

Programmable DC Power Supplies 200W/400W/600W/800W in 2U Built-in USB, RS-232 & RS-485 Interface

Optional Interface: LAN
IEEE488.2 SCPI (GPIB) Multi-Drop
Isolated Analog Programming



TDK·Lambda

TDK-Lambda

Features Include:

- High Power Density 200W/400W/600W/800W in 2U: 3.5 Inch (89mm) height
- Wide Range Input (85-265Vac continuous)
- Active Power Factor Correction (0.99 typical)
- Output Voltage up to 650V, Current up to 5A
- Constant Voltage (CV)/(CC) Constant Current auto-crossover
- Built-in RS-232/RS-485 Interface Standard
- Global Commands for Serial RS-232/RS-485 Interface
- Auto-Re-Start / Safe-Start: user selectable
- Last-Setting Memory
- High Resolution 16 bit ADCs & DACs
- Low Ripple & Noise
- Front Panel Lock selectable from Front Panel or Software
- · Reliable Encoders for Voltage and Current adjustment
- · Parallel Operation with Active Current Sharing, for up to six identical units
- · Advanced Parallel Master / Slave. Total Current is programmed and measured via the Master
- External Analog Programming and Monitoring (user selectable 0-5V & 0-10V)
- Reliable Modular and SMT Design
- 19" Rack Mount Capability for ATE and OEM applications
- Optional Interfaces

Isolated Analog Programming and Monitoring Interface (0-5V/0-10V & 4-20mA) IEEE 488.2 SCPI (GPIB) Multi-Drop

LAN

LabView® and LabWindows® drivers

• Arbitrary functions for:

Automotive or laser simulation / 4 Pre-Programmed Functions

- · Fast Command Processing Time
- Output Sequencing
- Four-cell Memory Settings
- User Programmable Signal Pins
- Five Year Warranty
- Worldwide Safety Agency Approvals; CE Mark for LVD and EMC regulations





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Front Panel Description







- 1. AC ON/OFF Switch
- 2. Air Intake allows zero stacking for maximum system flexibility and power density.*
- 3. Reliable encoder controls Output Voltage and power supply setting.
- 4. Volt Display shows Output Voltage and directly displays and power supply settings.
- 5. Reliable encoder controls Output Current, and power supply setting.
- 6. Current Display shows Output Current and power supply setting.
- 7. Function/Status LEDs:
- AlarmFine ControlPreview SettingsFoldback ModeRemote ModeOutput On
- 8. Pushbuttons allow flexible user configuration
- Coarse and Fine adjustment of Output Voltage/Current and Advanced Parallel Master or Slave
- Preview settings and set Voltage/Current with Output OFF, Front Panel Lockout
- · Set OVP, UVP, UVL Limits
- Set Current Foldback
- Local/Remote Mode and select Address and Baud Rate
- Output ON/OFF and Auto-Start/Safe-Start Mode
- Menu
- 9. Optional front panel insulated output sockets (Ø 4mm) for modules up to 650V: 5A Max

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^{*} Zero stacking - side-by-side mounting of 6 units in a 19" Rack

Rear Panel Description





- 1. Connector allows (Non-isolated) Analog Program and Monitor and other functions.
- 2. Remote/Local Output Voltage Sense Connections.
- 3. Signal Connector
- 4. RS-232/RS-485 INPUT Remote Serial Programming.
- 5. RS-485 OUTPUT to other Z⁺ Power Supplies.
- 6. USB Interface
- 7. Wide-Range Input 85-265VAC continuous, 47/63Hz with Active Power Factor Correction (0.99 typical) AC Input Connector: IEC320 -C16.
- 8. Exhaust air exits at the back. Allows vertical stacking of units without any separation between units
- 9. Output Connections:
 - MALE CONNECTOR (IC 2,5/4-G-5,08, PHOENIX CONTACT).
 - FEMALE PLUG (IC 2,5/4-ST-5,08, PHOENIX CONTACT).
- 10. Optional Interface Position for LAN Interface.
- 11. Optional Interface Position for GPIB Interface (shown) or Isolated Analog Interface.



***** Power Benchtop Parallel and Series Configurations

Benchtop Power Supply

Parallel operation - Master/Slave:

Active current sharing allows up to six identical units to be connected in an auto-parallel configuration for six times the output power.

In Advanced Parallel Master/Slave Mode, total current is programmed and reported by the Master, Up to six supplies act as one.



Series operation

Up to two units may be connected in series to increase the output voltage or to provide bipolar output.

Remote Programming via Built-in USB, RS-232 & RS-485 Interface

Standard Serial Interface allows daisy chain control of up to 31 power supplies on the same bus with built-in RS-232 & RS-485 Interface.

Optional Interface: LAN & IEEE488.2 SCPI (GPIB)

Multi-Drop

Allows LAN/IEEE Master to control up to 31 slaves over RS-485 daisy-chain Only the Master needs be equipped with LAN/IEEE Interface













Applications

 Z^{\dagger} series power supplies have been designed to meet the demands of a wide variety of applications.

Test and Measurement

Built-in Last-Setting memory based on Flash Memory no battery or capacitor backup. Simplifies test design and requirements.

Built-in RS-232/RS-485 gives maximum system flexibility along with 0-5V and 0-10V, selectable analog programming.

Wide range of available inputs allows testing of many different devices.

Semiconductor Burn-in

Safe-Start mode ENABLED - to re-start at Output OFF to protect load.

Wide range input (85-265Vac) with Active Power Factor correction rides through input transients easily.

Component Test

High power density, zero stacking and single wire parallel operation, give maximum system flexibility.

Laser Diode

OVP is directly set on Voltage Display, assuring accurate protection settings.

Fast Constant Current response, no over shoot. Current Limit Fold Back assures load is protected from current surges.

Heater Supplies

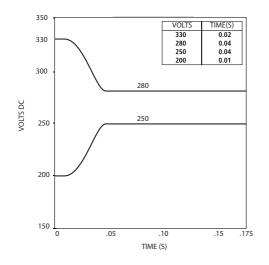
Smooth, reliable encoders enhance front panel control. Remote analog programming is user selectable 0-5V or 0-10V.

RF Amplifiers and Magnets

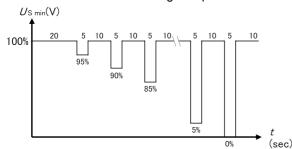
Robust design assures stable operation under a wide variety of loads. High linearity in Voltage & Current mode.

Z⁺ Series Sequence Programming Applications:

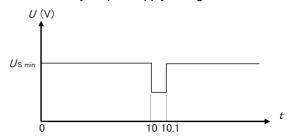
MILITARY STANDARD 704E Testing



Reset behaviour at voltage drop



Discontinuities in supply voltage Momentary drop in supply voltage



Options: (200W/400W/600W/800W)

Front Panel insulated Output sockets

Up to 650V Output Module

P/N: Z__--_L2



Optional front panel insulated output sockets (Ø 4mm) for modules up to 650V: 5A Max - L2

Z⁺ Assemblies

Dual Output Housing (for 105mm) 200W/400W/600W/800W Triple Output Housing (for 70mm) 200W/400W/600W/800W P/N: Z-NL200 (same p/n for both Dual & Triple Output Housing)w





19" Rack Mounted to 4.8kW

Six units (70mm) can be assembled into 19-Inch rack/2U high Four units (105mm) can be assembled into 19-Inch rack/2U high to meet your configuration requirements.

In cases where the entire rack is not occupied with power units, P/N: Z-BP for 70mm, P/N: Z-WBP for 105mm blank panels can be installed:

P/N: Z-NL100





Power Modules Table

Module Type	200W	400W	600W	800W
0~160V	1.3A	2.6A	4A	5A
0~320V	0.65A	1.3A	2A	2.5A
0~650V	0.32A	0.64A	1A	1.25A
19" rack width	1/6 width	1/6 width	1/6 width	1/6 width
19" rack width	1/4 width	1/4 width	1/4 width	1/4 width





Programming Options (Factory Installed)

Digital Programming via IEEE Interface

- IEEE 488.2 SCPI Compliant
- Program Voltage
- Measure Voltage
- Over Voltage setting and shutdown
- Error and Status Messages
- Multi-Drop
- Allows IEEE Master to control up to 31 slaves over RS-485 daisy-chain
- Only the Master needs be equipped with IEEE Interface

Isolated Analog Programming

Four Channels to Program and Monitor Voltage and Current.

Isolation allows operation with floating references in harsh electrical environments.

Choose between programming with Voltage or Current.

Connection via removable terminal block: Phoenix MC1,5/8-ST-3.81.

Voltage Programming, user-selectable 0-5V or 0-10V signal.
 Power Supply Voltage and Current Programming Accuracy ±1%
 Power Supply Voltage and Current Monitoring Accuracy ±1.5%

Current Programming with 4-20mA signal.
 Power Supply Voltage and Current Programming Accuracy ±1%
 Power Supply Voltage and Current Monitoring Accuracy ±1.5%

P/N: IS420

P/N: IS510

P/N: IEEE

LAN Interface P/N: LAN

- VISA & SCPI Compatible
- Address Viewable on Front Panel
- Fixed and Dynamic Addressing
- Compatible with most standard Networks
- TCP / UDP Socket Programming
- LAN Fault Indicators

Program Current

Measure Current

Current Foldback shutdown

- Auto-detects LAN Cross-over Cable
- Fast Startup

AC Cord

Region	Europe	Japan	North America	Israel
Output Power	850W	850W	850W	850W
AC Cords	10A/250Vac L=2m	15A/125Vac L=2m	13A/125Vac L=2m	10A/250Vac L=2m
Wall Plug	INT'L 7/VII	JIS C8303	NEMA 5-15P	SI-32
Power Supply	IEC320-C15	IEC320-C15	IEC320-C15	IEC320-C15
Connector				
Part Number	P/N: Z-E	P/N: Z-J	P/N : Z-U	P/N: Z-I

Communication Cable

RS-232/RS-485 Cable is used to connect the power supply to the PC Controller

		. ,
Mode	RS-485	RS-232
PC Connector	DB-9F	DB-9F
Communication Cable	Shield Ground L=2m	Shield Ground L=2m
Power Supply Connector	EIA/TIA-568A (RJ-45)	EIA/TIA-568A (RJ-45)
P/N	Z/485-9	Z/232-9

Serial Link Cable*

Daisy-chain up to 31 Z⁺ Series power supplies.

