



TRH25 VI Series

Application Note V11 February 2016

AC-DC Switching ADAPTER TRH25 VI Series APPLICATION NOTE



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1. Introduction

This application note describes the features and functions of Cincon's TRH25 VI series of adapter, switching AC-DC power. These are highly efficient, reliable, compact, high power density, single output AC/DC power. The power is fully protected against short circuit and over-voltage conditions. Cincon's world class automated manufacturing methods, together with an extensive testing and qualification program, ensure that the TRH25 VI series power is extremely reliable. is extremely reliable.

2. TRH25 VI Series Converter Features

- Universal Input: 90~264Vac
- EMI Meets EN55022 Class "B" and CISPR/FCC Class B
- Continuous Short Circuit Protection
- Over Voltage Protection
- Meet CoC V5 Tier 2 & DoE Level VI
(Output Cable Length \leq 1800mm)
(TRH25033: Output Cable Length \leq 720mm)
(TRH25050: Output Cable Length \leq 1220mm)
- No Load Power Consumption < 75mW



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3. 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.	Typical	Max.	Units
Input Voltage (Continuous)		All	90		264	Vac
Operating Temperature	See derating curve	All	-20		+60	°C
Storage Temperature		All	-20		+85	°C
Input/Output Isolation Voltage		All	4242			Vdc
INPUT CHARACTERISTICS						
Operating Voltage Range		All	100		240	Vac
Input Frequency Range		All	47		63	Hz
Input Current	100% Load, Vin=100Vac	All			0.7	A
Leakage Current		All			250	uA
Inrush Current	Vin=240Vac, cold start at 25°C	All			60	A
OUTPUT CHARACTERISTICS						
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Set Point	Voltage setpoint at 60% full load. Tc=25°C	TRH25033		3.3		Vdc
		TRH25050		5		
		TRH25120		12		
		TRH25150		15		
		TRH25180		18		
		TRH25240		24		
Operating Output Current Range		TRH25033			4	A
		TRH25050			4	
		TRH25120			2.1	
		TRH25150			1.67	
		TRH25180			1.4	
		TRH25240			1.05	
Holdup Time	Vin=115Vac	All		10		ms
Output Voltage Regulation						
Load Regulation	from 60% to full load and from 60% to 20% load	TRH25033			±6	%
		TRH25050			±6	
		TRH25120			±5	
		TRH25150			±3	
		TRH25180			±2	
		TRH25240			±2	



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OUTPUT CHARACTERISTICS						
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Line Regulation	Vin=high line to low line,full load	All			±1	%
Over Voltage Protection		TRH25033 TRH25050 TRH25120 TRH25150 TRH25180 TRH25240			7.44 7.44 16.2 18.9 23.5 28.8	VDC
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	TRH25033 TRH25050 TRH25120 TRH25150 TRH25180 TRH25240			50 50 120 150 180 240	mVp-p
Load Capacitance	1. Ambient temperature=25°C 2. Input voltage is 115VAC and 230VAC 3. Output is max. load	TRH25033 TRH25050 TRH25120 TRH25150 TRH25180 TRH25240			4000 4000 2100 1670 1400 1047	uF
Average Efficiency	Average Efficiency measured at 25%,50%,75%,100% load and input voltage is 115Vac / 230Vac.	TRH25033 TRH25050 TRH25120 TRH25150 TRH25180 TRH25240	80.97 83.69 87.02 86.99 87.02 87.02			%
ISOLATION CHARACTERISTICS						
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input to Output	1 minute (without dielectric breakdown)	All			4242	Vdc
Isolation Resistance		All	100			MΩ
FEATURE CHARACTERISTICS						
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency		All		67		KHz
GENERAL SPECIFICATIONS						
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
MTBF	Vin=115Vac , Io=100%; Ta=25°C per MIL-HDBK-217F	All	TBD			K hours
Weight		All		140		g



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4. Main Features and Functions

4.1 Operating Temperature Range

The highly efficient design of Cincon's TRH25 VI series power has resulted in their ability to operate within ambient temperature environments from -20°C to 40°C. Due consideration must be given to the de-rating curves when ascertaining the maximum power that can be drawn from the power. The maximum power which can be drawn is influenced by a number of factors, such as:

- Input voltage range
- Permissible Output load (per derating curve)
- Effective heat sinks

