



# TRH100A SERIES 100 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 Ed 3.0
- Approval EN55032 and CISPR/FCC Class B
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Over Voltage Protection
- Meets DOE and CoC Tier 2 Level VI



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE & NOISE NOTE1	VOLTAGE ACCURACY NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
TRH100A120	12 V	8.34 A	120mV	±2%	±1%	±4%	88%
TRH100A135	13.5 V	7.33 A	135mV	±2%	±1%	±4%	88%
TRH100A150	15 V	6.67 A	150mV	±2%	±1%	±4%	89%
TRH100A180	18 V	5.56 A	180mV	±2%	±1%	±2%	88%
TRH100A190	19 V	5.26 A	190mV	±2%	±1%	±2%	88%
TRH100A240	24 V	4.17 A	240mV	±2%	±1%	±2%	88%
TRH100A280	28 V	3.54 A	280mV	±2%	±1%	±2%	89%
TRH100A360	36 V	2.78 A	360mV	±2%	±1%	±2%	89%
TRH100A480	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.
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
TRH100A	XXX	-XX	E	XXX	+CCC
100W I.T.E Adapter	120 : 12V 135 : 15V 150 : 15V 180 : 18V 190 : 19V 240 : 24V 280 : 28V 360 : 36V 480 : 48V	<a href="#">See Page 7</a>	E : UL2464 with OVP	11 : 720mm with Ferrite Core 12 : 1220mm with Ferrite Core 13 : 1800mm with Ferrite Core  <a href="#">See page 7 for restrictions</a>	Bank or CCC Safety

Part Number Example:

**TRH100A120-01E12**, 100W, Class I, 12V<sub>dc</sub> Output, DC Jack Type, Cable Length 1220mm with Ferrite Core

**TRH100A120-01E12+CCC**, 100W, Class I, 12V<sub>dc</sub> Output, DC Jack Type, Cable Length 1220mm with Ferrite Core, CCC safety



# TRH100A 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 <sub>ac</sub>
Operating Temperature	See Derating Curve	All	-30		70	°C
Storage Temperature		All	-40		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			1.3	mA
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			120	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	TRH100A120	11.76	12	12.24	V <sub>dc</sub>
		TRH100A135	13.23	13.5	13.77	
		TRH100A150	14.7	15	15.3	
		TRH100A180	17.64	18	18.36	
		TRH100A190	18.62	19	19.38	
		TRH100A240	23.52	24	24.48	
		TRH100A280	27.44	28	28.56	
		TRH100A360	35.28	36	36.72	
		TRH100A480	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	TRH100A120	0		8.34	A
		TRH100A135	0		7.33	
		TRH100A150	0		6.67	
		TRH100A180	0		5.56	
		TRH100A190	0		5.26	
		TRH100A240	0		4.17	
		TRH100A280	0		3.54	
		TRH100A360	0		2.78	
		TRH100A480	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	TRH100A120			±4.0	%
		TRH100A135			±4.0	
		TRH100A150			±4.0	
		TRH100A180			±2.0	
		TRH100A190			±2.0	
		TRH100A240			±2.0	
		TRH100A280			±2.0	
		TRH100A360			±2.0	
TRH100A480			±2.0			
Line Regulation	V <sub>in</sub> =High line to low line, full load	All			±1.0	%