Mode	Power Supply Connector	Communication Cable	P/N
RS-485	EIA/TIA-568A (RJ-45)	Shield Ground	Z/RJ45

^{*} Included with power supply

Power Supply Identification / Accessories How to order

Z	650 -	1.25-			
Series Name	Output Voltage (0~650V)	Output Current (0~1.25A)	Factory Options:	Output Jack	AC cord Options: Region :
			IEEE LAN IS510 IS420	L2	E - Europe J - Japan U - North America I - Middle East C - China

Factory option
USB Interface built-in Standard
RS-232/RS-485 Interface built-in Standard
GPIB Interface
Voltage Programming Isolated Analog Interface
Current Programming Isolated Analog Interface
LAN Interface
LAN
Front panel insulated output sockets (Ø 4mm)

for modules up to 650V or 5A Max

L2

Model	Output Voltage (VDC)	Output Current (A)	Output Power (W)
Z160-1.3		0~1.3	208
Z160-2.6	0~160 VDC	0~2.6	416
Z160-4	0~160 VDC	0~4	640
Z160-5		0~5	800
Z320-0.65		0~0.65	208
Z320-1.3	0~320 VDC	0~1.3	416
Z320-2		0~2	640
Z320-2.5		0~2.5	800
Z375-2.2	0~375VDC	0~2.2	825
Z650-0.32		0~0.32	208
Z650-0.64	0.650,406	0~0.64	416
Z650-1	0~650 VDC	0~1	650
Z650-1.25		0~1.25	812



Z⁺200 Series Specifications

Less than 0.05% of rated output current over 30 minutes following load change.	2 200 Series Specific						
2 Rend cutput current (**P21**) A 13 0.65 0.32 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208 208			160-1.3	320-0.65	650-0.32		
Salested Output power							
CONSTANT VOLTAGE MODE 2 160-13 320-059 59-9.2 1. Max. Liber regulation (**) 3 20-059 59-9.2 1. Max. Liber regulation (**) 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3 20-059 6-7 3							
1.Mes. Line regulation (?)	3. Rated output power	W	208	208	208		
1.Mes. Line regulation (?)	CONSTANT VOLTAGE MODE	7	160 12	220.065	650.0.22		
2 Max Load regulation (??)			100-13		030-0.32		
3. Bipple and noise (pp., 20MH/d) (114) mW 100 150 250							
4. Ripple trans. SHz-1MHz (*14) mV 10 mV 25 60 mpc and and output voltage, following 30 minutes warm-up. Centain line, load & temp. 2025 of rated Vout over Bhs. intervel following 30 minutes warm-up. Centain line, load & temp. 2025 of rated Vout over Bhs. intervel following 30 minutes warm-up. Centain line, load & temp. 2025 of rated Vout over Bhs. intervel following 30 minutes warm-up. Centain line, load & temp. 2025 of rated volt output voltage to output voltage or to output voltage to output voltage or to output voltage v		mV	100		250		
S. Temperature coefficient							
Less than 0.05% of rated output voltage over 20 minutes following power on.		PPM/°C					
8. Remote sense compensation/wire			0.02% of rated Vout over 8hrs.	interval following 30 minutes warn	n-up. Constant line, load & temp.		
9. Up-prog. Response time.							
10. Down-prog response time Full load (1°9) m5 180 270 270 270 371 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 370 3							
No load (*10) S 2 25 3 3 1 1. Transient response time					-		
Time for output votage to recover within 0.5% of its rated output for a load change 10-90% of rated output turner. Output set spoint: 10-109%, Local sense Less than 2m.S.							
1. Interior response time	No load (*10)	5	2	2.5	3		
CONSTANT CURRENT MODE Z 160-13 0.320-0.65 650-0.32 1. Max. Line regulation (**6)	11. Transient response time	mS					
CONSTANT CURRENT MODE Z 160-13 0.320-0.65 650-0.32 1. Max. Line regulation (**6)	12. Hold-up time (*19)		16mSec	Typical.	15mSec Typical.		
1. Max. Line regulation (**6)			,		, , , , , , , , , , , , , , , , , , , ,		
1. Max. Line regulation (**6)	CONSTANT CURRENT MODE	Z	160-1.3	320-0.65	650-0.32		
2. Jose - Load regulation (*11) — Best than 0.05% of frated output current - Best than 0.05% of frated toutput current - Best than 0.05% of frated toutput current over 30 minutes (blowing load change) 4. Ripple runs. SH2-MHz (*12) (*14) MA 1.2 0.8 0.5 5. Temperature coefficient - PPM/**C 6. Temperature stability - 0.05% of frated output current, following 30 minutes warm-up. Constant line, load & temperature stability - 1.00 frated output current, following 30 minutes warm-up. Constant line, load & temperature stability - 2. Description of the stability of the stabili	1. Max. Line regulation (*6)						
4. Ripple trns. Sitz-Milkt (*12)(*14) 5. Temperature coefficient PPM/*C 100PBM/*C from rated output current, following 30 minutes warm-up. 0.58* of rated fout over 8hrs. interval following 30 minutes warm-up. Constant line, load & temperature stability					0.15% of rated output current		
S.Temperature coefficient PPRM/C 100PRM/C from rated output current, following 30 minutes warm-up. Gonstant line load's temperature products with the composition of the compositi				,			
6. Temperature stability — 0.95% of rated lout over 8hs. interval following 30 minutes warm-up. Constant line, load & temperature put diff — Less than +/-0.1% of rated output current over 30 minutes following power on. PROTECTIVE FUNCTIONS Z 160-13 3.20-0.65 650-0.32 1. Foldback protection — 650-0.32 1. Foldback protection — 650-0.32 2. Over-voltage protection (OVP) — 1. Inverter Shut down when power supply change mode from CV1 to Cor CC to CV. User presetable. Reset by AC input recycle in autostart mode or by OUTDEUT button or by rea panel ENABLE, or by communication port. 2. Over-voltage protection (OVP) — 1. Inverter Shut down method. Reset by AC input recycle in autostart mode or by OUTDEUT button or by rea panel ENABLE, or by communication port. 3. Over-voltage trip point V 5-176 5-353 5-717 4. Output under voltage limit (UVL) — 1. Preset by front panel or communication port. Prevents from adjusting Vour below limit. Does not affe in an leading programming. User programming output voltage protection (UVP) — 1. Reset by AC input recycle in autostart mode or by OUTDEUT button or by rear panel ENABLE, or by communication port. 8. Output under voltage protection (UVP) — 1. Reset by AC input recycle in autostart mode or by OUTDEUT button or by rear panel ENABLE, or by communication port. 9. Output under voltage programming — 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-10-5% of rated Vout. 1. Output outgage programming (**13) — 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-10-5% of rated Vout. 1. Output outgage programming (**13) — 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-10-5% of rated out. 2. Output voltage programming (**13) — 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-10-5% of rated out. 3. Over voltage programming (**13) — 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-10-5% of rated out. 4. Output outgage programming (**13) — 0-100%, 0-5V or 0-10V, user selectable. Accuracy and l					***		
PROTECTIVE FUNCTIONS Z 160-13 20-0.65 650-32							
PROTECTIVE FUNCTIONS Z 160-13 320-05 650-032 1. Foldback protection Beset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 2. Over-voltage protection (OVP) 3. Over-voltage protection (OVP) 3. Over-voltage trip point 4. Output under voltage limit (UVL) 4. Output under voltage limit (UVL) 5. Output under voltage protection (UVP) 6. Over treating trip point 7. Output under voltage protection (UVP) 8. Output under voltage protection (UVP) 8. Output under voltage protection (UVP) 8. Output under voltage protection (UVP) 9. Output shut-down when power supply output voltage below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by near panel ENABLE, or by communication port. 9. Output shut-down when power supply output voltage below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 9. Output shut-down when power supply output voltage below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 10. Output shut-down when power supply output voltage below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 10. Output under voltage programming or output							
Output shut-down when power supply change mode from CV to CC or CC to CV. User presetable. Reset by AC input recycle in autostart mode or by year panel ENABLE, or by communication port. 2. Over-voltage protection (OVP) 3. Over-voltage protection (OVP) 4. Output under voltage limit (UVL) 4. Output under voltage limit (UVL) 5. Output under voltage limit (UVL) 6. Output shut-down when power supply output voltage goes below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by repair and the standard programming. 5. Output under voltage protection (UVP) 6. Over temperature protection 7. Output shut-down when power supply output voltage goes below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 6. Over temperature protection 8. Over temperature protection 8. Over temperature protection 9. Over temperature protection 9. Over temperature protection 10. Output shut-down when power supply output voltage goes below UVP programming. User presetable Resetable, accuracy and linearity: +/-0.5% of rated Vout. 10. Over temperature protection 10. Over temp	7. Warm-up drift		Less than +/-0.1% of I	rated output current over 30 minut	es following power on.		
Output shut-down when power supply change mode from CV to CC or CC to CV. User presetable. Reset by AC input recycle in autostart mode or by year panel ENABLE, or by communication port. 2. Over-voltage protection (OVP) 3. Over-voltage protection (OVP) 4. Output under voltage limit (UVL) 4. Output under voltage limit (UVL) 5. Output under voltage limit (UVL) 6. Output shut-down when power supply output voltage goes below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by repair and the standard programming. 5. Output under voltage protection (UVP) 6. Over temperature protection 7. Output shut-down when power supply output voltage goes below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 6. Over temperature protection 8. Over temperature protection 8. Over temperature protection 9. Over temperature protection 9. Over temperature protection 10. Output shut-down when power supply output voltage goes below UVP programming. User presetable Resetable, accuracy and linearity: +/-0.5% of rated Vout. 10. Over temperature protection 10. Over temp	DROTECTIVE FUNCTIONS	7	160.13	220.0.65	650.033		
1. Foldback protection	PROTECTIVE FUNCTIONS						
2. Over-voltage protection (OVP) 3. Over-voltage trip point 4. Output under voltage limit (UVL) 5. Output under voltage limit (UVL) 6. Output under voltage protection (UVP) 7. Output under voltage protection (UVP) 8. Output under voltage protection (UVP) 9. Output shut-down when power supply output voltage goes below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 6. Over temperature protection 1. Vout voltage programming 1. Vout voltage progr	1. Foldback protection			itostart mode or by OUTPUT butto			
4. Output under voltage limit (UVL)	2. Over-voltage protection (OVP)			by AC input recycle in autostart m			
in analog programming. Output shut-down when power supply output youtdage goes below UVP programming. User presetable Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. 6. Over temperature protection ————————————————————————————————————	3. Over -voltage trip point	V	5~176	5~353	5~717		
S. Output under voltage protection (UVP) Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port.	4. Output under voltage limit (UVL)		Preset by front panel or communi		ng Vout below limit. Does not affect		
ANALOG PROGRAMMING AND MONITORING	5. Output under voltage protection (UVP)		Output shut-down when power s Reset by AC input recycle in au	utostart mode or by OUTPUT butto	JVP programming. User presetable. n or by rear panel ENABLE, or by		
1. Vout voltage programming ————————————————————————————————————	6. Over temperature protection		·				
1. Vout voltage programming ————————————————————————————————————	ANALOS PROSPANANTAS AND MONITORING						
2. lout voltage programming (*13)			0.4000/ 0.51/ 0.40//				
3. Vout resistor programming					/		
4. lout resistor programming (*13)							
5. Shut Off (SO) control 6. Output current monitor (*13) 7. Output voltage monitor 7. Output voltage monitor 8. Power supply OK signal 7. Output voltage monitor 8. Power supply OK signal 8. Power supply OK signal 9. Parallel operation (*8) 9. Possible, up to 6 units in master/slave mode with single wire current balance connection. 10. Series operation 11. CV/CC indicator 12. Identical units (with external diodes). 11. CV/CC indicator 12. Interlock (ILC) control 13. Local/Remote mode Control 14. Local/Remote mode Control 15. Trigger out 16. Trigger in 17. Programmed signal 1 18. Programmed signal 1 19. Programmed signal 1 19. Programmed signal 1 19. Programmed signal 2 10. Control functions 10. Series operation 10. Series oper							
6. Output current monitor (*13) 0-5V or 0-10V, user selectable. Accuracy: +/-1%. 7. Output voltage monitor 0-5V or 0-10V, user selectable. Accuracy: +/-1%. 8. Power supply OK signal 4-5V-OK, 0V-Fail. 500ohm series resistance. 9. Parallel operation (*8) Possible, up to 6 units in master/slave mode with single wire current balance connection. 10. Series operation 2 identical units (with external diodes). 11. CV/CC indicator Open collector. CC mode: On, CV mode: Off. Maximum voltage: 30V, maximum sink current: 10mA 12. Interlock (ILC) control Bables/Disables the PS output by dry contact (Short: On, Open: Off, Source current: less than 0.5mA). Ena/Dis is activated by front par 13. Local/Remote mode Control By electrical signal or Open: Off. Open: Off, Source current: less than 0.5mA). Ena/Dis is activated by front par 13. Local/Remote mode Indicator Open collector (shunted by 36V zener). On (0-0.6V, 10mA sink current max.)-Remote. Off-Local (30V ma 15. Trigger out Maximum low level output = 0.8V, Minimum high level output = 3.8V, Maximum high level output = 5V Maximum low level input = 1.2V, Minimum high level input = 3.5V, Maximum high level input = 5V, Maximum sink current = 16mA, positive edge, trigger: tw = 10µs minimum, Tr/Tf = 1µs maximum. 17. Programmed signal 1 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener) 18. Programmed signal 2 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener) 19. Communication Functions - Selection of LANJ,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address							
7. Output voltage monitor							
8. Power supply OK signal							
9. Parallel operation (*8) Possible, up to 6 units in master/slave mode with single wire current balance connection. 10. Series operation 2 identical units (with external diodes). 11. CV/CC indicator Open collector. CC mode: On, CV mode: Off. Maximum voltage: 30V, maximum sink current: 10mA 12. Interlock (ILC) control Enables/Disables the PS output by dry contact (Short: On, Open: Off, Source current: less than 0.5mA). Ena/Dis is activated by front parallel properties of the pr							
10. Series operation	11 / 3						
11. CV/CC indicator							
12. Interlock (ILC) control							
14. Local/Remote mode Indicator 15.Trigger out							
15.Trigger out Maximum low level output =0.8V, Minimum high level output =3.8V, Maximum high level output =5. Maximum source current =16mA, pulse =20μs Typical. 16.Trigger in Maximum low level input =1.2V, Minimum high level input =3.5V, Maximum high level input =5V, Maximum sink current =16mA, positive edge, trigger: tw =10μs minimum, Tr/Tf =1μs maximum. 17. Programmed signal 1 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener) 18. Programmed signal 2 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener) FRONT PANEL Multiple options with 2 Encoders	13. Local/Remote mode Control		By electrical signal or 0	Open/Short: 0~0.6V or short: Remo	te, 2~15V or open: Local		
Maximum source current =16mA, pulse =20μs Typical.	14. Local/Remote mode Indicator		Open collector (shunted by 36V zer	ner). On (0~0.6V, 10mA sink current	max.)-Remote. Off-Local (30V max.)		
Maximum sink current =16mA, positive edge, trigger: tw =10µs minimum, Tr/Tf =1µs maximum.	15.Trigger out						
17. Programmed signal 1 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener) 18. Programmed signal 2 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener) FRONT PANEL Multiple options with 2 Encoders Vout/lout manual adjust OVP/UVL/UVP manual adjust OVP/UVL/UVP manual adjust Protection Functions - OVP, UVL, UVP, Foldback, OCP, INT, SO Communication Functions - Selection of LAN,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address	16.Trigger in		Maximum low level input =1.2	V, Minimum high level input =3.5V	, Maximum high level input =5V,		
Tensor Protection Functions Protection Functions - Selection of Baud Rate, Address	17. Programmed signal 1						
Multiple options with 2 Encoders Vout/lout manual adjust OVP/UVL/UVP manual adjust OVP/UVL/UVP manual adjust Protection Functions - OVP, UVL,UVP, Foldback, OCP, INT, SO Communication Functions - Selection of LAN,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address			 	_ ,	, ,		
Multiple options with 2 Encoders Vout/lout manual adjust OVP/UVL/UVP manual adjust OVP/UVL/UVP manual adjust Protection Functions - OVP, UVL,UVP, Foldback, OCP, INT, SO Communication Functions - Selection of LAN,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address							
Vout/lout manual adjust OVP/UVL/UVP manual adjust OVP/UVL/UVP manual adjust Protection Functions - OVP, UVL,UVP, Foldback, OCP, INT, SO Communication Functions - Selection of LAN,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address	FRONT PANEL						
OVP/UVL/UVP manual adjust Protection Functions - OVP, UVL, UVP, Foldback, OCP, INT, SO Communication Functions - Selection of LAN, IEEE (*17), RS232, RS485, USB Communication Functions - Selection of Baud Rate, Address					·		
1. Control functions - Protection Functions - OVP, UVL,UVP, Foldback, OCP, INT, SO Communication Functions - Selection of LAN,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address							
1. Control functions - Communication Functions - Selection of LAN,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address							
Communication Functions - Selection of LAN,IEEE (*17),RS232,RS485,USB Communication Functions - Selection of Baud Rate, Address	1. Control functions						
Analog Control Functions Colortion Voltage Vaciative programming EV/10V EV/10V							
Analog Control Functions - Selection Voltage/resistive programming, 5V/10V, 5K/10K programming Analog Control Functions - Selection of Voltage/Current Monitoring 5V/10V, Output ON/OFF, Front Panel Lo							

