



electronic powersolutions

# TR100M SERIES 100 WATT MEDICAL SWITCH ADAPTER

## Features

- Universal Input Range 90~264Vac
- High Efficiency up to 89%
- Class II
- No Load Input Power Consumption < 300mW
- Approval IEC/EN/UL 60601-1 2 MOPP
- Approval EN55011 and CISPR/FCC Class B
- Operating Altitude 3000m
- Continuous Short Circuit Protection
- Over Voltage Protection



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE & NOISE NOTE1	VOLTAGE ACCURACY NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
TR100M120	12 V	8.34 A	120mV	±2%	±1%	±4%	88%
TR100M150	15 V	6.67 A	150mV	±2%	±1%	±3%	88%
TR100M180	18 V	5.56 A	180mV	±2%	±1%	±2%	88%
TR100M190	19 V	5.27 A	190mV	±2%	±1%	±2%	88%
TR100M200	20 V	5.0 A	200mV	±2%	±1%	±2%	88%
TR100M240	24 V	4.17 A	240mV	±2%	±1%	±2%	88%
TR100M480	48 V	2.1 A	480mV	±2%	±1%	±2%	89%

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<sub>ac</sub> to 240V<sub>ac</sub> 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<sub>ac</sub> and 75% full load at 25°C.

## PART NUMBER

Series	Output Voltage	DC Plug Type	Cable Type	Cable Length
TR100M	XXX	-XX	E	XX
100W Medical Adapter	120 : 12V 150 : 15V 180 : 18V 190 : 19V 200 : 20V 240 : 24V 480 : 48V	See Page 6	E : UL1185 with OVP	12V : 1500mm with DC Jack 15V : 1500mm with DC Jack 18V : 1800mm with DC Jack 19V : 1800mm with DC Jack 20V : 1800mm with DC Jack 24V : 1800mm with DC Jack 48V : 1800mm with DC Jack

Part Number Example:

**TR100M120-11E36**, 100W, Class II, 12V<sub>dc</sub> Output, DC Jack Type, Cable Length 1500mm



## 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	90		264	V <sub>ac</sub>
			120		370	V <sub>dc</sub>
Operating Temperature	See Derating Curve	All	-20		70	°C
Storage Temperature		All	-20		85	°C
Input/Output Isolation Voltage	1 minute	All			4800	V <sub>ac</sub>
Operating Altitude		All			3000	m

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Voltage Range		All	100		240	V <sub>ac</sub>
Input Frequency Range		All	47		63	Hz
Maximum Input Current	100% Load, V <sub>in</sub> =100V <sub>ac</sub>	All			1.5	A
Leakage Current (Touch)		All			100	uA
Under Voltage Protection		All	65		70	V <sub>ac</sub>
Power Factor	230V <sub>ac</sub> /50Hz @ Full load	All	0.9			
Inrush Current	V <sub>in</sub> =240V <sub>ac</sub> , Cold start at 25°C.	All			100	A

### OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	V <sub>in</sub> =115V <sub>ac</sub> and 230V <sub>ac</sub> , I <sub>o</sub> =60% Full load T <sub>c</sub> =25°C	TR100M120	11.76	12	12.24	V <sub>dc</sub>
		TR100M150	14.7	15	15.3	
		TR100M180	17.64	18	18.36	
		TR100M190	18.62	19	19.38	
		TR100M200	19.6	20	20.4	
		TR100M240	23.52	24	24.48	
		TR100M480	47.04	48	48.96	
Operating Output Current Range	V <sub>in</sub> =115V <sub>ac</sub> and 230V <sub>ac</sub> , T <sub>c</sub> =25°C	TR100M120	0		8.34	A
		TR100M150	0		6.67	
		TR100M180	0		5.56	
		TR100M190	0		5.27	
		TR100M200	0		5	
		TR100M240	0		4.17	
		TR100M480	0		2.1	
Holdup Time	V <sub>in</sub> =115V <sub>ac</sub>	All		16		ms
Output Voltage Regulation						
Load Regulation	60%±40% Full load change	TR100M120			±4.0	%
		TR100M150			±3.0	
		TR100M180			±2.0	
		TR100M190			±2.0	
		TR100M200			±2.0	
		TR100M240			±2.0	
		TR100M480			±2.0	
Line Regulation	V <sub>in</sub> =High line to low line, full load	All			±1.0	%



