Medical / Industrial AC-DC Power Supply

120 W Convection 2” x 3” / MEP-120A☐J BNA



MEP-120A

Highlights & Features

- 2" x 3" x 1.2" Package with base
- Up to 16.67 W/inch^3 power density
- Up to 120 W output with natural convection cooling
- Up to 150 W peak power for 10 sec
- No Load Consumption < 0.21 W
- Up to 70 °C Ambient Operation
- Up to 700KHrs MTBF
- 2 x MOPP Isolation
- Suited for Type BF Medical Products.
- Class B Conducted and Radiated EMI
- IEC60601-1-2 4th Edition Immunity Compliance
- Compliance with IEC 61000-4-6 20V/m for semiconductor applications

Safety Certifications

E356265

Model Number: MEP-120A☐J BNA
Unit Weight: 0.14 kg (0.308 lb)
Dimensions (W × L × H): 50.8 x 76.2 x 31 mm (2.0 x 3.0 x 1.2 inch)

General Description

The MEP-120A offers 120 W output power and 4 output voltage of 12 V, 15 V, 18 V and 24 V in a 2” x 3” footprint. It supports up to 150W peak power for 10 seconds and features a wide operating temperature ranging from -30°C to +70°C. With low no load power consumption < 0.21 W and electric shock protection complying with 2 x MOPP, the MEP-120A offers reliable power supply for type BF medical equipment. The MEP-120A is certified with medical, ICT and home appliance safety approvals, including UL/ TUV/ CE/ UKCA and CB certification, as well as EMC approvals to EN 55032 Class B. It is applicable to type BF medical products, IT equipment and household appliances.

Model Information

Model Number	Input Voltage	Output Voltage	Max Continuous Current
MEP-120A12J BNA	90-264 Vac	12 Vdc	9.5 A
MEP-120A15J BNA	90-264 Vac	15 Vdc	8.0 A
MEP-120A18J BNA	90-264 Vac	18 Vdc	6.67 A
MEP-120A24J BNA	90-264 Vac	24 Vdc	5.0 A

Model Numbering

						CC Code
MEP –	**120**	**A**	**☐**	**J**	**☐**	**BNA**
ME: Delta Medical Power Supply P: Open frame	Max Wattage in Product Series 120: 120 W	Family Code	Output Voltage (Single Output) 12 – 12V 15 – 15V 18 – 18V 24 – 24V	Input Connector Type J: JST connector	Blank	Delta Standard, No conformal coating

All parameters are specified at 25°C ambient unless otherwise noted.

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Specifications

Input Ratings / Characteristics

Model Number		MEP-120A12J	MEP-120A15J	MEP-120A18J	MEP-120A24J
Nominal Input Voltage		100-240 Vac			
Input Voltage Range		90-264 Vac			
Nominal Input Frequency		50-60 Hz			
Input Frequency Range		47-63 Hz			
Input Current (max)		1.3 A @ 115 Vac 0.9 A @ 230 Vac			
Efficiency (typ.) @ full load	@ 115 Vac	91.0%	91.5%	92.0%	92.0%
	@ 230 Vac	93.5%	93.5%	94.0%	94.0%
No load Power Consumption		< 0.21 W @ 115 Vac & 230 Vac			
Inrush Current (typ.)		60 A @ 230 Vac, cold start			
Earth leakage current (max)		0.1 mA @ NC, 1.0 mA @ SFC*1			
Touch current (max)		0.1 mA @ NC, 0.5 mA @ SFC*1			
Power Factor (typ.)		0.98 @ 115 V/60 Hz, full load			

