

# Medical AC-DC Adapter

## 24 V 250 W / MEA-250A24C□

# MEA-250A24C□



### Highlights & Features

- Meet Efficiency Level VI
- Safety Approvals to IEC 60601-1 3.1 Ed. & IEC 62368-1
- Compliant with IEC 60601-1-2 3<sup>rd</sup> and 4<sup>th</sup> Ed. Requirements
- IP22 ingress protection rating
- 2 × MOPP isolation
- Suited for Type BF Medical Products

### Safety Standards



CB Certified for worldwide use

**Model Number:** MEA-250A24C□  
**Unit Weight:** 1.05 kg (37.0 ounces)  
**Dimensions (L × W × H):** 200.0 × 100.0 × 43.0 mm  
 7.88 × 3.94 × 1.70 inch

### General Description

The MEA-250A24C medical AC-DC desktop type adapter comes with universal AC input voltage range at 90Vac to 264Vac. The 24Vdc/10.42A output adapter complies to the latest IEC/EN 60601-1-2 4th edition requirements. It is certified for EMC standards according to EN/BS EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment and EN/BS EN 55032 for Information Technology Equipment (ITE) radio-frequency equipment. MEA-250A24C also has both medical and ITE safety approvals including UL/cUL and IEC 62368-1, CB certification and CCC approval. Designs are fully compliant with RoHS Directive for environmental protection.

### Model Information

Medical AC-DC Adapter

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
MEA-250A24C H-A	90-264 Vac	24 Vdc	10.42 A

### Model Numbering

					CC Code	
MEA –	250	A	24	C	H-	A
Delta Medical Desktop Adapter	Max wattage in the product series (May be lower at some voltage)	Family Code	Output Voltage (Single Output) 24 – 24 V	Input Connector Type C – C14	Plug Type: 6 pins mini-fit Cable Length: 1.5 m	Delta Standard

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### Specifications

#### Input Ratings / Characteristics

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.)	4 A @ 115 Vac, 2 A @ 230 Vac
Average Efficiency (typ.)	90%, Reference Fig. 1
Standby Power (max.)	0.3 W @ 115 Vac & 230 Vac
Inrush Current (typ.)	50 A @ 115 Vac and 100 A @ 230 Vac
Touch Current (max.)	0.1 mA @ 264 Vac NC <sup>1)</sup> , 0.3 mA @ 264 Vac SFC <sup>2)</sup>
Earth Leakage Current (max.)	0.2 mA @ 264 Vac NC <sup>1)</sup> , 0.5 mA @ 264 Vac SFC <sup>2)</sup>

