



## CFM130M SERIES 130 WATT MEDICAL 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 60601-1 2 MOPP
- Meets IEC/EN60335-1
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Active PFC Function



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					
CFM130M120	12 V	8.34 A	10.8 A	120 mV	±2%	±0.5%	±1%	93%
CFM130M180	18 V	5.56 A	7.2 A	180 mV	±2%	±0.5%	±1%	93%
CFM130M190	19 V	5.26 A	6.8 A	190 mV	±2%	±0.5%	±1%	93%
CFM130M240	24 V	4.2 A	5.4 A	240 mV	±2%	±0.5%	±1%	93%
CFM130M360	36 V	2.8 A	3.6 A	360 mV	±2%	±0.5%	±1%	94%
CFM130M480	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°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 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	M : MEDICAL	120 : 12V 180 : 18V 190 : 19V 240 : 24V 360 : 36V 480 : 48V	Blank : Wafer B : Base Cooling C : Cover

Part Number Example:

**CFM130M120-B:** Open Frame, 130W, Medical 12Vdc Output, Base Cooling



# CFM130M 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		All	80	264		V <sub>ac</sub>
Operating Temperature	See Derating Curve	All	-30	70		°C
Storage Temperature		All	-40	85		°C
Operating Altitude		All			5000	m

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Voltage Range		All	100	240		V <sub>ac</sub>
Input Frequency Range		All	47	63		Hz
Maximum Input Current	100% Load, V <sub>in</sub> =100V <sub>ac</sub>	All			1.8	A
Inrush Current	V <sub>in</sub> =240V <sub>ac</sub> , Cold start @25°C	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 <sub>in</sub> =80V <sub>ac</sub> ~264V <sub>ac</sub> , I <sub>o</sub> =Full load, Ambient temperature=25°C	CFM130M120	11.76	12	12.24	V <sub>dc</sub>
		CFM130M180	17.64	18	18.36	
		CFM130M190	18.62	19	19.38	
		CFM130M240	23.52	24	24.48	
		CFM130M360	35.28	36	36.72	
		CFM130M480	47.04	48	48.96	
Operating Output Current Range	V <sub>in</sub> =80V <sub>ac</sub> ~264V <sub>ac</sub> , See Derating Curve	CFM130M120			10.8	A
		CFM130M180			7.2	
		CFM130M190			6.8	
		CFM130M240			5.4	
		CFM130M360			3.6	
		CFM130M480			2.7	
Holdup Time	V <sub>in</sub> =115V <sub>ac</sub>	All	20			ms
Output Voltage Regulation						
Load Regulation	10% Load to Full Load	All			±1.0	%
Line Regulation	V <sub>in</sub> =High line to low line	All			±0.5	%
Over Voltage Protection	Auto recovery	CFM130M120			13.5	V <sub>dc</sub>
		CFM130M180			20.5	
		CFM130M190			23	
		CFM130M240			30	
		CFM130M360			42	
		CFM130M480			54	
Over Current Protection	Auto recovery	All	115	130	145	%
Short Circuit Protection	Auto recovery	All				



# CFM130M Series

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°C	CFM130M120			120	mV
		CFM130M180			180	
		CFM130M190			190	
		CFM130M240			240	
		CFM130M360			360	
		CFM130M480			480	
Load Capacitance	1. Input Voltage is 115V <sub>ac</sub> and 230V <sub>ac</sub> . 2. Output is max. Full Load 3. Ambient Temperature=25°C	CFM130M120			8400	uF
		CFM130M180			5600	
		CFM130M190			5200	
		CFM130M240			4200	
		CFM130M360			2720	
		CFM130M480			2040	
Efficiency	1. Input Voltage is 230V <sub>ac</sub> 2. Output is 75% Full Load 3. Ambient Temperature=25°C	CFM130M120		93		%
		CFM130M180		93		
		CFM130M190		93		
		CFM130M240		93		
		CFM130M360		94		
		CFM130M480		94		

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute (without dielectric breakdown)	All			4400	V <sub>ac</sub>
Input to Earth (Ground)	1 minute (without dielectric breakdown)	All			1800	V <sub>ac</sub>
Output to Earth (Ground)	1 minute (without dielectric breakdown)	All			1800	V <sub>ac</sub>
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 <sub>o</sub> =100%; T <sub>a</sub> =25°C 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		CFM130M CFM130M-B CFM130M-C	135 170 218			grams
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 60601-1:2005 (Third Edition) + CORR. 1(2006) + CORR. 2(2007) + AM1(2012) EN 60601-1:2006;A11+A1+A12 ANSI/AAMI ES60601-1 (2005)(R)2012 + A1:2012, C1:2009/(R)2012 + A2:2010/(R)2012 CAN/CSA-C22.2 No. 60601-1:14				Ed 3.1	
EMC Emission	EN55011, Class B, IEC61000-3-2:2014, IEC61000-3-3:2013, FCC CFR 47 Part 18					



