TECHNICAL DATASHEET

Medical AC-DC Adapter

MEA-160W Series / MEA-160A☐C ☐☐A

MEA-160A

Highlights & Features

- Extreme compact size
- Meet Efficiency Level VI / VII & CoC Tier 2
- Universal AC input range at 85-264 Vac
- Safety Approvals to IEC 60601-1 & IEC 62368-1
- Compliant with IEC 60601-1-2 Ed. 4 Requirements
- Low touch current (<0.1 mA Normal & single fault)
- 2 × MOPP isolation

Safety Standards

CB Certified for worldwide use

Model Number: MEA-160A☐C G☐A
Unit Weight: 450 grams (0.992 lb)
Dimensions (W × L × H): 65.0 × 150.0 × 32.0 mm
2.56 × 5.90 × 1.26 inch

General Description

The MEA-160A series of external power supply come with universal AC input at 85 Vac to 264 Vac. Key features include 0.1mA low leakage current in normal and single fault conditions, and electric shock protection complying with 2 x MOPP. The MEA-160A series is certified according to EN 55011 for industrial, scientific and medical (ISM) radio-frequency equipment and meets EN 55032 for Information Technology Equipment (ITE) radio-frequency equipment. MEA-160A series has both medical and ITE safety approvals such as IEC 62368, CB certification and CCC approval. Designs are fully compliant with RoHS for environmental protection.

Model Information

Medical AC-DC Adapter

Model Number	Input Voltage Range	Rated Output Voltage	Rated Output Current
MEA-160A12C G☐A	85-264 Vac	12 Vdc	12.5 A
MEA-160A15C G☐A		15 Vdc	10.67 A
MEA-160A19C G☐A		19 Vdc	8.42 A
MEA-160A24C G☐A		24 Vdc	6.67 A

Model Numbering

						CC Code	
MEA –	**160**	**A**	**☐**	**C**	**☐**	**☐**	**☐A**
Delta Medical Desktop Adapter	Max wattage in the product series (150 W for 12 V output 160 W for other output)	Family Code	Output Voltage (Single Output) 12 – 12 V 15 – 15 V 19 – 19 V 24 – 24 V	Input Connector Type C – C14	Blank	Plug, Molding type and others G: 4 Pin Din	AA: Pin1, Pin2: +V Pin3, Pin4: -V CA*: Pin2, Pin4: +V Pin1, Pin3: -V

* CA is only available for 19 V & 24 V model

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

Medical AC-DC Adapter

MEA-160W Series / MEA-160A□C □□A

Specifications

Model Number	MEA-160A12C	MEA-160A15C	MEA-160A19C	MEA-160A24C

Input Ratings / Characteristics

Nominal Input Voltage		100-240 Vac			
Input Voltage Range		85-264 Vac			
Nominal Input Frequency		50-60 Hz			
Input Frequency Range		47-63 Hz			
Input Current (max.)		2.2 A @ 100 Vac, 1 A @ 230 Vac			
Efficiency	@ 115 Vac (typ)	90%	90.5%	91%	91%
	@ 230 Vac (typ)	91%	92.5%	93%	93%
Average Efficiency (min)		89%			
Efficiency @ 10% Load		79%			
Standby Power (max.)		0.15 W @ 115 Vac & 230 Vac			
Inrush Current (typ.)		50 A @ 115 Vac, 100 A @ 230 Vac			
Touch Current (max.)		0.1 mA @ 264 Vac NC[1], 0.1 mA @ 264 Vac SFC[2]			
Earth Leakage Current (max.)		0.1 mA @ 264 Vac NC[1], 0.1 mA @ 264 Vac SFC[2]			
Power Factor (typ)		0.99 @ 115 Vac ; 0.95 @ 230 Vac			

