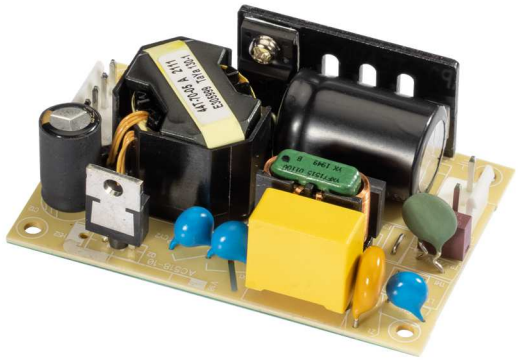
CFM50S SERIES
50 WATT OPEN FRAME AC-DC MODULES

Features

- Universal Input Range 90~264Vac
- High Efficiency up to 89%
- 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



E176177

MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	VOLTAGE ACCURACY NOTE1	RIPPLE& NOISE NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
CFM50S050	5 V	8.0 A	±2%	150 mV	±0.5%	±1%	85%
CFM50S120	12 V	4.17 A	±2%	120 mV	±0.5%	±1%	87%
CFM50S150	15 V	3.33 A	±1%	150 mV	±0.5%	±1%	88%
CFM50S240	24 V	2.08 A	±1%	240 mV	±0.5%	±1%	89%
CFM50S360	36 V	1.39 A	±1%	360 mV	±0.5%	±1%	89%
CFM50S480	48 V	1.04 A	±1%	480 mV	±0.5%	±1%	89%

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℃.
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
CFM50	O	XX	-X (Option)
CFM50	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:

CFM50S120: Open Frame, 50W, Single 12V_{dc} Output

TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, full load at 25℃ unless otherwise noted.)

ABSOLUTE MAXIMUM RATINGS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input Voltage	Safety approvals only to the AC input	All	90 120		264 370	V_{ac} V_{dc}
Operating Temperature	See Derating Curve	All	-30		80	℃
Storage Temperature		All	-30		85	℃
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			1.2	A
Leakage Current		All			0.1	mA
Inrush Current	V_{in}=240V_{ac}, Cold start at 25℃	All		110		A

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	V_{in}=Nominal V_{in}, I_o=Io max., T_c=25℃	CFM50S050 CFM50S120 CFM50S150 CFM50S240 CFM50S360 CFM50S480	4.90 11.76 14.85 23.76 35.64 47.52	5 12 15 24 36 48	5.10 12.24 15.15 24.24 36.36 48.48	V_{dc}
Operating Output Current Range	V_{in}=115V_{ac} and 230V_{ac},T_c=25℃	CFM50S050 CFM50S120 CFM50S150 CFM50S240 CFM50S360 CFM50S480			8.00 4.17 3.33 2.08 1.39 1.04	A
Holdup Time	V_{in}=115V_{ac}	All	8			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)	CFM50S050 CFM50S120 CFM50S150 CFM50S240 CFM50S360 CFM50S480			10.0 16.0 25.0 35.0 50.0 63.0	V_{dc}
Over Current Protection	Hiccup mode (Auto recovery)	All	110		140	%
Short Circuit Protection	Hiccup mode (Auto recovery)	All				
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℃	CFM50S050 CFM50S120 CFM50S150 CFM50S240 CFM50S360 CFM50S480			150 120 150 240 360 480	mV

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℃	CFM50S050 CFM50S120 CFM50S150 CFM50S240 CFM50S360 CFM50S480			8000 4200 3400 2087 1440 600	uF
Efficiency	1. Output is rated load 2. Ambient temperature=25℃ 3. Input voltage is 230V_{ac}	CFM50S050 CFM50S120 CFM50S150 CFM50S240 CFM50S360 CFM50S480		85 87 88 89 89 89		%

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			MΩ

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	Pout=max. rated power	All		65		kHz

