



## CFM80S Series

Application Note V10 November 2020

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### 80W OPECN FRAME AC-DC MODULES CFM80S Series APPLICATION NOTE



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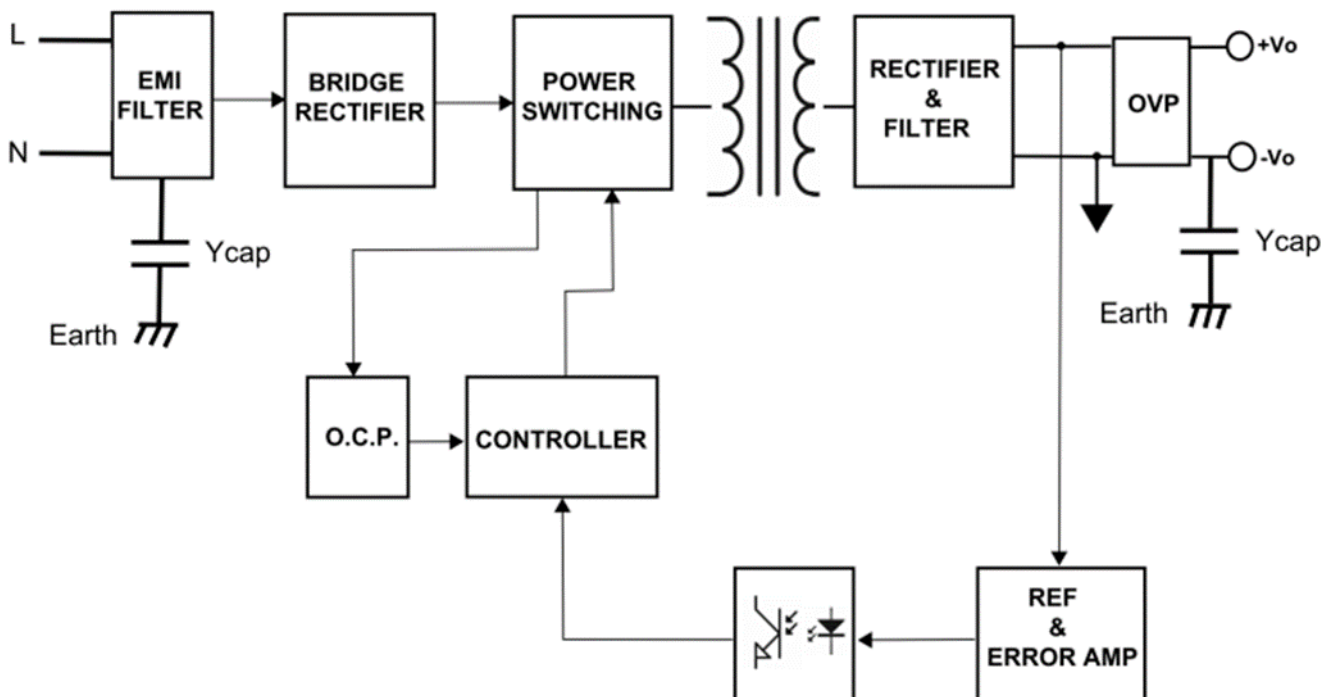
#### 1. Introduction

This application note describes the features and functions of Cincon's CFM80S series of open frame, switching AC-DC power module. These are highly efficient, reliable and compact, high power density, single output AC/DC power module. 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 CFM80S series power module is extremely reliable.

#### 2. CFM80S Series Features

- Universal Input 90~264Vac
- Continuous Short Circuit Protection
- High Efficiency to 90% Typical
- Meets EN55032 Class B and CISPR/FCC Class B
- Meets EN61000-3-2 Class A
- No Load Power Consumption <0.5W
- 2" x 4" Size

#### 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 (Continuous)	See derating curve	All	90		264	Vac
Operating Temperature	See derating curve	All	-20		+80	°C
Storage Temperature		All	-20		+85	°C
Input/Output Isolation Voltage	1 minute	All	3000			Vac

#### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Operating Voltage Range		All	100		240	Vac
Input Frequency Range		All	47		63	Hz
Maximum Input Current	100% Load, Vin=100Vac	All			2	A
Leakage Current		All			3.5	mA
Inrush Current	Vin=240Vac, cold start at 25°C	All			100	A
No Load Input Power		All			0.5	W

#### OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Output Voltage Set Point	Vin=Nominal Vin, Io=Io .max, Tc=25°C.	CFM80S050	4.75	5	8.25	Vdc
		CFM80S120	11.4	12	12.6	
		CFM80S150	14.25	15	15.75	
		CFM80S240	22.8	24	25.2	
		CFM80S480	45.6	48	50.4	
Operating Output Current Range		CFM80S050			12	A
		CFM80S120			6.7	
		CFM80S150			5.36	
		CFM80S240			3.35	
		CFM80S480			1.67	
Holdup Time	Vin=115Vac	All		12		ms
Output Voltage Regulation						
Load Regulation	10% load to full load	All			±1.0	%
Line Regulation	Vin=high line to low line	All			±0.5	%

#### Output Voltage Ripple and Noise

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	CFM80S050		50		mVp-p
		CFM80S120		120		
		CFM80S150		150		
		CFM80S240		240		
		CFM80S480		480		



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PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Maximum Output Capacitance	Vin=Nominal Vin at Full load	CFM80S050 CFM80S120 CFM80S150 CFM80S240 CFM80S480			12700 6600 5500 3300 1680	uF
Efficiency	1. Input voltage is 230VAC 2. Output is max. load	CFM80S050 CFM80S120 CFM80S150 CFM80S240 CFM80S480		86 89 90 90 90		%

### ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Input to Output	1 minute	All			3000	Vac
Input to Earth	1 minute	All			2121	Vdc
Output to Earth	1 minute	All			500	Vdc
Isolation Resistance		All	100			MΩ

### FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
Switching Frequency		All		100		KHz

### GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typical	Max.	Units
MTBF	Io=100%; Ta=25°C per MIL-HDBK-217F	All		200		K hours
Weight		All		155		g
Safety	Class I, IEC/EN/UL 60950-1/62368-1					
EMC Emission	EN55032 Class B, EN55024, EN61204-3, EN61000-3-2, EN6100-3-3, EN61000-6-1, EN61000-6-3, 47 CFR FCC Part 15 Subpart B (Class B)					
Conducted disturbance	EN55032, FCC CFR 47 Part 15 Subpart B (Class B)				Class B	
Radiated disturbance	EN55032, FCC CFR 47 Part 15 Subpart B (Class B)				Class B	
Harmonic Current Emissions	IEC 61000-3-2:2014				Class A, D	
Voltage fluctuations & flicker	IEC 61000-3-3:2013				Criteria A	
EMC Immunity	EN55024, EN61204-3:2000, EN61000-6-1:2007, EN61000-6-2:2005					
Electrostatic discharge (ESD)	IEC 61000-4-2:2008, Air discharge: ±8KV					
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2010				Criteria A	
Electrical fast transient (EFT)	IEC 61000-4-4:2012, ±0.5KV, ±1 KV, ±2 KV				Criteria A	
Surge	IEC 61000-4-5:2014, L-N: ±0.5KV, ±1KV,				Criteria A	
Conducted Disturbances, Induced by RF Fields	IEC 61000-4-6:2013				Criteria A	
Power Frequency Magnetic Field	IEC 61000-4-8:2009				Criteria A	
Voltage Dips	IEC 61000-4-11:2004, Dip: 30% 10ms, Dip: 60% 100ms, Dip >95% 5000ms				Criteria A	
Voltage Interruptions	IEC 61000-4-11:2004, >95% 5000ms				Criteria B	



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### 5. Main Features and Functions

#### 5.1 Operating Temperature Range

Cincon's CFM80S series power modules, which highly efficient design, has resulted in its ability to operate ambient temperature environment (-20°C to 80°C). Due to consideration must be given to the de-rating curves when ascertaining maximum power that can be drawn from the power module. The maximum power drawn is influenced by a number of factors, such as:

- Input voltage range.
- Output load current.
- These can be effective heat sinks for the power module

#### 5.2 Output Protection (Over Current Protection)

The power modules provide 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 will operate normally once the fault condition is removed. The power module will go to hiccup mode if the output current or voltage is set from 120% to 160% of rated current or voltage.