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

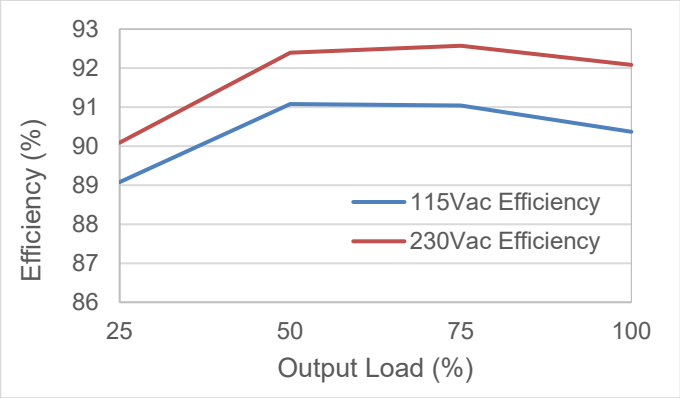

Figure 1-1 MEA-160A12C Efficiency versus Output Load

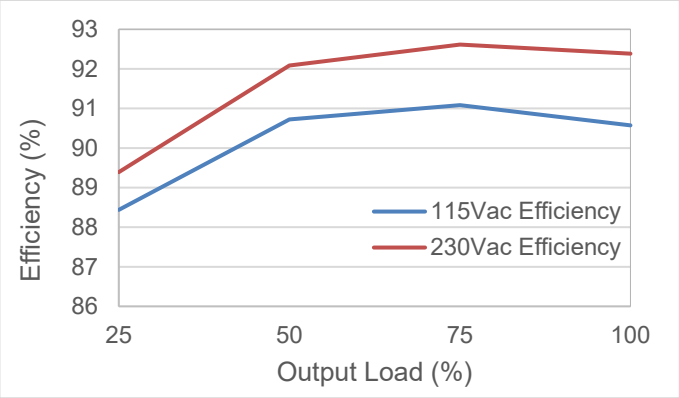

Figure 1-2 MEA-160A15C Efficiency versus Output Load

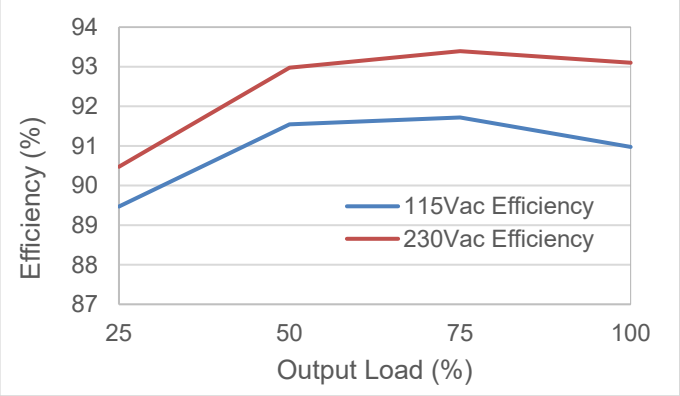

Figure 1-3 MEA-160A19C Efficiency versus Output Load

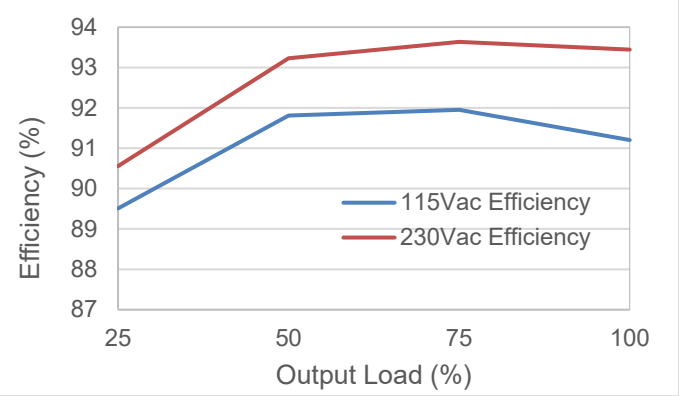

Figure 1-4 MEA-160A24C Efficiency versus Output Load

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

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MEA-160W Series / MEA-160A☐C ☐☐A