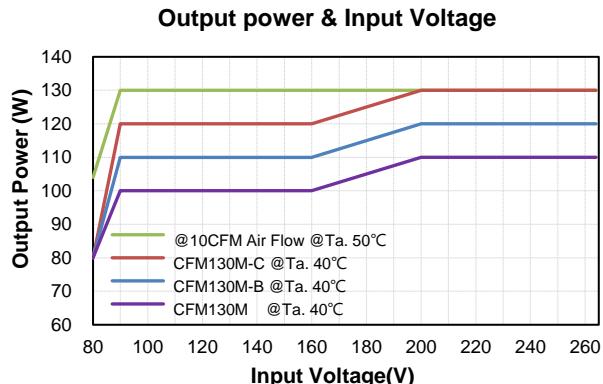
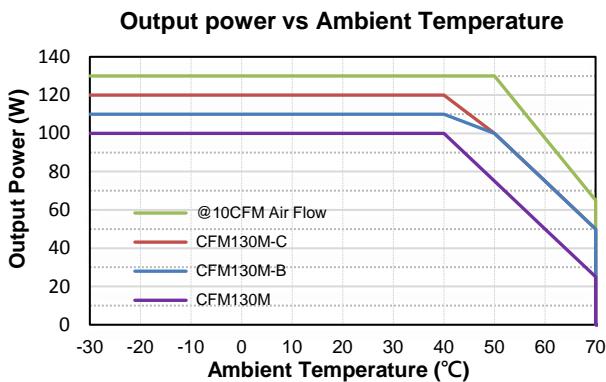
# CFM130M Series

## GENERAL SPECIFICATIONS

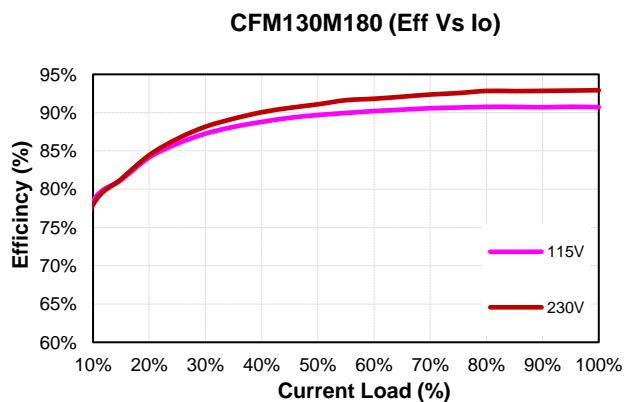
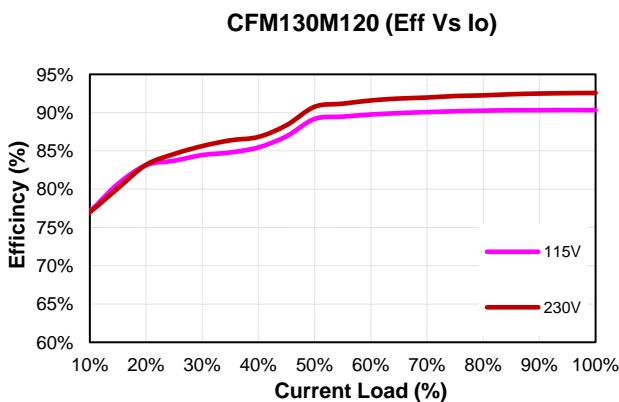
Conducted Disturbance	EN55011, FCC CFR 47 Part 18 (Class I & Class II meets Class B)	Class B
Radiated Disturbance	EN55011, FCC CFR 47 Part 18 Class I (Class I Meet Class B; Class II Meet Class A)	Class B
Harmonic Current Emissions	IEC 61000-3-2:2014	Class A
Voltage Fluctuations & Flicker	EN 61000-3-3:2013	Criteria A
<b>EMC Immunity</b>	EN60601-1-2:2015, IEC61000-4-2, 3, 4, 5, 6, 8, 11	Ed 4.0
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008 Air Discharge: $\pm 15\text{kV}$ , Contact Discharge: $\pm 8\text{kV}$	Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2006+A1:2007+A2:2010	Criterion A
Electrical Fast Transient (EFT)	IEC61000-4-4:2012, $\pm 2\text{kV}$	Criterion A
Surge	IEC 61000-4-5:2014+A1:2017, L-N: $\pm 1\text{kV}$ , L-E (Ground): $\pm 1\text{kV}$ , $\pm 2\text{kV}$	Criterion A
Conducted Disturbances, Induced by RF Fields	IEC 61000-4-6:2013+COR1:2015	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+A1:2017, >95% reduction	Criterion B
Application Note Link	<a href="#">CFM130M Series App Notes</a>	