*1 NC: normal condition, SFC: single fault condition

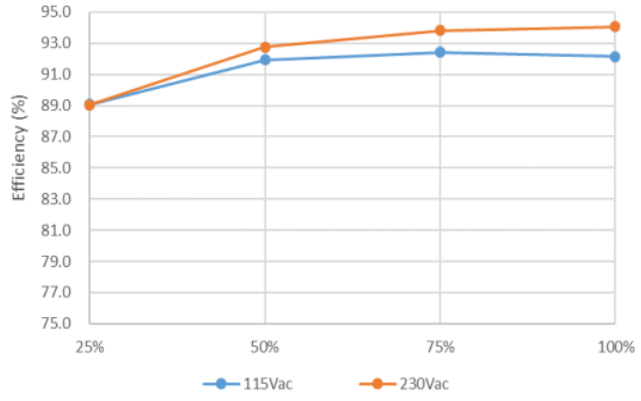


Figure 1-1. Typical efficiency Curve for 12 V

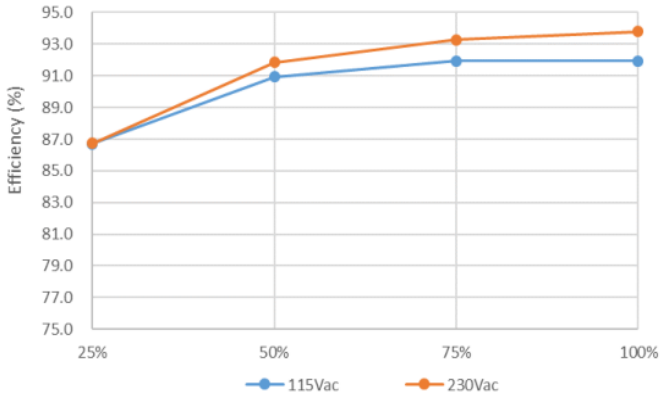


Figure 2-2. Typical efficiency Curve for 15 V

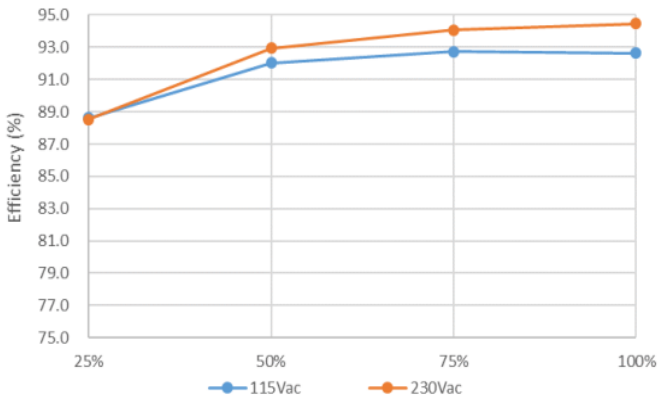


Figure 3-3. Typical efficiency Curve for 18 V

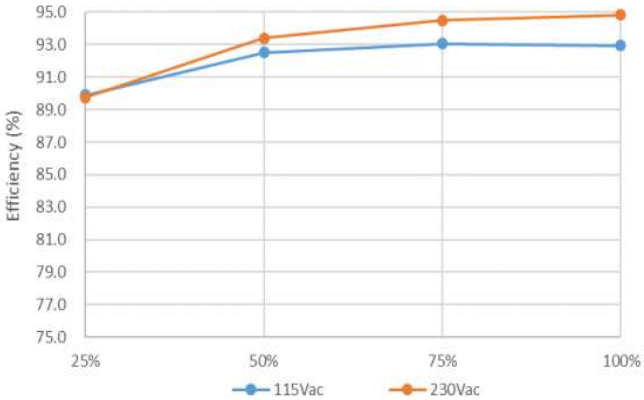


Figure 4-4. Typical efficiency Curve for 24 V

All parameters are specified at 25°C ambient unless otherwise noted.

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Output Ratings / Characteristics*2

Model Number		MEP-120A12J	MEP-120A15J	MEP-120A18J	MEP-120A24J
Output Power (max)		114 W	120 W		
Peak Power (max) for 10 sec		140 W	150 W		
Line Regulation (max)		0.5%			
Load Regulation (max)		1%			
PARD*3 (20 MHz)	≥ 25 °C	100 mVpp	120 mVpp	150 mVpp	150 mVpp
	≥ -30 °C	300 mVpp	360 mVpp	450 mVpp	450 mVpp
Start-up Time (max)		1000 ms @ 115 Vac 500 ms @ 230 Vac			
Hold-up Time (typ.)		20 ms @ 100% load, with nominal input range			
Rise time (max)		40 ms			
Dynamic Response		± 10% @ with 5-100% load change, (50% duty @ 5 Hz & 10 KHz, 2.5 A/us slew rate)			
Capacitive load (max)		8000 uF			

*2 For power de-rating from > 50°C to 70°C, see power de-rating on page 5
*3 PARD is measured with an AC coupling mode, and in parallel to end terminal with 0.1 µF ceramic capacitor & 47 µF electrolytic capacitor.
PSU need to burn in > 5 minutes when AMB ≤ 0°C

