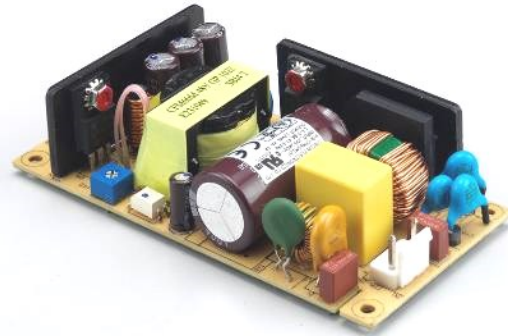




CFM60M SERIES 60W MEDICAL OPEN FRAME AC-DC MODULES

Features

- Universal Input Range 90~264V_{ac}
- Efficiency to 90%
- 2"x 4" Size
- Meets Class I
- No Load Power Consumption<0.5W
- Approval Safety IEC/EN/UL 60601-1 2MOPP
- Approval EN 55011, FCC CFR 47 Part 18 Class B
- Continuous Short Circuit Protection



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT	VOLTAGE ACCURACY NOTE1	RIPPLE & NOISE NOTE2	VOLTAGE ADJ. RANGE	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ.) NOTE5
CFM60M050	5 V	8 A	±1%	50 mV	4.75~5.25 V	±0.5%	±1%	82%
CFM60M120	12 V	5 A	±1%	120 mV	11.4~12.6 V	±0.5%	±1%	87%
CFM60M150	15 V	4 A	±1%	150 mV	14.25~15.75 V	±0.5%	±1%	88%
CFM60M240	24 V	2.5 A	±1%	240 mV	22.8~25.2 V	±0.5%	±1%	89%
CFM60M480	48 V	1.25 A	±1%	480 mV	45.6~50.4 V	±0.5%	±1%	90%

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. Optional Input and output connectors (CN1 and CN2) wafer with LONG CHU P3060 series and mate with MOLEX housing 5195 series and MOLEX 5194 series crimp terminal or equivalent.
7. 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	M	XXX	-X (Option)
CFM60	M : Medical	050 : 05V 120 : 12V 150 : 15V 240 : 24V 480 : 48V	None : Wafer CA : Cover

Part Number Example:

CFM60M120: Open Frame Type, 60W, 12Vdc Output

CFM60M120-CA: Cover Type, 60W, 12Vdc Output



CFM60M 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		264	V _{ac}
				120		370
Operating Temperature	See Derating Curve	All	-20		70	°C
Storage Temperature		All	-20		85	°C
Operating Altitude		All			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	47		63	Hz
Maximum Input Current	100% full load, V _{in} =100V _{ac}	All			1.6	A
Leakage Current		All			0.1	mA
Inrush Current	V _{in} =240V _{ac} , Cold start at 25°C	All			75	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°C	CFM60M050	4.95	5	5.05	V _{dc}
		CFM60M120	11.88	12	12.12	
		CFM60M150	14.85	15	15.15	
		CFM60M240	23.76	24	24.24	
		CFM60M480	47.52	48	48.48	
Operating Output Current Range	V _{in} =90V _{ac} ~264V _{ac} , See Derating Curve	CFM60M050			8	A
		CFM60M120			5	
		CFM60M150			4	
		CFM60M240			2.5	
		CFM60M480			1.25	
Holdup Time	V _{in} =115V _{ac}	All		16		ms
Output Voltage Regulation						
Load Regulation	10% load to 100% full load	All			±1.0	%
Line Regulation	V _{in} =High line to low line with 100% full load	All			±0.5	%
Over Current Protection	Hiccup mode (Auto recovery)	All	110		180	%
Short Circuit Protection	Hiccup mode (Auto recovery)	All				
Over Voltage Protection	Uses a TVS component to clamp output voltage	CFM60M050		6.8		V _{dc}
		CFM60M120		15		
		CFM60M150		18		
		CFM60M240		30		
		CFM60M480		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	CFM60M050			50	mV
		CFM60M120			120	
		CFM60M150			150	
		CFM60M240			240	
		CFM60M480			480	



CFM60M Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Load Capacitance	1. $V_{in}=115V_{ac}$ and $230V_{ac}$ 2. Output is 100% full load 3. Ambient temperature= $25^{\circ}C$	CFM60M050			8180	uF
		CFM60M120			5180	
		CFM60M150			4000	
		CFM60M240			2720	
		CFM60M480			1080	
Efficiency	1. $V_{in}=230V_{ac}$ 2. Output is 100% full load 3. Ambient temperature= $25^{\circ}C$	CFM60M050		82		%
		CFM60M120		87		
		CFM60M150		88		
		CFM60M240		89		
		CFM60M480		90		