- 1) NC: Normal condition
- 2) SFC: Single fault condition

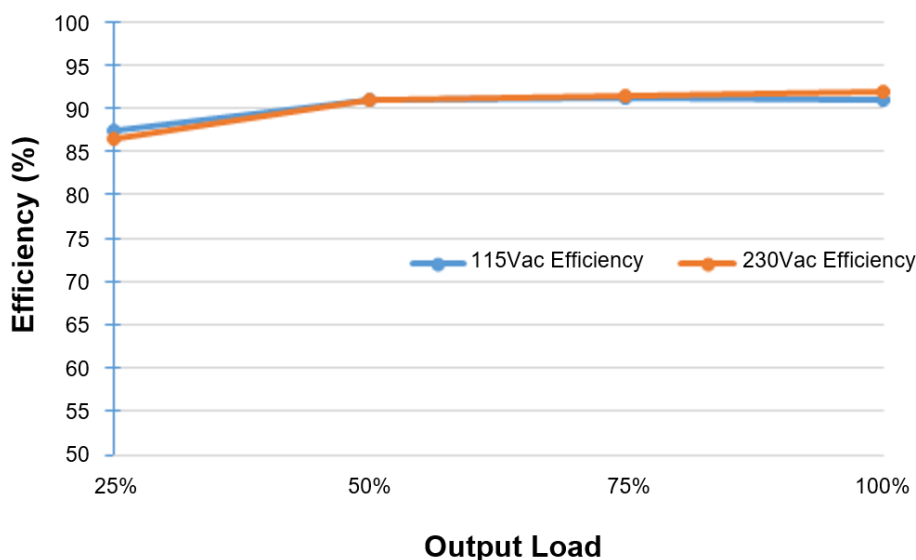


Fig. 1 Efficiency versus Output load

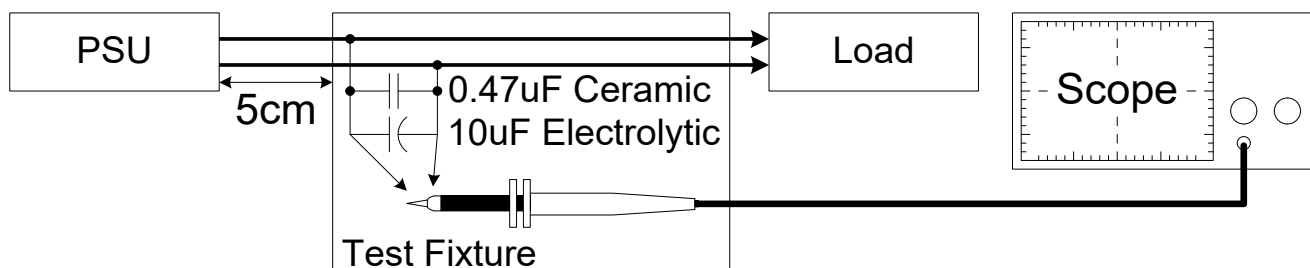
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## 24 V 250 W / MEA-250A24C□

### Output Ratings / Characteristics

Nominal Output Voltage	24 Vdc
Output Total Regulation	± 5%
Output Current	10.42 A
Output Power	250 W
Line Regulation	± 0.5%
Load Regulation	± 4.5%
Ripple & Noise (max.)	240 mVpk-pk @ Rated load
Start-up Time (max.)	3000 ms @ 115 Vac
Hold-up Time (min.)	10 ms @ 100 Vac
Dynamic Response (Overshoot & Undershoot O/P Voltage)	± 10% @ 0-50% & 50-100% load; Slew rate 0.25 A/μs (@ 100 Hz, 50% Duty Cycle)

### Ripple & Noise measurement circuit with 20MHz BW



### Mechanical

Case	PC
Dimensions (L × W × H)	200.0 × 100.0 × 43.0 mm (7.88 × 3.94 × 1.70 inch)
Unit Weight	1.05 kg (37.0 ounces)
Cable Length	1500 mm
Indicator	YES
Cooling System	NA
Terminal	Input IEC 60320 C14 socket
	Output MOLEX 39-01-2060

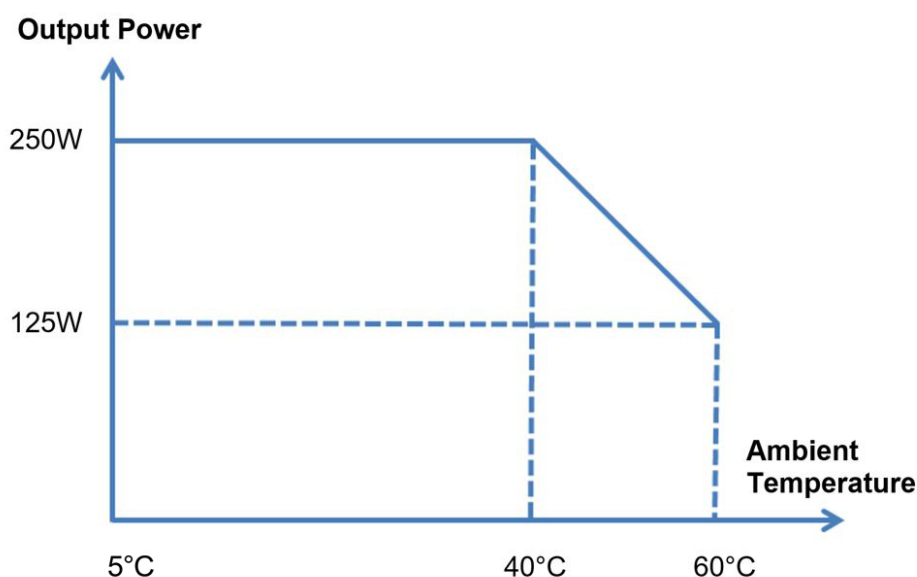
# Medical AC-DC Adapter

## 24 V 250 W / MEA-250A24C□

### Environment

Surrounding Air Temperature	Operating	5°C to +60°C
	Storage	-40°C to +70°C
Power De-rating		> 40°C de-rate power by 2.5% / °C
Operating Humidity		10-95% RH (Non-Condensing)
Operating Altitude		5,000 meters (16,400 feet)
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