Mechanical

Package		Open Frame
Dimensions (W x L x H)		50.8 x 76.2 x 31 mm (2 x 3 x 1.2 inch)
Unit Weight		0.14 kg (0.308 lb)
Cooling System		Convection
Terminal	Input	JST: B2P3-VH(LF)(SN) or equivalent
	Output	JST: B4P-VH(LF)(SN) or equivalent
Noise (1 meter from power supply)		Sound Pressure Level (SPL) < 25 dBA

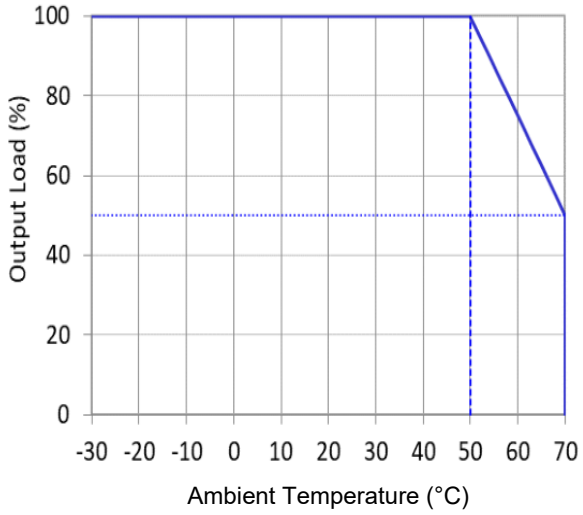
Medical / Industrial AC-DC Power Supply

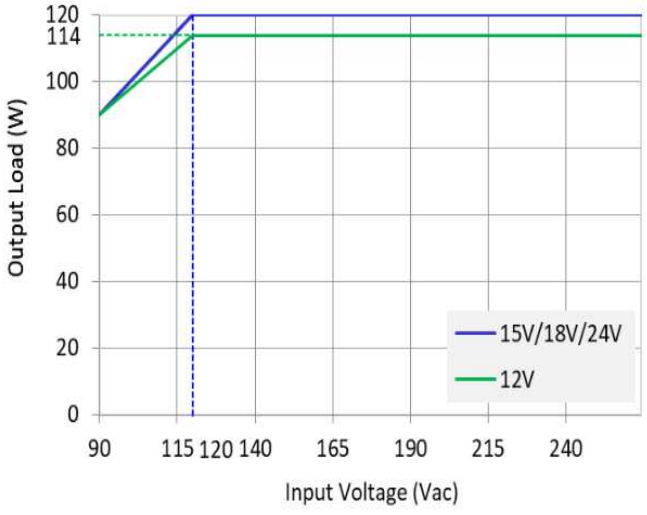
120 W Convection 2” x 3” / MEP-120A□J BNA

Environment

Surrounding Air Temperature	Operating	-30°C to +70°C (-40°C cold start)
	Storage	-40°C to +85°C
Temperature Power De-rating		Linear power derating from 100% load at 50°C, to 50% load at 70°C with 2.5%/°C Note: see power de-rating curves below
Line Power De-rating		< 120Vac de-rate power by 0.70% / Vac (12 V) < 120Vac de-rate power by 0.83% / Vac (15 V/18 V/24 V) Note: see power de-rating curves below
Operating Humidity		5-95% RH (Non-Condensing)
Operating Altitude		Up to 5,000 meters (up to 16,400 feet or 106-54 kPa) (4000 meters for IEC 60335-1, IEC 61558-1)
Shock Test (Non-Operating)		50 G, 11 ms, 3 shocks for each direction
Vibration (Non-Operating)		5-500 Hz, 2.09 Grms, 20 minute for each three axis
Over Voltage Category		II
Pollution Degree		2

Power De-rating Curve





Protections

Overvoltage	Main output 110-150% of rated normal voltage, Latch mode
Over load / Over current	Main output 105-185% of rated current , Hiccup Mode
Over Temperature	Latch Mode
Short Circuit	Hiccup Mode (Non-Latching, Auto-Recovery)
Protection Against Shock*4	Class I & II

*4 applicable to Class II medical equipment which need to be evaluated in the end product assembly

