



EN60335-1



ANSI/AAMI ES60601-1



EN60601-1



IEC60601-1 TPTC004



### ■ Features

- 1.93"x0.94" compact size
- Medical safety approved (2 x MOPP) according to ANSI/AAMI ES60601-1 and IEC/EN60601-1
- Suitable for BF application with appropriate system consideration
- No load power consumption < 0.1W
- Extremely low leakage current
- Wide operating temp. range -35 ~ +85°C
- EMI class B for class II configuration
- Protections:  
Short circuit / Overload / Over voltage / Over temperature
- No minimum load required
- 3 years warranty

### ■ Applications

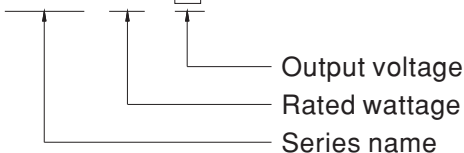
- Portable medical device
- Mobile clinical workstation
- Medical computer monitor
- Medical examination instrument

### ■ Description

MFM-20 is a 20W high density and small size (49\*23.8\*23mm) AC/DC on board type medical power supply series. It features the operation for 80~264VAC, a low no load power consumption less than 0.1W, a high efficiency up to 87%, Class II (no FG) double insulation, outstanding dissipation, 5G anti-vibration, high EMC performance, 4KVAC isolation, etc. The design observes IEC/EN60601-1 and ANSI/AAMI ES60601-1 version three with 2xMOPP level and ultra-low leakage current (< 80 μA). It is very suitable for BF (patient contact) type medical device or relevant equipment.

