

# LFM200M SERIES 200 WATT MEDICAL AC-DC POWER SUPPLY WITH PFC

## Features

- Universal Input Range 85~264Vac
- High Efficiency up to 94%
- Class I & Class II
- 25.4mm Low Profile Package
- No Load Input Power Consumption<0.3W
- 48V, 54V No Load Input Power Consumption<0.4W
- Approval Safety IEC/EN/UL 60601-1 2 MOPP
- Approval Safety IEC/EN/UL 62368-1
- Meets IEC/EN 60335-1
- Operating Altitude 5000m
- Continuous Short Circuit Protection
- Over Voltage Protection
- Over Temperature Protection
- High Power Density 28.35W/Inches<sup>3</sup>
- Active PFC Function



MODEL NUMBER	OUTPUT VOLTAGE	OUTPUT CURRENT			RIPPLE & NOISE NOTE1	VOLTAGE ACCURACY NOTE2	LINE REGULATION NOTE3	LOAD REGULATION NOTE4	%EFF. (Typ) NOTE5
		With Fan NOTE6	Without Conduction Cooling	With Conduction Cooling NOTE7					
LFM200M120C	12 V	16.67 A	9.17 A	14.17 A	150 mV	±1%	±0.2%	±0.5%	92%
LFM200M150C	15 V	13.33 A	7.33 A	11.33 A	150 mV	±1%	±0.2%	±0.5%	92%
LFM200M240C	24 V	8.33 A	4.58 A	7.08 A	200 mV	±1%	±0.2%	±0.5%	94%
LFM200M280C	28 V	7.14 A	3.93 A	6.07 A	200 mV	±1%	±0.2%	±0.5%	93%
LFM200M300C	30 V	6.66 A	3.67 A	5.67 A	200 mV	±1%	±0.2%	±0.5%	93%
LFM200M360C	36 V	5.55 A	3.06 A	4.72 A	200 mV	±1%	±0.2%	±0.5%	94%
LFM200M480C	48 V	4.16 A	2.29 A	3.54 A	200 mV	±1%	±0.2%	±0.5%	94%
LFM200M540C	54 V	3.7 A	2.04 A	3.15 A	200 mV	±1%	±0.2%	±0.5%	93%

### Note:

1. Add a 0.1uF ceramic capacitor and a 10uF E.L. capacitor to output for ripple & noise measuring @20MHz BW.
2. Voltage accuracy is set at full load.
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 full load at 25°C.
6. Forced air convection with 14CFM above 110Vac.
7. With addition cooling conduction plate, 17.78 by 17.78 cm with min. 0.2 cm thick, as below.

# LFM200M Series

## PART NUMBER

Series	Number of Outputs	Nominal Output Voltage	Type	Mounting Inserts
LFM200	O	XXX	X	-YZ
LFM200	M : Medical	120 : 12V 150 : 15V 240 : 24V 280 : 28V 300 : 30V 360 : 36V 480 : 48V 540 : 54V	C : With Cover	Blank : Through Hole C0 : Threaded Hole

Part Number Example:

**LFM200M120C-C0**: With Cover 200W, Medical 12Vdc Output, Threaded Hole

## 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	85		264	V <sub>ac</sub>
Input Voltage		All	115		370	V <sub>dc</sub>
Operating Temperature	See Derating Curve	All	-40		80	°C
Operating Case Temperature	At the center of base plate (T <sub>c</sub> = Case temperature)	All	-40		90	°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			3.15	A
Leakage Current	Contact leakage current Earth leakage current	All			100 300	uA
Inrush Current	V <sub>in</sub> =240V <sub>ac</sub> , Cold Start @25°C	All			85	A
Power Factor	230V <sub>ac</sub> @ Full load	All	0.96	0.98		

### 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	LFM200M120C	11.88	12	12.12	V <sub>dc</sub>
		LFM200M150C	14.85	15	15.15	
		LFM200M240C	23.76	24	24.24	
		LFM200M280C	27.72	28	28.28	
		LFM200M300C	29.7	30	30.3	
		LFM200M360C	35.64	36	36.36	
		LFM200M480C	47.52	48	48.48	
Operating Output Current Range	V <sub>in</sub> =85V <sub>ac</sub> ~264V <sub>ac</sub> , See Derating Curve	LFM200M120C	0		16.67	A
		LFM200M150C	0		13.33	
		LFM200M240C	0		8.33	
		LFM200M280C	0		7.14	
		LFM200M300C	0		6.66	
		LFM200M360C	0		5.55	
		LFM200M480C	0		4.16	
LFM200M540C	0		3.7			
Holdup Time	V <sub>in</sub> =115V <sub>ac</sub>	All	10	12		ms
Output Voltage Regulation						
Load Regulation	10% Load to full load	All			±0.5	%
Line Regulation	V <sub>in</sub> =High line to low line	All			±0.2	%
Output Voltage Adjustment	P <sub>o</sub> ≤ max. rated power, I <sub>o</sub> ≤ I <sub>o</sub> max.	All	-5		+5	%