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Reliability Data

MTBF (typ.) at 115 Vac & 230 Vac, 25 °C	700K hrs based on Telecordia SR-332
Operating life (typ.) at 115 Vac & 230 Vac, 50% load, 40°C	10 years

Safety Standards / Directives

Medical Safety		IEC60601-1 CB report TUV EN60601-1 ANSI/AAMI ES 60601-1+CAN/CSA-C22.2 No.60601-1
ITE Safety		IEC60950-1 CB report IEC62368-1 CB report TUV EN 62368-1 UL 62368-1 and CAN/CSA C22.2 No. 62368-1 CCC GB 17625.1; GB 4943.1; GB/T 9254.1
Home Appliance (for 12 V & 24 V model)		IEC60335-1 CB report IEC61558-1 /-2-16 CB report TUV EN60335-1 TUV EN61558-1/-2-16
CE		In conformance with EN 60601-1: 2006 + A11: 2011 + A1: 2013 + A12: 2014 & EN 60601-1-2: 2015
UKCA		In conformance with Electromagnetic Compatibility Regulations 2016 and Medical Devices Regulations 2002 Regulations 2016 (UK MDR 2002)
Galvanic Isolation	Input to/Output (2XMOPP) Input to/Ground (1XMOPP) Output to/Ground (1XMOPP)	4000 Vac 2000 Vac 1500 Vac (Type BF application rated)

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EMC

EMC / Emissions		EN55032, CISPR 32 AS/NZS CISPR32 & CISPR11 Class B Compliance to EN55014-1, CISPR 14-1, AS/NZS CISPR 14 Class B Note: Class A Radiated Emission for Class II connection without earth connection
Harmonic Current Emissions	IEC 61000-3-2	Meet Class A limit
Voltage Flicker	IEC 61000-3-3	
Immunity to		
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A[1)] Air Discharge: 15 kV Contact Discharge: 8 kV
Radiated Field	IEC 61000-4-3	Criteria A[1)] 80 MHz-2700 MHz, 10 V/m AM modulation
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A[1)]: 2 kV
Surge	IEC 61000-4-5	Level 3 Criteria A[1)] Common Mode[3)]: 2 kV Differential Mode[4)]: 1 kV
Conducted	IEC 61000-4-6	Level 2 Criteria A[1)] 150 kHz-80 MHz, 3 Vrms, 6 Vrms, 20 Vrms at ISM bands and Amateur radio bands
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A[1)] Magnetic field strength 30 A/m
Voltage Dips	IEC 61000-4-11	0% residual; 1 cycle, Criteria A[1)] 40% residual; 10 cycle, Criteria B[2)] 70% residual; 25 cycle, Criteria B[2)]
Voltage Dips[5)]	IEC 60601-1-2	Criteria A[2)] 0% U_T, 0.5 cycle(10 ms), (0°,45°,90°,135°,180°,225°,270°,315°,360°) Criteria B[2)] 0% U_T,1 cycle (20 ms), 0° Criteria B[2)] 70% U_T,25 cycle (500 ms) , 0° Criteria B[2)] 0% U_T,250 cycle (5000 ms) , 0°

