

PROGRAMMABLE DC ELECTRONIC LOAD MODEL 63600 SERIES

Chroma's 63600 series DC electronic loads are designed for testing multi-output AC/DC power supplies, DC/DC converters, chargers, batteries, server power supplies, and power electronic components. They are excellent for research, development, production, and incoming inspection applications.

The 63600's state of the art design uses DSP technology to simulate non-linear loads using a unique CZ operation mode allowing realistic loading behavior.

The 63600 series can draw its rated current under very low voltage (0.4V typical). This unique feature guarantees the best loading performance for modern Point-of-Load conditions and fuel cells.

The 63600 series can simulate a wide range of dynamic loading applications, with programmable load levels, slew rates, duration, and conducting voltage. The 63600 also has a dynamic sweep function to meet the test requirements of ATX power supplies. The instrument allows up to 100 sets of system operating status which can be stored in the EEPROM and recalled instantly for automated testing application.

Real time measurement of voltage and current are integrated into each 63600 load module using a 16-bit measurement circuit with three current ranges. The user can perform online voltage measurements and adjustments or simulate short circuit tests using the simple keypad on the front panel.

With the VFD display and rotary knob, the 63600 loads offer versatile front panel operation. Users are able to control the 63600 family remotely via Ethernet, USB, or GPIB interface.

Also included in the 63600 are self-diagnostic routines and full protections against OP, OC, OT and alarm indicating OV, reverse polarity. This ensures the quality and reliability of the 63600 and provides protection to units under test.

USB

Programmable DC Electronic Load

MODEL 63600 SERIES

Key Features :

- Max. power : 100W × 2(Dual), 300W & 400W
- Voltage range : up to 600V
- 5 module mainframe Max. 2000W, load modules up to 400W/ea
- Up to 10 channels in one mainframe, fit for testing multiple output SMPS
- 0.4V @ 80A (Typical) low voltage operating characteristics
- Flexible CC, CR, CV and CP operation modes
- CZ mode for turn on capacitive load simulation
- Parallel mode for high current and power application up to 2kW
- Multi channel synchronous control
- Auto frequency sweep up to 50kHz
- Real time power supply load transient response simulation and Vpk+/measurement
- User defined waveform
- Max. Power Point Tracking
- User programmable 100 sequential front panel input status for user-friendly operation
- Precision voltage and current measurement
- Precision high speed digitizing measurement/ data capture
- Voltage, current and P_{max} measurement for OCP/OLP testing
- Timing measurement for batteries
- Short circuit simulation
- Self-test at power-on
- Full protection : OC, OP, OT protection and OV alarm
- Ethernet, USB and GPIB interfaces



Chroma





Functionality DUT		0		-		Master					<u>()</u> .			OCP
Electric Vehicle Components														
Battery	*	*		*	*	*		*	*	*	*			
Charger		*		*					*	*	*			*
Generator		*			*	*		*	*	*				*
Wiper current simulation		*		*				*	*	*				*
DC to DC converter	*	*	*		*	*		*	*	*	*		*	*
Fuse		*		*		*		*	*	*	*			
Relay		*		*		*		*	*	*	*			
Connector		*		*		*		*	*	*	*			
Body control module (BCM)		*				*		*	*	*				
A/C controller		*		*				*	*	*				
Storage power														
Battery	*	÷		*	*	÷		÷	*	*	*			*
PV module	111	*		275	775	775		×15	*	*	775	*		775
Fuel cell	*	*		*	*	*		*	*	*	*	775		*
	202	212		<15 (15)	215	212		215	<15 (15)	415				×15
3C Products														
Adaptor		*	*	*	*				*	*	*		*	*
Power supply		*	*	*	*	*	*	*	*	*	*		*	*
Server power		*	*	*	*	*	*	*	*	*	*		*	*
Printer power		*	*	*	*	*		*	*	*	*		*	*
Charger		*		*		*		*	*	*	*		*	*
VRM/POL	*	*		*				*	*	*			*	*
UPS		*	*	*		*		*	*	*			*	*
Telecom power	*	*	*	*		*	*	*	*	*	*		*	*
DC to DC converter		*	*	*	*			*	*	*	*		*	*



Low Voltage Operating Characteristics 0.4V@80A (typical)



High Measurement Accuracy





Dynamic Loading and Control Up to 40 channels

Peak Current Test



(Programmable repetitive peak cycle)





Master / Slave Parallel Control

Constant Impedance Mode (CZ mode)



Timing Function

Maximum Power Point Tracking Function

Auto Sweep for Dynamic Loading Test

<u>OCP</u>

Over Current Protection Test

User Defined Waveform Function

Sine Wave Dynamic Function

VERSATILE SYSTEM CONFIGURATION

Chroma's 63600 Series Programmable Electronic Load integrates micro-processing capability into each load module to optimize the speed and control among multiple load modules. All load modules are configured to work independently, though testing can be carried out simultaneously at multiple outputs via remote control to simulate real life application.

MODULE LOAD DESIGN

The Chroma 63600 electronic load mainframe accepts the user-installable 63600 series load modules for easy system configuration. The model 63600-5 mainframe holds five 63610 load modules to offer up to 10 100W load input channels with standard front-panel inputs. The maximum power for a single mainframe is 2kW when five 63640-80-80 load modules are paralleled. This is suitable for testing multiple output switch mode power supplies, and many other types of power products. Using the GO/NG output port, production snapshots are made available to show the immediate pass/fail judgment of UUT. All modules on the mainframe share a common GPIB address to synchronize and speed up the control of the load modules and read back the operating data.



APPLICATION OF SPECIFIC LOAD SIMULATION

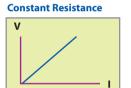
The 63600 series load modules operate in constant voltage, current, resistance, power, or impedance to satisfy a wide range of test requirements. For example, the CV is designed to simulate batteries for charger testing.

Constant Current



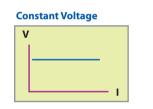
CC Applications:

- 1. Load/Cross regulation test for CV power supply
- 2. Battery discharge time test and life cycle test
- 3. Fuel cell testing
- 4. Loading pattern simulation for automotive wiper



CR Applications:

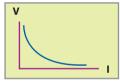
- 1. Test current limit point and slew rate for power supply
- 2. Soft start test for telecom power
- 3. Loading simulation for automotive temperature controller



CV Applications:

- 1. Charger test for mobile phone
- 2. Current limit test for fold back power supply
- 3. Fuel cell test.
 - 4. Current source test

Constant Power



CP Applications:

- 1. CP power test
- 2. Battery capacity test and capacity life cycle test
- 3. Pout vs Eff% curve test

PRECISE MEASUREMENTS

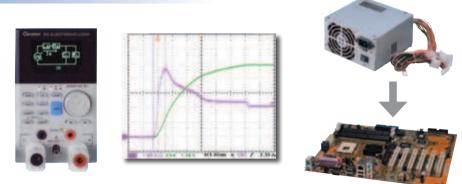
The 63600 series provides three operating current ranges and a built-in 16-bit, precision A/D converter, achieving 0.025%+0.01%F.S., 0.05%+0.05%F.S. and 0.1%+0.1%F.S. accuracy for voltage, current and power measurement respectively. Precise measurements like these are ideal for testing power efficiency and other critical parameters of the UUT's. The precise measurement of 63600 series also meets the requirements of ENERGY STAR® and 80 Plus.

Besides, The 63600 series can measure OCP/OLP trip voltage and current by setting the step, step current, dwell time and so on. Then 63600 series will judge the test result for Pass or Fail and shows the maximum power (Pmax) on the display after completed the OCP/OLP test.

Two high-speed A/D are built in the 63600 series to measure the voltage and current at the same time and calculate the true power value for displaying without distortion

CONSTANT IMPEDANCE MODE (CZ MODE)

The unique CZ mode designed in 63600 series can improve the loading behavior of CC & CP mode and makes the simulated loading current more realistic.



PROGRAM SEQUENCES

The 63600 series offers 100 programmable loading sequences that enable the user to simulate various real world conditions. In addition, each module can be operated independently or synchronized so that all modules start operating at the same time while running independent programs. Below are some examples of the most popular program sequences available.



Simulations of all kinds of real current waveforms for battery discharge testing and other applications are possible. (Notebook, Electric car and Electric bike) (Single output channel for UUT)

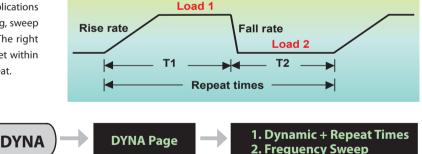
Current Delay

Peak power cycle test for printer power (Three output channel for UUT)

DYNAMIC LOADING AND CONTROL

Modern electronic devices operate at very high speed and demand rapid transient response characteristics. To address these applications the 63600 offers high speed, programmable dynamic loading, sweep simulation and control capability never before achieved. The right figure shows the programmable parameters which can be set within the 63600 loads: Waveforms can be single shot or set to repeat.