### Power De-rating Curve



### Protections

Overvoltage (max.)	120%, Latch Mode
Overload / Overcurrent (max.)	200% of rated load current, Hiccup Mode, (Non-Latching, Auto-Recovery)
Over Temperature	Hiccup Mode, (Non-Latching, Auto-Recovery)
Short Circuit	Hiccup Mode, (Non-Latching, Auto-Recovery)
Degree of Protection	IP22
Protection Against Shock	Class I

### Reliability Data

MTBF (typ.)	500K Hours based on Telecordia SR-332 (at 115 Vac, Max. load and 25°C Ambient)
Expected Cap Life Time <sup>1)</sup>	5 Years (115 Vac , 100% load @ 25°C)

1) Estimated lifetime when 8 hours operating a day.

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## 24 V 250 W / MEA-250A24C□

### Safety Standards / Directives

Medical Safety	IEC 60601-1 3.1 edition CB report EN 60601-1 CAN/CSA-C22.2 NO. 60601-1:14, ANSI/AAMI ES 60601-1 UL 60601-1 (File No. E356265)	
ITE Safety	IEC 60950-1 (Ed.2,2005), GB 4943.1-2011, GB 9254-2008, IEC 62368-1, GB 17625.1-2012, J 60950-1 (H29) UL 60950-1 (Ed.2 2014) AS/NZS 60950-1 (2015)	
CE	In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU EN 60601-1: 2006 + A11: 2011 + A1: 2013 + A12: 2014 & EN 60601-1-2: 2015	
UKCA	In conformance with Electrical Equipment (Safety) Regulations 2016, and Electromagnetic Compatibility Regulations 2016, Medical Devices Regulations 2002(UK MDR 2002)	
Galvanic Isolation	Input to Output (2XMOPP)	4000 Vac
	Input to PE (1XMOPP)	1500 Vac
	Output to PE (1XMOPP)	1500 Vac (Type BF application rated)

### EMC (Compliant with IEC 60601-1-2 4<sup>th</sup> Ed. Requirements)

EMC / Emissions	EN/BS EN 55011, EN/BS EN 55032, Compliance to FCC FCC Title 47: Class B	
Harmonic Current Emissions	IEC 61000-3-2	Meet Class A and Class D limit
Immunity to		
Voltage Flicker	IEC 61000-3-3	
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A <sup>1)</sup> Air Discharge: 15 kV Contact Discharge: 8 kV
Radiated Field	IEC 61000-4-3	Criteria A <sup>1)</sup> 80 MHz-2700 MHz, 10 V/m AM modulation 385 MHz-5785 MHz, 28 V/m Pulse mode and other modulation
Electrical Fast Transient / Burst	IEC 61000-4-4	Level 3 Criteria A <sup>1)</sup> : 2 kV
Surge	IEC 61000-4-5	Level 3 Criteria A <sup>1)</sup> Common Mode <sup>3)</sup> : 2 kV Differential Mode <sup>4)</sup> : 1 kV
Conducted	IEC 61000-4-6	Level 2 Criteria A <sup>1)</sup> 150 kHz - 80 MHz, 3 Vrms, 6 Vrms at ISM bands and Amateur radio bands
Power Frequency Magnetic Fields	IEC 61000-4-8	Criteria A <sup>1)</sup> Magnetic field strength 30 A/m
Voltage Dips	IEC 61000-4-11	Criteria A <sup>1)</sup> 0% U <sub>T</sub> , 0.5 cycle (10 ms), 0°/45°/90°/135°/180°/225°/270°/315°/360° Criteria A <sup>1)</sup> 0% U <sub>T</sub> , 1 cycle (20 ms), 0° Criteria B <sup>2)</sup> 70% U <sub>T</sub> , 25 cycle (500 ms), 0° Criteria B <sup>2)</sup> 0% U <sub>T</sub> , 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 restore to normal operation after test.

