



TRH70A SERIES 70 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
TRH70A120	12 V	5.8 A	120mV	±2%	±1%	±4%	88%
TRH70A150	15 V	4.65 A	150mV	±2%	±1%	±3%	88%
TRH70A180	18 V	3.9 A	180mV	±2%	±1%	±2%	88%
TRH70A190	19 V	3.7 A	190mV	±2%	±1%	±2%	88%
TRH70A240	24 V	3 A	240mV	±2%	±1%	±2%	89%
TRH70A280	28 V	2.5 A	280mV	±2%	±1%	±2%	89%
TRH70A360	36 V	2 A	360mV	±2%	±1%	±2%	89%
TRH70A480	48 V	1.5 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_{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. Providing specific model number for customer requirement of CCC safety approval.

PART NUMBER

Series	Output Voltage	DC Plug Type	Cable Type	Cable Length	Optional
TRH70A	XXX	-XX	E	XX	+CCC
70W I.T.E Adapter	120 : 12V 150 : 15V 180 : 18V 190 : 19V 240 : 24V 280 : 28V 360 : 36V 480 : 48V	See Page 7	E : UL1185 with OVP	01 : 720mm 02 : 1220mm 03 : 1800mm 11 : 720mm with Ferrite Core 12 : 1220mm with Ferrite Core 13 : 1800mm with Ferrite Core See page 7 for restrictions	Bank or CCC Safety

Part Number Example:

TRH70A120-01E01, 70W, Class I, 12V_{dc} Output, DC Jack Type, Cable Length 720mm

TRH70A120-01E01+CCC, 70W, Class I, 12V_{dc} Output, DC Jack Type, Cable Length 720mm, CCC Safety



TRH70A Series

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 _{ac}
Operating Temperature	See Derating Curve	All	-20		70	°C
Storage Temperature		All	-20		85	°C
Input/Output Isolation Voltage	1 minute	All			3000	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)		All			1	mA
Under Voltage Protection		All	50	55	60	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	TRH70A120	11.76	12	12.24	V _{dc}
		TRH70A150	14.7	15	15.3	
		TRH70A180	17.64	18	18.36	
		TRH70A190	18.62	19	19.38	
		TRH70A240	23.52	24	24.48	
		TRH70A280	27.44	28	28.56	
		TRH70A360	35.28	36	36.72	
		TRH70A480	47.04	48	48.96	
Operating Output Current Range	V _{in} =115V _{ac} and 230V _{ac} , T _c =25°C	TRH70A120	0		5.8	A
		TRH70A150	0		4.65	
		TRH70A180	0		3.9	
		TRH70A190	0		3.7	
		TRH70A240	0		3.0	
		TRH70A280	0		2.5	
		TRH70A360	0		2.0	
		TRH70A480	0		1.5	
Holdup Time	V _{in} =115V _{ac}	All		8		ms
Output Voltage Regulation						
Load Regulation	60%±40% Full load change	TRH70A120			±4	%
		TRH70A150			±3	
		TRH70A180			±2	
		TRH70A190			±2	
		TRH70A240			±2	
		TRH70A280			±2	
		TRH70A360			±2	
TRH70A480			±2			
Line Regulation	V _{in} =high line to low line, full load	All			±1.0	%



TRH70A Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Over Voltage Protection	TVS Component to clamp	TRH70A120	14.3		15.8	V _{dc}
		TRH70A150	17.1		18.9	
		TRH70A180	20.9		23.1	
		TRH70A190	20.9		23.1	
		TRH70A240	28.5		31.5	
		TRH70A280	31.35		34.65	
		TRH70A360	40.9		45.2	
		TRH70A480	53.2		58.8	
Over Current Protection	Auto recovery	All	150		170	%
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	TRH70A120			120	mV
		TRH70A150			150	
		TRH70A180			180	
		TRH70A190			190	
		TRH70A240			240	
		TRH70A280			280	
		TRH70A360			360	
		TRH70A480			480	
Load Capacitance	1. V _{in} =115V _{ac} and 230V _{ac} 2. Output is max. load 3. Ambient temperature=25°C	TRH70A120			5800	uF
		TRH70A150			4600	
		TRH70A180			4000	
		TRH70A190			3600	
		TRH70A240			3000	
		TRH70A280			2400	
		TRH70A360			2000	
		TRH70A480			1470	
Efficiency	1. V _{in} =230V _{ac} 2. Output is 75% full load 3. Ambient temperature=25°C	TRH70A120		88		%
		TRH70A150		88		
		TRH70A180		88		
		TRH70A190		88		
		TRH70A240		89		
		TRH70A280		89		
		TRH70A360		89		
		TRH70A480		89		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute (without dielectric breakdown)	All			3000	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°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-I 10ms, each axis 3 times(±X、±Y、±Z axis)	All		75		g