## CHARACTERISTIC CURVE

### Power Derating Curve



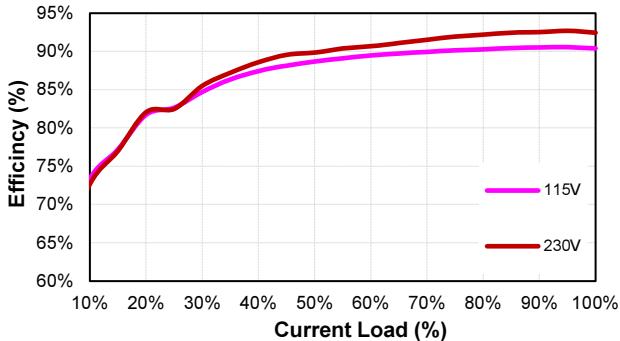
### Performance Data



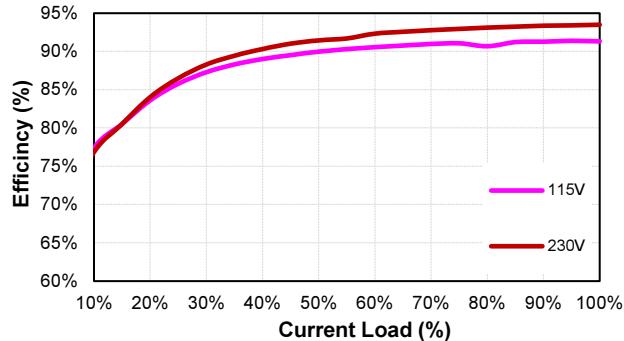


# CFM130M Series

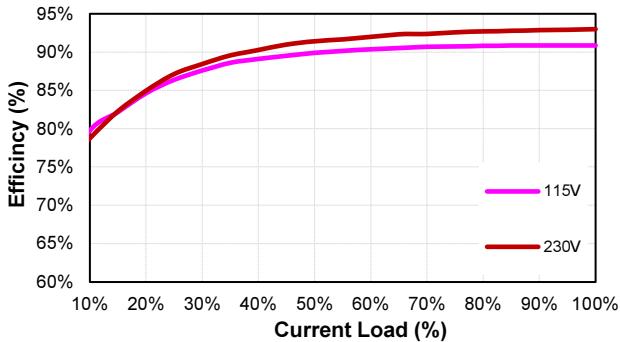
CFM130M190 (Eff Vs Io)



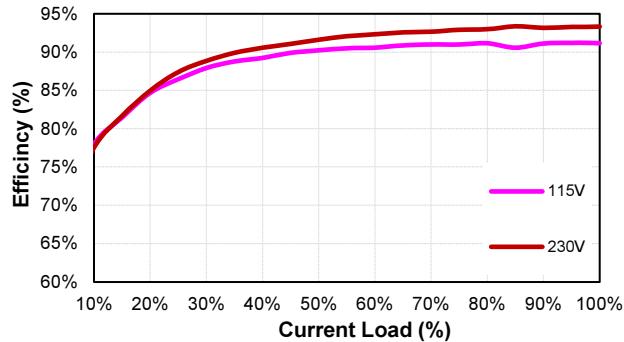
CFM130M240 (Eff Vs Io)



