



electronic powersolutions

TR70M SERIES 70 WATT MEDICAL SWITCH ADAPTER

Features

- Universal Input Range 80~264Vac
- High Efficiency up to 91%
- Class I (TR70MA), Class II (TR70MB)
- No Load Input Power Consumption < 150mW
- Approval IEC/EN/UL 60601-1 2 MOPP
- Approval IEC/EN 60601-1-11 (TR70MB)
- Home Healthcare Applications (TR70MB)
- Approval IP21 (TR70MB)
- Approval EN55011 and CISPR/FCC Class B
- Meets IEC/EN 60335-1
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Over Voltage Protection
- Meets CoC Tier 2 and DOE Level VI



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE & NOISE NOTE1	VOLTAGE ACCURACY NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
TR70MA120	12 V	5.8 A	120 mV	±2%	±1%	±5%	89%
TR70MA150	15 V	4.65 A	150 mV	±2%	±1%	±3%	89%
TR70MA180	18 V	3.9 A	180 mV	±2%	±1%	±2%	89%
TR70MA240	24 V	3.0 A	240 mV	±2%	±1%	±2%	90%
TR70MA360	36 V	1.9 A	360 mV	±2%	±1%	±2%	90%
TR70MA480	48 V	1.5 A	480 mV	±2%	±1%	±2%	91%
TR70MB120	12 V	5.8 A	120 mV	±2%	±1%	±5%	89%
TR70MB150	15 V	4.65 A	150 mV	±2%	±1%	±3%	89%
TR70MB180	18 V	3.9 A	180 mV	±2%	±1%	±2%	89%
TR70MB240	24 V	3.0 A	240 mV	±2%	±1%	±2%	90%
TR70MB360	36 V	1.9 A	360 mV	±2%	±1%	±2%	90%
TR70MB480	48 V	1.5 A	480 mV	±2%	±1%	±2%	91%

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 100V_{ac} to 240V_{ac} with full load.
4. Load regulation measured from 60% to 100% full load and from 60% to 20% full load (60%±40% full load).
5. Typical efficiency at 230V_{ac} and 75% full load at 25°C.
6. TR70MA120 & TR70MB120 of 115VAC meet DoE Level VI and 230VAC meet CoC Tier 2

PART NUMBER

Series		Output Voltage	DC Plug Type	Cable Type	Cable Length
TR70M	X	XXX	-XX	E	XX
70W Medical Adapter	A : Class I B : Class II	120 : 12V	See Page 6	E : UL1185 with OVP	12V : 1220mm with DC Jack ^{Note6}
		150 : 15V			15V : 1220mm with DC Jack
		180 : 18V			18V : 1800mm with DC Jack
		240 : 24V			24V : 1800mm with DC Jack
		360 : 36V			36V : 1800mm with DC Jack
		480 : 48V			48V : 1800mm with DC Jack

Part Number Example:

TR70MA120-01E02, 70W, Class I, 12V_{dc} Output, DC Jack Type, Cable Length 1200mm



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	-30		70	°C
Storage Temperature		All	-40		85	°C
Input/Output Isolation Voltage	1 minute	All			4400	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		63	Hz
Maximum Input Current	100% Load, V _{in} =100V _{ac}	All			1.5	A
Leakage Current (Earth)		TR70MA			300	uA
Leakage Current (Touch)		All			90	uA
Under Voltage Protection		All	60	65	70	V _{ac}
Inrush Current	V _{in} =240V _{ac} , Cold start at 25°C	All			100	A

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	V _{in} =115V _{ac} and 230V _{ac} , I _o =60% Full load T _c =25°C	TR70MA/B120	11.76	12	12.24	V _{dc}
		TR70MA/B150	14.7	15	15.3	
		TR70MA/B180	17.64	18	18.36	
		TR70MA/B240	23.52	24	24.48	
		TR70MA/B360	35.28	36	36.72	
		TR70MA/B480	47.04	48	48.96	
Operating Output Current Range	V _{in} =115V _{ac} and 230V _{ac} , T _c =25°C	TR70MA/B120	0		5.8	A
		TR70MA/B150	0		4.65	
		TR70MA/B180	0		3.9	
		TR70MA/B240	0		3.0	
		TR70MA/B360	0		1.9	
		TR70MA/B480	0		1.5	
Holdup Time	V _{in} =115V _{ac}	All	8	10		ms
Output Voltage Regulation						
Load Regulation	60%±40% Full load change	TR70MA/B120			±5.0	%
		TR70MA/B150			±3.0	
		TR70MA/B180			±2.0	
		TR70MA/B240			±2.0	
		TR70MA/B360			±2.0	
		TR70MA/B480			±2.0	
Line Regulation	V _{in} =High line to low line, full load	All			±1.0	%
Over Voltage Protection	IC component to clamp (auto recovery)	TR70MA/B120		13.5		V _{dc}
		TR70MA/B150		16.5		
		TR70MA/B180		19.5		
		TR70MA/B240		26		
		TR70MA/B360		40		
		TR70MA/B480		53.5		
Over Current Protection	Auto recovery	All	130		150	%
Short Circuit Protection	Auto recovery	All				