The dynamic mode provides a unique simulation capability allowing users to set the number of times each cycle repeats from 1~65,535. Feature is excellent for determining the peak current which can be sustained by converters.



The 63600 also offers a unique dynamic frequency sweep with variable frequencies up to 50kHz. This capability is ideal for determining worst case voltage peaks (see Figure 1). Measurement of the Vpeak (+/-) can be achieved by this function with a sampling rate of 500 kHz (Figure 2). The dynamic loading mode can simulate different loading conditions for most test requirements. Dedicated remote load sensors and control circuits guarantee minimum waveform distortion during dynamic loading.



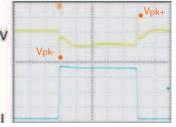
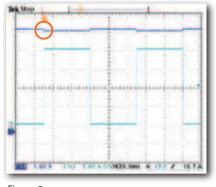


Figure 2 : Measurement of Vpeak

Figure 1 : Sweep Waveform

According to Intel's Design Guide for ATX 12V Power Supplies, measurement of output transient response requires simultaneous load steps when testing the power supply's +12VDC, +5VDC and +3VDC outputs (all steps must occur at the same time). The 63600 provides a dynamic synchronous function that can be used to perform this test on up to 10 outputs within each mainframe. The total dynamic synchronous channels can up to 40 when using 4 mainframes providing higher flexible and increased utility.

In addition to the dynamic loading function the 63600 provides Master/Slave (parallel) operation of individual loads. This capability provides for up to 2,000W per mainframe. Figure 3 shows the parallel synchronous dynamic loading and Figure 4 shows the parallel non-synchronous dynamic loading of previous designs. As show, the Vpeak value is significantly reduced and incorrect when using non-synchronous loading.





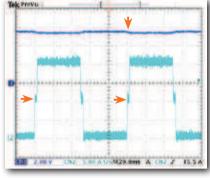
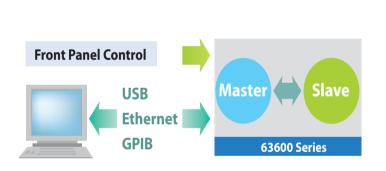


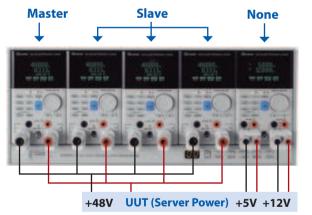
Figure 4 : Parallel non-synchronous dynamic loading

MASTER / SLAVE PARALLEL CONTROL

When the need is for increased power, paralleling two or more loads can be done to achieve the desired load current. The 63600 provides the user with smart Master/Slave mode controls which enables the user to program the load currents of the Master and have them automatically calculated and downloaded to the slave modules. Using several loads in parallel to emulate a single load dramatically simplifies operation and allows the 63600 to be used for both multiple output power supplies and larger single output supplies. The 63600 can controlled and reconfigured with USB, Ethernet, and GPIB interfaces for automated testing applications.



Application for High Power



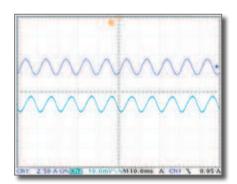
SINE WAVE DYNAMIC FUNCTION

The 63600 has a unique sine wave loading function which allows setting of a current bias (I_DC), a loading sine wave (I_AC) and sine wave frequency without the need for an external function generator. As see in the figure right, CH1 is the actual load current and CH2 is the voltage waveform of the UUT. This function can be used in D2D/ATX Power supplies for sine wave dynamic testing.

DIGITIZING FUNCTION

The 63600 offers a digitizing function that makes the load very convenient for recording transients in both voltage and current waveforms. The following are the specifications of setting parameters :

Sampling Time : 2µs to 40ms / R : 2µs (Setting the interval of sampling time) Sampling Point : 1 to 4096 (Setting the total sampling points)



USER DEFINED WAVEFORM

In addition to common constant current, constant voltage, constant power and constant resistance modes of conventional loads, the 63600 accepts digital data from DAQ cards or analog data from function generators to allow for complex waveforms to be created as depicted below. The 63600 also provides an enhanced feature, User Defined Waveform (UDW), to simulate the actual current profiles and waveforms.



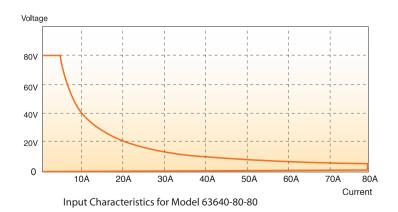
To reconstruct the actual current waveform, one can simply upload the captured waveform data into any module via a Chroma softpanel. Each module is capable of storing up to 10 sets of waveforms with each comprising up to 1.2 millions data points to meet the more strenuous test requirements.

In addition, 63600 series also provides voltage peak measurements during actual loading conditions. Avoiding the need for using an oscilloscope to capture the voltage peak, saving time and costs.

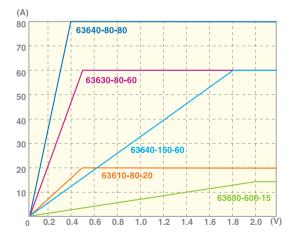


LOW VOLTAGE OPERATION

Each 63600 load module contains 3 load current ranges with a minimum full current operating voltage of 0.5V for each range. At the minimum voltage (0.4V), the 63640-80-80 load can draw maximum current defined by the current range. Based on this design, the 63600 is well suited for testing DC/DC converters, fuel cells, and other low voltage - high current devices. Low voltage operation is possible towards zero volts with corresponding reduced current levels (see de-rating curves).



Low Voltage & V-I Curve Operating Characteristics (Typical of 63600 Series)



Note: All specifications are measured at load input terminals. (Ambient temperature of 25 $^\circ$ C)

TIMING FUNCTION

The 63600 loads include a unique timing & measurement function allowing precise time measurements in the range of 2ms to 100,000s. This feature allows users to set the final voltage & timeout values for battery discharge testing and other similar applications.

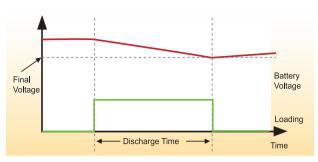
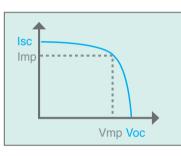


Figure 5 : Battery Discharge Testing

MPPT FUNCTION

The 63600 series loads also include built-in Maximum Power Point Tracking function which is used for solar panel test. Just connect the solar panel to the 63600 loads, the loads will track the maximum power point of solar panel using a high speed built-in algorithm. The 63600 can also calculate the consumption of energy automatically.

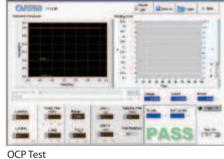




SOFT PANEL

The 63600 loads can be operated from the front panel controls or from available softpanels. This user friendly software includes all functions of 63600s and is easy to understand and operate. The 63600 can be controlled via GPIB, USB and Ethernet interfaces for remote control and automated testing applications.







User Defined Waveform

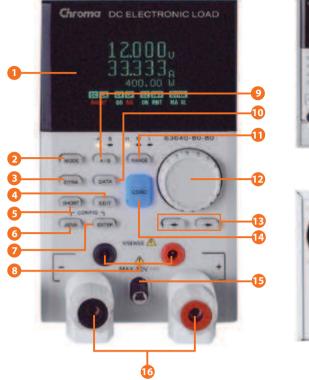


Battery Discharge Test

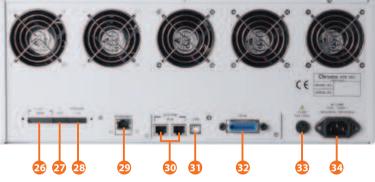
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Charger Test

PANEL DESCRIPTION







- 1. LCD Display: Used for setting and measurements
- 2. MODE key: Used to select the operating mode : CC, CR, CV, CP or CZ
- 3. DYNA key: To select dynamic test mode
- 4. EDIT key: Used for setting and editing
- 5. SHORT key: Used to apply a short circuit across the input
- 6. ADVA key: Used to select the other testing functions
- 7. Enter key: Used for confirming data entry
- 8. Voltage sense terminal
- A/B key: Used to select static A or B load (63630, 63640)
 L/R key: Used to select left or right channel of input load (63610)
- 10. DATA key: Used to select the other parameters
- 11. RANGE key: Used to select HIGH, MIDDLE or LOW loading range
- 12. Rotary knob: Used to adjust loading and parameter setting
- 13. Cursor key: Used for setting and editing
- 14. LOAD key: Used to enable or disable the load input
- 15. Module lock: Used to remove the module
- 16. Load terminal
- 17. Power switch

