



E-Star Power Development Co., Ltd. (E-STAR)
 1F., No.40, Juren Ln., Sec. 2, Sanmin Rd., Banciao Dist., New Taipei City
 22069, Taiwan (R.O.C.)
 Phone : 886-2-2957 5580 Fax : 886-2-2957 7473

500W Open Frame Medical power supply > CFM500M

Features

- Universal Input Range 80~264Vac
- High Efficiency up to 94.5%
- 3"x 5" Compact Size
- High Power Density Up to 20.96W/Inch³
- 390W Natural, 470 ~ 500W Conduction Convection
- No Load Power Consumption<0.5W
- Over Temperature Protection
- PS On/Off Remote Control
- Power Good & Power Fail Signal
- +5V Stand-by, 12V Fan Output
- Low Inrush Current
- Active PFC Meets EN61000-3-2
- Meets EN55011 Class B, 2MOPP
- Meets IEC/EN60335
- Class I



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT			VOLTAGE ACCURACY	RIPPLE & NOISE	VOLTAGE ADJ. RANGE	LINE REGULATION	LOAD REGULATION	%EFF. (Typ)
		NOTE1		NOTE2						
		With Fan	Without Fan							
CFM500M120	12 V	41.67A	27.5A	25A	±1%	1%	11.4~12.6 V	±0.5%	±1%	91.5%
CFM500M180	18 V	27.78A	18.33A	16.67A	±1%	1%	17.1~18.9 V	±0.5%	±1%	92.5%
CFM500M240	24 V	20.83A	17.08A	15.83A	±1%	1%	22.8~25.2 V	±0.5%	±1%	93%
CFM500M360	36 V	13.89A	11.39A	10.56A	±1%	1%	34.2~37.8 V	±0.5%	±1%	94.5%
CFM500M480	48 V	10.42A	8.54A	7.92A	±1%	1%	45.6~50.4 V	±0.5%	±1%	94%
Stand-by Output Voltage										
All	+5V	1A			±3%	1%	---	±1%	±5%	---
Fan Output Voltage										
All	+12V	0.5A (NOTE 6)			---	---	---	---	---	---

- Note:
1. Forced air Convection with 21CFM Fan.
 2. Voltage accuracy is set at full load and 25°C Ta.
 3. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for Ripple & Noise measuring @20MHz B.W.
 4. Line regulation is measured from High Line to Low Line with rated load.
 5. Load regulation is measured from full load to 10% rated load.
 6. Fan output can only operate normal when the Stand-by output is above 0.5A.

PART NUMBER

Series	Number of Outputs	Nominal Output Voltage	Type
CFM500	O	XXX	Y (Option)
CFM500	M: Medical	120: 12VDC	None: Open frame C: With Cover
		180: 18VDC	
		240: 24VDC	
		360: 36VDC	
		480: 48VDC	

Part Number Example:
CFM500M120: Open Frame, 500W, 12Vdc Output
CFM500M120C: With Case, 500W, 12Vdc Output



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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	Safety approvals only to the AC input	All	80		264	V _{ac} V _{dc}
Operating Case Temperature	See Derating Curve	All	-40		85	°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 _{ac}
Input Frequency Range		All	47		63	Hz
Maximum Input Current	100% Load, V _{in} =100Vac	All			6	A
Leakage Current		All			0.1	mA
Inrush Current	V _{in} =240Vac, Cold Start at 25°C.	All		8.5		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.	CFM500M120	11.88	12	12.12	V _{dc}
		CFM500M180	17.82	18	18.18	
		CFM500M240	23.76	24	24.24	
		CFM500M360	35.64	36	36.36	
		CFM500M480	47.52	48	48.48	
Operating Output Current Range		CFM500M120			41.67	A
		CFM500M180			27.78	
		CFM500M240			20.83	
		CFM500M360			13.89	
		CFM500M480			10.42	
Holdup Time	V _{in} =115Vac	All		16		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	Latch Off (AC Recycle to Reset)	CFM500M120			16	V _{dc}
		CFM500M180			30	
		CFM500M240			35	
		CFM500M360			50	
		CFM500M480			63	
Over Current Protection	Auto Recovery	All	120		190	%
Short Circuit Protection	Auto Recovery	All				
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	CFM500M120			120	mV
		CFM500M180			150	
		CFM500M240			150	
		CFM500M360			200	
		CFM500M480			250	
Load Capacitance	1. Ambient Temperature=25°C 2. Input Voltage is 115VAC and 230VAC 3. Output is max. Load	CFM500M120			42900	uF
		CFM500M180			28600	
		CFM500M240			20800	
		CFM500M360			14000	
		CFM500M480			10800	