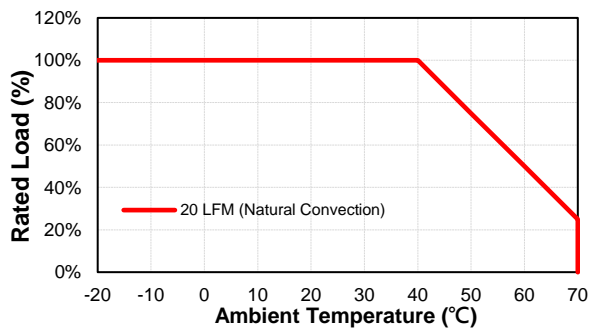
TRH70A Series

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)			
Safety	Class I, IEC62368-1:2014 EN62368-1:2014+A11:2017 UL 62368-1, 2nd Edition:2014					Ed 2.0
EMC Emission	EN55032:2015, EN61000-3-2:2019, EN61000-3-3:2013, FCC CFR 47 Part 15, ICES-003 Issue 7					
Conducted Disturbance	EN55032:2015+A11:2020, FCC CFR 47 Part 15, ICES-003 Issue 7					Class B
Radiated Disturbance	EN55032:2015+A11:2020, FCC CFR 47 Part 15, ICES-003 Issue 7					Class B
Harmonic Current Emissions	EN 61000-3-2:2019					Class A
Voltage Fluctuations & Flicker	EN 61000-3-3:2013+A1:2019					Criterion A
EMC Immunity	EN55035:2017+A11:2020, 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 61000-4-3:2020					Criterion A
Electrical Fast Transient (EFT)	IEC61000-4-4:2012, ±0.5kV, ±1kV					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					Criterion A
Power Frequency Magnetic Field	IEC 61000-4-8:2009					Criterion A
Voltage Dips	IEC 61000-4-11:2020, Dips:30% reduction, Dips: >95% Reduction					Criterion A
Voltage Interruptions	IEC 61000-4-11:2020, >95% Reduction					Criterion B
Application Note Link						TRH70A Series App Notes