- 18. LED display: Used to display the memory address
- 19. Up / Down key: Used to select the next or previous memory address
- 20. SPEC key: Used to setup High/Low limits for GO/NG test
- 21. LOCK key: Used to lock the setting data
- 22. SAVE key: Used to save the front panel input status into memory
- 23. RECALL key: Used to recall the front panel input status from memory
- 24. LOCAL key: Used to recover local control
- 25. Shortcut key: Used to save loading profile for all channels
- 26. Voltage & Current monitor output: Analog output to proportional to

the voltage and current waveform

- 27. V EXT: Input for external wave in control
- 28. System I/O: Used for system input/output control signals
- 29. Ethernet connector
- 30. System Bus: Used for master/slave control system data communication
- 31. USB connector
- 32. GPIB connector
- 33. AC input fuse
- 34. AC Input connector

CardigurstinionImage: Image: Ima	SPECIFICATIONS-1								
whole Image Image <t< th=""><th>Model</th><th></th><th>63610-80-20</th><th></th><th colspan="5">63630-80-60</th></t<>	Model		63610-80-20		63630-80-60				
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Prover *2 State Mode0~100W0~300W0~600W0~600W0~600W0~600WUyscal Min Operating Obloge DD0.5Vig0.2A	Voltage *1 *8		0~80V						
Static Mode D. SVe0.2A D. SVe2A Resolution <	Current	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A		
Dynall Mino Operating Marge ICO D.SV@2A D.SV@2A D.SV@2A D.SV@6A D.SV@6A D.SV@6A Constant Current Mode Range 0-12A 0-2A 0-2A 0-2A 0-00A 0-0A 0-6A 0-6A Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA	Power *2	0~16W	0~30W	0~100W	0~30W	0~60W	0~300W		
withoge (DC) 0.5VIEAA	Static Mode								
Constant Current Mode	Typical Min. Operating Voltage (DC)	0.5V@0.2A	0.5V@2A	0.5V@20A	0.5V@0.6A	0.5V@6A	0.5V@60A		
Bange 0-0.2A 0-2A 0-2BA		<u>, </u>	I		1 1	I			
Becolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Corusary 0.1%H-01%F.5 0.1%H-01%F.5 0.1%H-01%F.5 0.1%H-01%F.5 Brange CRL:0.04-80 0 (1000W/H0V) CRL:0.015-50 0 (3000W/H0V) CRL:0.015-50 0 (3000W/H0V) Resolution "9 0.2328m5 0.95964m5 0.95964m5 Corusary 10.000775 (807) 0.1%H-0.075 (607) 0.1%H-0.075 (607) 0.1%H-0.075 (607) Range 0.6-6V 0-16V 0-680V 0.1%H-0.075 (807) 0.1%H-0.075 (807) Range 0.6-6V 0-16V 0-680V 0.1%H-0.075 (807) 0.95%H-0.1%K-5 Range 0.6-6V 0-16V 0-680V 0.1%H-0.075 (807) 0.95%H-0.1%K-5 Constant Voltage Mode Range 0.5%H-0.01%K-1%K-5 0.05%H-0.1%K-5 0.05%H-0.1%K-5 0.05%H-0.1%K-5 Constant Voltage Mode 1.1%M 1.10W 0.10M-W 3.20MW 3.20MW Range 0.2W 0-10W 0-0W 0.2MW 3.20MW 3.20MW Range 0.24M 0.10M-1%K 1.00M-1%K		0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A		
Constant Resistance Mode CRL::0.015-3-DC (300W/16V) Range CRL::0.01-8-3DC (100W/8V) CRL::0.015-3DC (300W/16V) Resolution "9 0.3288m5 0.9964m5 Resolution "9 0.3288m5 0.9964m5 Constant Resolution "9 0.1%+0.03755 (8V) 0.1%+0.0355 (8V) Constant Notage Mode 0.1%+0.03755 (8V) 0.1%+0.0355 (8V) Range 06V 016V 060V 016V 080V Range 06V 016V 060V 016V 080V Range 02W 016W 010W 010W 010W 010W Constant Notage Mode Constant Notage Mode 0.3%+0.3%FS. 0.3%+0.3%FS. 0.3%+0.3%FS. Constant Notage 02W 010W 010W 3.2mW 3.2mW </td <td>Resolution</td> <td>0.01mA</td> <td>0.1mA</td> <td>1mA</td> <td>0.01mA</td> <td>0.1mA</td> <td>1mA</td>	Resolution	0.01mA	0.1mA	1mA	0.01mA	0.1mA	1mA		
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Bange CRM: 1.44–2.9k.0 (100W/16V) CRM: 1.54–3k.0 (120W/16V) CRM: 1.54–3k.0 (120W/16V) Besolution *9 0.3288m5 0.1%+0.0325 (BV) 0.1%+0.0325 (BV) Accuracy *3 0.1%+0.0375 (BV) 0.1%+0.035 (BV) 0.1%+0.035 (BV) Constant Voltage Mode Bange 06V 016V 080V 0.1%+0.035 (BV) 0.1%+0.035 (BV) Range 06V 0-16V 0.980V 0.01%+0.035 (BV) 0.05%+0.1%E Constant Power Mode Execuracy *0.05%+0.1%E/S 0.05%+0.1%E/S 0.05%+0.1%E/S 0.05%+0.1%E/S Range 0-20 0.05%+0.1%E/S 0.05%+0.1%E/S 0.05%+0.1%E/S 0.05%+0.1%E/S Constant Power Mode Execuracy 1.01M2 0.01M2 0.01M2 0.01M2 Constant Power Mode Execuracy 1.01M2 0.01M2 0.01M2 0.01M2 Constant Power Mode Execuracy 1.01M2 0.01M2 0.01M2 0.01M2 Range 0-2.20 0.01M2 0.01M2 0.01M2 0.01M2 0.01M2 Securacy *1 0.01M2/LS 0.1M2/	Constant Resistance Mod	de							
BeachLine "90.328em3ID0.1%+0.035 (6V) 0.1%+0.035 (6V) 0.1%+0.035 (6V) 0.1%+0.035 (6V) 0.1%+0.035 (6V) 0.1%+0.035 (6V) 0.1%+0.035 (6V)0.1%+0.035 (6V) 0.1%+0.035 (6V) 0.1%+0.035 (6V)Canstant Voltage Mode Range0-6V0-80V 	Range	CRM	l: 1.44~2.9kΩ (100W/1	6V)	CRM	Λ: 0.3~600Ω (300W/16	5V)		
0.1%+0.0755 (6V) 0.1%+0.015 (16V) 0.1%+0.015 (16V) 0.1%+0.016 (16V) 0.1%+0.016 (16V) 0.1%+0.016 (16V) 0.1%+0.016 (16V) 0.1%+0.016 (16V) 0.1%+0.016 (16V) 0.1%+0.016 (16V) 0.0%+0.01%+5. Constant Voltage 0.02/Lip 0.0%+0.1%+5. 0.0%+0.1%+5. 0.0%+0.1%+5. Disposition 0.01mA/µs 1.5V 0.5%+0.1%+5. 0.2%+0.1%+5. Disposition 0.01mA/µs 1.5V 1.5V 0.0%+0.1%+5. Disposition 0.01mA/µs 1.5V 1.5V 0.1%+0.01%+5. Disposition 0.01mA/µs 0.1mA/µs 1mA/µs 0.1mA/µs 1.0M+µs Besolution 0.01mA/µs 0.1mA/µs 1.0M+µs 0.1mA/µs 1.0M+µs Besolution 0.01mA/µs 0.1mA/µs 1.0M+µs 0.1mA/µs 1.0M+µs Besolution 0.01mA 0.1mA 0.1mA 0.1mA 1.0M Current Meddel20H12: CC Come 0.05%+5. 0.05%+5. 0.05%+5. Brange <td>Resolution *9</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>.,</td>	Resolution *9						.,		