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 Minute	All			4000	V_{ac}
Input to Earth (Ground)	1 Minute	All			1500	V_{ac}
Output to Earth (Ground)	1 Minute	All			500	V_{ac}
Isolation Resistance	Input to output	All	100			M Ω

FEATURE CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Switching Frequency	$P_{out}=\text{max. rated power}$	All		65		kHz
Output Voltage Adjustment		All	-5		+5	%

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	560			k hours
	$I_o=100\%$; $T_a=25^{\circ}C$ per Telcordia SR332		2440			
Humidity	Non-condensing	All			93	% RH
Shock	Meet MIL-STD-810F Table 516.5, Table 516.5-I 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	Open frame versions	All		125		grams
	Covered versions			185		
Dimensions	Open frame (Wafer)	All	4.000x2.000x1.100 Inches (101.60x50.80x27.94 mm)			
	CA (Cover)		4.606x2.480x1.575 Inches (117.00x63.00x40.00 mm)			
Safety	Class I, IEC 60601-1:2005+AMD1:2012+AMD2:2020 EN 60601-1:2006+A11:2011+A1:2013+A12:2014+A2:2021 ANSI/AAMI ES 60601-1:2005 & A1:2012 & A2:2021					Ed.3.2
EMC Emission	EN 55011:2016+A11:2020, CISPR 11:2015+A1:2016+A2:2019, Class B, EN 61000-3-2:2019, EN 61000-3-3:2013+A1:2019, FCC CFR 47 Part 18					
Conducted Disturbance	EN 55011:2016+A11:2020, CISPR 11:2015+A1:2016+A2:2019, FCC CFR 47 Part 18					Class B
Radiated Disturbance	EN 55011:2016+A11:2020, CISPR 11:2015+A1:2016+A2:2019, FCC CFR 47 Part 18					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 60601-1-2:2015+A1:2021, IEC 61000-4-2, 3, 4, 5, 6, 8, 11					Ed. 4.1
Electrostatic Discharge (ESD)	IEC 61000-4-2:2008, Air Discharge: $\pm 15kV$ Contact, Discharge: $\pm 8kV$					Criterion A



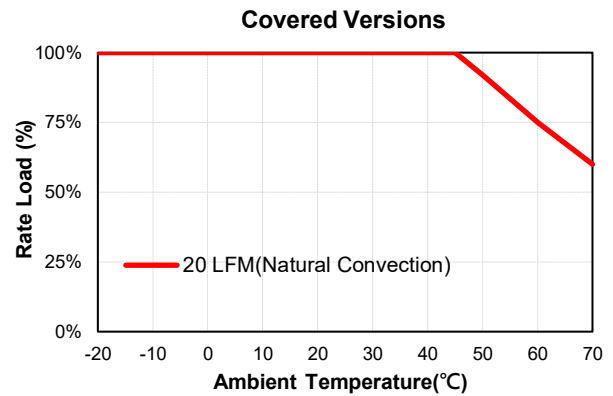
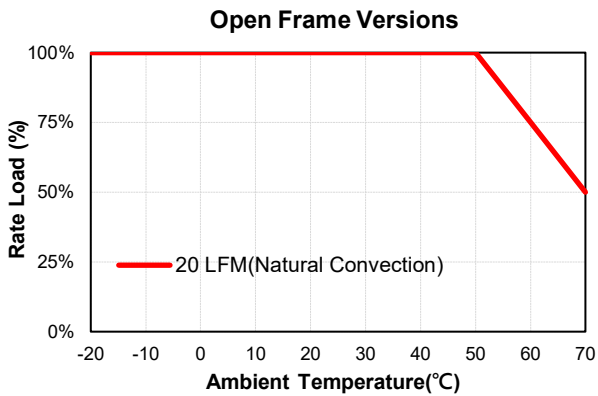
CFM60M Series

