



TRE06 Series

Application Note V11 November 2020

AC-DC Switching ADAPTER TRE06 Series APPLICATION NOTE



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1. Introduction

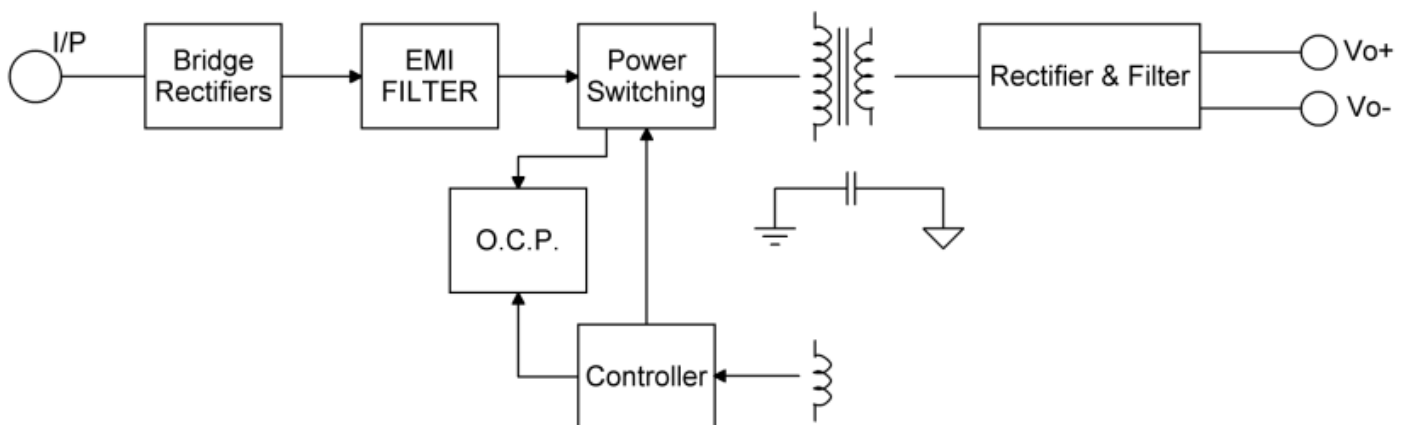
This application note describes the features and functions of Cincon's TRE06 series of adapter, switching AC-DC power. These are highly efficient, reliable, compact, high power density, single output AC/DC power. The power is fully protected against short circuit and over-voltage conditions. Cincon's world class automated manufacturing methods, together with an extensive testing and qualification program, ensure that the TRE06 series power is extremely reliable.

2. TRE06 Series Features

- Universal Input: 90~264Vac
- Meets EN55032 Class B and CISPR/FCC Class B
- Continuous Short Circuit Protection
- No Load Power Consumption < 75mW
- Constant Current (Optional)
- Optional US&EU AC Plugs
- Approved IEC/UL 62368-1
- Meet DoE & CoC Tier 2 Level VI
- Class II

(Output Cable Length \leq 1800mm)

3. Electrical Block Diagram





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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		All	90		264	Vac
			120		370	Vdc
Operating Temperature	See derating curve	All	-20		+80	°C
Storage Temperature		All	-20		+85	°C
Input/Output Isolation Voltage		All	3000			Vac
Altitude		All			4000	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
Maximum Input Current	100% Load, Vin=100Vac	All			0.25	A
Leakage Current		All			250	uA
Inrush Current	Vin=240Vac, cold start at 25°C	All			90	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	TRE06050	4.8	5	5.2	Vdc
		TRE06090	8.73	9	9.27	
		TRE06120	11.64	12	12.36	
		TRE06150	14.55	15	15.45	
Operating Output Current Range		TRE06050			1.2	A
		TRE06090			0.65	
		TRE06120			0.5	
		TRE06150			0.4	
Holdup Time	Vin=115Vac	All	10			ms
Output Voltage Regulation						
Load Regulation	from 60% to full load and from 60% to 20% load	TRE06050			±3	%
		TRE06090			±2	
		TRE06120			±2	
		TRE06150			±2	
Line Regulation	Vin=high line to low line, full load	All			±1	%
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	TRE06050			100	mVp-p
		TRE06090			100	
		TRE06120			120	
		TRE06150			120	