TR70M Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
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°C	TR70MA/B120			120	mV
		TR70MA/B150			150	
		TR70MA/B180			180	
		TR70MA/B240			240	
		TR70MA/B360			360	
		TR70MA/B480			480	
Load Capacitance	1. $V_{in}=115V_{ac}$ and $230V_{ac}$ 2. Output is max. load 3. Ambient temperature=25°C	TR70MA/B120			5800	uF
		TR70MA/B150			4650	
		TR70MA/B180			3900	
		TR70MA/B240			3000	
		TR70MA/B360			1900	
		TR70MA/B480			1500	
Efficiency	1. $V_{in}=230V_{ac}$ 2. Output is 75% full load 3. Ambient temperature=25°C	TR70MA/B120		89%		%
		TR70MA/B150		89%		
		TR70MA/B180		89%		
		TR70MA/B240		90%		
		TR70MA/B360		90%		
		TR70MA/B480		91%		

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)	TR70MA			1800	V_{ac}
Output to Earth (Ground)	1 minute (without dielectric breakdown)	TR70MA			1800	V_{ac}
Isolation Resistance	Input to output	All	100			MΩ

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency		All		65		kHz

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	$I_o=100%$; $T_a=25^\circ C$ per MIL-HDBK-217F	All	500			k hours
Humidity	Non-condensing	All			93	% RH
Shock	MIL-STD-810F Table 516.5, TABLE 516.5-I 10ms, each axis 3 times($\pm X$ 、 $\pm Y$ 、 $\pm Z$ axis)	All		75		g
Vibration	MIL-STD-810F Table 514.5C-VIII, 15~2000Hz, X、Y、Z axis, 1 hour(each axis),. total 3 hours.	All		4		g
Weight		All		300		grams
Dimension		All	4.724x2.047x1.220 inches (120.00x52.00x31.00 mm)			
Safety	Class I (TR70MA), Class II (TR70MB) IEC 60601-1:2005 (Third Edition) + CORR. 1:2006 + CORR. 2:2007 + A1:2012 EN 60601-1:2006;A1 ANSI/AAMI ES60601-1 (2005/(R)2012 + A1:2012, C1:2009/(R)2012 + A2:2010/(R)2012) IEN/EN 60601-1-11-2015 For TR70MB (Home Health Care)					Ed 3.1
EMC Emission	EN55011:2009+A1:2010, EN61000-3-2:2014, EN6100-3-3:2013, 47 CFR FCC Part 18					
Conducted Disturbance	EN55011:2009+A1:2010, 47 CFR FCC Part 18					Class B
Radiated Disturbance	EN55011:2009+A1:2010, 47 CFR FCC Part 18					Class B
Harmonic Current Emissions	EN 61000-3-2:2014					Class A
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					Ed 4.0
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008 Air Discharge: $\pm 15kV$ Contact Discharge: $\pm 8kV$					Criterion A



