AC-DC Switching ADAPTER
TRG36 VI Series
APPLICATION NOTE

Approved By:

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TRG36 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 TRG36 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 TRG36 VI series power is extremely reliable. is extremely reliable.

2. TRG36 VI Series Features

- Universal Input: 90~264Vac
- Meets EN55032 Class "B" and CISPR/FCC Class B, Conducted
- Continuous Short Circuit Protection
- Leakage Current 0.25mA Max.
- 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)

  (TRG36A05: Output Cable Length≦720mm)

  (TRG36A09: Output Cable Length≦1220mm 18AWG/UL2464)

3. Technical Specifications

(All specifications are typical at nominal input, full load at 25ºC 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	℃
Storage Temperature		All	-20		+85	℃
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			1	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℃	TRG36A05 TRG36A09 TRG36A12 TRG36A13 TRG36A15 TRG36A18 TRG36A24 TRG36A48		5 9 12 13.5 15 18 24 48		Vdc
Operating Output Current Range		TRG36A05 TRG36A09 TRG36A12 TRG36A13 TRG36A15 TRG36A18 TRG36A24 TRG36A48			4 3 2.5 2.4 2.4 2 1.5 0.75	A
Holdup Time	Vin=115Vac	All		8		ms
Output Voltage Regulation						
Load Regulation	from 60% to full load and from 60% to 20% load	TRG36A05 TRG36A09 TRG36A12 TRG36A13 TRG36A15 TRG36A18 TRG36A24 TRG36A48			±6 ±5 ±5 ±5 ±3 ±2 ±2 ±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		TRG36A05			7.14	VDC
		TRG36A09			11.6	
		TRG36A12			15.8	
		TRG36A13			15.8	
		TRG36A15			18.9	
		TRG36A18			23.1	
		TRG36A24			31.5	
		TRG36A48			58.8	
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℃	TRG36A05			50	mVp-p
		TRG36A09			90	
		TRG36A12			120	
		TRG36A13			135	
		TRG36A15			150	
		TRG36A18			180	
		TRG36A24			240	
		TRG36A48			480	
Load Capacitance	1. Ambient temperature=25℃ 2. Input voltage is 115VAC and 230VAC 3. Output is max. load	TRG36A05			4000	uF
		TRG36A09			3000	
		TRG36A12			2500	
		TRG36A13			2400	
		TRG36A15			2400	
		TRG36A18			2000	
		TRG36A24			1500	
		TRG36A48			780	
Average Efficiency	Average Efficiency measured at 25%,50%,75%,100% load and input voltage is 115Vac / 230Vac.	TRG36A05	83.68			%
		TRG36A09	87.30			
		TRG36A12	87.70			
		TRG36A13	87.93			
		TRG36A15	88.3			
		TRG36A18	88.3			
		TRG36A24	88.3			
		TRG36A48	88.3			
ISOLATION CHARACTERISTICS						
PARAMETER	**NOTES and CONDITIONS**	Device	Min.	Typical	Max.	Units
Input to Output	1 minute	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℃ per MIL-HDBK-217F	All	200			K hours
Weight		All		190		g

4. Main Features and Functions

4.1 Operating Temperature Range

The highly efficient design of Cincon's TRG36 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

4.2 Over Current Protection

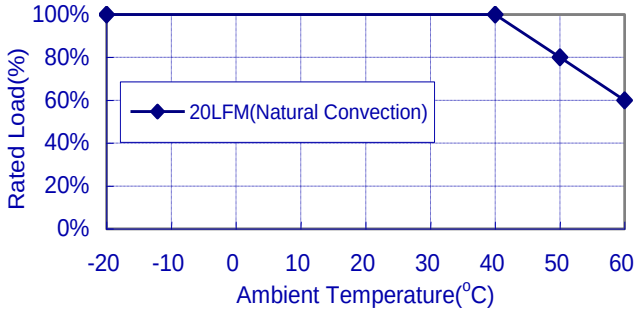
All different voltage models have a full continuous short-circuit protection. The unit will auto recover once the short circuit is removed. To provide protection in a fault condition, the unit is equipped with internal over-current protection. The unit operates normally once the fault condition is removed. 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 IEC62368-1/60950-1
- TUV EN62368-1/60950-1
- UL/cUL UL62368-1/60950-1
- CE EN55032 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 TRG36 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.