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FRONT PANEL								
2. Display					accuracy: 0.5% of rated output vo			
Z. Dispidy				lout: 4 digits, accuracy: 0.5% of rated output current+/-1 count.				
3. Indications				GREEN LEDs: FINE, MENU, PREV, PROT, REM, OUTPUT, CV, CC				
				RED LED: PROT (OVP, UVP, OTP, FOLD, AC FAIL).				
4. Function buttons				F	NE, MENU, PREV, PROT, REM, OUT	PUT		
PROGRAMMING AND REA	ADBACK (RS2	32/485,USB, Op	tional: IEEE(*17), LAN)				
1. Vout programming accu	uracy			0.05%	of actual + 0.05% of rated output	t voltage		
2. lout programming accu	ıracy (*13)				0.2% of rated output current			
3. Vout programming reso	olution				0.012% of full scale			
4. lout programming reso	lution			0.012% of full scale				
5. Vout readback accuracy				0.05% of actual + 0.05% of rated output voltage				
6. lout readback accuracy	(*13)			0.1%	of actual +0.3% of rated output of	current		
7. Vout readback resolution	n				0.012% of full scale			
8. lout readback resolution	n				0.012% of full scale			
INPUT CHARACTERISTICS	5		Z	160-1.3	320-0.65	650-0.32		
1. Input voltage/freq. (*3)					65Vac continuous, 47~63Hz, singl	_ \		
2. Maximum Input current		(*4) (*15)		2.64/1.30	2.64/1.30	2.64/1.30		
3. Power Factor (Typ)		(1, (12)			99 at 100Vac, >0.98 at 200Vac,100			
4. Efficiency (Typ) 100/200	OVAC (*4) (*15)	%	79/81	79/81	79/81		
5. Inrush current 100/200		<u>′</u>						
					203 (1411 257)			
ENVIRONMENTAL CONDI				I	2 5005 1000/ 1			
1. Operating temperature								
2. Storage temperature				-20~85°C				
3. Operating humidity			%	20~90% RH (no condensation).				
4. Storage humidity			%	10~95% RH (no condensation).				
5. Altitude				Maximum 3000m. Derate ambient temp above 2000m. Operating: Maximum ambient temperature, From 2000m up to 3000m Ambient temperature 40°C.				
SAFETY/EMC								
SALET I/EMC		5.5.		UL61010-1, EN610	10-1, IEC61010-1. Built to meet UL	_60950-1, EN60950-1		
1. Applicable standards:		Safety				ATED Analog ,LAN are Non Hazardous		
		EMC		IEC/EN	61326-1 (Built to meet EN55022/E	EN55024)		
				Output floating: Output, J1, J2 are	Hazardous; J3, J4, USB, LAN, IEEE/IS	OLATED ANALOG are Non Hazardous		
2.Interface classification						EEE/ISOLATED ANALOG are Non Hazardous		
				Vout>400V, +Output grounded: 0	Output, J1, J2, J3, J4, USB, LAN, IEE	E/ISOLATED ANALOG are Hazardous		
160≤Vouts320V models: Input-Output&J1,J2: 2970VDC/1min; Input-Ground: 2828VDC/1min. Output&J1,J2,-Ground: 2000VDC/1min; Output&J1,J2: 3974VDC/1min; Input-Ground: 2820VDC/1min. Output&J1,J2,-Ground: 2000VDC/1min; Output&J1,J2: 3J,J4,USB,LAN/IEEE/ISOLATED ANALOG: 3200VDC/1min. 3. Withstand voltage 650V model: Input-Output&J1,J2: 3704VDC/1min; Input-Ground: 2828VDC/1min. Output&J1,J2,-Ground: 2780VDC/1min; Output&J1,J2: J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4244VDC/1min; Input-Ground: 2828VDC/1min.			//SOLATED ANALOG:3200VDC/1min; LATDE ANALOG Input-Ground: 707VDC/1min. round: 2828VDC/1min. r//SOLATED ANALOG:4244VDC/1min; 42VDC/1min;					
4. Insulation resistance				J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min. More than 100Mohm at 25°C, 70%RH.				
5. Conducted emission								
6. Radiated emission								
MECHANICAL					,			
1. Cooling					Forced air cooling by internal far	1		
	СТЛ	NDARD	Kg		Less than 1.9Kg.	1.		
2. Weight		DE BODY		Lace than	Less than 1.9kg. 2.4Kg. Wide body with Isolated an	alog or IEEE		
	1		Kg					
3. Dimensions (WxHxD)		NDARD DE BODY	mm mm		xcluding bus bars, handles…). (Rexcluding bus bars, handles…). (R			
4. Vibration					According to: IEC60068-2-64			
[- C]				1 1 200 1 10 1	44 6 11 11 1 1 4	l:		

