TR160M SERIES
160 WATT MEDICAL SWITCH ADAPTER

Features

- Universal Input Range 80~264VAC
- Meets EN55011 Class B and CISPR/FCC Class B
- Continuous Short Circuit Protection
- Over Voltage Protection
- No Load Input Power Consumption<150mW
- Meets CoC Tier 2 and DOE Level VI
- Meets IEC/EN 60335-1
- IEC/EN/UL 60601-1 2 MOPP Approval
- Class I (TR160MA), Class II (TR160MB)
- Operating Altitude 5000m
- IP22

MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE & NOISE NOTE1	VOLTAGE ACCURACY NOTE1	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
TR160MA120	12 V	12.5A	1%	±2%	±1%	±4%	91%
TR160MA240	24 V	6.66 A	1%	±2%	±1%	±4%	92%
TR160MA360	36 V	4.44 A	1%	±2%	±1%	±4%	92%
TR160MA480	48 V	3.33A	1%	±2%	±1%	±4%	93%
TR160MB120	12 V	12.5A	1%	±2%	±1%	±4%	91%
TR160MB240	24 V	6.66 A	1%	±2%	±1%	±4%	92%
TR160MB360	36 V	4.44 A	1%	±2%	±1%	±4%	92%
TR160MB480	48 V	3.33A	1%	±2%	±1%	±4%	93%

Note:

1. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measuring @20MHz BW.
2. Voltage accuracy is set at 60% full load.
3. Line regulation is measured from 100Vac to 240Vac with full load.
4. Load regulation measured from 60% to 100% full load and from 60% to 20% load (60% +/- 40% full load).
5. Typical efficiency at 230 VAC and 75% full load at 25°C.

PART NUMBER

Series	Output Voltage	DC Plug Type	OVP	DC Cable Length and Type
TR160MX	XXX	-XX	X	XX
X=A or B A: Class I B: Class II	120: 12VDC 240: 24VDC 360: 36VDC 480: 48VDC		E: with OVP	471:950mm with Ferrite Core 12:1220mm with Ferrite Core 13:1800mm with Ferrite Core *UL2464 Cable for All Models

12V: Output Cable Length ≦ 950mm, DIN Power Plug
24V: Output Cable Length ≦ 1220mm, DC Jack
36V & 48V: Output Cable Length ≦ 1800mm, DC Jack

Part Number Example:

TR160MA480-02E13,,160W ,Class I , 48VDC Output , Cable Length 1800mm .

TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25°C unless otherwise noted.)

ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage		All	80		264	V_{ac}
Operating Temperature	See Derating Curve	All	-20		70	°C
Storage Temperature		All	-40		85	°C
Input/Output Isolation Voltage	1 minute	All	4000			V_{ac}
Operating Altitude		All			5000	m

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Voltage Range		All	100		240	V_{ac}
Input Frequency Range		All	47		60	Hz
Maximum Input Current	100% Load, V_{in}=100Vac	All			2.0	A
Leakage Current (Earth)		All			300	uA
Leakage Current (Tounch)		All			100	uA
Under Voltage Protection		All	60	66	70	V

