

BS EN/EN60335-1 ANSI/AAMI ES60601-1 BS EN/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/BS EN/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

## ■ GTIN CODE

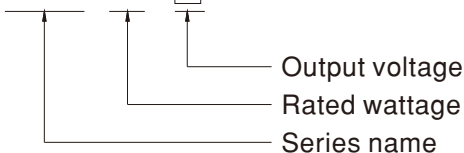
MW Search : <https://www.meanwell.com/serviceGTIN.aspx>

## ■ 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/BS EN/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

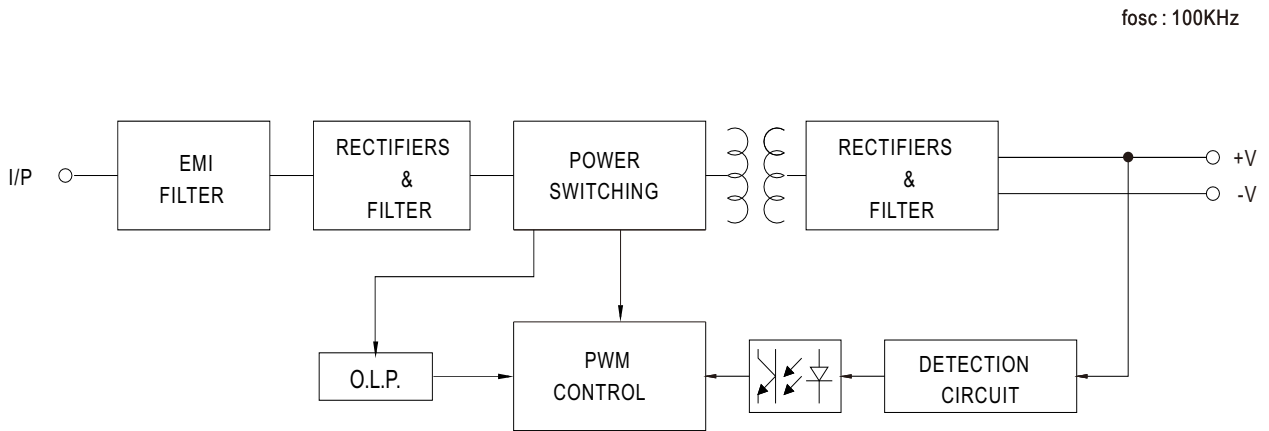
**MFM - 20 - 5**



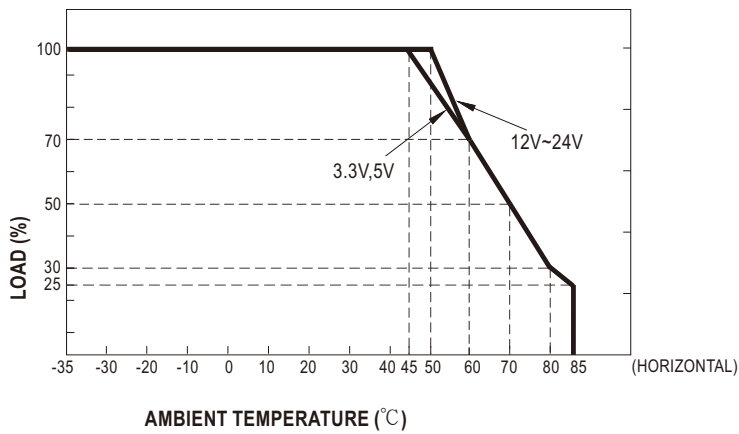
**SPECIFICATION**

| 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<br>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 off o/p voltage, clamping by zener diode<br>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   | Wave soldering: 265 $^{\circ}$ C, 5s (max.); Manual soldering: 390 $^{\circ}$ C, 3s (max.)   |                         |              |  |  |  |
|                           | VIBRATION   | 10 ~ 500Hz, 5G 10min./1cycle, period for 60min. each along X, Y, Z axes  |                         |              |  |  |  |
|                           | OPERATING ALTITUDE <small>Note.8</small>  | 5000 meters  |                         |              |  |  |  |
| SAFETY & EMC (Note.9)     | SAFETY STANDARDS  | IEC60601-1, BS EN/EN60601-1, IEC60335-1, BS EN/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   | BS EN/EN55011 (CISPR11) |              |  | Class B  |  |
|                           |   | Radiated emission  | BS EN/EN55011 (CISPR11) |              |  | Class B  |  |
|                           |   | Harmonic current   | BS EN/EN61000-3-2       |              |  | Class A  |  |
|                           |   | Voltage flicker  | BS EN/EN61000-3-3       |              |  | ----   |  |
|                           | EMC IMMUNITY  | Parameter  | Standard                |              |  | Test Level / Note  |  |