GENERAL SPECIFICATIONS

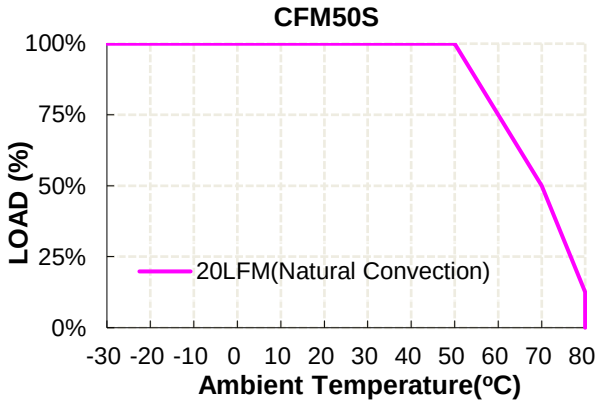
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I_o=100%; T_a=25℃ per MIL-HDBK-217F	All		1200		k hours
Humidity	Non-condensing	All			93	% RH
Shock	Meet MIL-STD-810F Table 516.5, Table 516.5-I 10ms, each axis 3 times(±X、±Y、±Z axis)	All		75		g
Vibration	Meet MIL-STD-810F Table 514.5C-VIII,15~2000Hz, X、Y、Z axis, 1 hour (each axis),. Total 3 hrs.	All		4		g
Weight		CFM50S CFM50S-P CFM50S-CA		95 93 180		grams
Dimensions	Open Frame (Wafer) P (PCB Mount) CA (Cover)	All	3.000x2.000x1.067 Inches (76.20x50.80x27.10 mm) 3.000x2.000x1.142 Inches (76.20x50.80x29.00 mm) 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	EN55032:2015+AC:2016, 47 CFR FCC Part 15 Subpart B EN61000-3-2:2019, EN61000-3-3:2013					Class B
Conducted Disturbance	EN55032, 47 CFR FCC Part 15					Class B
Radiated Disturbance	EN55032, 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	EN55035:2017					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008, Air Discharge: ±8kV, Contact Discharge: ±4kV					Criterion A

GENERAL SPECIFICATIONS

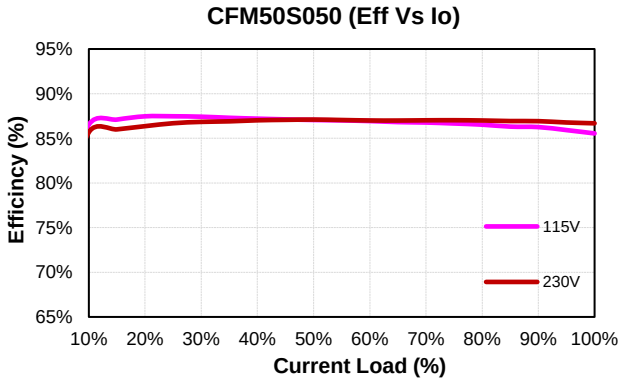
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2020	Criterion A
Electrical Fast Transient (EFT)	IEC 61000-4-4:2012, ±0.5kV, ±1kV, ±2kV	Criterion A
Surge	IEC 61000-4-5:2014, L-N: ±0.5kV, ±1kV, L-E(Ground): ±0.5kV, ±1kV, ±2kV	Criterion A
Conducted Disturbances, Induced by RF Fields	IEC 61000-4-6:2013	Criterion A
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	CFM50S Series App Notes	

