

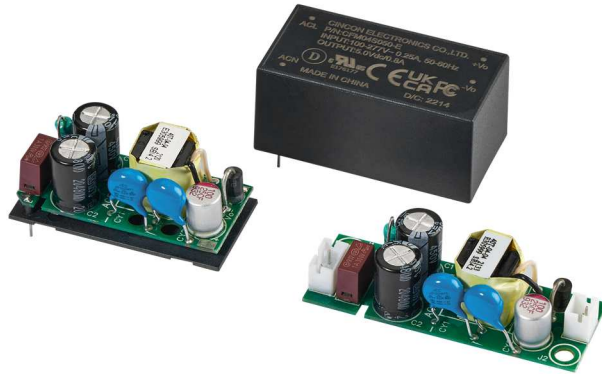


electronic powersolutions

# CFM04S SERIES 4 WATT OPEN FRAME AC-DC MODULES

## Features

- Universal Input Range 85~305V<sub>ac</sub>
- High Efficiency up to 82%
- 0.76"x 1.56" Compact Size
- Class II
- No Load Power <0.075W
- Approval IEC/EN/UL 62368-1 Ed 3.0
- Approval EN 55032 Class B and CISPR/FCC Class B
- Design Meets IEC/EN 60335-1
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Over Voltage Protection
- Over Voltage Category OVC II & OVC III



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	RIPPLE & NOISE NOTE2	VOLTAGE ACCURACY NOTE1	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
CFM04S033	3.3 V	1.200 A	100 mV	±5%	±1%	±5%	74%
CFM04S050	5.0 V	0.800 A	100 mV	±4%	±1%	±4%	77%
CFM04S120	12 V	0.333 A	120 mV	±3%	±1%	±3%	81%
CFM04S150	15 V	0.266 A	150 mV	±3%	±1%	±3%	81%
CFM04S240	24 V	0.166 A	240 mV	±3%	±1%	±3%	82%

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. (CFM04S033: Add a 0.1uF ceramic capacitor and a 47uF E.L. capacitor.)
3. Line regulation is measured from high line to low line with 100% full load.
4. Load regulation is measured from 0% to 100% full load.
5. Typical efficiency at 230 V<sub>ac</sub> and 100% full load at 25°C.
6. T Version wafer with JST B3B-PH / B2B-PH and mate with JST PH series or equivalent.

## PART NUMBER

Series	Number of Outputs	Nominal Output Voltage	Type
CFM04	X	XXX	-X
CFM04	S : Single	033 : 3.3V 050 : 5.0V 120 : 12V 150 : 15V 240 : 24V	Blank : PCB mount T : Wafer E : Encapsulated

Part Number Example:

- CFM04S120:** 4W, Single 12Vdc Output, PCB Mount Type
- CFM04S120-T:** 4W, Single 12Vdc Output, Wafer Type



## TECHNICAL SPECIFICATIONS

(All specifications are typical at nominal input, 100% 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	All	85		305	V <sub>ac</sub>
				120		431
Operating Temperature	See Derating Curve	All	-40		80	°C
Storage Temperature		All	-40		85	°C
Operating Altitude	IEC/EN/UL 62368-1 OVC II	All			5000	m
	IEC/EN/UL 62368-1 OVC III			2000		
	Meets IEC/EN 60335-1 OVC II			3000		

### INPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Operating Voltage Range		All	100		277	V <sub>ac</sub>
Input Frequency Range		All	50		60	Hz
Maximum Input Current	100% Full load, V <sub>in</sub> =100V <sub>ac</sub>	All			0.25	A
Leakage Current		All			0.1	mA
Inrush Current	V <sub>in</sub> =240V <sub>ac</sub> , Cold start at 25°C	All			70	A

### OUTPUT CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Output Voltage Set Point	V <sub>in</sub> =Nominal V <sub>in</sub> , I <sub>o</sub> =I <sub>o</sub> max., T <sub>c</sub> =25°C	CFM04S033	3.135	3.3	3.465	V <sub>dc</sub>
		CFM04S050	4.80	5.0	5.20	
		CFM04S120	11.64	12	12.36	
		CFM04S150	14.55	15	15.45	
		CFM04S240	23.28	24	24.72	
Operating Output Current Range	V <sub>in</sub> =85V <sub>ac</sub> ~305V <sub>ac</sub> , See Derating Curve	CFM04S033			1.200	A
		CFM04S050			0.800	
		CFM04S120			0.333	
		CFM04S150			0.266	
		CFM04S240			0.166	
Holdup Time	V <sub>in</sub> =115V <sub>ac</sub>	All		16		ms
Output Voltage Regulation						
Load Regulation	0% to 100% Full load	CFM04S033			±5.0	%
		CFM04S050			±4.0	
		CFM04S120			±3.0	
		CFM04S150			±3.0	
		CFM04S240			±3.0	
Line Regulation	V <sub>in</sub> =High line to low line	All			±1.0	%
Over Current Protection	Hiccup mode, auto recovery	All	110		180	%
Short Circuit Protection	Auto recovery	All				
Over Voltage Protection	Built-in a TVS component to clamp output voltage	CFM04S033	6.45		7.14	V <sub>dc</sub>
		CFM04S050	6.45		7.14	
		CFM04S120	14.3		15.8	
		CFM04S150	17.1		19.5	
		CFM04S240	28.5		31.5	