# TRH100A Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Over Voltage Protection	TVS Component to clamp	TRH100A120	14.3		15.8	V <sub>dc</sub>
		TRH100A135	17.1		19.3	
		TRH100A150	20.9		23.1	
		TRH100A180	20.9		23.1	
		TRH100A190	22.8		25.2	
		TRH100A240	28.5		31.9	
		TRH100A280	53.2		59.2	
		TRH100A360	14.3		15.8	
		TRH100A480	17.1		19.3	
Over Current Protection	Auto recovery	All	110		130	%
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	TRH100A120			120	mV
		TRH100A135			135	
		TRH100A150			150	
		TRH100A180			180	
		TRH100A190			190	
		TRH100A240			240	
		TRH100A280			280	
		TRH100A360			360	
		TRH100A480			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	TRH100A120			8400	uF
		TRH100A135			7400	
		TRH100A150			6600	
		TRH100A180			5500	
		TRH100A190			5500	
		TRH100A240			4200	
		TRH100A280			3600	
		TRH100A360			2780	
		TRH100A480			2040	
Efficiency	1. V <sub>in</sub> =230V <sub>ac</sub> 2. Output is 75% full load 3. Ambient temperature=25°C	TRH100A120		88%		%
		TRH100A135		88%		
		TRH100A150		89%		
		TRH100A180		88%		
		TRH100A190		88%		
		TRH100A240		88%		
		TRH100A280		89%		
		TRH100A360		89%		
		TRH100A480		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



# TRH100A Series

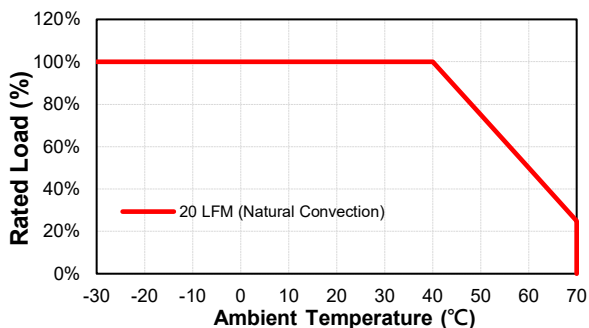
## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	$I_o=100\%$ ; $T_a=25^\circ\text{C}$ per MIL-HDBK-217F	All	160			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		485		grams
Dimension		All	5.591x2.283x1.457 inches (142.00x58.00x37.00 mm)			
<b>Safety</b>	Class I, IEC 62368-1:2018 EN 62368-1: 2020+A11:2020 UL 62368-1: 3rd					Ed3.0
<b>EMC Emission</b>	EN 55032:2015+A11:2020, EN 61000-3-2:2019, EN 61000-3-3:2013, FCC CFR 47 Part 15, ICES-003 Issue 5					Class B
Conducted Disturbance	EN 55032:2015+A11:2020, FCC CFR 47 Part 15, ICES-003 Issue 5					Class B
Radiated Disturbance	EN 55032:2015+A11:2020, FCC CFR 47 Part 15, ICES-003 Issue 5					Class B
Harmonic Current Emissions	EN 61000-3-2:2019					Class A
Voltage Fluctuations & Flicker	EN 61000-3-3:2013					Criterion A
<b>EMC Immunity</b>	EN 55035:2017+A11:2020, EN 61204-3:2000, IEC 61000-4-2, 3, 4, 5, 6, 8, 11					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008 Air Discharge: $\pm 8\text{kV}$ , Contact Discharge: $\pm 4\text{kV}$					Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2020					Criterion A
Electrical Fast Transient (EFT)	IEC 61000-4-4:2012, $\pm 1\text{kV}$ , $\pm 2\text{kV}$					Criterion A
Surge	IEC 61000-4-5:2014, L-N: $\pm 0.5\text{kV}$ , $\pm 1\text{kV}$ , $\pm 2\text{kV}$ L-E (Ground): $\pm 0.5\text{kV}$ , $\pm 1\text{kV}$ , $\pm 2\text{kV}$					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 61000-4-11:2020, Dips: 30% reduction, Dips: >95% Reduction					Criterion A
Voltage Interruptions	IEC 61000-4-11:2020, >95% Reduction					Criterion B
Application Note Link						<a href="#">TRH100A Series App Notes</a>

