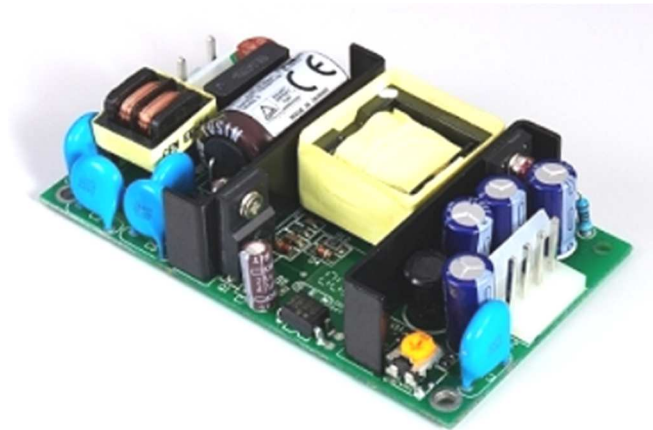




CFM20 Series

Application Note V10 February 2021

20W AC-DC Power Supply CFM20 Series APPLICATION NOTE



Approved By:

Department	Approved By	Checked By	Written By
Research and Development Department	Enoch	Yang	Horard
		Ovid	
Quality Assurance Department	Ryan	Benny	



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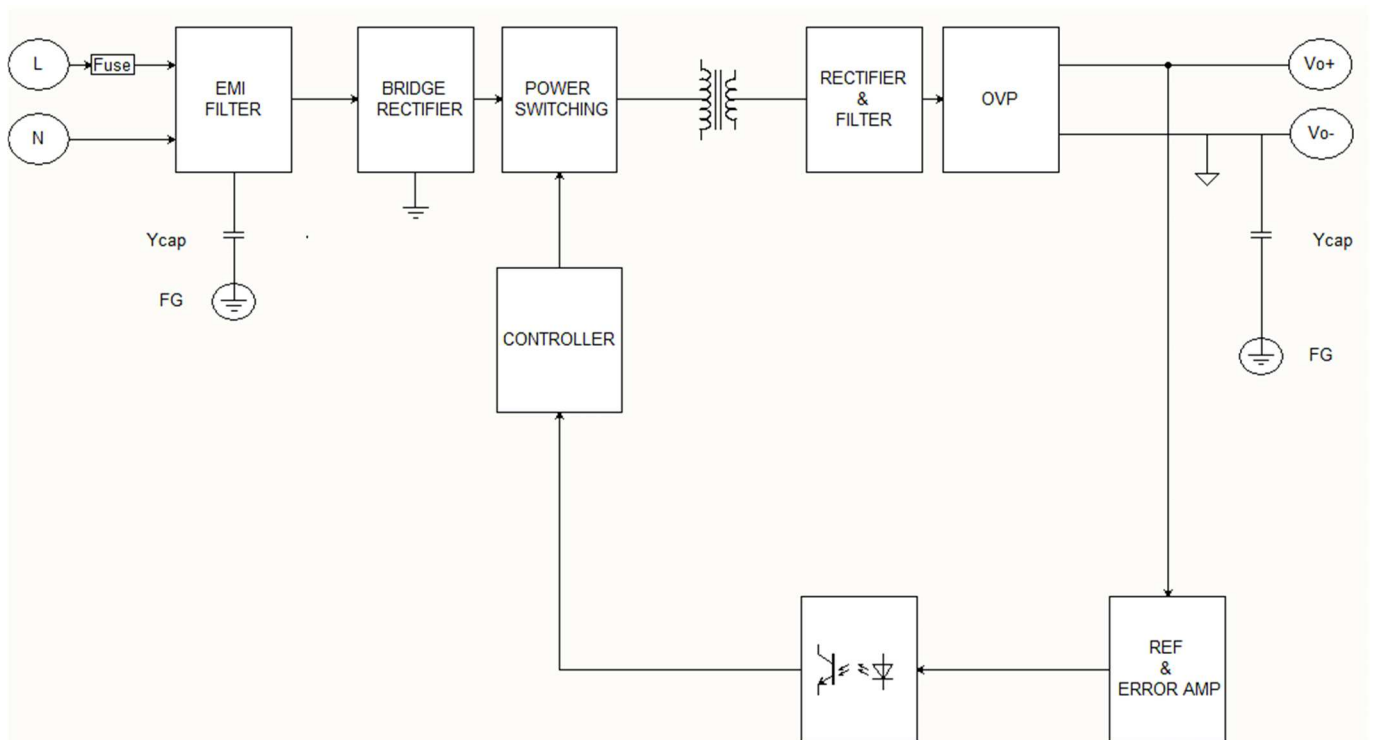
1. Introduction

