



CFM60S SERIES 60WATT OPEN FRAME AC-DC MODULES

Features

- Universal Input Range 90~264V_{ac}
- Efficiency to 88%
- 2"x 4" Size
- Meets Class I
- Approval IEC/EN/UL 62368-1
- Approval EN 55032 Class B and CISPR/FCC Class B
- Operating Altitude 2000m
- Continuous Short Circuit Protection



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	VOLTAGE ACCURACY NOTE1	RIPPLE& NOISE NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
CFM60S033	3.3 V	8 A	±1%	50 mV	±0.5%	±1%	72%
CFM60S050	5 V	8 A	±1%	50 mV	±0.5%	±1%	77%
CFM60S090	9 V	6.67 A	±1%	90 mV	±0.5%	±1%	84%
CFM60S120	12 V	5 A	±1%	120 mV	±0.5%	±1%	85%
CFM60S150	15 V	4 A	±1%	150 mV	±0.5%	±1%	86%
CFM60S240	24 V	2.5 A	±1%	240 mV	±0.5%	±1%	86%
CFM60S300	30 V	2 A	±1%	300 mV	±0.5%	±1%	86%
CFM60S360	36 V	1.67 A	±1%	360 mV	±0.5%	±1%	88%
CFM60S480	48 V	1.25 A	±1%	480 mV	±0.5%	±1%	88%

Note:

1. Voltage accuracy is set at 100% full load and 25°C Ta.
2. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measuring @20MHz B.W.
3. Line regulation is measured from high line to low line with 100% full load.
4. Load regulation is measured from 10% to 100% full load.
5. Typical efficiency at 230 V_{ac} and 100% full load at 25°C.
6. Safety approvals do not apply to the covered versions, only to the open-frame versions.

PART NUMBER

Series	Number of Outputs	Nominal Output Voltage	Type
CFM60	S	XXX	-X (Option)
CFM60	S : Single	033 : 3.3V 050 : 05V 090 : 09V 120 : 12V 150 : 15V 240 : 24V 300 : 30V 360 : 36V 480 : 48V	None : Wafer P : PCB Mount CA : Cover

Part Number Example:

CFM60S120: Open Frame Type, 60W, Single 12Vdc Output

CFM60S120-P: PCB Mount Type, 60W, Single 12Vdc Output

CFM60S120-CA: Cover Type, 60W, Single 12Vdc Output



CFM60S Series

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	90 120		264 370	V_{ac} V_{dc}
Operating Temperature	See Derating Curve	All	0		70	°C
Storage Temperature		All	-20		85	°C
Operating Altitude		All			2000	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% full load, $V_{in}=100V_{ac}$	All			1.4	A
Leakage Current		All		1		mA
Inrush Current	$V_{in}=240V_{ac}$, Cold start at 25°C	All			65	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., $T_c=25^\circ\text{C}$	CFM60S033 CFM60S050 CFM60S090 CFM60S120 CFM60S150 CFM60S240 CFM60S300 CFM60S360 CFM60S480	3.26 4.95 8.91 11.88 14.85 23.76 29.70 35.64 47.52	3.3 5.0 9.0 12.0 15.0 24.0 30.0 36.0 48.0	3.33 5.05 9.09 12.12 15.15 24.24 30.30 36.36 48.48	V_{dc}
Operating Output Current Range	$V_{in}=90V_{ac} \sim 264V_{ac}$, See Derating Curve	CFM60S033 CFM60S050 CFM60S090 CFM60S120 CFM60S150 CFM60S240 CFM60S300 CFM60S360 CFM60S480			8 8 6.67 5 4 2.5 2 1.67 1.25	A
Holdup Time	$V_{in}=115V_{ac}$	All		8		ms
Output Voltage Regulation						
Load Regulation	10% load to 100% full load	All			± 1.0	%
Line Regulation	V_{in} =High line to low line	All			± 0.5	%
Over Current Protection	Hiccup mode (auto recovery)	All	110		180	%
Short Circuit Protection	Hiccup mode (auto recovery)	All				



