



CFM70S SERIES 70 WATT OPEN FRAME AC-DC MODULES

Features

- Universal Input Range 90~264Vac
- High Efficiency up to 91%
- 2"x 3" Open Frame Compact Size
- Class I and Class II
- No Load Input Power < 0.15W
- Approval IEC/EN/UL 62368-1
- Meets IEC/EN 60335-1
- Approval EN 55032 Class B and CISPR/FCC Class B
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Over Voltage Protection



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	VOLTAGE ACCURACY NOTE1	RIPPLE& NOISE NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
CFM70S050	5 V	10.0 A	±2%	150 mV	±0.5%	±1%	86%
CFM70S120	12 V	5.80 A	±2%	120 mV	±0.5%	±1%	90%
CFM70S150	15 V	4.65 A	±1%	150 mV	±0.5%	±1%	90%
CFM70S240	24 V	2.92 A	±1%	240 mV	±0.5%	±1%	90%
CFM70S360	36 V	1.94 A	±1%	360 mV	±0.5%	±1%	90%
CFM70S480	48 V	1.46 A	±1%	480 mV	±0.5%	±1%	91%

Note:

1. Voltage accuracy is set at 100% full load.
2. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measurement @20MHz BW.
3. Line regulation is measured from 90V_{ac} to 264V_{ac} with 100% full load.
4. Load regulation is measured from 10% to full load.
5. Typical efficiency at 230 V_{ac} and 100% full load at 25°C.
6. Standard input and output connectors (CN1 and CN2) wafer with TAIWAN KING PIN TERMINAL PVHI series and mate with JST housing VHR series and JST SVH-41T-P1.1 series crimp terminal and output connectors wire 16AWG.
7. Safety approvals do not apply to the covered version only to the open frame versions.

PART NUMBER

Series	Number of Outputs	Nominal Output Voltage	Type
CFM70	O	XX	-X (Option)
CFM70	S : Single	050 : 05V 120 : 12V 150 : 15V 240 : 24V 360 : 36V 480 : 48V	None : Wafer P : PCB Mount CA : Cover (note7)

Part Number Example:

CFM70S120: Open Frame, 70W, Single 12V_{dc} Output



CFM70S Series

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.	Typ.	Max.	Units
Input Voltage	Safety approvals only to the AC input (DC input no safety)	All	90	264	V_{ac}	
			120	370	V_{dc}	
Operating Temperature	See Derating Curve	All	-30	80	°C	
Storage Temperature		All	-30	85	°C	
Operating Altitude	IEC/EN/UL 62368-1 Meets IEC/EN 60335-1	All		5000	3000	m

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Voltage Range		All	100	240	V_{ac}	
Input Frequency Range		All	50	60	Hz	
Maximum Input Current	100% Load, $V_{in}=100V_{ac}$	All		1.5	A	
Leakage Current		All		0.1	mA	
Inrush Current	$V_{in}=240V_{ac}$, Cold start at 25°C	All		130	A	

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	V_{in} =Nominal V_{in} , $I_o=I_{o\ max.}$, $T_c=25^\circ C$	CFM70S050	4.90	5	5.10	
		CFM70S120	11.76	12	12.24	
		CFM70S150	14.85	15	15.15	
		CFM70S240	23.76	24	24.24	
		CFM70S360	35.64	36	36.36	
		CFM70S480	47.52	48	48.48	
Operating Output Current Range	$V_{in}=115V_{ac}$ and $230V_{ac}$, $T_c=25^\circ C$	CFM70S050			10.0	
		CFM70S120			5.80	
		CFM70S150			4.65	
		CFM70S240			2.92	
		CFM70S360			1.94	
		CFM70S480			1.46	
Holdup Time	$V_{in}=115V_{ac}$	All		10		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	Hiccup mode (Auto recovery)	CFM70S050			7.1	
		CFM70S120			15.6	
		CFM70S150			18.0	
		CFM70S240			29.1	
		CFM70S360			43.3	
		CFM70S480			56.8	
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	CFM70S050			150	
		CFM70S120			120	
		CFM70S150			150	
		CFM70S240			240	
		CFM70S360			360	
		CFM70S480			480	
						mV



CFM70S Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Load Capacitance	1. $V_{in}=115V_{ac}$ and $230V_{ac}$ 2. Output is max. load 3. Ambient temperature=25°C	CFM70S050			10300	uF
		CFM70S120			6000	
		CFM70S150			4700	
		CFM70S240			2920	
		CFM70S360			1980	
		CFM70S480			930	
Efficiency	1. Output is rated load 2. Ambient temperature=25°C 3. Input voltage is $230V_{ac}$	CFM70S050		86		%
		CFM70S120		90		
		CFM70S150		90		
		CFM70S240		90		
		CFM70S360		90		
		CFM70S480		91		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute	All			3000	V_{ac}
Isolation Resistance	Input to output	All	100			$M\Omega$

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	$P_{out}=\text{max. rated power}$	All		65		kHz

