



LFM420S Series

Application Note V10

420W AC-DC Power Supply with PFC LFM420S Series APPLICATION NOTE



Approved By:

| Department | Approved By | Checked By | Written By |
|-------------------------------------|-------------|------------|------------|
| Research and Development Department | Ovid | Wei-Cheng | Horard |
| Design Quality Department | Benny | JoJo | |



LFM420S Series

Application Note V10

Content

| | |
|---|----------|
| 1. INTRODUCTION | 3 |
| 2. ELECTRICAL BLOCK DIAGRAM | 3 |
| 3. MAIN FEATURES AND FUNCTIONS | 4 |
| 3.1 <i>Operating Temperature Range</i> | 4 |
| 3.2 <i>Output Protection (Over Current/Constant Curren/Over Voltage Protection)</i> | 4 |
| 4. APPLICATIONS | 4 |
| 4.1 <i>Test Set-Up</i> | 4 |
| 4.2 <i>Output Ripple and Noise Measurement</i> | 4 |
| 4.3 <i>Installation Instruction</i> | 5 |
| 4.4 <i>External Baseplate Cooling</i> | 5 |
| 4.5 <i>EMI Test</i> | 6 |
| 4.6 <i>Mating Connectors</i> | 6 |
| 4.7 <i>Output Remote Sensing</i> | 6 |
| 5. PACKING INFORMATION | 7 |



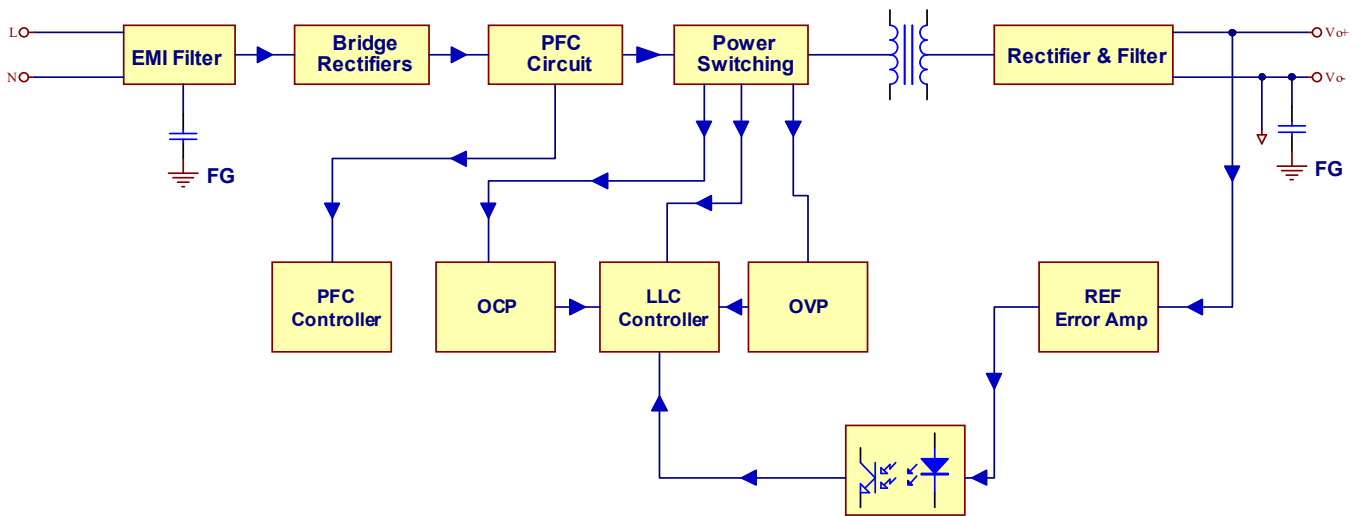
LFM420S Series

Application Note V10

1. Introduction

This application note describes the features and functions of Cincon's LFM420S series 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 LFM420S series power module is extremely reliable.

2. Electrical Block Diagram





LFM420S Series

Application Note V10

3. Main Features and Functions

3.1 Operating Temperature Range

The highly efficient design of Cincon's LFM420S 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)
- Effective heat sinks

3.2 Output Protection (Over Current/Constant Current/Over Voltage 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 output voltage will decrease when the output current is above its constant current point. When the output current is continue increase the power module will go to hiccup mode if the output voltage is lower than its set output voltage.

When the overvoltage protection is activated, the machine latch. It is necessary to wait for about one minute after turning off the input voltage.

