

MPM-05M Series



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

Key Features:

- 5W Output Power
- EN 60601-1 3RD 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 _{IN} = Min to Max		±0.5		%
Load Regulation	I _{OUT} = 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 _{NOM}
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)
			Voltage (VDC)	Current (mA)				
	115 VAC	230 VAC		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

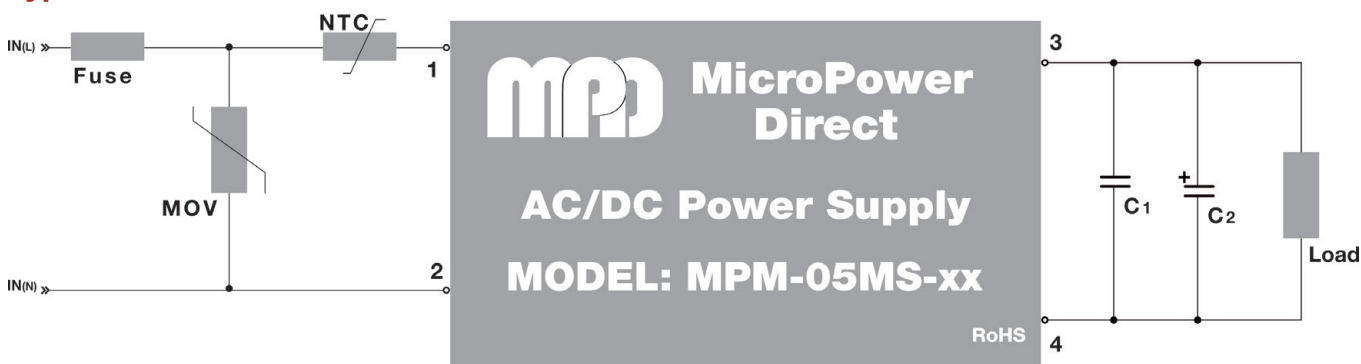
Notes:

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_{OUT} pin to the -V_{OUT} 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

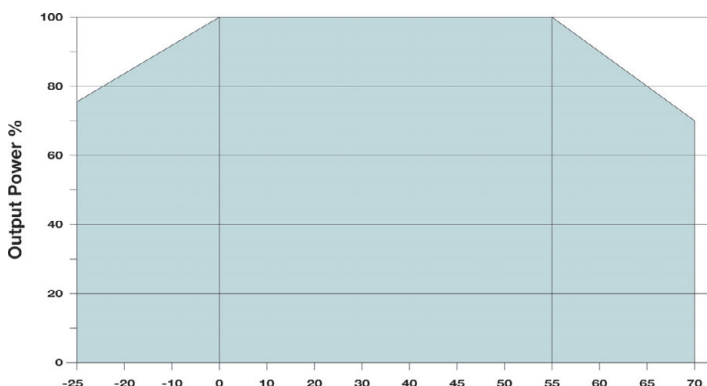


The diagram above illustrates a typical application connection of the **MPM-05MS** series. Notes on this circuit (starting with the input circuit) are:

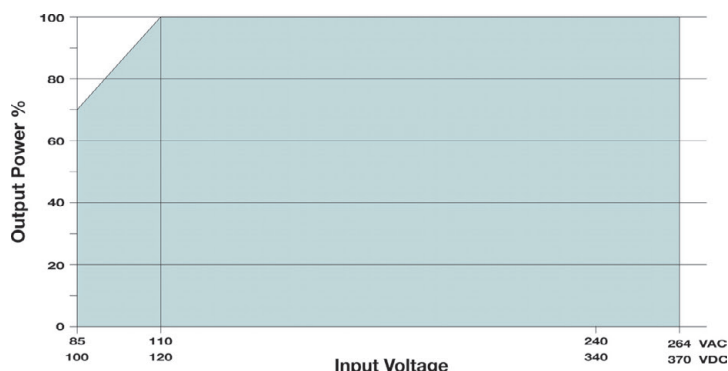
1. It is recommended that an external fuse and NTC be used. The recommended fuse is a 2.0A/250 VAC slow blow. The NTC a 5D9.
2. All units are rated for EN 55022 (CE/RE) class B without external components.
3. All units are rated for EN 61000-4-4 (±2 kV) with the addition of the MOV and NTC shown in the 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 C₁ and C₂ should be sufficient for most applications. The recommended values are shown in the table at right. The output filtering capacitor C₂ is a high frequency, low resistance electrolytic capacitor. Capacitor C₁ 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 ₁	C ₂
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