Range Resolution0-6V0-6V0-10V0-80V0-6V0-80VResolution0.1mV1mV0.1mV0.1mV1mV1mVAccuracy0-2W0-10W0-10W0-6W0-30W0-30W0-30WResolution *91mV0.10mV0-10W0-6W0-30W32mW<	Accuracy *3		0.1%+0.075S (6V) 0.1%+0.01S (16V)			0.1%+0.25 (6V) 0.1%+0.035 (16V)			
Range Resolution0-6V0-6V0-10V0-80V0-6V0-80VResolution0.1mV1mV0.1mV0.1mV1mV1mVAccuracy0-2W0-10W0-10W0-6W0-30W0-30W0-30WResolution *91mV0.10mV0-10W0-6W0-30W32mW<	Constant Voltage Mode								
Accuracy 0.05%+0.1%F.S. 0.05%+0.1%F.S. Constant Power Mode 0.05%+0.1%F.S. 0.05%+0.1%F.S. Range 0-2W 0-10W 0-10W 0-6W 0-30W 0-30W Resolution "9 1mW 10mW 100mW 32mW 32mW 32mW Recuracy "4 0.3%+0.3%F.S. 0.3%+0.3%F.S. 0.3%+0.3%F.S. 0.3%+0.3%F.S. Min. Operating Voltage 1.5V 1.5V 1.5V Frequency 100H2-50kHz/0.01Hz-1kHz 100Hz-50kHz/0.01Hz-1kHz 100Hz-50kHz/0.01Hz-1kHz Duty 1.99% (Min. Rise Time Dominated) 1.99% (Min. Rise Time Dominated) 1.97% (Min. Rise Time Dominated) Accuracy 0.01mA/µs 0.1mA/µs 0.1mA/µs 0.1mA/µs 10mA/µs Sew Nate 0.044/ms-0.204µs 1.44/ms-0.24µs 0.01mA/µs 10mA/µs 10mA/µs Gravent 10%2.0µs 10% 1.20ms-66.4µs 100 µs Current 8 0.1mA/µs 0.1mA/µs 0.1mA/µs 0.1mA/µs Range 0-0.2A 0-2A 0-20A 0-6A<	Range	0~6V	0~16V	0~80V	0~6V	0~16V	0~80V		
Constant Power Mode	Resolution	0.1mV	1mV	1mV	0.1mV	1mV	1mV		
Range 0-20W 0-10W 0-100W 0-6W 0-30W 0-30W Resolution *9 1mW 10mW 100mW 3.2mW 3.2mW 32mW 32mW </td <td>Accuracy</td> <td>ĺ</td> <td>0.05%+0.1%F.S.</td> <td></td> <td colspan="4">0.05%+0.1%F.S.</td>	Accuracy	ĺ	0.05%+0.1%F.S.		0.05%+0.1%F.S.				
Resolution *9 1mW 10mW 100mW 3.2mW 32mW 320mW Accuracy *4 0.3%+0.3%F.5. 0.3%+0.3%F.5. 0.3%+0.3%F.5. 0.3%+0.3%F.5. Prequency 100Hz-50KHz/0.01Hz-1kHz 100Hz-50KHz/0.01Hz-1kHz 100Hz-50KHz/0.01Hz-1kHz 100Hz-50KHz/0.01Hz-1kHz Duty 1-99% (Min. Rise Time Dominated) 1-99% (Min. Rise Time Dominated) 12.4/ms-6.64/µs 12.4/ms-6.64/µs Sew Rate 0.04A/ms-0.02A/µs 0.4A/ms-0.22A/µs 0.01mA/µs 0.1mA/µs 1mA/µs Resolution 0.01mA/µs 0.1mA/µs 1mA/µs 0.1mA/µs 1mA/µs Resolution 0.01mA/µs 0.1mA/µs 1mA/µs 0.1mA/µs 1mA/µs Current 10 µs 10 µs 10 µs 10 µs 10 µs 10 µs Current 10 µs 0.1mA 1mA 0.01mA 0.1mA 1mA Resolution 0.01mA 0.1mA 1mA 0.01mA 0.46A 0-60A Level 0-0.2A 0-2A 0-20A 0-6A 0-60A 0.40 <tr< td=""><td>Constant Power Mode</td><td></td><td></td><td></td><td></td><td></td><td></td></tr<>	Constant Power Mode								
Besolution *9 1mW 10mW 100mW 3.2mW 32mW 32mW Accuracy *4 0.3%+0.3%F.5. 0.3%+0.3%F.5. 0.3%+0.3%F.5. Dynamic Mode - CC 1.5V 1.5V Frequency Prequency 100Hz-50KHz/0.01Hz-1kHz 101Hz-1KHz 101Hz-1KHz 101Hz-1KHz Duty 0.4A/ms-0.02A/µs 0.4A/ms-0.02A/µs 0.4A/ms-0.02A/µs 12A/ms-6A/µs 12A/ms-6A/µs Sew Ate 0.04A/ms-0.02A/µs 0.4A/ms-0.2A/µs 0.1mA/µs 0.1mA/µs 1mA/µs Resolution 0.01mA/µs 0.1mA/µs 1mA/µs 0.01mA/µs 1mA/µs Resolution 0.01mA/µs 0.1mA/µs 0.1mA/µs 1mA/µs Resolution 0.01mA 0.1mA 1mA 0.01mA 1mA/µs Resolution 0.01mA 0.1mA 1mA 0.01mA 0.mA 1mA/µs Ku Wave Mode/20KH2:CC C V 0.02M 0-6A 0-60A 0-60A Resolution 0.01mA 0.1mA 1mA 0.01mA 1mA/µs 0.01mA	Range	0~2W	0~10W	0~100W	0~6W	0~30W	0~300W		
Opmanic Mode - CC I.5V I.5V Min. Operating Voltage 1.5V 100Hz-50kHz/0.01Hz-1kHz 100Hz-50kHz/0.01Hz-1kHz Duty 1-99% (Min. Rise Time Dominated) 1-99% (Min. Rise Time Dominated) 1-99% (Min. Rise Time Dominated) 12A/ms-0.6A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs 1mA/µs 1mA/µs 0.mA/µs 0.mA/µs 1mA/µs 0.mA/µs 0.mA/µs 1mA/µs 0.mA/µs 0.mA/µs 1mA/µs 0.mA/µs 1mA/µs 1mA/µs 0.mA/µs 1mA/µs 1mA/µs 0.mA/µs 1mA/µs 1mA/µs 0.mA/µs 1mA/µs 1mA/µs 1mA/µs 0.mA/µs 1mA/µs	Resolution *9	1mW	10mW	100mW	3.2mW	32mW	320mW		
Min. Operating Voltage I	Accuracy *4	0.3%+0.3%F.S							
Min. Operating Voltage I					·				
Frequency 100Hz-50kHz/0.01Hz-1kHz 100Hz-50kHz/0.01Hz-1kHz 100Hz-50kHz/0.01Hz-1kHz Duty 1-99% (Min. Rise Time Dominated) 1-99% (Min. Rise Time Dominated) 1-99% (Min. Rise Time Dominated) Accuracy 0.04A/ms-0.02A/µs 0.4A/ms-0.2A/µs 0.12A/ms-0.06A/µs 12A/ms-0.6A/µs 12A/ms-0.6A/µs Resolution 0.01mA/µs 0.1mA/µs 1mA/µs 0.01mA/µs 0.1mA/µs 10% ± 2µs Kcuracy 10% ± 2µs Range 0-0.2A 0-2A 0-20A 0-0.6A 0-6A 0-60A Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Ktw WaveMode(20kHz) : CC C C C C C C Range 0-64V 0-2A 0-20A 0-0.6A 0-6A 0 0.01W Resolution 0.1059mV 0.2849mV 1.3337mV 0.0169mV 0.2849mV			1.5V			1.5V			
Duty1~99% (Min. Rise Time Dominated)1~99% (Min. Rise Time Dominated)AccuracyIss/Ims+100ppm1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/1/		100)Hz~50kHz/0.01Hz~1k	Hz	100	Hz~50kHz/0.01Hz~1k	Hz		
Accuracy 1µs/1ms+100ppm 1µs/1ms+100ppm Slew Rate 0.04A/ms-0.02A/µs 0.4A/ms-0.2A/µs 0.12A/ms-0.06A/µs 1.2A/ms-0.6A/µs Slew Rate 0.01mA/µs 0.1mA/µs 0.1mA/µs 0.1mA/µs 1mA/µs Accuracy 0.01mA/µs 10% ± 20µs 10% ± 20µs 10% ± 20µs 10% ± 20µs Min. Rise Time 10µs 0.01mA/µs 10% ± 20µs 10µs Current 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA/µs Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA KW We Mode(20kHz) : CC C C 0		1~99%	(Min. Rise Time Domi	nated)	1~99%	(Min. Rise Time Domi	nated)		
Slew Rate 0.04A/ms~0.02A/µs 0.4A/ms~0.2A/µs 1.2A/ms~0.6A/µs 1.2A/ms~0.6A/µs 1.2A/ms~0.6A/µs Resolution 0.01mA/µs 0.1mA/µs 0.01mA/µs 0.1mA/µs 0.1mA/µs 1mA/µs Accuracy 10% ± 20µs 0.01mA/µs 0.1mA/µs 1mA/µs 0.01mA/µs 1mA/µs Min. Rise Time 10 µs 10 µs 10 µs 10 µs 10 µs Current 10 µs 0.001MA 0.1mA 1mA 0.01mA 0.0-6A 0~60A Range 0~0.02A 0~2A 0~20A 0~0.6A 0.6A 0~60A Range 0~0.02A 0~2A 0~20A 0~0.6A 0.6A 0~60A Level 0~10A 0.1mA 1mA 0.01mA 0.1mA 1mA Range 0~0.02A 0~2A 0~20A 0~0.6A 0.6A 0~60A Level 0~10F 0.5%F.S 0.5%F.S 0.5%F.S 0.5%F.S 0.5%F.S 0.025%F.S 0.025%F.S 0.025%F.S 0.025%F.S 0.025%F.S 0.025%F	· · ·		•		1µs/1ms+100ppm				