CFM60S Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Over Voltage Protection	Uses a TVS component to clamp output voltage	CFM60S033		6.8		V_{dc}
		CFM60S050		6.8		
		CFM60S090		11		
		CFM60S120		15		
		CFM60S150		18		
		CFM60S240		30		
		CFM60S300		36		
		CFM60S360		47		
		CFM60S480		56		
Output Ripple and Noise	1. Add a 0.1uF ceramic capacitor and a 10uF aluminum electrolytic capacitor to output 2. Oscilloscope is 20MHz bandwidth 3. Ambient temperature=25°C	CFM60S033			50	mV
		CFM60S050			50	
		CFM60S090			90	
		CFM60S120			120	
		CFM60S150			150	
		CFM60S240			240	
		CFM60S300			300	
		CFM60S360			360	
		CFM60S480			480	
Load Capacitance	1. $V_{in}=115V_{ac}$ and $230V_{ac}$ 2. Output is 100% full load 3. Ambient temperature=25°C	CFM60S033			8800	μF
		CFM60S050			8800	
		CFM60S090			6670	
		CFM60S120			5000	
		CFM60S150			3600	
		CFM60S240			2500	
		CFM60S300			2200	
		CFM60S360			1140	
		CFM60S480			770	
Efficiency	1. $V_{in}=230V_{ac}$ 2. Output is 100% full load 3. Ambient temperature=25°C	CFM60S033		72		%
		CFM60S050		77		
		CFM60S090		84		
		CFM60S120		85		
		CFM60S150		86		
		CFM60S240		86		
		CFM60S300		86		
		CFM60S360		88		
		CFM60S480		88		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 Minute	All			4242	V_{dc}
Isolation Resistance	Input to Output	All	100			M Ω

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	P_{out} =max. rated power	All		66		kHz



CFM60S Series

GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	I _o =100%; T _a =25°C per MIL-HDBK-217F I _o =100%; T _a =25°C per Telcordia SR332	All	290 2600			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	Open Frame versions PCB Mount versions Covered versions	All		170 168 230		grams
Dimensions	Open Frame (Wafer)	All	4.000x2.000x1.200 Inches (101.60x50.80x30.48 mm)			
	P (PCB Mount)		4.000x2.000x1.275 Inches (101.60x50.80x32.38 mm)			
	CA (Cover)		4.606x2.480x1.575 Inches (117.00x63.00x40.00 mm)			
Safety	Class I, IEC/EN/UL 62368-1					Ed.3.0
EMC Emission	EN 55032:2015+A11:2020, EN 61000-6-3:2007+A1:2011+AC:2012, Class B, EN 61204-3:2018, EN 61000-3-2:2019, EN 61000-3-3:2013+A1:2019, FCC CFR 47 Part 15					
Conducted Disturbance	EN 55032:2015+A11:2020, EN 61000-6-3:2007+A1:2011+AC:2012, EN 61204-3:2018, FCC CFR 47 Part 15					Class B
Radiated Disturbance	EN 55032:2015+A11:2020, EN 61000-6-3:2007+A1:2011+AC:2012, EN 61204-3:2018, FCC CFR 47 Part 15					Class B
Harmonic Current Emissions	EN 61000-3-2:2019					Class A
Voltage Fluctuations & Flicker	EN 61000-3-3:2013+A1:2019					
EMC Immunity	EN 55035:2017+A11:2020, EN 61000-6-1:2019, EN 61204-3:2018, IEC 61000-4-2, 3, 4, 5, 6, 8, 11					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008, Air Discharge: ±8kV Contact, Discharge: ±4kV					Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2020					Criterion A
Electrical Fast Transient (EFT)	IEC 61000-4-4:2012, ±1kV					Criterion A
Surge	IEC 61000-4-5:2014+A1:2017, 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+COR1:2015					Criterion A
Power Frequency Magnetic Field	IEC 61000-4-8:2009					Criterion A
Voltage Dips	IEC 61000-4-11:2020, Dips: 30% Reduction, Dips: >95% Reduction					Criterion A
Voltage Interruptions	IEC 61000-4-11:2020, >95% Reduction					Criterion B
Application Note Link			CFM60S Series App Notes			