## LFM200M Series

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Over Voltage Protection	Latch off (AC recycle to reset)	LFM200M120C			16	V <sub>dc</sub>
		LFM200M150C			20	
		LFM200M240C			32	
		LFM200M280C			35	
		LFM200M300C			35	
		LFM200M360C			45	
		LFM200M480C			55	
		LFM200M540C			63	
Over Current Protection	Auto recovery (output is rated load)	All	125	145	165	%
Short Circuit Protection	Auto recovery	All				
Over Temperature 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	LFM200M120C			150	mV
		LFM200M150C			150	
		LFM200M240C			200	
		LFM200M280C			200	
		LFM200M300C			200	
		LFM200M360C			200	
		LFM200M480C			200	
		LFM200M540C			200	
Load Capacitance	1. V <sub>in</sub> =115V <sub>ac</sub> and 230V <sub>ac</sub> 2. Output is max. load 3. Ambient temperature=25°C	LFM200M120C			6800	uF
		LFM200M150C			5360	
		LFM200M240C			3440	
		LFM200M280C			3440	
		LFM200M300C			3220	
		LFM200M360C			2680	
		LFM200M480C			2000	
		LFM200M540C			1560	
Efficiency	1. Input Voltage is 230V <sub>ac</sub> 2. Output is rated load 3. Ambient temperature=25°C	LFM200M120C		92		%
		LFM200M150C		92		
		LFM200M240C		94		
		LFM200M280C		93		
		LFM200M300C		93		
		LFM200M360C		94		
		LFM200M480C		94		
		LFM200M540C		93		

### ISOLATION CHARACTERISTICS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
Input to Output	1 Minute (without dielectric breakdown)	All			4250	V <sub>ac</sub>
Input to Earth (Ground)	1 Minute (without dielectric breakdown)	All			2000	V <sub>ac</sub>
Output to Earth (Ground)	1 Minute (without dielectric breakdown)	All			2000	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		15V		130		kHz
		Others		110		