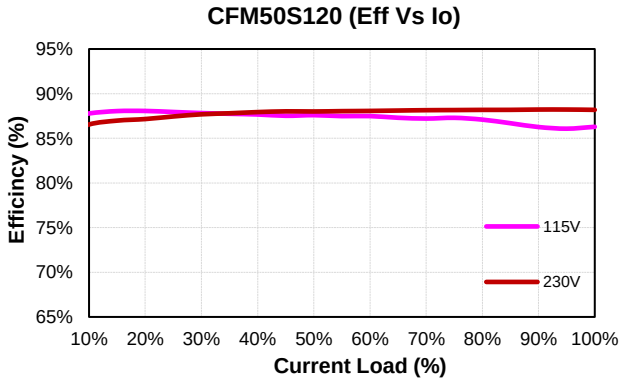
CHARACTERISTIC CURVE

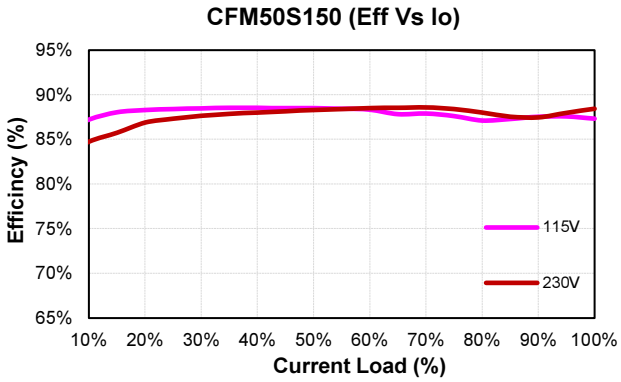
Power Derating Curve

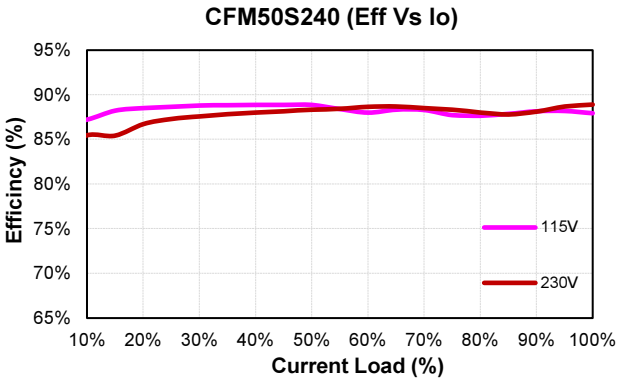


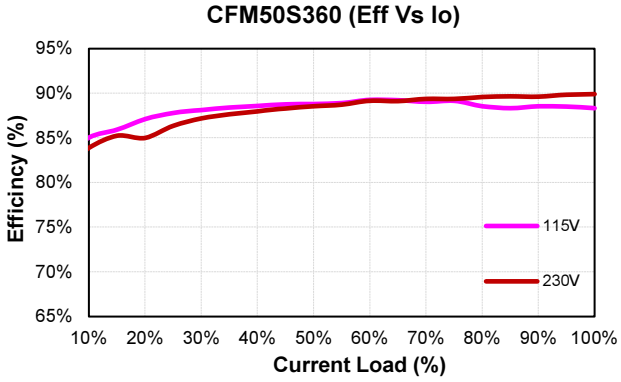
Performance Data

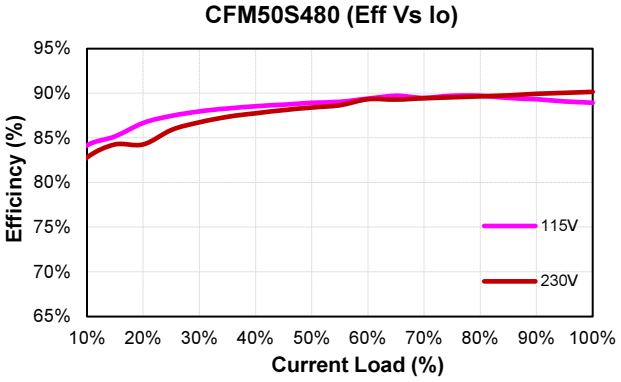




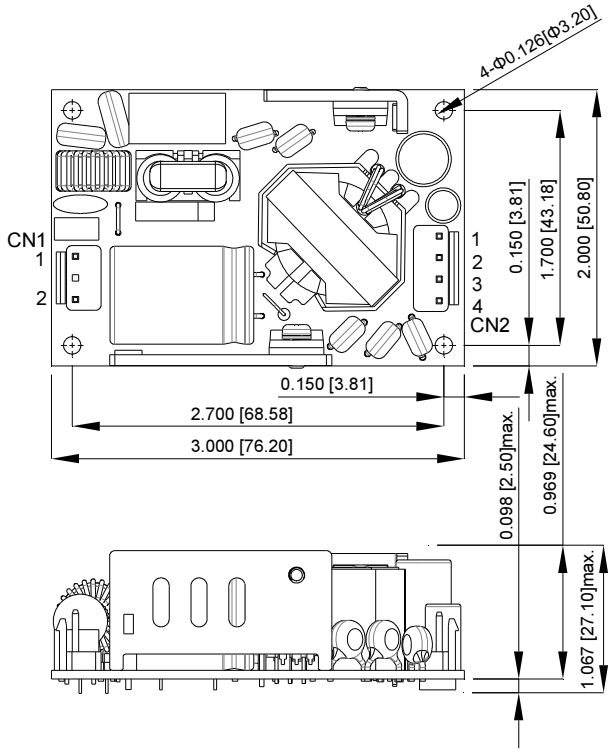








MECHANICAL SPECIFICATION



CN1

PIN CONNECTION	
PIN	Function
1	ACL
2	ACN

CN2

PIN CONNECTION	
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

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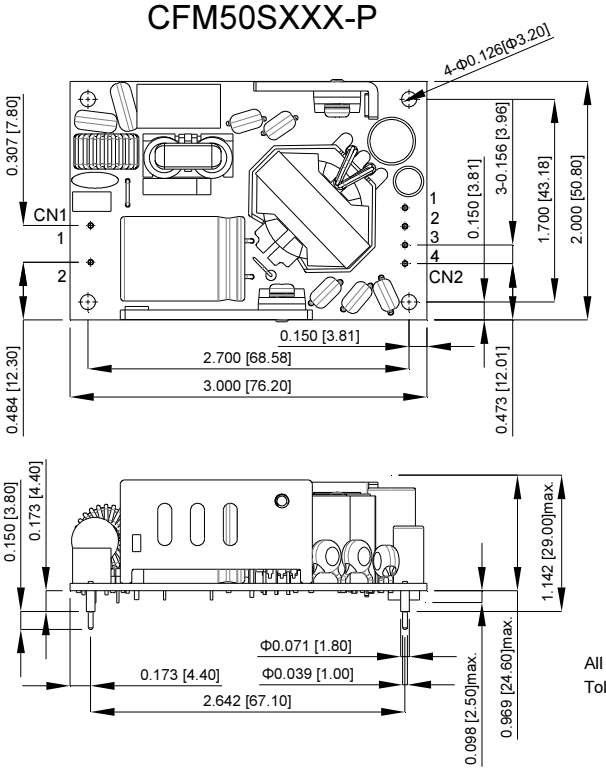
MECHANICAL SPECIFICATION