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PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Load Capacitance	1. Ambient temperature=25°C 2. Input voltage is 115VAC and 230VAC 3. Output is max. load	TRE06050			1200	uF
		TRE06090			680	
		TRE06120			560	
		TRE06150			400	
Efficiency	Efficiency with 230Vac ANd 75% load 25°C	TRE06050		77.79		%
		TRE06090		81.39		
		TRE06120		81.57		
		TRE06150		82.61		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input to Output	1 minute	All			3000	Vac
Isolation Resistance		All	100			MΩ

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency		All		30 ~ 70		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	900			K hours
Weight		All		55		g
Safety	Class II, IEC/UL 62368-1/60950-1					
EMC Emission	EN 55032: 2012+AC: 2013 Class B FCC Part 15, Subpart B Class B ANSI C63.4:2014					
EMC Immunity	EN 55024, EN 61000-6-3, EN 61000-3-2, EN 61000-3-3, EN 61000-6-1, EN 61204-3					
Voltage Fluctuation and Flicker	EN 61000-3-3:2013					
Conducted Emission	EN 55032:2012+AC:2013				Class B	
Radiated Emission	EN 55032:2012+AC:2013				Class B	
Electrostatic Discharge (ESD)	EN 61000-4-2:2009				Criterion B	
Radiated Susceptibility (RS)	EN 61000-4-3:2006+A1:2008+A2:2010				Criterion A	
Electrical Fast Transient (EFT)	EN 61000-4-4:2012				Criterion B	
Surge	EN 61000-4-5:2014				Criterion B	
Power Frequency Magnetic Field	EN 61000-4-8:2010				Criterion A	
Conducted Susceptibility (CS)	EN 61000-4-6:2014				Criterion A	
Voltage dips & voltage variations	EN 61000-4-11:2004, 100% reduction				Criterion A	
	EN 61000-4-11:2004, 30% reduction				Criterion B	
Voltage Interruptions	EN 61000-4-11:2004, 100% reduction				Criterion B	



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5. Main Features and Functions

5.1 Operating Temperature Range

The highly efficient design of Cincon's TRE06 series power has resulted in their ability to operate within ambient temperature environments from -20°C to 80°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)

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 120-140% of rated current. In the event of an over current converter will go into a hiccup mode protection

6. EMC & Safety

■ Emission and Immunity

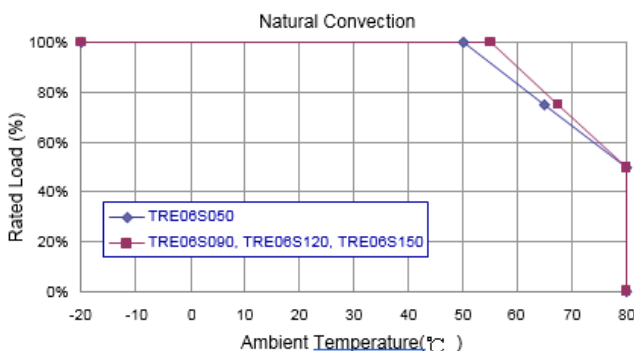
- EN55032 Class B, FCC Part 15 Class B
- EN61000-6-3, EN61000-3-2, EN61000-3-3
- EN55024, EN61204-3, EN61000-6-1

■ Safety

- Class II, IEC/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 TRE06 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:

- Vo is output voltage
- Io is output current
- Pin 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.

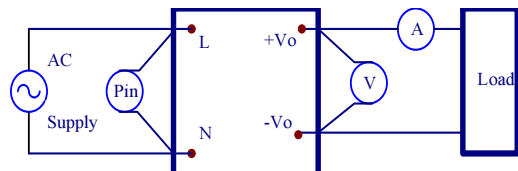


Figure 1 TRE06 VI Series Test Setup



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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.

