



electronicpowersolutions

# TRH50A SERIES 50 WATT I.T.E SWITCH ADAPTER

## Features

- Universal Input Range 90~264Vac
- High Efficiency up to 89%
- Class I
- No Load Input Power Consumption < 150mW
- Approval IEC/EN/UL 62368-1
- Approval EN55032 and CISPR/FCC Class B
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Over Voltage Protection
- Meets CoC Tier 2 and DOE Level VI



(Optional NOTE6)

MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE & NOISE NOTE1	VOLTAGE ACCURACY NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
TRH50A120	12 V	4.2 A	120mV	±2%	±1%	±3%	88%
TRH50A150	15 V	3.36 A	150mV	±2%	±1%	±3%	88%
TRH50A180	18 V	2.8 A	180mV	±2%	±1%	±2%	88%
TRH50A190	19 V	2.65 A	190mV	±2%	±1%	±2%	88%
TRH50A240	24 V	2.1 A	240mV	±2%	±1%	±2%	89%
TRH50A280	28 V	1.8 A	280mV	±2%	±1%	±2%	89%
TRH50A360	36 V	1.4 A	360mV	±2%	±1%	±2%	88%
TRH50A480	48 V	1.05 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.
6. Providing specific model number for customer requirement of CCC safety approval.

## PART NUMBER

Series	Output Voltage	DC Plug Type	Cable Type	Cable Type	Optional
TRH50A	XXX	-XX	E	XXX	+CCC
50W I.T.E Adapter	120 : 12V 150 : 15V 180 : 18V 190 : 19V 240 : 24V 280 : 28V 360 : 36V 480 : 48V	See Page 6	E : UL1185 with OVP	12V : 1220mm with DC Jack 15V : 1220mm with DC Jack 18V : 1800mm with DC Jack 19V : 1800mm with DC Jack 24V : 1800mm with DC Jack 28V : 1800mm with DC Jack 36V : 1800mm with DC Jack 48V : 1800mm with DC Jack	Bank or CCC Safety

Part Number Example:

**TRH50A120-01E02**, 50W, Class I, 12V<sub>dc</sub> Output, DC Jack Type, Cable Length 1220mm

**TRH50A120-01E02+CCC**, 50W, Class I, 12V<sub>dc</sub> Output, DC Jack Type, Cable Length 1220mm, CCC Safety



## 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>
Operating Temperature	See Derating Curve	All	-20		70	°C
Storage Temperature		All	-20		85	°C
Input/Output Isolation Voltage	1 minute	All			3000	V <sub>ac</sub>
Operating Altitude		All			5000	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 (Earth)		All			1	mA
Under Voltage Protection		All	50	55	60	V <sub>ac</sub>
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	TRH50A120	11.76	12	12.24	V <sub>dc</sub>
		TRH50A150	14.7	15	15.3	
		TRH50A180	17.64	18	18.36	
		TRH50A190	18.62	19	19.38	
		TRH50A240	23.52	24	24.48	
		TRH50A280	27.44	28	28.56	
		TRH50A360	35.28	36	36.72	
		TRH50A480	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	TRH50A120	0		4.2	A
		TRH50A150	0		3.36	
		TRH50A180	0		2.8	
		TRH50A190	0		2.65	
		TRH50A240	0		2.1	
		TRH50A280	0		1.8	
		TRH50A360	0		1.4	
		TRH50A480	0		1.05	
Holdup Time	V <sub>in</sub> =115V <sub>ac</sub>	All		8		ms
Output Voltage Regulation						
Load Regulation	60%±40% Full load change	TRH50A120			±3	%
		TRH50A150			±3	
		TRH50A180			±2	
		TRH50A190			±2	
		TRH50A240			±2	
		TRH50A280			±2	
		TRH50A360			±2	
		TRH50A480			±2	
Line Regulation	V <sub>in</sub> =high line to low line, full load	All			±1.0	%



