

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 3th and 4th 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
 7.87 × 3.94 × 1.69 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

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| 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 | Tuning Fork/Din/Other |

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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 ¹⁾ , 0.3 mA @ 264 Vac SFC ²⁾ |
| Earth Leakage Current (max.) | 0.2 mA @ 264 Vac NC ¹⁾ , 0.5 mA @ 264 Vac SFC ²⁾ |

1) NC: Normal condition

2) SFC: Single fault condition

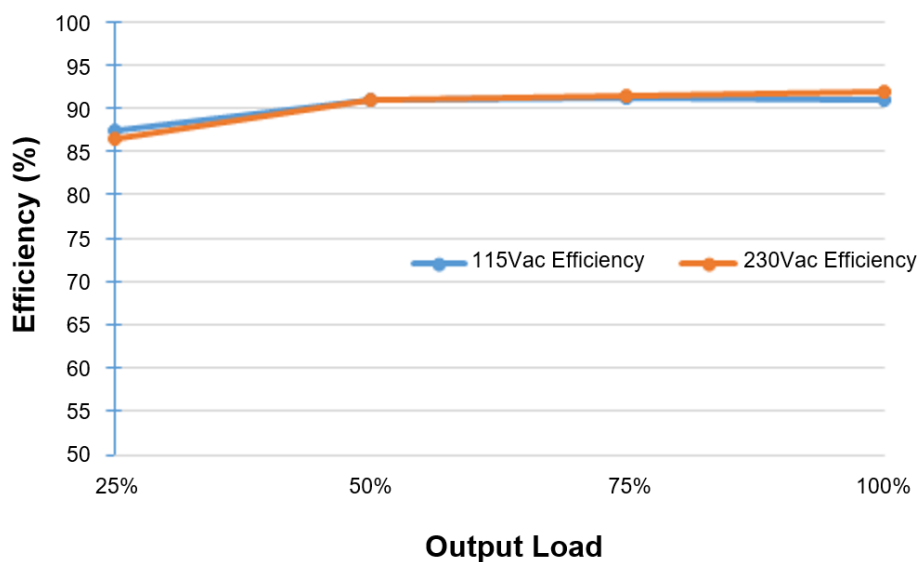


Fig. 1 Efficiency versus Output load

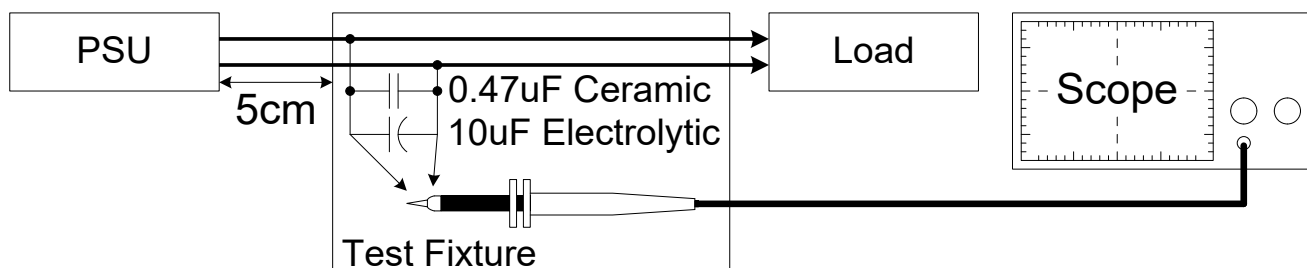
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Output Ratings / Characteristics

| | |
|--|---|
| 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 (7.87 × 3.94 × 1.69 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 |

