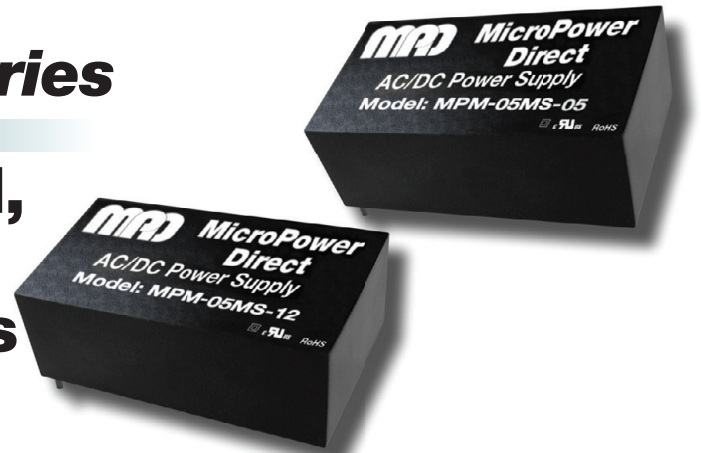


# MPM-05M Series

## Compact Encapsulated, Medical Approved, 5W AC/DC Power Supplies



### Key Features:

- 5W Output Power
- EN 60601-1 3<sup>RD</sup> Edition
- Universal 85-264 VAC Input
- Reinforced Insulation (2xMOPP)
- Meets IEC Safety Class II
- Short Circuit Protection
- Over Current Protection
- Over Voltage Protection
- Low Leakage Current
- -25°C to +70°C Operation



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### Electrical Specifications

Specifications typical @ +25°C, 230 VAC input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

#### Input

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range		85		264	VAC
		100		370	VDC
Input Frequency		47		63	Hz
Inrush Current, See Note 2	115 VAC		10		A Pk
	230 VAC		20		
No Load Power Consumption				0.3	W

#### Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±2.0		%
Line Regulation	V <sub>IN</sub> = Min to Max		±0.5		%
Load Regulation	I <sub>OUT</sub> = 10% to 100%		±1.0		%
Ripple & Noise (20 MHz)	See Note 3		50	100	mV Pk-Pk
Hold-Up Time	115 VAC, 60 Hz		10		mS
	230 VAC, 50 Hz		80		
Temperature Coefficient			±0.02		%/°C
Overload Protection	Autorecovery	110		280	% I <sub>NOM</sub>
Short Circuit Protection	Continuous (Autorecovery)				

#### General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	Input to Output, 60S	4,000			VAC rms
Leakage Current			80		μA
Isolation Resistance	500 VDC	1,000			MΩ
Switching Frequency			140		kHz

#### Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-25	+25	+70	°C
Maximum Case Temperature	Case			+95	°C
Storage Temperature Range		-40		+95	°C
Cooling	Free Air Convection (See Derating Curve)				
Humidity	RH, Non-condensing			95	%RH
Lead Temperature	See Note 4		260		°C
			360		

#### Physical

Case Size	See Mechanical Diagram (Page 4)
Case Material	Non-Conductive Plastic Resin (UL94-V0)
Weight	1.52 Oz (43g)

#### Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	300			kHours
Safety Standards	UL 60601, EN 60601				
Safety Class	Class II				
Insulation Level	2XMOPP				