# TRH50A Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Over Voltage Protection	TVS Component to clamp	TRH50A120	14.3		15.8	V <sub>dc</sub>
		TRH50A150	17.1		18.9	
		TRH50A180	20.9		23.1	
		TRH50A190	20.9		23.1	
		TRH50A240	28.5		31.5	
		TRH50A280	31.35		34.65	
		TRH50A360	40.85		45.15	
		TRH50A480	53.2		58.8	
Over Current Protection	Auto recovery	All	175		190	%
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	TRH50A120			120	mV
		TRH50A150			150	
		TRH50A180			180	
		TRH50A190			190	
		TRH50A240			240	
		TRH50A280			280	
		TRH50A360			360	
		TRH50A480			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	TRH50A120			4400	uF
		TRH50A150			3400	
		TRH50A180			2800	
		TRH50A190			2800	
		TRH50A240			2200	
		TRH50A280			1800	
		TRH50A360			1360	
		TRH50A480			1200	
Efficiency	1. V <sub>in</sub> =230V <sub>ac</sub> 2. Output is 75% full load 3. Ambient temperature=25°C	TRH50A120		88		%
		TRH50A150		88		
		TRH50A180		88		
		TRH50A190		88		
		TRH50A240		89		
		TRH50A280		89		
		TRH50A360		88		
		TRH50A480		89		

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute (without dielectric breakdown)	All			3000	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		65		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	200			k hours
Humidity	Non-condensing	All			93	% RH
Shock	MIL-STD-810F Table 516.5, TABLE 516.5-1 10ms, each axis 3 times(±X、±Y、±Z axis)	All		75		g



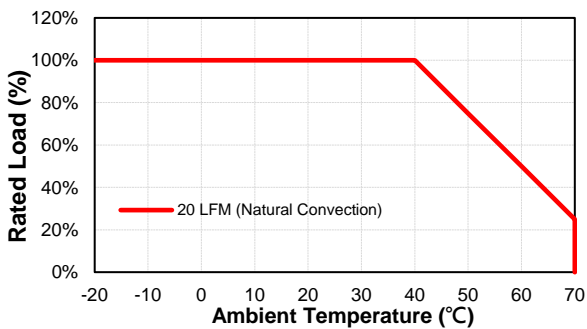
# TRH50A Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
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)			
<b>Safety</b>	Class I, IEC62368-1:2014 EN62368-1:2014+A11:2017 UL 62368-1, 2nd Edition					Ed 2.0
<b>EMC Emission</b>	EN55032:2012+AC:2013, EN61000-3-2:2014, EN6100-3-3:2013, FCC CFR 47 Part 15					
Conducted Disturbance	EN55032:2012+AC:2013, FCC CFR 47 Part 15					Class B
Radiated Disturbance	EN55032:2012+AC:2013, FCC CFR 47 Part 15					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>	EN55024:2010+A1:2015, EN61000-6-1:2007, EN61204-3:2000, IEC61000-4-2,3,4,5,6,8,11					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008 Air Discharge: ±8kV 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, ±0.5 kV, ±1 kV					Criterion A
Surge	IEC61000-4-5:2014+A1:2017, L-N: ±0.5 kV, ±1 kV, L-E (Ground): ±0.5 kV, ±1 kV, ±2 kV					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+A1:2017, Dips:30% reduction, Dips: >95% Reduction					Criterion A
Voltage Interruptions	IEC 61000-4-11:2004+A1:2017, >95% Reduction					Criterion B
Application Note Link	<a href="#">TRH50A Series App Notes</a>					