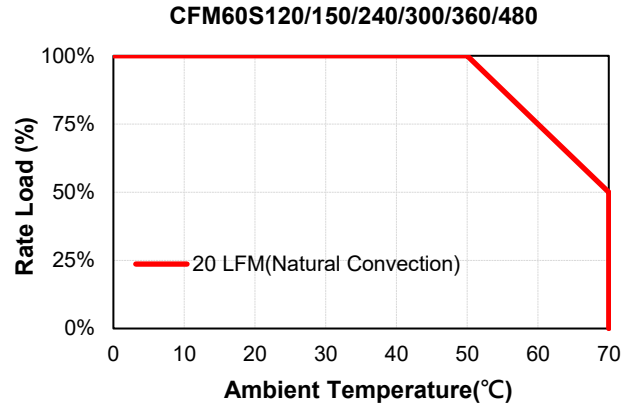
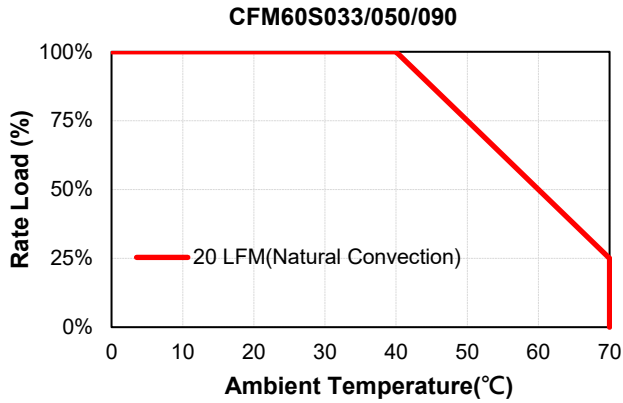


CFM60S Series

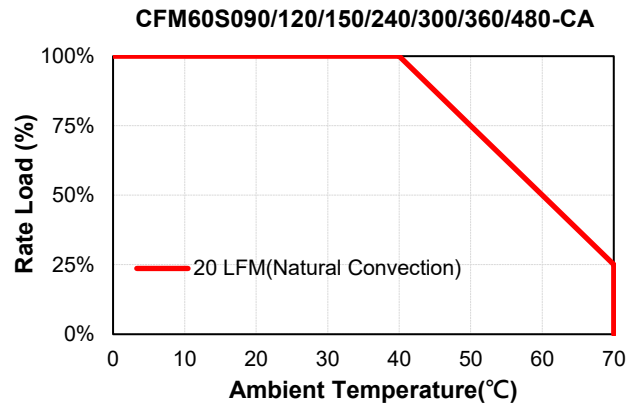
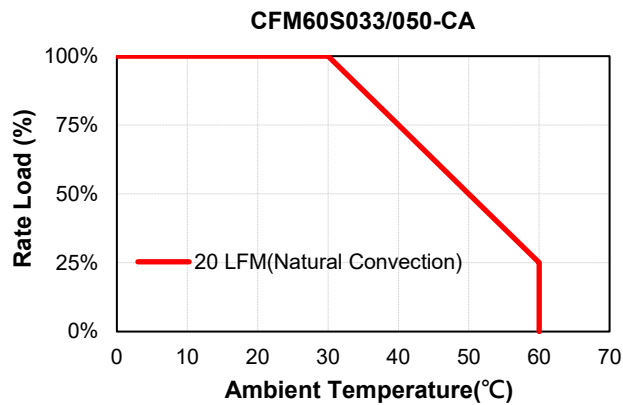
CHARACTERISTIC CURVE

Power Derating Curve

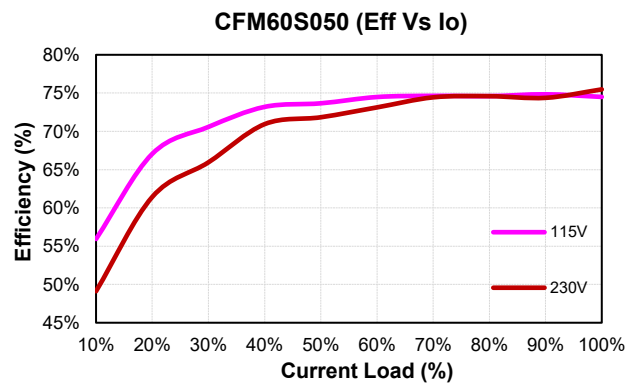
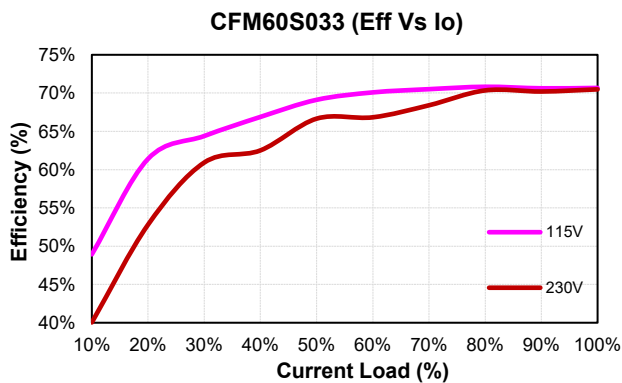
Open Frame versions