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	$I_o=100\%$; $T_a=25^\circ C$ per MIL-HDBK-217F	All	500			k hours
Humidity	Non-condensing	All			93	% RH
Shock	Meet MIL-STD-810F Table 516.5, Table 516.5-I 10ms, each axis 3 times($\pm X$ 、 $\pm Y$ 、 $\pm Z$ axis)	All		75		g
Vibration	Meet MIL-STD-810F Table 514.5C-VIII, 15~2000Hz, X、Y、Z axis, 1 hour (each axis), Total 3 hrs.	All		4		g
Weight		CFM70S CFM70S-P CFM70S-CA	96.1 94.1 183			grams
Dimensions	Open Frame (Wafer) P (PCB Mount) CA (Cover)	All	3.000x2.000x1.067 Inches (76.20x50.80x27.1 mm) 3.000x2.000x1.142 Inches (76.20x50.80x29mm) 3.598x2.520x1.358 Inches (91.40x64.00x34.50 mm)			
Safety	Class I, Class II, IEC/EN/UL62368-1 Safety approvals do not apply to the covered version only to the open frame versions					
EMC Emission	EN 55032: 2015+AC: 2016, 47 CFR FCC Part 15 Subpart B, EN 61000-3-2: 2019, EN 61000-3-3: 2013					Class B
Conducted Disturbance	EN 55032, 47 CFR FCC Part 15					Class B
Radiated Disturbance	EN 55032, 47 CFR FCC Part 15					Class B
Harmonic Current Emissions	EN 61000-3-2:2019					
Voltage Fluctuations & Flicker	EN 61000-3-3:2013					
EMC Immunity	EN 55035:2017					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008, Air Discharge: $\pm 8kV$, Contact Discharge: $\pm 4kV$					Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2020					Criterion A
Electrical Fast Transient (EFT)	IEC 61000-4-4:2012, $\pm 0.5kV$, $\pm 1kV$, $\pm 2kV$					Criterion A
Surge	IEC61000-4-5:2014, L-N: $\pm 0.5kV$, $\pm 1kV$, L-E(Ground): $\pm 0.5kV$, $\pm 1kV$, $\pm 2kV$					Criterion A
Conducted Disturbances, Induced by RF Fields	IEC 61000-4-6:2013					Criterion A



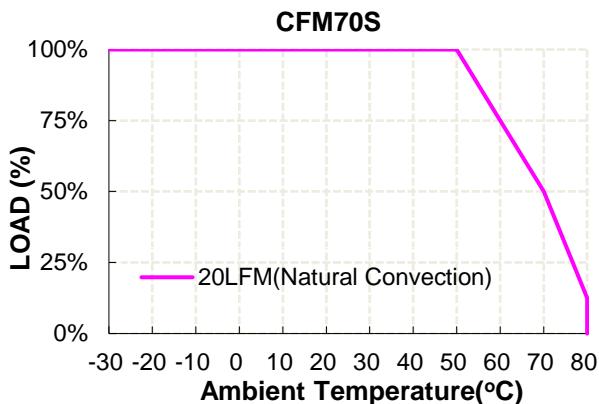
CFM70S Series

GENERAL SPECIFICATIONS

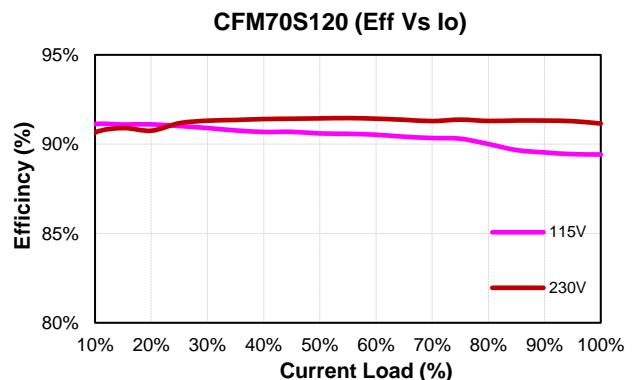
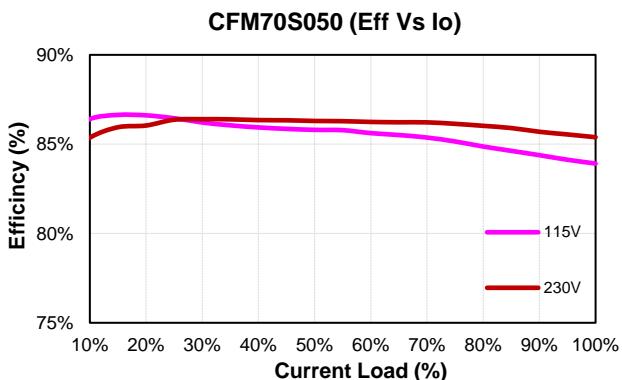
Power Frequency Magnetic Field	IEC 61000-4-8:2009	Criterion A
Voltage Dips	IEC 61000-4-11:2004, Dip: 30% Reduction, Dip >95% Reduction	Criterion A
Voltage Interruptions	IEC 61000-4-11:2004, >95% Reduction	Criterion B
Application Note Link	CFM70S Series App Notes	