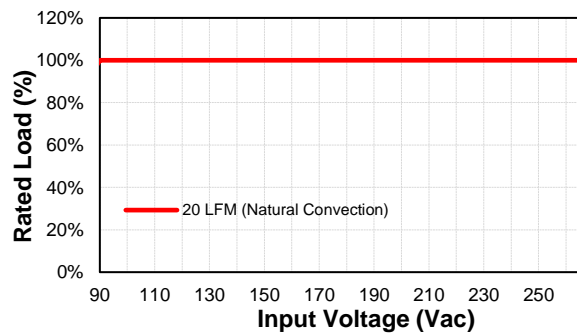
## CHARACTERISTIC CURVE

### Power Derating Curve

TRH50A Derating Curve



TRH50A Input Voltage Derating Curve

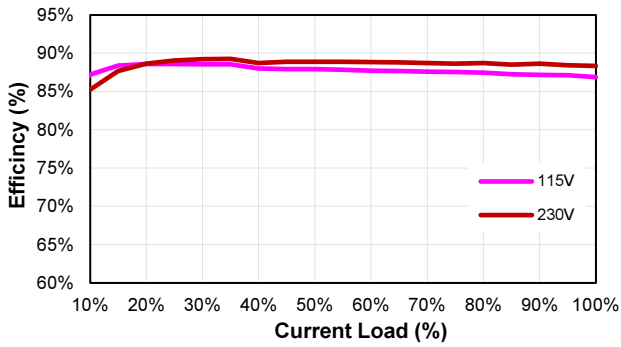




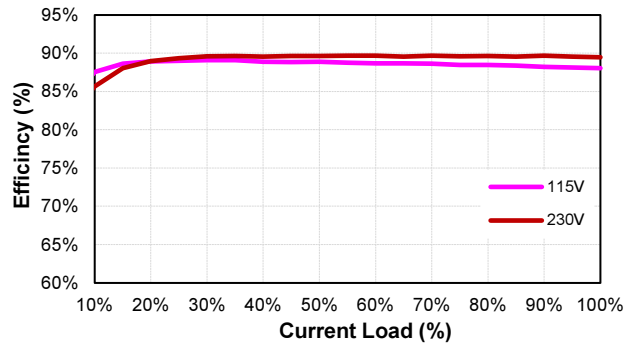
# TRH50A Series

## Performance Data

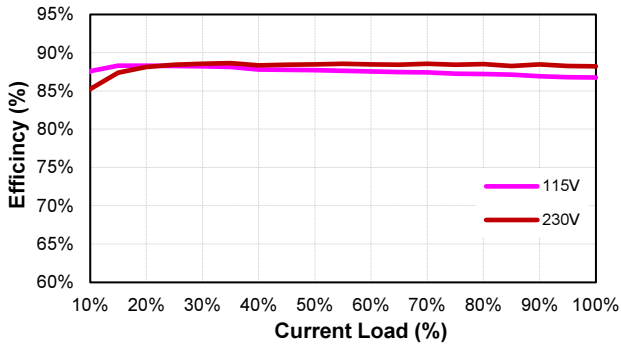
TRH50A120 (Eff Vs Io)



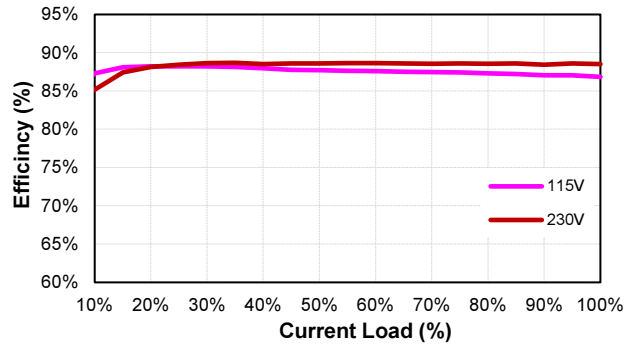
TRH50A150 (Eff Vs Io)



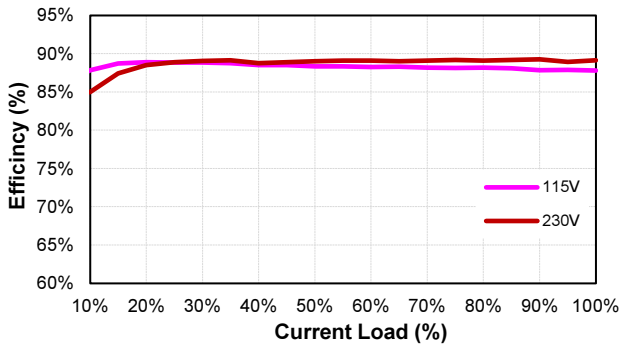
TRH50A180 (Eff Vs Io)



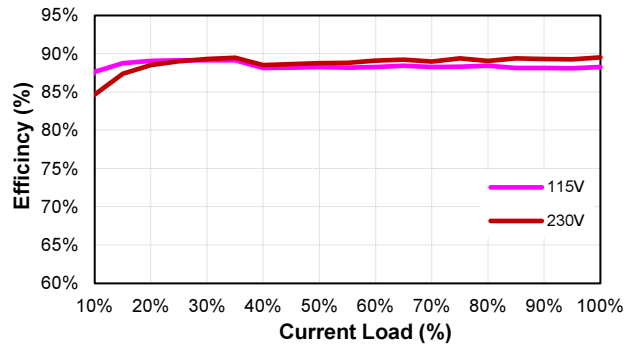
TRH50A190 (Eff Vs Io)



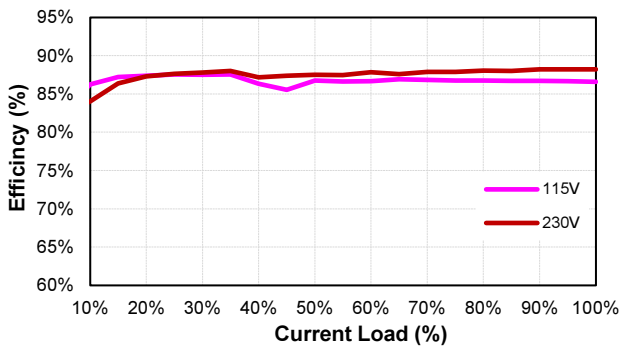
TRH50A240 (Eff Vs Io)