Covered versions



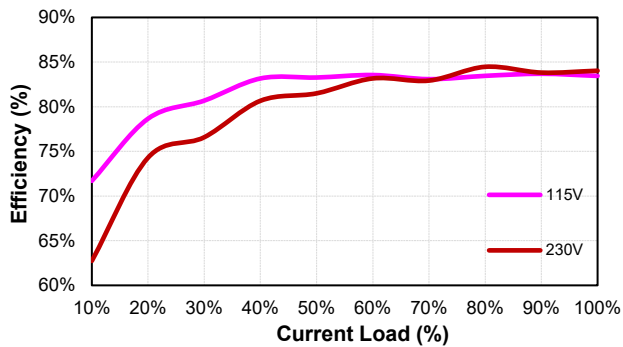
Performance Data



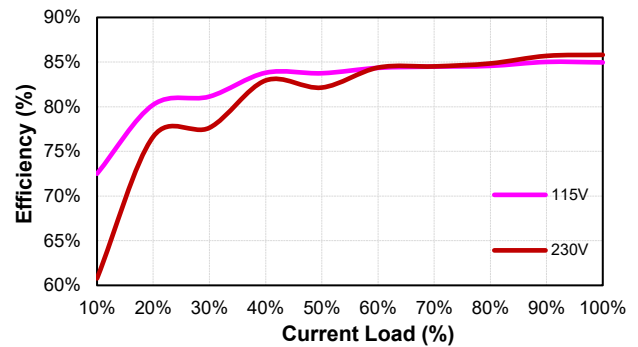


CFM60S Series

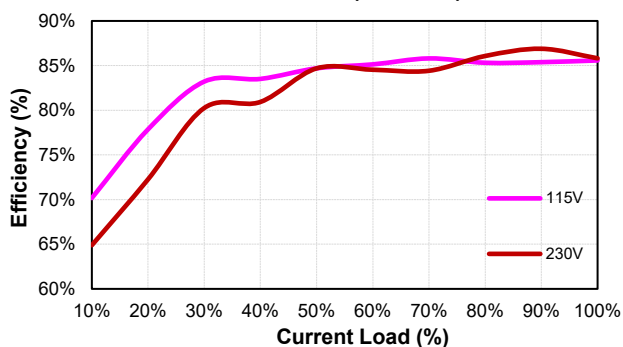
CFM60S090 (Eff Vs Io)



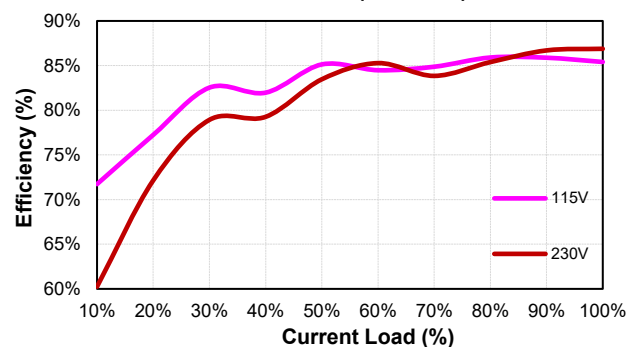
CFM60S120 (Eff Vs Io)



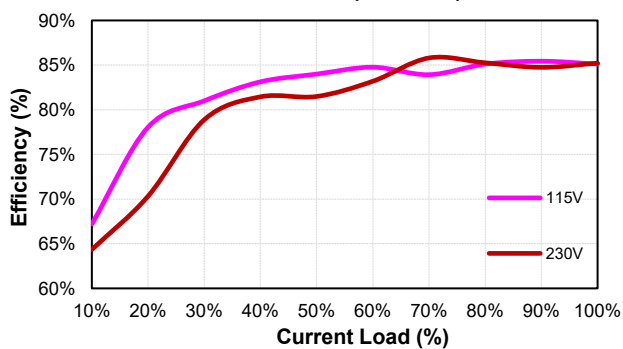
CFM60S150 (Eff Vs Io)