GENERAL SPECIFICATIONS

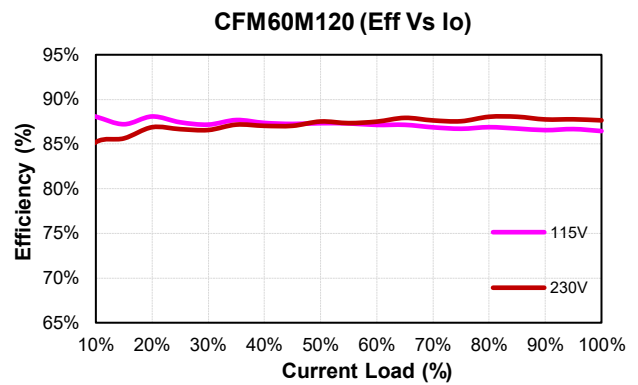
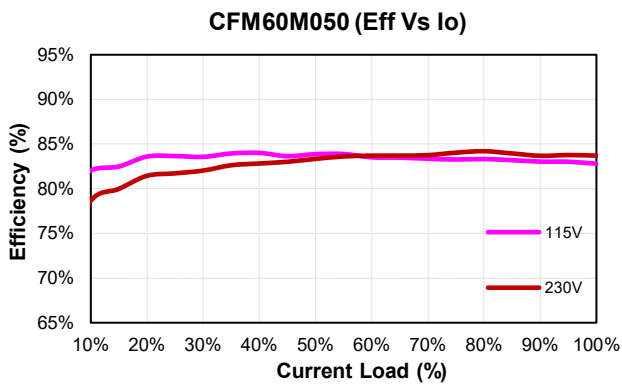
Radio-Frequency, Continuous Radiated Disturbance	IEC 61000-4-3:2020	Criterion A
Electrical Fast Transient (EFT)	IEC 61000-4-4:2012, $\pm 0.5\text{kV}$, $\pm 1\text{kV}$, $\pm 2\text{kV}$	Criterion A
Surge	IEC 61000-4-5:2014+A1:2017, L-N: $\pm 0.5\text{kV}$, $\pm 1\text{kV}$, L-E(Ground): $\pm 0.5\text{kV}$, $\pm 1\text{kV}$, $\pm 2\text{kV}$	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 61000-4-11:2020, Dips: 30% Reduction, Dips: >95% Reduction	Criterion A
Voltage Interruptions	IEC 61000-4-11:2020, >95% Reduction	Criterion B
Application Note Link	CFM60M Series App Notes	

CHARACTERISTIC CURVE

Power Derating Curve



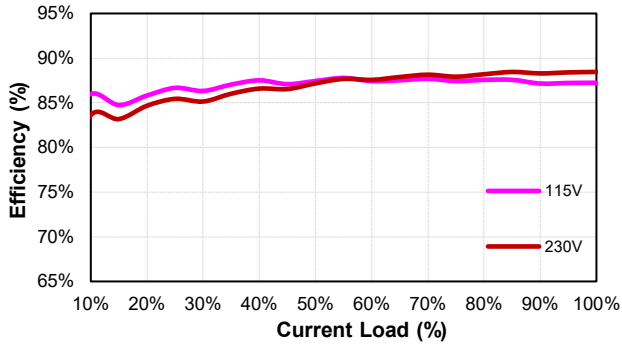
Performance Data



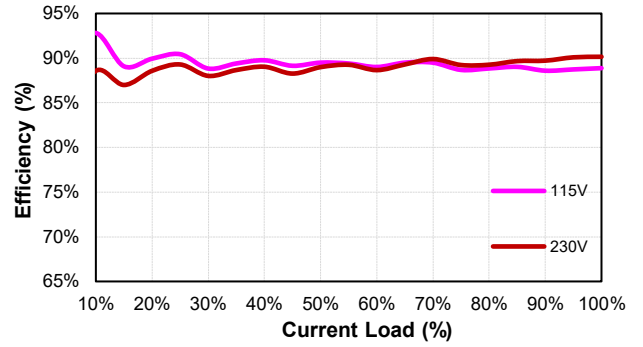


CFM60M Series

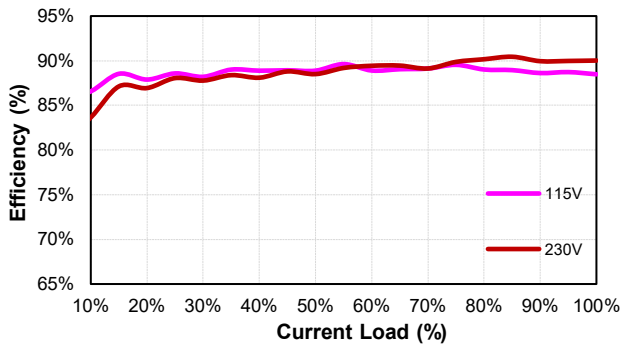
CFM60M150 (Eff Vs Io)



CFM60M240 (Eff Vs Io)