### ■ Model Encoding

**MFM - 20 - 5**

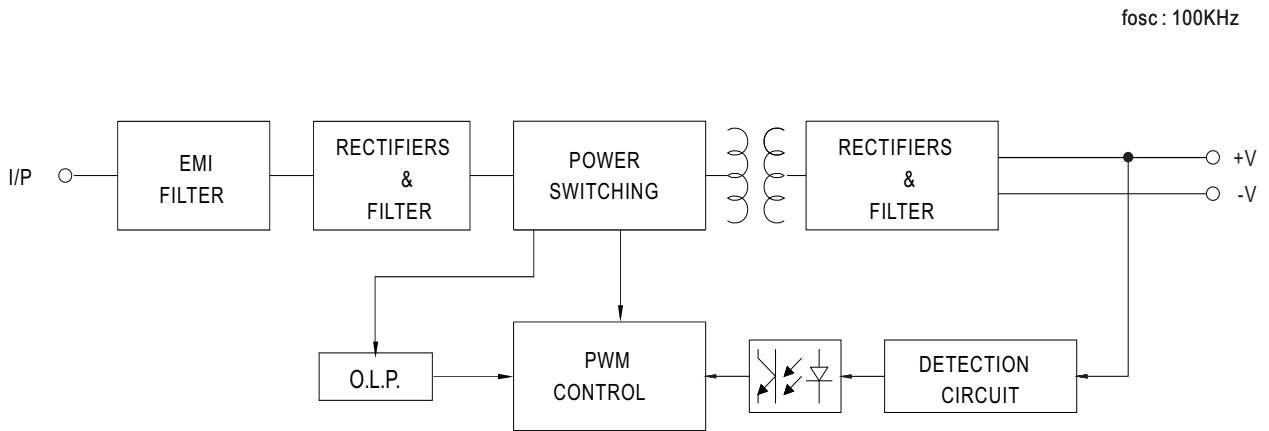




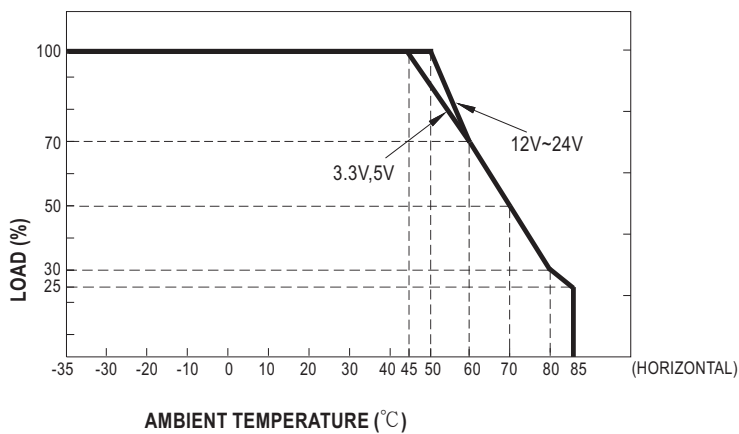
## SPECIFICATION

MODEL		MFM-20-3.3	MFM-20-5	MFM-20-12	MFM-20-15	MFM-20-24			
OUTPUT	DC VOLTAGE	3.3V	5V	12V	15V	24V			
	RATED CURRENT	4.5A	4A	1.8A	1.4A	0.9A			
	CURRENT RANGE <small>Note.2</small>	0 ~ 4.5A	0 ~ 4A	0 ~ 1.8A	0 ~ 1.4A	0 ~ 0.9A			
	PEAK CURRENT	4.95A	4.4A	1.98A	1.54A	0.99A			
	RATED POWER	14.9W	20W	21.6W	21W	21.6W			
	PEAK LOAD(10sec.) <small>Note.3</small>	16.3W	22W	23.8W	23.1W	23.8W			
	RIPPLE & NOISE (max.) <small>Note.4</small>	150mVp-p	150mVp-p	150mVp-p	180mVp-p	180mVp-p			
	VOLTAGE TOLERANCE <small>Note.5</small>	±2.0%	±2.0%	±2.0%	±2.0%	±2.0%			
	LINE REGULATION	±0.5%	±0.5%	±0.3%	±0.3%	±0.3%			
	LOAD REGULATION	±0.5%	±0.5%	±0.5%	±0.5%	±0.5%			
	SETUP, RISE TIME	1500ms, 30ms/230VAC    1500ms, 30ms/115VAC at full load							
HOLD UP TIME (Typ.)	40ms/230VAC    10ms/115VAC at full load								
INPUT	VOLTAGE RANGE <small>Note.6</small>	80 ~ 264VAC							
	FREQUENCY RANGE	47 ~ 440Hz							
	EFFICIENCY (Typ.)	81%	85%	85.5%	87%	87%			
	AC CURRENT (Typ.)	0.75A/115VAC    0.5A/230VAC							
	INRUSH CURRENT (Typ.)	COLD START 20A/115VAC    45A/230VAC							
	LEAKAGE CURRENT (max.) <small>Note.7</small>	Touch current <80 $\mu$ A/264VAC							
PROTECTION	OVERLOAD	110% ~ 150% rated output power Protection type : Hiccup mode, recovers automatically after fault condition is removed							
	OVER VOLTAGE	3.8 ~ 5V	5.8 ~ 6.8V	13.8 ~ 16.2V	17.3 ~ 20.3V	27.6 ~ 32.4V			
	OVER TEMPERATURE	Protection type : Shut down o/p voltage, recovers automatically after temperature goes down							
ENVIRONMENT	WORKING TEMP.	-35 ~ +85 $^{\circ}$ C (Refer to "Derating Curve")							
	WORKING HUMIDITY	20 ~ 90% RH non-condensing							
	STORAGE TEMP., HUMIDITY	-40 ~ +85 $^{\circ}$ C, 10 ~ 95% RH non-condensing							
	TEMP. COEFFICIENT	±0.03%/ $^{\circ}$ C (0 ~ 50 $^{\circ}$ C)							
	SOLDERING TEMPERATURE	260 $^{\circ}$ C ±5 $^{\circ}$ C/10sec.max.							
	VIBRATION	10 ~ 500Hz, 5G 10min./1cycle, period for 60min. each along X, Y, Z axes							
SAFETY & EMC (Note.9)	OPERATING ALTITUDE <small>Note.8</small>	5000 meters							
	SAFETY STANDARDS	IEC60601-1, EN60601-1, IEC60335-1, EN60335-1, EAC TP TC 004, UL ANSI/AAMI ES60601-1(3.1 version), CAN/CSA-C22 3 <sup>rd</sup> Edition approved							
	ISOLATION LEVEL	Primary-Secondary: 2xMOPP							
	WITHSTAND VOLTAGE	I/P-O/P:4KVAC							
	ISOLATION RESISTANCE	I/P-O/P:100M Ohms / 500VDC / 25 $^{\circ}$ C / 70% RH							
	EMC EMISSION	Parameter	Standard			Test Level / Note			
		Conducted emission	EN55011 (CISPR11)			Class B			
		Radiated emission	EN55011 (CISPR11)			Class B			
		Harmonic current	EN61000-3-2			Class A			
		Voltage flicker	EN61000-3-3			-----			
	EMC IMMUNITY	EN60601-1-2	Parameter			Standard		Test Level / Note	
		ESD	EN61000-4-2			Level 4, 15KV air ; Level 4, 8KV contact			
		RF field susceptibility	EN61000-4-3			Level 3, 10V/m( 80MHz~2.7GHz ) Table 9, 9~28V/m( 385MHz~5.78GHz )			
EFT bursts		EN61000-4-4			Level 3, 2KV				
Surge susceptibility		EN61000-4-5			Level 3, 1KV/Line-Line				
Conducted susceptibility		EN61000-4-6			Level 3, 10V				
Magnetic field immunity		EN61000-4-8			Level 4, 30A/m				
Voltage dip, interruption		EN61000-4-11			100% dip 1 periods, 30% dip 25 periods, 100% interruptions 250 periods				
OTHERS	MTBF	1210Khrs min. MIL-HDBK-217F (25 $^{\circ}$ C)							
	DIMENSION	49*23.8*23mm (L*W*H) or 1.93"*0.94"*0.91" inch							
	PACKING	0.028Kg; 200pcs/6.6Kg/0.94CUFT							
NOTE	<p>1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25<math>^{\circ}</math>C of ambient temperature.</p> <p>2. No minimum load required.</p> <p>3. 33% Duty cycle maximum within every 30 seconds. Average output power should not exceed the rated power.</p> <p>4. Ripple &amp; noise are measured at 20MHz of bandwidth by using a 12" twisted pair-wire terminated with a 0.1 <math>\mu</math>f &amp; 47 <math>\mu</math>f parallel capacitor.</p> <p>5. Tolerance : includes set up tolerance, line regulation and load regulation.</p> <p>6. Derating may be needed under low input voltages. Please check the derating curve for more details.</p> <p>7. Touch current was measured from primary input to DC output.</p> <p>8. The ambient temperature derating of 3.5<math>^{\circ}</math>C/1000m with fanless models and of 5<math>^{\circ}</math>C/1000m with fan models for operating altitude higher than 2000m(6500ft).</p> <p>9. The power supply is considered a component which will be installed into a final equipment. The final equipment must be re-confirmed that it still meets EMC directives. For guidance on how to perform these EMC tests, please refer to "EMI testing of component power supplies." (as available on <a href="http://www.meanwell.com">http://www.meanwell.com</a>)</p>								

