



# CFM61S Series

## Application Note V13

### AC-DC Switching Power Module CFM61S Series APPLICATION NOTE



**Approved By:**

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# CFM61S Series

## Application Note V13

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### Content

<b>1. INTRODUCTION</b>	<b>3</b>
<b>2. ELECTRICAL BLOCK DIAGRAM</b>	<b>3</b>
<b>3. MAIN FEATURES AND FUNCTIONS</b>	<b>4</b>
3.1 <i>Operating Temperature Range</i>	4
3.2 <i>Output Protection</i>	4
3.3 <i>Peak Load Function</i>	4
<b>4. APPLICATIONS</b>	<b>5</b>
4.1 <i>Peak Load Vin De-Rating Curve</i>	5
4.2 <i>Power De-Rating Curve</i>	5
4.3 <i>Test Set-Up</i>	5
4.4 <i>Output Ripple and Noise Measurement</i>	5
4.5 <i>Installation Instruction</i>	6
4.6 <i>EMI Test</i>	7
<b>5. PACKING INFORMATION</b>	<b>8</b>



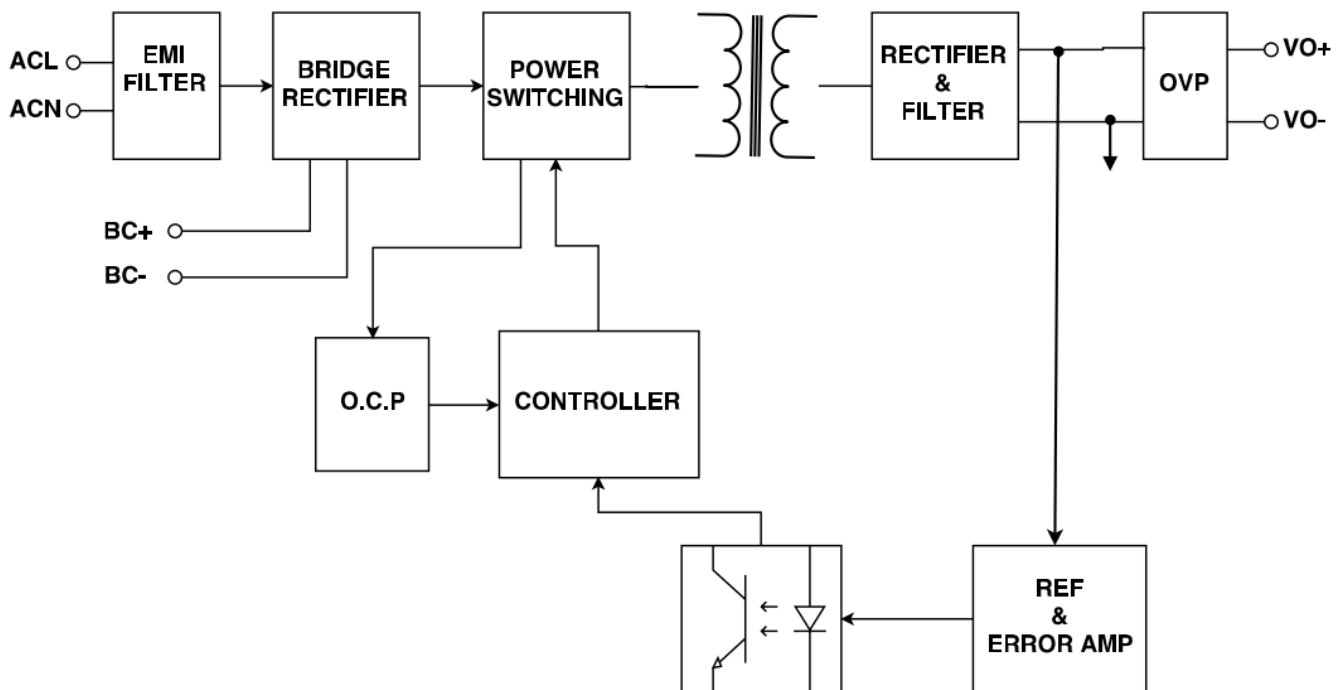
# CFM61S Series

## Application Note V13

### 1. Introduction

This application note describes the features and functions of Cincon's CFM61S 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 CFM61S series power module is extremely reliable.

