CFM130S SERIES
130 WATT AC-DC POWER SUPPLY WITH PFC

Features

- Universal Input Range 80~264Vac
- High Efficiency up to 94%
- 2"x 3" Open Frame Compact Size
- Class I & Class II (NOTE8)
- 100W with Natural Convection
- 130W with Fan-Cooled
- No Load Input Power Consumption<150mW
- Approved Safety IEC/EN/UL 62368-1
- Meets IEC/EN60335-1
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Active PFC Function

E176177

MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT		RIPPLE& NOISE NOTE2	VOLTAGE ACCURACY NOTE1	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ) NOTE5
		NATURAL CONVECTION	FAN COOLED NOTE7					
CFM130S120	12 V	8.34 A	10.8 A	120 mV	±2%	±0.5%	±1%	93%
CFM130S180	18 V	5.56 A	7.2 A	180 mV	±2%	±0.5%	±1%	93%
CFM130S190	19 V	5.26 A	6.8 A	190 mV	±2%	±0.5%	±1%	93%
CFM130S240	24 V	4.2 A	5.4 A	240 mV	±2%	±0.5%	±1%	93%
CFM130S360	36 V	2.8 A	3.6 A	360 mV	±2%	±0.5%	±1%	94%
CFM130S480	48 V	2.1 A	2.7 A	480 mV	±2%	±0.5%	±1%	94%

Note:

1. Voltage accuracy is set at full load.
2. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measuring @20MHz BW.
3. Line regulation is measured from 100Vac to 240Vac with full load.
4. Load regulation is measured from 10% to 100% full load.
5. Typical efficiency at 230 VAC and 75% 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 or equivalent.
7. Requires 10CFM.
8. Conductive: Class I & Class II meets Class B Radiation: Class I meet Class B, Class II meet Class A.

PART NUMBER

Series	Number of Outputs	Nominal Output Voltage	Type
CFM130	X	XXX	-X (Option)
CFM130	S：Single	120：12V 180：18V 190：19V 240：24V 360：36V 480：48V	Blank：Wafer B：Base Cooling C：Cover

Part Number Example:

CFM130S120-B: Open Frame, 130W, Single 12Vdc Output, Base Cooling

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		All	80		264	V_{ac}
Operating Temperature	See Derating Curve	All	-30		70	℃
Storage Temperature		All	-40		85	℃
Operating Altitude		All			5000	m

INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Voltage Range		All	100		240	V_{ac}
Input Frequency Range		All	47		63	Hz
Maximum Input Current	100% Load, V_{in}=100Vac	All			1.8	A
Inrush Current	V_{in}=240V_{ac}, Cold start @25℃	All			100	A
Leakage Current		All			100	uA
Under Voltage Protection		All	55	62	70	V

OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	V_{in}=80V_{ac}~264V_{ac}, I_o=Full load, Ambient temperature=25℃	CFM130S120	11.76	12	12.24	V_{dc}
		CFM130S180	17.64	18	18.36	
		CFM130S190	18.62	19	19.38	
		CFM130S240	23.52	24	24.48	
		CFM130S360	35.28	36	36.72	
		CFM130S480	47.04	48	48.96	
Operating Output Current Range	V_{in}=80V_{ac}~264V_{ac}, See Derating Curve	CFM130S120			10.8	A
		CFM130S180			7.2	
		CFM130S190			6.8	
		CFM130S240			5.4	
		CFM130S360			3.6	
		CFM130S480			2.7	
Holdup Time	V_{in}=115V_{ac}	All	20			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	Auto recovery	CFM130S120		13.5		V_{dc}
		CFM130S180		20.5		
		CFM130S190		23		
		CFM130S240		30		
		CFM130S360		42		
		CFM130S480		54		
Over Current Protection	Auto recovery	All	115	130	145	%
Short Circuit Protection	Auto recovery	All				