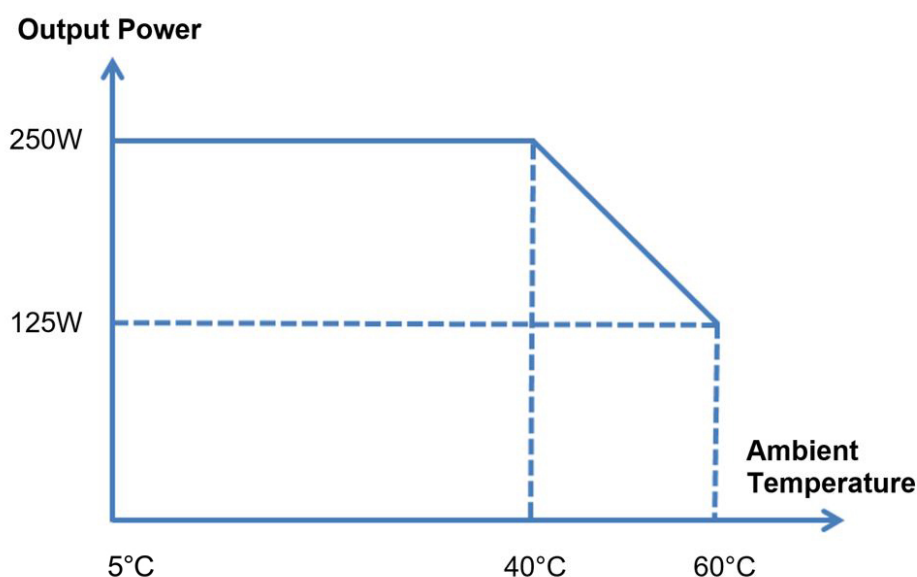
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Environment

| | | |
|-----------------------------|---------------|--|
| 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 ¹⁾ | 5 Years (115 Vac , 100% load @ 25°C) |

1) Estimated lifetime when 8 hours operating a day.

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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 4th Ed. Requirements)

| | | |
|-----------------------------------|--|--|
| EMC / Emissions | EN/BS EN 55011, EN/BS EN 55032, Compliance to 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 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 385 MHz-5785 MHz, 28 V/m Pulse mode and other 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 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 | Criteria A ¹⁾ 0% U _T , 0.5 cycle (10 ms), 0°/45°/90°/135°/180°/225°/270°/315°/360° Criteria A ¹⁾ 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 restore to normal operation after test.

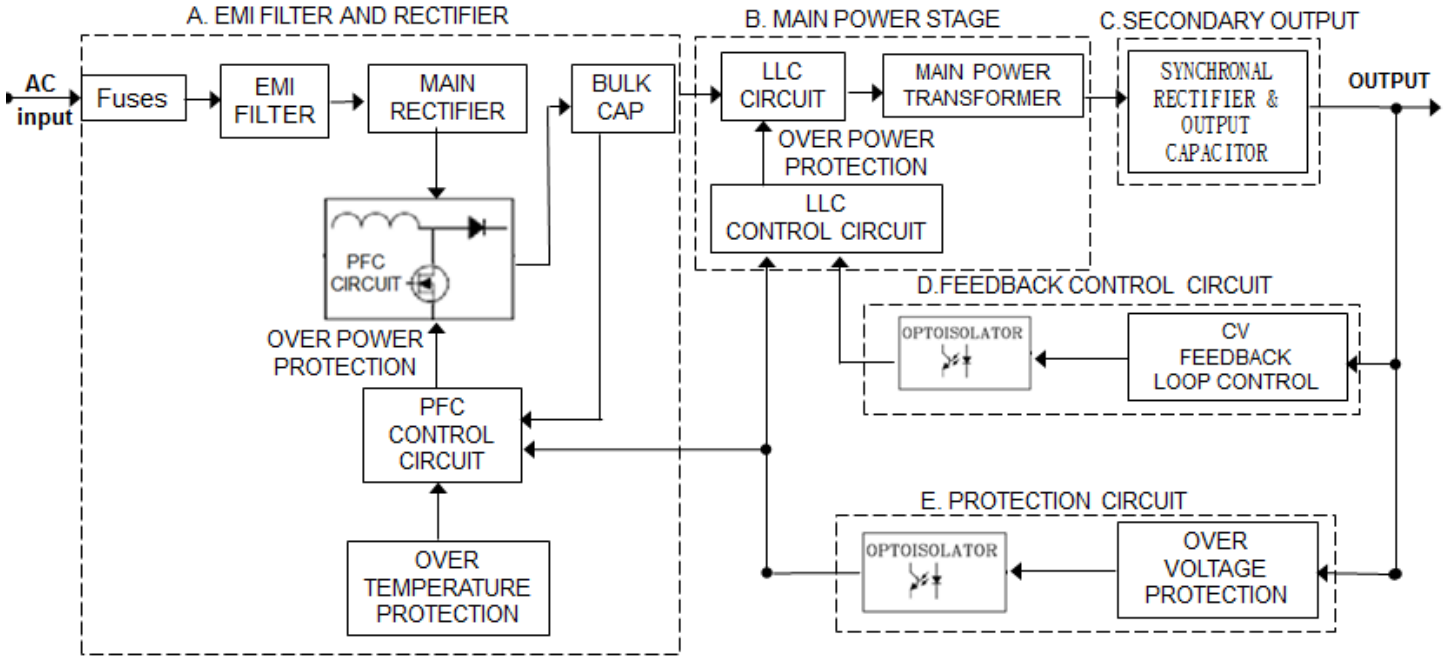
3) Asymmetrical: Common mode (Line to earth)