|                           |   | ESD  | BS EN/EN61000-4-2       |              |  | Level 4, 15KV air ; Level 4, 8KV contact                             |  |
|                           |   | RF field susceptibility  | BS EN/EN61000-4-3       |              |  | Level 3, 10V/m( 80MHz~2.7GHz )<br>Table 9, 9~28V/m( 385MHz~5.78GHz ) |  |
|                           |   | EFT bursts   | BS EN/EN61000-4-4       |              |  | Level 3, 2KV   |  |
|                           |   | Surge susceptibility   | BS EN/EN61000-4-5       |              |  | Level 3, 1KV/Line-Line   |  |
|                           |   | Conducted susceptibility   | BS EN/EN61000-4-6       |              |  | Level 3, 10V   |  |
| Magnetic field immunity   |   | BS EN/EN61000-4-8  |                         |              | Level 4, 30A/m   |  |  |
| Voltage dip, interruption |   | BS EN/EN61000-4-11   |                         |              | 100% dip 1 periods, 30% dip 25 periods, 100% interruptions 250 periods |  |  |
| OTHERS                    | MTBF  | 7319.8K hrs min.      Telcordia SR-332 (Bellcore) ; 1210.1K hrs 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."<br/>(as available on <a href="http://www.meanwell.com">http://www.meanwell.com</a>)</p> <p>※ Product Liability Disclaimer : For detailed information, please refer to <a href="https://www.meanwell.com/serviceDisclaimer.aspx">https://www.meanwell.com/serviceDisclaimer.aspx</a></p> |  |                         |              |  |  |  |

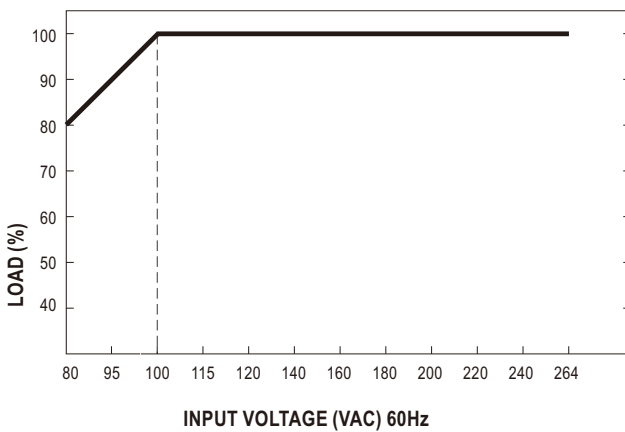
### Block Diagram



### Derating Curve

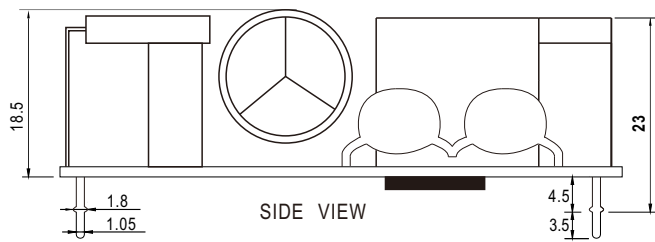
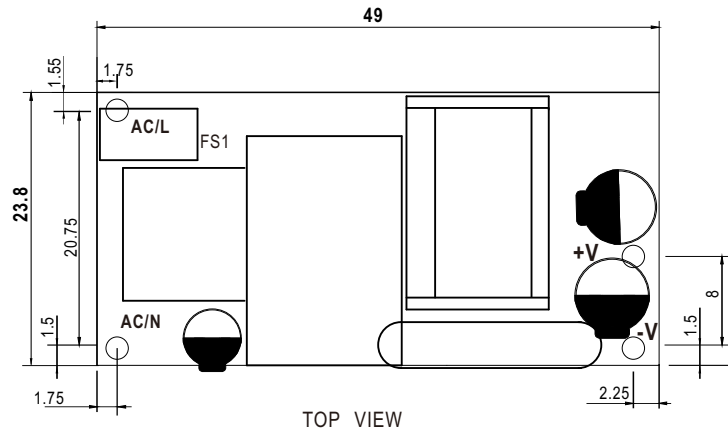


### Output Derating VS Input Voltage



■ **Mechanical Specification**

Unit:inch(mm)



■ **Installation Manual**

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