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	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℃	CFM130S120			120	mV
		CFM130S180			180	
		CFM130S190			190	
		CFM130S240			240	
		CFM130S360			360	
		CFM130S480			480	
Load Capacitance	1. Input Voltage is 115V_{ac} and 230$V_{ac.}$ 2. Output is max. Full Load 3. Ambient Temperature=25℃	CFM130S120			8400	uF
		CFM130S180			5600	
		CFM130S190			5200	
		CFM130S240			4200	
		CFM130S360			2720	
		CFM130S480			2040	
Efficiency	1. Input Voltage is 230V_{ac} 2. Output is 75% Full Load 3. Ambient Temperature=25℃	CFM130S120		93		%
		CFM130S180		93		
		CFM130S190		93		
		CFM130S240		93		
		CFM130S360		94		
		CFM130S480		94		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute (without dielectric breakdown)	All			3000	V_{ac}
Input to Earth (Ground)	1 minute (without dielectric breakdown)	All			1500	V_{ac}
Output to Earth (Ground)	1 minute (without dielectric breakdown)	All			500	V_{ac}
Isolation Resistance	Input to Output	All	100			MΩ

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency		All		105		kHz

GENERAL SPECIFICATIONS

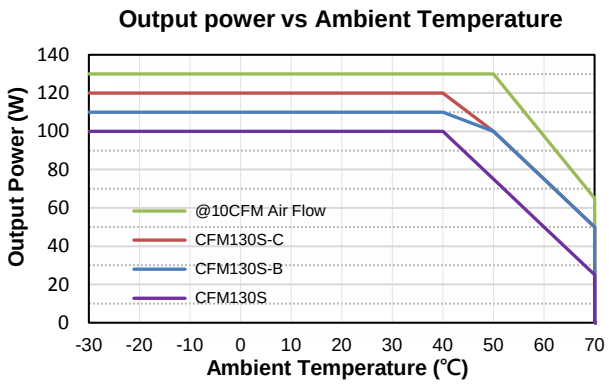
PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I_o=100%; T_a=25℃ per MIL-HDBK-217F	All	400			k hours
Humidity	Non-condensing	All			93	% RH
Shock	Meets MIL-STD-810F Table 516.5,TABLE 516.5-I 10ms, each axis 3 times(±-X、±Y、±Z axis)	All		75		g
Vibration	Meets MIL-STD-810F Table 514.5C-VIII,15~2000Hz, X、Y、Z axis, 1 hr (each axis),. total 3 hrs.	All		4		g
Weight		CFM130S		135		grams
		CFM130S-B		170		
		CFM130S-C		218		
Dimensions	Open Frame (Wafer)	All	3.000x2.000x1.201 Inches (76.20x50.80x30.50 mm)			
	B (Base Cooling)		3.598x2.000x1.299 Inches (91.40x50.80x33.00mm)			
	C (Cover)		3.598x2.520x1.358 Inches (91.40x64.00x34.50mm)			
Safety	Class I, Class II, IEC/EN/UL62368-1					Ed. 2.0
EMC Emission	EN 55032: 2015+A1: 2016, 47 CFR FCC Part 15 Subpart B, EN 61204-3: 2000, EN 6100-6-3: 2007+A1: 2011+AC: 2012, EN 6100-6-4: 2007+A1: 2011					Class B
Conducted Disturbance	EN 55032, 47 CFR FCC Part 15 (Class I & Class II meets Class B)					Class B
Radiated Disturbance	EN 55032, 47 CFR FCC Part 15 (Class I Meet Class B; Class II Meet Class A)					Class B