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 LFM420S 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_o is output voltage,
- I_o is output current,
- V_{in} is input voltage,
- I_{in} is input current

The value of load regulation is defined as:

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

Where:

- V_1 is the output voltage at full load
- V_2 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.

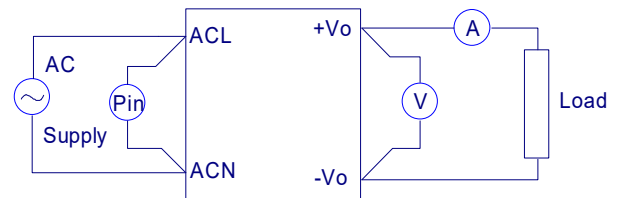


Figure 1. LFM420S Series Test Setup

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 to output at 20 MHz Band Width.

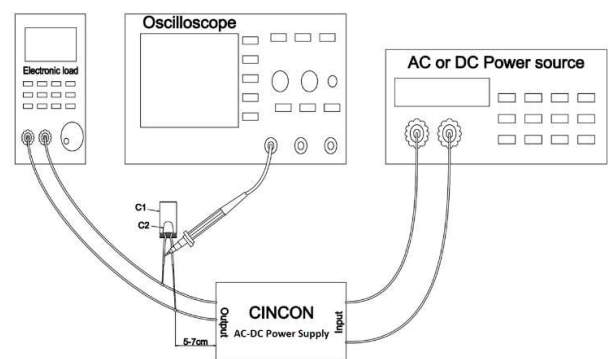


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

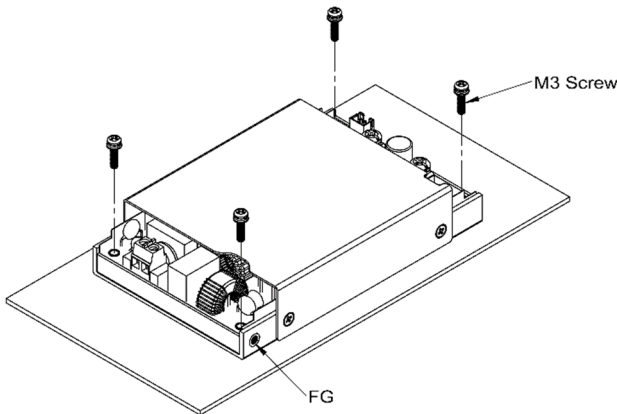


LFM420S Series

Application Note V10

4.3 Installation Instruction

The LFM420S series provide the baseplate cooling for customer to increasing heat dissipation. Please refer to the following figure for installation.

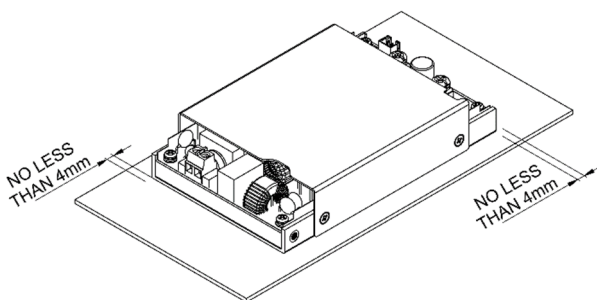


LFM420SXXXC Installation Diagram

Note:

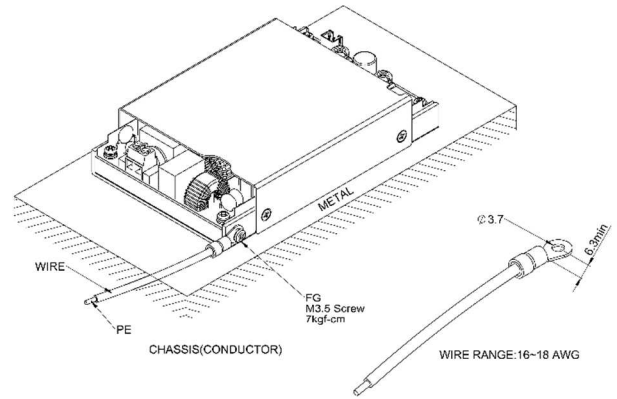
M3 screw head and washer diameter shall not exceed 5.5mm. M3 torque is 4 kgf-cm max.

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 5mm 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.