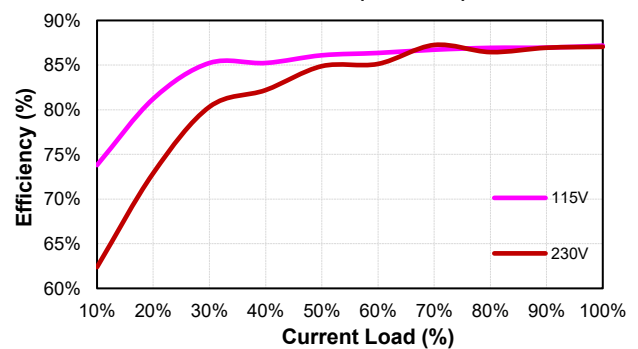
CFM60S240 (Eff Vs Io)



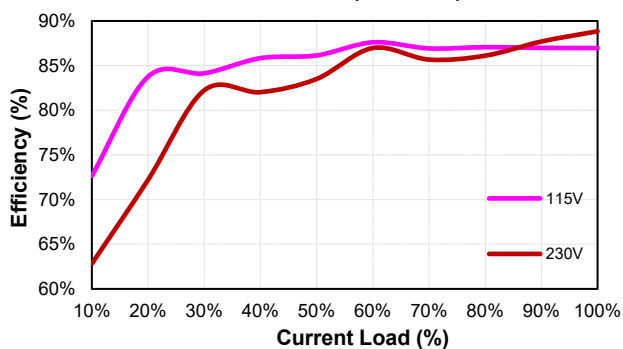
CFM60S300 (Eff Vs Io)



CFM60S360 (Eff Vs Io)



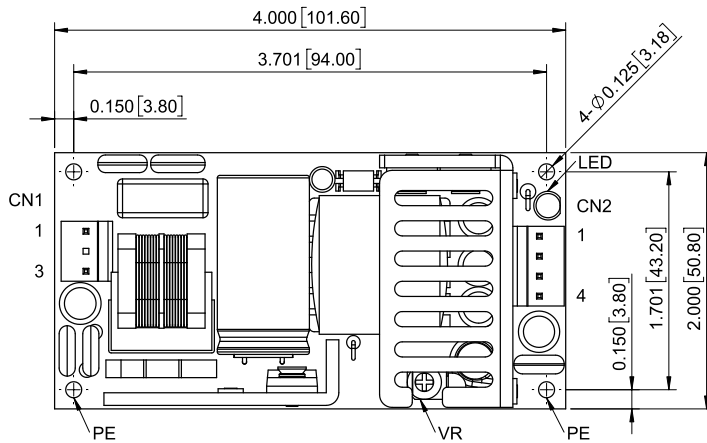
CFM60S480 (Eff Vs Io)





CFM60S Series

MECHANICAL SPECIFICATION



CFM60SXXX

All Dimensions in Inches[mm]

Tolerance Inches: x.xxx=±0.020

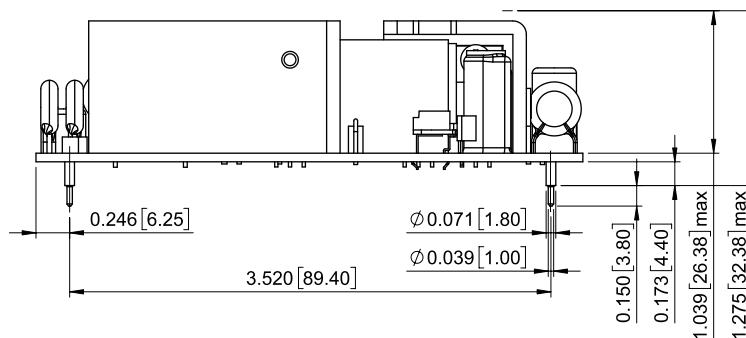
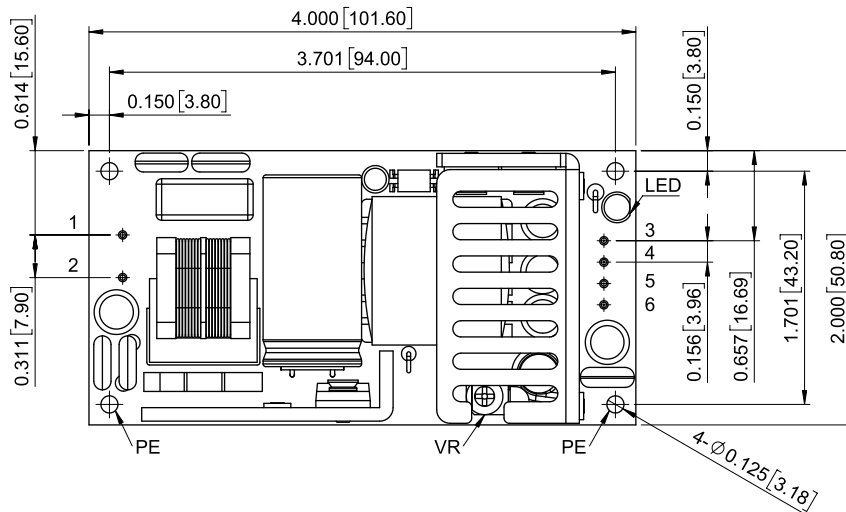
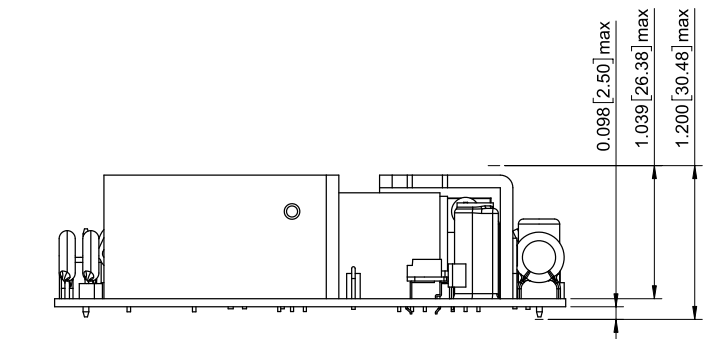
Millimeters: x.xx=±0.50