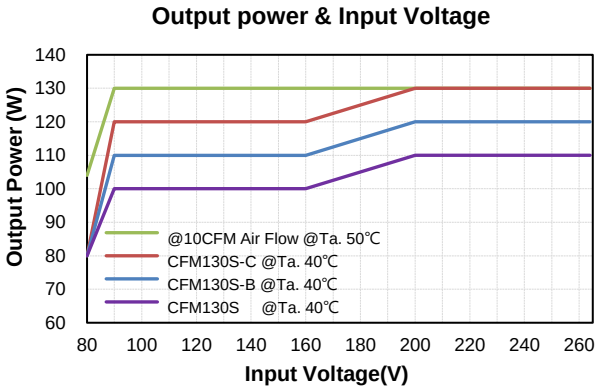
GENERAL SPECIFICATIONS

Harmonic Current Emissions	EN 61000-3-2:2014	Class A
Voltage Fluctuations & Flicker	EN 61000-3-3:2013	
EMC Immunity	EN 55024: 2010+A1: 2015, EN 61000-6-1: 2007, EN 61000-6-2: 2005+AC, EN 61204-3: 2000	
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008 Air Discharge: ±8kV, Contact Discharge: ±4kV	Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2010	Criterion A
Electrical Fast Transient (EFT)	IEC61000-4-4:2012, ±1kV, ±2kV	Criterion A
Surge	IEC61000-4-5:2014, 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	CFM130S Series App Notes	

