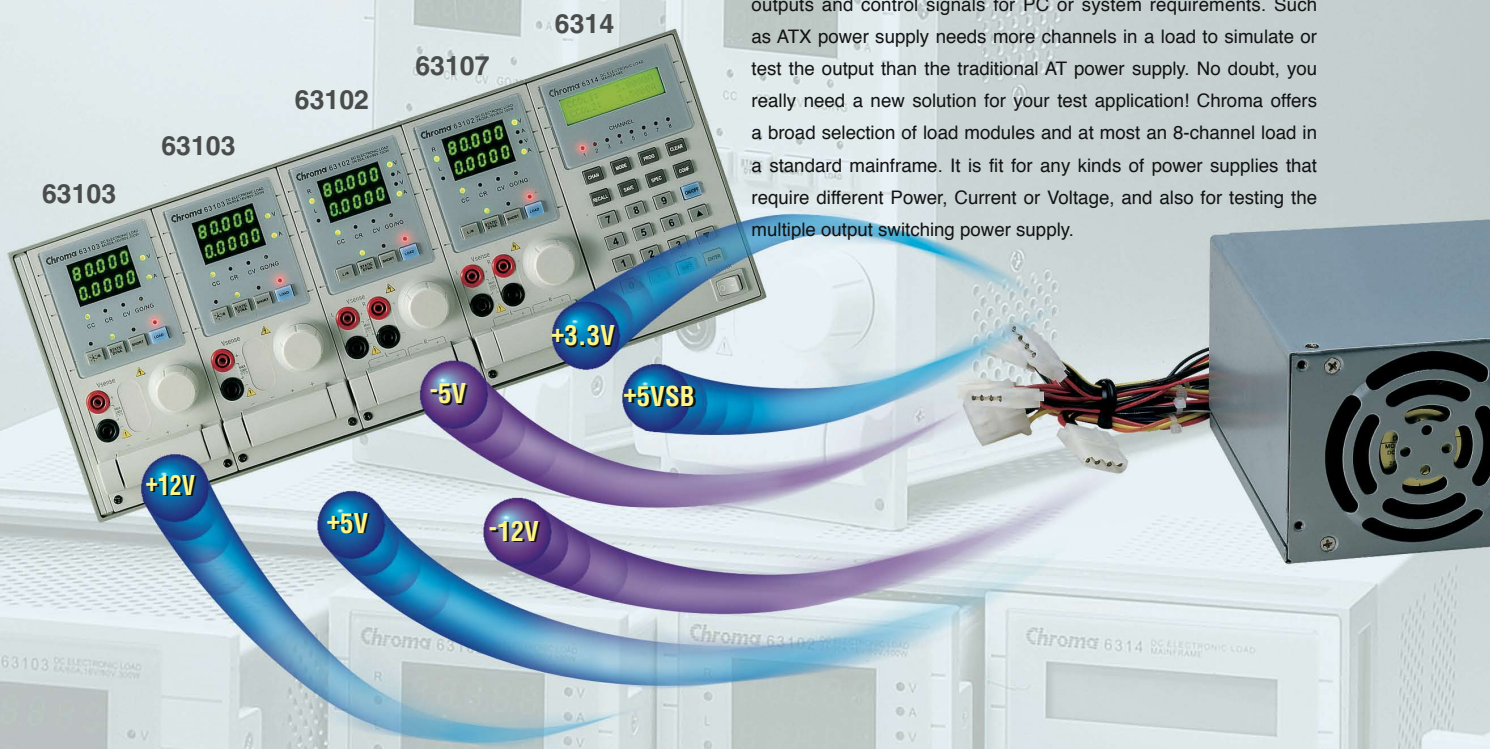
1 **LED indicator**
2 **SHORT key :** To apply a short circuit across the input
3 **STATIC / DYNA key :** To select static or dynamic test mode
4 **L / R key :** To select left or right channel of input load (63102, 63107)
A / B key : To select static A or B load (other models)
5 **V terminal :** To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

A MULTIPLE SELECTION FOR MULTIPLE OUTPUT SPS TEST APPLICATION

Product Lineup

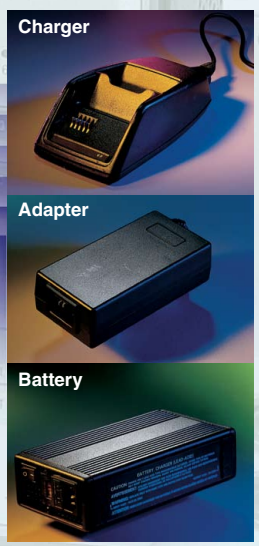
MODEL	Power	Operation Voltage	Current
63101	200W	1-80V	40A
63103	300W	1-80V	60A
63106	600W	1-80V	120A
63112	1200W	1-80V	240A
63102	100W X 2	1-80V	20A (Dual Channels)
63107	250W & 30W	1-80V	40A & 5A (Dual Channels)
63105	300W	2.5-500V	10A
63108	600W	2.5-500V	20A

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



Testing 8 Units in one instant time

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: 0.1℧ + 0.2% 7.5kΩ: 0.01℧ + 0.1%		300Ω: 0.1℧ + 0.2% 15kΩ: 0.01℧ + 0.1%		100Ω: 0.1℧+ 0.2% 5kΩ: 0.01℧+ 0.1%		5kΩ: 20m℧+ 0.2% 200kΩ:5m℧+ 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


6314 : 4 in 1 Mainframe


A630002 : GPIB Interface


6312 : 2 in 1 Mainframe


A631001: Remote Controller

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: 0.4℧ + 0.5% 2.5kΩ: 0.04℧ + 0.2%		1.2kΩ: 0.1℧ + 0.2% 60kΩ: 0.01℧ + 0.1%		150Ω: 0.1℧ + 0.2% 7.5kΩ: 0.01℧ + 0.1%	25kΩ: 50m℧+ 0.2% 100kΩ: 5m℧+ 0.1%		25Ω: 0.8℧+ 0.8% 1.25kΩ: 0.08℧+ 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 0ºC to 40ºC. All specifications apply for 25ºC±5ºC, 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

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