CHARACTERISTIC CURVE

Power Derating Curve

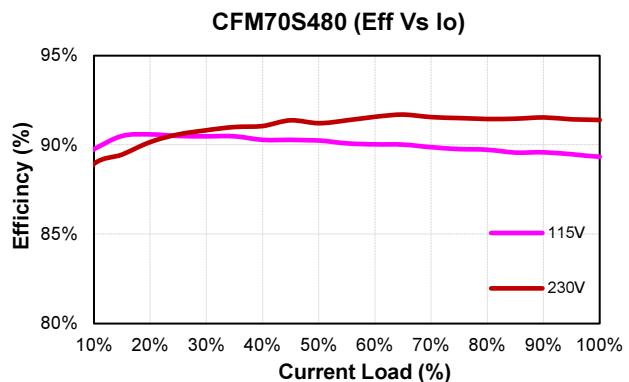
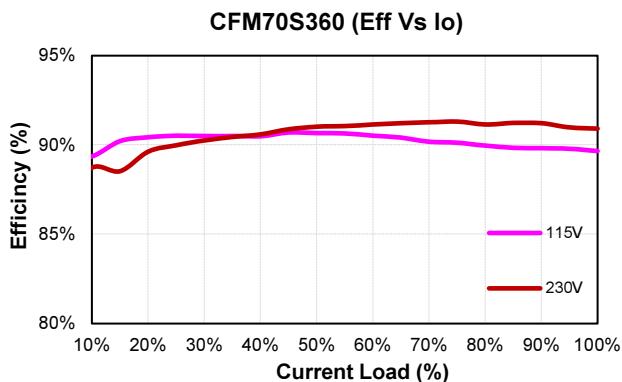
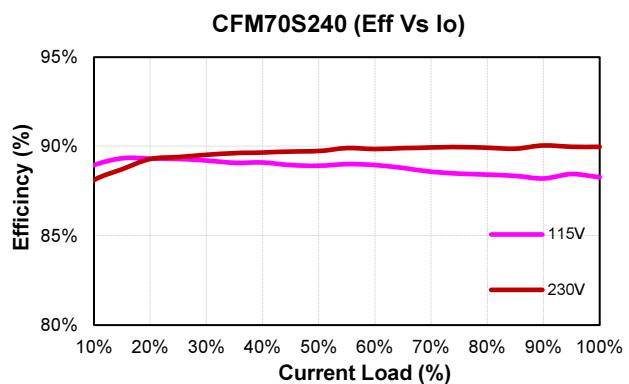
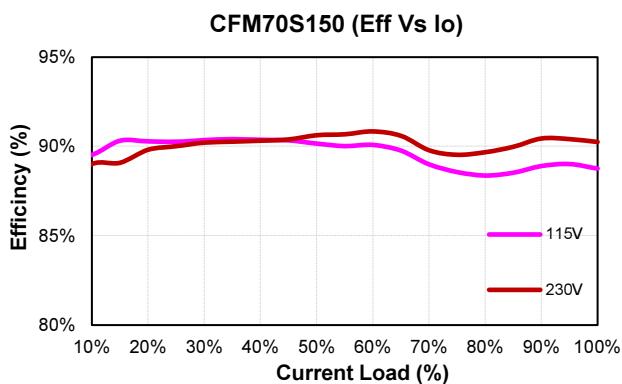