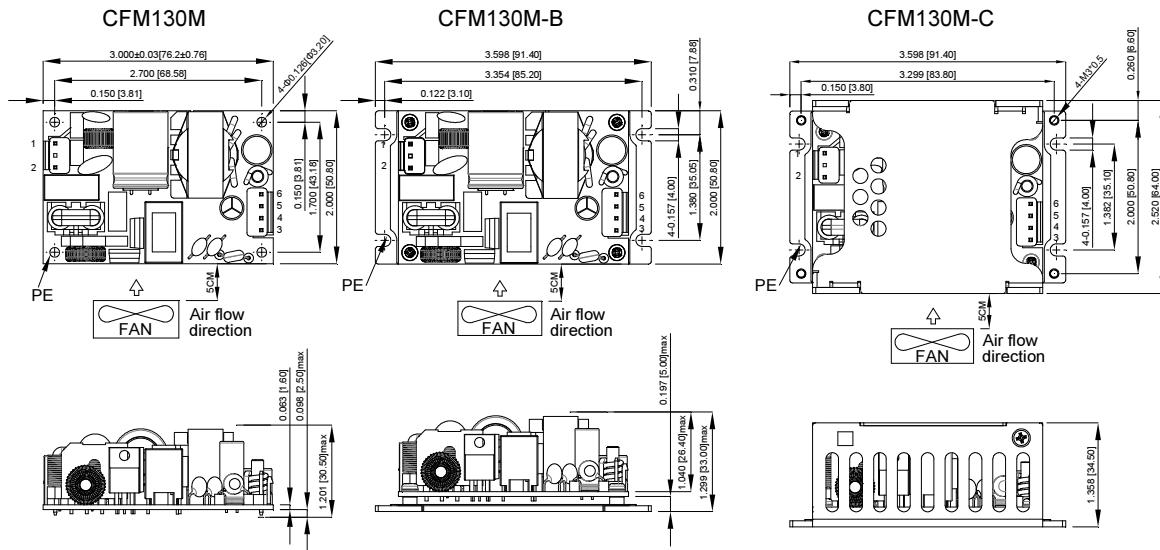
CFM130M360 (Eff Vs Io)



CFM130M480 (Eff Vs Io)



## MECHANICAL SPECIFICATION



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=  $\pm 0.02$   
Millimeters: x.xx =  $\pm 0.5$

CINCON Electronics Co. Ltd.

Add: 14F, No. 306, Sec.4, Hsin Yi Rd., Taipei, Taiwan

Tel: 886-2-27086210

Fax: 886-2-27029852

E-mail: [sales@cincon.com.tw](mailto:sales@cincon.com.tw)

Web: [www.cincon.com](http://www.cincon.com)



# CFM130M Series

## Application Note V13

### 130W AC-DC Power Supply with PFC CFM130M Series APPLICATION NOTE



#### Approved By:

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



# CFM130M Series

## Application Note V13

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### Content

<b>1. INTRODUCTION</b>	<b>3</b>
<b>2. ELECTRICAL BLOCK DIAGRAM</b>	<b>3</b>
<b>3. MAIN FEATURES AND FUNCTIONS</b>	<b>4</b>
3.1 <i>Operating Temperature Range</i>	4
3.2 <i>Output Protection (Over Current Protection)</i>	4
<b>4. APPLICATIONS</b>	<b>4</b>
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
4.4 <i>EMI Test</i>	6
4.5 <i>Mating Connectors</i>	6
<b>5. PACKING INFORMATION</b>	<b>7</b>