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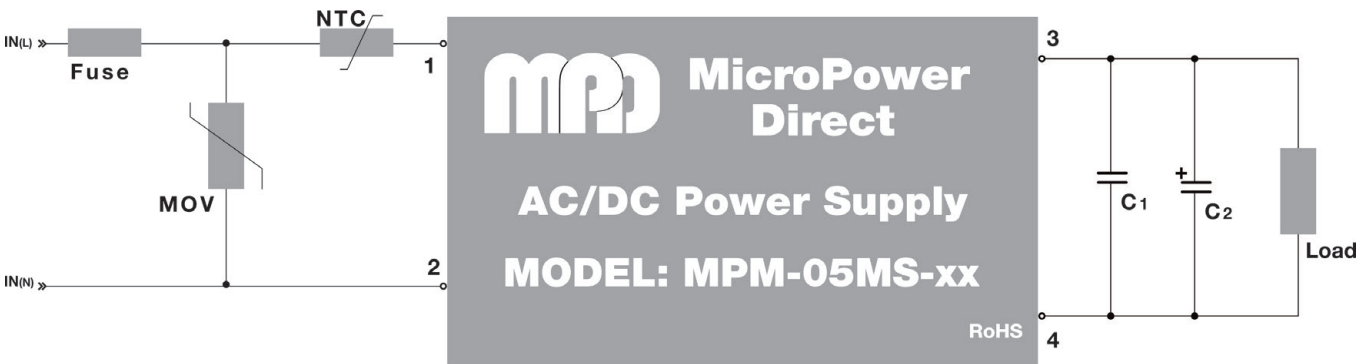
Model Number	Input Current (mA Typ)		Output			Capacitive Load (μF, Max)	Over Voltage Protection (VDC, Max)	Efficiency (% Typ)
	115 VAC	230 VAC	Voltage (VDC)	Current (mA)				
				Max.	Min.			
MPM-05MS-05	120	70	5.0	1,000	0.00	4,000	7.5	76
MPM-05MS-12	120	70	12.0	420	0.00	820	16.0	80
MPM-05MS-15	120	70	15.0	333	0.00	820	20.0	81
MPM-05MS-24	120	70	24.0	230	0.00	330	30.0	81

**Notes:**

1. Operation at no load will not damage the units, however, they may not meet all specifications.
2. Inrush current is given for a cold start at 25°C.
3. When measuring output ripple, it is recommended that an external 0.1 μF high frequency ceramic capacitor be placed in parallel with a 47 μF high frequency electrolytic capacitor from the +V<sub>OUT</sub> pin to the -V<sub>OUT</sub> pin.
4. The max lead temp for wave soldering is ±5% for a time period of 5 to 10S. For hand soldering, it is ±10% for 3 to 5S.
5. All units are rated for EN 55022 (CE/RE) class B without external components.
6. All units are rated for EN 61000-4-4 (±2 kV) with the addition of the MOV and NTC shown in the typical connection below. They will meet EN 61000-4-4 (±4 kV) with the additional input components shown in the typical connection diagram shown on page 3.
7. All units are rated for EN 61000-4-5 (±1 kV) with the addition of the MOV and NTC shown in the typical connection below. They will meet EN 61000-4-5 (±2 kV / ±4 kV) with the input components shown in the typical connection diagram on page 3.
8. It is recommended that a fuse be used on the input of a power supply for protection. For the **MPM-05MS** series, a 2.0A/250 VAC slow blow should be used.

MPD offers a wide variety of input protection and filtering modules for use with our AC & DC power modules. The **MACFM-02A** may be used with the **MPM-05MS**, as shown on page 3. Full datasheets for all our input modules are available on our website, or call the factory for a more help.

**Typical Connection**

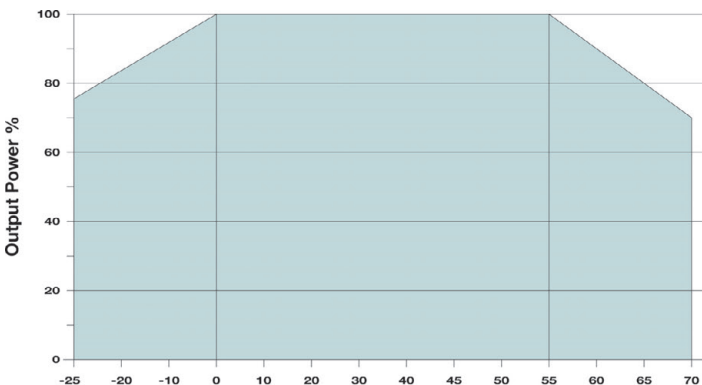


The diagram above illustrates a typical application connection of the **MPM-05MS** series. Notes on this circuit (starting with the input circuit) are:

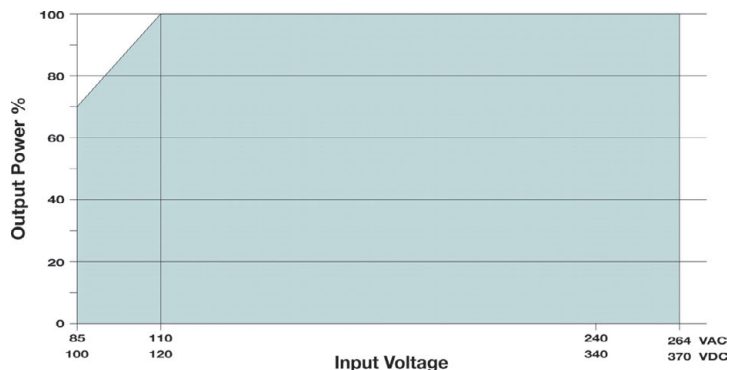
1. It is recommended that an external fuse and NTC be used. The recommended fuse is a 2.0A/250 VAC slow blow. The NTC is a 5D9.
2. All units are rated for EN 55022 (CE/RE) class B without external components.
3. All units are rated for EN 61000-4-4 (±2 kV) with the addition of the MOV and NTC shown in the typical connection above. They will meet EN 61000-4-4 (±4 kV) with the additional input components shown in the typical connection diagram shown on page 3.
4. All units are rated for EN 61000-4-5 (±1 kV/±2 kV) with the addition of the MOV and NTC shown in the typical connection above.
5. If output noise levels lower than the specified limits are required, the addition of C<sub>1</sub> and C<sub>2</sub> should be sufficient for most applications. The recommended values are shown in the table at right. The output filtering capacitor C<sub>2</sub> is a high frequency, low resistance electrolytic capacitor. Capacitor C<sub>1</sub> is ceramic. Voltage derating of capacitors should be 80% or above.
6. The TVS is added to protect circuits being powered from damage if the module fails.

Model	C <sub>1</sub>	C <sub>2</sub>
MPM-05MS-05	1.0 μF/50V	220 μF/10V
MPM-05MS-12	1.0 μF/50V	100 μF/25V
MPM-05MS-15	1.0 μF/50V	100 μF/25V
MPM-05MS-24	1.0 μF/50V	47 μF/35V

**Derating Curve**



**Input Voltage Vs Load**

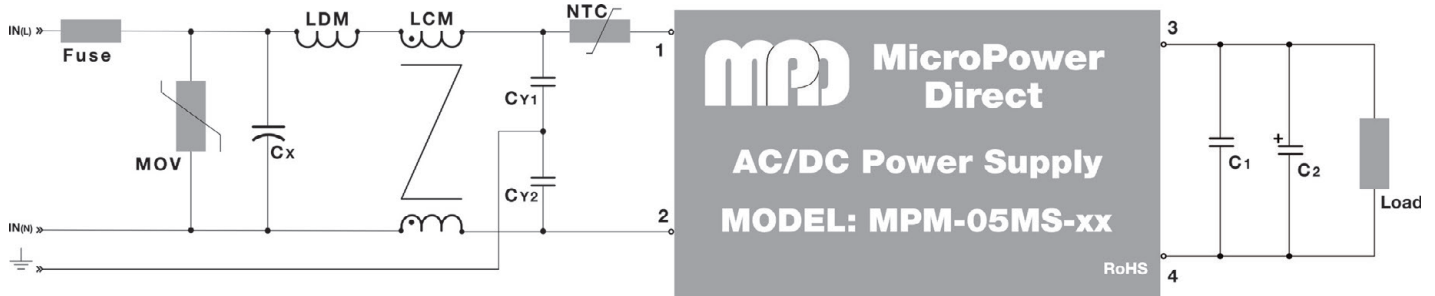


Parameter	Conditions	Criteria	Level
Radiated Emissions	EN 55022		Class B
Conducted Emissions	EN 55022		Class B
ESD	EN 61000-4-2	B	±8 kV Air ±6 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT, See Note 1	EN 61000-4-4	B	±2 kV
		B	±4 kV
Surge, See Note 2	EN 61000-4-5	B	±1 kV/±2 kV
		B	±2 kV/±4 kV
CS	EN 61000-4-6	A	10V rms
PFM	EN 61000-4-8	A	10A/m
Voltage Dips, Short, Interruptions	EN 61000-4-11	B	0% - 70%