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 (CFM04S033: Add a 0.1uF ceramic capacitor and a 47uF E.L. capacitor). 2. Oscilloscope is 20MHz bandwidth 3. Ambient temperature=25°C	CFM04S033			100	mV
		CFM04S050			100	
		CFM04S120			120	
		CFM04S150			150	
		CFM04S240			240	
Load Capacitance	1. $V_{in}=115V_{ac}$ and $230V_{ac}$ 2. Output is 100% full load 3. Ambient Temperature=25°C	CFM04S033			1200	uF
		CFM04S050			800	
		CFM04S120			330	
		CFM04S150			266	
		CFM04S240			166	
Efficiency	1. $V_{in}=230V_{ac}$ 2. Output is 100% full load 3. Ambient temperature=25°C	CFM04S033		74		%
		CFM04S050		77		
		CFM04S120		81		
		CFM04S150		81		
		CFM04S240		82		

## ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute	All			4300	$V_{ac}$
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		43		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	2200			k hours
Humidity	Non-condensing	All			93	% RH
Shock	Meet MIL-STD-810F Table 516.5, Table 516.5-1 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	Blank (PCB mount)			10		g
	T (Wafer)	All		12		
	E (Encapsulated)			30		
Dimensions	Blank (PCB mount)		1.56x0.76x0.720 Inches (39.5x19.4x18.30 mm)			
	T (Wafer)	All	1.95x0.71x0.689 Inches (49.5x18.0x17.50 mm)			
	E (Encapsulated)		1.62x0.83x0.787 Inches (41.1x21.0x20.00 mm)			
Safety	Class II, IEC/EN/UL 62368-1					Ed 3.0
EMC Emission	EN 55032:2015+A1:2020, EN 55032:2015+A11:2020, 47 CFR FCC Part 15 Subpart B, ICES-003 Issue7, EN 61204-3:2018, EN 61000-6-3:2021, EN 61000-6-4:2019 EN 61000-3-2:2019, EN 61000-3-3:2013+A1:2019					Class B
Conducted Disturbance	EN 55032:2015+A1:2020, EN 55032:2015+A11:2020, 47 CFR FCC Part 15 Subpart B, ICES-003 Issue7, EN 61204-3:2018, EN 61000-6-3:2021, EN 61000-6-4:2019					Class B
Radiated Disturbance	EN 55032:2015+A1:2020, EN 55032:2015+A11:2020, 47 CFR FCC Part 15 Subpart B, ICES-003 Issue7, EN 61204-3:2018, EN 61000-6-3:2021, EN 61000-6-4:2019					Class B
Harmonic Current Emissions	EN 61000-3-2:2019					
Voltage Fluctuations & Flicker	EN 61000-3-3:2013+A1:2019					
EMC Immunity	EN 55035:2017+A11:2020, EN 61204-3:2018, EN 61000-6-1:2019, EN 61000-6-2:2019, IEC 61000-4-2, 3, 4, 5, 6, 8, 11					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008					Criterion A
Surge	IEC 61000-4-5:2014+A1:2017, L-N: $\pm 0.5kV$ , $\pm 1kV$ , $\pm 2kV$ ( $\pm 2kV$ requires external parts, refer to the application note "Surge recommendation")					Criterion A