This application note describes the features and functions of Cincon's CFM20 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 CFM20 series power module is extremely reliable.

2. CFM20 Series Features

- Universal Input Range 85~264V_{ac}
- Efficiency to 81%
- Industry Standard Pin Out
- Meets EN55032 Class B
- Continuous Short Circuit Protection
- PCB Mountable Type is Available

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	Safety approvals only to the AC input	All	85 120		264 370	V _{ac} V _{dc}
Operating Temperature	See derating curve	All	0		+70	°C
Storage Temperature		All	-20		+85	°C
Input/Output Isolation Voltage		All	4242			V _{dc}

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Operating Voltage Range		All	100		240	V _{ac}
Input Frequency Range		All	47		63	Hz
Maximum Input Current	100% Load, V _{in} =100V _{ac}	All			0.5	A
Leakage Current	V _{in} =264V _{ac} , 60Hz	All			3.5	mA
Inrush Current	V _{in} =230V _{ac} , Cold start at 25°C	All			40	A

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Set Point	V _{in} =Nominal V _{in} , I _o =I _o .max, T _c =25°C.	CFM2001S CFM2002S CFM2003S CFM2005S CFM2007S CFM2009S	4.95 11.88 14.85 23.76 3.26 8.91	5 12 15 24 3.3 9	5.05 12.12 15.15 24.24 3.33 9.09	V _{dc}
Operating Output Current Range		CFM2001S CFM2002S CFM2003S CFM2005S CFM2007S CFM2009S			4400 1800 1400 920 4400 2450	mA
Holdup Time	V _{in} =115V _{ac}	All		16		ms
Output Voltage Regulation						
Load Regulation	10% Load to full load	All			±1.0	%
Line Regulation	V _{in} =High line to low line	All			±0.5	%
Over Voltage Protection	Uses a TVS component to clamp output voltage	CFM2001S CFM2002S CFM2003S CFM2005S CFM2007S CFM2009S		6.8 15 18 30 6.8 11		V _{dc}



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PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
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	CFM2001S CFM2002S CFM2003S CFM2005S CFM2007S CFM2009S			50 120 150 240 50 90	mVp-p
Efficiency	1. Input voltage is 230V _{ac} 2. Output is max. load	CFM2001S CFM2002S CFM2003S CFM2005S CFM2007S CFM2009S		72 79 80 81 66 76		%

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input to Output	1 minute	All			4242	V _{dc}
Isolation Resistance		All	100			MΩ

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency	P _{out} =max. rated power	All		67		kHz

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
MTBF	I _o =100%; T _a =25°C per MIL-HDBK-217F	All	300			k hours
Weight		All		100		g
Safety	Class I, EN/IEC/UL 62368-1					
EMC Emission	EN55032, Class B, IEC61000-3-2:2014, IEC61000-3-3:2013					
Conducted disturbance	EN55032 Class B					
Radiated disturbance	EN55032 Class B					
Harmonic current emissions	IEC 61000-3-2:2014					
Voltage fluctuations & flicker	IEC 61000-3-3:2013					
EMC Immunity	IEC61000-4-2, 3, 4, 5, 6, 8, 11					
Radio-frequency, Continuous radiated disturbance	IEC 61000-4-3:2010					
Electrical fast transient (EFT)	IEC 61000-4-4:2012					
Surge	IEC 61000-4-5:2005					
Conducted disturbances, induced by RF fields	IEC 61000-4-6:2008					
Power frequency magnetic field	IEC 61000-4-8:2009					
Voltage dips	IEC 61000-4-11:2004					
Voltage interruptions	IEC 61000-4-11:2004					