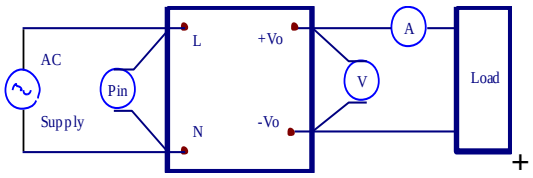


Figure 1 TRG36 VI Series Test Setup

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.

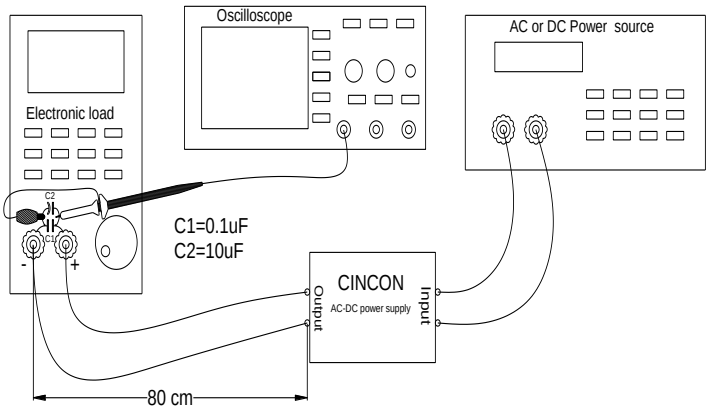


Figure 2 Output Voltage Ripple and Noise Measurement Set-Up

7. Part Number

TRG36 A XX – XX E XX

SERIES

OVP

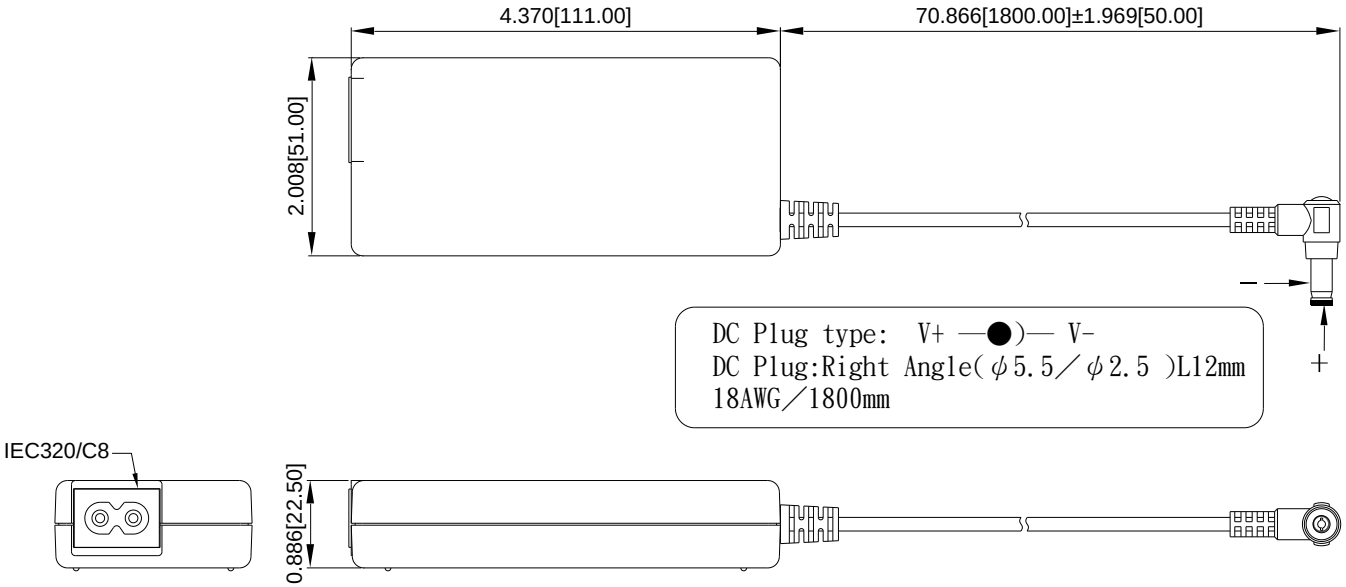
DC Plug Type

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
* 18AWG / UL2464 FOR 5V
* 18AWG / UL1185 FOR 9V, 12V, 13V, 15V, 18V, 24V, 48V

- 05：Output Voltage 5 VDC
- 09：Output Voltage 9 VDC
- 12：Output Voltage 12 VDC
- 13：Output Voltage 13 VDC
- 15：Output Voltage 15 VDC
- 18：Output Voltage 18 VDC
- 24：Output Voltage 24 VDC
- 48：Output Voltage 48VDC

8. TRG36 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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