4) Symmetrical: Differential mode (Line to line)

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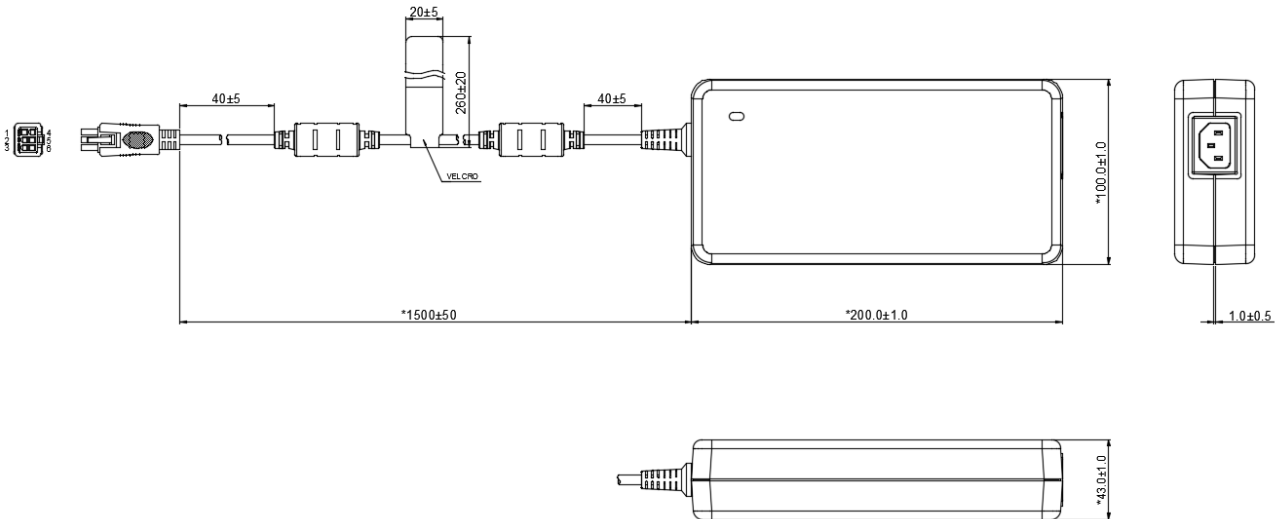
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Block Diagram



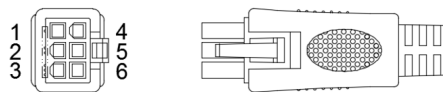
Dimensions

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.