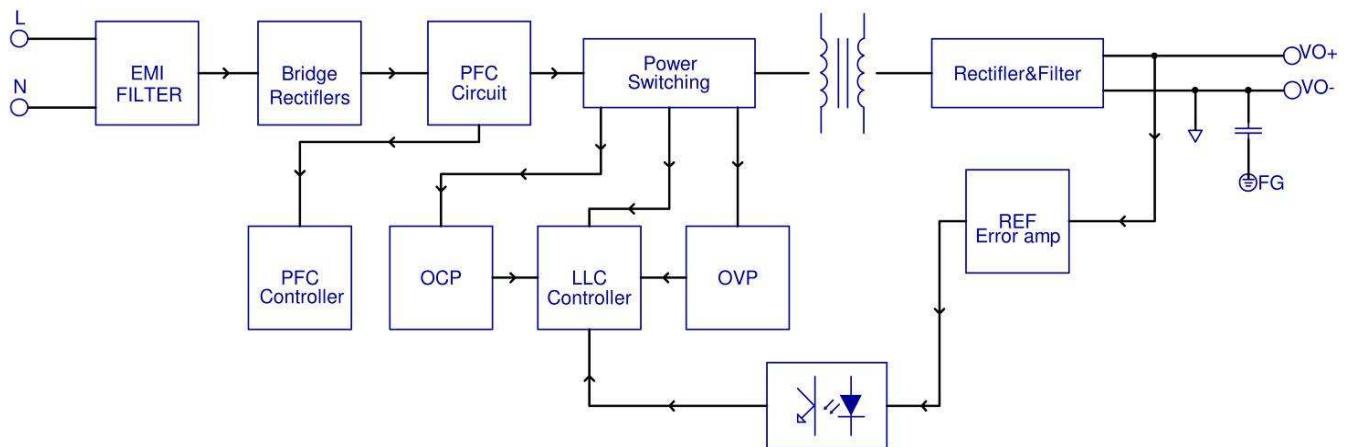
# CFM130M Series

## Application Note V13

### 1. Introduction

This application note describes the features and functions of Cincon's CFM130M 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 CFM130M series power module is extremely reliable.

### 2. Electrical Block Diagram





# CFM130M Series

## Application Note V13

### 3. Main Features and Functions

#### 3.1 Operating Temperature Range

The highly efficient design of Cincon's CFM130M series power modules has resulted in their ability to operate within ambient temperature environments from -30°C to 70°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)
- 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 115% to 145% 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 CFM130M 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:

$$\text{Load reg.} = \frac{V_{FL} - V_{NL}}{V_{NL}} \times 100\%$$

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:

$$\text{Line reg.} = \frac{V_{HL} - V_{LL}}{V_{LL}} \times 100\%$$

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.

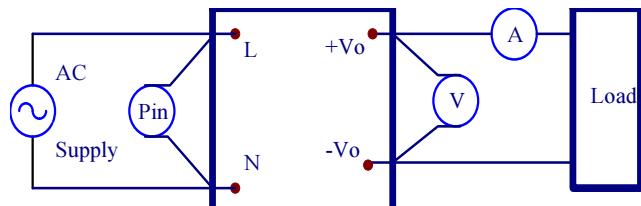


Figure 1. CFM130M Series Test Setup

#### 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  $C_2=0.1\mu F$  ceramic capacitor and a  $C_1=10\mu F$  electrolytic capacitor to output at 20 MHz Band Width.

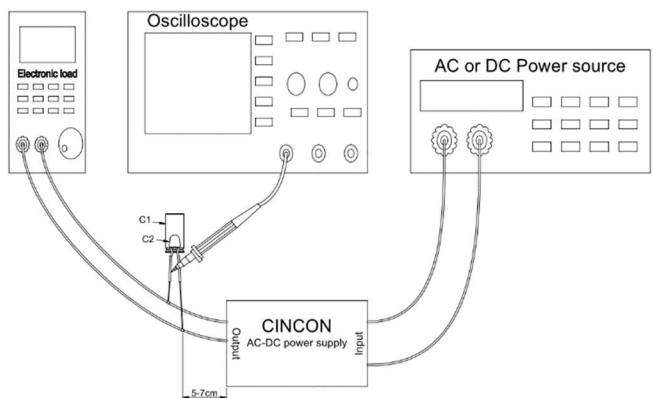


Figure 2. Output Voltage Ripple and Noise Measurement Set-Up

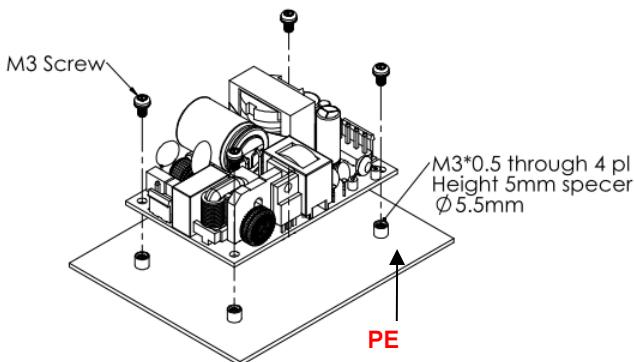


# CFM130M Series

## Application Note V13

### 4.3 Installation Instruction

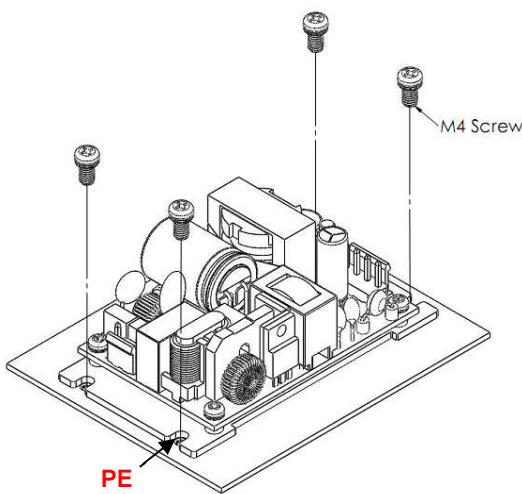
The CFM130M series has four 3.2mm diameter mounting holes. There are three type installations for CFM130M. Please use the mounting holes as follows: Insert the spacer (5.5mm diameter max.) of 5mm height or more to mount the unit.