CFM50SXXX-P



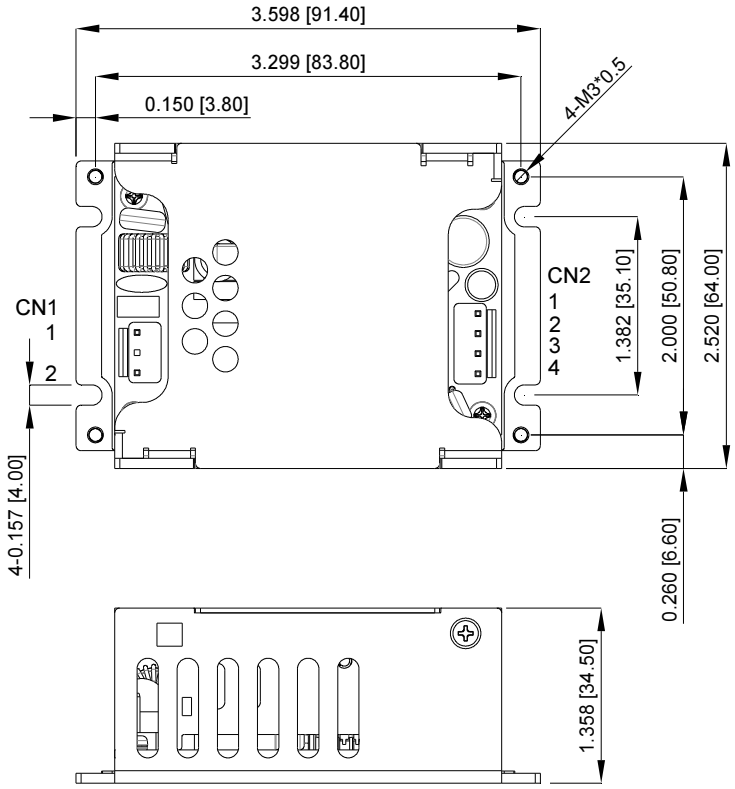
CN1

PIN CONNECTION	
PIN	Function
1	ACL
2	ACN

CN2

PIN CONNECTION	
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



CFM50SXXX-CA

All Dimensions in Inches[mm]
Tolerance Inches：X.XXX=±0.02
Millimeters：X.XX=±0.5

CN1

PIN CONNECTION	
PIN	Function
1	ACL
2	ACN

CN2

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

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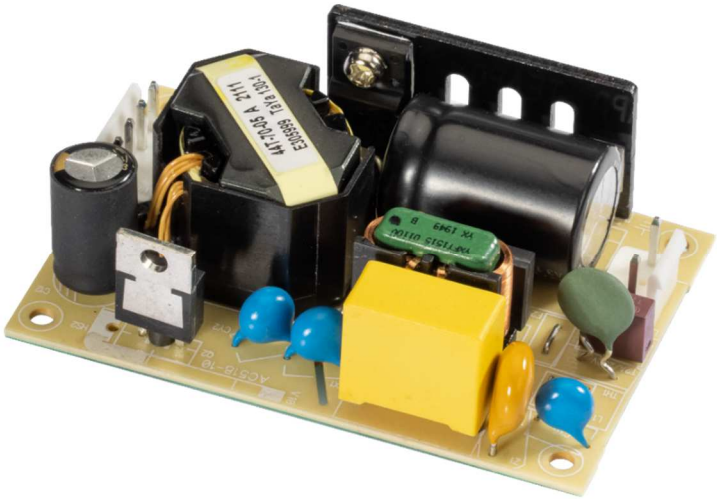
AC-DC Switching Power Module
CFM50S Series
APPLICATION NOTE



Approved By:

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

CFM50S Series

Application Note V10

Content

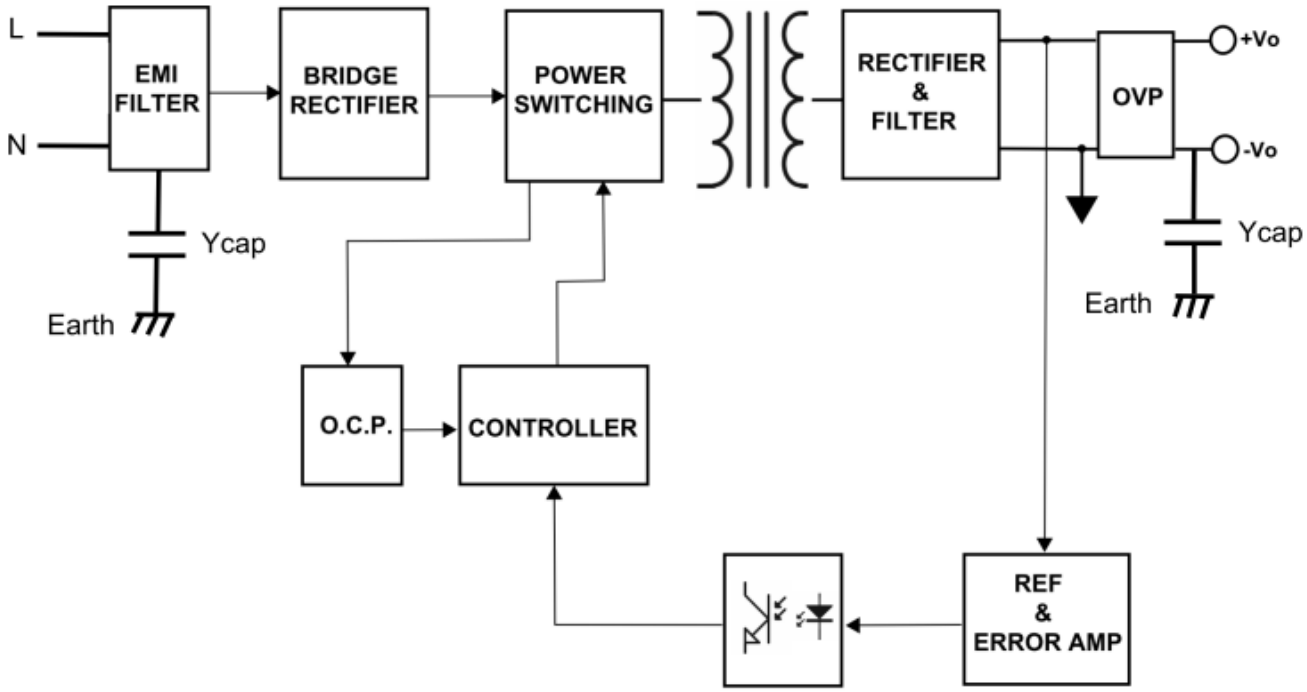
CFM50S Series

Application Note V10

1. Introduction

This application note describes the features and functions of Cincon's CFM50S 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 CFM50S series power module is extremely reliable.

2. Electrical Block Diagram



3. Main Features and Functions

3.1 Operating Temperature Range

The highly efficient design of Cincon's CFM50S series power modules has resulted in their ability to operate within ambient temperature environments from -30℃ to 80℃, -40℃ 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 CFM50S 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:

$$\eta = \frac{Vo \times Io}{Pin} \times 100\%$$

Where:

Vo is output voltage

Io is output current

Pin 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.

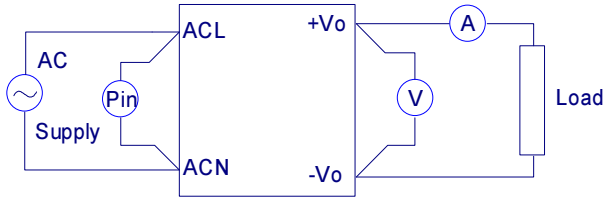


Figure 1. CFM50S Series Test Setup

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.

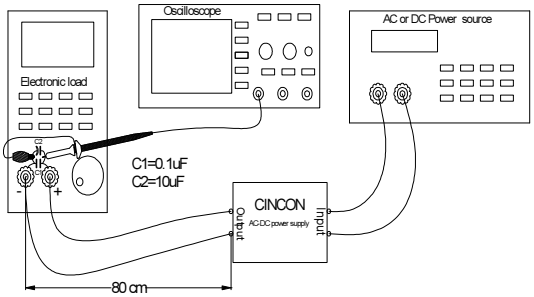
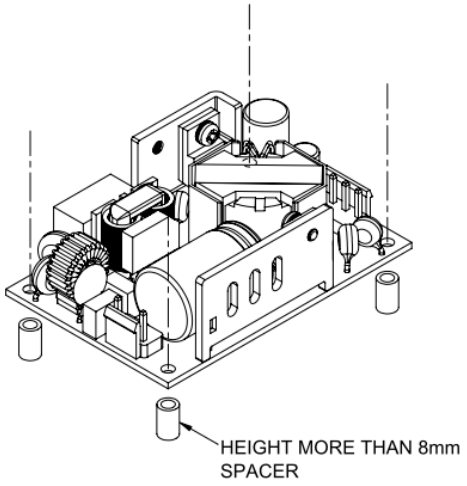