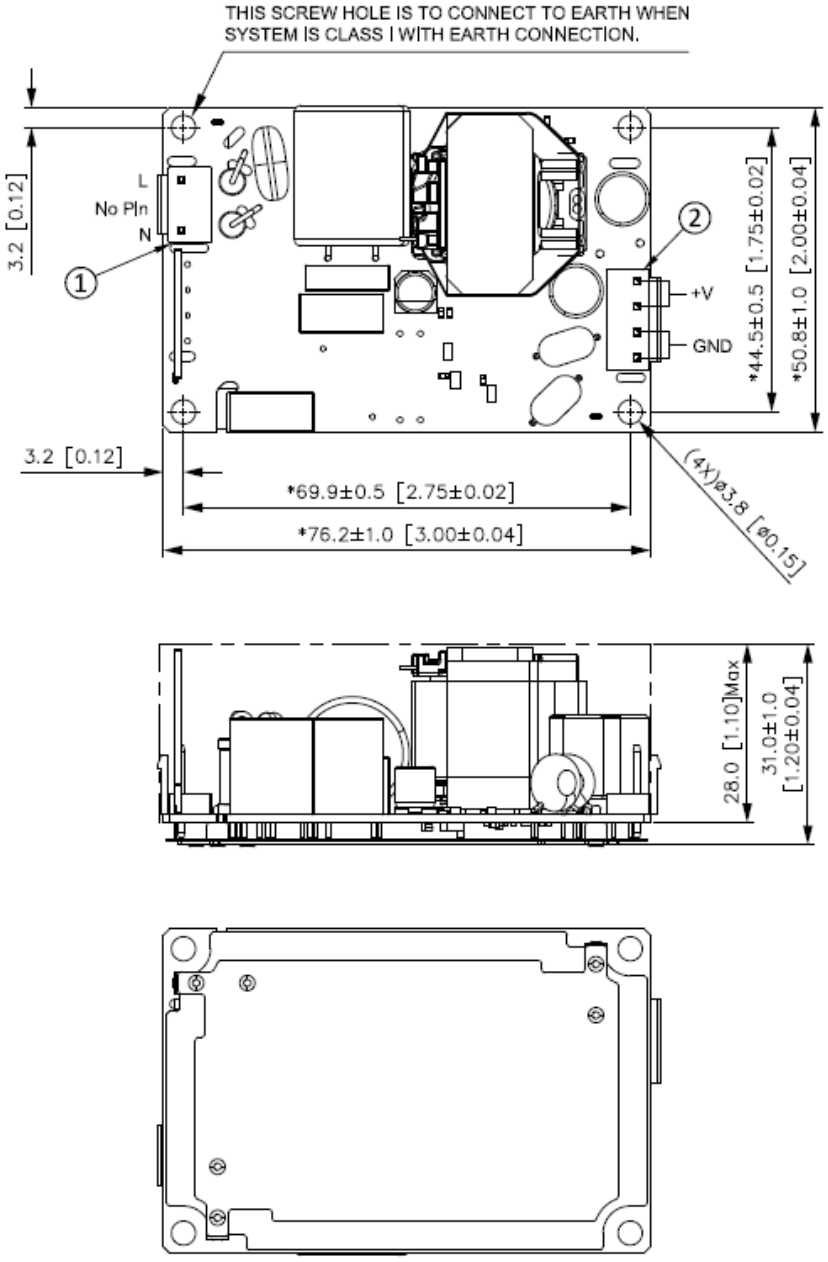
1) Criteria A: Normal performance within the specification limits
2) Criteria B: Output out of regulation, or shuts down during test. Automatically restored to normal operation after test.
3) Asymmetrical: Common mode (Line to earth)
4) Symmetrical: Differential mode (Line to line)

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Dimensions

W x L x H: 50.8 x 76.2 × 31.0 mm (2 x 3 × 1.2 inch)



Notes:

- All dimensions are in millimeters and inches.

Connector Definition and Pin Assignment:

No	Item	Part No.	Mating
1	**AC input connector(CN1)**	JST, B2P3-VH or equivalent	JST, VHR-3N or equivalent
2	**DC output connector(CN101)**	JST, B4P-VH or equivalent	JST, VHR-4N or equivalent

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Functions

Start-up Time

The time required for the output voltage to reach 90% of its final steady state value, after the input voltage is applied.

Rise Time

The time required for the output voltage to change from 10% to 90% of its final steady state value.

Hold-up Time

Time between the collapse of the AC input voltage, and the output falling to 90% of its steady state value.

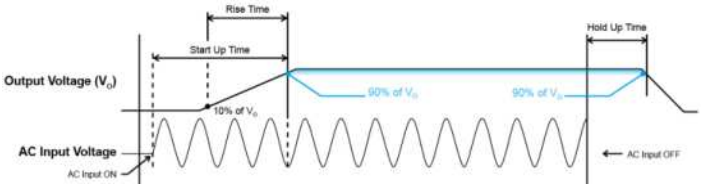


Figure 2. Time Sequence

Dynamic Response (Main Output)

The power supply output voltage will remain within ±10% of its steady state value, when subjected to a dynamic load 5% to 100% of its rated current.