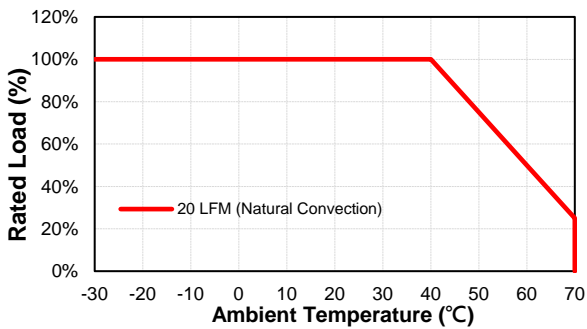
GENERAL SPECIFICATIONS

Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2006+A1:2007+A2:2010	Criterion A
Electrical Fast Transient (EFT)	IEC61000-4-4:2012, ±1kV, ±2kV	Criterion A
Surge	IEC61000-4-5:2014+A1:2017, L-N: ±0.5kV, ±1kV, L-E (Ground): ±0.5kV, ±1kV, ±2kV	Criterion A
Conducted Disturbances, Induced by RF Fields	IEC 61000-4-6:2013+COR1:2015	Criterion A
Power Frequency Magnetic Field	IEC 61000-4-8:2009	Criterion A
Voltage Dips	IEC 61000-4-11:2004+A1:2017, Dips:30% reduction, Dips: >95% Reduction, Criteria A	Criterion A
Voltage Interruptions	IEC 61000-4-11:2004+A1:2017, >95% Reduction	Criterion B
Application Note Link	TR70M Series App Notes	

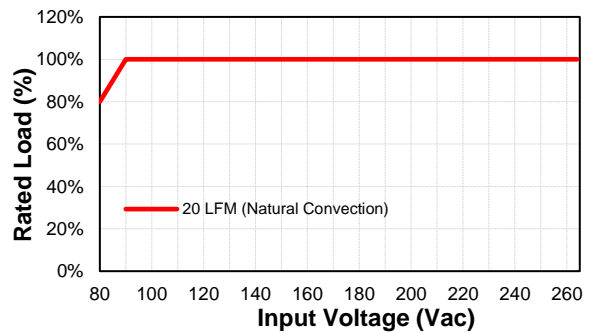
CHARACTERISTIC CURVE

Power Derating Curve

TR70M Derating Curve

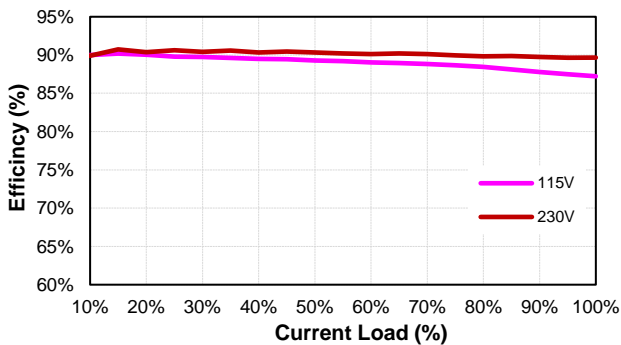


TR70M Input Voltage Derating Curve

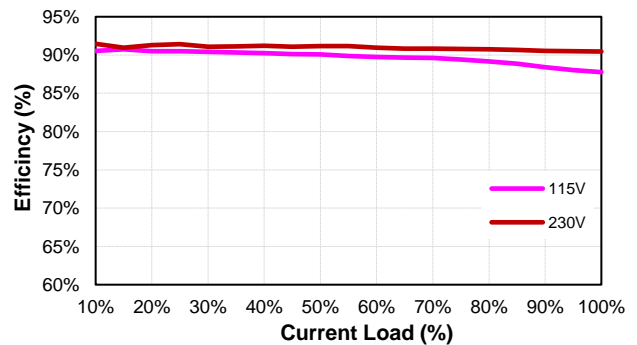


Performance Data

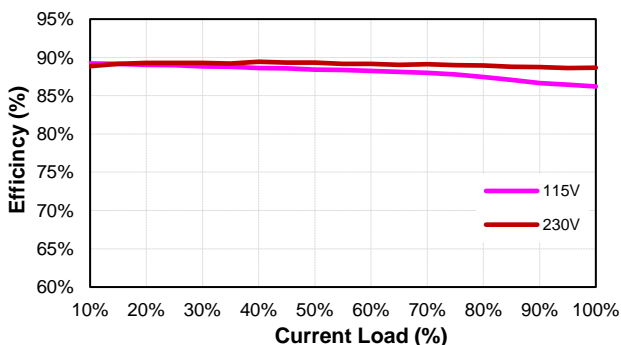
TR70M120 (Eff Vs Io)



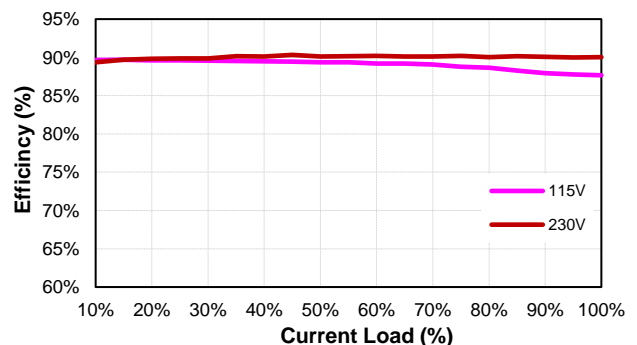
TR70M150 (Eff Vs Io)