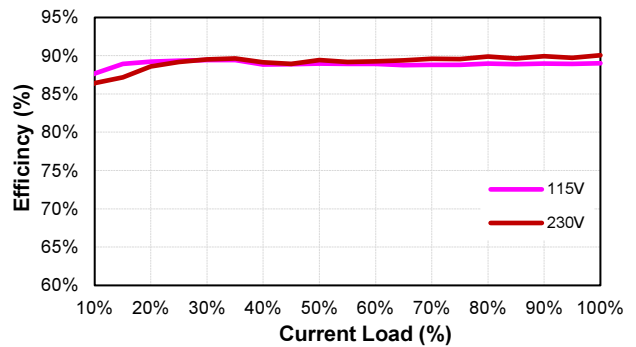
TRH50A280 (Eff Vs Io)



TRH50A360 (Eff Vs Io)



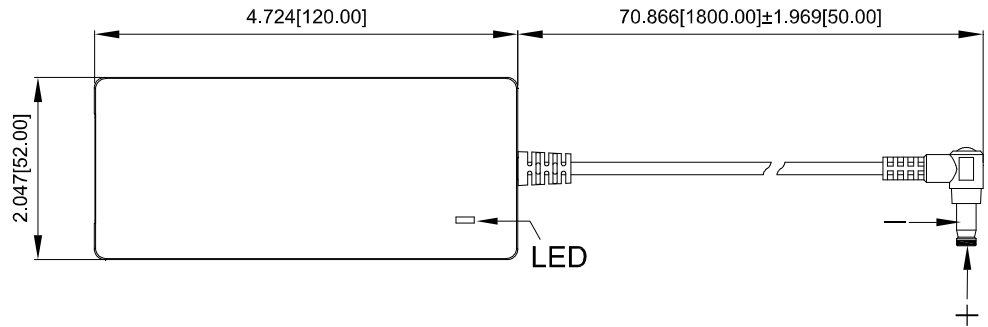
TRH50A480 (Eff Vs Io)





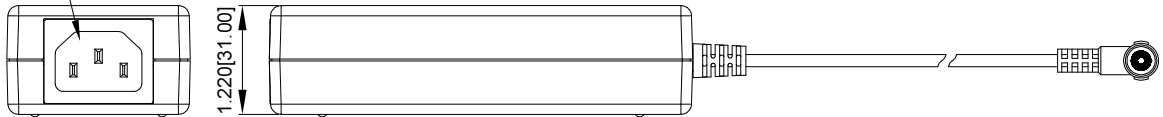
## MECHANICAL SPECIFICATION

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

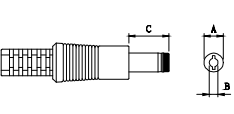
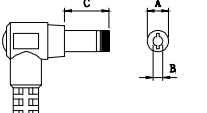
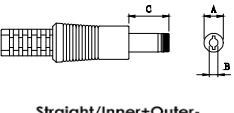
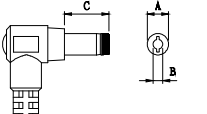


DC Plug type: V+ —●— V-  
 DC Plug :Right Angle(φ5.5/φ2.1) L12mm  
 18AWG/1800mm

IEC320/C14



## STANDARD OUTPUT DC PLUG

DC Plug Type	Cable Number -XXXX	A	B	C	Cable Type	Cable Length	Cable AWG
		OD (mm)	ID (mm)	L (mm)			
 Straight/Inner+Outer- + —●— -	11E02	Φ5.5	Φ2.1	12	UL1185	1220mm 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			
 Right Angle/Inner+Outer- + —●) — -	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			
 Straight/Inner+Outer- + —●— -	11E03	Φ5.5	Φ2.1	12	UL1185	1800mm without Core	16AWG for Vo: 18V, 19V 18AWG for Vo: 24V, 28V, 36V, 48V
	12E03	Φ5.5	Φ2.5	12			
	23E03	Φ5.5	Φ2.1	9.5			
	26E03	Φ5.5	Φ2.5	9.5			
 Right Angle/Inner+Outer- + —●) — -	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			