■ **5% to 100% Load**

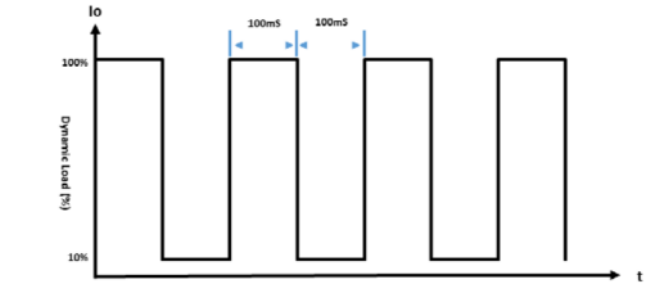


Figure 3-1. Dynamic Load (5 Hz)

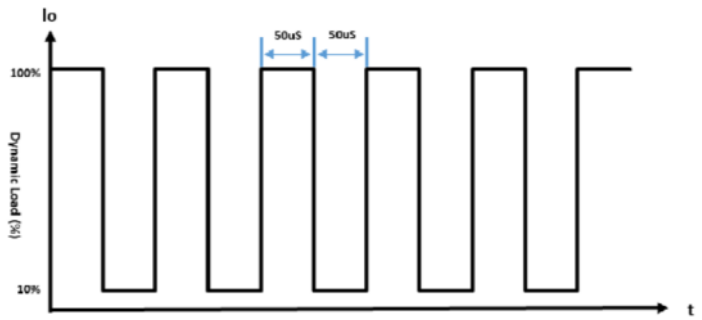


Figure 3-2. Dynamic Load (10K Hz)

Inrush Current

Inrush current is the input current that occurs when the input voltage is first applied. For AC input voltages, the maximum peak value of inrush current will occur during the first half cycle of the applied AC voltage. This peak value decreases exponentially during subsequent cycles of AC voltage.

Overvoltage Protection

The power supply’s overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 5 under “Protections”. Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

Overload & Over current Protections

The power supply’s Overload (OLP) and Over current (OCP) Protections will be activated before output current under 175% of I_O (Max load). Upon such occurrence, V_O will start to drop. Once the power supply has reached its maximum power limit, the protection will be activated and the power supply will go into “Hiccup mode” (Auto-Recovery). The power supply will recover once the fault condition causing the OLP and OCP is removed and I_O is back within the specified limit.

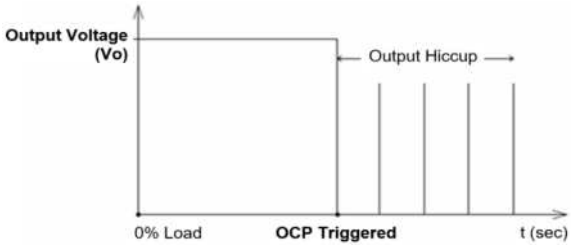


Figure 4. Hiccup at OLP/OCP

Additionally, if the Iout is >100% for a prolong period of time (depending on the load), the Over Temperature Protection (OTP) may be activated due to high temperature on critical components. The power supply will then go into latch mode.

Short Circuit Protection

Output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in “Hiccup mode”, The power supply will return to normal operation after the short circuit is removed.

Over Temperature Protection

As mentioned above, the power supply also has Over Temperature Protection (OTP). This is activated when the overload condition persists for an extended duration and the output current is below the overload trigger point but >100% load. In the event of a higher operating temperature condition at 100% load, the power supply will run into OTP when the surrounding air temperature is higher than the operating temperature. When activated, the output voltage will go into latch mode until the input voltage is removed; then, reapplied, and the surrounding air temperature drops to its normal operating temperature.

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Certificate



All Delta Medical Power products conform to the European directive 2011/65/EU.

ROHS is the abbreviation for “Restriction of the use of certain hazardous substances”



Delta has been certified as meeting the requirement of ISO 13485: 2016 and EN ISO 13485:2016 for the design and manufacture of switching power supply and adaptor for medical device.



In addition to a UL Total Certification Program (TCP) approved client laboratory for IEC60950 and IEC60065. Delta also has participated UL Client Test Data Program (CDTP) for IEC 60601

Attention

Delta provides all information in the datasheets on an “AS IS” basis and does not offer any kind of warranty through the information for using the product. In the event of any discrepancy between the information in the catalog and datasheets, the datasheets shall prevail (please refer to PSU.deltaww.com for the latest datasheets information). Delta shall have no liability of indemnification for any claim or action arising from any error for the provided information in the datasheets. Customer shall take its responsibility for evaluation of using the product before placing an order with Delta.

Delta reserves the right to make changes to the information described in the datasheets without notice.

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