### 6. EMC & Safety

#### ■ Emission and Immunity

EN55032 Class B, EN55024, EN61204-3,  
EN61000-3-2, EN6100-3-3, EN61000-6-1, EN61000-6-3  
47 CFR FCC Part 15 Subpart B (Class B)

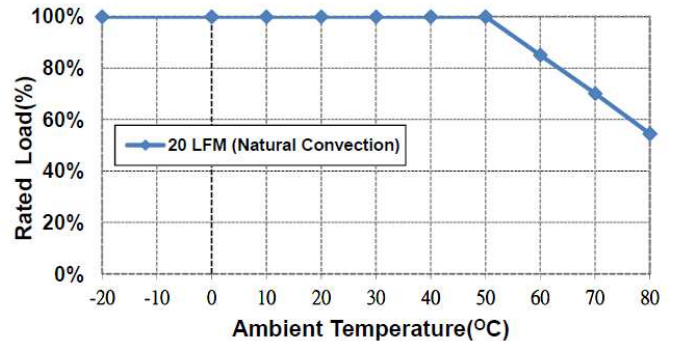
#### ■ Safety

Class I, IEC/EN/UL 60950-1/62368-1

### 7. Applications

#### 7.1 Power De-Rating Curve

##### CFM80S Series Derating 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 CFM80S 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.

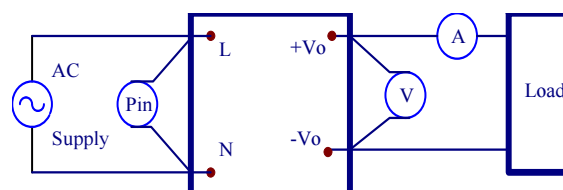


Figure 1. CFM80S Series Test Setup



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#### 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 terminal wire is 800mm MIN that the output end needs to connect the sub length of line of one end. Add a 0.1  $\mu$ F ceramic capacitor and a 10  $\mu$ F electrolytic capacitor to output connect for ripple & noise measuring at 20 MHz Band Width.

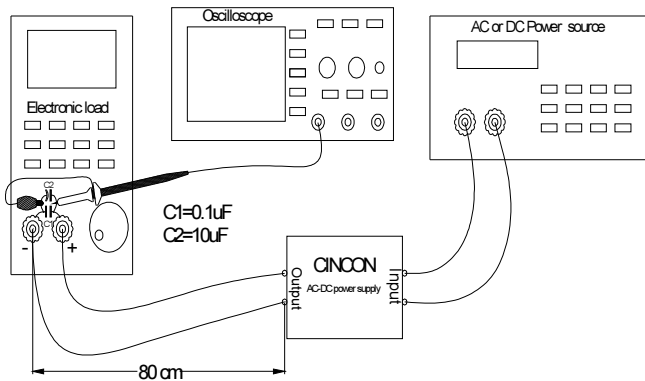


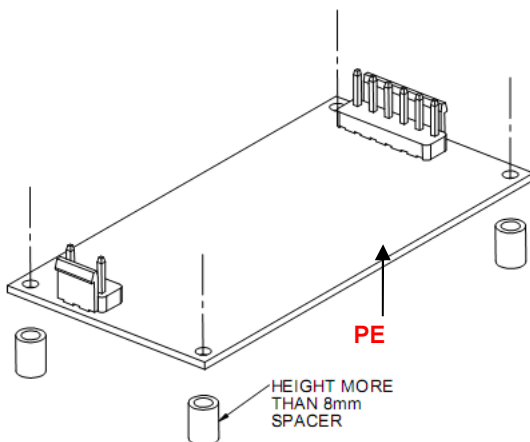
Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