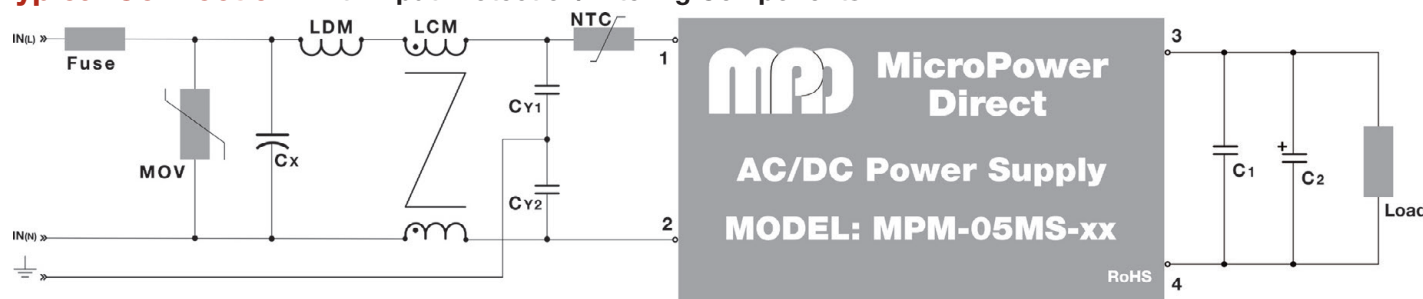
Input Voltage Vs Load



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:

1. 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.
2. 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.

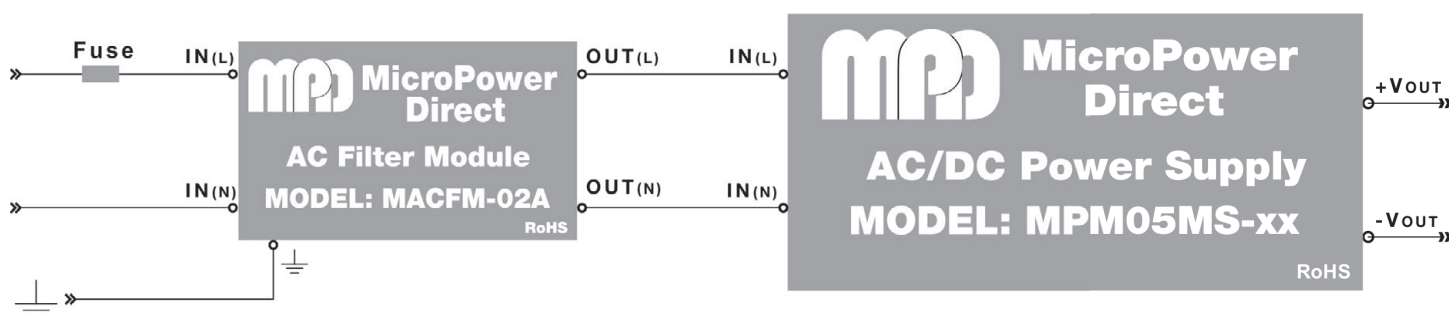
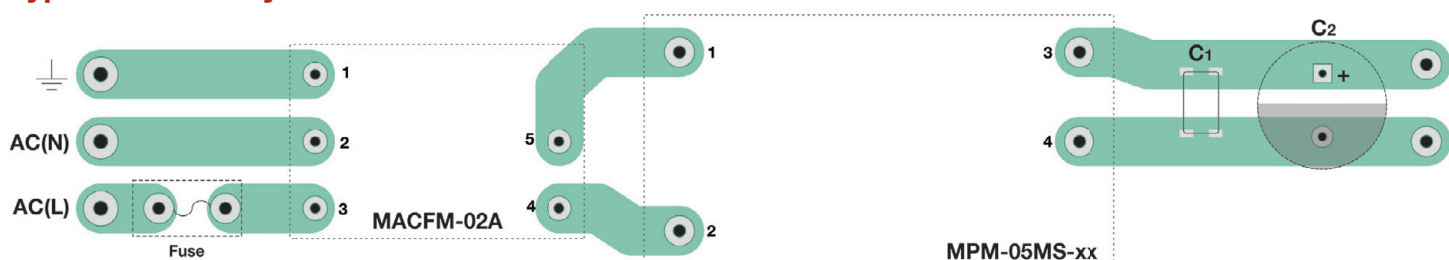
Typical Connection: With Input Protection/Filtering Components

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:

1. It is recommended that an external fuse be used. The recommended fuse size is a 1.0A/300 VAC slow blow.
2. 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.
3. The output filtering capacitors (C1 & C2) will reduce the output noise below specified levels. Recommended values are given in the table on page 2.
4. 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.

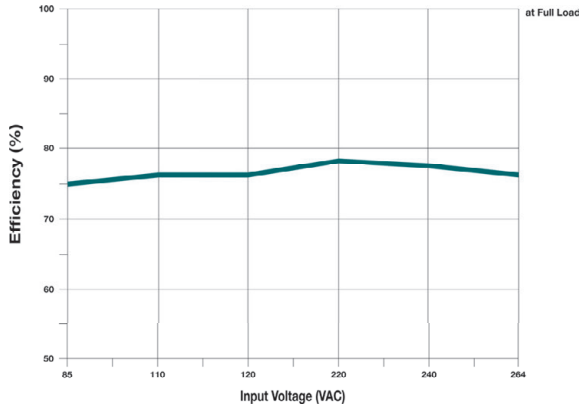
5. Suggested component values are:

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 μ F/275V	0.1 μ F/250V	0.1 μ F/250V	0.1 μ F/250V
LDM	4.7 μ H/2A	4.7 μ H/2A	4.7 μ H/2A	4.7 μ 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