### 2. Electrical Block Diagram





# CFM61S Series

## Application Note V13

### 3. Main Features and Functions

#### 3.1 Operating Temperature Range

The highly efficient design of Cincon's CFM61S series power modules has resulted in their ability to operate within ambient temperature environments from -30°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:

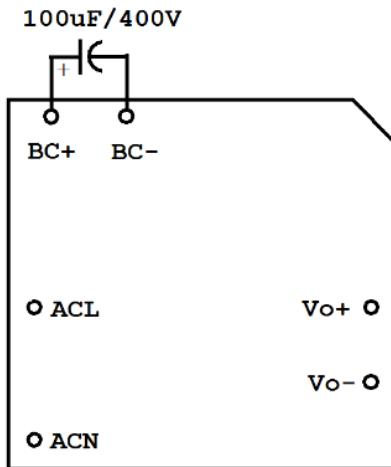
- Input voltage range
- Permissible output load (per derating curve)

#### 3.2 Output Protection

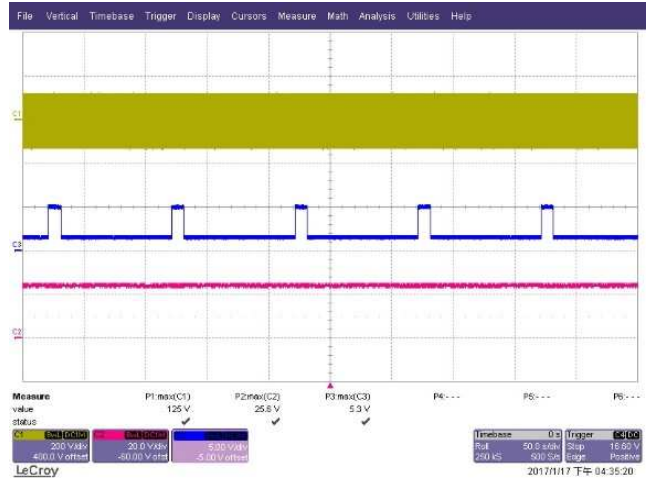
The power modules provide full continuous short-circuit protection. The unit will auto recover once the short circuit is removed. To provide protection in a fault condition, the unit is equipped with internal over-current protection. The unit will operate normally once the fault condition is removed.

#### 3.3 Peak Load Function

CFM61SXXX and CFM61SXXX-E has a very powerful peak load function which can provide twice the rated power. However, the duration of the peak load should be less than 10 seconds, with a maximum 10% duty cycle and must externally add a 100uF/ 400V capacitor to BC+ & BC-, but this is not needed when input is @ 230Vac.



$V_{in}=110V_{ac} \ \& \ 115V_{ac} \ \& \ 230V_{ac} \ \& \ 264V_{ac}$   
 Peak Load Function by 200% Load 10S & 65% Load 90S



CH1:  $V_{in}$ , CH2:  $V_{out}$  Current, CH3:  $V_{out}$   
 Average Power: 47.1W  
 Add external 100uF/400V capacitor to BC &+ BC-

$V_{in}=230V_{ac} \ \& \ 264V_{ac}$   
 Peak Load Function by 200% Load 10S & 65% Load 90S



CH1:  $V_{in}$ , CH2:  $V_{out}$  Current, CH3:  $V_{out}$   
 Average Power: 47.1W