AC Input Connector(CN1):LCU P3060-03-2-S2 or equivalent

Pin	Function	Mating Housing	Terminal
1	ACN	MOLEX 09501031 or equivalent	MOLEX 08701031 or equivalent
2	-		
3	ACL		

DC Output Connector(CN2):LCU P3060-04-S2 or equivalent

Pin	Function	Mating Housing	Terminal
1	+Vout	MOLEX 09501041 or equivalent	MOLEX 08701031 or equivalent
2	+Vout		
3	-Vout		
4	-Vout		



CFM60SXXX-P

All Dimensions in Inches[mm]

Tolerance Inches: x.xx=±0.02

Millimeters: x.x=±0.5

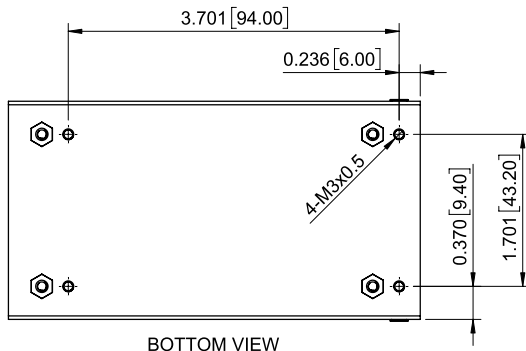
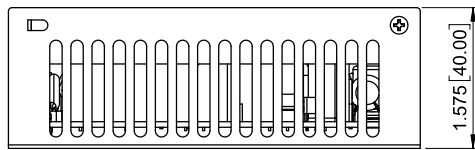
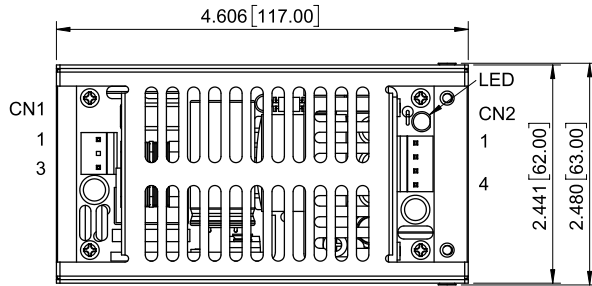
Pin Connection

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



CFM60S Series

MECHANICAL SPECIFICATION



CFM60SXXX-CA

All Dimensions in Inches[mm]

Tolerance Inches: x.xxx=±0.020

Millimeters: x.xx=±0.50

AC Input Connector(CN1):LCU P3060-03-2-S2 or equivalent

Pin	Function	Mating Housing	Terminal
1	ACN	MOLEX 09501031 or equivalent	MOLEX 08701031 or equivalent
2	-		
3	ACL		

DC Output Connector(CN2):LCU P3060-04-S2 or equivalent

Pin	Function	Mating Housing	Terminal
1	+Vout	MOLEX 09501041 or equivalent	MOLEX 08701031 or equivalent
2	+Vout		
3	-Vout		
4	-Vout		