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5. Main Features and Functions

5.1 Operating Temperature Range

The highly efficient design of Cincon's CFM20 series power modules has resulted in their ability to operate within ambient temperature environments from 0°C to 45°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)

5.2 Continuous Short Circuit Protection

The power modules provide full continuous short-circuit protection. The unit will automatically recover once the short circuit is removed.

6. EMC & Safety

■ Emission and Immunity

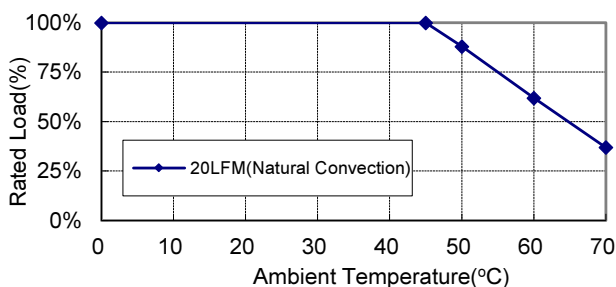
EN55032 Class B EN61000-6-3, EN61000-3-2, EN61000-3-3 EN55024, EN61204-3, EN61000-6-1

■ Safety

IEC/EN/UL 62368-1

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 CFM20 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:

V_o is output voltage

I_o is output current

P_{in} 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.

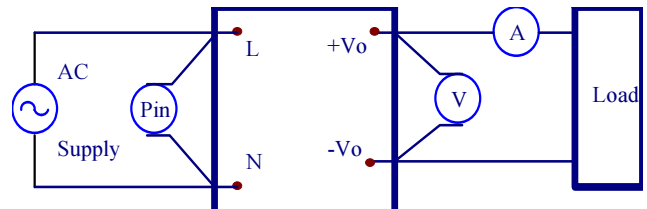


Figure 1. CFM20 Series Test Setup

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 C2=0.1uF ceramic capacitor and a C1=10uF electrolytic capacitor to output at 20 MHz Band Width.

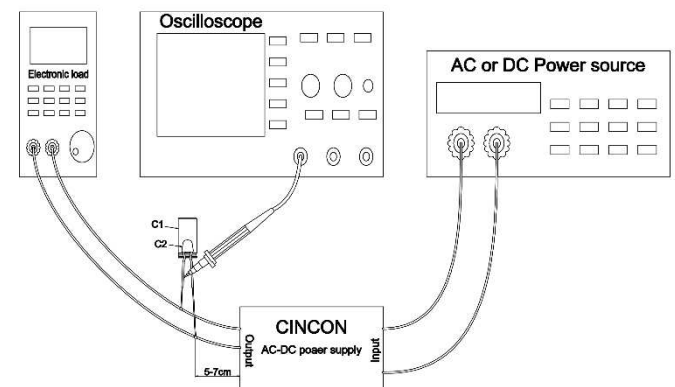


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up



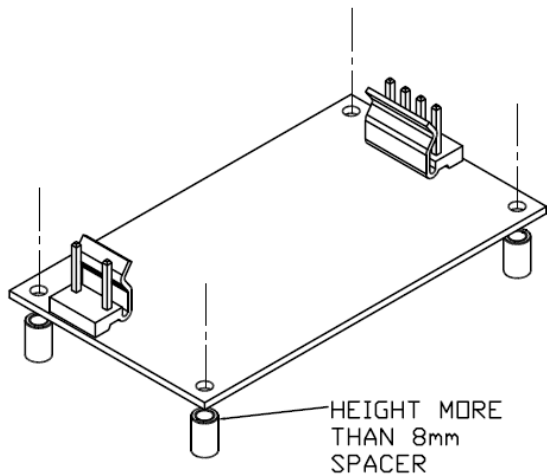
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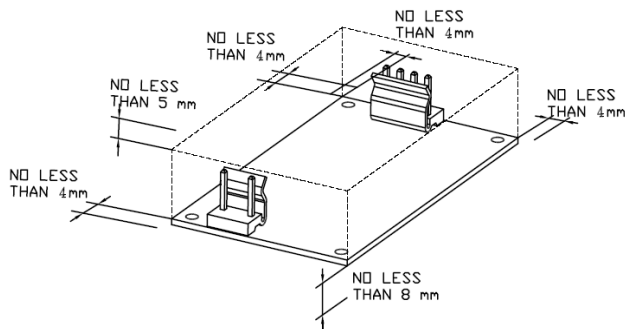
7.4 Installation Instruction

