



# CFM04S Series

## Application Note V12

### AC-DC Switching Power Module CFM04S Series APPLICATION NOTE



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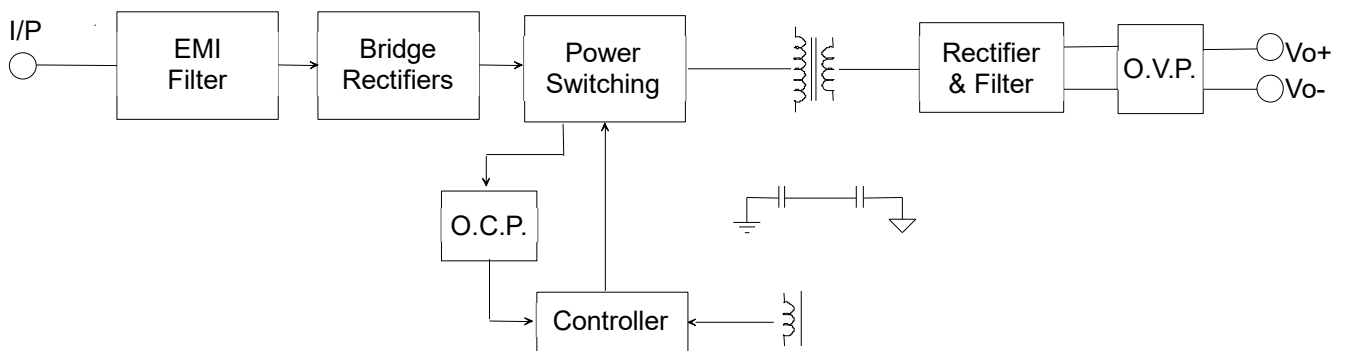
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### 1. Introduction

This application note describes the features and functions of Cincon's CFM04S series of open frame, switching AC-DC power module. These are highly efficient, reliable, compact, high power density, single output AC/DC power modules. The module 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 CFM04S series power module is extremely reliable.

### 2. Electrical Block Diagram





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### 3. Main Features and Functions

#### 3.1 Operating Temperature Range

The highly efficient design of Cincon's CFM04S series power modules has resulted in their ability to operate within ambient temperature environments from -40°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 module. 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)

#### 3.2 Output Protection

The power modules provide 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 will operate normally once the fault condition is removed. The power module will go to hiccup mode if the output current is set from 110% to 180% of rated current.

### 4. Applications

#### 4.1 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 CFM04S 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:

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

Where:

V<sub>FL</sub> is the output voltage at 100% full load

V<sub>NL</sub> is the output voltage at no load

The value of line regulation is defined as:

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

Where:

V<sub>HL</sub> is the output voltage of maximum input voltage at 100% full load.

V<sub>LL</sub> is the output voltage of minimum input voltage at 100% full load.

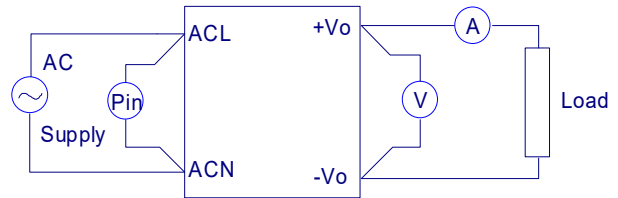


Figure 1. CFM04S Series Test Setup

#### 4.2 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure 2. Measured method: Add a C2=0.1uF ceramic capacitor and a C1=10uF electrolytic capacitor (CFM04S033 C2=47uF) to output at 20 MHz Band Width.