Performance Data

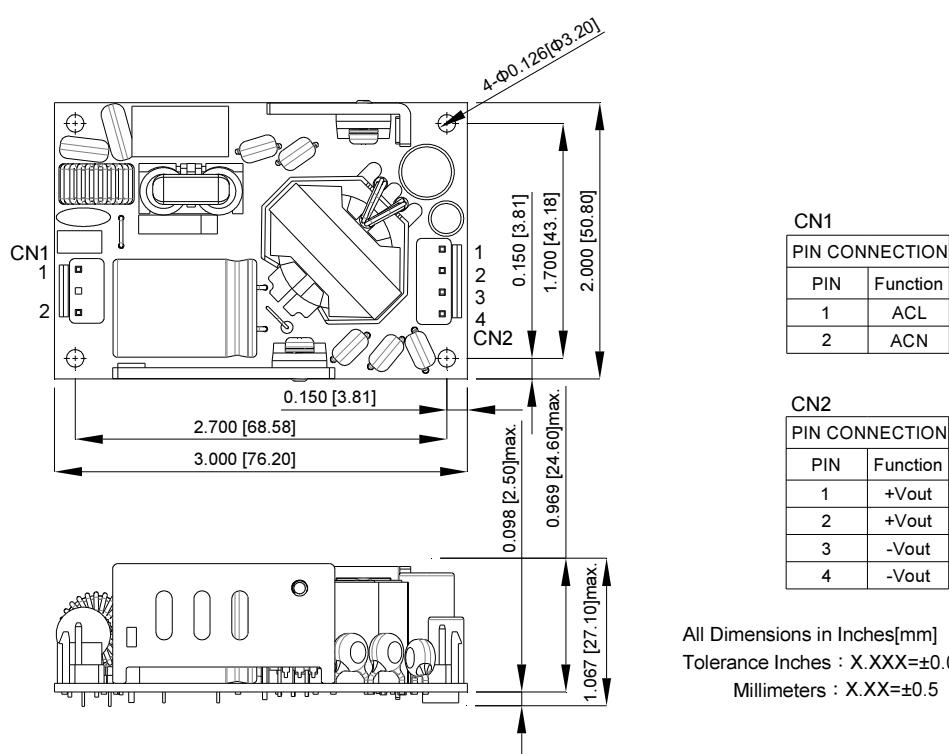




CFM70S Series



MECHANICAL SPECIFICATION

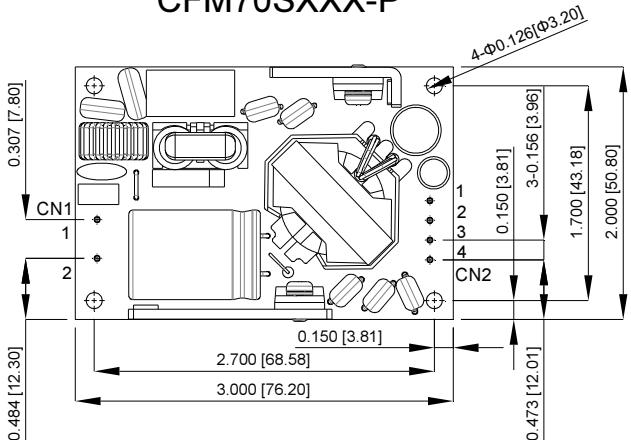




CFM70S Series

MECHANICAL SPECIFICATION

CFM70SXXX-P



CN1

PIN	Function
1	ACL
2	ACN

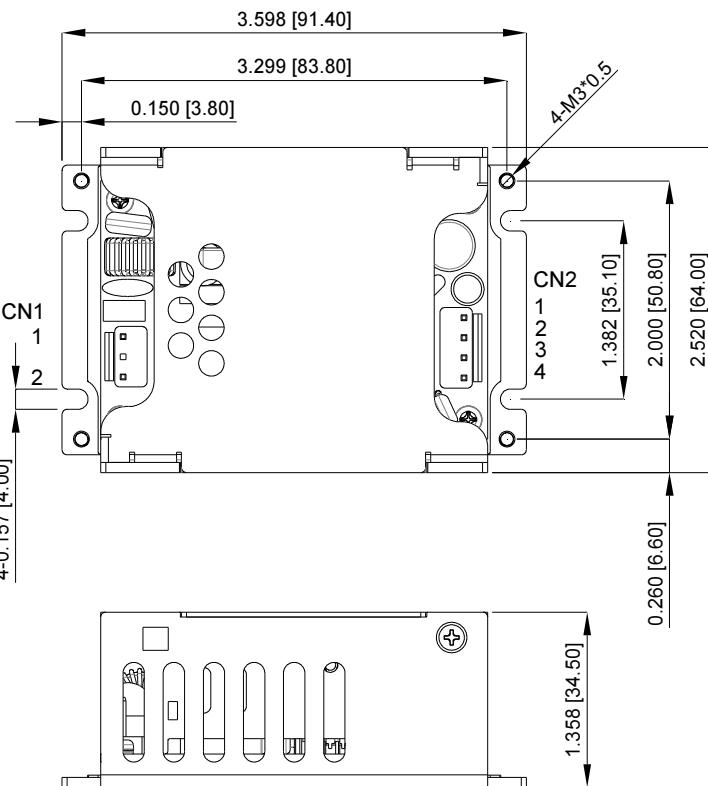
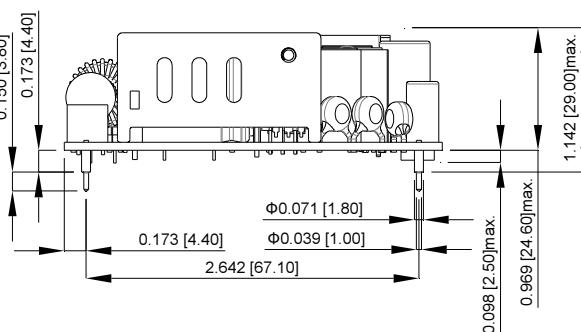
CN2

PIN	Function
1	+Vout
2	+Vout
3	-Vout
4	-Vout

All Dimensions in Inches[mm]

Tolerance Inches : X.XXX=±0.02

Millimeters : X.XX=±0.5



CFM70SXXX-CA

All Dimensions in Inches[mm]