4.2 Over Current Protection

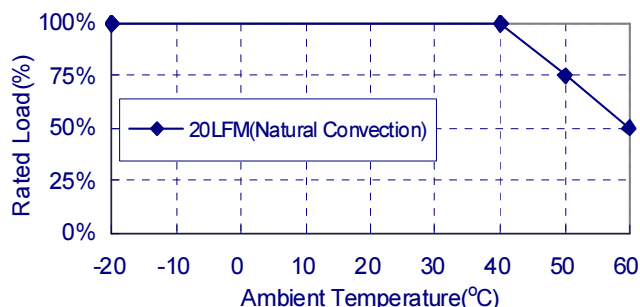
All different voltage models have a full continuous short-circuit protection. The unit will auto recover once the short circuit is removed. To provide protection in a fault condition, the unit is equipped with internal over-current protection. The unit operates normally once the fault condition is removed. The power module will supply up to 120-140% of rated current. In the event of an over current converter will go into a hiccup mode protection

5. EMC & Safety

- CB IEC 60950-1
- TUV EN 60950-1
- UL/cUL UL60950-1
- CE EN55022 Class B, FCC Part 15 Class B, EN61000-6-3, EN61000-3-2, EN61000-3-3, EN55024, EN61204-3, EN61000-6-1

6. Applications

6.1 Power De-Rating Curve



6.2 Test Set-Up

The basic test set-up to measure parameters such as efficiency and load regulation is shown in Figure 1. When testing the Cincon's TRH25 VI series under any transient conditions, please ensure that the transient response of the source is sufficient to power the equipment under test. We can calculate the

- Efficiency

- Load regulation and line regulation.
- The value of efficiency is defined as:

$$\eta = \frac{V_o \times I_o}{P_{in}} \times 100\%$$

Where:

V_o is output voltage

I_o is output current

P_{in} is input power

The value of load regulation is defined as:

$$\text{Load reg.} = \frac{V_{FL} - V_{NL}}{V_{NL}} \times 100\%$$

Where:

V_{FL} is the output voltage at full load

V_{NL} is the output voltage at 10% load

The value of line regulation is defined as:

$$\text{Line reg.} = \frac{V_{HL} - V_{LL}}{V_{LL}} \times 100\%$$

Where:

V_{HL} is the output voltage of maximum input voltage at full load.

V_{LL} is the output voltage of minimum input voltage at full load.

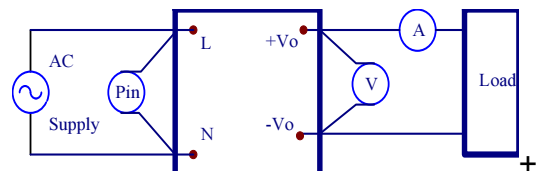


Figure 1 TRH25 VI Series Test Setup



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6.3 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure 2. Measured method:
Add a 0.1 uF ceramic capacitor and a 10 uF electrolytic capacitor to output at 20 MHz Band Width.

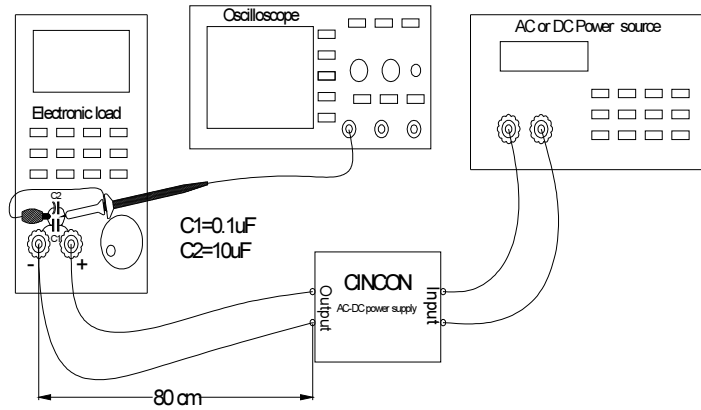
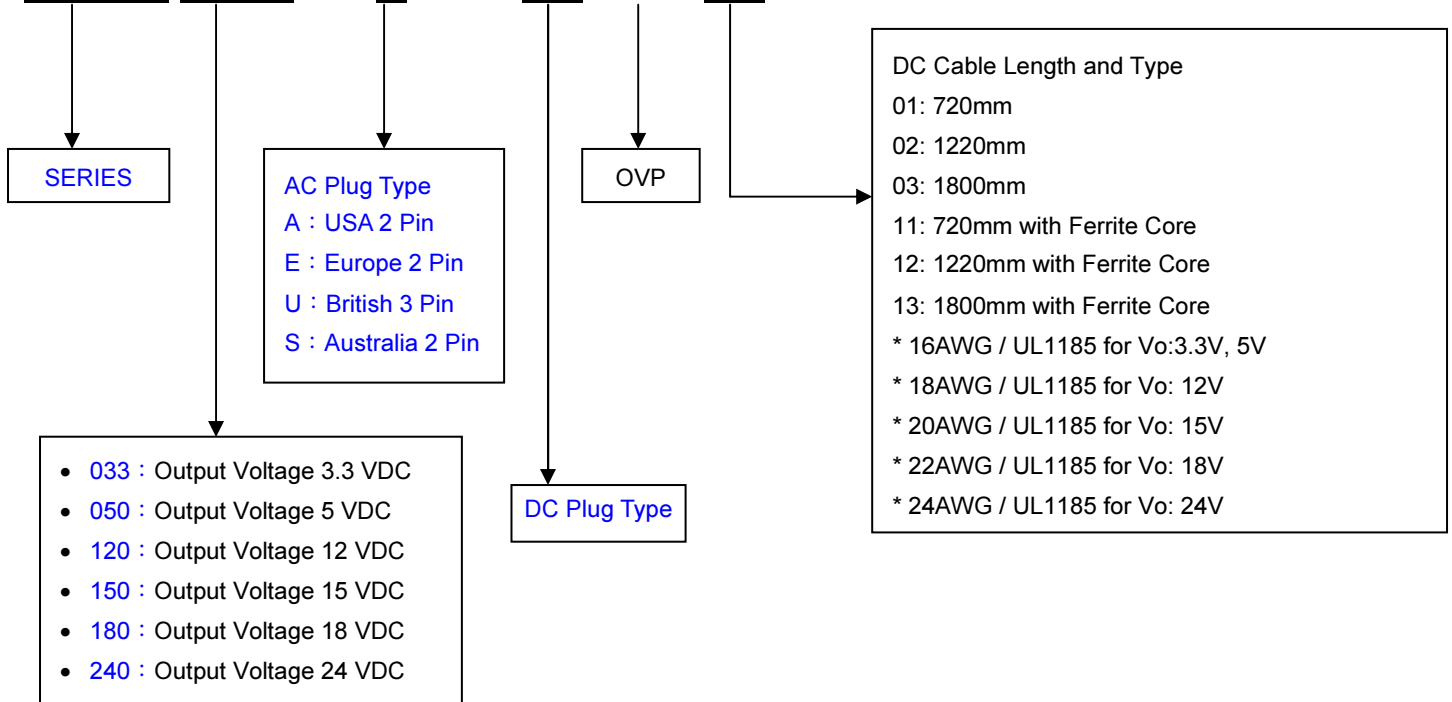