CFM130MXXX Installation Diagram

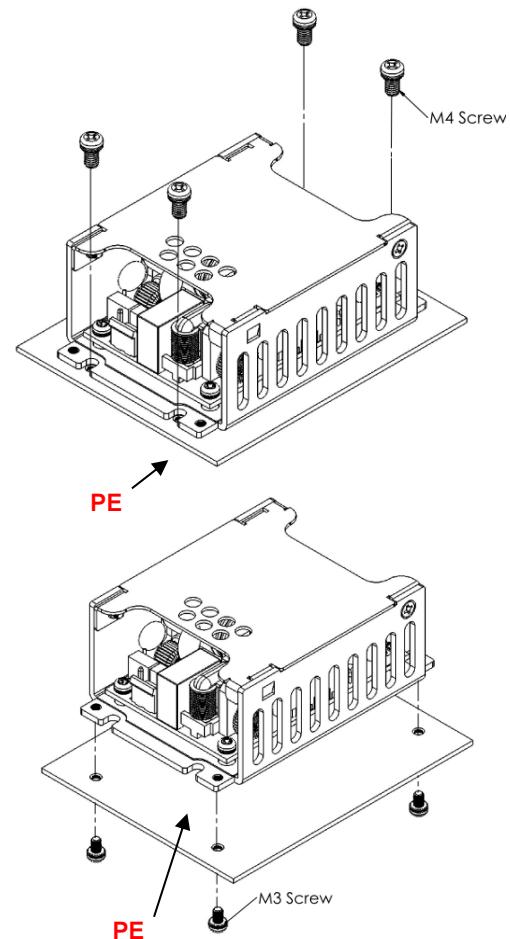
Note: M3 screw head and washer diameter shall not exceed 5.5mm.

The CFM130M series provide the baseplate cooling for customer to increasing heat dissipation. Please refer to the following figure for installation.



CFM130MXXX-B installation diagram

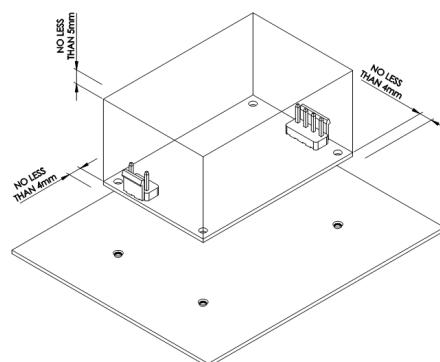
Note: M4 screw head and washer diameter shall not exceed 5.5mm.



CFM130MXXX-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.