Notes:

- To meet the requirements of EN 61000-4-4 (±4 kV), external components are needed. This can be done discretely (as shown below), or with the addition of the **MACFM-02A**. Contact the factory for more information.
- To meet the requirements of EN 61000-4-5 (±2 kV/ ±4 kV), external components are needed. This can be done discretely (as shown below), or with the addition of the **MACFM-02A**. Contact the factory for more information.

Typical Connection: With Input Protection/Filtering Components



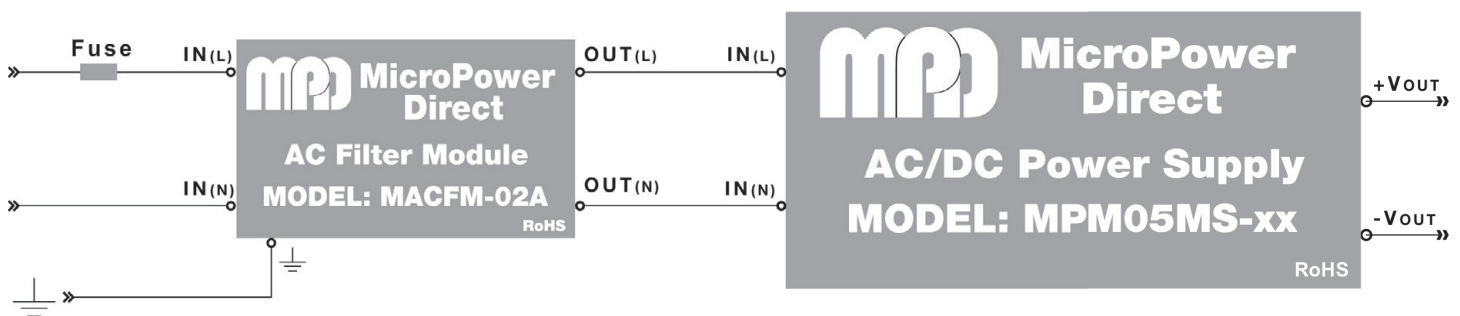
The diagram above illustrates a typical connection of the **MPM-05SV** series. The input components are required to meet the more stringent EFT/Surge levels of EN 61000-4 (see notes for EMC Characteristics table above). Some notes on these components are:

- It is recommended that an external fuse be used. The recommended fuse size is a 1.0A/300 VAC slow blow.
- An external MOV is recommended on the input to protect the unit in the event of a surge. A recommended value is given in the table at right.
- The output filtering capacitors (C1 & C2) will reduce the output noise below specified levels. Recommended values are given in the table on page 2.
- Input protection and filtering modules are available for a number of **MPD** AC/DC power supplies. For use with the **MPM-05MS** product series, the **MACFM-02A** filter module is recommended. A typical connection diagram and board layout with this module is shown in the figures below. For pricing or full technical information on the **MACFM-02A** (or any of our other modules) please contact the factory.