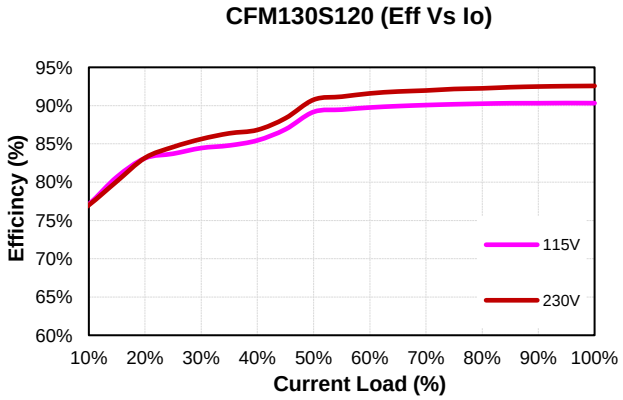
CHARACTERISTIC CURVE

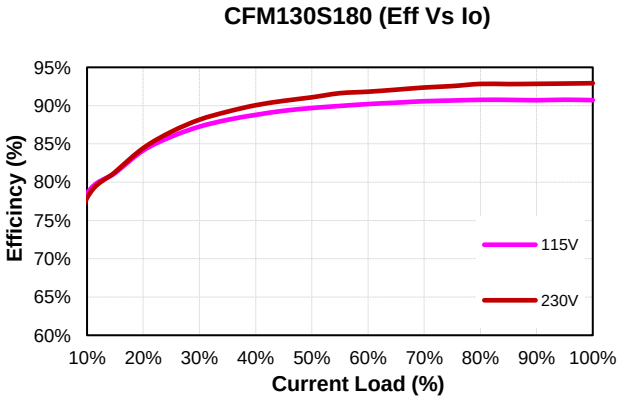
Power Derating Curve





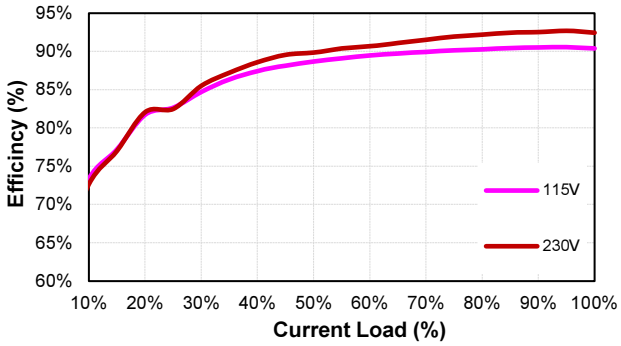
Performance Data



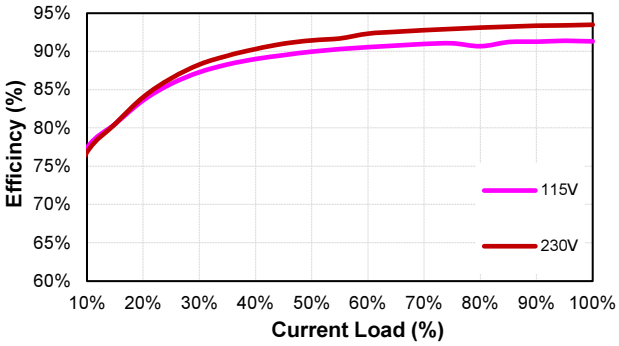


CFM130S Series

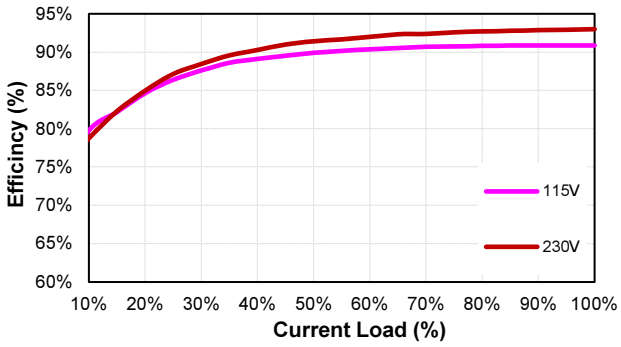
CFM130S190 (Eff Vs Io)



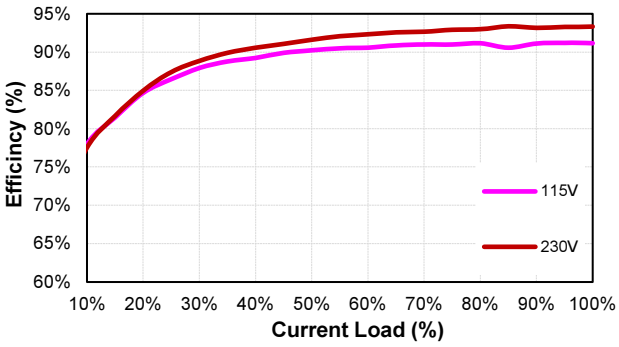
CFM130S240 (Eff Vs Io)



CFM130S360 (Eff Vs Io)

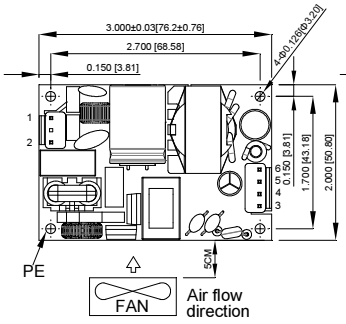


CFM130S480 (Eff Vs Io)