Resolution 0.01mA/µs 0.1mA/µs 1mA/µs 0.01mA/µs 0.1mA/µs 1mA/µs Accuracy 10% \pm 20µs 10% \pm 20µs 10% \pm 20µs 10% \pm 20µs Min. Rise Time 10 µs 10 µs 10 µs 10 µs Current 0 ~0.02A 0 ~2A 0 ~20A 0 ~6.6A 0 ~6A 0 ~60A Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Resolution 0.01mA 0.1mA 0.1mA 1mA 0.01mA 1mA Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Resolution 0.01mA 0.1mA 1mA 0.01mA 1mA 0.01mA 1mA Range 0 ~0.2A 0 ~2A 0 ~20A 0 ~6.6A 0 ~66A 0 ~60A 0 6.026K 0.66A 0 ~60A 0.66A 0.66A 0.66A 0.66A 0.025%+0.01%F.S 0.025%+S. 0.01%+ 0.025%+S. 0.01%+ 0.025%+S. 0.01%+ 0.025%+S. 0.01%+<		0.04A/ms~0.02A/us		4A/ms~2A/us	0.12A/ms~0.06A/us		12A/ms~6A/us		
Accuracy 10% \pm 20µs 10% \pm 20µs Min. Rise Time 10 µs 10 µs Current 10 µs 10 µs Range 0~0.2.A 0~2.A 0~20A 0~0.6.A 0~-6.A 0~-60A Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Resolution 0.010A 0.1mA 1mA 0.01mA 0.1mA 1mA KWave Mode(20kHz): CC C 0~2.0.A 0~2.0.A 0~0.6.A 0~-6.A 0~-60A Level 0~0.0.2.M 0~2.0.A 0~2.0.A 0~0.6.A 0~-6.A 0~-60A Level 0.100V 0.5%F.S. 0.5%F.S. 0.5%F.S. 0.5%F.S. Measurement V 0.580V 0~6V 0~16V 0~80V Range 0~6V 0~16V 0~80V 0.66V 0~16F.S. 0.01%H Kcuracy *5 0.025%+0.01%F.S. 0.0169mV 0.2849mV 1.3537mV 0.025%+0.01%F.S. 0.01%HA Range 0~0.2A 0~2A	Resolution	· · ·		•		· · ·	•		
Min. Rise Time 10 µs 10 µs Current Range 0~0.2A 0~2A 0~20A 0~0.6A 0~6A 0~60A Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Ext Wave Mode(20kHz): CC 0~10V 0~0.6A 0~6A 0~60A Ext Wave Mode(20kHz): CC 0~10V 0~0.6A 0~6A 0~60A Evel 0~10V 0~20A 0~0.6A 0~10V 0~10V 0~10V Accuracy 0.5%F.S. 0.5%F.S. 0.5%F.S. 0.5%F.S. 0.5%F.S. Measurement Voltage Read Back 0.016H 0.0269MV 0.2849mV 1.3537mV 0.1069mV 0.2849mV 1.3537mV Accuracy *5 0.025%+0.01%F.S. 0.01%H 0.025%+S. 0.01%H 0.025%+S. 0.01%H 0.025%+S. Current Read Back 0.025%HS. 0.025%HA 0.025%HA 0.025%HA 0.025%HA 0.025%HA 0.025%HA 0.005%HA 0.005%H	Accuracy		· · · ·						
Current Norman Norma	Min. Rise Time		•			•			
Resolution 0.01mA 0.1mA 1mA 0.01mA 0.1mA 1mA Range 0~0.2A 0~2A 0~20A 0~0.6A 0~6A 0~60A Level 0~10V 0~10V 0~10V 0.10K 0.10K Accuracy 0.5%F.S. 0.5%F.S. 0.5%F.S. 0.5%F.S. Measurement V 0.1069mV 0.2849mV 1.3537mV 0.1069mV 0.2849mV 1.3537mV Voltage Read Back 8ange 0~6V 0~16V 0~80V 0~6V 0~16V 0~80V Accuracy *5 0.025%+0.01%F.S. 0.01%eh 0.025%+0.01%F.S. 0.01%eh 0.025%+0.01%F.S. 0.01%eh Accuracy *5 0.025%+0.01%F.S. 0.025%F.S. 0.025%H.0.01%F.S. 0.025%H.0.01%F.S. 0.025%H.0.01%F.S. 0.025%H.0.01%F.S. 0.025%H.0.01%F.S. 0.00942mA 0.101748mA 1.009678mA Accuracy *5 0~0.2A 0~2A 0~20A 0~6A 0~6AW 0~30W Accuracy *5 0.16W 0~30W 0~100W 0~30W 0.00942mA	Current		· · · ·		,				
Resolution0.0 mA0.1 mA1 mA0.0 1 mA0.1 mA1 mAExt Wave Mode(20kHz) : CCRange0~0.2 A0~2 A0~0.6 A0~6 A0~6 ALevel0~10V0~20A0~0.6 A0~6 A0~6 AAccuracy00.5 %F.S.0.5 %F.S.0.5 %F.S.MeasurementVoltage Read BackRange0~6 V0~16 V0~80 V0~6 V0~16 V0~80 VRange0.025 %+ 0.025 %F.S.0.01 %F.S.0.01 %F.S.0.01 %F.S.0.01 %F.S.0.01 %F.S.Accuracy *50.025 %+ 0.01 %F.S.0.01 %F.S.0.02 %F.S.0.02 %F.S.0.01 %F.S.0.01 %F.S.Current Read Back20~0.2 A0~2 A0~0.0 A0~6 A0~60 AResolution0.03 (34 9m A)0.34 62 8m A)0.3295 61 mA0.009 4m A1.00987 mAAccuracy *50~0.5 %+ 0.05 %F.S.0.5 %+ 0.5 %F.S.0.05 %+ 0.05 %+ 0.5 %+	Range	0~0.2A	0~2A	0~20A	0~0.6A	0~6A	0~60A		
Range0~0.2A0~2A0~20A0~0.6A0~6A0~60ALevel0~10V·0~10V·0~10V·0~10VAccuracy·································	Resolution	0.01mA	0.1mA	1mA	0.01mA	0.1mA	1mA		
Range0~0.2A0~2A0~20A0~0.6A0~6A0~60ALevel0~10V·0~10V·0~10V·0~10VAccuracy·································	Ext Wave Mode(20kHz) :	CC							
Level $0 - 10V$ $0 - 10V$ Accuracy $0.5\%F.S.$ $0.5\%F.S.$ Measurement Voltage Read Back $0 - 6V$ $0 - 16V$ $0 - 80V$ $0 - 6V$ $0 - 16V$ $0 - 80V$ Range $0 - 6V$ $0 - 16V$ $0 - 80V$ $0 - 6V$ $0 - 16V$ $0 - 80V$ Range $0 - 6V$ $0 - 16V$ $0 - 80V$ $0 - 6V$ $0 - 16V$ $0 - 80V$ Accuracy *5 $0.025\% + 0.01\% F.S.$ $0.01\% + \\0.025\% F.S.$ $0.01\% + \\0.025\% F.S.$ $0.01\% + \\0.025\% F.S.$ $0.01\% + \\0.025\% F.S.$ Current Read Back $0 - 2A$ $0 - 2A$ $0 - 0.6A$ $0 - 6A$ $0 - 60A$ Resolution $0.003349mA$ $0.034628mA$ $0.329561mA$ $0.009942mA$ $0.101748mA$ $1.009878mA$ Accuracy *5 $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.035\% F.S.$ Power Read Back Range $0 - 16W$ $0 - 30W$ $0 - 30W$ $0 - 60W$ $0 - 30W$ $0 - 60W$ $0 - 30W$ $0 - 60W$ $0 - 30W$ $0 - 60$			0~2A	0~20A	0~0.6A	0~6A	0~60A		
Accuracy 0.5%F.S. 0.5%F.S. Measurement Voltage Read Back Range 0~6V 0~16V 0~80V 0~6V 0~16V 0~80V Range 0~6V 0.1069mV 0.2849mV 1.3537mV 0.1069mV 0.2849mV 1.3537mV Accuracy *5 0.025%+0.01%F.S. 0.01%+ 0.025%F.S. 0.01%+ 0.025%F.S. 0.01%+ 0.025%F.S. 0.01%+ 0.025%F.S. Current Read Back 8 0.329561mA 0.009942mA 0.101748mA 1.009878mA Range 0~0.2A 0~2A 0~20A 0~00W 0~009942mA 0.101748mA 1.009878mA Accuracy *5 0.05%+0.05%F.S. 0.05%+0.05%F.S. 0.05%+0.05%F.S. 0.05%+0.05%F.S. Power Read Back 0~16W 0~10W 0~30W 0~00W 0~30W 0~60W 0~30W Range 0~16W 0~30W 0~100W 0~30W 0~60W 0~60W 0~30W Range 0~16W 0~30W 0~10W 0~60W 0~60W 0~60W 0~80V 0 0	Level		0~10V		'	0~10V			