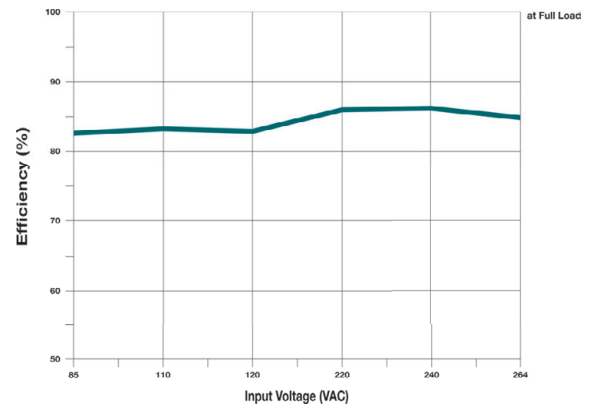
Typical Board Layout: With External Filter Module**Typical Board Layout: With External Filter Module**

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

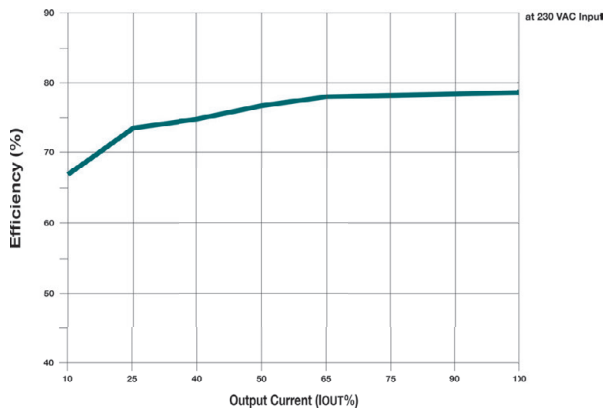
Efficiency Vs Input Voltage: MPM-05MS-05



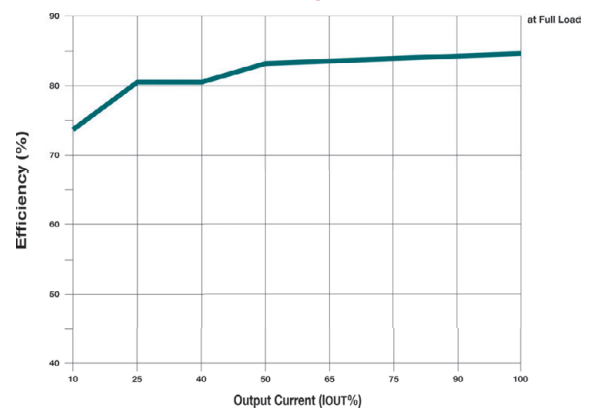
Efficiency Vs Input Voltage: MPM-05MS-24



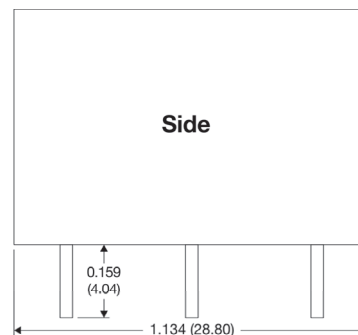
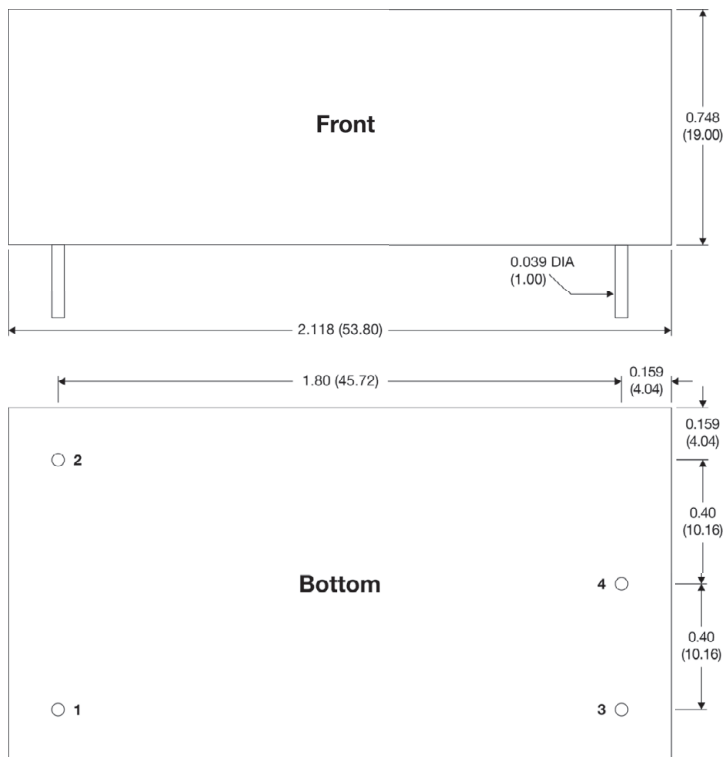
Efficiency Vs Output Load: MPM-05MS-05



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)