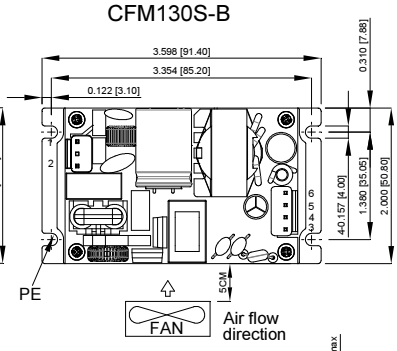


MECHANICAL SPECIFICATION

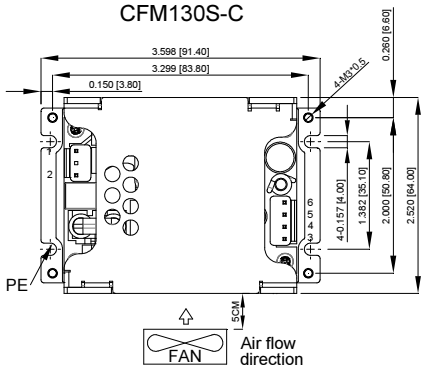
CFM130S



CFM130S-B



CFM130S-C



PIN CONNECTION	
Pin	Function
1	ACL
2	ACN
3	-Vout
4	-Vout
5	+Vout
6	+Vout

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

CINCON Electronics Co. Ltd.
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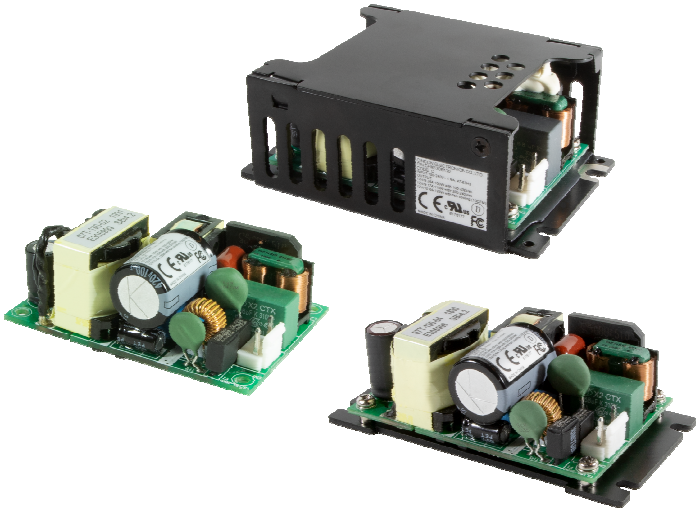
Web: www.cincon.com

130W AC-DC Power Supply with PFC
CFM130S Series
APPLICATION NOTE



Approved By:

Department	Approved By	Checked By	Written By
Research and Development Department	Enoch	Calvin/Wendong Ovid	Joyce
Quality Assurance Department	Ryan	Benny	

CFM130S Series

Application Note V11

Content

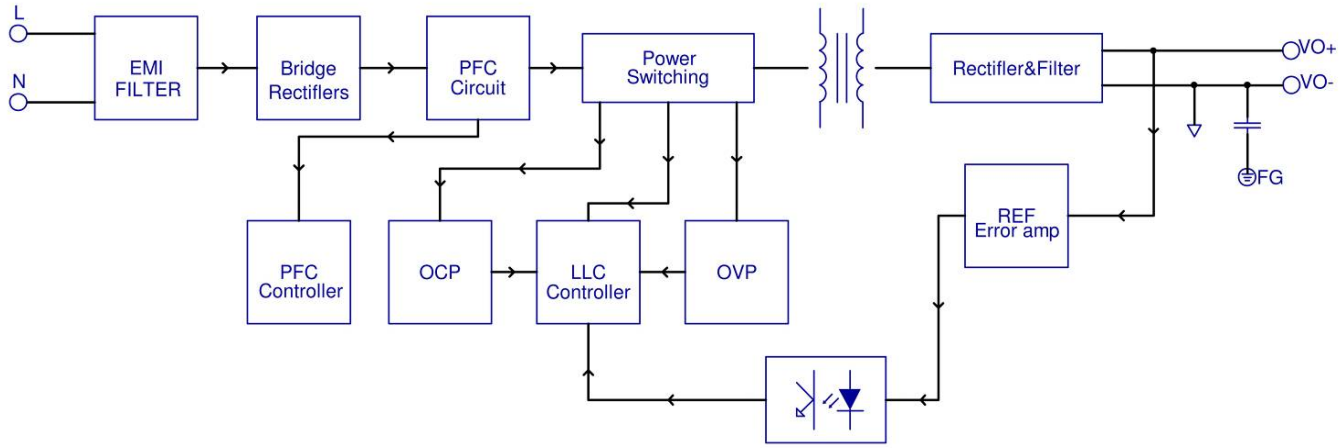
CFM130S Series

Application Note V11

1. Introduction

This application note describes the features and functions of Cincon's CFM130S 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 CFM130S 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 CFM130S series power modules has resulted in their ability to operate within ambient temperature environments from -30℃ to 70℃. 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 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 power module will go to hiccup mode if the output current is set from 150% to 190% of rated current.

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 CFM130S 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.

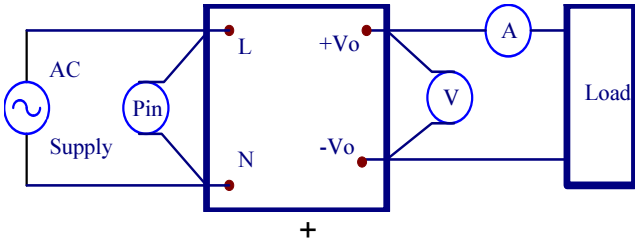


Figure 1. CFM130S Series Test Setup

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.