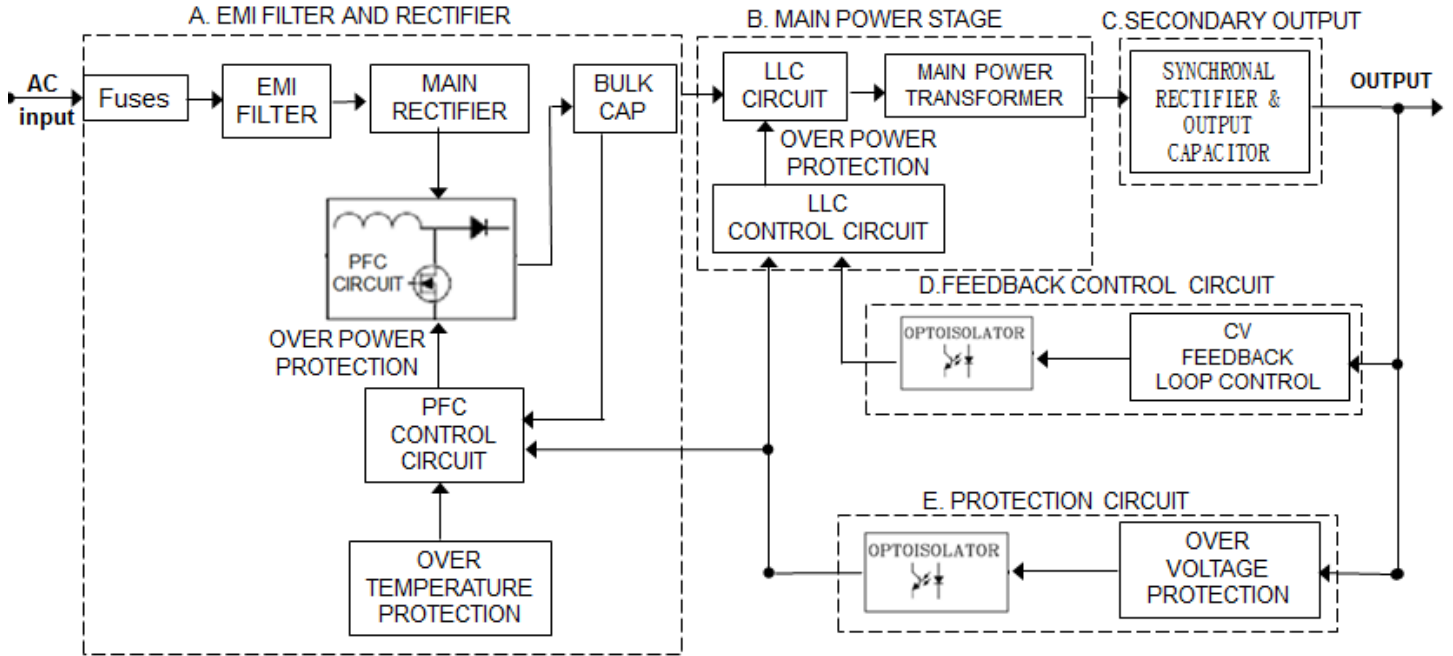
3) Asymmetrical: Common mode (Line to earth)

4) Symmetrical: Differential mode (Line to line)