TR70M180 (Eff Vs Io)



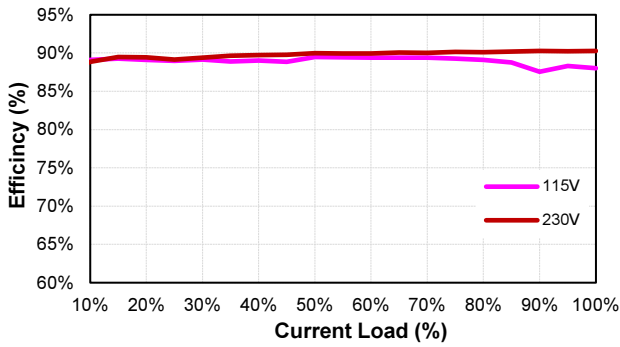
TR70M240 (Eff Vs Io)



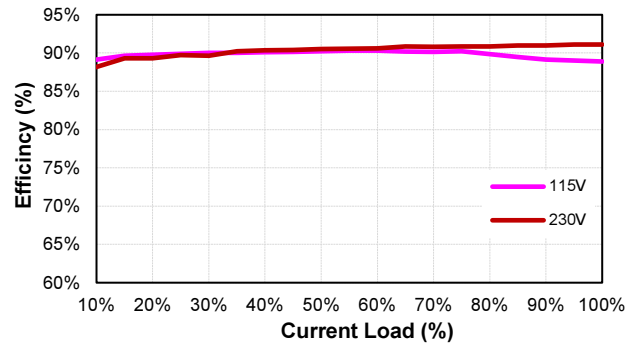


TR70M Series

TR70M360 (Eff Vs Io)



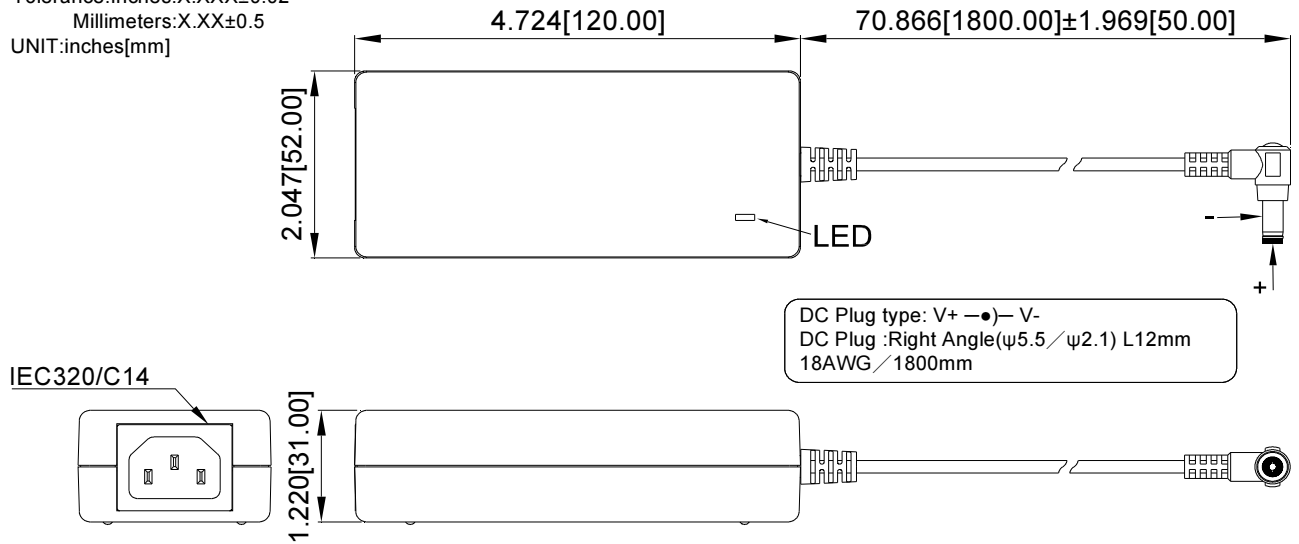
TR70M480 (Eff Vs Io)