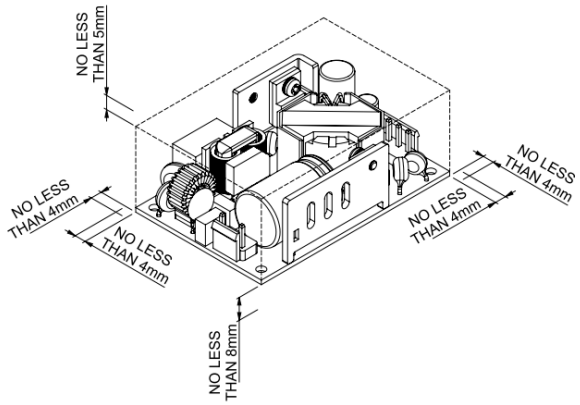
Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

4.3 Installation Instruction

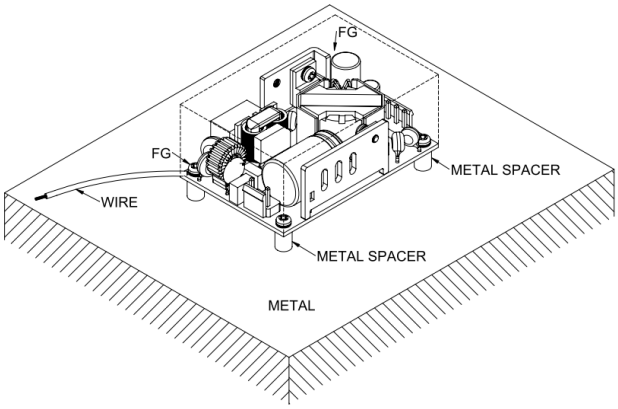
Please use the mounting hold as:
CFM50S series: 4 holds of Φ3.17 and insert the spacer (MaxΦ6) of height over 8mm to lift the unit. The vibration spec. is the value take when the unit is raised by 8mm spacers.



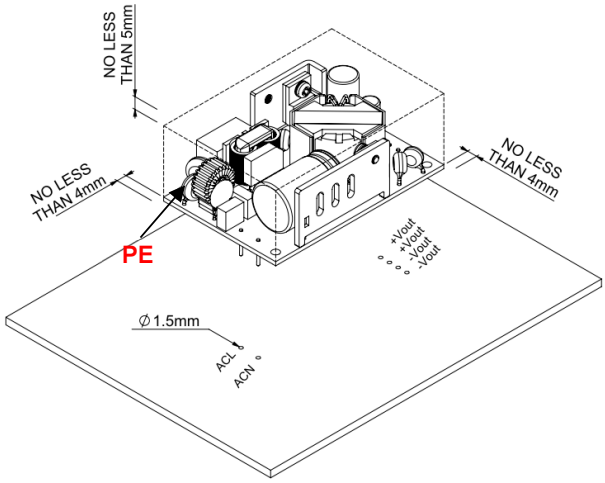
Please reserve 4mm space from the surfaces and the sides of PCB, especially from the solder surface, 8mm space is necessary. If the space is not enough, the specification of insulation and withstand will not be satisfied.



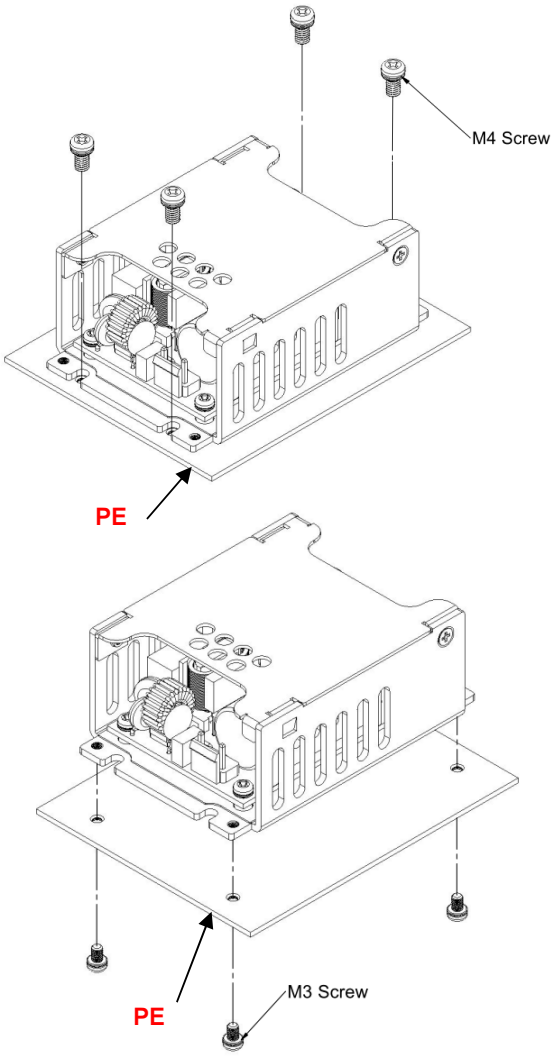
FG should be connected to the earth (ground) terminal of the apparatus. If not, the conducted noise and output noise will increase.