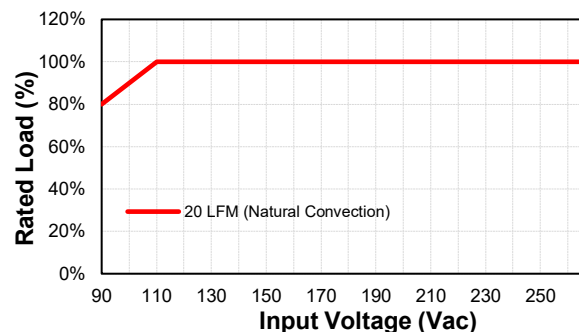
## CHARACTERISTIC CURVE

### Power Derating Curve

TRH100A Derating Curve



TRH100A Input Voltage Derating Curve

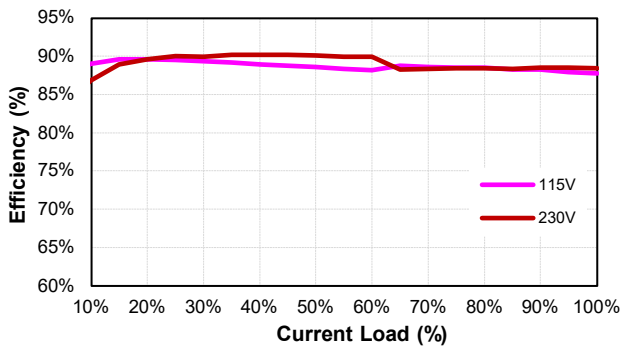




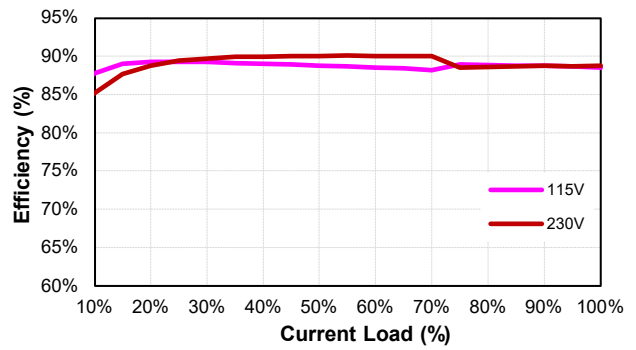
# TRH100A Series

## Performance Data

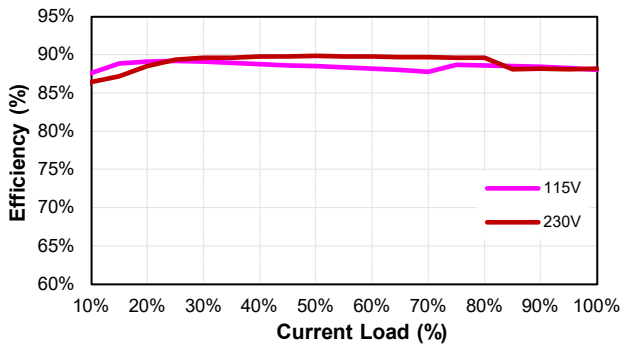
TRH100A120 (Eff Vs Io)



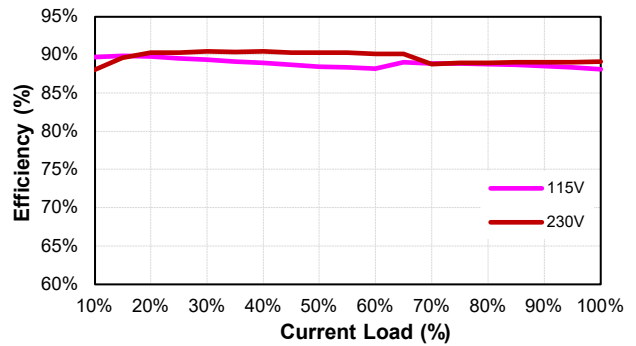
TRH100A135 (Eff Vs Io)