Measurement Voltage Read Back Range $0 \sim 6V$ $0 \sim 16V$ $0 \sim 80V$ $0 \sim 6V$ $0 \sim 16V$ $0 \sim 80V$ Resolution $0.1069mV$ $0.2849mV$ $1.3537mV$ $0.1069mV$ $0.2849mV$ $1.3537mV$ Accuracy *5 $0.025\% + 0.01\% F.S.$ $0.01\% + 0.025\% F.S.$ $0.025\% + 0.01\% F.S.$ $0.01\% + 0.025\% F.S.$ Current Read Back 2 $0 \sim 2A$ $0 \sim 20A$ $0 \sim 0.6A$ $0 \sim 6A$ $0 \sim 60A$ Range $0 \sim 0.2A$ $0 \sim 2A$ $0 \sim 20A$ $0 \sim 0.6A$ $0 \sim -6A$ $0 \sim 60A$ Accuracy *5 $0 \sim 0.0349mA$ $0.034628mA$ $0.329561mA$ $0.009942mA$ $0.101748mA$ $1.009878mA$ Accuracy *5 $0 \sim 0.5\% + 0.05\% F.S.$ $0 \sim 0.5\% + 0.05\% + 0.5\% F.S.$ $0 \sim 0.5\% + 0.05\% + 0.5\% F.S.$ Power Read Back $3 = 0 \sim 16W$ $0 \sim -30W$ $0 \sim -30W$ $0 \sim -60W$ $0 \sim -30W$ Range $0 \sim 16W$ $0 \sim 30W$ $0 \sim 10W$ $0 \sim 30W$ $0 \sim -60W$ $0 \sim -30W$ Voltage Monitor Bandwidth <td></td> <td></td> <td>0.5%F.S.</td> <td></td> <td></td> <td>0.5%F.S.</td> <td></td>			0.5%F.S.			0.5%F.S.			
Voltage Read Back Range $0 \sim 6V$ $0 \sim 16V$ $0 \sim 80V$ $0 \sim 6V$ $0 \sim 16V$ $0 \sim 80V$ Resolution $0.1069mV$ $0.2849mV$ $1.3537mV$ $0.0169mV$ $0.2849mV$ $1.3537mV$ Accuracy *5 $0.025\% + 0.01\% F.S.$ $0.01\% + 0.025\% + 0.01\% F.S.$ $0.00349mA$ $0.034628mA$ $0.329561mA$ $0.009942mA$ $0.101748mA$ $1.009878mA$ Accuracy *5 $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.0\% M$ $0 \sim 30W$	Measurement								
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Accuracy *5 $0.025\%+0.1\%$ F.S. $0.01\%+\\0.025\%$ F.S. $0.025\%+0.1\%$ F.S. $0.01\%+\\0.025\%$ F.S. Current Read Back $0.025\%+0.01\%$ F.S. 0.025% F.S. 0.025% F.S. Range $0~0.2A$ $0~2A$ $0~20A$ $0~0.6A$ $0~6A$ $0~60A$ Resolution $0.003349mA$ $0.034628mA$ $0.329561mA$ $0.009942mA$ $0.101748mA$ $1.009878mA$ Accuracy *5 $0.05\%+0.05\%$ F.S. $0.005\%+0.05\%$ F.S. $0.05\%+0.05\%$ F.S. $0.05\%+0.05\%$ F.S. Power Read Back $ange$ $0~-16W$ $0~-30W$ $0~-60W$ $0~-30W$ Range $0~-16W$ $0~-30W$ $0~-60W$ $0~-30W$ $0~-60W$ $0~-30W$ Voltage Monitor Bandwidth 20 kHz 20 kHz 20 kHz 20 kHz Range $0~-6V$ $0~-16V$ $0~-80V$ $0~-6V$ $0~-16V$ $0~-80V$ Output $0~-6V$ $0~-16V$ $0~-80V$ $0~-6V$ $0~-16V$ $0~-80V$ Range $0~-6V$ $0~-16V$ $0~-50\%$ 0.5% F.S.	Range	0~6V	0~16V	0~80V	0~6V	0~16V	0~80V		
Range $0 \sim 0.2A$ $0 \sim 2A$ $0 \sim 20A$ $0 \sim 0.6A$ $0 \sim 6A$ $0 \sim 60A$ Resolution $0.003349mA$ $0.034628mA$ $0.329561mA$ $0.009942mA$ $0.101748mA$ $1.009878mA$ Accuracy *5 $0 \sim 05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ Power Read Back $0 \sim 16W$ $0 \sim 30W$ $0 \sim 30W$ $0 \sim 60W$ $0 \sim 300W$ Accuracy *5 $0 \sim 16W$ $0 \sim 30W$ $0 \sim 30W$ $0 \sim 60W$ $0 \sim 300W$ Accuracy *5 $0 \sim 16W$ $0 \sim 30W$ $0 \sim 0.05\% + 0.1\% F.S.$ $0.1\% + 0.1\% F.S.$ $0.1\% + 0.1\% F.S.$ Voltage Monitor $U = V = V = V = V = V = V = V = V = V = $	•								
Range $0 \sim 0.2A$ $0 \sim 2A$ $0 \sim 20A$ $0 \sim 0.6A$ $0 \sim 6A$ $0 \sim 60A$ Resolution $0.003349mA$ $0.034628mA$ $0.329561mA$ $0.009942mA$ $0.101748mA$ $1.009878mA$ Accuracy *5 $0 \sim 05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ $0.05\% + 0.05\% F.S.$ Power Read Back $0 \sim 16W$ $0 \sim 30W$ $0 \sim 30W$ $0 \sim 60W$ $0 \sim 300W$ Accuracy *5 $0 \sim 16W$ $0 \sim 30W$ $0 \sim 30W$ $0 \sim 60W$ $0 \sim 300W$ Accuracy *5 $0 \sim 16W$ $0 \sim 30W$ $0 \sim 0.05\% + 0.1\% F.S.$ $0.1\% + 0.1\% F.S.$ $0.1\% + 0.1\% F.S.$ Voltage Monitor $U = V = V = V = V = V = V = V = V = V = $	Resolution	0.1069mV	0.2849mV	1.3537mV 0.01%+	0.1069mV	0.2849mV	1.3537mV 0.01%+		
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Accuracy *5 $0.05\%+0.05\%$ F.S. $0.05\%+0.05\%$ F.S. Power Read Back 0%	Resolution Accuracy *5 Current Read Back	0.1069mV 0.025%+(0.2849mV 0.01%F.S.	1.3537mV 0.01%+ 0.025%F.S.	0.1069mV 0.025%+(0.2849mV 0.01%F.S.	1.3537mV 0.01%+ 0.025%F.S.		
Power Read Back Range 0~16W 0~30W 0~30W 0~30W 0~60W 0~300W Accuracy *5 0.1%+0.1%F.S. 0.1%+0.1%F.S. 0.1%+0.1%F.S. 0.1%+0.1%F.S. Voltage Monitor Bandwidth 20 kHz Bandwidth 20 kHz 20 kHz 20 kHz 0~80V 0~6V 0~16V 0~80V Output 0~6V 0~10V 0~80V 0~6V 0~16V 0~80V Output 0~6V 0~16V 0~80V 0~6V 0~16V 0~80V Current Monitor 20 kHz 0.5%F.S. 0.5%F.S. 0.5%F.S. 0.5%F.S. Bandwidth 20 kHz 20 kHz 20 kHz 20 kHz 20 kHz Bandwidth 20 kHz 20 kHz 20 kHz 20 kHz 20 kHz 20 kHz Bandwidth 0~0.2A 0~2A 0~20A 0~0.6A 0~6A 0~60A Output 0~10V 0~10V 0~10V 0~10V 0~10V 0~10V 0~10V	Resolution Accuracy *5 Current Read Back Range	0.1069mV 0.025%+(0~0.2A	0.2849mV 0.01%F.S. 0~2A	1.3537mV 0.01%+ 0.025%F.S. 0~20A	0.1069mV 0.025%+0 0~0.6A	0.2849mV 0.01%F.S. 0~6A	1.3537mV 0.01%+ 0.025%F.S. 0~60A		
Range 0~16W 0~30W 0~100W 0~30W 0~60W 0~300W Accuracy *5 0.1%+0.1%F.S. 0.1%+0.1%F.S. 0.1%+0.1%F.S. 0.1%+0.1%F.S. Voltage Monitor Bandwidth 20 kHz 20 kHz 20 kHz 0~60V 0~6V 0~80V 0~6V 0~80V 0~6V 0~80V 0~6V 0~80V 0~6V 0~80V 0~80V 0~10V 0~80V 0~6V 0~80V 0~80V 0~6V 0~80V 0~80V 0~6V 0~80V 0~80	Resolution Accuracy *5 Current Read Back Range Resolution	0.1069mV 0.025%+(0~0.2A	0.2849mV 0.01%F.S. 0~2A 0.034628mA	1.3537mV 0.01%+ 0.025%F.S. 0~20A	0.1069mV 0.025%+0 0~0.6A	0.2849mV 0.01%F.S. 0~6A 0.101748mA	1.3537mV 0.01%+ 0.025%F.S. 0~60A		