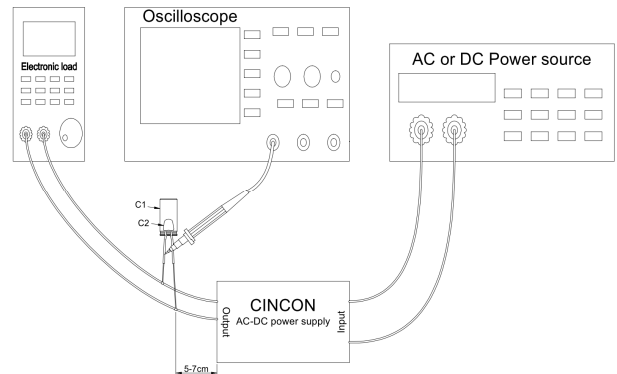


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

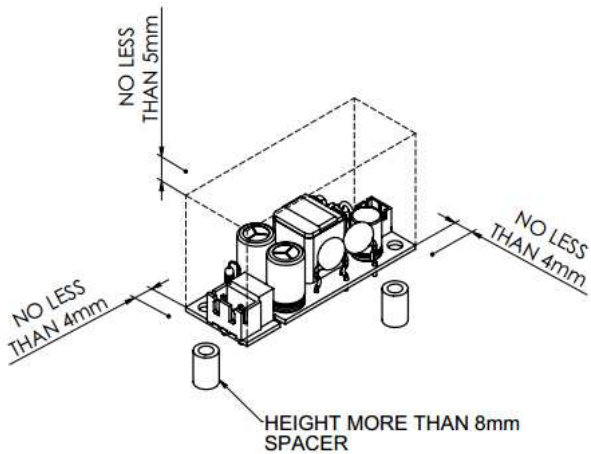


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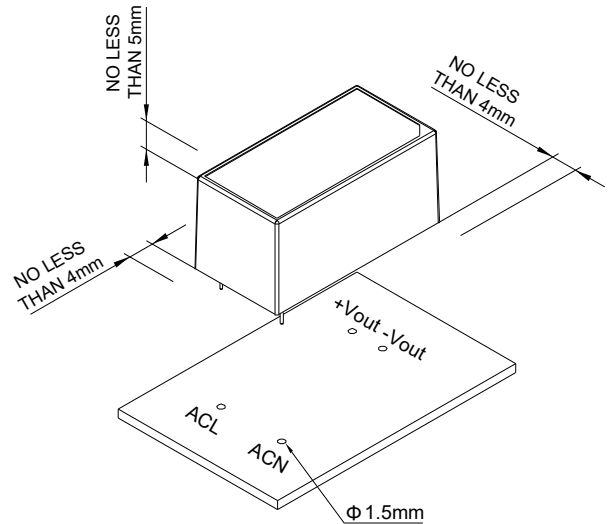
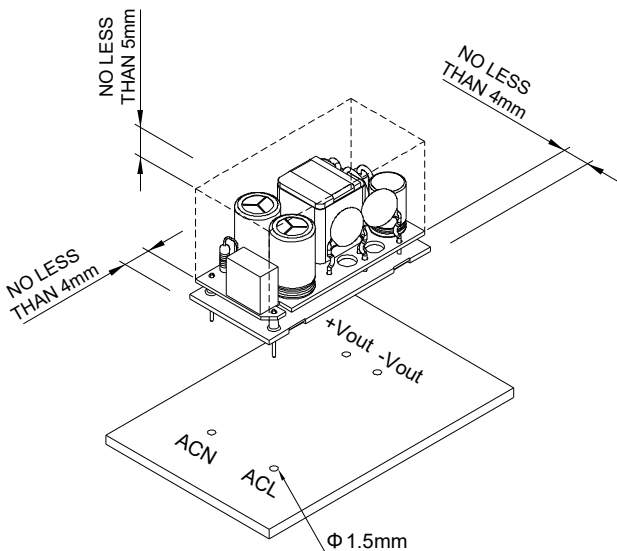
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### 4.3 Installation Instruction

The CFM04SXXX-T has two 3.2mm diameter mounting holes. Please use the mounting holes as follows: Insert the spacer (6mm diameter max.) of 8mm height or more to mount the unit. The vibration specification applies when the unit is mounted on 8mm spacers. Please allow 4mm side clearance from the components and all side of the PCB. Allow 5mm clearance above the highest parts on the PCB. Be especially careful to allow 8mm between the solder side of the PCB and the mounting surface. If the clearances are not sufficient, the specifications for isolation and withstand will not be valid.



The CFM04SXXX and CFM04SXXX-E mounting holes are 1.5mm. Please allow 4mm side clearance from the components and all side of the PCB and CASE. Allow 5mm clearance above the highest parts on the PCB and CASE.



### 4.4 Surge Recommendation ( $\pm 2kV$ )

The test set-up (Figure 3) is to show the recommendation for passing  $\pm 2kV$  Surge test. Adding F1= 300V/2A fuse and VR1= 10  $\phi$  470V Varistor and TH1=10  $\phi$  10R NTC at input side. No additional component needed for  $\pm 0.5kV$ ,  $\pm 1kV$ .