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PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Efficiency	Output is Rated Load Ambient Temperature=25°C @ Input Voltage is 230VAC	CFM500M120 CFM500M180 CFM500M240 CFM500M360 CFM500M480		91.5 92.5 93 94.5 94		%
PS-On Signal	Power on	All	0		2	Vdc
	Power off (PS-ON and GND open)			4		
	Power on (PS-ON and GND short)		10	mA		
	Power-off (PS-ON and GND open)		0			
Power Good (PG)	1. Input voltage is 90VAC~264VAC 2. Output is max. load 3. The TTL goes high after power set up	All	100		500	ms
Power Fail (PF)	1. Input voltage is 90VAC~264VAC 2. Output is max. load 3. The TTL goes low before Vo below 90% rated value	All	1	10		ms

ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 minute	All			4000	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		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°C per MIL-HDBK-217F	All		200		K hours
Humidity	Nom-condensing	All			93	% RH
Shock	Meet MIL-STD-810F Table 516.5, Table 516.5-1 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	All		515		g
	Covered Versions		635			
Dimensions	Open Frame	All	5.000x3.000x1.540 Inches (127.00x76.20x39.10mm)			
	C (with Cover)	All	5.354x3.425x1.673 Inches (136.00x87.00x42.50mm)			
Safety	Class I, IEC/EN/UL60601-1				Ed 3.1	
EMC Emission	EN55011 Class B, EN61000-3-2:2014, EN6100-3-3:2013, FCC CFR47 Part 15				Ed 4.0	
Conducted Disturbance	EN55011, FCC CFR 47 Part 15				Class B	
Radiated Disturbance	EN55011, FCC CFR 47 Part 15				Class B	
Harmonic Current Emissions	EN61000-3-2:2014				Class A, C, D	
Voltage Fluctuations & Flicker	EN61000-3-3:2013					
EMC Immunity	EN60601-1-2:2015, IEC61000-4-2,3,4,5,6,8,11					
Electrostatic Discharge (ESD)	IEC61000-4-2:2008, Air Discharge: ±8kV, Contact Discharge: ±4kV				Criterion A	
Radio-Frequency, Continuous Radiated Disturbance	IEC61000-4-3:2010				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	



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GENERAL SPECIFICATIONS

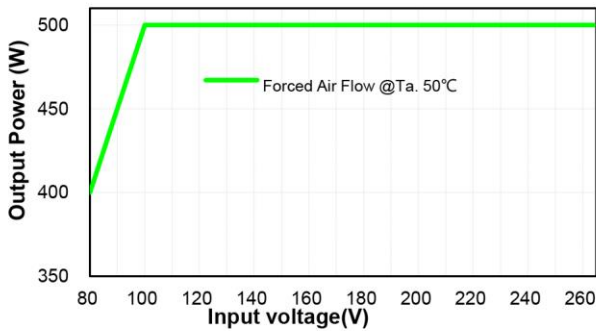
Conducted Disturbances, Induced by RF Fields	IEC61000-4-6:2013	Criterion A
Power Frequency Magnetic Field	IEC61000-4-8:2009	Criterion A
Voltage Dips	IEC61000-4-11:2004, Dip: 30% Reduction, Dip >95% Reduction	Criterion A
Voltage Interruptions	IEC61000-4-11:2004, >95% Reduction	Criterion B