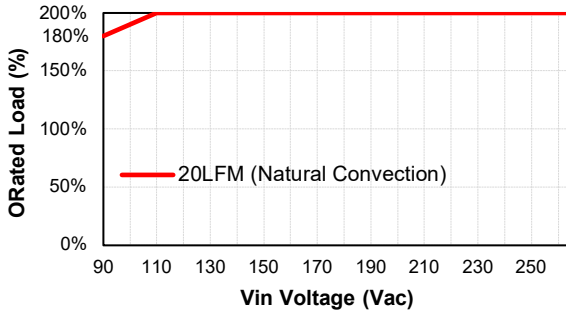


# CFM61S Series

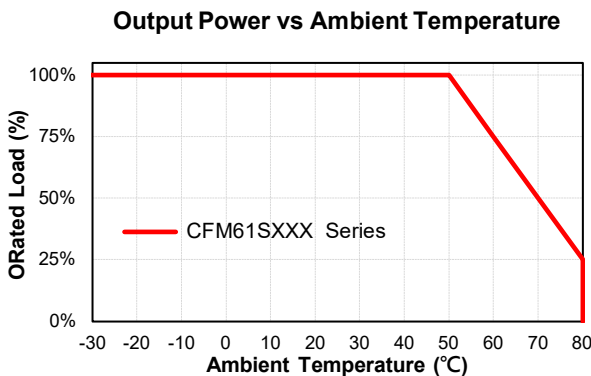
## Application Note V13

### 4. Applications

#### 4.1 Peak Load Vin De-Rating Curve



#### 4.2 Power De-Rating Curve



#### 4.3 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 CFM61S 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:

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

Where:

- V<sub>o</sub> is output voltage,
- I<sub>o</sub> is output current,
- V<sub>in</sub> is input voltage,
- I<sub>in</sub> is input current

The value of load regulation is defined as:

$$Load\ reg. = \frac{V_1 - V_2}{V_2} \times 100\%$$

Where:

- V<sub>1</sub> is the output voltage at full load
- V<sub>2</sub> 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<sub>HL</sub> is the output voltage of maximum input voltage at full load.
- V<sub>LL</sub> is the output voltage of minimum input voltage at full load.

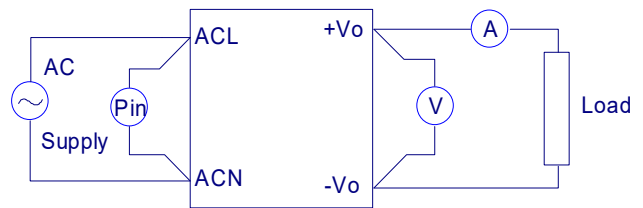


Figure 1. CFM61S Series Test Setup

#### 4.4 Output Ripple and Noise Measurement

The test set-up for noise and ripple measurements is shown in Figure 2 Measured method:

Add a 0.1uF ceramic capacitor and a 10uF electrolytic capacitor to output at 20 MHz Band Width. (CFM61S050: Add a 0.1uF ceramic capacitor and 47uF aluminum electrolytic capacitor to output.)

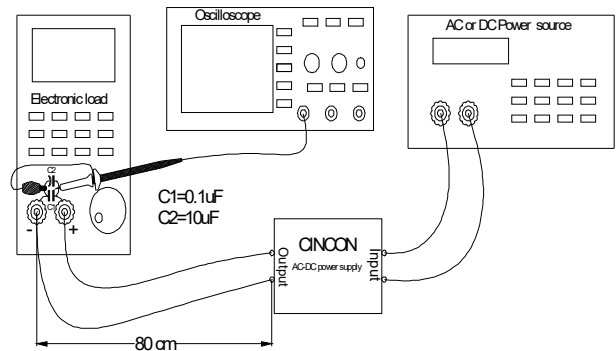


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

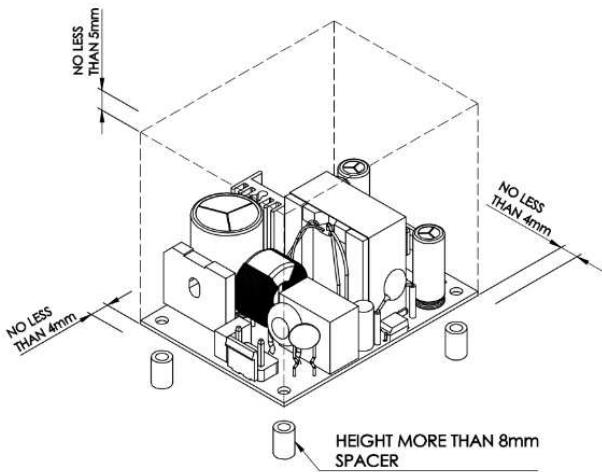
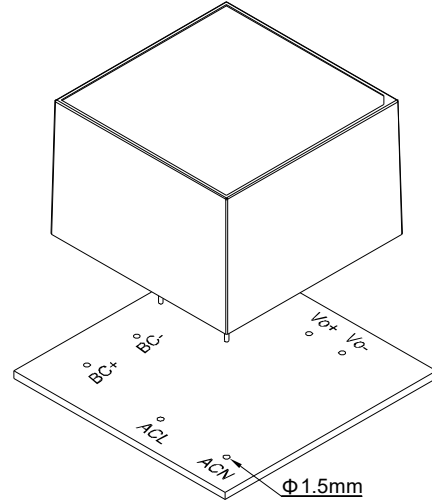