Figure 2 Output Voltage Ripple and Noise Measurement Set-Up

7. Part Number

TRH25 XXX - X - XX E XX



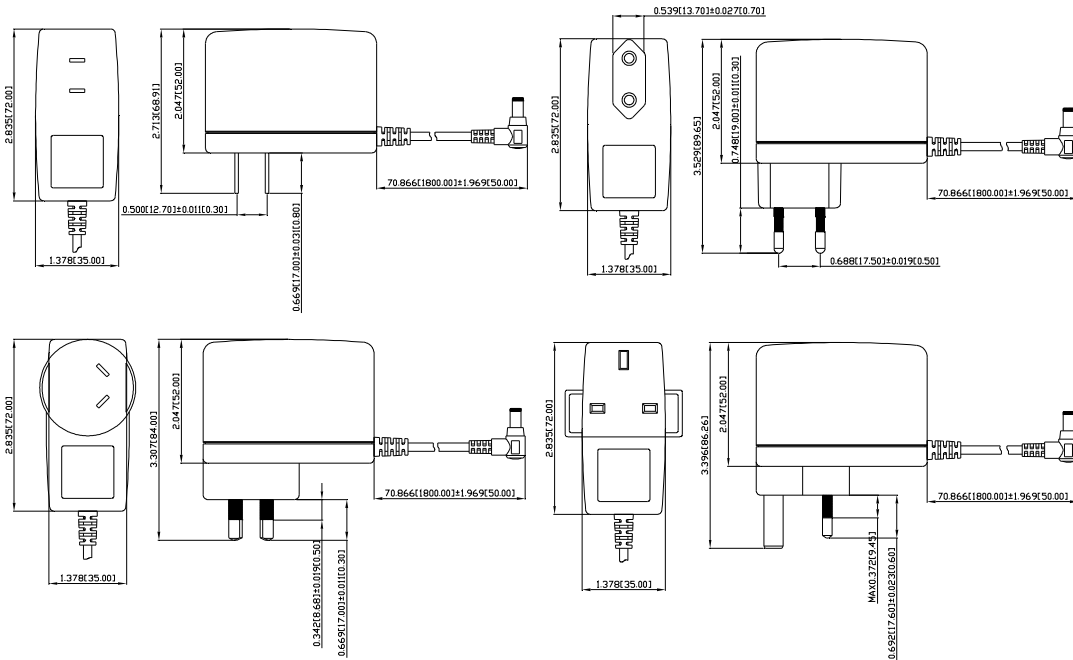


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8. TRH25 Series Mechanical Outline Diagrams

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



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