CHARACTERISTIC CURVE

Power Derating Curve

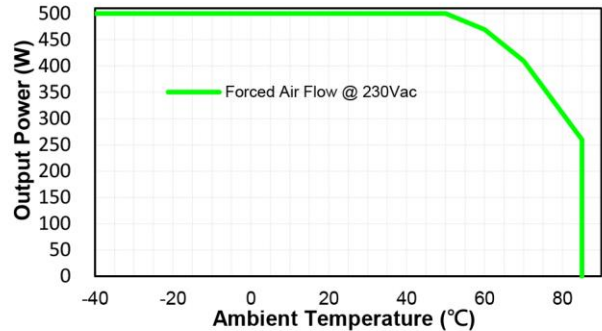
Forced Air Flow

Output power & Input voltage



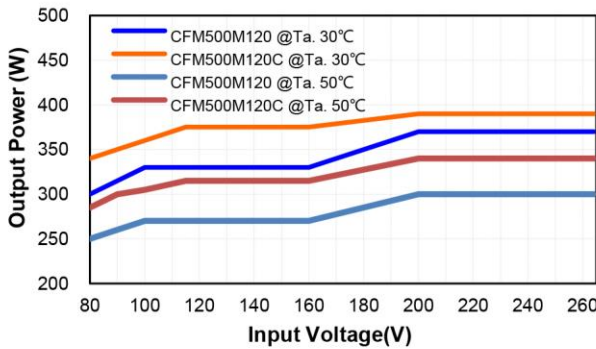
Forced Air Flow

Output power vs Ambient Temperature



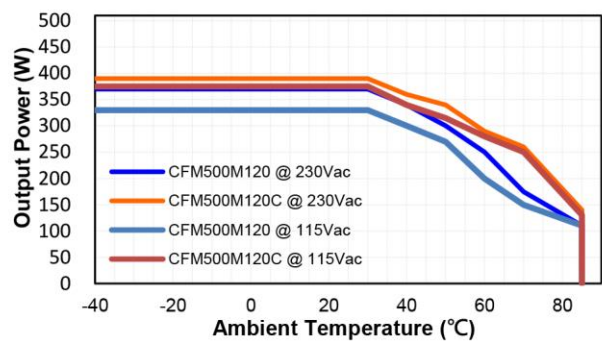
Natural Convection

Output power & Input Voltage

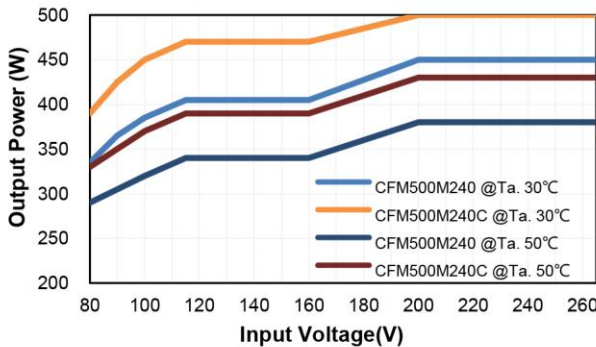


Natural Convection

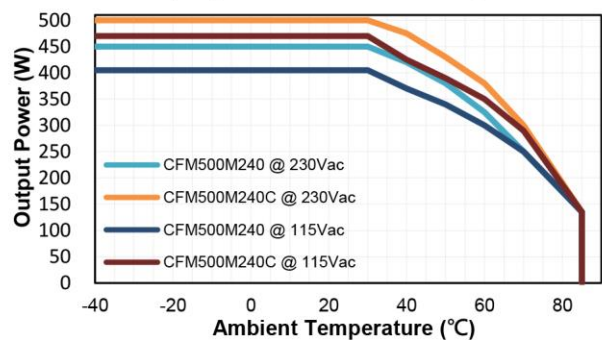
Output power vs Ambient Temperature



Output power & Input Voltage



Output power vs Ambient Temperature





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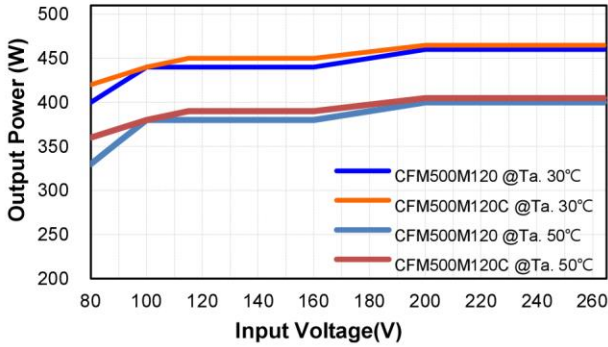
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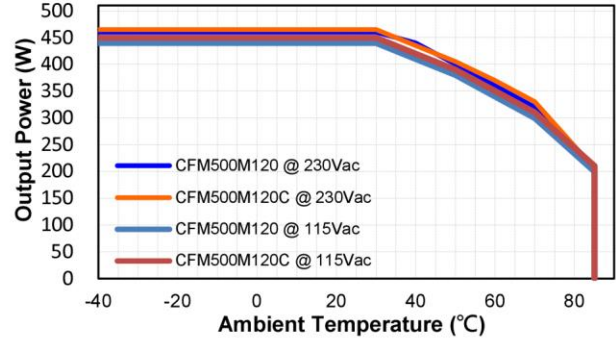
Conduction Convection with External Baseplate (48x24.8x0.12cm)