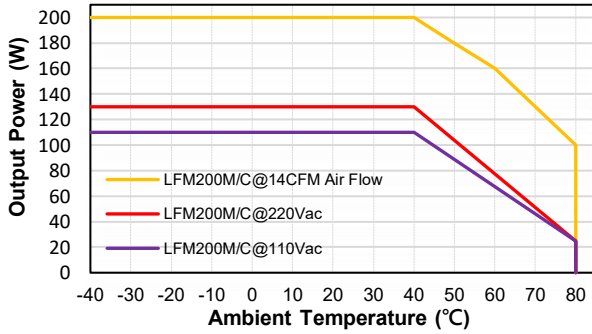
## GENERAL SPECIFICATIONS

PARAMETER	NOTES and CONDITIONS	Device	Min.	Typ.	Max.	Units
MTBF	$I_o=100\%$ ; $T_a=25^\circ\text{C}$ per MIL-HDBK-217F	All	450			k hours
Life Time	@75% Load, $40^\circ\text{C}$	All	26			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		All		220		grams
Dimensions		All	3.09x2.28x1.00 Inches (78.6x57.9x25.4 mm)			
<b>Safety</b>	Class I, Class II ANSI/AAMI ES 60601-1:2005 & A1:2012 & A2:2021 IEC 60601-1:2005/AMD1:2012 + AMD2:2020 EN 60601-1:2006/A1:2013 + A12:2014 + A2:2021					Ed. 3.2
	Class I, IEC/EN/UL 62368-1					Ed. 3.0
<b>EMC Emission</b>	EN 55011: 2016+A2: 2021, Class B, IEC/EN 61000-3-2: 2019+A1:2021, EN 61000-3-3: 2013+A2: 2021, 47 CFR FCC Part 18					
	EN 55032:2015+A11:2020, EN 61000-6-4:2019, EN 61204-3:2018, EN 61000-3-2:2019+A1:2021, EN 61000-3-3:2013+A2:2021, 47 CFR FCC Part 15					
Conducted Disturbance	EN 55011: 2016+A2: 2021, EN 55032:2015+A11:2020 47, CFR FCC Part 18 & Part 15					Class B
Radiated Disturbance	EN 55011:2016+A2: 2021, CFR FCC Part 18 (Class II Only Meets Class A), EN 55032:2015+A11:2020 47, CFR FCC Part 15					Class B
Harmonic Current Emissions	IEC/EN 61000-3-2: 2019+A1:2021					Class A, C, D
Voltage Fluctuations & Flicker	EN 61000-3-3:2013+A2: 2021					Criterion A
<b>EMC Immunity</b>	EN 60601-1-2: 2015+A1:2021, IEC/EN 61000-4-2, 3, 4, 5, 6, 8, 11					Ed 4.1
	EN 55035:2017+A11:2020, EN 61000-6-2:2019, EN 61204-3:2018					
Electrostatic Discharge (ESD)	IEC 61000-4-2:2009 Air Discharge: $\pm 15\text{kV}$ , Contact Discharge: $\pm 8\text{kV}$					Criterion A
Radio-Frequency, Continuous Radiated Disturbance	IEC/EN 61000-4-3: 2020					Criterion A
Electrical Fast Transient (EFT)	EN 61000-4-4:2012, $\pm 2\text{kV}$					Criterion A
Surge	EN 61000-4-5:2014+A1:2017, L-N: $\pm 2\text{kV}$ , L-E (Ground): $\pm 4\text{kV}$					Criterion A
Conducted Disturbances, Induced by RF Fields	EN 61000-4-6: 2014+AC: 2015					Criterion A
Power Frequency Magnetic Field	EN 61000-4-8: 2010					Criterion A
Voltage Dips	IEC/EN 61000-4-11: 2020, Dip: 30% Reduction, Dip >95% Reduction					Criterion A
Voltage Interruptions	IEC/EN 61000-4-11: 2020, >95% reduction					Criterion B
Application Note Link						<a href="#">LFM200M Series App Notes</a>