Please use the mounting hold as:

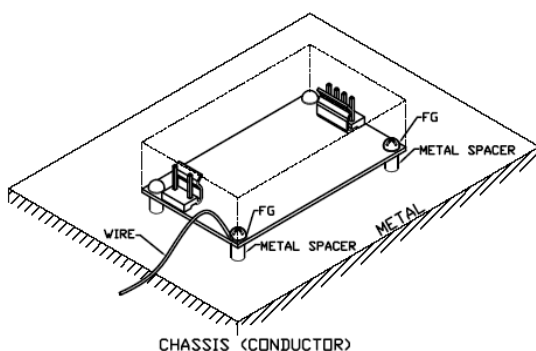
CFM20series: 4 holds of $\phi 3.18$ and insert the spacer (Max $\phi 6$) of height over 8mm to lift the unit. The vibration spec. is the value take when the unit is raised by 8mm spacers



Please reserve 4mm space from the surfaces and the sides of PCB, especially from the solder surface, 8mm space is necessary. If the space is not enough, the specification of insulation and withstand will not be satisfied.



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



8. Part Number

CFM 20 XX S

S : Single Output

- 01 : Output Voltage 5 VDC
- 02 : Output Voltage 12 VDC
- 03 : Output Voltage 15 VDC
- 05 : Output Voltage 24 VDC
- 07 : Output Voltage 3.3 VDC
- 09 : Output Voltage 9 VDC

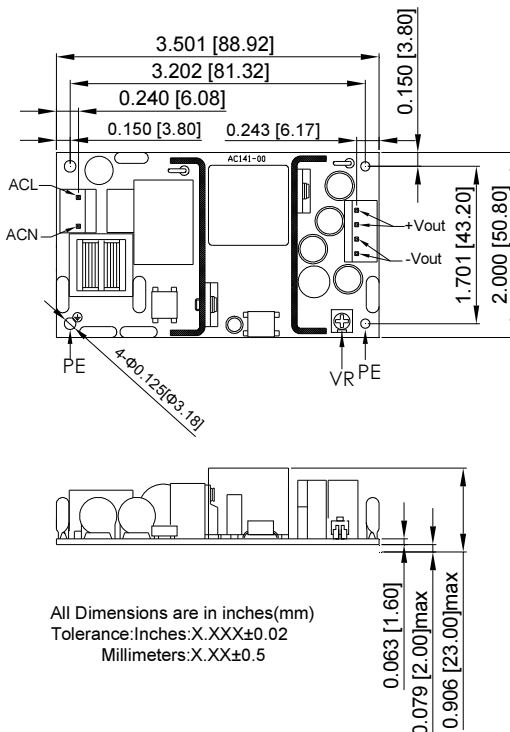
20 : Supply Max. Power

CFM SERIES

9. Mechanical Outline Diagrams and Packing Information

9.1. Mechanical Outline Diagrams

CFM20XXS Series



All Dimensions are in inches(mm)
Tolerance:Inches:X.XXX±0.02
Millimeters:X.XX±0.5