# TR100M Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Over Voltage Protection	TVS Component to clamp	TR100M120	14.3		15.8	V <sub>dc</sub>
		TR100M150	17.1		19.3	
		TR100M180	20.9		23.1	
		TR100M190	20.9		23.1	
		TR100M200	22.8		25.2	
		TR100M240	28.5		31.9	
		TR100M480	53.2		59.2	
Over Current Protection	Auto recovery	All	160		180	%
Short Circuit Protection	Auto recovery	All				
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	TR100M120			120	mV
		TR100M150			150	
		TR100M180			180	
		TR100M190			190	
		TR100M200			200	
		TR100M240			240	
		TR100M480			480	
Load Capacitance	1. V <sub>in</sub> =115V <sub>ac</sub> and 230V <sub>ac</sub> 2. Output is max. load 3. Ambient temperature=25°C	TR100M120			8400	uF
		TR100M150			6600	
		TR100M180			5800	
		TR100M190			5200	
		TR100M200			5100	
		TR100M240			4200	
		TR100M480			2040	
Efficiency	1. V <sub>in</sub> =230V <sub>ac</sub> 2. Output is 75% full load 3. Ambient temperature=25°C	TR100M120		88		%
		TR100M150		88		
		TR100M180		88		
		TR100M190		88		
		TR100M200		88		
		TR100M240		88		
		TR100M480		89		

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute (without dielectric breakdown)	All			4800	V <sub>ac</sub>
Isolation Resistance	Input to output	All	100			MΩ

## FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency		All		70		kHz

## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I <sub>o</sub> =100%; T <sub>a</sub> =25 °C per MIL-HDBK-217F	All	150			k hours
Humidity	Non-condensing	All			93	% RH
Shock	MIL-STD-810F Table 516.5, TABLE 516.5-I 10ms, each axis 3 times(±X、±Y、±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		485		grams
Dimension		All	5.591x2.283x1.457 inches (142.00x58.00x37.00 mm)			



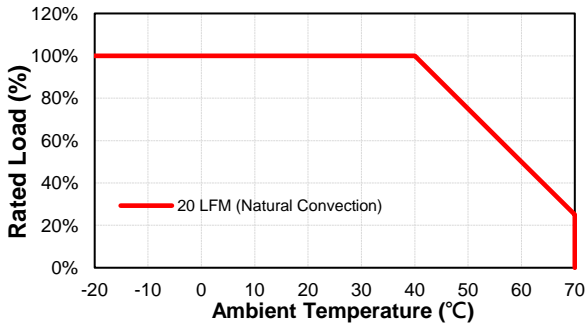
## GENERAL SPECIFICATIONS

<b>Safety</b>	Class II IEC 60601-1:2005 (Third Edition) + CORR. 1:2006 + CORR. 2:2007 + A1:2012 EN 60601-1:2006;A11+A1+A12 ANSI/AAMI ES60601-1 (2005 + C1:09 + A2:10)	Ed 3.1
<b>EMC Emission</b>	EN55011:2009+A1:2010, EN61000-3-2:2014, EN6100-3-3:2013, FCC CFR 47 Part 18	
Conducted Disturbance	EN55011:2009+A1:2010, FCC CFR 47 Part 18	Class B
Radiated Disturbance	EN55011:2009+A1:2010, FCC CFR 47 Part 18	Class B
Harmonic Current Emissions	EN 61000-3-2:2014	Class A
Voltage Fluctuations & Flicker	EN 61000-3-3:2013	Criterion A
<b>EMC Immunity</b>	EN60601-1-2:2015, IEC61000-4-2,3,4,5,6,8,11	
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008 Air Discharge: ±15kV Contact Discharge: ±8kV	Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2010	Criterion A
Electrical Fast Transient (EFT)	IEC61000-4-4:2012, ±0.5kV, ±1kV, ±2kV	Criterion A
Surge	IEC61000-4-5:2014, L-N: ±0.5kV, ±1kV	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	<a href="#">TR100M Series App Notes</a>	

