

## ■ Features

- 1.65"x0.88" 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 < 0.075W
- Extremely low leakage current
- Wide operating temp. range -40 ~ +85°C
- EMI class B for class II configuration
- Protections:  
Short circuit / Overload / Over voltage / Over temperature
- No minimum load required
- Typical lifetime > 52K hours
- 3 years warranty

## ■ Applications

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

## ■ GTIN CODE

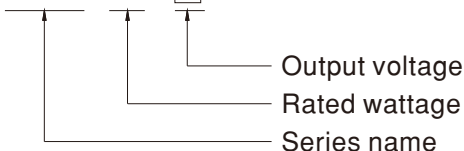
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## ■ Description

MFM-05 is a 5W high density and small size (42\*22.3\*20.5mm) AC/DC on board type medical grade power supply series. It features the operation for 80~264VAC, a low no load power consumption less than 0.075W, a high efficiency up to 82%, 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

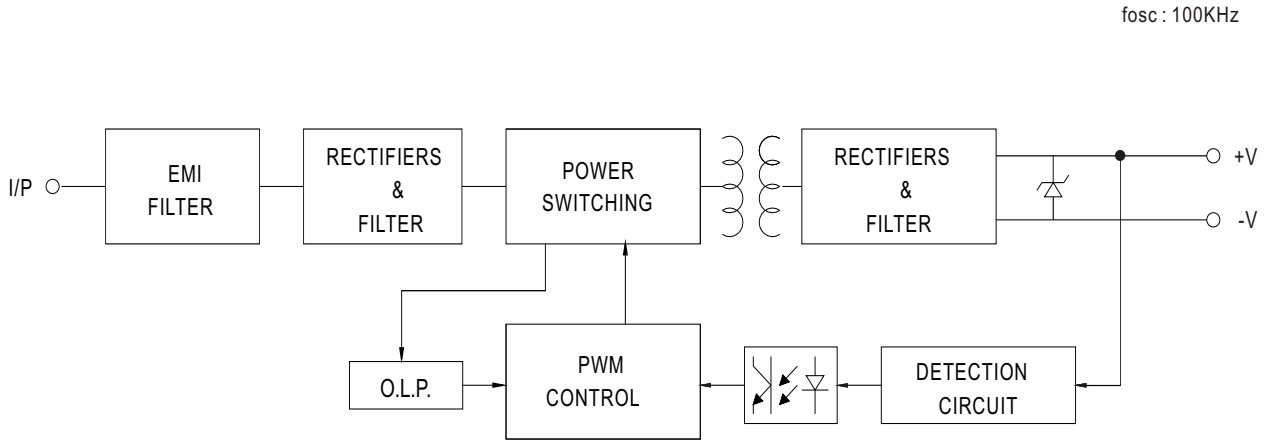
**MFM - 05 - 5**



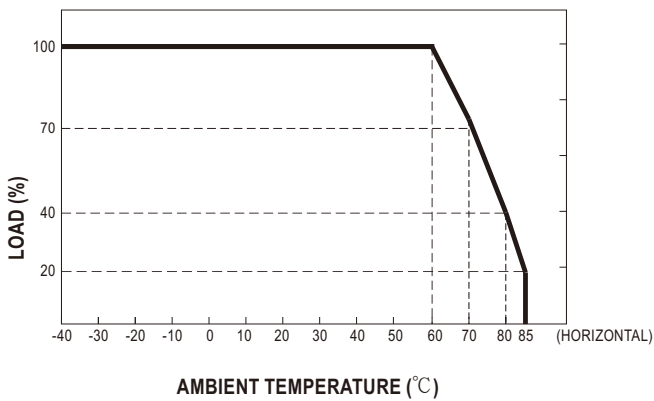
**SPECIFICATION**

| MODEL                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | MFM-05-3.3                                                                                                                                                                  | MFM-05-5                | MFM-05-12                                                              | MFM-05-15      | MFM-05-24                                                          |  |
|----------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------|----------------|--------------------------------------------------------------------|--|
| OUTPUT                                       | DC VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         | 3.3V                                                                                                                                                                        | 5V                      | 12V                                                                    | 15V            | 24V                                                                |  |
|                                              | RATED CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | 1.25A                                                                                                                                                                       | 1A                      | 0.42A                                                                  | 0.33A          | 0.23A                                                              |  |
|                                              | CURRENT RANGE <small>Note.2</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 0 ~ 1.25A                                                                                                                                                                   | 0 ~ 1A                  | 0 ~ 0.42A                                                              | 0 ~ 0.33A      | 0 ~ 0.23A                                                          |  |
|                                              | PEAK CURRENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 1.38A                                                                                                                                                                       | 1.1A                    | 0.46A                                                                  | 0.36A          | 0.25A                                                              |  |
|                                              | RATED POWER                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 4.1W                                                                                                                                                                        | 5W                      | 5W                                                                     | 5W             | 5.5W                                                               |  |
|                                              | PEAK LOAD(10sec.) <small>Note.3</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 4.6W                                                                                                                                                                        | 5.5W                    | 5.5W                                                                   | 5.4W           | 6W                                                                 |  |
|                                              | RIPPLE & NOISE (max.) <small>Note.4</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 100mVp-p                                                                                                                                                                    | 100mVp-p                | 150mVp-p                                                               | 150mVp-p       | 180mVp-p                                                           |  |
|                                              | VOLTAGE TOLERANCE <small>Note.5</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | ±2.5%                                                                                                                                                                       | ±2.5%                   | ±2.5%                                                                  | ±2.5%          | ±2.5%                                                              |  |
|                                              | LINE REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ±0.3%                                                                                                                                                                       | ±0.3%                   | ±0.3%                                                                  | ±0.3%          | ±0.3%                                                              |  |
|                                              | LOAD REGULATION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | ±0.5%                                                                                                                                                                       | ±0.5%                   | ±0.5%                                                                  | ±0.5%          | ±0.5%                                                              |  |
|                                              | SETUP, RISE TIME                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 1000ms, 30ms/230VAC    1000ms, 30ms/115VAC at full load                                                                                                                     |                         |                                                                        |                |                                                                    |  |
| HOLD UP TIME (Typ.)                          | 40ms/230VAC    12ms/115VAC at full load                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |                                                                                                                                                                             |                         |                                                                        |                |                                                                    |  |
| INPUT                                        | VOLTAGE RANGE <small>Note.6</small>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | 80 ~ 264VAC                                                                                                                                                                 |                         |                                                                        |                |                                                                    |  |
|                                              | FREQUENCY RANGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 47 ~ 440Hz                                                                                                                                                                  |                         |                                                                        |                |                                                                    |  |
|                                              | EFFICIENCY (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 74%                                                                                                                                                                         | 78%                     | 80%                                                                    | 81%            | 82%                                                                |  |
|                                              | AC CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 0.2A/115VAC    0.1A/230VAC                                                                                                                                                  |                         |                                                                        |                |                                                                    |  |
|                                              | INRUSH CURRENT (Typ.)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | COLD START    25A/115VAC    45A/230VAC                                                                                                                                      |                         |                                                                        |                |                                                                    |  |