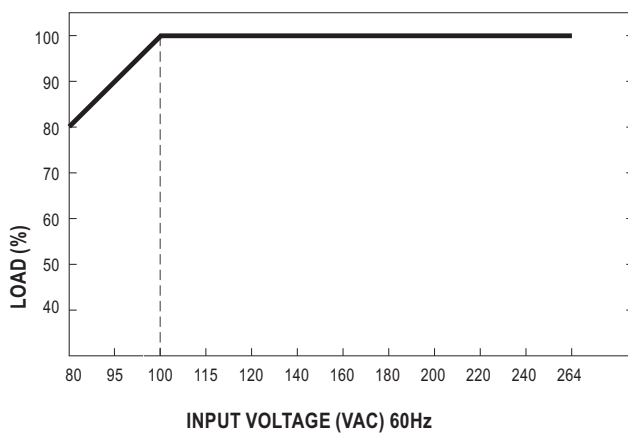
### Block Diagram



### Derating Curve

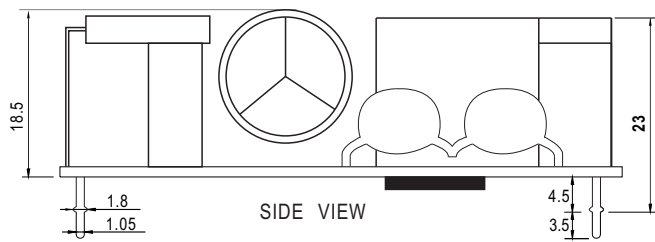
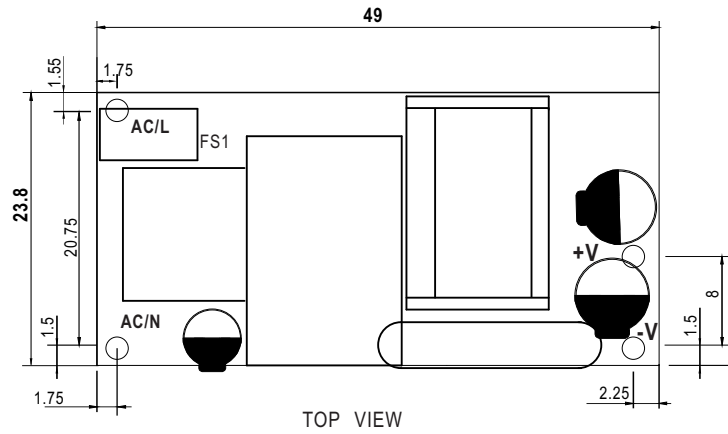


### Output Derating VS Input Voltage



## Mechanical Specification

Unit:inch(mm)



## Installation Manual

Please refer to : <http://www.meanwell.com/manual.html>