NOTES:

5. Shock

- *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage.
- *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).
- *4: Ta=25°C with rated output power.
- *5: Not including EMI filter inrush current, less than 0.2mSec at cold start Ta=25°C
- *6: At 85~132Vac or 170~265VAC, constant load.
- *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense.
- *8: For parallel operation up to 4 units, 5% of total output current is required.
- For parallel operation more than 4 units, 20% of total output current is required. *9: From 10% to 90% or 90% to 10% of Rated Output Voltage, with rated resistive load.
- *10: From 90% to 10% of Rated Output Voltage.
- *11: For load voltage change, equal to the unit voltage rating, constant input voltage.
- *12: Ripple is measured at 10~100% of rated output voltage and rated output current.
- *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.

Less than 20G, half sine, 11mS. Unit is unpacked. According to: IEC60068-2-27

- *14: Measured with 10:1 probe.
- *15: P.S with Lan, IEEE, models decrease efficiency by 0.5% and increase input current by 0.5%. P.S with Isolated analog option decreases efficiency by 1.5% and increases input current by 1.5%.
- *16: At rated output power.
- *17: Max. ambient temperature for using IEEE is 45°C.



Z⁺400 Series Specifications

MODEL	00 44 65			
2. Rated output current (*2)	4 6 6 0.64 0.64 0.00 0.00 0.00 0.00 0.00			
3. Rated output power	0.64 load & temp. on. d output current. Typical. 0.64			
CONSTANT VOLTAGE MODE	load & temp. on. 0 0 0 d output current. Fypical. 0.64			
1. Max. Line regulation (*6) 0.01% of rated output voltage	load & temp. on. 0 0 0 d output current. Typical. 0.64			
1. Max. Line regulation (*6) 0.01% of rated output voltage	load & temp. on. 0 0 0 d output current. Typical. 0.64			
2. Max. Load regulation ("7")	load & temp. on. 0 0 0 d output current. Typical. 0.64			
3. Ripple and noise (p-p. 20MHz) (**14)	load & temp. on. 0 0 0 d output current. Typical. 0.64			
4. Ripple trans. 5Hz—IMHz (**14) m/V 10 25 6. 5 Temperature coefficient PPM/C S10PPM/C from rated output voltage, following 30 minutes warm-up. 6. Temperature stability	load & temp. on. 0 0 0 d output current. Typical. 0.64			
S.Temperature coefficient	load & temp. on. 0 0 d output current. Fypical.			
6. Temperature stability 7. Warm-up drift 8. Remote sense compensation/wire 9. Up-prog. Response time, 0~Vomax(*9) 9. Up-prog. Response time, 0~Vomax(*9) 10. Down-prog. response time, 0~Vomax(*9) 11. Transient response time 9. Vilload (*10) 12. Vilload (*10) 13. Vilload (*10) 14. Transient response time 15. Vilload (*10) 16. Vilload (*10) 17. Vilload (*10) 18. Vilload (*10) 18. Vilload (*10) 19. Vilload (*10) 19. Vilload (*10) 10. Down-prog. response time 10. No load (*10) 10. Down-prog. response time 10. Down-prog. response time 11. Transient response time 12. Hold-up time (*19) 13. Vilload (*10) 14. Vilload (*10) 15. Vilload (*10) 15. Vilload (*10) 16. Vilload (*10) 17. Vilload (*10) 18. Vilload (*10) 18. Vilload (*10) 19. Vilload (*10) 19. Vilload (*10) 10. Vilload (*10) 1	on. O d output current. Typical. 0.64			
Remote sense compensation/wire V S S S S S S S S S	on. O d output current. Typical. 0.64			
8. Remote sense compensation/wire V 5 5 5 5 9. Up-prog. Response time, 0-Vomax(*9) mS 80 150 150 150 150 150 150 150 150 150 15	d output current. Typical. 0.64			
10. Down-prog. response time: Full load (*9) mS 100 150 15	d output current. Typical. 0.64			
Interest No load (*10) S 2 2.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5 3.5	d output current. Typical. 0.64			
11. Transient response time mS Time for output voltage to recover within 0.5% of its rated output for a load change 10-90% of rate Output set-point: 10-10%, Local sense. Less than 2mS. 12. Hold-up time (*19) — 16mSec Typical. 15mSec 16mSec Typical. 16mSec Typical. 15mSec 16mSec Typical. 16mSec T	Гуріcal. 0.64 nge.			
11. Iransent response time	Гуріcal. 0.64 nge.			
12. Hold-up time (*19)).64 nge.			
CONSTANT CURRENT MODE Z 160-2.6 320-1.3 650- 1. Max. Line regulation (*6) 2. Max. Load regulation (*11) 3. Load regulation thermal drift 3. Load regulation thermal drift 4. Ripple r.m.s. 5Hz~1MHz (*12) (*14) MA 1.5 Temperature coefficient PPW/C 100PPM/C from rated output current over 30 minutes following load cha 1.5 Temperature stability 0.05% of rated lout over 8hrs. interval following 30 minutes warm-up. 6. Temperature stability 0.05% of rated lout over 8hrs. interval following 30 minutes warm-up. Constant line, loa 7. Warm-up drift Less than +/-0.1% of rated output current over 30 minutes following power PROTECTIVE FUNCTIONS Z 160-2.6 320-1.3 650- Output shut-down when power supply change mode from CV to CC or CC to CV. User pres Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com Inverter Shut down method. Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com Inverter Shut down when power supply output voltage goes below UVP programming. User preset by front panel or communication port. Presents from adjusting Vout below limit. Does not affect in analo S. Output under voltage protection (UVP) Preset by front panel or communication port. Prevents from adjusting Vout below limit. Does not affect in analo Cover temperature protection Output shut-down when power supply output voltage goes below UVP programming. User p Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com User selectable, latched or non latched ANALOG PROGRAMMING AND MONITORING 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout voltage programming 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout voltage programming 0-100%, 0-5V or 0-10V, user selectable. Accuracy and linearity: +/-1% of rate).64 nge.			
1. Max. Line regulation (*6) 2. Max. Load regulation (*11) 3. Load regulation (*11) 4. Ripple rms. 5Hz~1MHz (*12) (*14) 5. Temperature coefficient 6. Temperature stability 7. Warm-up drift 7. Less than 0.05% of rated output current over 30 minutes following load chat on the company of the c	nge.			
1. Max. Line regulation (*6)	nge.			
2. Max. Load regulation (*11) 3. Load regulation thermal drift 4. Ripple r.m.s. 5Hz~1MHz (*12) (*14) 5. Temperature coefficient PPM/°C 100PPM/°C from rated output current, following 30 minutes warm-up. 6. Temperature stability				
3. Load regulation thermal drift 4. Ripple r.m.s. 5Hz~1 MHz (*12) (*14) 4. Ripple r.m.s. 5Hz~1 MHz (*12) (*14) 5. Temperature coefficient 6. Temperature coefficient 7. Warm-up drift 7. Warm-up drift 8. Tell countries stability 9. Tell countries stability				
4. Ripple t.m.s. 5Hz~1MHz (*12) (*14) mA 1.5 100PM/°C 100PPM/°C from rated output current, following 30 minutes warm-up. 6. Temperature stability 0.05% of rated lout over 8hrs. interval following 30 minutes warm-up. 6. Temperature stability 0.05% of rated lout over 8hrs. interval following 30 minutes warm-up. Constant line, loa 7. Warm-up drift Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes following power 1. Less than +/-0.1% of rated output current over 30 minutes warm-up. Constant line, loa 7. Less than +/-0.1% of rated output current over 30 minutes warm-up. Constant line, loa 7. Less than +/-0.1% of rated output current over 30 minutes warm-up. Constant line, loa 7. Less than +/-0.1% of rated output shut-down when power supply output or by rear panel ENABLE, or by come 1. Less than +/-0.1% of rated output shut-down when power supply output voltage goes below UVP programming. User power 1. Less than +/-0.1% of rated output shut-down when power supply output voltage goes below UVP programming. User power 1. Less than +/-0.1% of rated output shut-down when power supply output voltage goes below UVP programming. User power 1. Less than +/-0.1% of rated output shut-down when power supply output voltage goes below UVP programming. User power 1. Less than +/-0.1% of rated output shut-down when power supply output voltage goes below UVP programming. User power 1. Less than +/-0.1% of rat				
5. Temperature coefficient 6. Temperature stability 7. Warm-up drift	1			
6. Temperature stability	·			
PROTECTIVE FUNCTIONS Z 160-2.6 Output shut-down when power supply change mode from CV to CC or CC to CV. User preserby AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Noutput under voltage protection (UVP) Output shut-down when power supply output voltage goes below UVP programming. User preserby AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output under voltage Irinit (UVL) Preset by front panel or communication port. Prevents from adjusting Vout below limit. Does not affect in analogous description of the protection (UVP) Output shut-down when power supply output voltage goes below UVP programming. User preset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output shut-down when power supply output voltage goes below UVP programming. User preset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output shut-down when power supply output voltage goes below UVP programming. User preset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output shut-down when power supply output voltage goes below UVP programming. User preset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output shut-down when power supply output voltage goes below UVP programming. User present by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output shut-down when power supply output voltage goes below UVP programming. User present by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output shut-down when power supply output voltage goes below UVP programming. User present by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communic	& temperature.			
1. Foldback protection				
1. Foldback protection				
Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com 2. Over-voltage protection (OVP) 3. Over-voltage trip point 4. Output under voltage limit (UVL) 5. Output under voltage protection (UVP) 6. Over temperature protection 7. Output under voltage protection (UVP) 8. Output under voltage protection (UVP) 8. Output under voltage protection (UVP) 9. Output shut-down when power supply output voltage goes below UVP programming. User passet by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com 6. Over temperature protection 9. Output shut-down when power supply output voltage goes below UVP programming. User passet by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com 6. Over temperature protection 9. Output shut-down when power supply output voltage goes below UVP programming. User passet by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com 6. Over temperature protection 9. Over temperature protection 10. User Selectable. Latched or non latched 10. Output shut-down when power supply output voltage goes below UVP programming. User passet by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by com 6. Over temperature protection 9. Over temperature protection 10. User Selectable. Latched or non latched 10. Over temperature protection 10. Over temperature protec	.64			