Accuracy *5 $0.1\%+0.1\%F.S.$ $0.1\%+0.1\%F.S.$ Voltage Monitor 20 kHz 20 kHz Bandwidth 20 kHz $0~6V$ $0~16V$ $0~80V$ Range $0~6V$ $0~16V$ $0~80V$ $0~6V$ $0~16V$ $0~80V$ Output $0~10V$ $0~10V$ $0~10V$ $0~10V$ $0~20V$	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5	0.1069mV 0.025%+(0~0.2A	0.2849mV 0.01%F.S. 0~2A 0.034628mA	1.3537mV 0.01%+ 0.025%F.S. 0~20A	0.1069mV 0.025%+0 0~0.6A	0.2849mV 0.01%F.S. 0~6A 0.101748mA	1.3537mV 0.01%+ 0.025%F.S. 0~60A		
Bandwidth 20 kHz 20 kHz Range 0~6V 0~16V 0~80V 0~6V 0~16V 0~80V Output 0~10V 0~10V 0~10V 0~10V 0~10V Accuracy 0.5%F.S. 0.5%F.S. 0.5%F.S. 0.5%F.S. Current Monitor 20 kHz 20 kHz 20 kHz 20 kHz 20 kHz 20 kHz 0~6A 0~60A 0~6	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back	0.1069mV 0.025%+(0~0.2A 0.003349mA	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S.	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA	0.1069mV 0.025%+0 0~0.6A 0.009942mA	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S.	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
Range 0~6V 0~16V 0~80V 0~6V 0~16V 0~80V Output 0~10V 0~10	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range	0.1069mV 0.025%+(0~0.2A 0.003349mA	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA	0.1069mV 0.025%+0 0~0.6A 0.009942mA	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
Range 0~6V 0~16V 0~80V 0~6V 0~16V 0~80V Output 0~10V 0~10	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5	0.1069mV 0.025%+(0~0.2A 0.003349mA	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA	0.1069mV 0.025%+0 0~0.6A 0.009942mA	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
Output 0~10V 0~10V Accuracy 0.5%F.S. 0.5%F.S. Current Monitor	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor	0.1069mV 0.025%+(0~0.2A 0.003349mA	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S.	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA	0.1069mV 0.025%+0 0~0.6A 0.009942mA	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S.	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
Accuracy 0.5%F.S. 0.5%F.S. Current Monitor Bandwidth 20 kHz 20 kHz Range 0~0.2A 0~2A 0~20A 0~0.6A 0~6A 0~60A Output 0~10V 0~10V 0~10V 0~10V 0~10V	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor Bandwidth	0.1069mV 0.025%+(0~0.2A 0.003349mA 0~16W	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S. 20 kHz	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA 0~100W	0.1069mV 0.025%+(0~0.6A 0.009942mA 0~30W	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S. 20 kHz	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA 0~300W		
Current Monitor Bandwidth 20 kHz 20 kHz Range 0~0.2A 0~2A 0~20A 0~0.6A 0~6A 0~60A Output 0~10V 0~10V 0~10V 0~10V 0~10V	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor Bandwidth Range	0.1069mV 0.025%+(0~0.2A 0.003349mA 0~16W	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S. 20 kHz 0~16V	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA 0~100W	0.1069mV 0.025%+(0~0.6A 0.009942mA 0~30W	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S. 20 kHz 0~16V	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
Bandwidth 20 kHz 20 kHz Range 0~0.2A 0~2A 0~20A 0~0.6A 0~6A 0~60A Output 0~10V 0~10V 0~10V 0~10V 0~10V	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor Bandwidth Range Output	0.1069mV 0.025%+(0~0.2A 0.003349mA 0~16W	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA 0~100W	0.1069mV 0.025%+(0~0.6A 0.009942mA 0~30W	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
Range 0~0.2A 0~2A 0~20A 0~0.6A 0~6A 0~60A Output 0~10V 0~	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor Bandwidth Range Output Accuracy	0.1069mV 0.025%+(0~0.2A 0.003349mA 0~16W	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA 0~100W	0.1069mV 0.025%+(0~0.6A 0.009942mA 0~30W	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
Output 0~10V 0~10V	Range Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor Bandwidth Range Output Accuracy Current Monitor Bandwidth	0.1069mV 0.025%+(0~0.2A 0.003349mA 0~16W	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V 0.5%F.S.	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA 0~100W	0.1069mV 0.025%+(0~0.6A 0.009942mA 0~30W	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S. 20 kHz 0~16V 0~16V 0~10V 0.5%F.S.	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA		
	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor Bandwidth Range Output Accuracy Current Monitor	0.1069mV 0.025%+(0~0.2A 0~0.003349mA 0~16W 0~16W	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V 0.5%F.S. 20 kHz	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA 0~100W	0.1069mV 0.025%+0 0~0.6A 0.009942mA 0~30W	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V 0.5%F.S. 20 kHz	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA 0~300W		
(1997) U.J. U.J.	Resolution Accuracy *5 Current Read Back Range Resolution Accuracy *5 Power Read Back Range Accuracy *5 Voltage Monitor Bandwidth Range Output Accuracy Current Monitor Bandwidth	0.1069mV 0.025%+(0~0.2A 0~0.003349mA 0~16W 0~16W	0.2849mV 0.01%F.S. 0~2A 0.034628mA 0.05%+0.05%F.S. 0~30W 0.1%+0.1%F.S. 20 kHz 0~16V 0~10V 0.5%F.S. 20 kHz 0~2A	1.3537mV 0.01%+ 0.025%F.S. 0~20A 0.329561mA 0~100W	0.1069mV 0.025%+0 0~0.6A 0.009942mA 0~30W	0.2849mV 0.01%F.S. 0~6A 0.101748mA 0.05%+0.05%F.S. 0~60W 0.1%+0.1%F.S. 20 kHz 0~10V 0.5%F.S. 20 kHz 0~6A	1.3537mV 0.01%+ 0.025%F.S. 0~60A 1.009878mA 0~300W		

