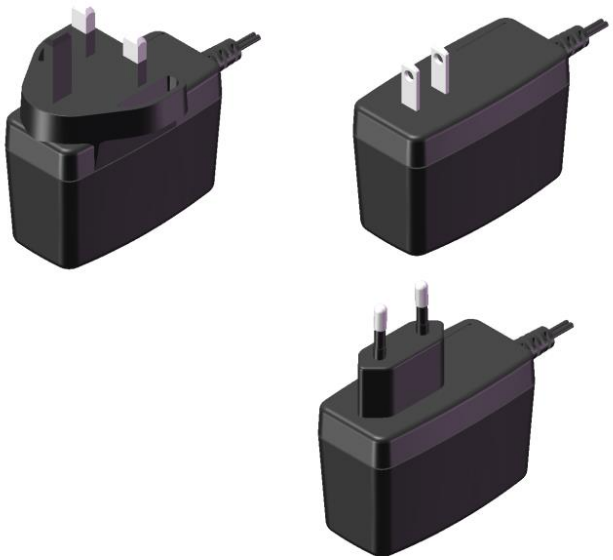
AC-DC Switching ADAPTER
TRE25 VI Series
APPLICATION NOTE



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TRE25 VI Series

Application Note V11 September 2019

Content

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1. Introduction

This application note describes the features and functions of Cincon's TRE25 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 TRE25 VI series power is extremely reliable. is extremely reliable.

- Universal Input: 90~264Vac
- EMI Meets EN55032 Class "B" and CISPR/FCC Class B
- Continuous Short Circuit Protection
- Over Voltage Protection
- No Load Power Consumption<75mW
- Approved IEC/EN/UL62368-1
- Meet CoC V5 Tier 2 & DoE Level VI

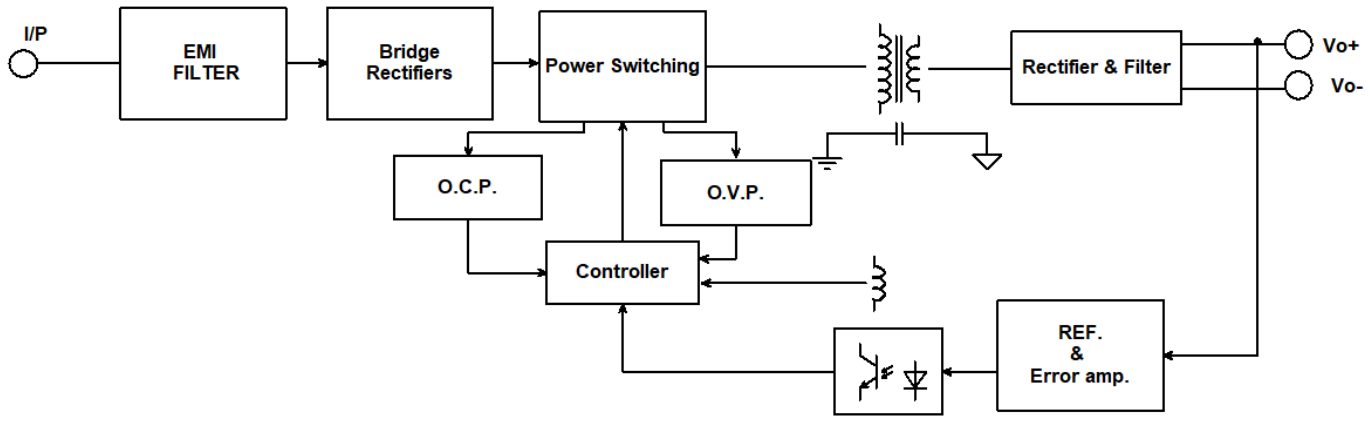
  (Output Cable Length ≦ 1800mm)

  (TRE25050: Output Cable Length ≦ 1220mm)

2. TRE25 VI Series Features

- Miniature Size

3. Electrical Block Diagram



4. 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
			120		370	Vdc
Operating Temperature	See derating curve	All	-20		+60	℃
Storage Temperature		All	-20		+85	℃
Input/Output Isolation Voltage		All			3000	Vac
Altitude		All			3000	m

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
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℃	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℃	TRE25050	4.9	5	5.1	Vdc
		TRE25090	8.82	9	9.18	
		TRE25120	11.76	12	12.24	
		TRE25150	14.7	15	15.3	
		TRE25180	17.64	18	18.36	
		TRE25240	23.52	24	24.48	
Operating Output Current Range		TRE25050			4	A
		TRE25090			2.5	
		TRE25120			2.1	
		TRE25150			1.67	
		TRE25180			1.4	
		TRE25240			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	TRE25050			±6	%
		TRE25090			±5	
		TRE25120			±5	
		TRE25150			±3	
		TRE25180			±2	
		TRE25240			±2	