2. Over-voltage protection (OVP) 1. Inverter Shut down method. Reset by AC input recycle in autostart mode or by OUTPU rear panel ENABLE, or by communication port. 3. Over-voltage trip point 4. Output under voltage limit (UVL) 5. Output under voltage protection (UVP) 6. Over temperature protection 7. Output shut-down when power supply output voltage goes below UVP programming. User protection (UVP) 8. Output under voltage protection (UVP) 9. Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable, latched or non latched. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable, latched or non latched. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable. Latched or non latched. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable. Latched or non latched. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable. Latched or non latched. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable. Latched or non latched. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable. Latched or non latched. Output shut-down when power supply output voltage goes below UVP programming. User protection user selectable. Accuracy and linearity: +/-0.5% of rate and user selectable. Accuracy and linearity: +/-0.5% of rate and user selectable. Accuracy and linearity: +/-1% of rate and user selectable. Accuracy and linearity: +/-1% of rate and user selectable. Accuracy and linearity: +/-1% of rate and user selectable. Accuracy and linearity: +/-1% of rate and user selectable. Accuracy and linearity: +/-1% of rate and user selectab				
2. Over-voltage protection (OVP) 3. Over -voltage trip point 4. Output under voltage limit (UVL) 5~176 5~353 5~7 4. Output under voltage limit (UVL) 5. Output under voltage protection (UVP) 6. Over temperature protection 5. Output under voltage protection (UVP) 6. Over temperature protection 7. Output shut-down when power supply output voltage goes below UVP programming. User part expected in autostart mode or by OUTPUT button or by rear panel ENABLE, or by come of the part of the p				
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4. Output under voltage limit (UVL) 5. Output under voltage protection (UVP) 6. Over temperature protection 6. Over temperature protection 6. Over temperature protection 6. Over temperature protection 7. Output shut-down when power supply output voltage goes below UVP programming. User passet by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by come of the protection of the protect	4-7			
5. Output under voltage protection (UVP)				
Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by come temperature protection Output shut-down when power supply output voltage goes below UVP programming. User panel ENABLE, or by come temperature protection Output shut-down when power supply output voltage goes below UVP programming. User panel ENABLE, or by come temperature protection Output shut-down when power supply output voltage goes below UVP programming. User panel ENABLE, or by come temperature protection User Selectable. Latched or non latched ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming O~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rate to voltage programming (*13) O~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate to voltage programming O~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate to voltage programming O~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate to voltage programming O~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate to voltage programming O~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate to voltage programming				
6. Over temperature protection User selectable, latched or non latched. 5. Output under voltage protection (UVP) Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by come user by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by come user by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by come user Selectable. Latched or non latched ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rate user selectable. Accuracy and linearity: +/-1% of user selectable. Accuracy an				
5. Output under voltage protection (UVP)	nunication port.			
S. Output under voltage protection (OVP) Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by come temperature protection User Selectable. Latched or non latched ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rate 2. lout voltage programming (*13) 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout resistor programming 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout resistor programming	esetable			
6. Over temperature protection User Selectable. Latched or non latched ANALOG PROGRAMMING AND MONITORING 1. Vout voltage programming 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rate 2. lout voltage programming (*13) 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout resistor programming 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1% of				
1. Vout voltage programming 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rate 2. lout voltage programming (*13) 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout resistor programming 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1% of				
1. Vout voltage programming 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rate 2. lout voltage programming (*13) 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout resistor programming 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1% of				
2. lout voltage programming (*13) 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rate 3. Vout resistor programming 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1% of				
3. Vout resistor programming 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1% of				
4. lout resistor programming (*13) 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1.5% or 5. Shut Off (SO) control By electrical Voltage: 0~0.6V/4~15V or dry contact, user selectable logic	rated lout.			
5. Shut Off (SO) control By electrical voltage: 0~0.6V/4~15V or dry contact, user selectable logic 6. Output current monitor (*13) 0~5V or 0~10V, user selectable. Accuracy: +/-1%.				
7. Output voltage monitor 0~5V or 0~10V, user selectable. Accuracy: +/-1%.				
8. Power supply OK signal 4~5V-OK, 0V-Fail. 500ohm series resistance.				
9. Parallel operation (*8) Possible, up to 6 units in master/slave mode with single wire current balance con	nection.			
10. Series operation —— 2 identical units (with external diodes).	-			
11. CV/CC indicator Open collector. CC mode: On, CV mode: Off. Maximum voltage: 30V, maximum sink o	urrent: 10mA			
12. Interlock (ILC) control Enables/Disables the PS output by dry contact (Short: On, Open: Off, Source current: less than 0.5mA). Ena/Dis is active				
13. Local/Remote mode Control By electrical signal or Open/Short: 0~0.6V or short: Remote, 2~15V or open:				
14. Local/Remote mode Indicator Open collector (shunted by 36V zener). On (0~0.6V, 10mA sink current max.)-Remote. Off-L				
15.Trigger out Maximum low level output = 0.8V, Minimum high level output = 3.8V, Maximum high level output = 3.8V, Maximum high level output = 3.8V, Maximum high level output = 3.8V, Minimum high level output	/el output =5V.			
Maximum source current = 1 om A, pulse = 20µs 1ypicai.	. ,			
Maximum low level input = 1.2V, Minimum high level input = 3.5V, Maximum high level input = 3.5V, Maximum high level input = 3.5V, Maximum high level input = 1.2V, Minimum high level input = 3.5V, Maximum high level input = 3.5V, M	<u> </u>			
Maximum sink current = 10mA, positive edge, trigger: tw = 10µs minimum, 17/11 = 1	el input =5V,			
17. Programmed signal 1 Open collector, maximum voltage 25V, maximum sink current 100mA. (Shunted by	el input =5V, s maximum.			
18. Programmed signal 2 Open collector, maximum voltage 25V, maximum sink current 100mA. (Shunted by	el input =5V, s maximum. 27V zener)			
FRONT PANEL	el input =5V, s maximum. 27V zener)			
Multiple options with 2 Encoders	el input =5V, s maximum. 27V zener)			
Vout/lout manual adjust	el input =5V, s maximum. 27V zener)			
OVP/UVL /UVP manual adjust	el input =5V, s maximum. 27V zener)			
Protection Functions - OVP LIVI_LIVP Foldback_OCP_INT_SO	el input =5V, s maximum. 27V zener)			
1. Control functions Communication Functions - Selection of LAN,IEEE (*20), RS232,RS485,US	el input =5V, s maximum. 27V zener)			
Communication Functions - Selection of Baud Rate, Address	el input =5V, s maximum. 27V zener) 27V zener)			
Analog Control Functions - Selection Voltage/resistive programming, 5V/10V, 5K/10K	el input =5V, s maximum. 27V zener) 27V zener)			
Analog Control Functions - Selection of Voltage/Current Monitoring 5V/10V, Output ON/OFF	el input =5V, s maximum. 27V zener) 27V zener)			



FRONT PANEL	
2. Display	 Vout: 4 digits, accuracy: 0.5% of rated output voltage+/-1 count.
2. Display	 lout: 4 digits, accuracy: 0.5% of rated output current+/-1 count.
3. Indications	 GREEN LEDs: FINE, MENU, PREV, PROT, REM, OUTPUT, CV, CC
3. Indications	 RED LED: PROT (OVP, UVP, OTP, FOLD, AC FAIL).
4. Function buttons	 FINE, MENU, PREV, PROT, REM, OUTPUT

PROGRAMMING AND READBACK (RS232/485,USB, Optional: IEEE(*17), LAN)					
1. Vout programming accuracy		0.05% of actual + 0.05% of rated output voltage			
2. lout programming accuracy (*13)		0.2% of rated output current			
3. Vout programming resolution		0.012% of full scale			
4. lout programming resolution		0.012% of full scale			
5. Vout readback accuracy		0.05% of actual + 0.05% of rated output voltage			
6. lout readback accuracy (*13)		0.1% of actual +0.3% of rated output current			
7. Vout readback resolution		0.012% of full scale			
8. lout readback resolution		0.012% of full scale			

INPUT CHARACTERISTICS	Z	160-2.6	320-1.3	650-0.64	
1. Input voltage/freq. (*3)		85~265Vac continuous, 47~63Hz, single phase			
2. Maximum Input current 100/200VAC (*4) (*15)		5/2.44	5/2.44	5/2.44	
3. Power Factor (Typ)		0.99 at 100/200Vac,100% load			
4. Efficiency (Typ) 100/200VAC (*4) (*15)	%	84/86	84/86	84/86	
5. Inrush current 100/200VAC (*5)		Less than 25A			

ENVIRONMENTAL CONDITIONS		
1. Operating temperature		0~50°C, 100% load.
2. Storage temperature		-20~85°C
3. Operating humidity	%	20~90% RH (no condensation).
4. Storage humidity	%	10~95% RH (no condensation).
5. Altitude		Maximum 3000m. Derate ambient temp above 2000m. Operating: Maximum ambient temperature, From 2000m up to 3000m Ambient temperature 40°C.