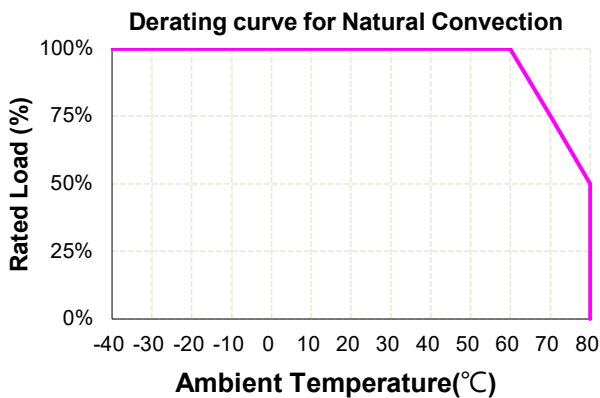


## GENERAL SPECIFICATIONS

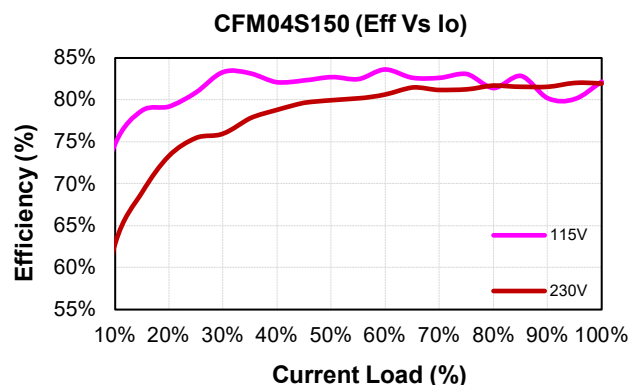
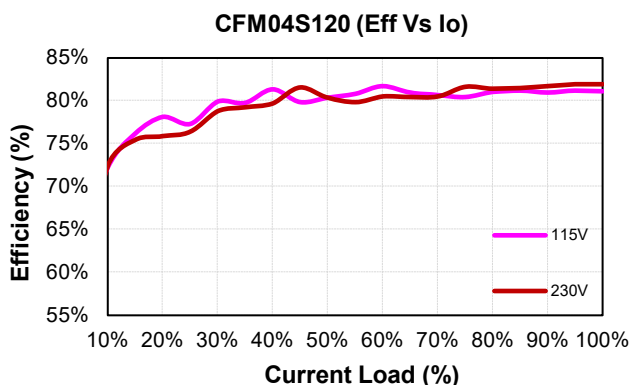
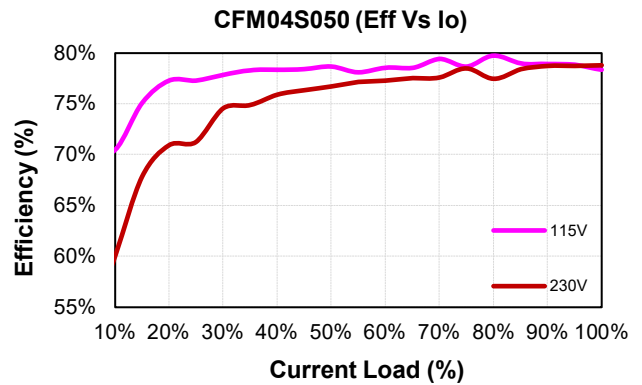
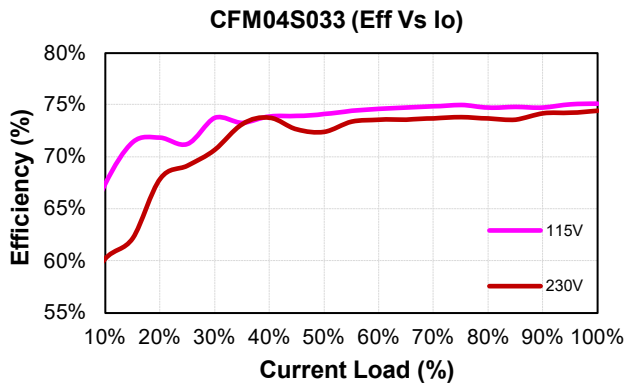
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2020	Criterion A
Electrical Fast Transient (EFT)	IEC 61000-4-4:2012, ±1kV, ±2kV	Criterion A
Conducted Disturbances, Induced by RF Fields	IEC 61000-4-6:2013+COR1:2015	Criterion A
Power Frequency Magnetic Field	IEC 61000-4-8:2009	Criterion A
Voltage Dips	IEC 61000-4-11:2020, Dip: 30% Reduction, Dip >95% Reduction	Criterion A
Voltage Interruptions	IEC 61000-4-11:2020, >95% Reduction	Criterion B
Application Note Link	<a href="#">CFM04S Series App Notes</a>	