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		TRE25050			7.44	Vdc
		TRE25090			13.6	
		TRE25120			16.2	
		TRE25150			18.9	
		TRE25180			23.5	
		TRE25240			28.8	
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℃	TRE25050			50	mVp-p
		TRE25090			90	
		TRE25120			120	
		TRE25150			150	
		TRE25180			180	
		TRE25240			240	
Load Capacitance	1. Ambient temperature=25℃ 2. Input voltage is 115VAC and 230VAC 3. Output is max. load	TRE25050			4000	uF
		TRE25090			2500	
		TRE25120			2100	
		TRE25150			1670	
		TRE25180			1400	
		TRE25240			1050	
Average Efficiency	Average Efficiency measured at 25%,50%,75%,100% load and input voltage is 115Vac/230Vac.	TRE25050	83.7			%
		TRE25090	86.52			
		TRE25120	87.0			
		TRE25150	87.0			
		TRE25180	87.0			
		TRE25240	87.0			

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input to Output	1 minute (without dielectric breakdown)	All			3000	Vac
Isolation Resistance		All	100			MΩ

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency		All		65		KHz

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
MTBF	Vin=115Vac, Io=100%; Ta=25℃ per MIL-HDBK-217F	All	300			K hours
Weight		All		140		g
Safety	Class II, IEC/EN/UL 62368-1/60950-1					
EMC Emission	EN 55032: 2010/AC: 2011 Class B, EN55032:2015+AC:2016 FCC CFR Title 47 Part 15 Subpart B: 2015 Class B					
EMC Immunity	EN 61204-3, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 55024, EN 61000-6-1					
Conducted Emission	EN 55032, EN 61000-6-3, EN 61204-3					
Radiated Emission	EN 55032, EN 61000-6-3, EN 61204-3					
Power Harmonics	EN 61000-3-2: 2014					
Voltage Fluctuation and Flicker	EN 61000-3-3: 2013					
Electrostatic Discharge (ESD)	IEC 61000-4-2 Ed. 2.0: 2008					
Radiated Susceptibility	IEC 61000-4-3 Ed. 3.2: 2010					
Electrical Fast Transient/Burst	IEC 61000-4-4 Ed. 3.0: 2012					
Surge	IEC 61000-4-5 Ed. 3.0: 2014					
Conducted Susceptibility	IEC 61000-4-6 Ed. 4.0: 2013					
Power Frequency Magnetic Field	IEC 61000-4-8 Ed. 2.0: 2009					
Voltage Dips and Interruption	IEC 61000-4-11 Ed. 2.0: 2004					

5. Main Features and Functions

5.1 Operating Temperature Range

The highly efficient design of Cincon's TRE25 VI series power has resulted in their ability to operate within ambient temperature environments from -20℃ to 40℃. 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

5.2 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 140-170% of rated current. In the event of an over current converter will go into a hiccup mode protection

6. EMC & Safety

■ Emission and Immunity

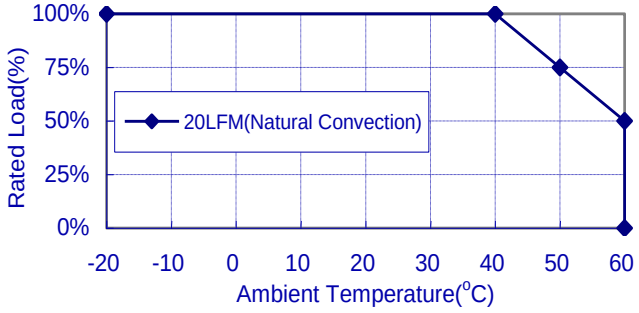
EN55032 Class B, FCC Part 15 Class B
EN61000-6-3, EN61000-3-2, EN61000-3-3
EN55024, EN61204-3, EN61000-6-1

■ Safety

Class II, IEC/EN/UL 62368-1/60950-1

7. Applications

7.1 Power De-Rating Curve



7.2 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 TRE25 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:

$$\eta = \frac{Vo \times Io}{Pin} \times 100\%$$

Where:

Vo is output voltage

Io is output current

Pin is input power

The value of load regulation is defined as:

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

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:

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

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.

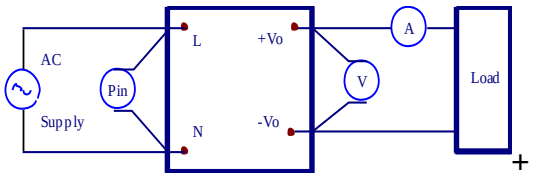


Figure 1 TRE25 VI Series Test Setup

7.3 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.