Output power & Input Voltage

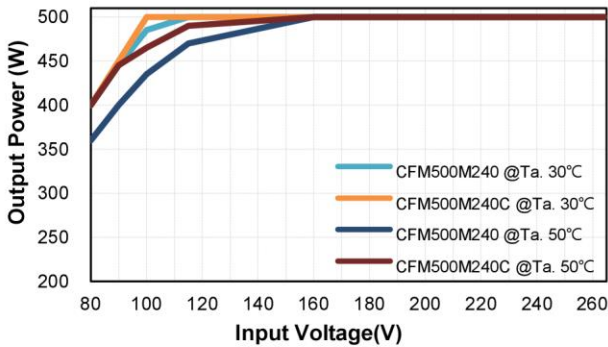


Conduction Convection with External Baseplate (48x24.8x0.12cm)

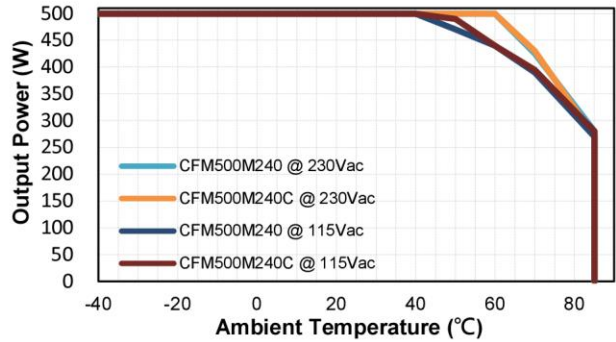
Output power vs Ambient Temperature



Output power & Input Voltage

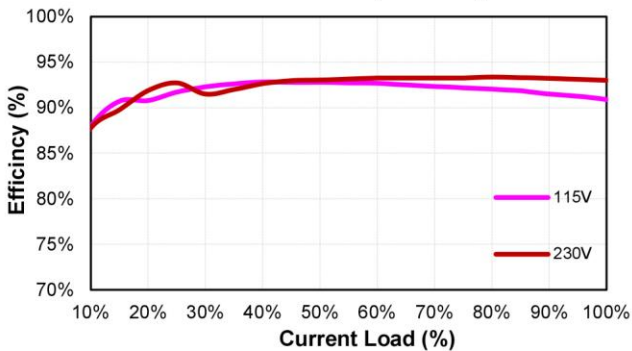


Output power vs Ambient Temperature

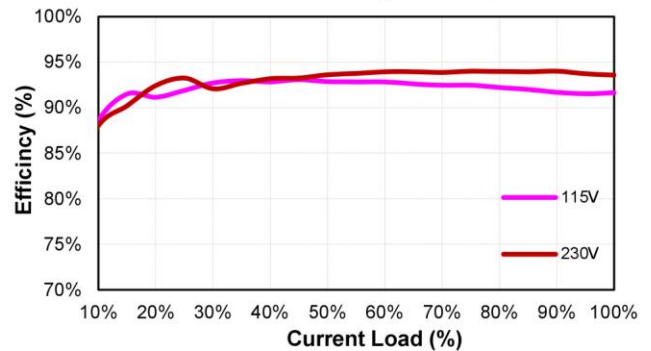


Performance Data

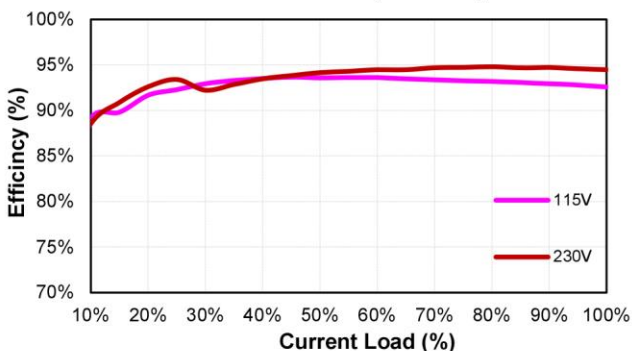
CFM500M120 (Eff Vs Io)