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• Continued on next page →

SPECIFICATIONS-2

Model	63630-600-15				63640-80-80		63640-150-60			
Configuration	300W				400W			400W		
Voltage *1 *8	0~600V			0~80V				0~150V		
Current	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A 0~6A 0~60		0~60A	
Power *2	0~90W	0~300W	0~300W	0~60W	0~60W	0~400W	0~90W	0~400W	0~400W	
Static Mode										
Typical Min. Operating Voltage (DC)	2V@0.15A	2V@1.5A	2V@15A	0.4V@0.8A	0.4V@8A	0.4V@80A	0.3V@1A	0.3V@6A	0.9V@30A 1.8V@60A	
Constant Current Mo	de									
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A	
Resolution	0.005mA	0.05mA	0.5mA	0.01mA	0.1mA	1mA	0.02mA	0.1mA	1mA	
Accuracy		0.1%+0.1%F.S.			0.1%+0.1%F.S.		(0.04%+0.04%F.	5.	
Constant Resistance	Node									
Range	CRL : 0.133~270 Ω (300W/80V) CRM : 1.92~4k Ω (300W/150V) CRH : 208~200k Ω (300W/600V)			CRL : 0.01~20 Ω (400W/6V) CRM : 0.36~720 Ω (400W/16V) CRH : 1.45~2.9k Ω (400W/80V)			CRL: 0.03~60 Ω (400W/16V) CRM : 0.64~800 Ω (400W/80V) CRH : 6.25~1.5k Ω (400W/150V)			
Resolution *9		0.2435mS	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,		1.322mS	,	charro	1mS	,,	
Accuracy *3	0.2433m5 0.1%+0.025 (80V) 0.1%+0.00055 (150V) 0.1%+0.00035 (600V)			1.322ms 0.1%+0.275S (6V) 0.1%+0.036S (16V) 0.1%+0.01375S (80V)			0.1%+0.067S (16V) 0.1%+0.00625S (80V) 0.1%+0.002S (150V)			
Constant Voltage Mo	de									
Range	0~80V	0~150V	0~600V	0~6V	0~16V	0~80V	0~16V	0~80V	0~150V	
Resolution	1mV	10mV	10mV	0.1mV	1mV	1mV	1mV	1mV	10mV	
Accuracy		0.05%+0.1%F.S.			0.05%+0.1%F.S		0.	.025%+0.025%	.S.	
Constant Power Mod	e									
Range	0~6W	0~30W	0~300W	0~8W	0~40W	0~400W	0~8W	0~40W	0~400W	
Resolution *9	5.625mW	56.25mW	562.5mW	4mW	40mW	400mW	4mW	40mW	400mW	
Accuracy *4		0.3%+0.3%F.S.	^		0.3%+0.3%F.S.			0.3%+0.3%F.S.		
Dynamic Mode - CC										
Min. Operating		214						1.01/		
Voltage Frequency	3V 100Hz~50kHz/0.01Hz~1kHz		1.5V 100Hz~50kHz/0.01Hz~1kHz			1.8V 100Hz~50kHz/0.01Hz~1kHz				
Duty	1~99% (Min. Rise Time Dominated)				1~99% (Min. Rise Time Dominated)			1in. Rise Time D		
Accuracy	1µs/1ms+100ppm			1µs/1ms+100ppm			1µs/1ms+100ppm			
Accuracy	0.03A/ms	0.3A/ms	3A/ms	0.16A/ms	1.6A/ms	16A/ms	0.2A/ms	1.2A/ms	12A/ms	
Slew rate	~0.015A/µs	~0.15A/µs	~1.5A/µs	~0.08A/µs	~0.8A/µs	~8A/µs	~0.1A/µs	~0.6A/µs	~6A/µs	
Resolution	0.005mA/µs	0.05mA/µs	0.5mA/µs	0.01mA/µs	0.1mA/µs	1mA/μs	0.02mA/µs	0.1mA/µs	1mA/μs	
Accuracy	0.0051177 µ5	$10\% \pm 20\mu s$	0.51177 µ5	0.011170 µ3	$10\% \pm 20\mu s$	11177μ3	0.021177 μ5	$10\% \pm 20\mu s$	Πηγμο	
Min. Rise Time		10 μs			10 μs			10 μs		
Current		10 µ3		<u> </u>	10 µ3			10 µ3		
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A	
Resolution	0.005mA	0.05mA	0.5mA	0.01mA	0.1mA	1mA	0.02mA	0.1mA	1mA	
Ext Wave Mode(20kH		0.05111A	0.5IIIA	0.0111A	0.111A	IIIA	0.02111A	0.111A	IIIIA	
	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A	
Range Level	0~0.15A	0~1.3A 0~10V	0~13A	0~0.8A	0~8A 0~10V	0~00A	0~1A	0~0A 0~10V	0~00A	
Accuracy		0~10V 0.5%F.S.		0.5%F.S.				0~10V 0.5%F.S.		
Measurement		0.5%г.5.			0.5%F.5.			0.5%F.5.		
Voltage Read Back	0.001/	0.1501/	0.001/	0.61/	0.1614	0.001/	0.101	0.001/	0.1501/	
Range	0~80V	0~150V	0~600V	0~6V	0~16V	0~80V	0~16V 0.27mV	0~80V 1.3mV	0~150V	
Resolution Accuracy *5	1.4194mV 0.025%+	2.661mV 0.01%F.S.	10.645mV 0.01%+	0.1069mV 0.2849mV 1.3537mV 0.025%+0.01%F.S. 0.01%+		0.27mV 1.3mV 2.5mV 0.025%+0.01%F.S.				
Comment Des al De al			0.025%F.S.			0.025%F.S.				
Current Read Back	0.0154	0.154	0.154	0.004	0.04	0.004	0.14	0.64	0.004	
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A	
Resolution	0.00275mA	0.0266mA	0.255mA	0.013695mA	0.138766mA	1.31406mA	0.02mA	0.1mA	1mA	
Accuracy *5		0.05%+0.05%F.S			0.05%+0.05%F.S		(0.04%+0.04%F.	5.	
Power Read Back	0.0011	0.00011	0.00011	0 60111	0.0011	0.400144	0.011	0 10111	0 40014	
Range	0~90W	0~300W	0~300W	0~60W	0~60W	0~400W	0~8W	0~40W	0~400W	
Accuracy *5		0.1%+0.1%F.S.			0.1%+0.1%F.S.			0.1%+0.1%F.S.		
Voltage Monitor		0.0111								
Bandwidth		20 kHz	0.0000		20 kHz	0.001	0.45	20 kHz	0.1-01	
Range	0~80V	0~150V	0~600V	0~6V	0~16V	0~80V	0~16V	0~80V	0~150V	
Output	0~10V		0~10V			0~10V				
Accuracy		0.5%F.S.			0.5%F.S.			0.5%F.S.		
Current Monitor										
Bandwidth		20 kHz			20 kHz			20 kHz		
Range	0~0.15A	0~1.5A	0~15A	0~0.8A	0~8A	0~80A	0~1A	0~6A	0~60A	
O · · · ·		0~10V			0~10V			0~10V		
Output Accuracy					0.5%F.S.			0.5%F.S.		

GENERAL SPECIFICATION

Model	63610-80-20	63630-80-60	63630-600-15	63640-80-80	63640-150-60						
Program mode				·							
Sequence No.			100/Program								
Dwell / SEQ	0.1ms ~ 30s (Resolution : 0.1ms)										
Load Setting	Refer to Static mode specifications										
Spec Check	Voltage/Current/Power										
Protection											
Over Power		Yes									
Over Current	Yes										
Over Voltage Alarm*8	Yes										
Over Temperature			Yes								
Reverse			Yes								
nterface											
JSB			Standard								
Ethernet			Optional								
GPIB			Optional								
System BUS			Master/Slave								
Dout	·										
No. of bits			2 bits per mainframe								
Level - H	1.8V/3.3V/5V switchable										
Level - L	<0.6V@lsink=10mA										
Drive	Pull_up resistor = $4.7k\Omega$										
Din (TTL Compatible, Rising E	Edge)										
No. of bits			2 bits per mainframe								
External Trig. for Digitizing											
No. of bits			1 bit per mainframe								
External Trig. for Auto Sequer	nces (TTL Compatible, Risi	na Edae)									
No. of bits			1 bit per mainframe								
Load ON - O/P											
Level		TTL	. Compatible, Level, Active	High							
Short ON - O/P											
		2 cł	nannels per 63600-1 mainf	rame							
No. of down als	4 channels per 63600-2 mainframe										
No. of channels	6 channels per 63601-5 mainframe										
		10 c	hannels per 63600-5 main	frame							
Level	TTL Compatible, Level, Active High										
Short circuit											
Current *6			Set to 100% of rated current								
nput Resistance (Load Off)	700k Ω (Typical)700k Ω (Typical)2M Ω (Typical)700k Ω (Typical)700k Ω (Typical)										
Dimensions (HxWxD)	142 x 86 x 514 mm / 5.6 x 3.4 x 20.2 inch										
Weight	5 kg / 11 lbs	4 kg / 8.8 lbs	5 kg / 11 lbs	4.5 kg / 9.9 lbs	4.5 kg / 9.9 lbs						
Operating Temperature	0~40°C										
Storage Temperature	-20~80°C										
Power			Supply from mainframe								
EMC & Safety	CE										

NOTE*1: The maximum current loading below the minimum operating voltage (0.5V) will follow a derating curve.

NOTE*2: The 400W power rating of the 63640-80-80 specified at an ambient temperature of 35°C, please refer to the power rating curve on the right. **NOTE*3**: Does not apply to setting current < 0.25% full scale current in high range. Does not apply to setting current < 0.05% full scale current in low and middle range.

NOTE*4: The full scale is Vmax x Imax.

NOTE*5 : The DC level measurements are made over a period of 20ms, and does not measure any transient signals in the DC measurements.

NOTE*6: Its limits are the maximum power and maximum current of the current ragne.

NOTE*7: The 63600 is guaranteed to meet specified performance at temperature range of 25 ± 5 °C.

NOTE*8: If the operating voltage exceeds the rated voltage for 1.1 times, it would cause permanent damage to the device.

NOTE*9: Please refer to user's manual for detail specifications, and S (siemens) is the SI unit of conductance, equal to one reciprocal ohm.



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