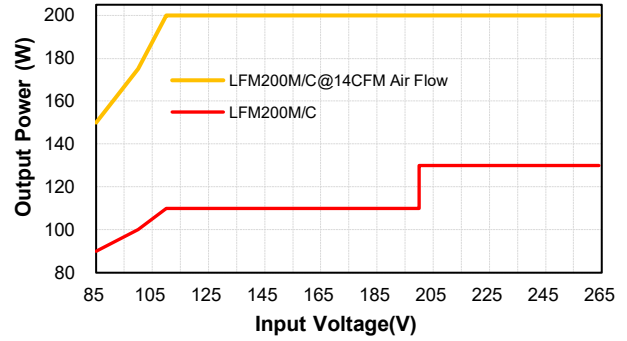
## CHARACTERISTIC CURVE

### Power Derating Curve

Output Power vs Ambient Temperature

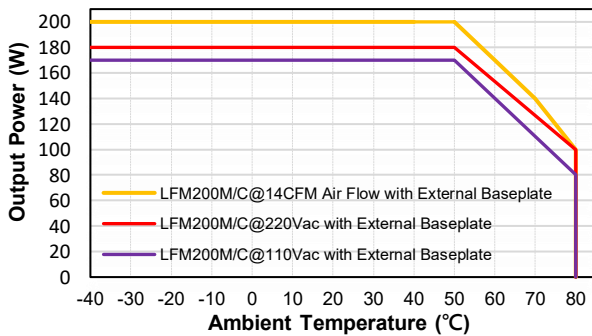


Output Power & Input Voltage

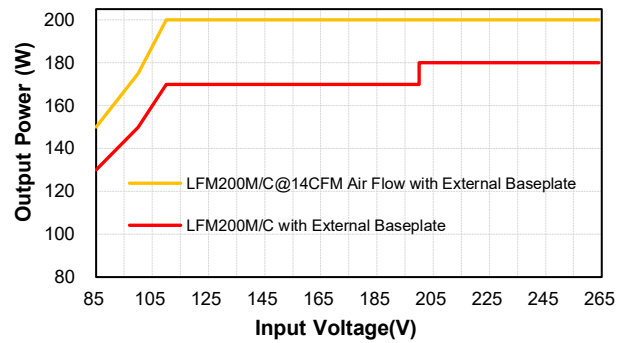


### Conduction Convection with External Baseplate (17.78cmx17.78cmx0.2cm)

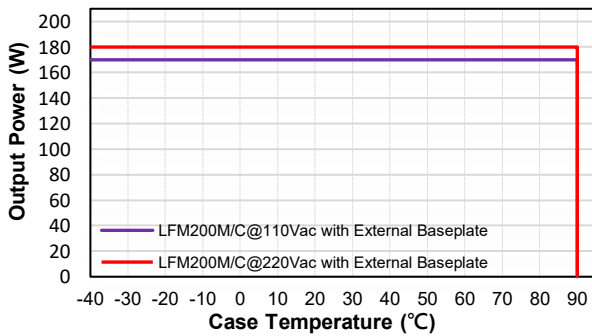
Output Power vs Ambient Temperature



Output Power & Input Voltage



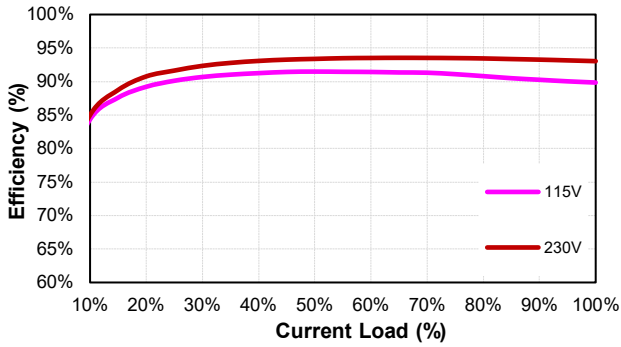
Output Power vs Case Temperature (Tc)