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	V_{in}=Nominal V_{in}, I_o=60% Load, T_c=25℃.	TR160MA/B120	11.76	12	12.24	V_{dc}
		TR160MA/B240	23.52	24	24.48	
		TR160MA/B360	35.28	36	36.72	
		TR160MA/B480	47.04	48	48.96	
Operating Output Current Range		TR160MA/B120			12.5	A
		TR160MA/B240			6.66	
		TR160MA/B360			4.44	
		TR160MA/B480			3.33	
Holdup Time	V_{in}=115Vac	All		25		ms
Output Voltage Regulation						
Load Regulation	40% Load to Full Load	All			±4.0	%
Line Regulation	V_{in}=High Line to Low Line	All			±1.0	%
Over Voltage Protection		TR160MA/B120		13.5		V_{dc}
		TR160MA/B240		30		
		TR160MA/B360		42		
		TR160MA/B480		56		
Output Ripple and Noise	1. Add a 0.1uF Ceramic Capacitor and a 10uF Aluminum Electrolytic Capacitor to Output. 2. Oscilloscope is 20MHz Band Width. 3. Ambient Temperature=25℃	TR160MA/B120			120	mV
		TR160MA/B240			150	
		TR160MA/B360			240	
		TR160MA/B480			480	
Load Capacitance	1. Ambient Temperature=25℃ 2. Input Voltage is 115VAC and 230VAC 3. Output is max. Load	TR160MA/B120			122500	uF
		TR160MA/B240			6600	
		TR160MA/B360			4330	
		TR160MA/B480			3240	
Efficiency	Output is Rated Load Ambient Temperature=25℃ @ Input Voltage is 230VAC	TR160MA/B120		91		%
		TR160MA/B240		92		
		TR160MA/B360		92		
		TR160MA/B480		93		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute (without Dielectric Breakdown)	All			4400	V_{ac}
Input to Earth(Ground)	1 minute (without Dielectric Breakdown)	All			1700	V_{ac}
Output to Earth(Ground)	1 minute (without Dielectric Breakdown)	All			1700	V_{ac}
Isolation Resistance	Input to Output	All	100			MΩ

FEATURE CHARACTERISTICS

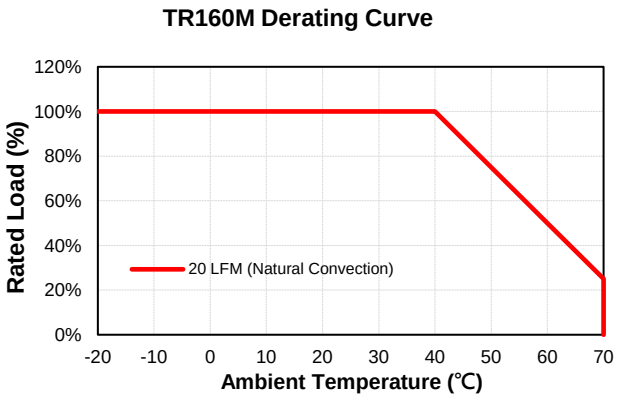
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency		All		115		KHz

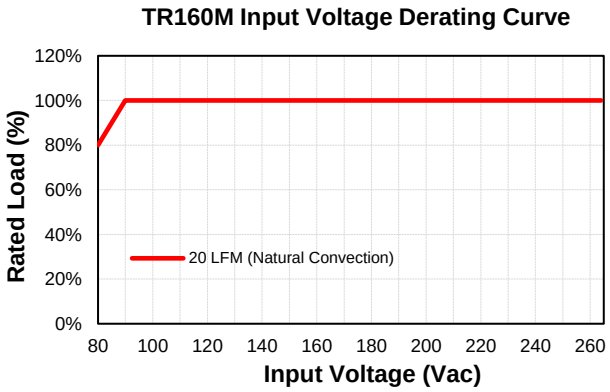
GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I_o=100%; T_a=25℃ per MIL-HDBK-217F	All	370			K hours
Humidity	Nom-condensing	All			93	% RH
Shock	Mests MIL-STD-810F Table 516.5,TABLE 516.5-1 10ms, each axis 3 times(+-X、Y、Z axis)	All		75		g
Vibration	Mests MIL-STD-810F Table 514.5C-VIII, 15~2000Hz, X、Y、Z axis, 1 hr(each axis),. total 3 hrs.	All		4		g
Weight		All		575		grams
Safety	Class I, Class II, IEC60601-1, EN60601-1-11, EN60601-1, ANSI/AAMI ES60601-1					Ed 3.1
EMC Emission	EN55011 Class B, EN61000-3-2:2014, EN6100-3-3:2013, FCC CFR47 Part 15					Ed 4.0
Conducted Disturbance	EN55011, FCC CFR47 Part 15					Class B
Radiated Disturbance	EN55011, FCC CFR47 Part 15					Class B
Harmonic Current Emissions	EN 61000-3-2:2014					Class A, D
Voltage Fluctuations & Flicker	EN 61000-3-3:2013					Criterion A
EMC Immunity	EN60601-1-2:2015, IEC61000-4-2,3,4,5,6,8,11					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008 Air Discharge: ±16kV Contact Discharge: ±4kV					Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2010					Criterion A
Electrical Fast Transient (EFT)	IEC61000-4-4:2012, ±1kV, ±2kV					Criterion A
Surge	IEC61000-4-5:2014, L-N: ±0.5kV, ±1kV, ±2kV L-E(Ground): ±0.5kV, ±1kV, ±2kV					Criterion A
Conducted Disturbances, Induced by RF Fields	IEC 61000-4-6:2013					Criterion A
Power Frequency Magnetic Field	IEC 61000-4-8:2009					Criterion A
Voltage Dips	IEC 61000-4-11:2004, Dips:30% reduction, Dips: >95% reduction, Criteria A					Criterion A
Voltage Interruptions	IEC 61000-4-11:2004, >95% Reduction					Criterion B
Application Note Link	TR160M Series App Notes					