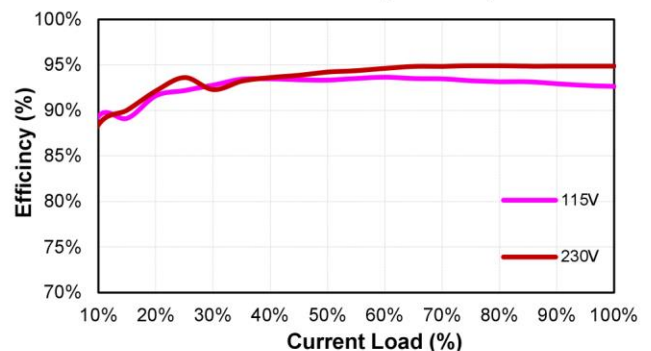
CFM500M180 (Eff Vs Io)



CFM500M240 (Eff Vs Io)



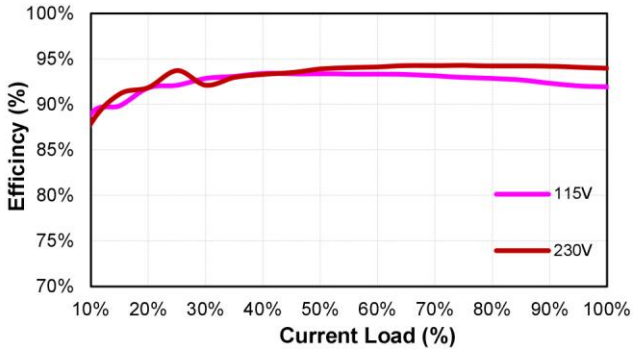
CFM500M360 (Eff Vs Io)



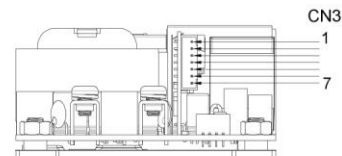
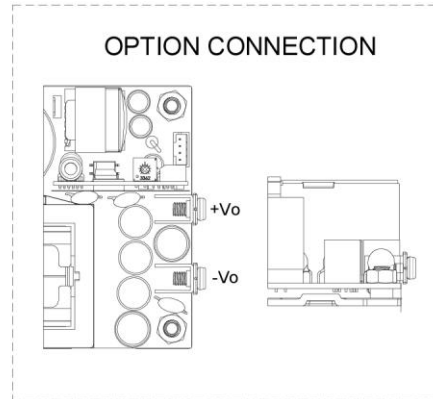
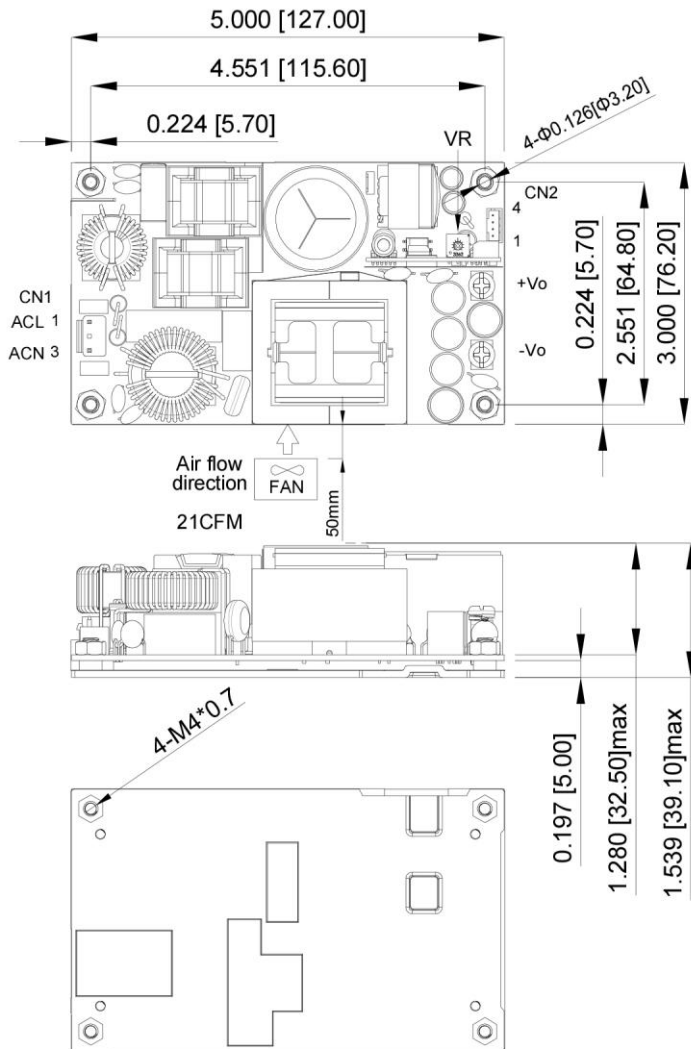