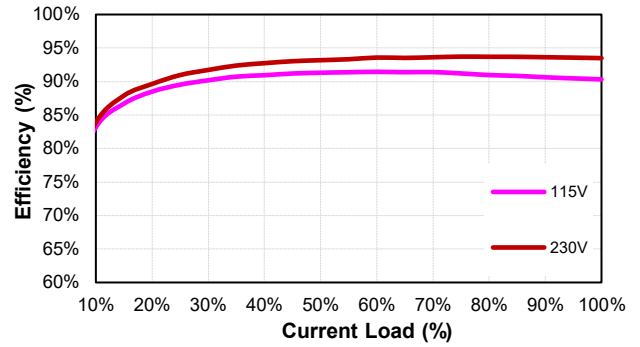
# LFM200M Series

## Performance Data

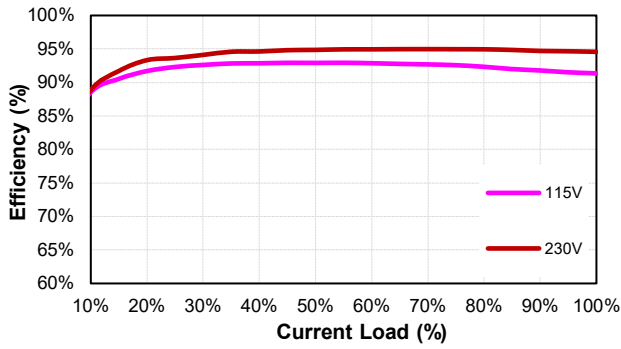
**LFM200M120 (Eff Vs Io)**



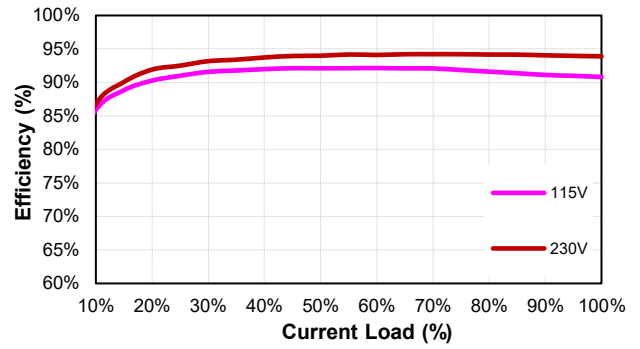
**LFM200M150 (Eff Vs Io)**



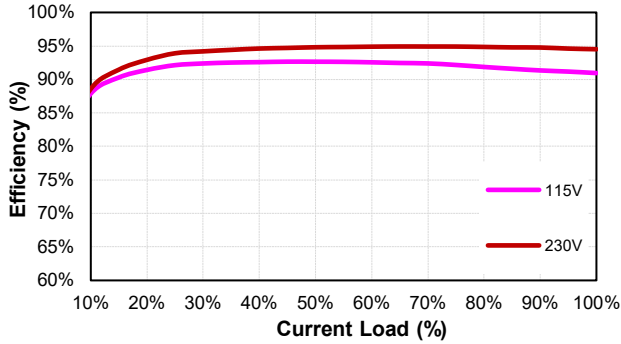
**LFM200M240 (Eff Vs Io)**



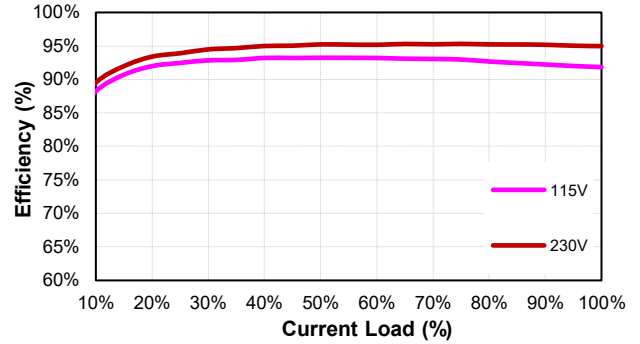
**LFM200M280 (Eff Vs Io)**



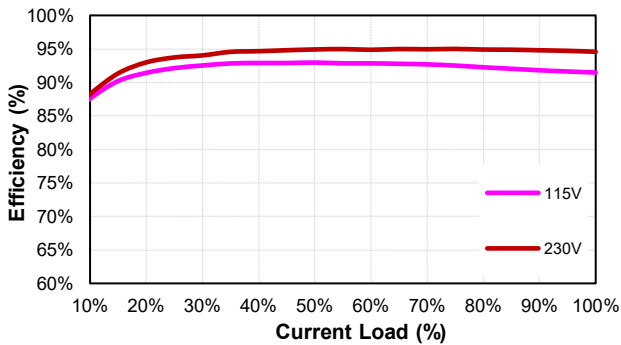
**LFM200M300 (Eff Vs Io)**



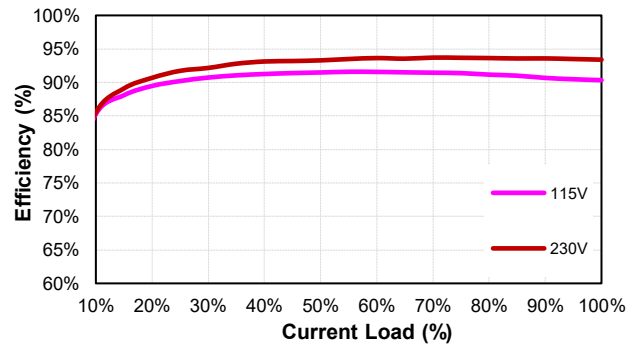
**LFM200M360 (Eff Vs Io)**



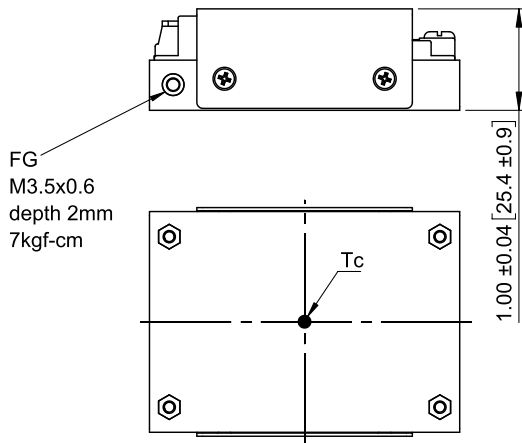
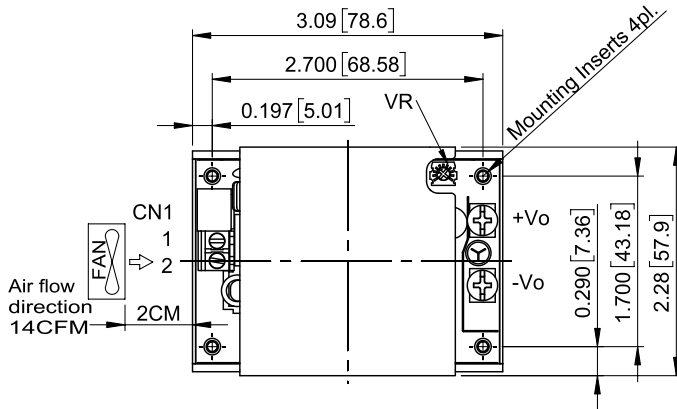
**LFM200M480 (Eff Vs Io)**



**LFM200M540 (Eff Vs Io)**



## MECHANICAL SPECIFICATION



### LFM200MXXXC LFM200MXXXC-C0

All Dimensions in Inches[mm]

Tolerance Inches: x.xx=±0.03, x.xxx=±0.020

Millimeters: x.x=±0.7, x.xx=±0.50

AC Input Connector(CN1):ECE ETB22

Pin	Function	Mating Wire Range
1	ACL	14~18 AWG
2	ACN	

DC Output Connector:KANG YANG PCB-58M4

Function	The screw locked torque
+Vo	M4 7kgf-cm
-Vo	

Mounting Inserts

Series	Option
Blank	∅ 3.2 Through depth 10.5mm
-C0	M3x0.5 Threaded depth 10.5mm