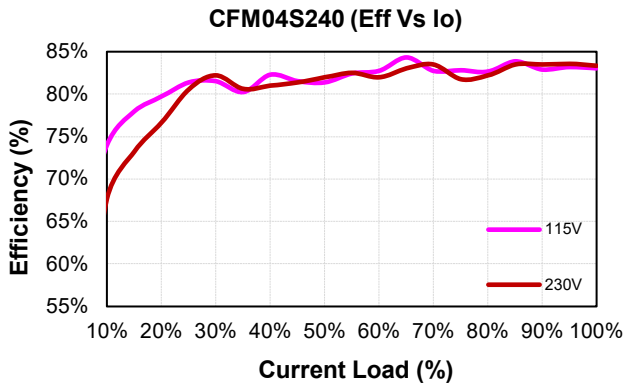
## CHARACTERISTIC CURVE

### Power Derating Curve



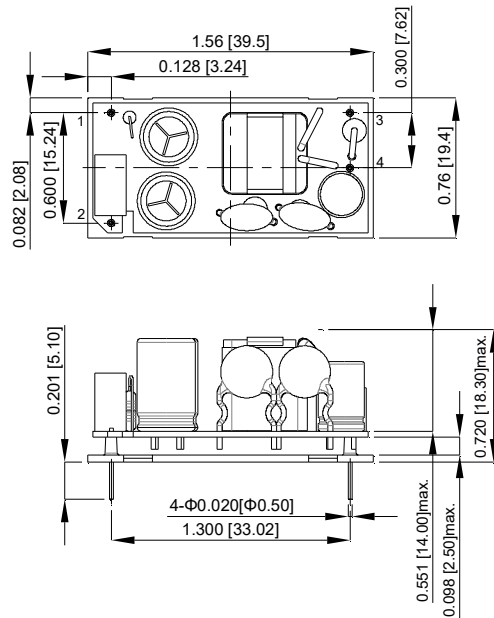
### Performance Data





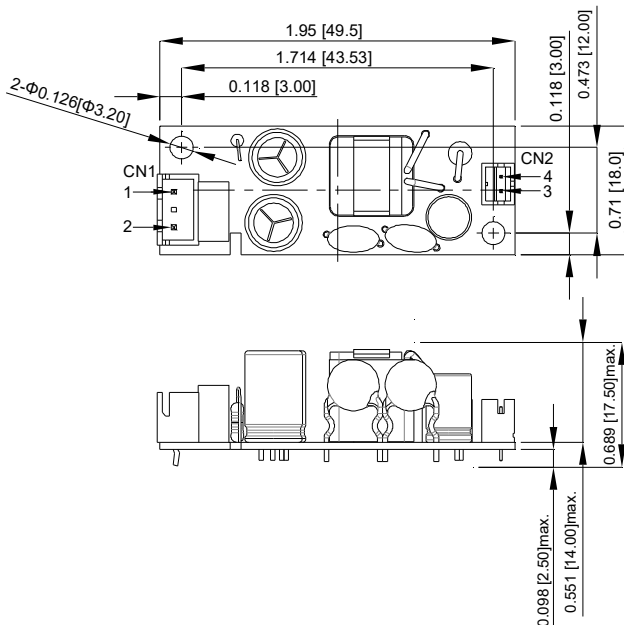
## MECHANICAL SPECIFICATION

### CFM04SXXX



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

All Dimensions in Inches[mm]  
 Tolerance Inches: x.xx=±0.03, x.xxx=±0.020  
 Millimeters: x.x=±0.7, x.xx=±0.50



### CFM04SXXX-T

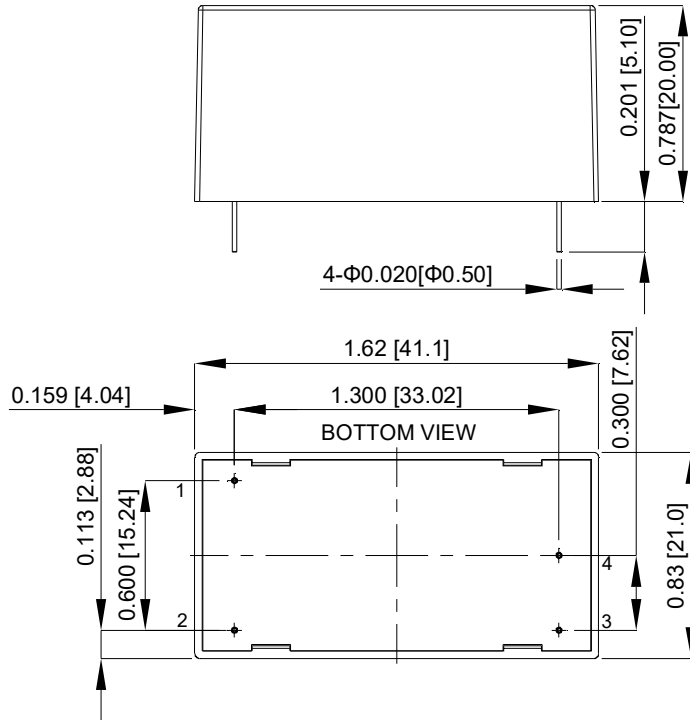
PIN CONNECTION		
Pin	Function	Wafer
1	ACN	CN1
2	ACL	
3	+Vout	CN2
4	-Vout	

All Dimensions in Inches[mm]  
 Tolerance Inches: x.xx=±0.03, x.xxx=±0.020  
 Millimeters: x.x=±0.7, x.xx=±0.50



## MECHANICAL SPECIFICATION

### CFM04SXXX-E



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

All Dimensions in Inches[mm]  
 Tolerance Inches: x.xx=±0.03, x .xxx=±0.020  
 Millimeters: x.x=±0.7, x.xx=±0.50