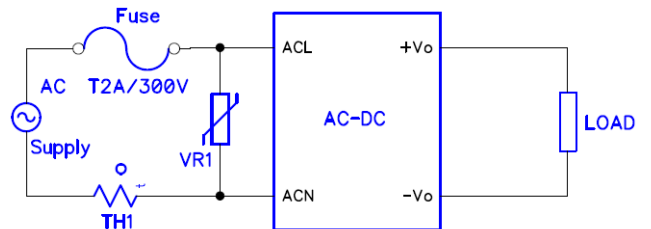


Figure 3. Surge Recommendation Test Set-up

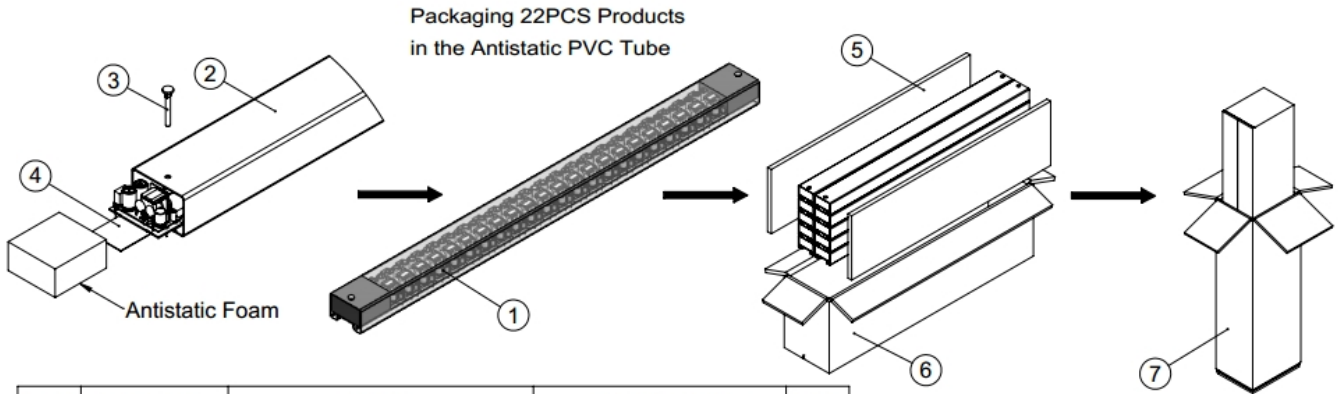


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### 5. Packing Information

The packing information for CFM04SXXX series is showing as follows:

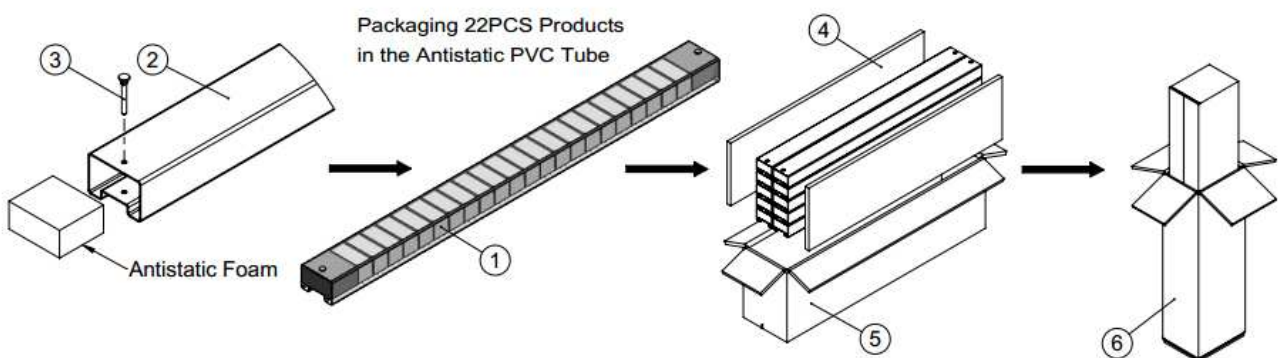


ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM04SXXX Product	39.5x19.4x18.3mm	220
2	G64910945	Antistatic PVC Tube	42.2x28.5x535mm	10
3	-	Tube Nail	-	20
4	G64U15132	Spacer	500x25x0.6mm	10
5	G64301154	Antistatic Foam	535x150x10mm	2
6	G64203214	No.14 Inner Cardboard Box	548.4x121.2x166.7mm	1
7	G64112338	No.14 Cardboard Box	590.9x148.5x193.9mm	1