SAFETY/EMC			
1. Applicable standards:	Safety		UL61010-1, EN61010-1, IEC61010-1. Built to meet UL60950-1, EN60950-1 160V≤Vout≤650V: Output,J1,J2 are Hazardous. J3,J4,USB, IEEE/ISOLATED Analog ,LAN are Non Hazardous
	EMC		IEC/EN61326-1 (Built to meet EN55022/EN55024)
			Output floating: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous
2.Interface classification			Vout≤400V, +Output grounded: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous
			Vout>400V, +Output grounded: Output, J1, J2, J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Hazardous
3. Withstand voltage			160≤Vout≤320V models: Input-Output&J1,J2: 2970VDC/1min; Input-Ground: 2828VDC/1min. Output&J1,J2;-Ground: 2000VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 3200VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATED ANALOG Input-Ground: 707VDC/1min. 650V model: Input-Output&J1,J2: 3704VDC/1min; Input-Ground: 2828VDC/1min. Output&J1,J2,-Ground: 2780VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.
4. Insulation resistance			More than 100Mohm at 25°C, 70%RH.
5. Conducted emission			IEC/EN61326-1 Industrial Location - B, FCC part 15-B, VCCI-B
6. Radiated emission			IEC/EN61326-1 Industrial Location - A, FCC part 15-A, VCCI-A

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NOTES:

- *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage.
- *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).
- *4: Ta=25°C with rated output power.
- *5: Not including EMI filter inrush current, less than 0.2mSec at cold start Ta=25°C
- *6: At 85~132Vac or 170~265VAC, constant load.
 *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense.
- *8: For parallel operation up to 4 units, 5% of total output current is required.
 For parallel operation more than 4 units, 20% of total output current is required.
- *9: From 10% to 90% or 90% to 10% of Rated Output Voltage, with rated resistive load.
- *10: From 90% to 10% of Rated Output Voltage.
- *11: For load voltage change, equal to the unit voltage rating, constant input voltage.
- *12: Ripple is measured at 10~100% of rated output voltage and rated output current.
- *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.
- *14: Measured with 10:1 probe.
 *15: P.S with Lan, IEEE, models decrease efficiency by 0.25% and increase input current by 0.25%.
 P.S with Isolated analog option decreases efficiency by 0.75% and increases input current by 0.75%.
- *16: At rated output power.
- *17: Max. ambient temperature for using IEEE is 45°C.



Z⁺600 Series Specifications

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OUTPUT RATING		Z	160-4	320-2	650-1		
1.Rated output voltage (*1)		V	160	320	650		
2.Rated output current (*2)			4.0	2.0	1.00		
3.Rated output power at 100≤Vin≤265Vac, Ta ±	3.Rated output power at 100≤Vin≤265Vac, Ta ≤ 50°c		640	640	650		
CONSTANT VOLTAGE MODE		Z	160-4	320-2	650-1		
1. Max. Line regulation (*6)				0.01% of rated output voltage			
2. Max. Load regulation (*7)				0.01% of rated output voltage			
3. Ripple and noise (p-p, 20MHz) (*14) (*17)		mV	100	150	250		
4. Ripple r.m.s. 5Hz~1MHz (*14) (*17)		mV	10	30	60		
5. Temperature coefficient		PPM/°C		rated output voltage, following 30			
6. Temperature stability 7. Warm-up drift				interval following 30 minutes warn ated output voltage over 30 minute			
8. Remote sense compensation/wire		V	5	5	5		
9. Up-prog. Response time, 0~Vomax.(*9)		mS	55	75	75		
	load (*9)	mS	65	85	85		
	load (*10)	S	2	2.5	3		
11. Transient response time		mS		ver within 0.5% of its rated output f Output set-point: 10~100%, Local se			
				· · · · · · · · · · · · · · · · · · ·			
12. Hold-up time (*15)			16mSec	Typical.	14mSec Typical.		
CONSTANT SUPPRINT							
CONSTANT CURRENT MODE		Z	160-4	320-2	650-1		
1. Max. Line regulation (*6)				0.02% of rated output current			
2. Max. Load regulation (*11)			Lander 0.050/ S	0.09% of rated output current	fallouing land shares		
3. Load regulation thermal drift				ted output current over 30 minutes	1		
4. Ripple r.m.s. 5Hz~1MHz (*12) (*14)		mA	2	1.5	1		
5. Temperature coefficient 6. Temperature stability		PPM/°C		rated output current, following 30	minutes warm-up. . Constant line, load & temperature.		
7. Warm-up drift				rated output current over 30 minut			
7. Waini-up unit	ļ		Less than +/-0.170 of	rated output current over 30 minut	es following power on.		
PROTECTIVE FUNCTIONS		Z	160-4	320-2	650-1		
				er supply change mode from CV to			
1. Foldback protection				utostart mode or by OUTPUT butto			
•				communication port.			
2. Over-voltage protection (OVP)					ode or by OUTPUT button or by rear		
				nel ENABLE, or by communication			
3. Over -voltage trip point		V	5~176	5~353	5~717		
4. Output under voltage limit (UVL)			Preset by front panel or commun		g Vout below limit. Does not affect		
			0.444-4	in analog programming.	JVP programming. User presetable.		
5. Output under voltage protection (UVP)				utostart mode or by OUTPUT butto			
3. Output under voltage protection (ovi)			nesce by he input recycle in at	communication port.	nor by rear parier ENABLE, or by		
6. Over temperature protection			U	Iser selectable, latched or non latch	ed.		
, and the second							
ANALOG PROGRAMMING AND MONITORING							
1. Vout voltage programming			0~100% 0~5V or 0~10V	user selectable. Accuracy and linea	urity: +/-0.5% of rated Vout		
2. lout voltage programming (*13)				/, user selectable. Accuracy and line			
3. Vout resistor programming				cale, user selectable. Accuracy and			
4. lout resistor programming (*13)				cale, user selectable. Accuracy and			
5. Shut Off (SO) control			By electrical Voltage: 0~0.6V/4~15V or dry contact, user selectable logic.				
6. Output current monitor (*13)			0~5V or 0~10V, user selectable. Accuracy: +/-1%.				
7. Output voltage monitor			0~5V	or 0~10V, user selectable. Accuracy	: +/-1%.		
8. Power supply OK signal			4~5	V-OK, 0V-Fail. 500ohm series resist	ance.		
9. Parallel operation (*8)				naster/slave mode with single wire			
10. Series operation				identical units (with external diode			
11. CV/CC indicator				V mode: Off. Maximum voltage: 30			
12. Interlock (ILC) control			1 / /		nan 0.5mA). Ena/Dis is activated by front panel.		
13. Local/Remote mode Control				Open/Short: 0~0.6V or short: Remo			
14. Local/Remote mode Indicator			<u> </u>		max.)-Remote. Off-Local (30V max.).		
15.Trigger out					/, Maximum high level output =5V,		
_				m source current =16mA, pulse =20			
16.Trigger in				V, Minimum high level input =3.5V			
17 Programmed signal 1			Maximum sink current =16mA, positive edge, trigger: tw =10µs minimum, Tr/Tf =1µs maximum.				
17. Programmed signal 1 18. Programmed signal 2			Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener)				
18. Programmed signal 2 Open collector, maximum voltage 25V,maximum sink current 100mA. (Shunted by 27V zener)							
FROME DANIEL							
FRONT PANEL				Multiple antique of the 2 Feet 1			
FRONT PANEL				Multiple options with 2 Encoders			
FRONT PANEL				Vout/lout manual adjust			
			Protection	Vout/lout manual adjust OVP/UVL/UVP manual adjust			
FRONT PANEL 1. Control functions				Vout/lout manual adjust OVP/UVL/UVP manual adjust Functions - OVP, UVL,UVP, Foldback	, OCP, INT, SO		
			Communication F	Vout/lout manual adjust OVP/UVL/UVP manual adjust	, OCP, INT, SO 7),RS232,RS485,USB		

Analog Control Functions - Selection Voltage/resistive programming, 5V/10V, 5K/10K programming Analog Control Functions - Selection of Voltage/Current Monitoring 5V/10V, Output ON/OFF, Front Panel Lock.



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/-1 count.
, CV, CC
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1. Vout programming accuracy		0.05%	of actual + 0.05% of rated output	voltage	
2. lout programming accuracy (*13)		310373	0.2% of rated output current	Tollage	
3. Vout programming resolution			0.012% of full scale		
4. lout programming resolution			0.012% of full scale		
5. Vout readback accuracy		0.05% of actual + 0.05% of rated output voltage			
6. lout readback accuracy (*13)		0.1% of actual +0.3% of rated output current			
7. Vout readback resolution		0.012% of full scale			
8. lout readback resolution		0.012% of full scale			
INPUT CHARACTERISTICS	Z	160-4	320-2	650-1	
1. Input voltage/freq. (*3)		85~265Vac continuous, 47~63Hz, single phase			
2. Maximum Input current 100/200VAC (*4)		7.5/3.7	7.5/3.7	7.6/3.75	
3. Power Factor (Typ)		>0.99 at 100Vac, >0.98 at 200Vac,100% load			
4. Efficiency (Typ) 100/200VAC (*4)	%	86.5/88.5 87/88.5 86.5/88.5			
5. Inrush current 100/200VAC (*5)		Less than 30A			

ENVIRONMENTAL CONDITIONS		
1. Operating temperature		0~50°C, 100% load.
2. Storage temperature		-20~85°C
3. Operating humidity	%	20~90% RH (no condensation).
4. Storage humidity	%	10~95% RH (no condensation).
5. Altitude		Maximum 3000m. Derate ambient temp above 2000m. Operating: Maximum ambient temperature, From 2000m up to 3000m Ambient temperature 40°C.