LFM420SXXXC Installation Diagram

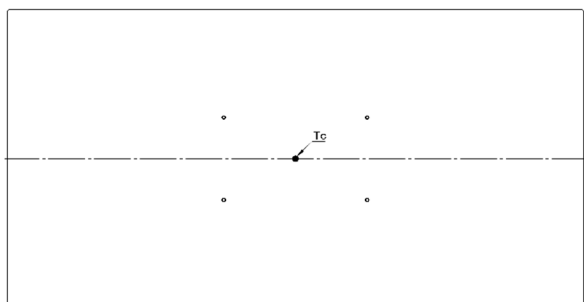
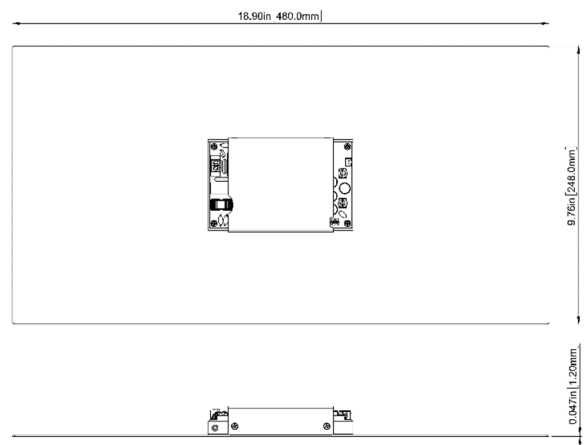
FG should be connected to the earth (ground) terminal of the apparatus. If not the conducted noise and output noise will increase.



4.4 External Baseplate Cooling

The LFM420S series provide the baseplate cooling for customer to increasing heat dissipation. For example, adding a 480mmx248mmx1.2mm heatsink at the bottom of LFM420S, between the heatsink and LFM420S with thermal grease better than 1.6 W/m.K or thermal pad (PMP-P-400) to help heating ability. If customer choose the other heatsinks make sure T_c point of LFM420S under 85°C.

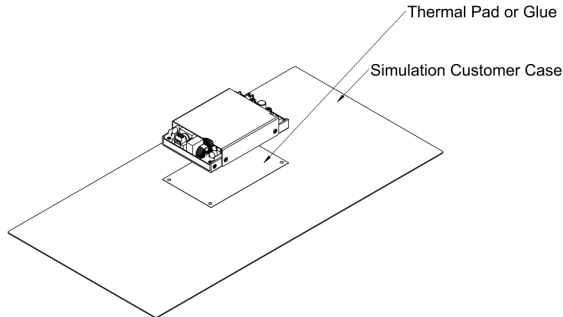
Please refer to the following figure for installation. When the LFM420S series uses an external baseplate cooling solution, it can be used at 350W. Please refer to the power derating curve in the specification.





LFM420S Series

Application Note V10



Thermal Pad: PMP-P-400 (P/N:G61236RC404)

4.5 EMI Test

The LFM420S series conductive EMI meets EN 55032, FCC Part 15 Class B when test condition is Class I.

4.6 Mating Connectors



LFM420SXXXC Installation Diagram

AC Input Connector(CN1):ECE ETB22

| Pin | Function | Mating Wire Range |
|-----|----------|-------------------|
| 1 | ACL | 14~18 AWG |
| 2 | ACN | |

DC Output Connector:KANG YANG PCB-58M4

| Function | The screw locked torque |
|----------|-------------------------|
| +Vo | M4 7kgf-cm |
| -Vo | |

DC Output Connector(CN2):TKP 8822-02-NHB or equivalent

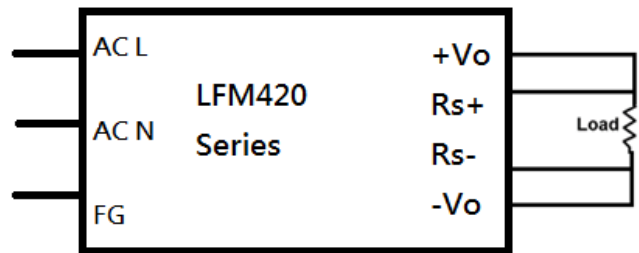
| Pin | Function | Mating Housing | Terminal |
|-----|----------|----------------------------|-----------------------|
| 1 | Rs+ | JST XHP-2 or equivalent | JST SXH-001T-P0.6N |
| 2 | Rs- | | or equivalent |

4.7 Output Remote Sensing

The LFM420S series converter has the capability to remotely sense both lines of its output. This feature moves the effective output voltage regulation point from the output of the unit to the point of connection of the remote sense pins. This feature automatically adjusts the real output voltage of the LFM420S series in order to compensate for voltage drops in distribution and maintain a regulated voltage at the point of load. The remote-sense voltage range is:

$$[(+V_{out}) - (-V_{out})] - [(Rs+) - (Rs-)] \leq 0.5V$$

If the remote sense feature is not to be used, the sense pins should be connected locally. The Rs+ pin should be connected to the +V_{out} pin at the module and the Rs- pin should be connected to the -V_{out} pin at the module. A Remote Sensing is provided in CN2. This is shown in the schematic as below. Remote sense and constant current functions cannot be used at the same time.