Tolerance Inches : X.XXX=±0.02

Millimeters : X.XX=±0.5

CN1

PIN	Function
1	ACL
2	ACN

CN2

PIN	Function
1	+Vout
2	+Vout
3	-Vout
4	-Vout

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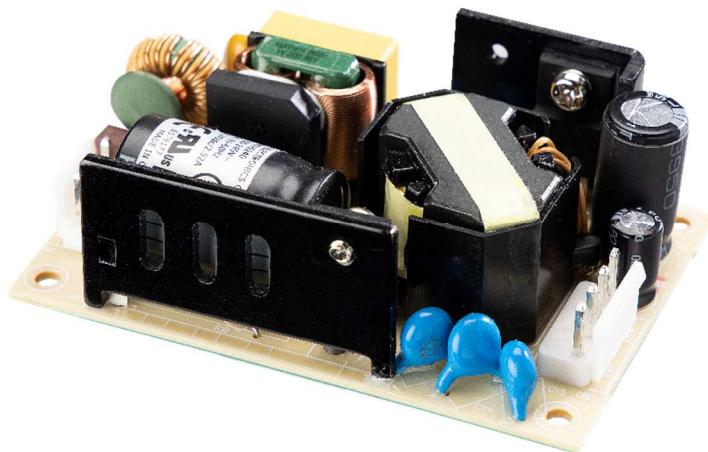
CFM70S Series

Application Note V10

AC-DC Switching Power Module

CFM70S Series

APPLICATION NOTE



Approved By:

Department	Approved By	Checked By	Written By
Research and Development Department	Enoch	Wei-Cheng	Jason
		Ovid	
Quality Assurance Department	Ryan	Benny	



CFM70S 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</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
5. PACKING INFORMATION	7



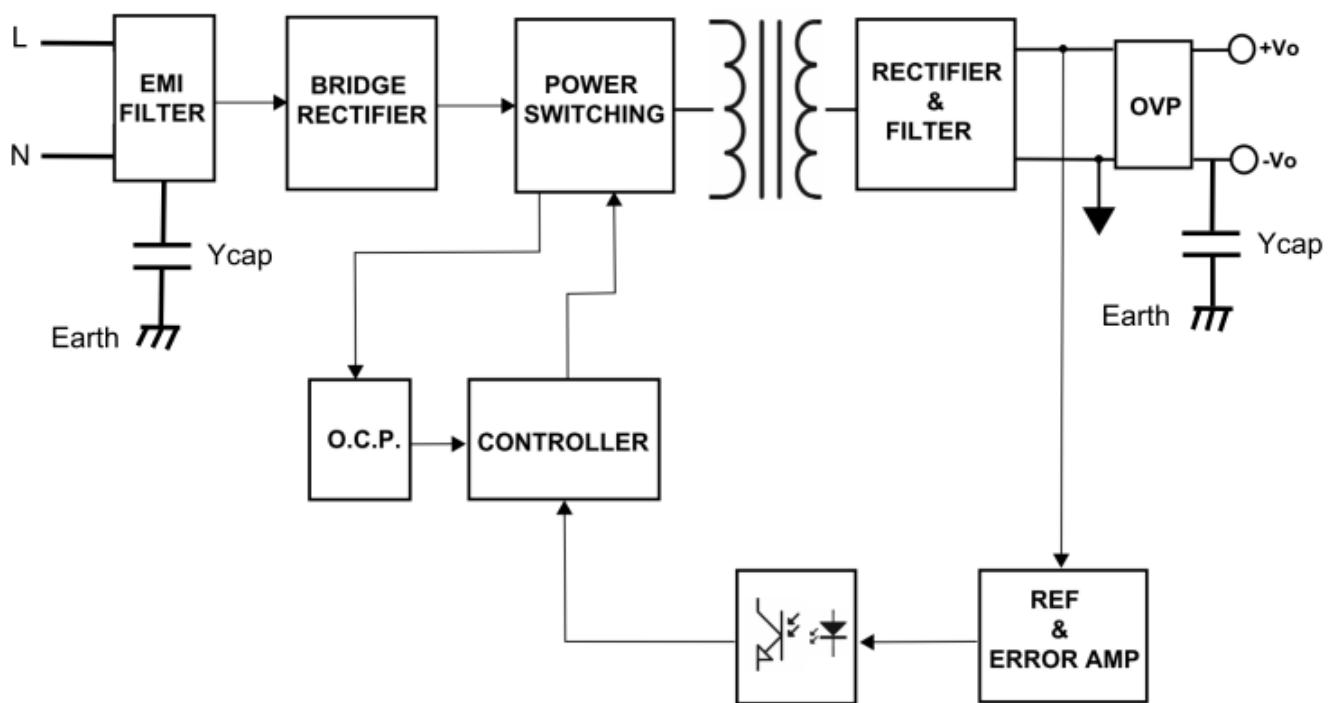
CFM70S Series

Application Note V10

1. Introduction

This application note describes the features and functions of Cincon's CFM70S 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 CFM70S series power module is extremely reliable.

2. Electrical Block Diagram





CFM70S Series

Application Note V10

3. Main Features and Functions

3.1 Operating Temperature Range

The highly efficient design of Cincon's CFM70S series power modules has resulted in their ability to operate within ambient temperature environments from -30°C to 80°C, -40°C can be start up. 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.

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 CFM70S 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.