Model Number	MEA-160A12C	MEA-160A15C	MEA-160A19C	MEA-160A24C

Output Ratings / Characteristics

Nominal Output Voltage		12 Vdc	15 Vdc	19 Vdc	24 Vdc
Nominal Output Current		12.5 A	10.67A	8.42 A	6.67 A
Output Power		150 W	160 W	160 W	160 W
Line Regulation		± 0.5%			
Load Regulation		± 6.5%	± 5%	± 5%	± 4%
PARD[3] (20 MHz)	@ 25°C to 40°C	150 mVp-p	150 mVp-p	190 mVp-p	240 mVp-p
	@ -20°C to 0°C	< 360 mVp-p	< 450 mVp-p	< 570 mVp-p	< 720 mVp-p
Rise Time		< 50 ms @ 115 Vac & 230 Vac			
Start-up Time		350 ms (typ.) @ 115 Vac & 230 Vac			
Hold-up Time		28 ms typ. @ 115 Vac			
E-Cap Load		6000 uF			
Dynamic Response (Overshoot & Undershoot O/P Voltage)		± 10% @ 5-100% load; Slew rate 0.1A/μs (@ 100 Hz, 50% Duty Cycle			

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

Case Chassis / Cover		PC
Dimensions (W × L × H)		65.0 × 150.0 × 32.0 mm (2.56 × 5.90 × 1.26 inch)
Unit Weight		450 grams (0.992 lb)
Cable Length		1200 mm
Indicator		Green LED
Terminal	Input	IEC 60320 C14 socket
	Output	4 Pin Din

Environment

Surrounding Air Temperature	Operating	-20°C to +60°C
	Storage	-40°C to +85°C
Power De-rating		> 40°C de-rate power by 2.5% / °C
Line De-rating		< 100 Vac de-rate power by 1% / Vac
Operating Humidity		20-90% RH (Non-Condensing)
Operating Altitude		Up to 5,000 meters (up to 16,400 feet or 106-54kPa)
Shock Test	Non-Operating	50 G, 11 ms, 3 shocks for each direction
Vibration	Non-Operating	5-500 Hz, 2.09 Grms, 20 minutes for each three axis

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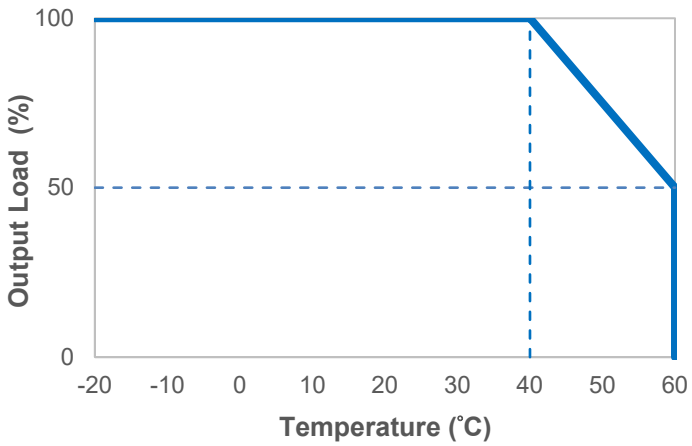
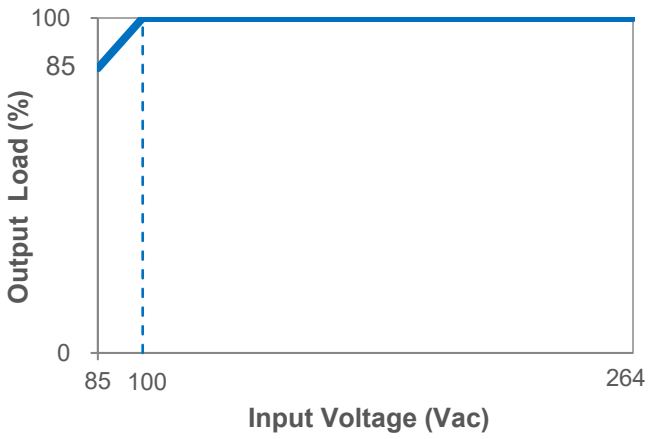
Power De-rating Curve





Protections

Overvoltage (max.)	150% max, Latch Mode
Overload / Overcurrent (max.)	180% max of rated load current, Hiccup Mode, (Non-Latching, Auto-Recovery)
Over Temperature	Latch Mode
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 E-cap Life Time[4)]	3 years (115 Vac, 100% load @ 25°C Ambient)

4) The expected E-cap life is based on 12 hours of operation per day.