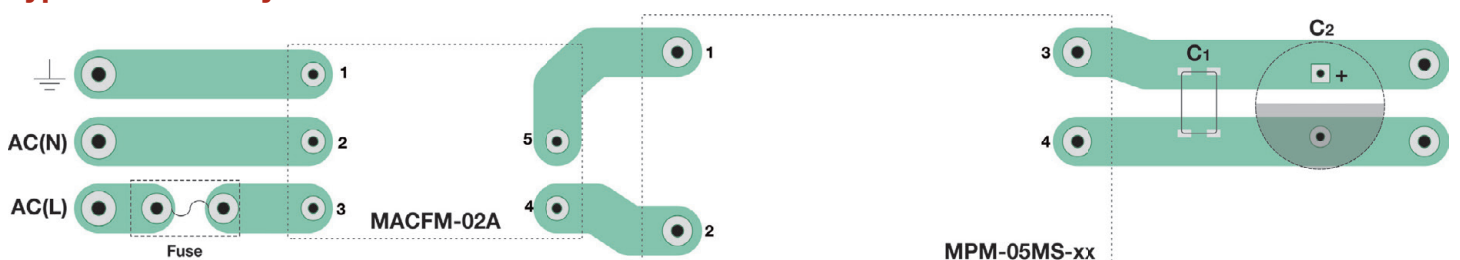
5. Suggested component values are:

Component	MPM-05MS-05	MPM-05MS-12	MPM-05SV-15	MPM-05MS-24
Fuse	2.0A/250 VAC	2.0A/250 VAC	2.0A/250 VAC	2.0A/250 VAC
MOV	S14K300	S14K300	S14K300	S14K300
Cx	0.1 $\mu$ F/275V	0.1 $\mu$ F/250V	0.1 $\mu$ F/250V	0.1 $\mu$ F/250V
LDM	4.7 $\mu$ H/2A	4.7 $\mu$ H/2A	4.7 $\mu$ H/2A	4.7 $\mu$ H/2A
LCM	2.2 mH	2.2 mH	2.2 mH	2.2 mH
Cy1/Cy2	1.0 nF/400 VAC	1.0 nF/400 VAC	1.0 nF/400 VAC	1.0 nF/400 VAC
NTC	5D-9	5D-9	5D-9	5D-9

Typical Board Layout: With External Filter Module

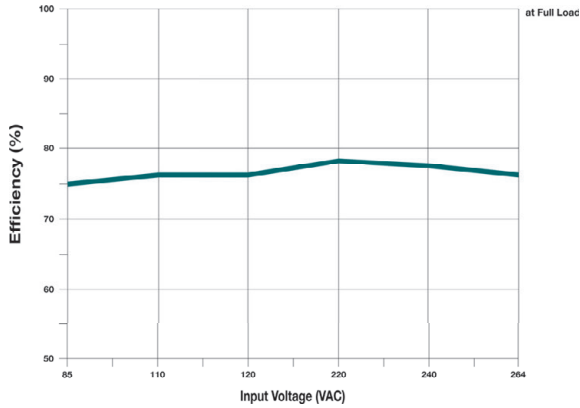


Typical Board Layout: With External Filter Module

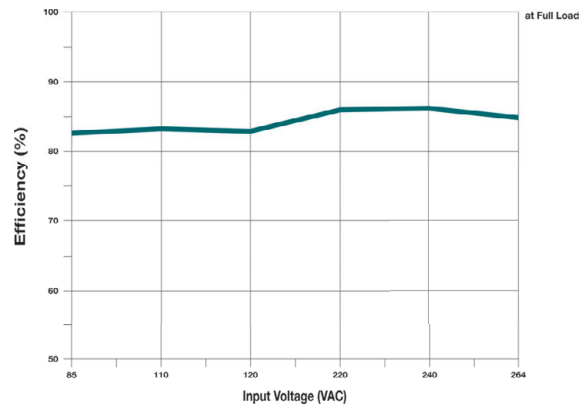


- The width of circuit traces should be a minimum of 3 mm.
- The distance between traces should be a minimum of 6 mm.
- The distance between a trace and ground should be a minimum of 6 mm.