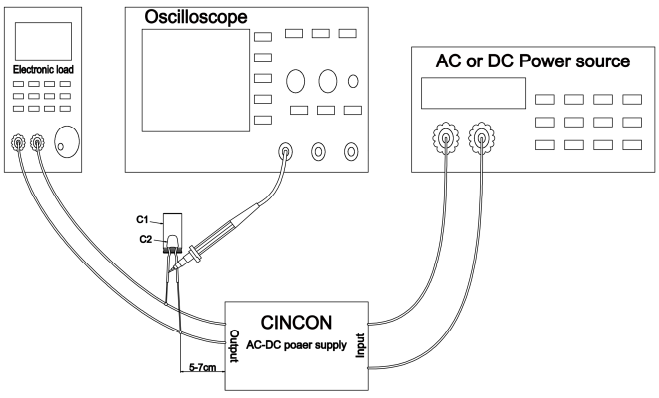
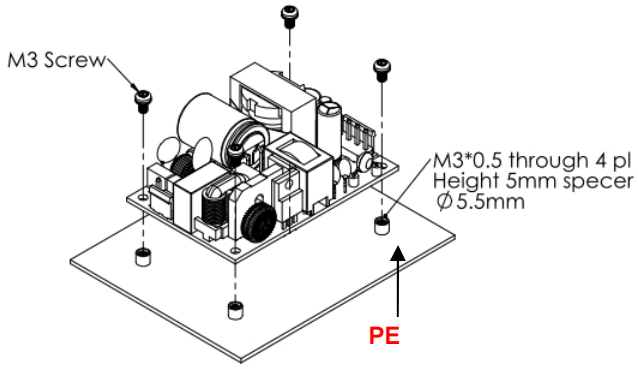


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

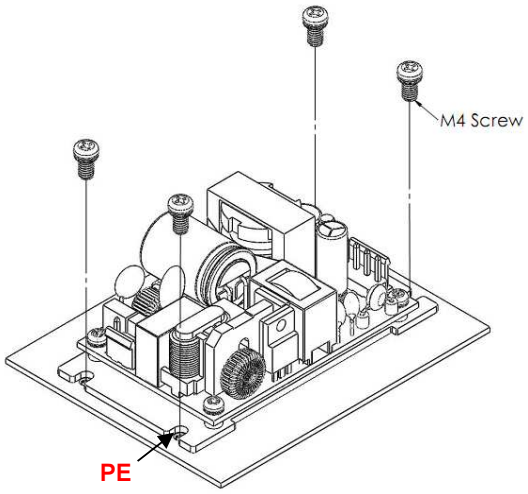
4.3 Installation Instruction

The CFM130S series has four 3.2mm diameter mounting holes. There are three type installations for CFM130S. Please use the mounting holes as follows:
Insert the spacer (5.5mm diameter max.) of 5mm height or more to mount the unit.



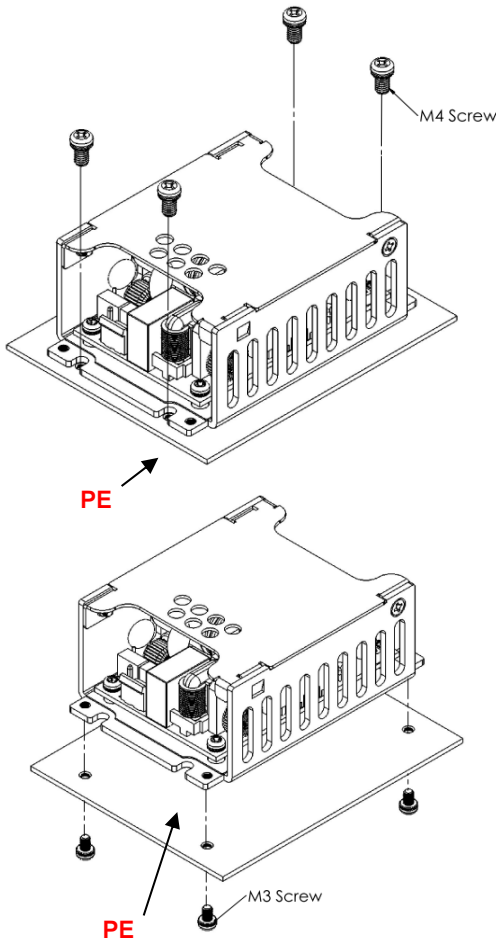
CFM130SXXX Installation Diagram

Note: M3 screw head and washer diameter shall not exceed 5.5mm.
The CFM130S series provide the baseplate cooling for customer to increasing heat dissipation. Please refer to the following figure for installation.