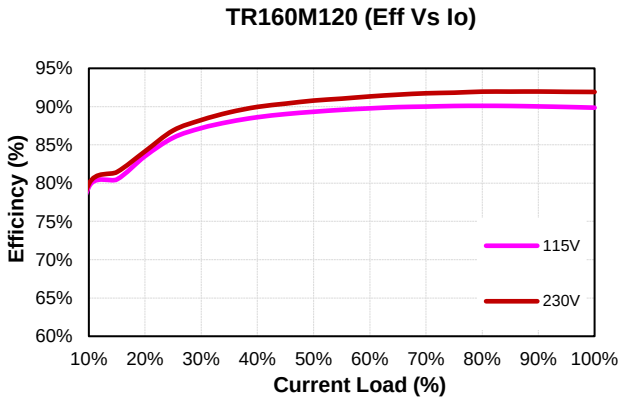
CHARACTERISTIC CURVE

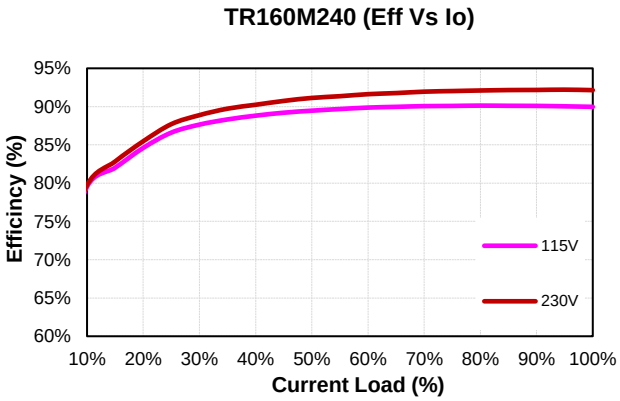
Power Derating Curve

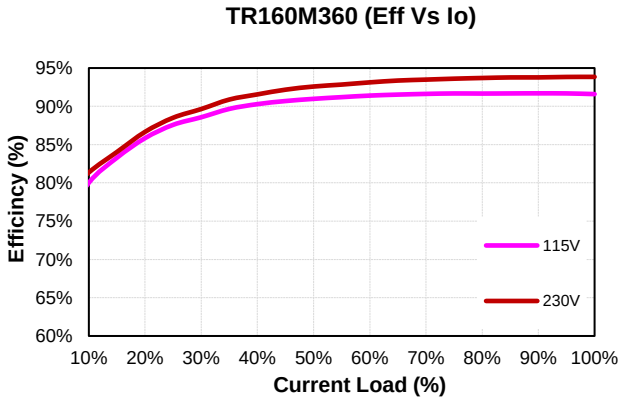


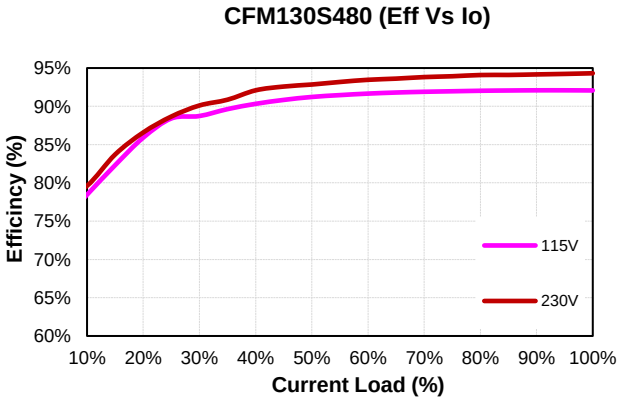


Performance Data





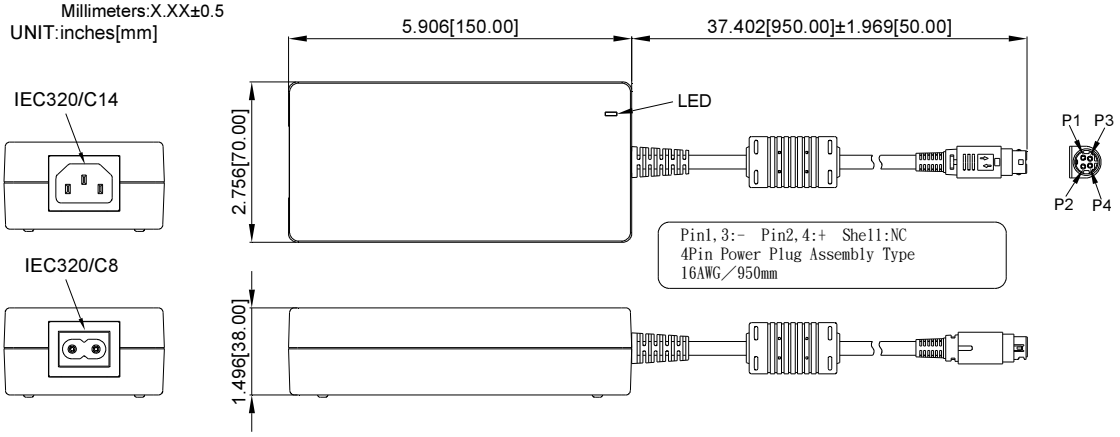




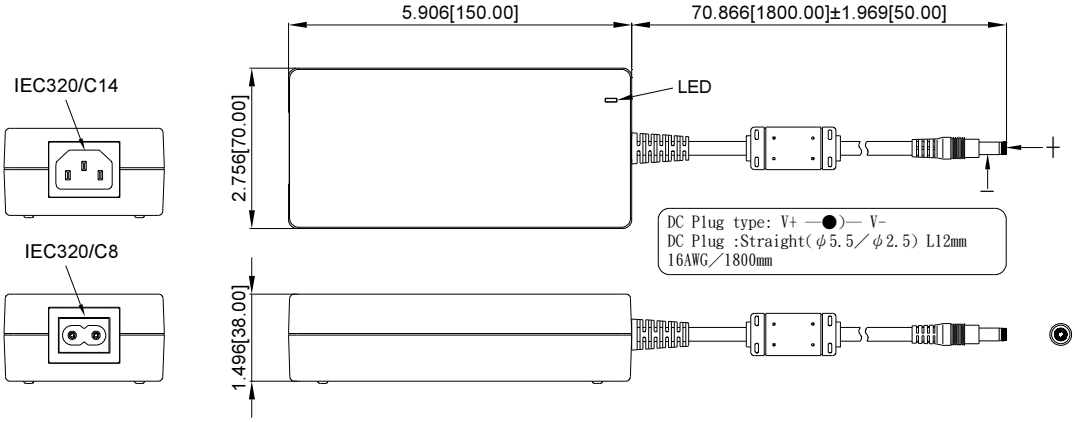
MECHANICAL SPECIFICATION

All Dimensions are in inches[mm]
Tolerance:Inches:X.XXX±0.02
Millimeters:X.XX±0.5
UNIT:inches[mm]

Din Power Plug



DC Jack



* For Output Voltage 12Vdc model, it must select Din Power Plug or equivalent

* For Output Voltage 24Vdc to 48Vdc models, it's able to select Din Power Plug, DC Jack or equivalent.

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