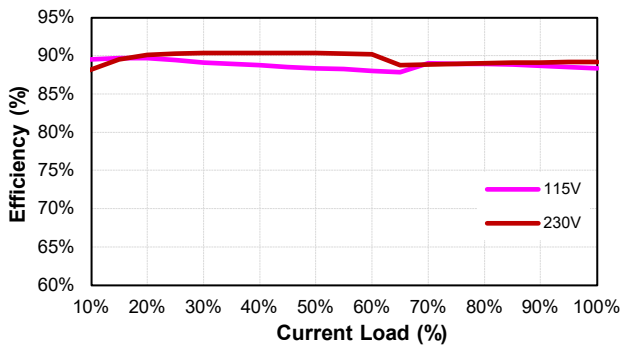
TRH100A150 (Eff Vs Io)



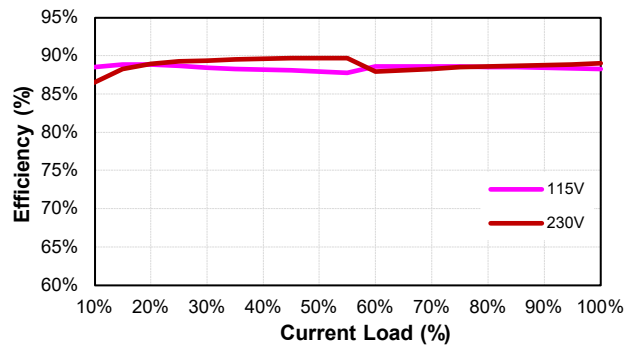
TRH100A180 (Eff Vs Io)



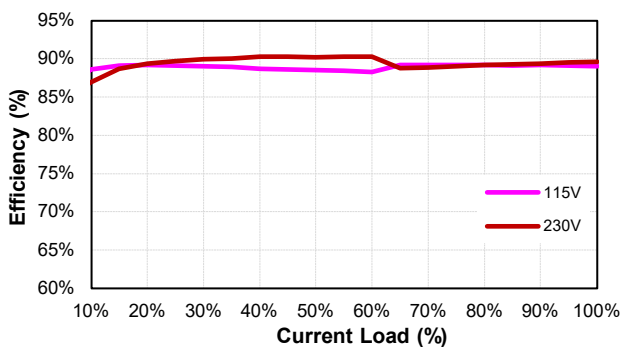
TRH100A190 (Eff Vs Io)



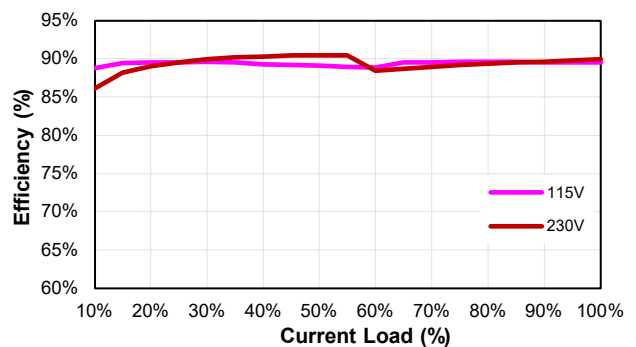
TRH100A240 (Eff Vs Io)



TRH100A280 (Eff Vs Io)



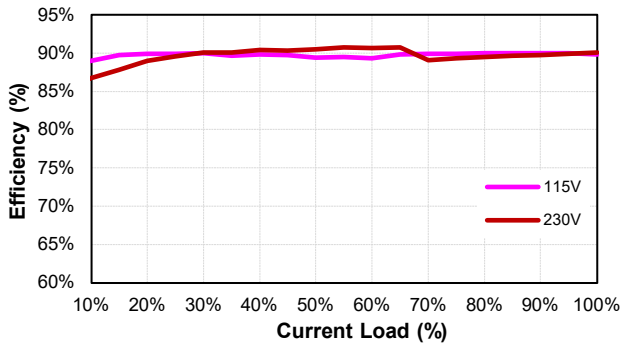
TRH100A360 (Eff Vs Io)