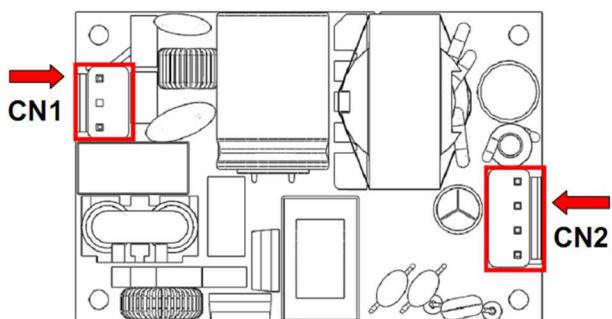
# CFM130M Series

## Application Note V13

### 4.4 EMI Test

The CFM130M series Conductive EMI meets EN55011 Class B when test condition is Class I & Class II.  
Radiation meet EN55011 Class B when test condition is Class I.  
Radiation meet EN55011 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.
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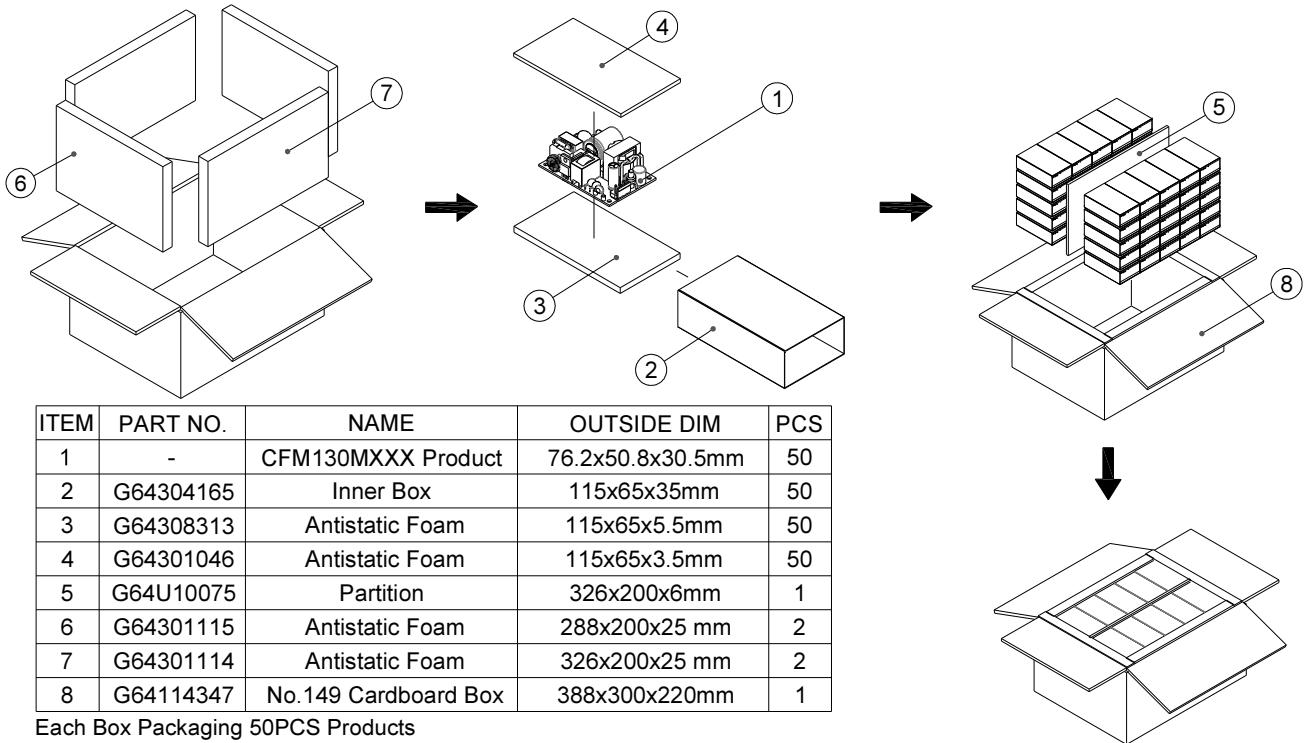