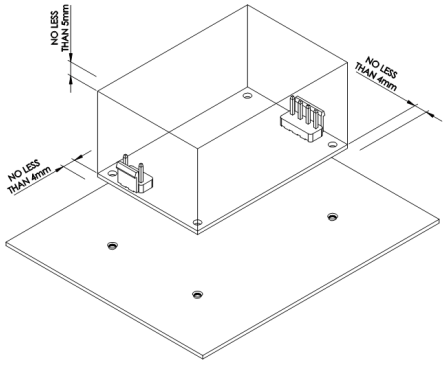
CFM130SXXX-B installation diagram

Note: M4 screw head and washer diameter shall not exceed 5.5mm.



CFM130SXXX-C installation diagram

Note: M3&M4 screw head and washer diameter shall not exceed 5.5mm
Please allow 4mm side clearance from the components and all side of the PCB. Allow 5mm clearance above the highest parts on the PCB. 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.



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

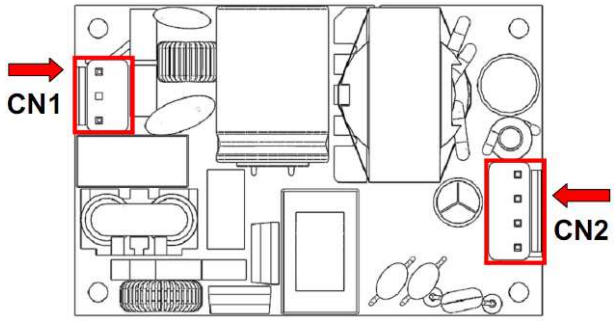
4.4 EMI Test

The CFM130S series Conductive EMI meets EN55032 FCC Part 15 Class B when test condition is Class I & Class II.

Radiation meet EN55032, FCC Part 15 Class B when test condition is Class I.

Radiation meet EN55032, FCC Part 15 Class A when test condition is Class II.