| LEAKAGE CURRENT (max.) <small>Note.7</small> | Touch current <80µA/264VAC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                                                                             |                         |                                                                        |                |                                                                    |  |
| PROTECTION                                   | OVERLOAD                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | 110% ~ 180% rated output power<br>Protection type : Hiccup mode, recovers automatically after fault condition is removed                                                    |                         |                                                                        |                |                                                                    |  |
|                                              | OVER VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 3.8 ~ 5V                                                                                                                                                                    | 5.75 ~ 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.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | -40 ~ +85°C (Refer to "Derating Curve")                                                                                                                                     |                         |                                                                        |                |                                                                    |  |
|                                              | WORKING HUMIDITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | 20 ~ 90% RH non-condensing                                                                                                                                                  |                         |                                                                        |                |                                                                    |  |
|                                              | STORAGE TEMP., HUMIDITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | -40 ~ +100°C, 10 ~ 95% RH non-condensing                                                                                                                                    |                         |                                                                        |                |                                                                    |  |
|                                              | TEMP. COEFFICIENT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | ±0.03%/°C (0 ~ 60°C)                                                                                                                                                        |                         |                                                                        |                |                                                                    |  |
|                                              | SOLDERING TEMPERATURE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              | Wave soldering: 265°C, 5s (max.); Manual soldering: 390°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 <small>(Note 9)</small>         | SAFETY STANDARDS                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | IEC60601-1, BS EN/EN60601-1, EAC TP TC 004, UL ANSI/AAMI ES60601-1(3.1 version), CAN/CSA-C22 3 <sup>rd</sup> Edition approved ; Design refer to BS EN/EN60335-1(by request) |                         |                                                                        |                |                                                                    |  |
|                                              | ISOLATION LEVEL                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Primary-Secondary: 2xMOPP                                                                                                                                                   |                         |                                                                        |                |                                                                    |  |
|                                              | WITHSTAND VOLTAGE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | I/P-O/P:4KVAC                                                                                                                                                               |                         |                                                                        |                |                                                                    |  |
|                                              | ISOLATION RESISTANCE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | I/P-O/P:100M Ohms / 500VDC / 25°C / 70% RH                                                                                                                                  |                         |                                                                        |                |                                                                    |  |
|                                              | EMC EMISSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | Parameter                                                                                                                                                                   | Standard                |                                                                        |                | Test Level / Note                                                  |  |
|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Conducted                                                                                                                                                                   | BS EN/EN55011 (CISPR11) |                                                                        |                | Class B                                                            |  |
|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Radiated                                                                                                                                                                    | BS EN/EN55011 (CISPR11) |                                                                        |                | Class B                                                            |  |
|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Harmonic Current                                                                                                                                                            | BS EN/EN61000-3-2       |                                                                        |                | Class A                                                            |  |
|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Voltage Flicker                                                                                                                                                             | BS EN/EN61000-3-3       |                                                                        |                | ----                                                               |  |
|                                              | EMC IMMUNITY                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | BS EN/EN55035, BS EN/EN60601-1-2                                                                                                                                            |                         |                                                                        |                |                                                                    |  |
|                                              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 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                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | 9337.3K hrs min.    Telcordia SR-332 (Bellcore) ; 1799.5K hrs min.    MIL-HDBK-217F (25°C)                                                                                  |                         |                                                                        |                |                                                                    |  |
|                                              | DIMENSION                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          | 42*22.3*20.5mm (L*W*H) or 1.65**0.88*0.80" inch                                                                                                                             |                         |                                                                        |                |                                                                    |  |
|                                              | PACKING                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | 0.018Kg; 270pcs/5.8Kg/0.94CUFT                                                                                                                                              |                         |                                                                        |                |                                                                    |  |
| NOTE                                         | <p>1. All parameters NOT specially mentioned are measured at 230VAC input, rated load and 25°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 0.1µf &amp; 47µf 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°C/1000m with fanless models and of 5°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> |                                                                                                                                                                             |                         |                                                                        |                |                                                                    |  |