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CFM500M480 (Eff Vs Io)



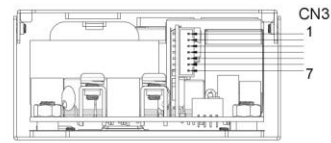
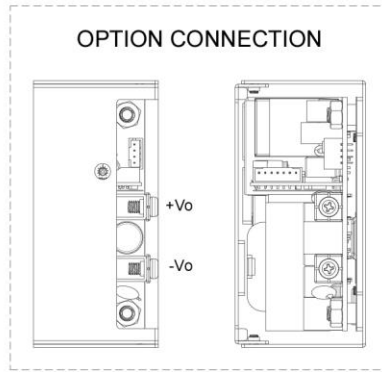
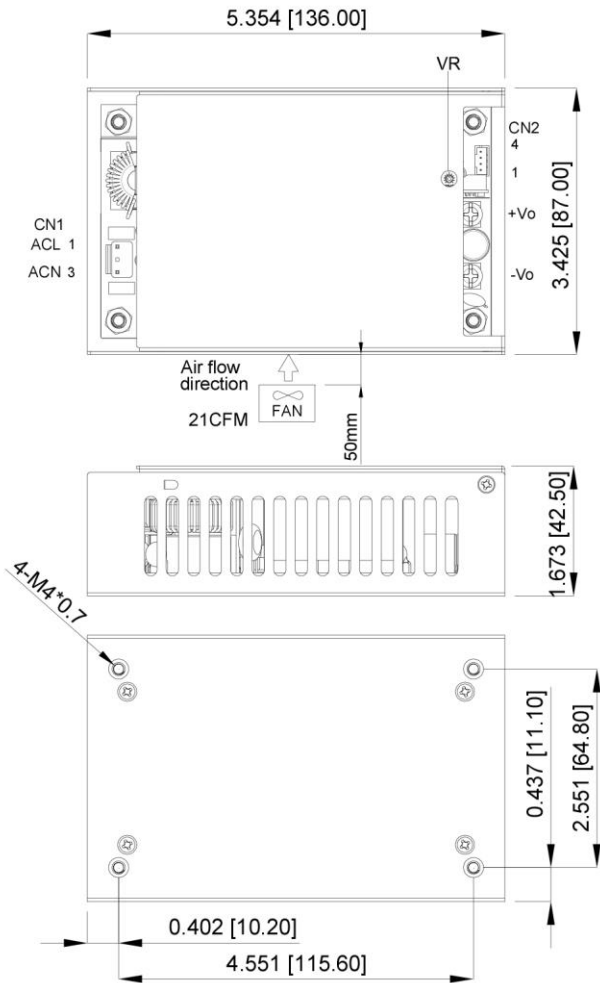
MECHANICAL SPECIFICATION





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CN1:
PIN CONNECTION

Pin	Function
1	ACL
2	-
3	ACN

CN2:
PIN CONNECTION

Pin	Function
1	GND
2	+5VSB
3	GND
4	+12V-FAN

CN3:
PIN CONNECTION

Pin	Function
1	GND
2	PF
3	FAN-EN
4	PS-ON
5	-Sense
6	+Sense
7	OPTION

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