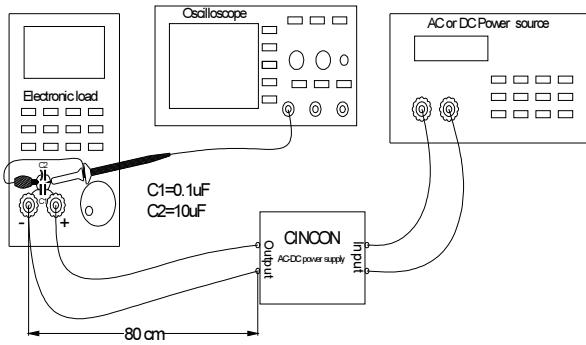


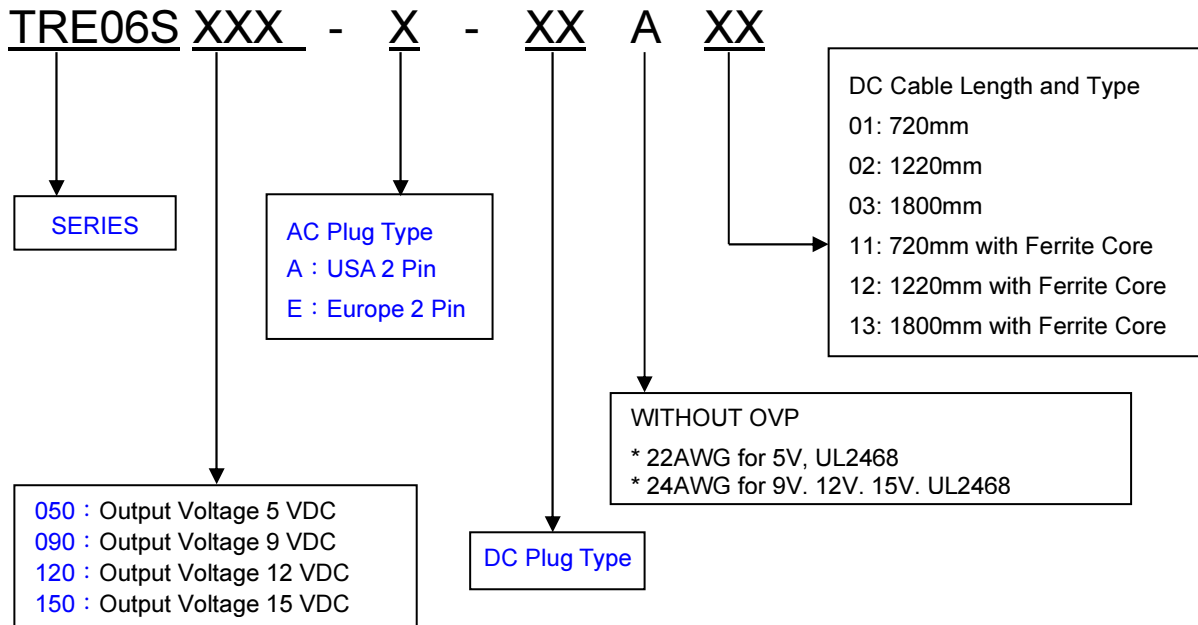
Figure 2 Output Voltage Ripple and Noise Measurement Set-Up