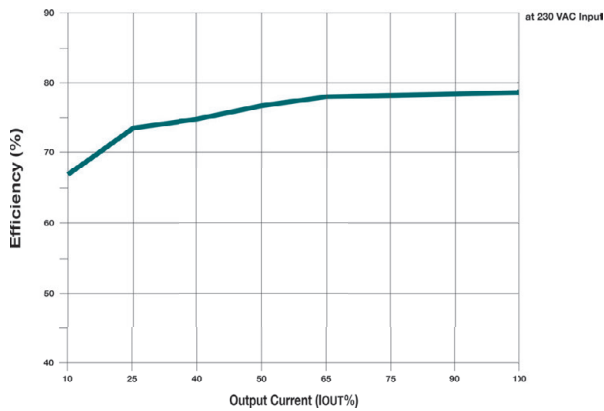
Efficiency Vs Input Voltage: MPM-05MS-05



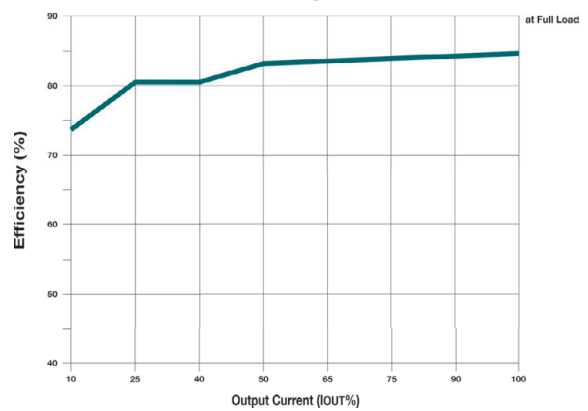
Efficiency Vs Input Voltage: MPM-05MS-24



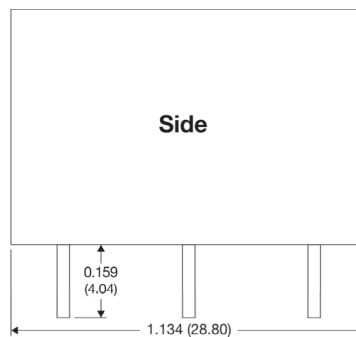
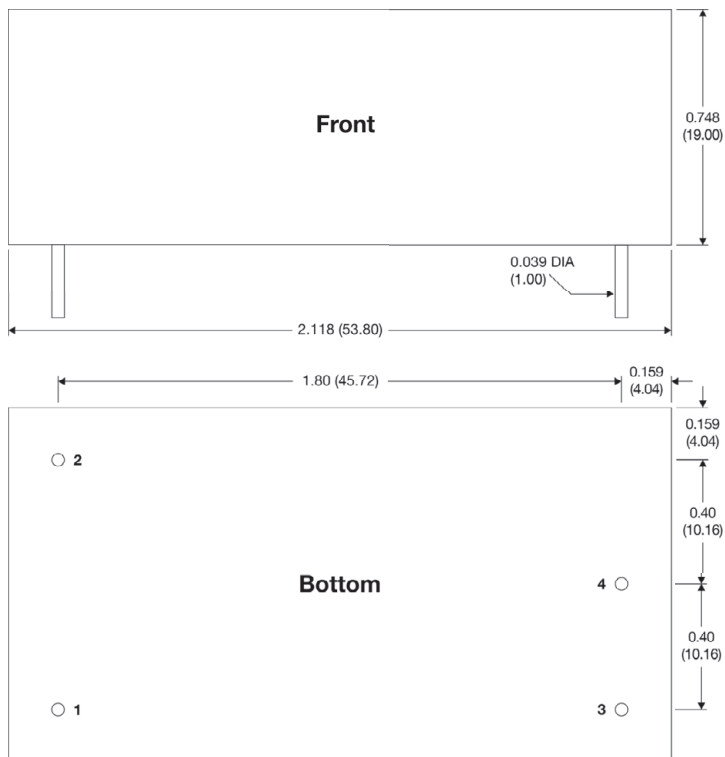
Efficiency Vs Output Load: MPM-05MS-05



Efficiency Vs Input Voltage: MPM-05MS-24



Mechanical Dimensions



Pin Connections

Pin	Function
1	AC Neutral
2	AC Line
3	+VOUT
4	-VOUT

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.5)



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