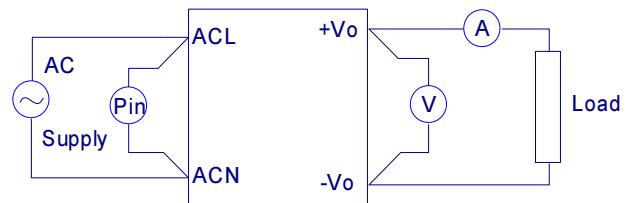


Figure 1. CFM70S Series Test Setup

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

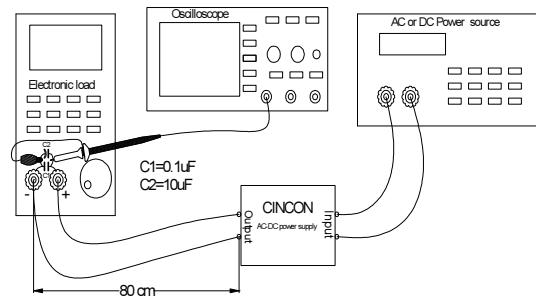


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up



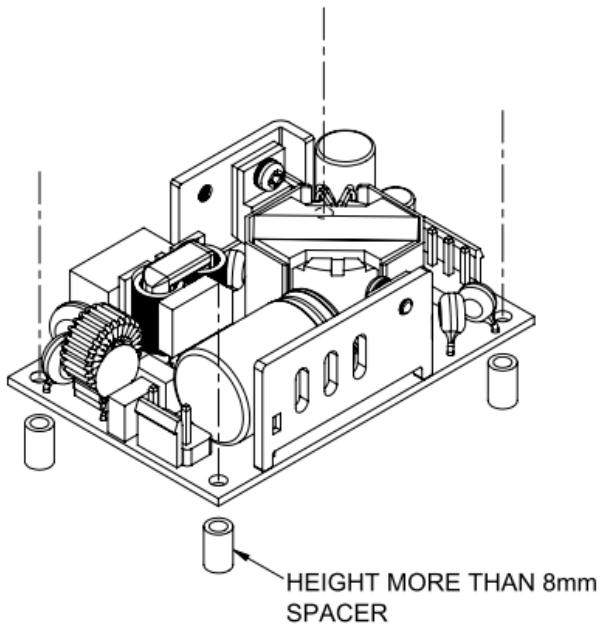
CFM70S Series

Application Note V10

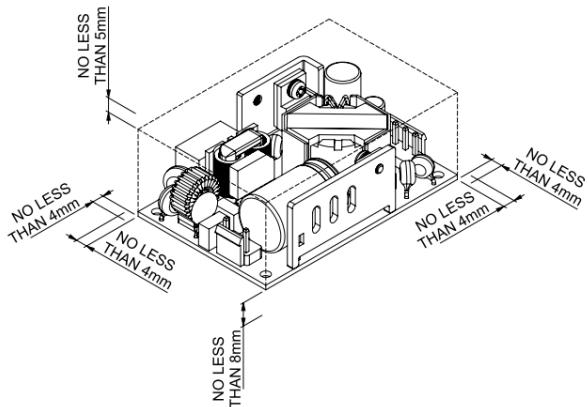
4.3 Installation Instruction

Please use the mounting hold as:

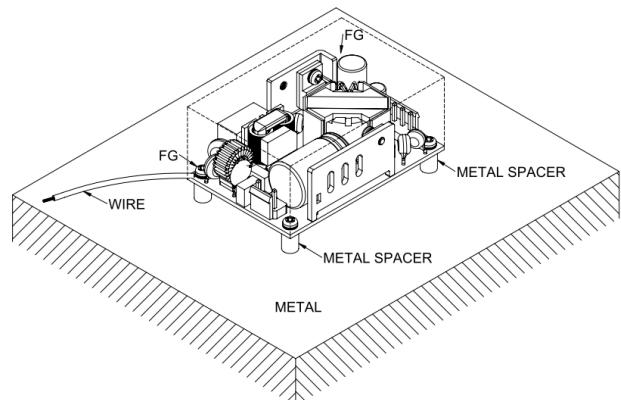
CFM70S series: 4 holds of $\Phi 3.17$ and insert the spacer (Max $\Phi 6$) of height over 8mm to lift the unit. The vibration spec. is the value take when the unit is raised by 8mm spacers.



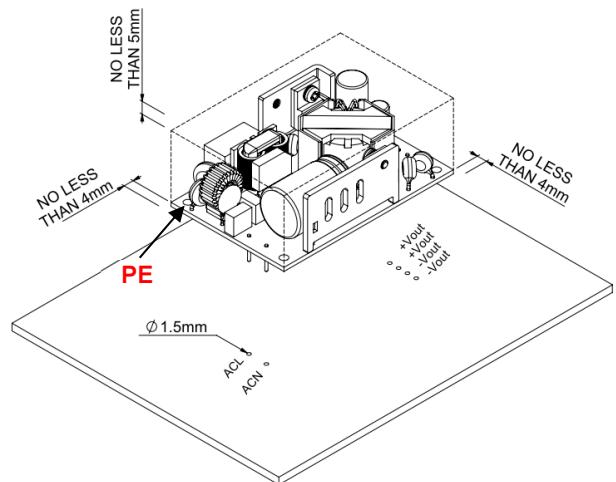
Please reserve 4mm space from the surfaces and the sides of PCB, especially from the solder surface, 8mm space is necessary. If the space is not enough, the specification of insulation and withstand will not be satisfied.