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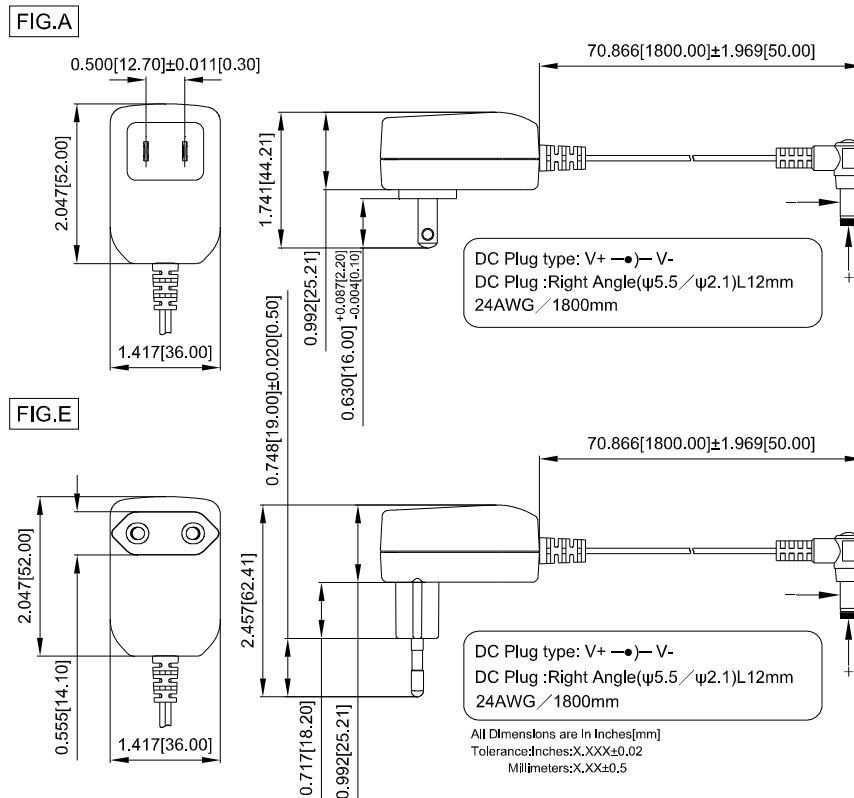
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8. Part Number



9. TRE06 Series Mechanical Outline Diagram

9.1 Mechanical Outline Diagram



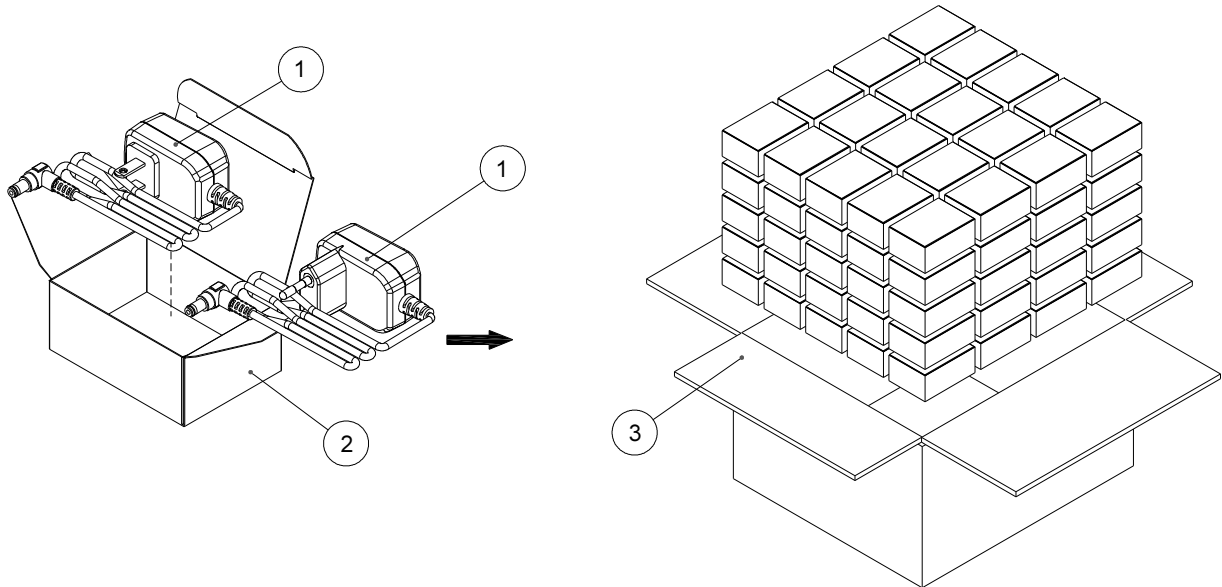


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9.2 Packing Information

The packing information for TRE06 series is showing as follows:



ITEM	PART NO.	NAME	OUTSIDE DIM(mm)	PCS
1	-	TRE06SXXX-A Product or TRE06SXXX-E Product	52x36x25.21mm	100
2	G64304172	Inner Box	90x65x40mm	100
3	G64114396	No.205 Cardboard Box	380x340x220mm	1

Each Box Packaging 100 PCS Products

Net weight Ref. 5.5 Kg

Gross weight Ref. 6.5 Kg

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