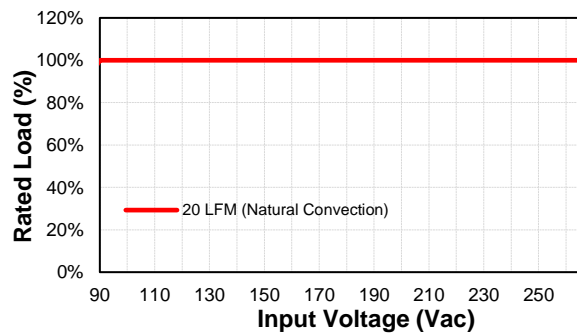
CHARACTERISTIC CURVE

Power Derating Curve

TRH70A Derating Curve



TRH70A Input Voltage Derating Curve

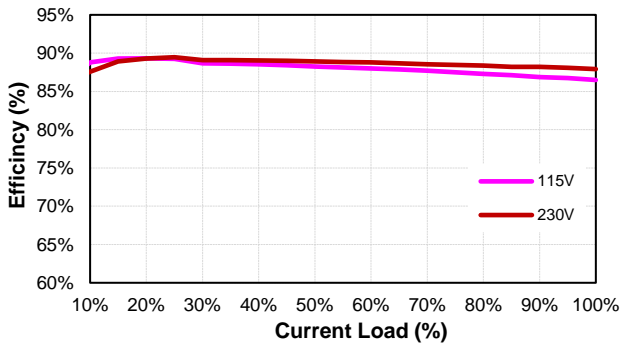




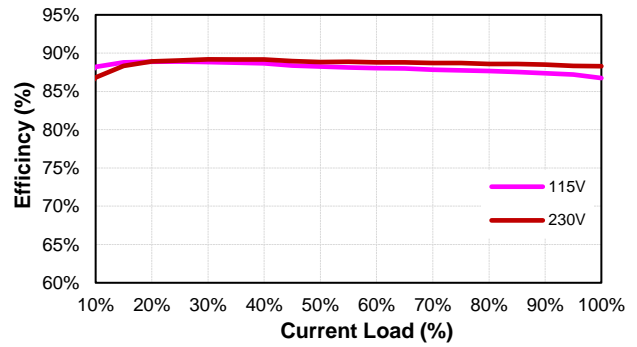
TRH70A Series

Performance Data

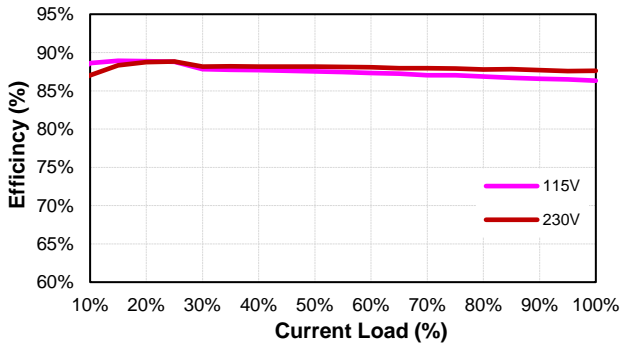
TRH70A120 (Eff Vs Io)



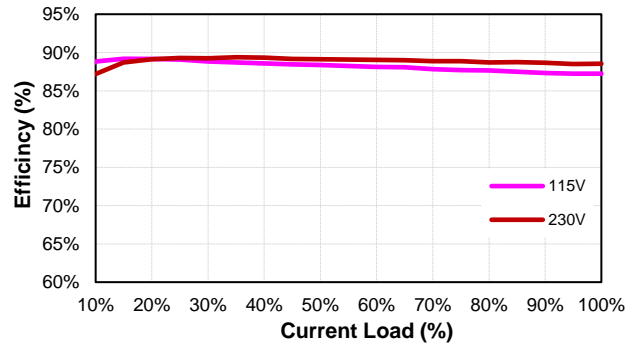
TRH70A150 (Eff Vs Io)



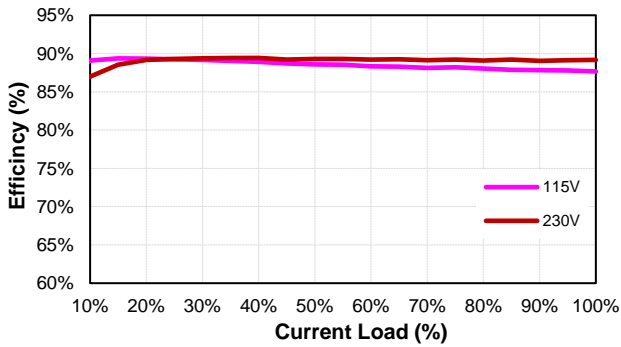
TRH70A180 (Eff Vs Io)



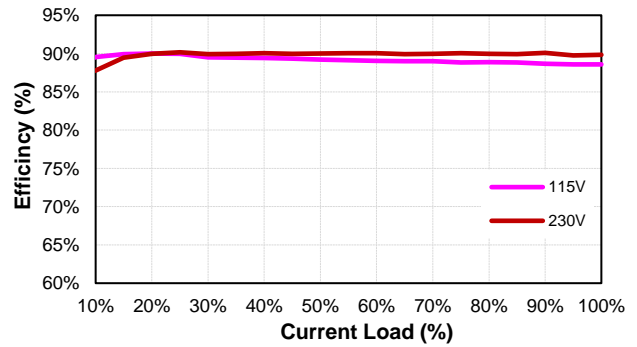
TRH70A190 (Eff Vs Io)