# CFM130M Series

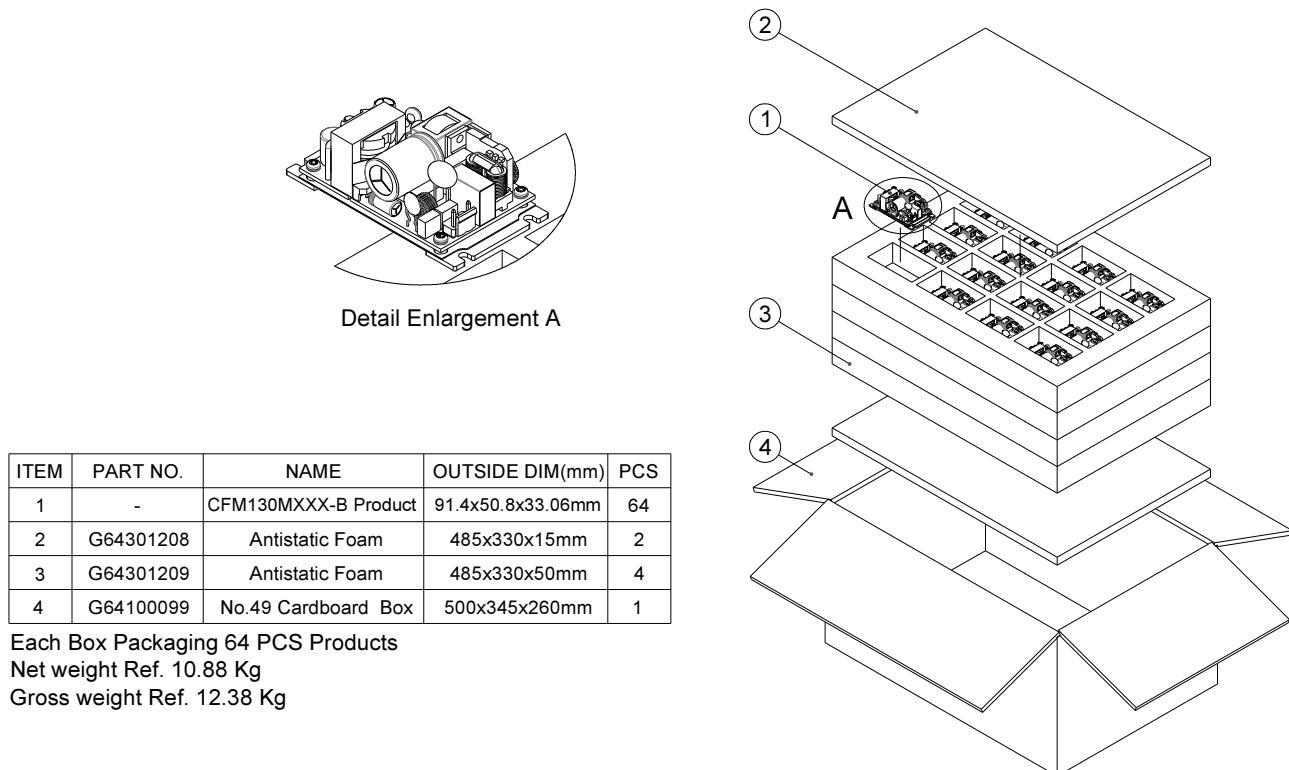
## Application Note V13

### 5. Packing Information

The packing information for CFM130MXXX series is showing as follows:



The packing information for CFM130MXXX-B series is showing as follows:

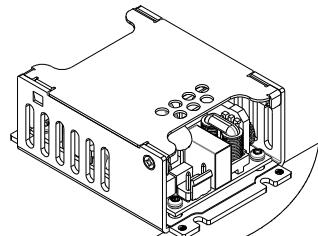




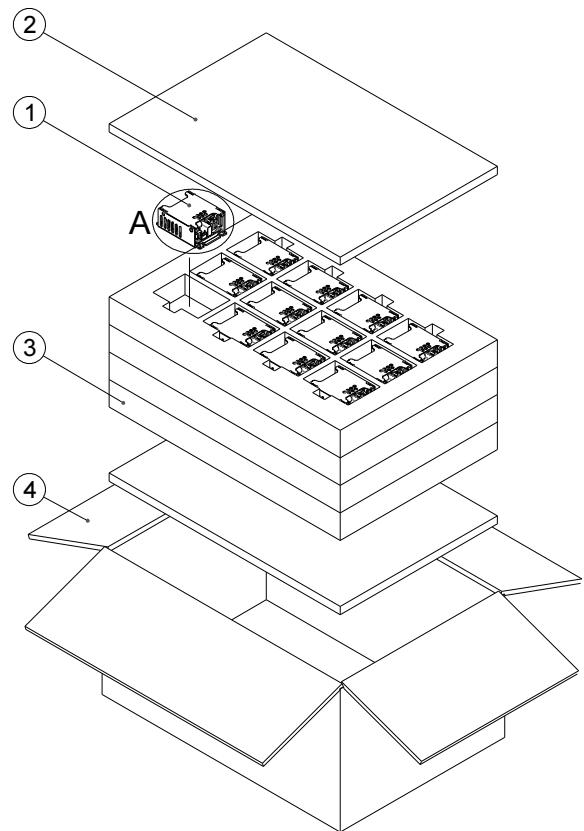
# CFM130M Series

## Application Note V13

The packing information for CFM130MXXX-C series is showing as follows:



Detail Enlargement A



ITEM	PART NO.	NAME	OUTSIDE DIM(mm)	PCS
1	-	CFM130MXXX-C Product	91.4x64x34.5mm	48
3	G64301210	Antistatic Foam	485x330x50mm	4
2	G64301208	Antistatic Foam	485x330x15mm	2
4	G64100099	No.49 Cardboard Box	500x345x260mm	1

Each Box Packaging 48 PCS Products

Net weight Ref. 10.464 Kg

Gross weight Ref. 11.964 Kg

### 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](mailto:support@cincon.com.tw)  
Web Site: <http://www.cincon.com>

### CINCON ELECTRONICS CO., LTD.

#### 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](mailto:info@cincon.com)