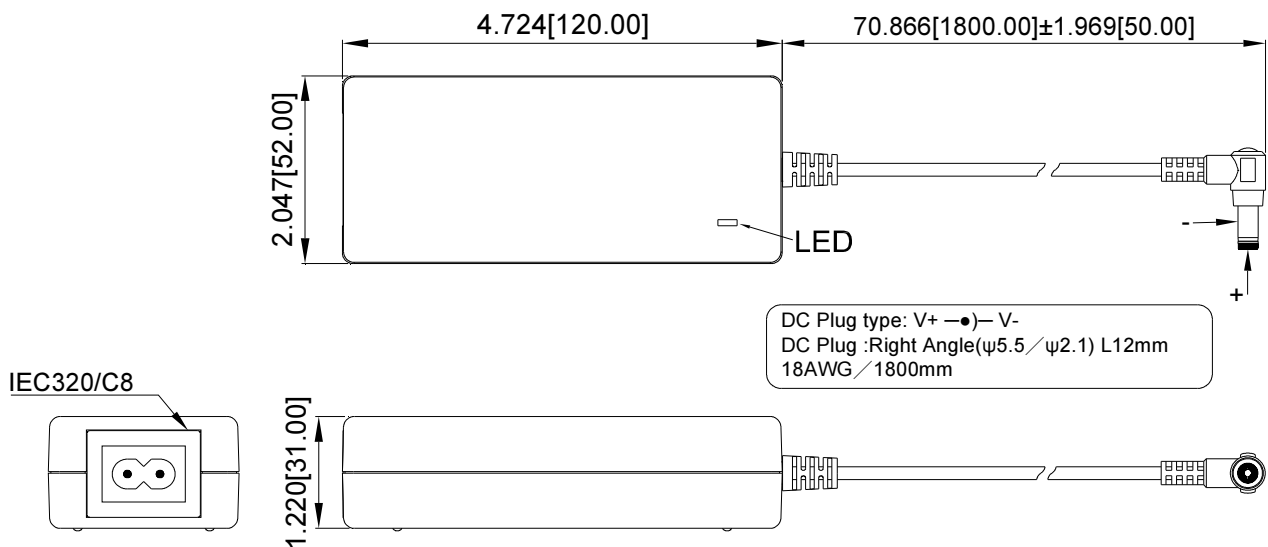
MECHANICAL SPECIFICATION

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

TR70MAXXX Series

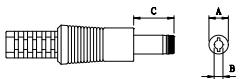
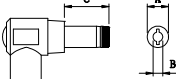
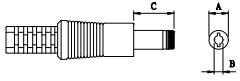
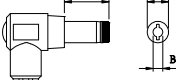


TR70MBXXX Series





Standard Output DC Plug

DC Plug Type	Cable Number -XXXXX	A	B	C	Cable Type	Cable Length	Cable AWG
		OD (mm)	ID (mm)	L (mm)			
 <p>Straight/Inner+Outer-</p> <p>+ ● -</p>	11E02	Φ5.5	Φ2.1	12	UL1185	1200mm without Core	16AWG for Vo: 12V, 15V
	12E02	Φ5.5	Φ2.5	12			
	23E02	Φ5.5	Φ2.1	9.5			
	26E02	Φ5.5	Φ2.5	9.5			
 <p>Right Angle/Inner+Outer-</p> <p>+ ●) -</p>	01E02	Φ5.5	Φ2.1	12			
	02E02	Φ5.5	Φ2.5	12			
	21E02	Φ5.5	Φ2.1	9.5			
	24E02	Φ5.5	Φ2.5	9.5			
 <p>Straight/Inner+Outer-</p> <p>+ ● -</p>	11E03	Φ5.5	Φ2.1	12	UL1185	1800mm without Core	16AWG for Vo: 18V 18AWG for Vo: 24V, 36V, 48V,
	12E03	Φ5.5	Φ2.5	12			
	23E03	Φ5.5	Φ2.1	9.5			
	26E03	Φ5.5	Φ2.5	9.5			
 <p>Right Angle/Inner+Outer-</p> <p>+ ●) -</p>	01E03	Φ5.5	Φ2.1	12			
	02E03	Φ5.5	Φ2.5	12			
	21E03	Φ5.5	Φ2.1	9.5			
	24E03	Φ5.5	Φ2.5	9.5			