# CFM61S Series

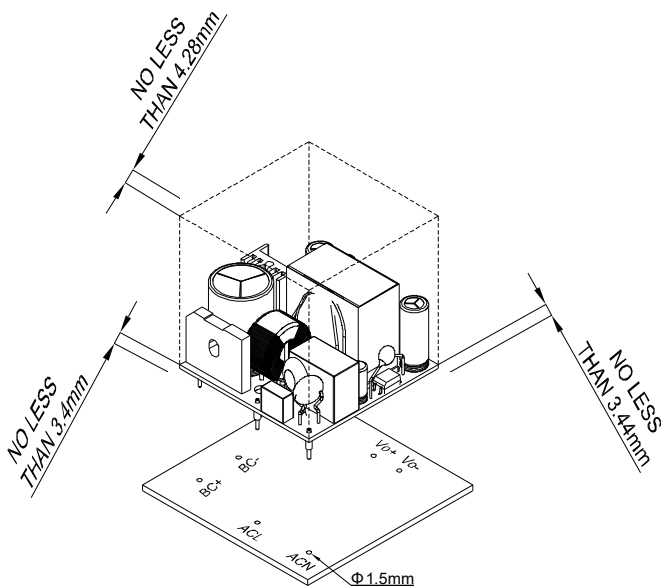
## Application Note V13

### 4.5 Installation Instruction

The CFM61SXXX-T has four 3.5mm 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 CFM61SXXX and CFM61SXXX-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.





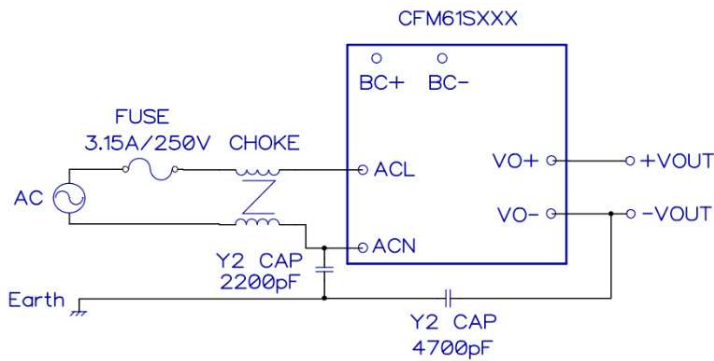
# CFM61S Series

## Application Note V13

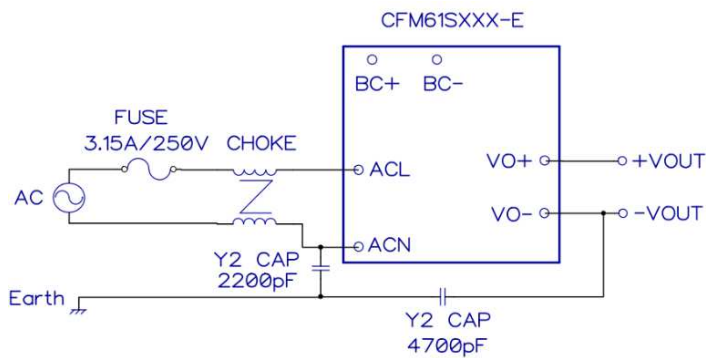
### 4.6 EMI Test

The CFM61S series need additional inductance and Y Cap to meet EN55032 Class B when test condition is Class I. If customers use in Class II systems, please ignore this section.