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



The CFM70SXXX-P mounting holes are 1.5mm. Please allow 4mm side clearance from the components and all side of the PCB. Allow 5mm clearance above the highest parts on the PCB.

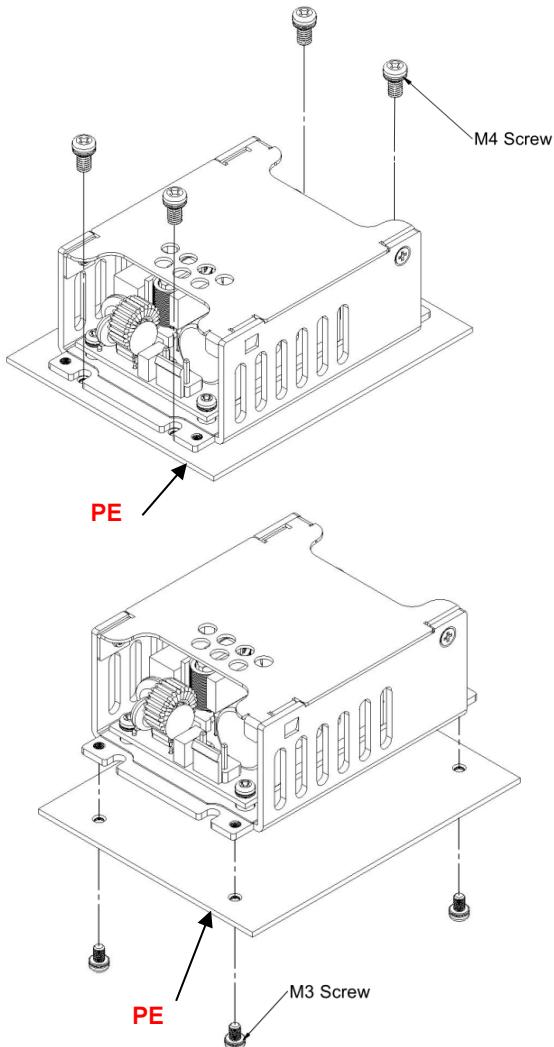


CFM70SXXX-P installation diagram



CFM70S Series

Application Note V10



CFM70SXXX-CA installation diagram

Note:

M3&M4 screw head and washer diameter shall not exceed 5.5mm

Note2:

Recommended torque value of M3 threaded hole:
4kgf-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.