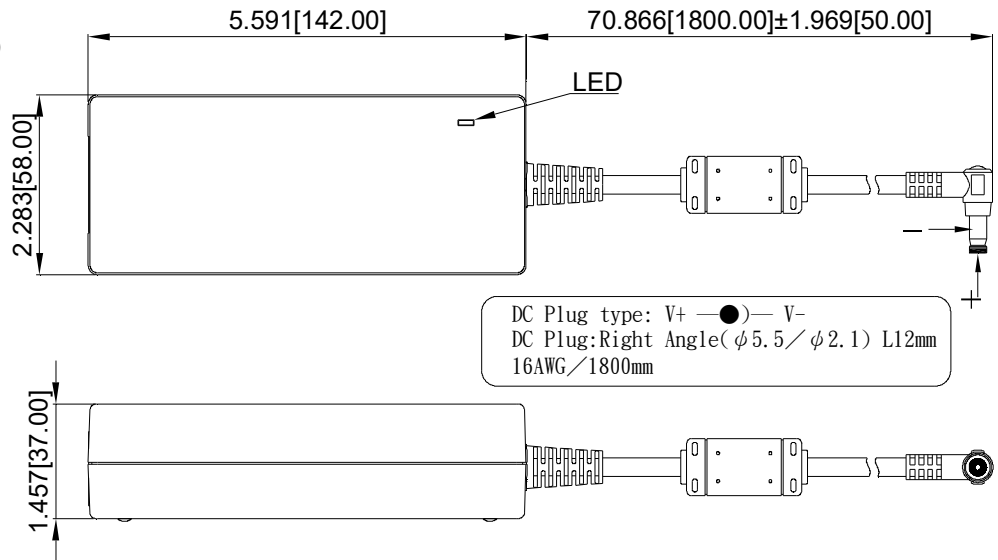
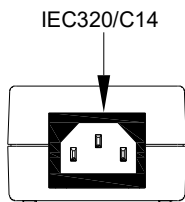
# TRH100A Series

TRH100A480 (Eff Vs Io)



## MECHANICAL SPECIFICATION

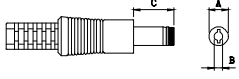
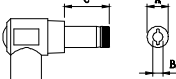
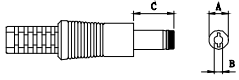
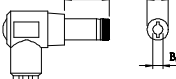
All Dimensions are in inches(mm)  
 Tolerance:Inches:X.XXX±0.02  
 Millimeters:X.XX±0.5  
 UNIT:inches(mm)





# TRH100A 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)			
 Straight/Inner+Outer- + ● -	11E12	Φ5.5	Φ2.1	12	UL2464	1220mm with Ferrite Core	16AWG for Vo: 12V, 13.5V, 15V
	12E12	Φ5.5	Φ2.5	12			
	23E12	Φ5.5	Φ2.1	9.5			
	26E12	Φ5.5	Φ2.5	9.5			
 Right Angle/Inner+Outer- + ● -	01E12	Φ5.5	Φ2.1	12			
	02E12	Φ5.5	Φ2.5	12			
	21E12	Φ5.5	Φ2.5	9.5			
	24E12	Φ5.5	Φ2.1	9.5			
 Straight/Inner+Outer- + ● -	11E13	Φ5.5	Φ2.1	12	UL2464	1800mm with Ferrite Core	16AWG for Vo: 18V, 19V, 24V, 28V 36V, 48V
	12E13	Φ5.5	Φ2.5	12			
	23E13	Φ5.5	Φ2.1	9.5			
	26E13	Φ5.5	Φ2.5	9.5			
 Right Angle/Inner+Outer- + ● -	01E13	Φ5.5	Φ2.1	12			
	02E13	Φ5.5	Φ2.5	12			
	21E13	Φ5.5	Φ2.5	9.5			
	24E13	Φ5.5	Φ2.1	9.5			

※Other DC Plug Type please refer to the link: <https://www.cincon.com/productdownload/TRH100A-cable-DC-plug.pdf>

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