Safety Standards / Directives

Medical Safety		IEC 60601-1 CB Report, EN 60601-1 CAN/CSA-C22.2 No.60601-1 ANSI/AAMI ES 60601-1
ITE Safety		IEC 62368-1, UL 62368-1, PSE J 62368-1, CCC GB 4943.1, GB/T 9254.1, GB 17625.1
CE		In conformance with EMC Directive 2014/30/EU and Low Voltage Directive 2014/35/EU EN 60601-1: 2006 + A1: 2013 + A12: 2014+ A2: 2021 & EN 60601-1-2: 2015 + A1: 2021
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	4000 Vac
	Input to PE	1500 Vac
	Output to PE	500 Vac

EMC (Compliant with IEC 60601-1-2 4th Ed. Requirements)

EMC / Emissions		EN/BS EN 55011, EN/BS EN 55032 : Class B CISPR 11, CISPR 32 : Class B Compliance to FCC Title 47: Class B
Harmonic Current Emissions	IEC 61000-3-2	Meet Class A
Immunity to		
Voltage Flicker	IEC 61000-3-3	
Electrostatic Discharge	IEC 61000-4-2	Level 4 Criteria A[5)] Air Discharge: 15 kV Contact Discharge: 8 kV
Radiated Field	IEC 61000-4-3	Criteria A[5)] 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[5)]: 2 kV
Surge	IEC 61000-4-5	Level 3 Criteria A[5)] Common Mode[7)]: 2 kV Differential Mode[8)]: 1 kV
Conducted	IEC 61000-4-6	Level 2 Criteria A[5)] 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[5)] Magnetic field strength 30 A/m
Voltage Dips	IEC 61000-4-11	Criteria A[5)] 0% U_T, 0.5 cycle (10 ms) 0°/45°/90°/135°/180°/225°/270°/315°/360° Criteria A[5)] 0% U_T, 1 cycle (20 ms), 0° Criteria B[6)] 70% U_T, 25 cycle (500 ms), 0° Criteria B[6)] 0% U_T, 250 cycle (5000 ms), 0°

5) Criteria A: Normal performance within the specification limits
6) Criteria B: Output out of regulation, or shuts down during test. Automatically restore to normal operation after test.
7) Asymmetrical: Common mode (Line to earth)
8) Symmetrical: Differential mode (Line to line)

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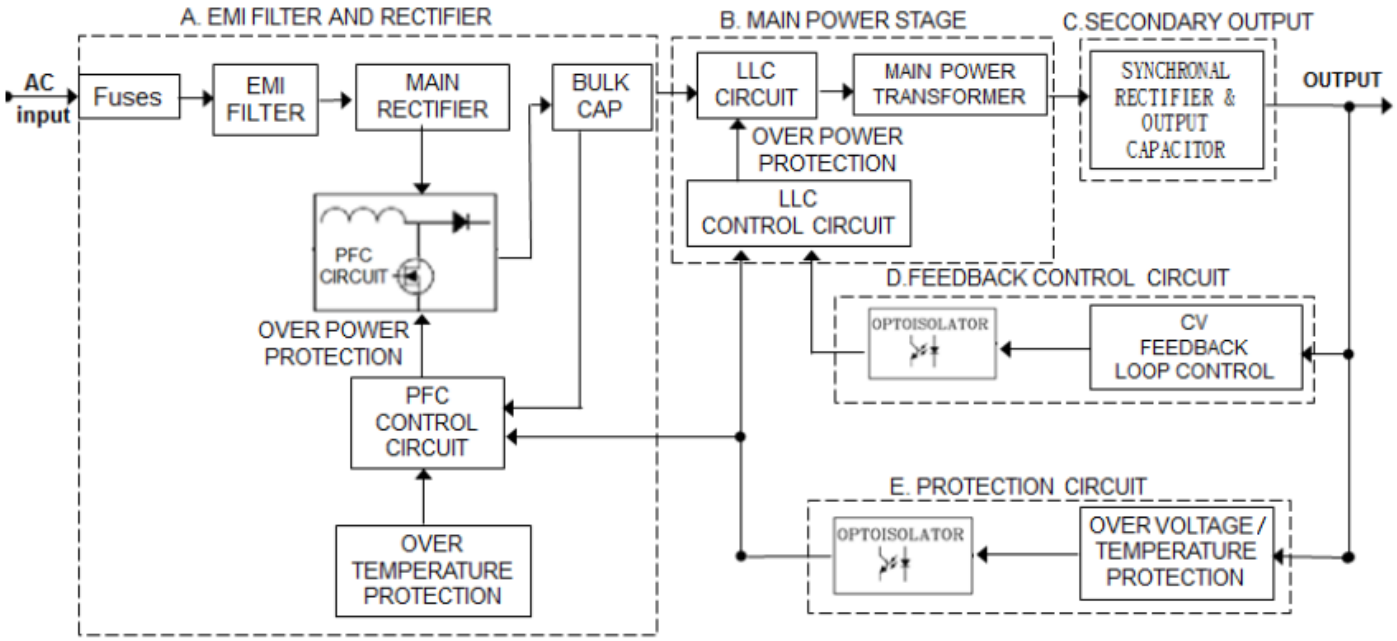
Block Diagram