SAFETY/EMC		
1. Applicable standards:	Safety	 UL61010-1, EN61010-1, IEC61010-1. Built to meet UL60950-1, EN60950-1 160V≤Vout≤650V: Output,J1,J2 are Hazardous. J3,J4,USB, IEEE/ISOLATED Analog ,LAN are Non Hazardous
	EMC	 IEC/EN61326-1 (Built to meet EN55022/EN55024)
		Output floating: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous
2.Interface classification		Vout≤400V, +Output grounded: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous
		Vout>400V, +Output grounded: Output, J1, J2, J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Hazardous
3. Withstand voltage		160≤Vout≤320V models: Input-Output&J1,J2: 2970VDC/1min; Input-Ground: 2828VDC/1min.
		Output&J1,J2,-Ground: 2000VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 3200VDC/1min;
		Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.
		 650V model: Input-Output&J1,J2: 3704VDC/1min; Input-Ground: 2828VDC/1min.
		Output&J1,J2,-Ground: 2780VDC/1min; Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG :4244VDC/1min;
		Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min;
		J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.
4. Insulation resistance		 More than 100Mohm at 25°C, 70%RH.
5. Conducted emission		 IEC/EN61326-1 Industrial Location - B, FCC part 15-B, VCCI-B
6. Radiated emission		 IEC/EN61326-1 Industrial Location - A, FCC part 15-A, VCCI-A

MECHANICAL			
1. Cooling			Forced air cooling by internal fan.
2. Weight	STANDARD	Kg	Less than 2Kg
2. Weight WIDE BODY		Kg	Less than 2.5Kg. Wide body with isolated analog or IEEE
2 Dimensions (Mallad)	STANDARD	mm	H: 83, W: 70, D: 350 (excluding bus bars, handles). (Refer to Outline drawing).
3. Dimensions (WxHxD) WIDE BODY		mm	H: 83, W: 105, D: 350 (excluding bus bars, handles…). (Refer to Outline drawing).
4. Vibration			According to: IEC60068-2-64
5. Shock			Less than 20G, half sine, 11mS. Unit is unpacked. According to: IEC60068-2-27

NOTES:

- *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage.
- *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).

 *4: Ta=25°C with rated output power.

 *5: Not including EMI filter inrush current, less than 0.2mSec.

- *6: At 85~132Vac or 170~265VAC, constant load.
- *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense.
- *8 For Parallel operation up to 4 units, 5% of total output current is required.
 - For Parallel operation more than 4 units, 20% of total output current is requierd.
- *9: From 10% to 90% or 90% to 10% of rated output voltage, with rated resistive load. *10: From 90% to 10% of rated output voltage.
- *11: For load voltage change, equal to the unit voltage rating, constant input voltage.
- *12: Ripple is measured at 10~100% of rated output voltage and rated output current.
- *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.
- *14: Measured with 10:1 probe.
- *15:At rated output power.
- *16 Max. ambient temperature for using IEEE is 45°C. *17: start in low ambient temp. (0°C), 1 min. warm up is required



Z⁺800 Series Specifications

OUTPUT RATING	Z	160-5	320-2.5	375-2.2	650-1.25
1.Rated output voltage (*1)	V	160	320	375	650
2.Rated output current (*2) at $100 \le Vin \le 265 Vac$, $Ta \le 50^{\circ}c$ Rated output current (*2) at $85 \le Vin < 100 Vac$, $Ta \le 40^{\circ}c$ Rated output current (*2) at $85 \le Vin < 100 Vac$, $40^{\circ}c < Ta \le 50^{\circ}c$	А	5.0	2.5	2.2	1.25
		5.0	2.5	2.2	1.25
		4.7	2.35	2.0	1.15
3.Rated output power at 100≤Vin≤265Vac, Ta ≤ 50°c Rated output power at 85≤Vin<100Vac, Ta ≤ 40°c Rated output power at 85≤Vin<100Vac, 40°c < Ta ≤ 50°c	W	800	800	825	812.5
		800	800	825	812.5
		752	752	750	747.5

CONSTANT VOLTAGE MODE		Z	160-5	320-2.5	375-2.2	650-1.25	
1. Max. Line regulation (*6)			0	0.01% of rated output voltage			
2. Max. Load regulation (*7)			0	.01% of rated output voltag	ge		
3. Ripple and noise (p-p, 20MHz) (*14) (**	17)	mV	100	150	150	250	
4. Ripple r.m.s. 5Hz~1MHz (*14) (*17)			10	30	30	60	
5. Temperature coefficient Pf			30PPM/	30PPM/°C from rated output voltage, following 30 minutes warm-up.			
5. Temperature stability			0.02% of rated Vout over 8hrs. interval following 30 minutes warm-up. Constant line, load & temp.			stant line, load & temp.	
7. Warm-up drift			Less than 0.05% of rated output voltage over 30 minutes following power on.			ng power on.	
8. Remote sense compensation/wire	8. Remote sense compensation/wire		5	5	5	5	
9. Up-prog. Response time, 0~Vomax.(*9)		mS	45	55	55	55	
10. Down-prog. response time:	Full load (*9)	mS	55	65	65	65	
	No load (*10)	S	2	2.5	2.5	3	
11. Transient response time		mS		e to recover within 0.5% of urrent. Output set-point: 1			

11. Transient response time	mS	output current. Output set-point: 10~100%, Local sense Less than 2mS.			
12. Hold-up time (*15)	mS	13msec Typical. 11.5msec Typical.			

CONSTANT CURRENT MODE	Z	160-5	320-2.5	375-2.2	650-1.25	
1. Max. Line regulation (*6)		0.02% of rated output current				
2. Max. Load regulation (*11)		0.09% of rated output current				
3. Load regulation thermal drift		Less than 0.05% of rated output current over 30 minutes following load change.				
4. Ripple r.m.s. 5Hz~1MHz (*12) (*14)	mA	2	1.5	1.5	1	
5. Temperature coefficient	PPM/°C	100PPM/°C from rated output current, following 30 minutes warm-up.				
6. Temperature stability		0.05% of rated lout over 8hrs. interval following 30 minutes warm-up. Constant line, load & temperature.				
7. Warm-up drift		Less than +/-0.1% of rated output current over 30 minutes following power on.				

PROTECTIVE FUNCTIONS	Z	160-5	320-2.5	375-2.2	650-1.25	
		Output shut-down when power supply change mode from CV to CC or CC to CV. U Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel				
1. Foldback protection						
		communication port.				
2. Over-voltage protection (OVP)		Inverter Shut down method. Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port.				
3. Over -voltage trip point	V	5~176	5~353	5~413	5~717	
4. Output under voltage limit (UVL)		Preset by front panel or communication port. Prevents from adjusting Vout below limit. Does not affect in analog programming.				
5. Output under voltage protection (UVP)		Output shut-down when power supply output voltage goes below UVP programming. User presetable. Reset by AC input recycle in autostart mode or by OUTPUT button or by rear panel ENABLE, or by communication port.				
6. Over temperature protection		User selectable, latched or non latched.				

ANALOG PROGRAMMING AND MONITORING		
1. Vout voltage programming	 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-0.5% of rated Vout.	
2. lout voltage programming (*13)	 0~100%, 0~5V or 0~10V, user selectable. Accuracy and linearity: +/-1% of rated lout.	
3. Vout resistor programming	 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1% of rated Vout.	
4. lout resistor programming (*13)	 0~100%, 0~5/10Kohm full scale, user selectable. Accuracy and linearity: +/-1.5% of rated lout.	
5. Shut Off (SO) control	 By electrical Voltage: 0~0.6V/4~15V or dry contact, user selectable logic.	
6. Output current monitor (*13)	 0~5V or 0~10V, user selectable. Accuracy: +/-1%.	
7. Output voltage monitor	 0~5V or 0~10V, user selectable. Accuracy: +/-1%.	
8. Power supply OK signal	 4~5V-OK, 0V-Fail. 500ohm series resistance.	
9. Parallel operation (*8)	 Possible, up to 6 units in master/slave mode with single wire current balance connection.	
10. Series operation	 2 identical units (with external diodes). 650VDC MAX. From chassis to ground	
11. CV/CC indicator	 Open collector. CC mode: On, CV mode: Off. Maximum voltage: 30V, maximum sink current: 10mA	
12. Interlock (ILC) control	 Enables/Disables the PS output by dry contact (Short: On, Open: Off, Source current: less than 0.5mA). Ena/Dis is activated by front panel.	
13. Local/Remote mode Control	 By electrical signal or Open/Short: 0~0.6V or short: Remote, 2~15V or open: Local	
14. Local/Remote mode Indicator	 Open collector (shunted by 36V zener). On (0~0.6V, 10mA sink current max.)-Remote. Off-Local (30V max.).	
15.Trigger out	 Maximum low level output =0.8V, Minimum high level output =3.8V, Maximum high level output =5V, Maximum source current =16mA, pulse =20µs Typical.	
16.Trigger in	Maximum low level input =1.2V, Minimum high level input =3.5V, Maximum high level input =5V,	
	 Maximum sink current =16mA, positive edge, trigger: tw =10μs minimum, Tr/Tf =1μs maximum.	
17. Programmed signal 1	 Open collector, maximum voltage 25V, maximum sink current 100mA. (Shunted by 27V zener)	
18. Programmed signal 2	 Open collector, maximum voltage 25V, maximum sink current 100mA. (Shunted by 27V zener)	