# Medical AC-DC Adapter

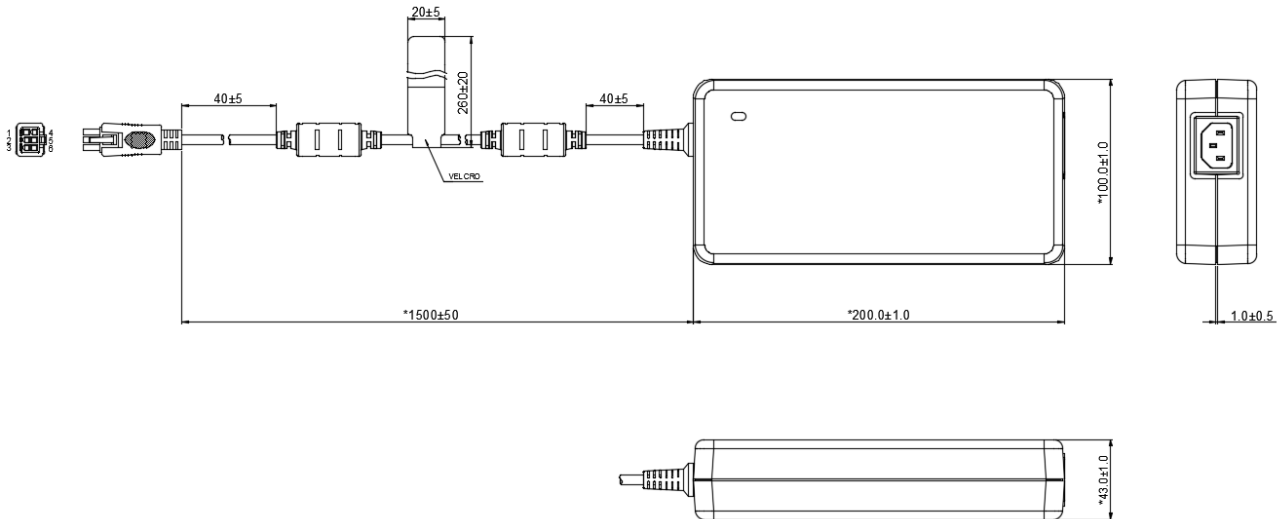
## 24 V 250 W / MEA-250A24C□

### Block Diagram



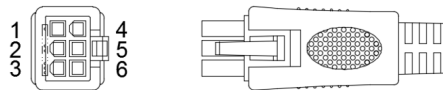
### Dimensions

W × L × H: 100.0 × 200.0 × 43.0 mm



**Note:** The plug's polarity is as following.

DC PLUG: MOLEX, 39-01-2060	
DIN PLUG	POLARITY
P1	V+
P2	V+
P3	V+
P4	RTN
P5	RTN
P6	RTN



#### MATING CONNECTOR

- PCB MOUNT TYPE  
MOLEX, 39-29-1067 (5569 SERIES)
- WIRE CONNECTOR TYPE  
HOUSING: MOLEX, 39-01-3069 (5559 SERIES)  
TERMINAL: MOLEX 5558 SERIES

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### Functions

#### Start-up Time

The time required for the output voltage ( $V_o$ ) to reach 90% of its set value, after the input AC voltage is applied.

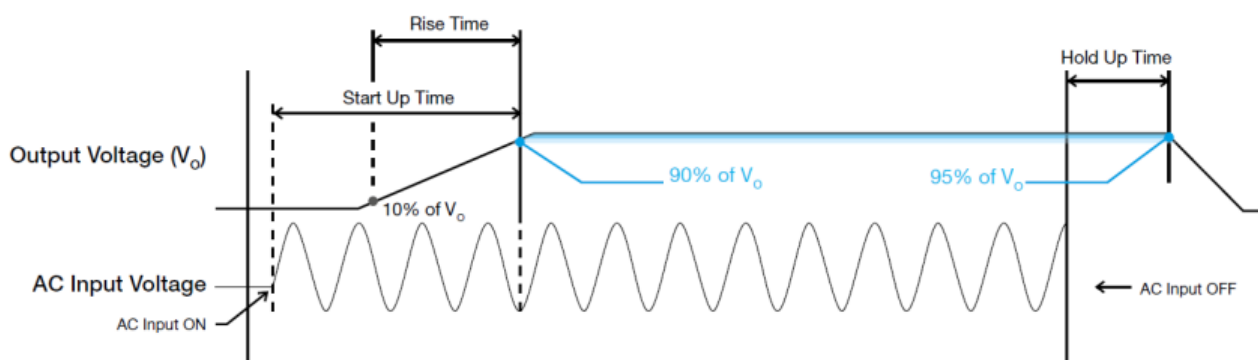
#### Rise Time

The time required for the output voltage ( $V_o$ ) to change from 10% to 90% of its steady state value.