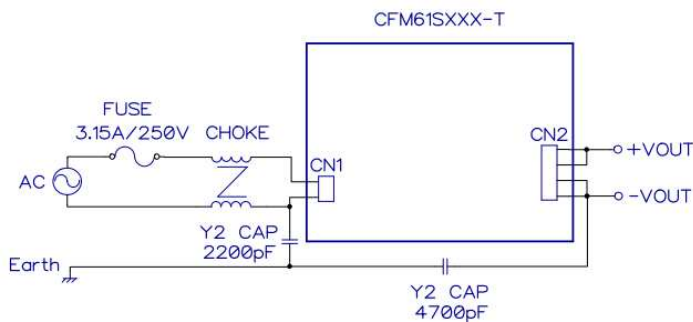
CFM61SXXX



CFM61SXXX-E



CFM61SXXX-T



Additional Inductance related parameters:

Specification	Inductance	Duplex Winding /turns	Manufacturers
T10*6*5C A15	2.6mH	TIW-M $\Phi$ 0.35*2/25T	ACME
T10*6*5C R15K	2.6mH	TIW-M $\Phi$ 0.35*2/25T	VAKOS

Additional Safety YCap related parameters:

Subclass	Withstand Voltage	Capacitance	Manufacturers
Y2 CAP	250V(min)	2200pF(typ.)	TDK
Y2 CAP	250V(min)	4700pF(typ.)	TDK

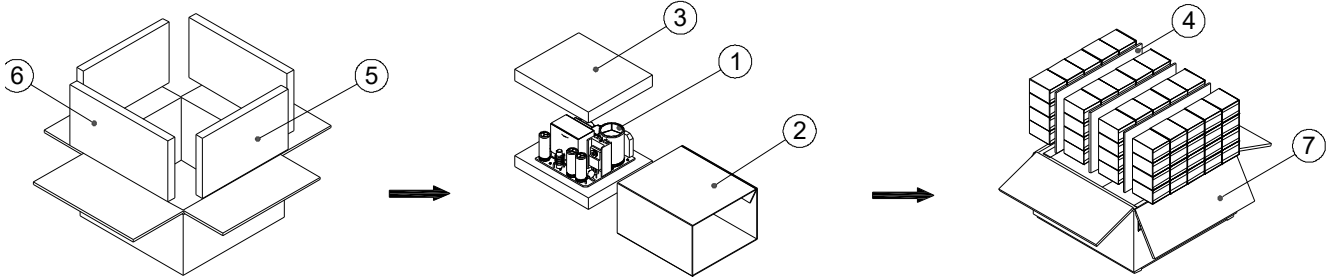


# CFM61S Series

## Application Note V13

### 5. Packing Information

The packing information for CFM61S series is showing as follows:

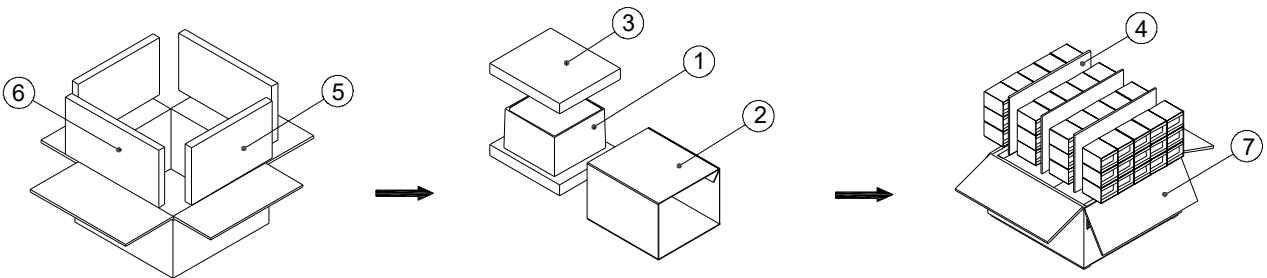


ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM61SXXX Product	50.8x50.8x33.4mm	80
2	G64304174	Inner Box	76x66x45mm	80
3	G64308311	Antistatic Foam	75x65x10mm	160
4	G64U10075	Partition	326x200x6mm	3
5	G64301114	Antistatic Foam	326x200x25mm	2
6	G64301113	Antistatic Foam	373x200x25mm	2
7	G64114346	No.148 Cardboard Box	393x385x220mm	1

Each Box Packaging 80PCS Products  
Gross weight Ref. 8.5Kg

CFM61S 80pcs a box, including the total weight of package material about 8.5Kg

The packing information for CFM61S-E series is showing as follows:



ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM61SXXX-E Product	54.3x54.3x35.8mm	60
2	G64304180	Inner Box	76x66x52mm	60
3	G64308311	Antistatic Foam	75x65x10mm	120
4	G64U10075	Partition	326x200x6mm	3
5	G64301114	Antistatic Foam	326x200x25mm	2
6	G64301113	Antistatic Foam	373x200x25mm	2
7	G64114346	No.148 Cardboard Box	393x385x220mm	1

Each Box Packaging 60PCS Products  
Gross weight Ref. 13Kg

CFM61S-E 60pcs a box, including the total weight of package material about 13Kg

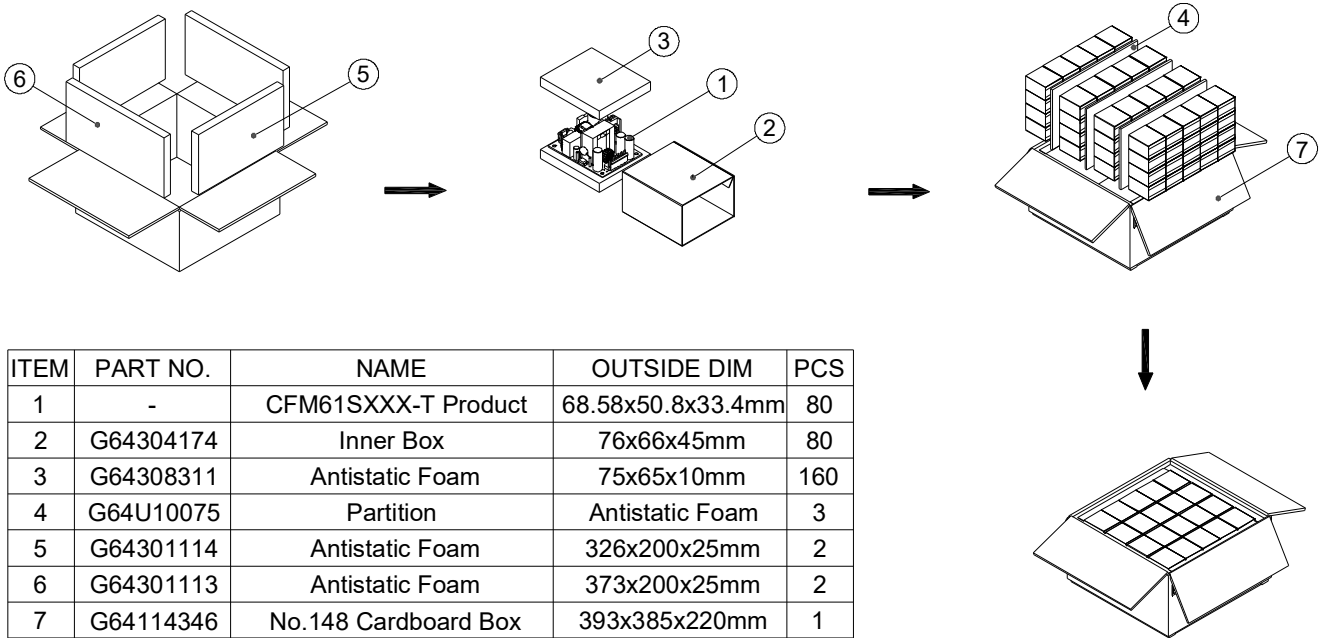




# CFM61S Series

## Application Note V13

The packing information for CFM61S-T SERIES is showing as follows:



ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM61SXXX-T Product	68.58x50.8x33.4mm	80
2	G64304174	Inner Box	76x66x45mm	80
3	G64308311	Antistatic Foam	75x65x10mm	160
4	G64U10075	Partition	Antistatic Foam	3
5	G64301114	Antistatic Foam	326x200x25mm	2
6	G64301113	Antistatic Foam	373x200x25mm	2
7	G64114346	No.148 Cardboard Box	393x385x220mm	1

Each Box Packaging 80PCS Products  
Gross weight Ref. 9Kg

CFM61S-T 80pcs a box, including the total weight of package material about 9Kg

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