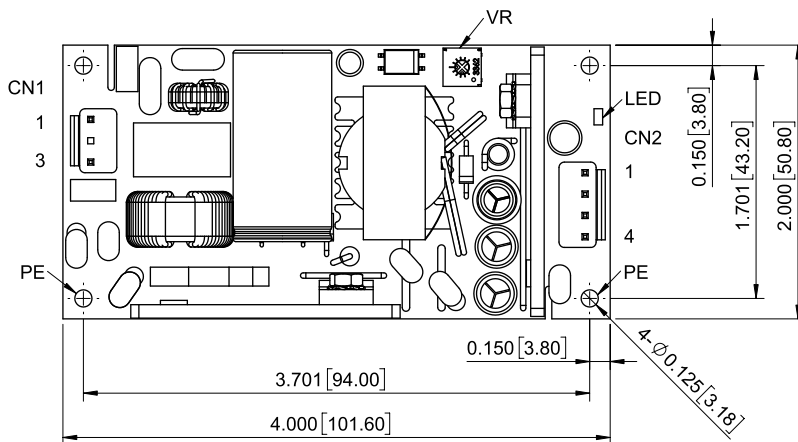
CFM60M480 (Eff Vs Io)





CFM60M Series

MECHANICAL SPECIFICATION



CFM60MXXX

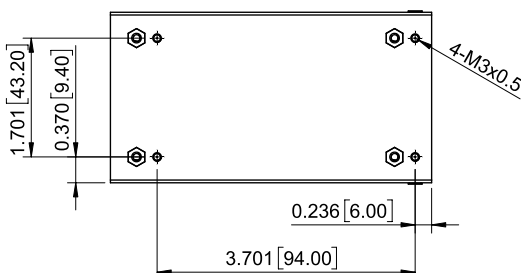
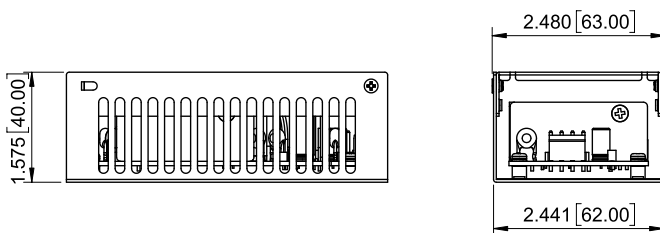
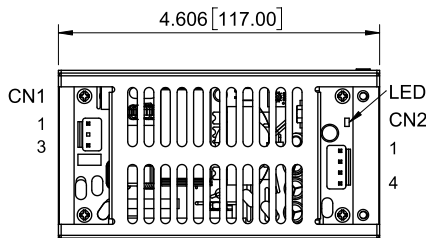
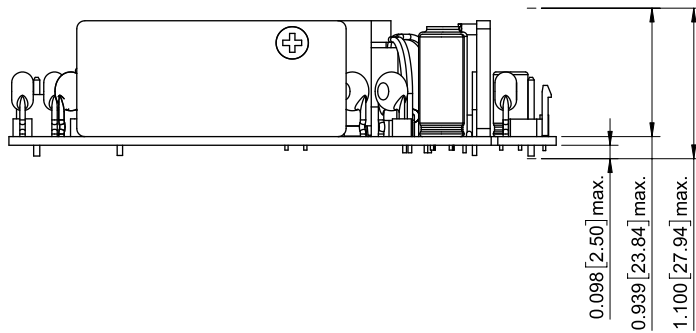
All Dimensions in Inches[mm]
 Tolerance Inches: x.xxx=±0.020
 Millimeters: x.xx=±0.50

AC Input Connector(CN1):TKP PVHI-03N2 or equivalent

Pin	Function	Mating Housing	Terminal
1	ACN	JST VHR-3N or equivalent	JST SVH-21T-P1.1 or equivalent
2	-		
3	ACL		

DC Output Connector(CN2):TKP PVHI-04 or equivalent

Pin	Function	Mating Housing	Terminal
1	+Vout	JST VHR-4N or equivalent	JST SVH-21T-P1.1 or equivalent
2	+Vout		
3	-Vout		
4	-Vout		



CFM60MXXX-CA

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

AC Input Connector(CN1):TKP PVHI-03N2 or equivalent

Pin	Function	Mating Housing	Terminal
1	ACN	JST VHR-3N or equivalent	JST SVH-21T-P1.1 or equivalent
2	-		
3	ACL		

DC Output Connector(CN2):TKP PVHI-04 or equivalent

Pin	Function	Mating Housing	Terminal
1	+Vout	JST VHR-4N or equivalent	JST SVH-21T-P1.1 or equivalent
2	+Vout		
3	-Vout		
4	-Vout		

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