16



FRONT PANEL								
			T		Multiple options	with 2 Encoders		
			Multiple options with 2 Encoders Vout/lout manual adjust					
				OVP/UVL/UVP manual adjust				
				Protection Functions - OVP, UVL, UVP, Foldback, OCP, INT, SO				
1. Control functions				Communication Functions - Selection of LAN,IEEE (*16),RS232,RS485,USB				
				Communication Functions - Selection of Baud Rate, Address				
				Analog Control Functions - Selection Voltage/resistive programming, 5V/10V, 5K/10K programming				
					Analog Control Functions - Selection of Voltage/Current Monitoring 5V/10V, Output ON/OFF, Front Panel Loci			
1				Vout: 4 digits, accuracy: 0.5% of rated output voltage+/-1 count.				
2. Display			lout: 4 digits, accuracy: 0.5% of rated output current+/-1 count.					
			GREEN LEDs: FINE, MENU, PREV, PROT, REM, OUTPUT, CV, CC					
3. Indications				RED LED: PROT (OVP, UVP, OTP, FOLD, AC FAIL).				
4. Function buttons	4. Function buttons			FINE, MENU, PREV, PROT, REM, OUTPUT				
PROGRAMMING AND REA		232/485,USB, Op	1	(*16), LAN)				
1. Vout programming accur				0.05% of actual + 0.05% of rated output voltage				
2. lout programming accur				0.2% of rated output current				
3. Vout programming resol				0.012% of full scale				
4. lout programming resolu	ıtıon			0.012% of full scale 0.05% of actual + 0.05% of rated output voltage				
5. Vout readback accuracy	/*12\		 	-				
6. lout readback accuracy (of rated output current f full scale		
7. Vout readback resolution 8. lout readback resolution						f full scale f full scale		
INPUT CHARACTERISTICS			Z	160-5	320-2.5	375-2.2	650-1.25	
1. Input voltage/freq. (*3)					85~265Vac continuous	, 47~63Hz, single phase		
2. Maximum Input current	100/200VAC	(*4)		9.35/4.61	9.35/4.59	9.58/4.7	9.44/4.64	
3. Power Factor (Typ)					0.99 at 100Vac, 0.98	at 200Vac, 100% load		
4. Efficiency (Typ) 100/200VAC (*4)		%	86.5/88.5	86.5/89	87.5/89.5	87/89		
5. Inrush current 100/200V	AC (*5)			Less than 30A				
ENVIRONMENTAL CONDIT	IONS							
1. Operating temperature				0~50°C, 100% load.				
2. Storage temperature				-20~85℃				
3. Operating humidity			%	20~90% RH (no condensation).				
4. Storage humidity		%	10∼95% RH (no condensation).					
5. Altitude				Maximum 3000m. Derate ambient temp above 2000m. Operating: Maximum ambient temperature, From 2000m up to 3000m Ambient temperature 40°C.				
SAFETY/EMC				Operating, maximum	ambient temperature, mon	1 2000111 up to 3000111 71111	sient temperature 40 C.	
		Safety		UL61010-1, EN61010-1, IEC61010-1. Built to meet UL60950-1, EN60950-1 160V≤Vout≤650V: Output,J1,J2 are Hazardous. J3,J4,USB, IEEE/ISOLATED Analog ,LAN are Nor				
1. Applicable standards:							<u>og ,LAN are Non Hazardou</u>	
		EMC		IEC/EN61326-1 (Built to meet EN55022/EN55024)				
2 Interface dessitions				Output floating: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous Vout≤400V, +Output grounded: Output, J1, J2 are Hazardous; J3, J4, USB, LAN, IEEE/ISOLATED ANALOG are Non Hazardous				
2.Interface classification					ounded: Output, J1, J2 are Hazardous ounded: Output, J1, J2, J3, J			
		-			OV models: Input-Output&1,J2:			
					: 2000VDC/1min; Output&J1,J2			
				Input-J3,J4,USB,LAN/IEEE/ISOI	ut-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min; J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.			
3. Withstand voltage				375≤Vout≤650V model: Input-Output&J1,J2: Ir		out-Output&J1,J2: 3704VDC/1min; Input-Ground: 2828VDC/1min.		
				Outpu	Output&11,12, Ground:2154VDC/1min for 375VDC, 2780VDC/1min for 65VDC;			
			Output&J1,J2- J3,J4,USB,LAN/IEEE/ISOLATED ANALOG :4244VDC/1min; Input-J3,J4,USB,LAN/IEEE/ISOLATED ANALOG: 4242VDC/1min;					
			J3,J4,USB,LAN/IEEE/ISOLATDE ANALOG Input-Ground: 707VDC/1min.					
4. Insulation resistance				More than 100Mohm at 25°C, 70%RH.				
5. Conducted emission			IEC/EN61326-1 Industrial Location - B, FCC part 15-B, VCCI-B					
6. Radiated emission			IEC/EN61326-1 Industrial Location - A, FCC part 15-A, VCCI-A					
MECHANICAL								
1. Cooling			Forced air cooling by internal fan.					
2 1//-:	STA	ANDARD	Kg	Less than 2Kg				
2. Weight		DE BODY	Kg	Less than 2.5Kg. Wide body with isolated analog or IEEE			EE	
2 0'		ANDARD	mm	H: 83, W: 70, D: 350 (excluding bus bars, handles). (Refer to Outline drawing).				
3. Dimensions (WxHxD)		DE BODY	mm	H: 83, W: 105, D: 350 (excluding bus bars, handles). (Refer to Outline drawing).				
4. Vibration			According to: IEC60068-2-64					
i, violation				+	9 tor			

5. Shock NOTES:

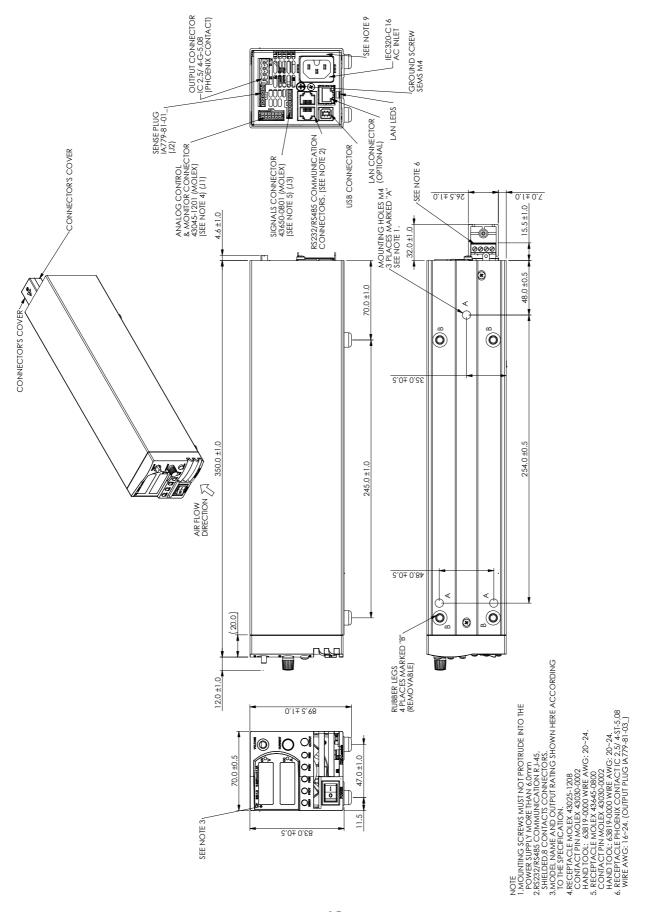
- *1: Minimum voltage is guaranteed to maximum 0.1% of rated output voltage. *2: Minimum current is guaranteed to maximum 0.2% of rated output current.
- *3: For cases where conformance to various safety standards (UL, IEC, etc...) is required, to be described as 100-240Vac (50/60Hz).

Less than 20G, half sine, 11mS. Unit is unpacked. According to: IEC60068-2-27

- *4: Ta=25°C with rated output power.
 *5: Not including EMI filter inrush current, less than 0.2mSec.
- *6: At 85~132Vac or 170~265VAC, constant load.
- *7: From No-Load to Full-Load, constant input voltage. Measured at the sensing point in Remote Sense. *8 For Parallel operation up to 4 units, 5% of total output current is required.
- For Parallel operation more than 4 units, 20% of total output current is requierd. *9: From 10% to 90% or 90% to 10% of rated output voltage, with rated resistive load.
- *10: From 90% to 10% of rated output voltage.

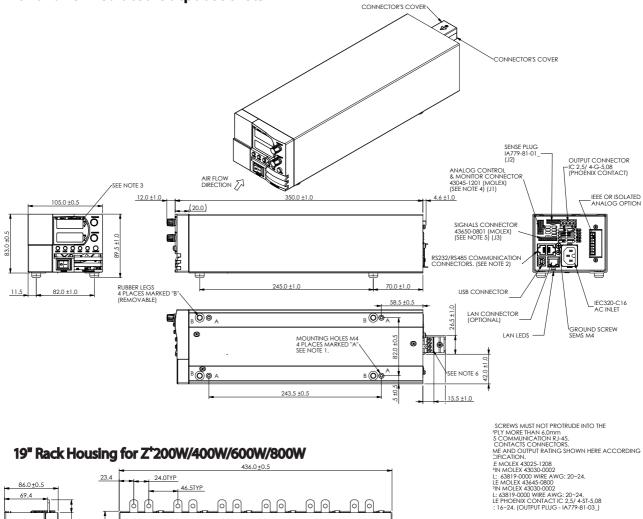
- *11: For load voltage change, equal to the unit voltage rating, constant input voltage.
 *12: Ripple is measured at 10~100% of rated output voltage and rated output current.
 *13: The Constant Current programming, readback and monitoring accuracy do not include the warm-up and Load regulation thermal drift.
- *14: Measured with 10:1 probe.
- *15:At rated output power.
- *16 Max. ambient temperature for using IEEE is 45°C.
- *17: start in low ambient temp. (0°C), 1 min. warm up is required

2.6 Z200W/400W/600W/800W Outline Drawing

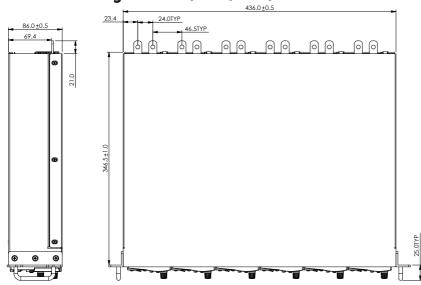


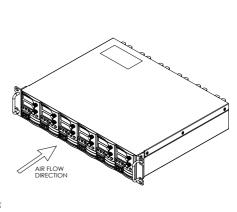


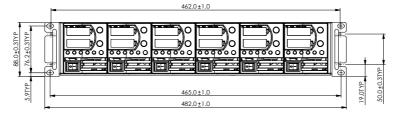
2.7 Z200W/400W/600W/800W Optional IEEE, Isolated Analog Interface, **Front Panel insulated Output sockets**



19" Rack Housing for Z*200W/400W/600W/800W







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