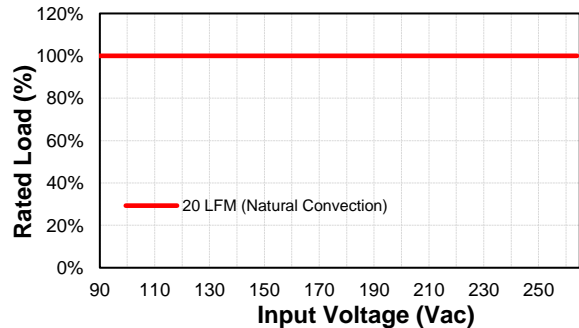
## CHARACTERISTIC CURVE

### Power Derating Curve

TR100M Derating Curve

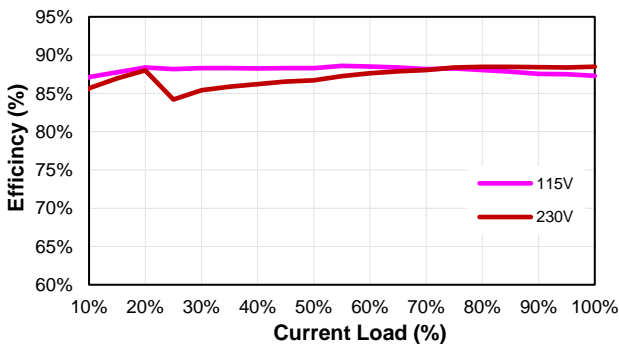


TR100M Input Voltage Derating Curve

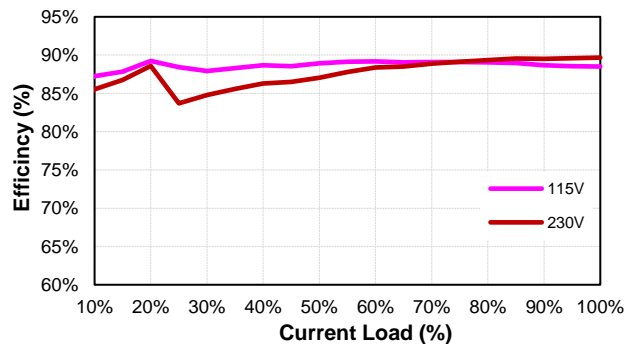


### Performance Data

TR100M120 (Eff Vs Io)



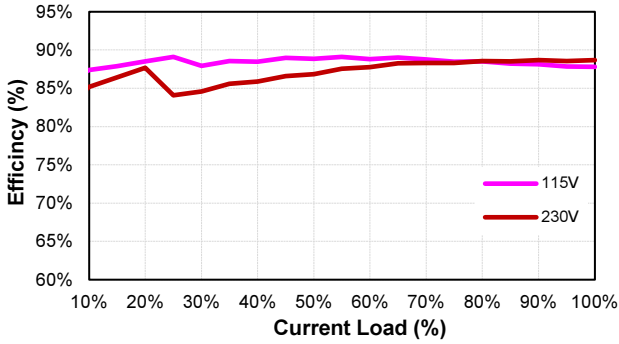
TR100M150 (Eff Vs Io)



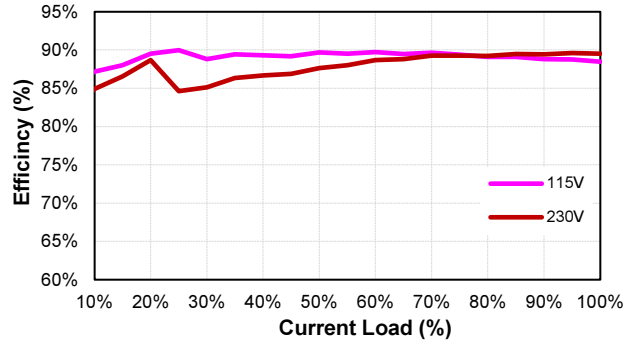


# TR100M Series

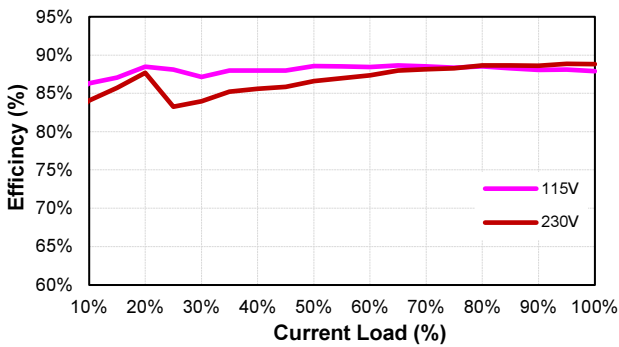
### TR100M180 (Eff Vs Io)



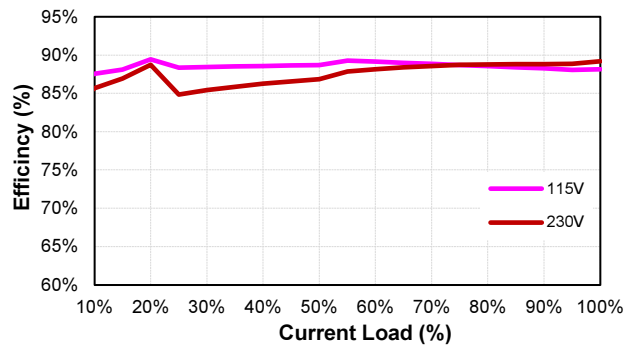
### TR100M190 (Eff Vs Io)