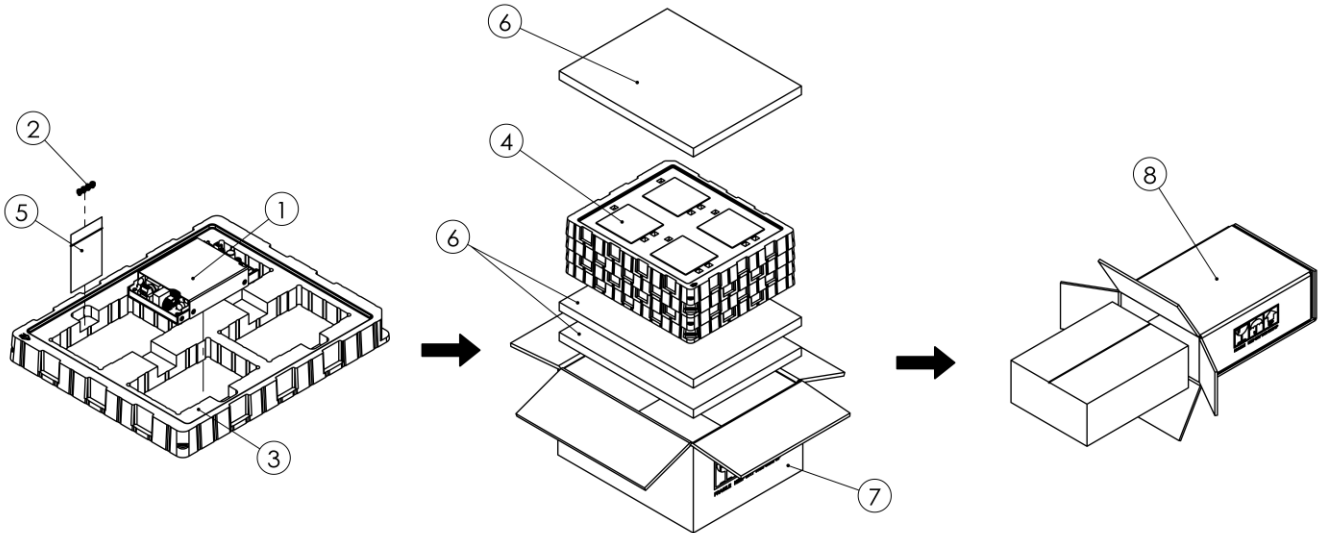


LFM420S Series

Application Note V10

5. Packing Information

The packing information for LFM420SXXXC series is showing as follows:



| ITEM | PART NO. | NAME | OUTSIDE DIM(mm) | PCS |
|------|-------------|----------------------------|------------------|-----|
| 1 | - | LFM420SXXXC Product | 129.4x83.5x25.4 | 16 |
| 2 | G75V2200000 | Screw | M3.5x0.6 | 16 |
| 3 | G64G20154 | Antistatic Plastic blister | 338.4x283.4x34.2 | 4 |
| 4 | G64G20153 | Antistatic Plastic blister | 340x285x35 | 4 |
| 5 | GT4101 | Zipper Bag | 70x50x0.04 | 4 |
| 6 | G64301087 | Antistatic Foma | 360x290x20 | 3 |
| 7 | G64211308 | No.114 Inner Cardboard Box | 364x294x200 | 1 |
| 8 | G64114293 | No.114 Cardboard Box | 400x320x225 | 1 |

Each Box Packaging 16 PCS Products
Gross weight Ref. 9.5 Kg

Headquarters:

14F, No.306, Sec.4, Hsin Yi Rd.
Taipei, Taiwan
Tel: 886-2-27086210
Fax: 886-2-27029852
E-mail: sales@cincon.com.tw
Web Site: <https://www.cincon.com>

CINCON ELECTRONICS CO., LTD.

Factory:

No. 8-1, Fu Kung Rd.
Fu Hsing Industrial Park
Fu Hsing Hsiang,
Chang Hua Hsien, Taiwan
Tel: 886-4-7690261
Fax: 886-4-7698031

Cincon North America:

1655 Mesa Verde Ave. Ste 180
Ventura, CA 93003
Tel: 805-639-3350
Fax: 805-639-4101
E-mail: info@cincon.com