Each Box Packaging 220PCS Products  
Gross Weight Ref. 4.5Kg

CFM04SXXX 220pcs a box, including the total weight of package material about 4.5Kg

The packing information for CFM04SXXX-E series is showing as follows:



ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM04SXXX-E Product	41.1x21x20mm	220
2	G64910942	Antistatic PVC Tube	43.6x29.1x535mm	10
3	-	Tube Nail	-	20
4	G64301154	Antistatic Foam	535x150x10mm	2
5	G64203214	No.14 Inner Cardboard Box	548.4x121.2x166.7mm	1
6	G64112338	No.14 Cardboard Box	590.9x148.5x193.9mm	1

Each Box Packaging 220PCS Products  
Gross Weight Ref. 8.9Kg

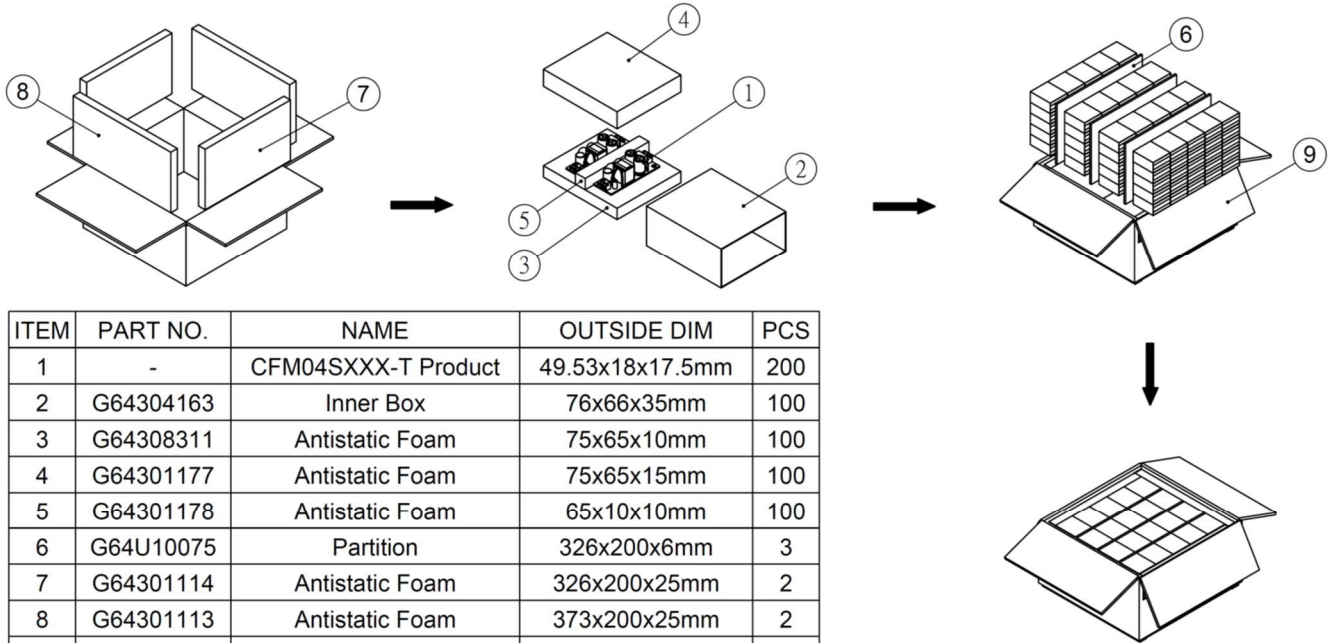
CFM04SXXX-E 220pcs a box, including the total weight of package material about 8.9Kg



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The packing information for CFM04SXXX-T series is showing as follows:



ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM04SXXX-T Product	49.53x18x17.5mm	200
2	G64304163	Inner Box	76x66x35mm	100
3	G64308311	Antistatic Foam	75x65x10mm	100
4	G64301177	Antistatic Foam	75x65x15mm	100
5	G64301178	Antistatic Foam	65x10x10mm	100
6	G64U10075	Partition	326x200x6mm	3
7	G64301114	Antistatic Foam	326x200x25mm	2
8	G64301113	Antistatic Foam	373x200x25mm	2
9	G64114346	No.148 Cardboard Box	393x385x220mm	1

Each Box Packaging 200PCS Products  
Gross Weight Ref. 4.2Kg

CFM04SXXX-T 200pcs a box, including the total weight of package material about 4.2Kg

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