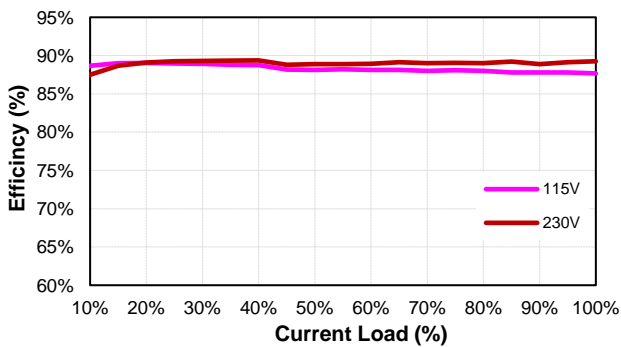
TRH70A240 (Eff Vs Io)



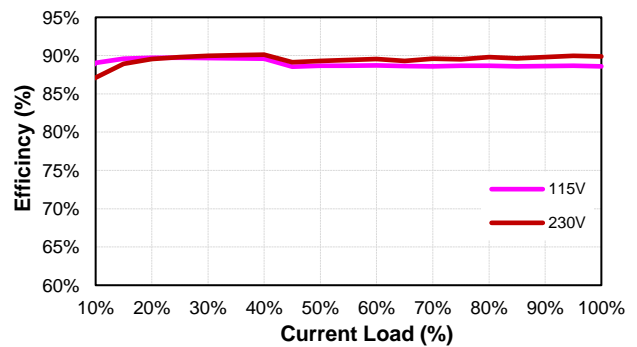
TRH70A280 (Eff Vs Io)



TRH70A360 (Eff Vs Io)



TRH70A480 (Eff Vs Io)

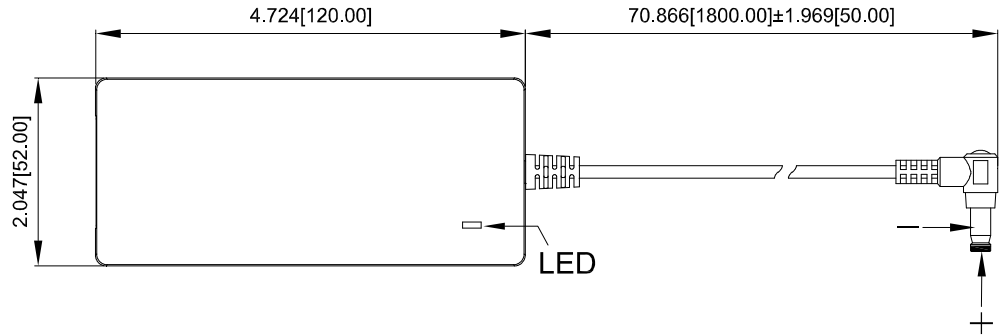




TRH70A Series

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($\phi 5.5 / \phi 2.1$) L12mm
18AWG/1800mm

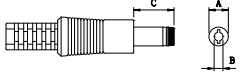
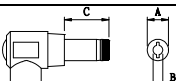
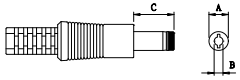
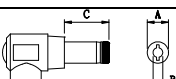
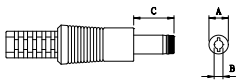
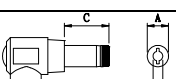
IEC320/C14





TRH70A 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>	11E01	Φ5.5	Φ2.1	12	UL1185	720mm without Core	16AWG for Vo: 12V	
	12E01	Φ5.5	Φ2.5	12				
	23E01	Φ5.5	Φ2.1	9.5				
	26E01	Φ5.5	Φ2.5	9.5				
 <p>Right Angle/Inner+Outer-</p> <p>+ ●) -</p>	01E01	Φ5.5	Φ2.1	12				
	02E01	Φ5.5	Φ2.5	12				
	21E01	Φ5.5	Φ2.5	9.5				
	24E01	Φ5.5	Φ2.1	9.5				
 <p>Straight/Inner+Outer-</p> <p>+ ● -</p>	11E02	Φ5.5	Φ2.1	12		UL1185	1220mm without Core	16AWG for Vo: 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	Φ2.5	9.5				
	24E02	Φ5.5	Φ2.1	9.5				
 <p>Straight/Inner+Outer-</p> <p>+ ● -</p>	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				
 <p>Right Angle/Inner+Outer-</p> <p>+ ●) -</p>	01E03	Φ5.5	Φ2.1	12				
	02E03	Φ5.5	Φ2.5	12				
	21E03	Φ5.5	Φ2.5	9.5				
	24E03	Φ5.5	Φ2.1	9.5				