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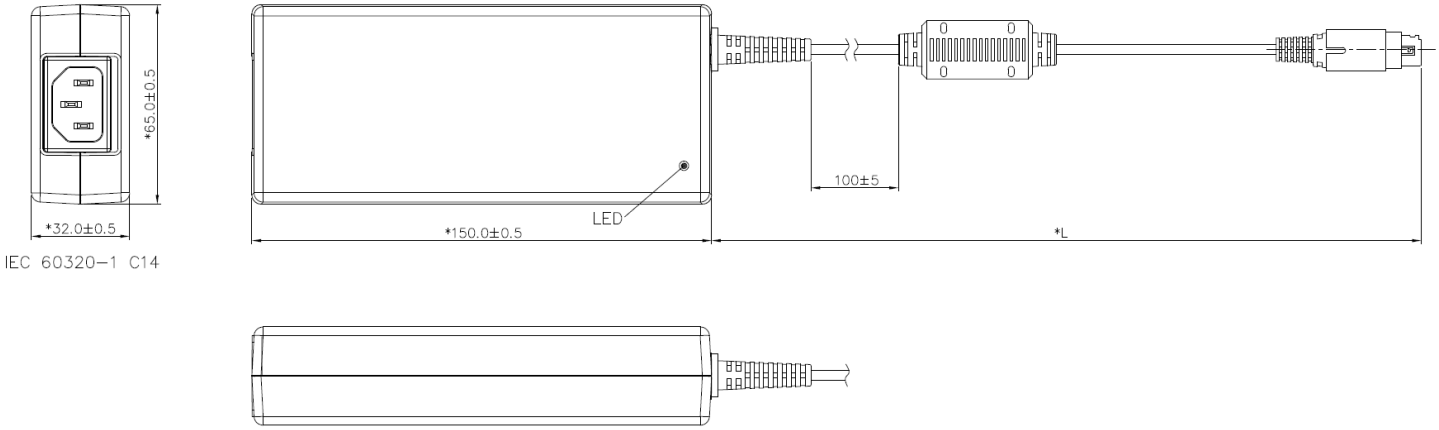
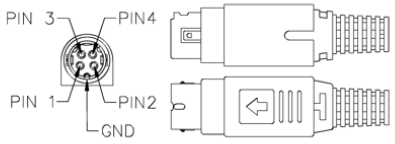
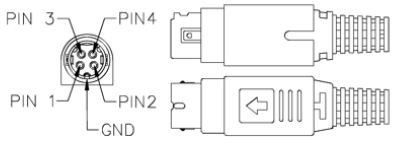
Dimensions

W × L × H: 65.0 × 150.0 × 32.0 mm (2.56 × 5.90 × 1.26 inch)



POWER DIN 4 Pins with Lock	CC Code	Voltage	Cable Type	Cable Length(L)	Pin Assignment	
 KYCON KPPX-4P Equivalent	GAA	12V	UL2464 #14AWG*2C	1200+/-50	1	+V
		15V	UL2464 #14AWG*2C		2	+V
		19V	UL2464 #16AWG*2C		3	-V
		24V	UL2464 #18AWG*2C		4	-V

POWER DIN 4 Pins with Lock	CC Code	Voltage	Cable Type	Cable Length(L)	Pin Assignment	
 KYCON KPPX-4P Equivalent	GCA	19V	UL2464 #16AWG*2C	1200+/-50	1	-V
					2	+V
		24V	UL2464 #18AWG*2C		3	-V
					4	+V