#### 7.4 Installation Instruction

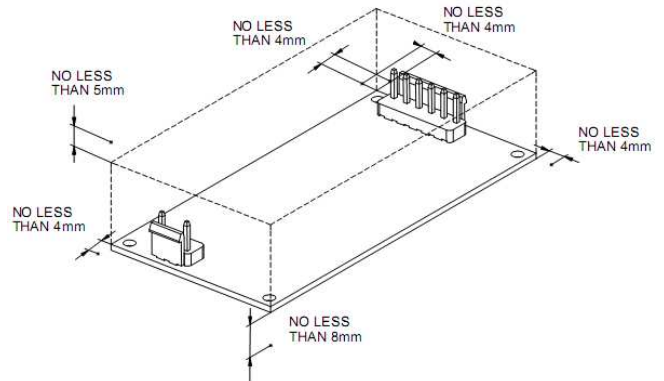
Please use the mounting hold as:

CFM80S series: 4 holds of  $\phi 3.17$

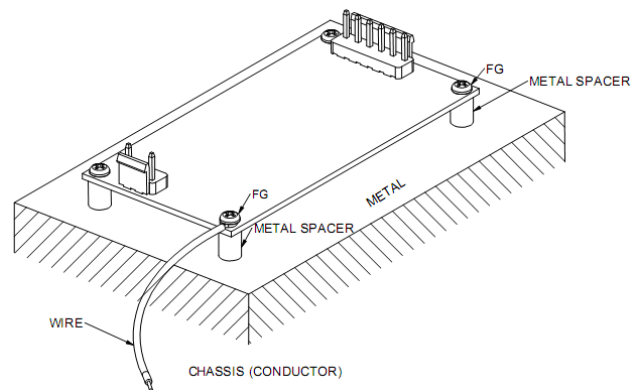
And insert the spacer (Max  $\phi 6$ ) of height over 8mm to lift the unit. The vibration spec. is the value take when the unit is raised by 8mm spacers



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.



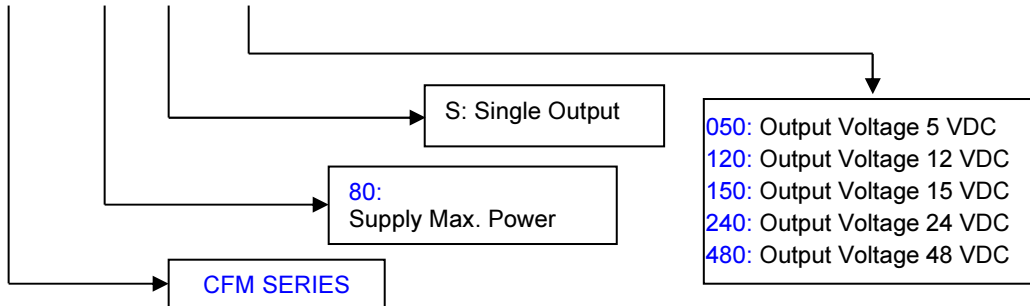


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### 8. Part Number

**CFM 80 S XXX**

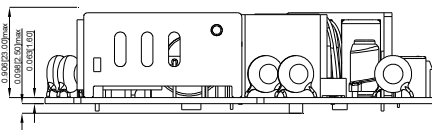
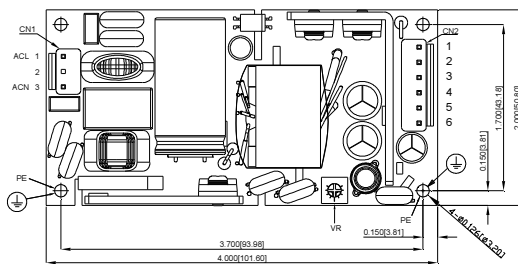


### 9. CFM80S Series Mechanical Outline Diagrams

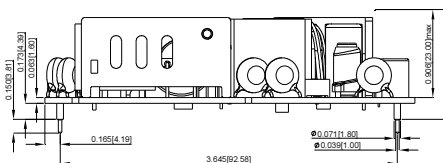
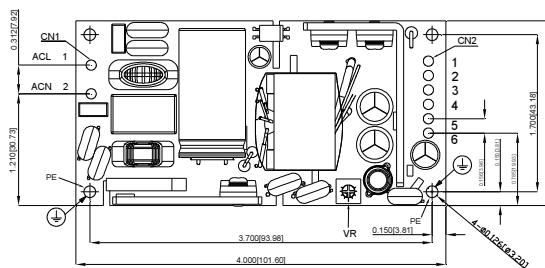
#### 9.1. Mechanical Outline Diagrams