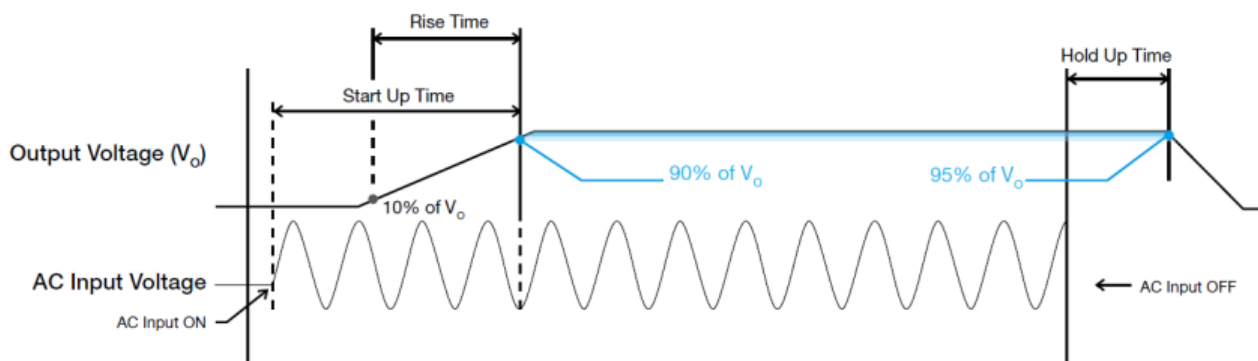
Rise Time

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

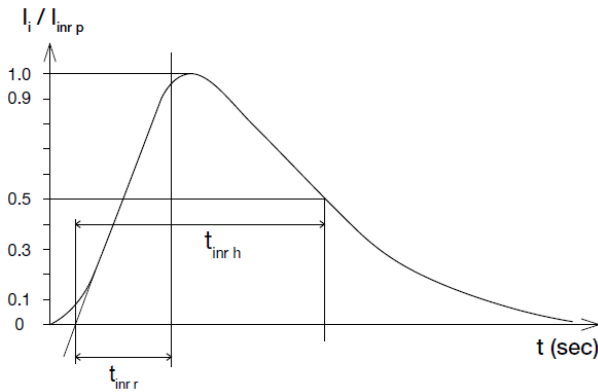


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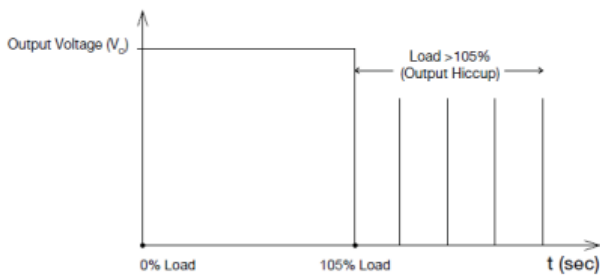
Inrush Current

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.



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.

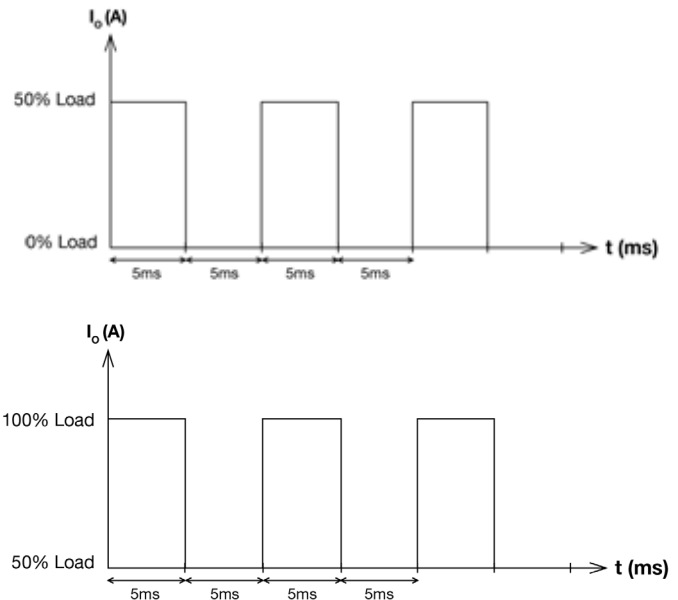


Short Circuit Protection (Auto-Recovery)

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.

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.



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 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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