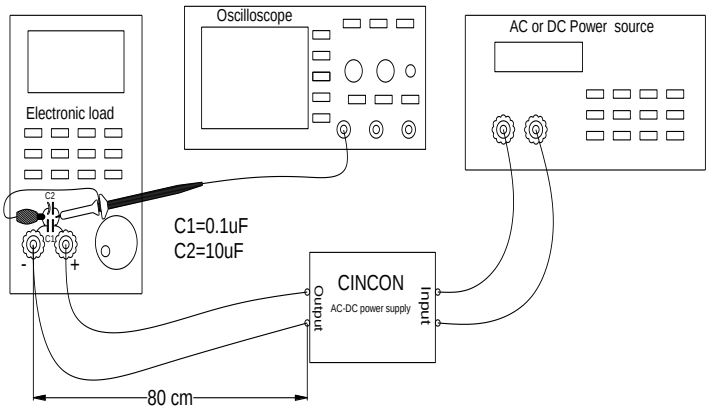


Figure 2 Output Voltage Ripple and Noise Measurement Set-Up

8. Part Number

TRE25 XXX - X – XX G XX

- SERIES
- XXX:
  - 050：Output Voltage 5 VDC
  - 090：Output Voltage 9 VDC
  - 120：Output Voltage 12 VDC
  - 150：Output Voltage 15 VDC
  - 180：Output Voltage 18 VDC
  - 240：Output Voltage 24 VDC
- X:
  - AC Plug Type
  - A：USA 2 Pin
  - E：Europe 2 Pin
  - U：British 3 Pin
- XX: DC Plug Type
- G: UL1571 WITH OVP
- XX:
  - DC Cable Length and Type
  - 01: 720mm
  - 02: 1220mm
  - 03: 1800mm
  - 11: 720mm with Ferrite Core
  - 12: 1220mm with Ferrite Core
  - 13: 1800mm with Ferrite Core
  - *16AWG/UL1571 for Vo: 5V
  - *18AWG/UL1571 for Vo: 9V
  - *20AWG/UL1571 for Vo: 12V、15V、18V、24V