CFM20XXS-P Series

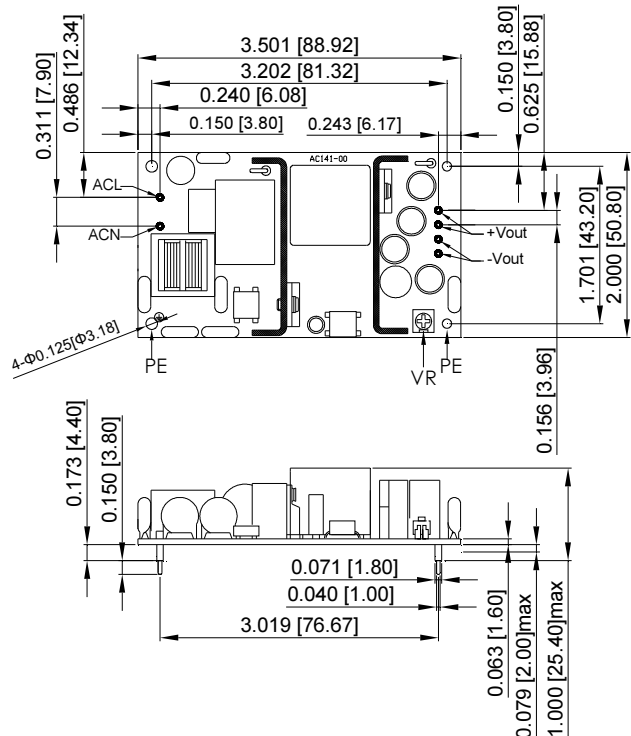


Figure 3. CFM20 series Mechanical Outline Diagram

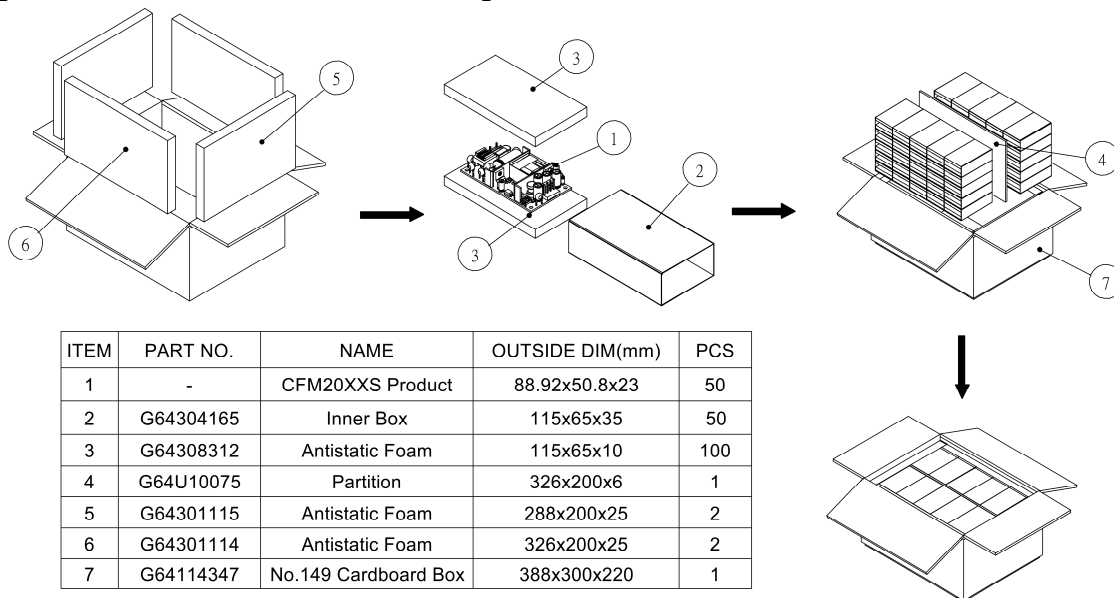


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9.2. Packing Information

The packing information for CFM20 series is showing as follows:



Each Box Packaging 50 PCS Products
Gross weight Ref. 7 Kg

CFM20 50Pcs a box, including the total weight of package material about 7Kg

CINCON ELECTRONICS CO., LTD.

Headquarters:

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

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