The CFM50SXXX-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.



CFM50SXXX-P installation diagram

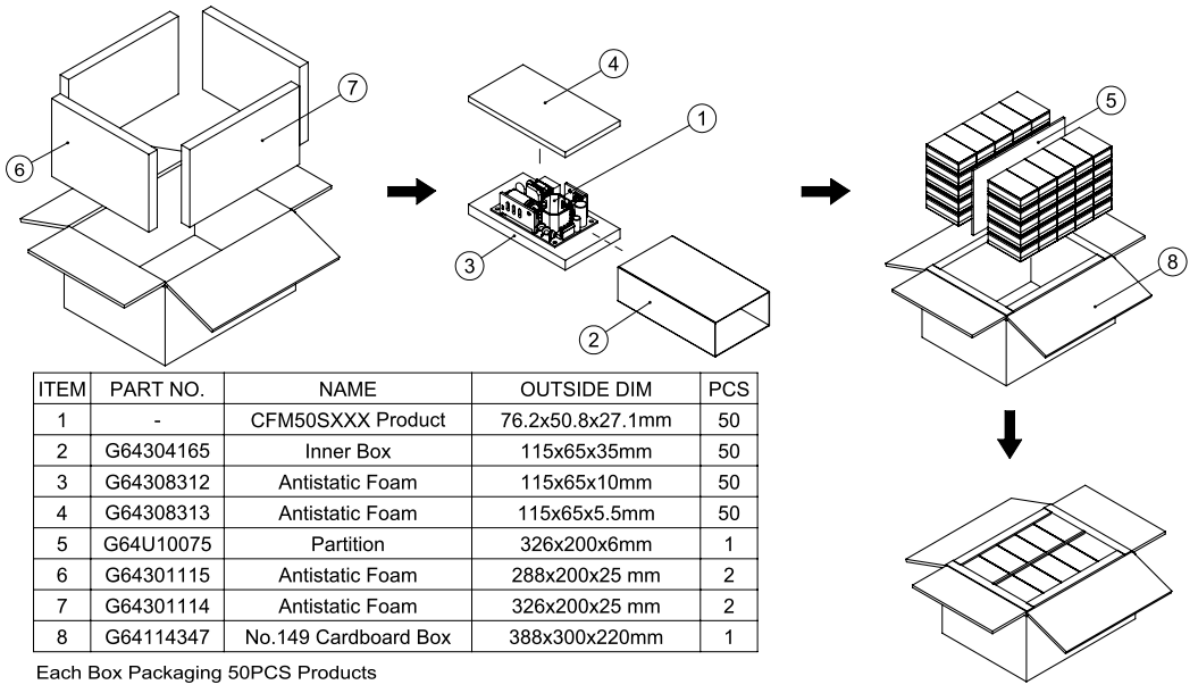


CFM50SXXX-CA installation diagram

Note1:
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.

5. Packing Information

The packing information for CFM50SXXX SERIES:

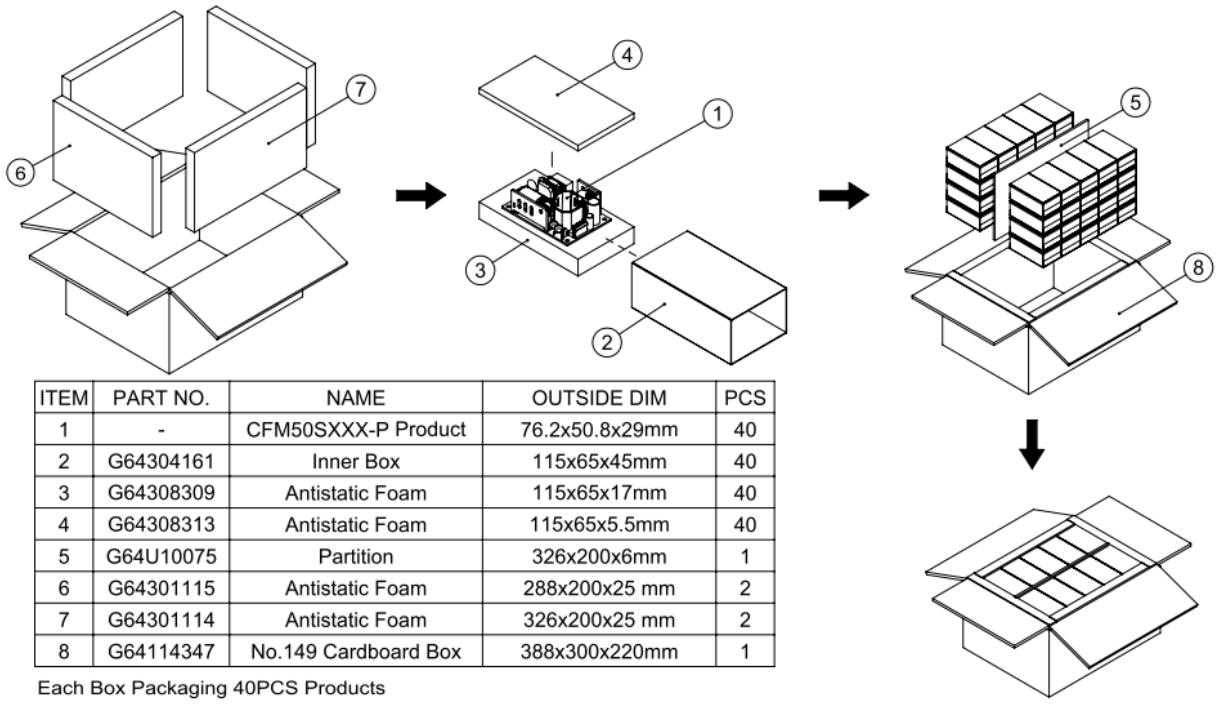


ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM50SXXX Product	76.2x50.8x27.1mm	50
2	G64304165	Inner Box	115x65x35mm	50
3	G64308312	Antistatic Foam	115x65x10mm	50
4	G64308313	Antistatic Foam	115x65x5.5mm	50
5	G64U10075	Partition	326x200x6mm	1
6	G64301115	Antistatic Foam	288x200x25 mm	2
7	G64301114	Antistatic Foam	326x200x25 mm	2
8	G64114347	No.149 Cardboard Box	388x300x220mm	1

Each Box Packaging 50PCS Products
Gross Weight Ref. 6.2Kg

CFM50SXXX 50pcs a box, including the total weight of package material about 6.2Kg

The packing information for CFM50SXXX-P SERIES:

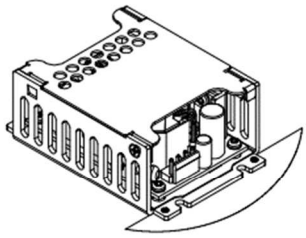


ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM50SXXX-P Product	76.2x50.8x29mm	40
2	G64304161	Inner Box	115x65x45mm	40
3	G64308309	Antistatic Foam	115x65x17mm	40
4	G64308313	Antistatic Foam	115x65x5.5mm	40
5	G64U10075	Partition	326x200x6mm	1
6	G64301115	Antistatic Foam	288x200x25 mm	2
7	G64301114	Antistatic Foam	326x200x25 mm	2
8	G64114347	No.149 Cardboard Box	388x300x220mm	1

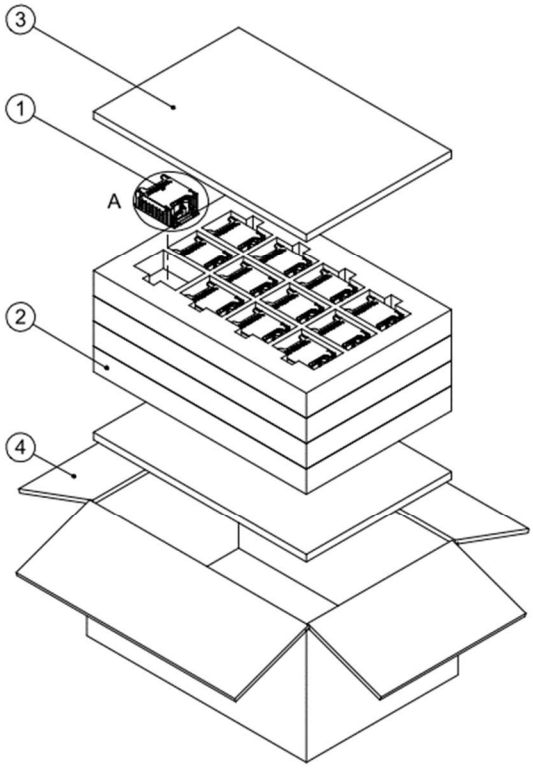
Each Box Packaging 40PCS Products
Gross Weight Ref. 5.2Kg

CFM50SXXX-P 40 pcs a box, including the total weight of package material about 5.2Kg

The packing information for CFM50SXXX-CA SERIES:



Detail Enlargement A



ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM50SXXX-CA Product	81.28x62x40mm	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

CFM50SXXX-CA 48 pcs a box, including the total weight of package material about 10Kg

CINCON ELECTRONICS CO., LTD.

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