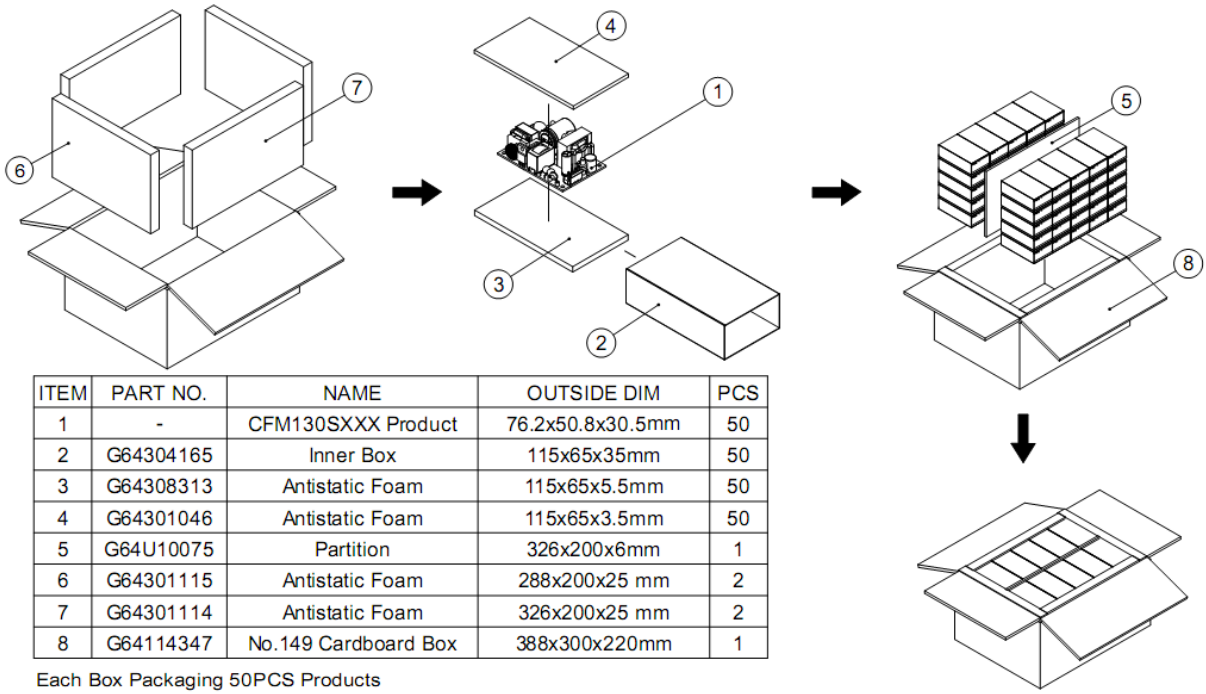
4.5 Mating Connectors



AC Input (CN1) DC Output (CN2)	Wafer: TAIWAN KING PIN TERMINAL PVHI series or equivalent. Housing: JST VHR series or equivalent.

5. Packing Information

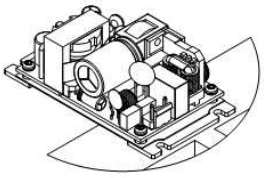
The packing information for CFM130SXXX series is showing as follows:



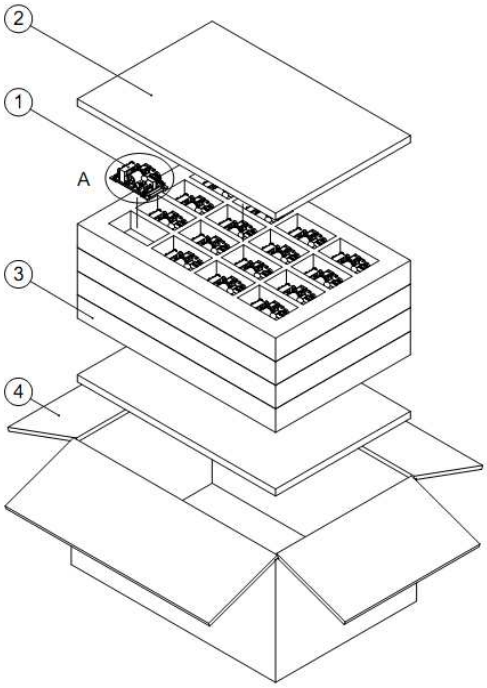
ITEM	PART NO.	NAME	OUTSIDE DIM	PCS
1	-	CFM130SXXX Product	76.2x50.8x30.5mm	50
2	G64304165	Inner Box	115x65x35mm	50
3	G64308313	Antistatic Foam	115x65x5.5mm	50
4	G64301046	Antistatic Foam	115x65x3.5mm	50
5	G64U10075	Partition	326x200x6mm	1
6	G64301115	Antistatic Foam	288x200x25 mm	2
7	G64301114	Antistatic Foam	326x200x25 mm	2
8	G64114347	No.149 Cardboard Box	388x300x220mm	1

Each Box Packaging 50PCS Products
Net weight Ref. 6.8 Kg
Gross Weight Ref. 8.3Kg

The packing information for CFM130SXXX-B series is showing as follows:



Detail Enlargement A



ITEM	PART NO.	NAME	OUTSIDE DIM(mm)	PCS
1	-	CFM130SXXX-B Product	91.4x50.8x33.06mm	64
2	G64301208	Antistatic Foam	485x330x15mm	2
3	G64301209	Antistatic Foam	485x330x50mm	4
4	G64100099	No.49 Cardboard Box	500x345x260mm	1

Each Box Packaging 64 PCS Products
Net weight Ref. 10.88 Kg
Gross weight Ref. 12.38 Kg