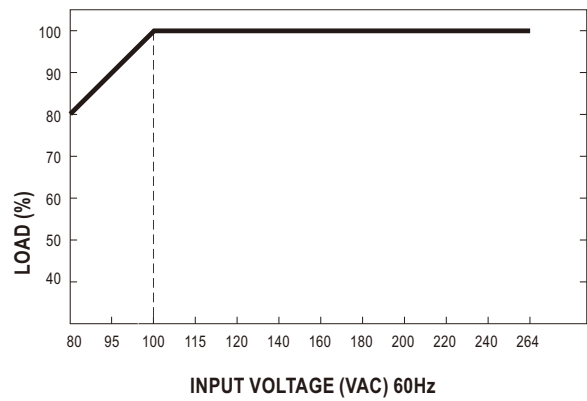
## Block Diagram



## Derating Curve

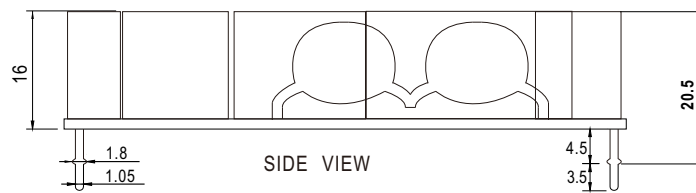
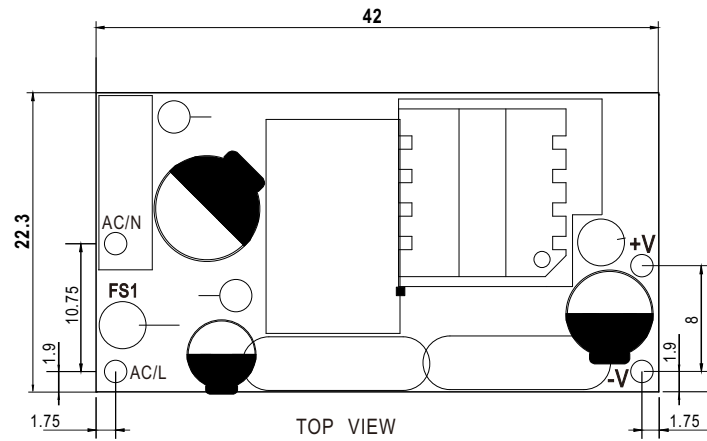


## Output Derating VS Input Voltage



## ■ Mechanical Specification

Unit: mm



## ■ Installation Manual

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