All Dimensions in Inches[mm]  
 Tolerance Inches:x.xxx±0.02  
 Millimeters:x.xx±0.5

CFM80SXXX



CFM80SXXX-P  
 (Input/Output Connector with PIN)



CN1:

Pin	Function
1	Line
2	Neutral

CN2:

Pin	Function
1	Vout(+)
2	Vout(+)
3	Vout(+)
4	Vout(-)
5	Vout(-)
6	Vout(-)



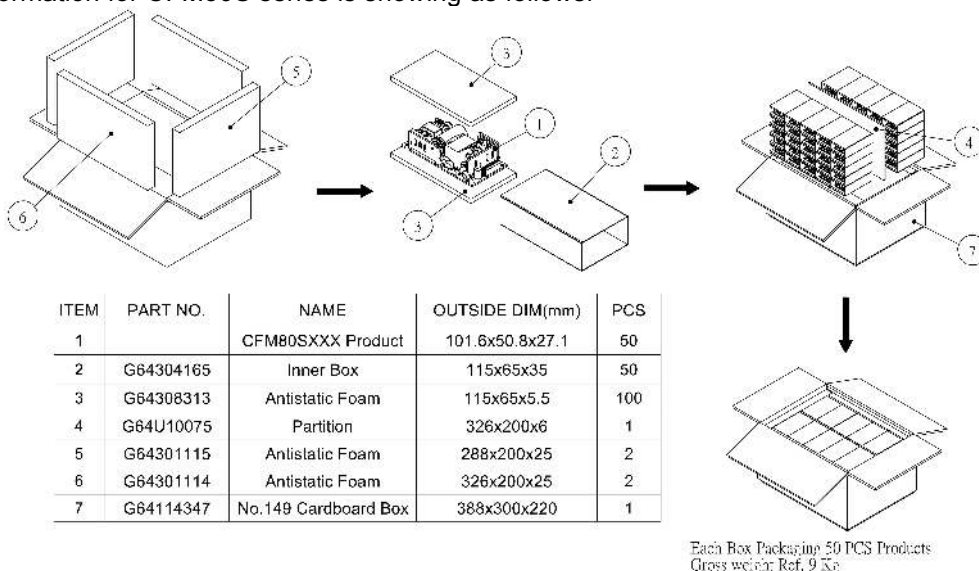


# CFM80S Series

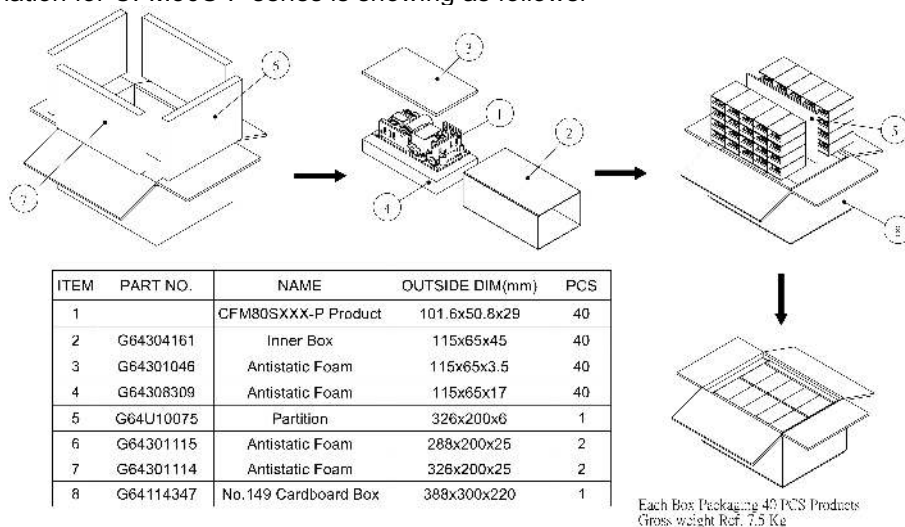
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### 9.2. Packing Information

The packing information for CFM80S series is showing as follows:



The packing information for CFM80S-P series is showing as follows:



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