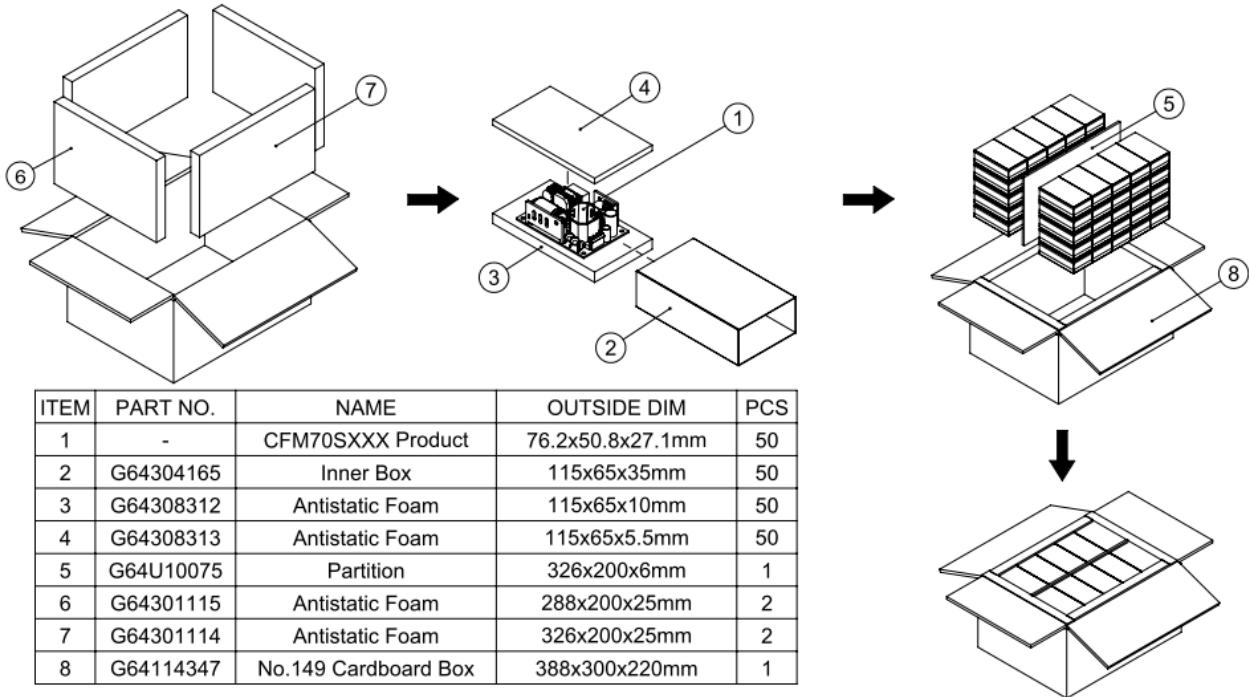


CFM70S Series

Application Note V10

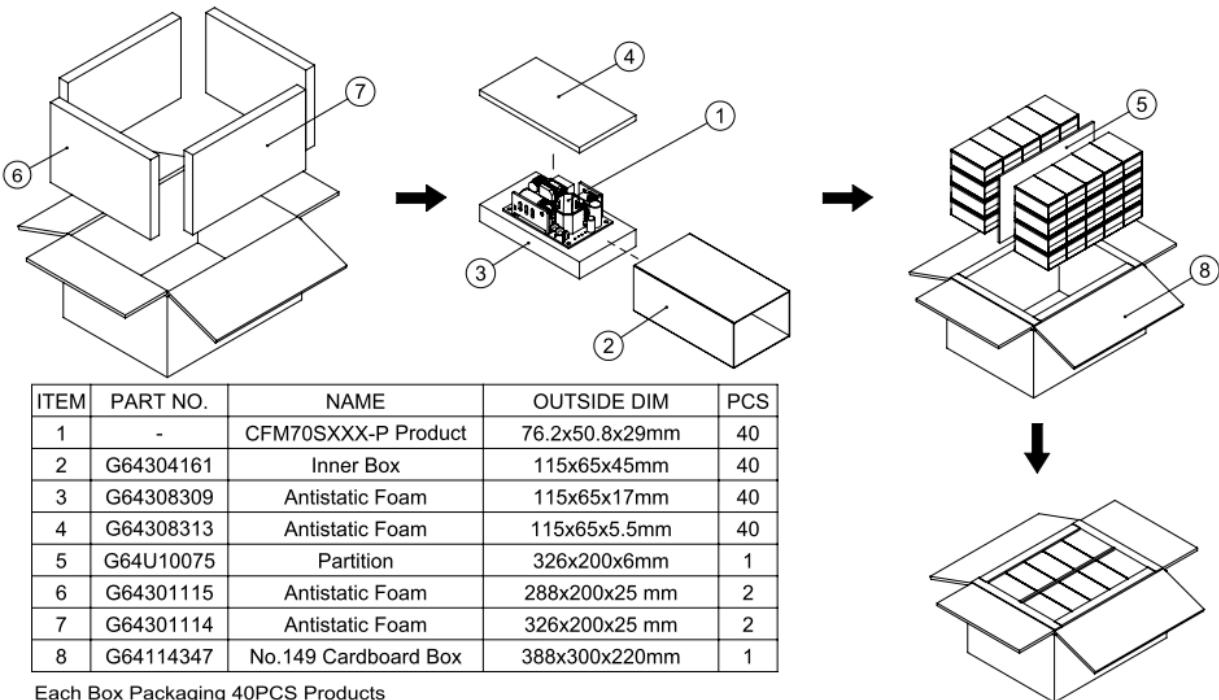
5. Packing Information

The packing information for CFM70SXXX SERIES



CFM70SXXX 40pcs a box, including the total weight of package material about 6.2Kg

The packing information for CFM70SXXX-P SERIES:



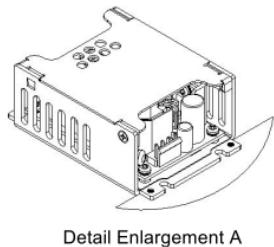
CFM70SXXX-P 40 pcs a box, including the total weight of package material about 5.2Kg



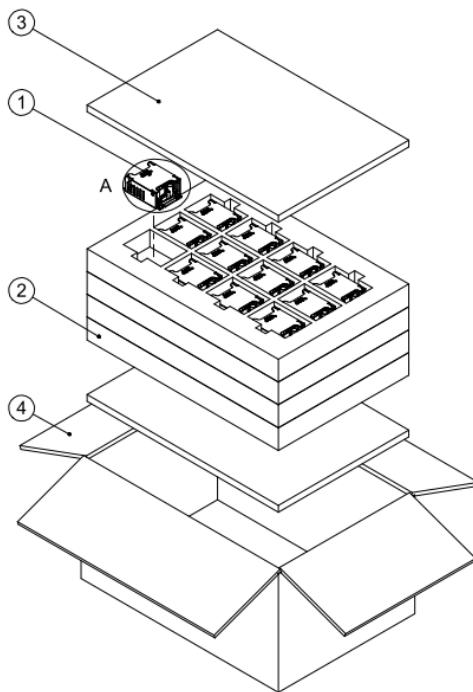
CFM70S Series

Application Note V10

The packing information for CFM70SXXX-CA SERIES:



Detail Enlargement A



ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM70SXXX-CA Product	91.4x64x34.5mm	48
2	G64301210	Antistatic Foam	485x330x50mm	4
3	G64301208	Antistatic Foam	485x330x15mm	2
4	G64100099	No.49 Cardboard Box	500x345x260mm	1

Each Box Packaging 48 PCS Products

Gross weight Ref. 10.0 Kg

CFM70SXXX-CA 48 pcs a box, including the total weight of package material about 10Kg

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