9. TRE25 Series Mechanical Outline Diagrams

9.1. Mechanical Outline Diagrams

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

FIG.E

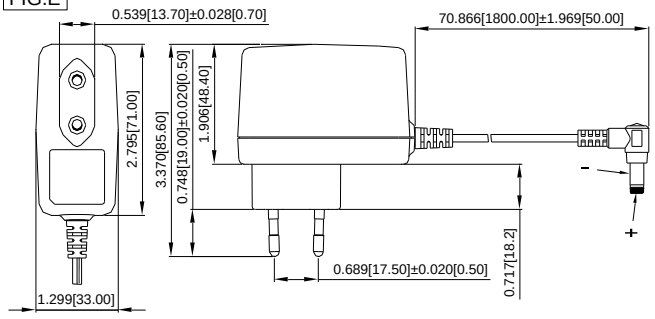


FIG.A

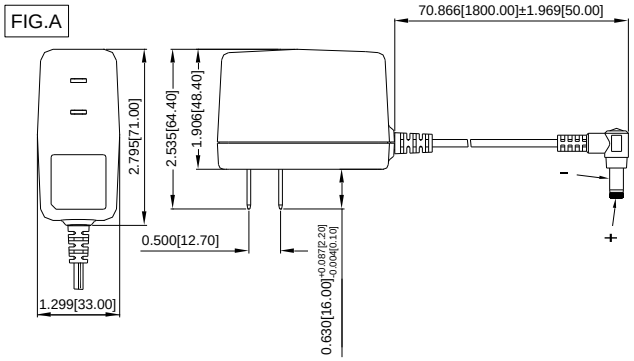
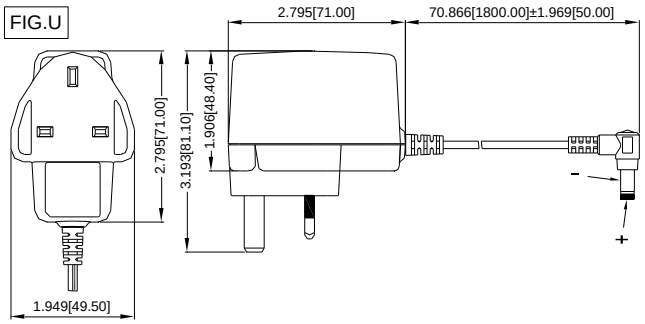
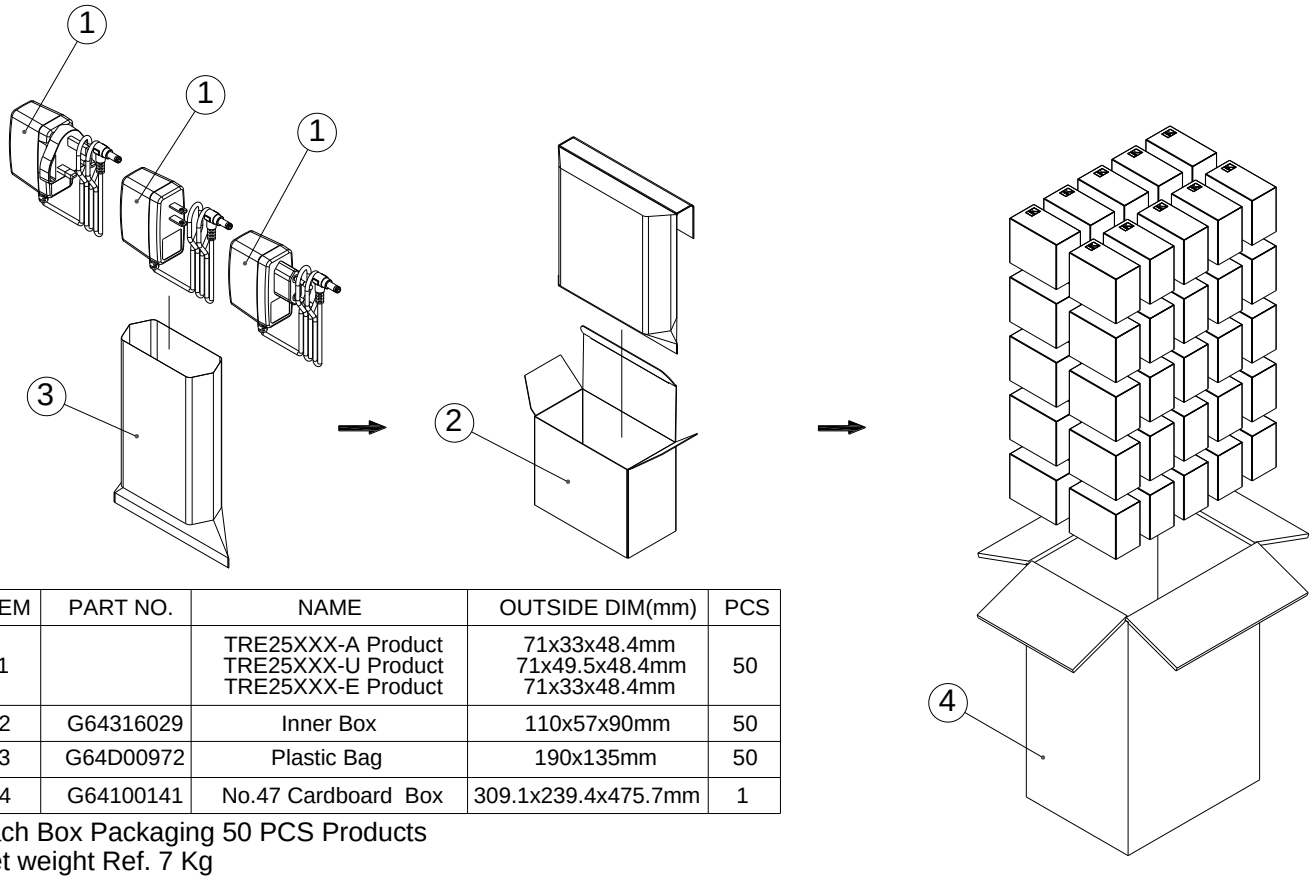


FIG.U



9.2. Packing Information

The packing information for TRE25 series is showing as follows:



ITEM	PART NO.	NAME	OUTSIDE DIM(mm)	PCS
1		TRE25XXX-A Product TRE25XXX-U Product TRE25XXX-E Product	71x33x48.4mm 71x49.5x48.4mm 71x33x48.4mm	50
2	G64316029	Inner Box	110x57x90mm	50
3	G64D00972	Plastic Bag	190x135mm	50
4	G64100141	No.47 Cardboard Box	309.1x239.4x475.7mm	1

Each Box Packaging 50 PCS Products
Net weight Ref. 7 Kg
Gross weight Ref. 8 Kg

TRE25XXX-A/U/E 50pcs a box, including the total weight of package material about 8Kg

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