#### Hold-up Time

Hold up time is the time when the AC input collapses and output voltage retains regulation for a certain period of time. The time required for the output to reach 95% of its set value, after the input voltage is removed.

#### ■ Graph illustrating the Start-up Time, Rise Time, and Hold-up Time

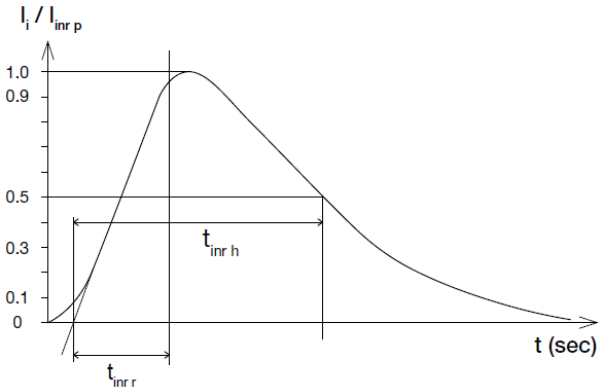


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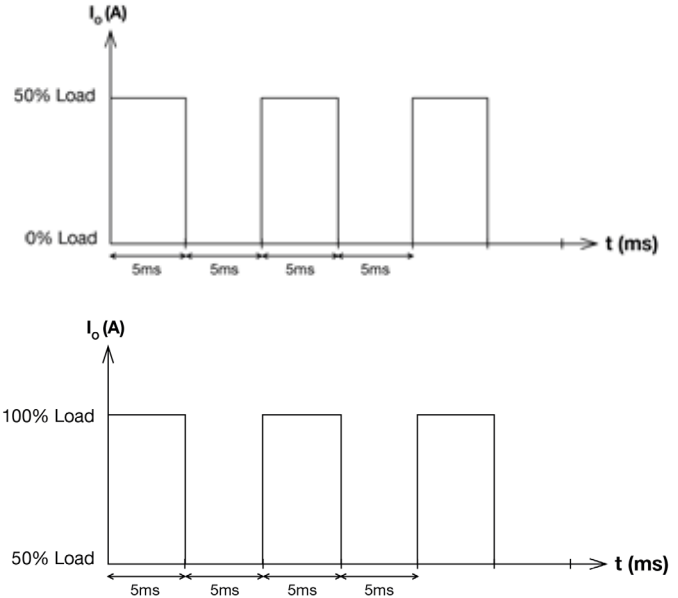
### Inrush Current

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.



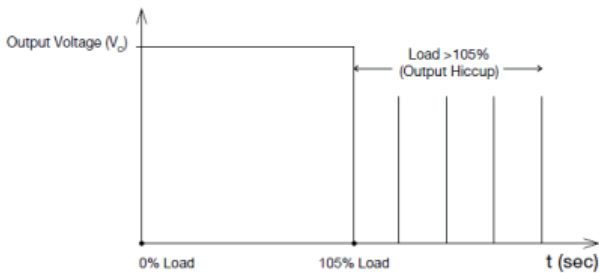
### Dynamic Response

The power supply output voltage will remain within  $\pm 10\%$  of its steady state value, when subjected to a dynamic load change from 0% to 50% or 50% to 100% of its rated current.



### Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Protections will be activated when output current ( $I_o$ ) is about 105% - 200%. Upon such an 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.



### Short Circuit Protection (Auto-Recovery)

The power supply's output OLP/OCP function also provides protection against short circuits. When a short circuit is applied, the output current will operate in "Hiccup mode", as shown in the illustration in the OLP/OCP section on this page. The power supply will return to normal operation after the short circuit is removed.

### 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 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

### 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 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 hiccup 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



Delta has been certified as meeting the requirement of ISO 13485: 2003 and EN ISO 13485:2012 for the design and manufacture of switching power supply and adapter for medical device.



Delta is approved for the UL Total Certification Program (TCP) approved client laboratory for IEC 62368-1. Delta also has participated UL Client Test Data Program (CTDP) for IEC 60601.



Energy star level VI compliance

### 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 [www.DeltaPSU.com](http://www.DeltaPSU.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.

### Manufacturer and Authorized Representatives Information

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