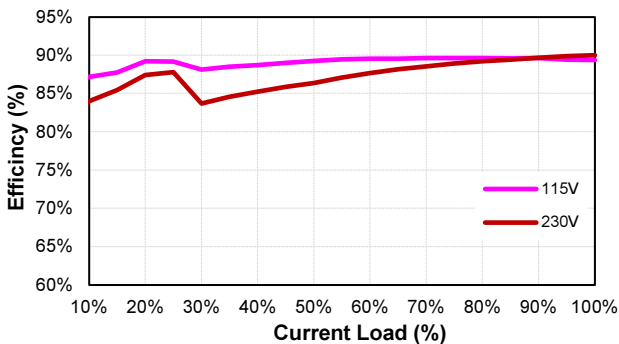
### TR100M200 (Eff Vs Io)



### TR100M240 (Eff Vs Io)



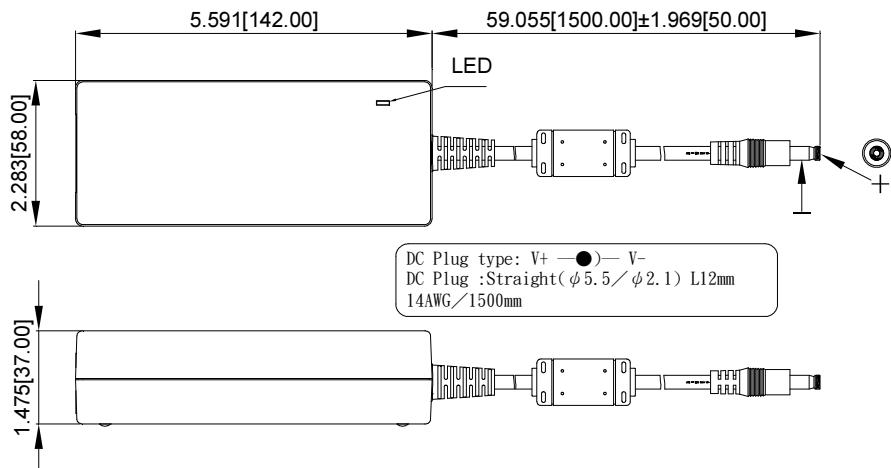
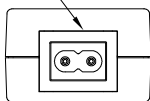
### TR100M480 (Eff Vs Io)



## MECHANICAL SPECIFICATION

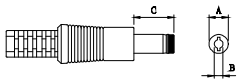
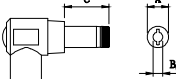
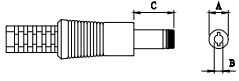
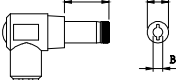
All Dimensions are in inches(mm)  
 Tolerance: Inches: X.XXX±0.02  
 Millimeters: X.XX±0.5  
 UNIT: inches(mm)

IEC320/C8





## 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>	11E36	Φ5.5	Φ2.1	12	UL1185	1500mm with Ferrite Core	14AWG for Vo: 12V, 15V
	12E36	Φ5.5	Φ2.5	12			
	23E36	Φ5.5	Φ2.1	9.5			
	26E36	Φ5.5	Φ2.5	9.5			
 <p>Right Angle/Inner+Outer-</p> <p>+ ● -</p>	01E36	Φ5.5	Φ2.1	12			
	02E36	Φ5.5	Φ2.5	12			
	21E36	Φ5.5	Φ2.1	9.5			
	24E36	Φ5.5	Φ2.5	9.5			
 <p>Straight/Inner+Outer-</p> <p>+ ● -</p>	11E13	Φ5.5	Φ2.1	12	UL1185	1800mm with Ferrite Core	16AWG for Vo: 18V, 19V, 20V, 24V, 48V
	12E13	Φ5.5	Φ2.5	12			
	23E13	Φ5.5	Φ2.1	9.5			
	26E13	Φ5.5	Φ2.5	9.5			
 <p>Right Angle/Inner+Outer-</p> <p>+ ● -</p>	01E13	Φ5.5	Φ2.1	12			
	02E13	Φ5.5	Φ2.5	12			
	21E13	Φ5.5	Φ2.1	9.5			
	24E13	Φ5.5	Φ2.5	9.5			