Functions

Start-up Time

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

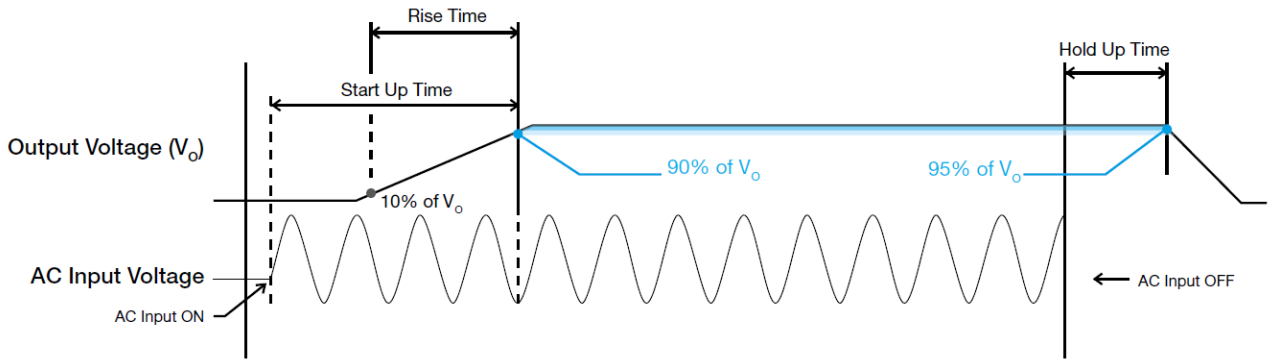
Rise Time

The time required for the output voltage (Vo) 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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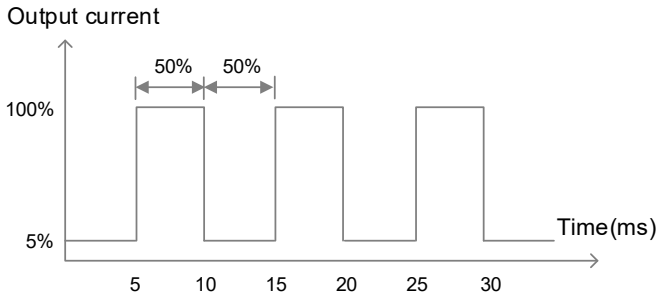
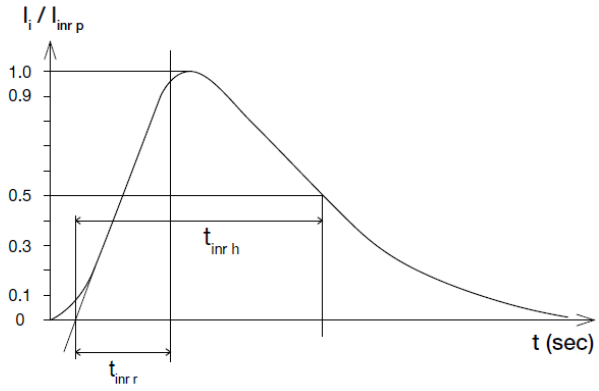
Dynamic Response

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



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

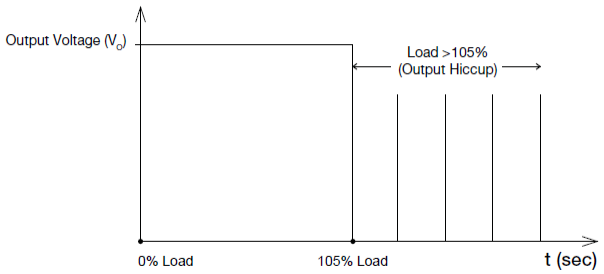
The power supply's overvoltage circuit will be activated when its internal feedback circuit fails. The output voltage shall not exceed its specifications defined on Page 4 under "Protections". Power supply will latch off, and require removal/re-application of input AC voltage in order to restart.

Short Circuit Protection

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.

Overload & Over current Protections

The power supply's Overload (OLP) and Over current (OCP) Protections will be activated when output current is between 105% and 180% of I_O (Max load). 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.



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 latch off and require removal/re-application of input AC voltage in order to restart.

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Certificate

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.

E356265

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.

Meet DOE Level VI Efficiency Requirement.

Manufacturer and Authorized Representatives Information

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