

# MPM20SEP B Series

## Very Compact, 20W High Performance, AC/DC Power Supplies



### Key Features:

- 20W Output Power
- Compact 1.1 x 2.1 Inch Case
- Universal 85-264 VAC Input
- EN 62368 Approved (UL)
- Meets IEC Safety Class II
- Industry Standard Pin-Out
- Meets EN 55032 Class B
- >300 kHour MTBF
- Chassis Mount Available
- DIN Rail Mount Available
- **Low Cost**



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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
Input Current	See Model Selection Guide				
Inrush Current	115 VAC		12.0		A Pk
	230 VAC		36.0		

Output					
Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage	See Model Selection Guide				
Output Current	See Model Selection Guide				
Minimum Load		0			%
Output Voltage Accuracy	3.3 V <sub>OUT</sub> Output		±3.0		%
	All Other Models		±2.0		
Line Regulation	See Note 2		±0.5		%
Load Regulation	I <sub>OUT</sub> = 0% to 100%		±1.0		%
Ripple & Noise (20 MHz)	See Note 3		50	120	mV Pk - Pk
Hold-Up Time	115 VAC	5	10		mSec
	230 VAC	44	55		
Temperature Coefficient			±0.02		%/°C
Overload Protection	Autorecovery	110			%I <sub>OUT</sub>
Short Circuit Protection, See Note 4	Continuous (Autorecovery)				

General					
Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, See Note 5	Input to Output	4,000			VAC
Switching Frequency			100		kHz

Environmental					
Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+70	°C
Storage Temperature Range		-40		+85	°C
Cooling	Free Air Convection (See Derating Curve)				
Humidity	RH, Non-condensing			95	%

Physical					
Parameter	Conditions	Min.	Typ.	Max.	Units
Case Size		See Mechanical Diagram (Page 5, 6)			
Case Material		Non-Conductive Black Plastic (UL94-V0)			
Weight		See Mechanical Diagram (Page 5, 6)			

Reliability Specifications					
Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	300			kHours
Lead Temperature, See Note 6	Wave Solder			260	°C
	Hand Solder			360	
Safety Standards	UL/cUL 62368-1 recognition (UL certificate)				
Safety Class	IEC 60536 Class II				

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Model Number	Input		Output			Over Voltage Protection (VDC)	Capacitive Load (µF, Max)	Efficiency (230 VAC, %, Typ)	Fuse Rating Slow-Blow
	Current (A)		Voltage (VDC)	Current (A Max.)	Power (W)				
	115 VAC	230 VAC							
MPM-20S-03EPB	0.37	0.24	3.3	3.600	11.8	7.50	10,000	74	3.15A/250V
MPM-20S-05EPB	0.37	0.24	5.0	3.600	18.0	7.50	6,600	78	3.15A/250V
MPM-20S-09EPB	0.37	0.24	9.0	2.200	20.0	15.0	4,400	79	3.15A/250V
MPM-20S-12EPB	0.37	0.24	12.0	1.666	20.0	20.0	3,000	82	3.15A/250V
MPM-20S-15EPB	0.37	0.24	15.0	1.333	20.0	20.0	2,000	83	3.15A/250V
MPM-20S-24EPB	0.37	0.24	24.0	0.833	20.0	30.0	800	83	3.15A/250V

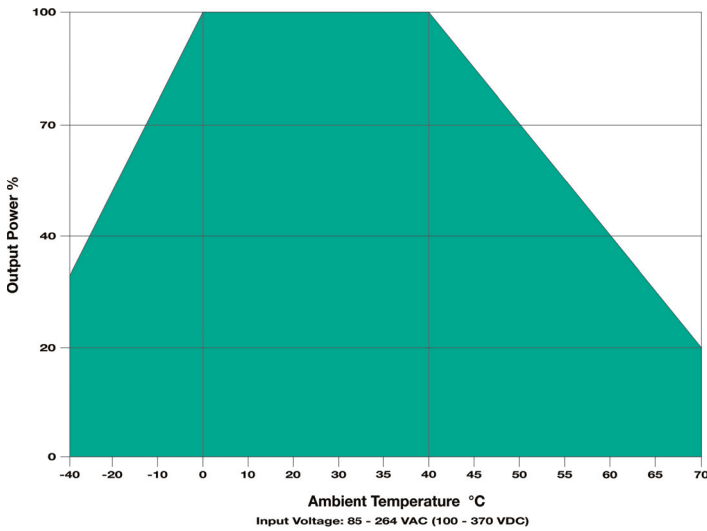
**Notes:**

- Operation at no load will not damage the units, however, they may not meet all specifications.
- Line regulation is measured with the unit at full load while the input is varied from 85 VAC to 264 VAC.
- 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.
- Output short circuit protection is provided by a "hiccup mode" circuit. The unit recovers automatically when the fault condition is removed.
- Input-output isolation is tested for 60 sec. with a leakage current of <5 mA.
- Lead temperature is specified for 5 to 10 seconds for wave soldering with a tolerance of ±5°C. For manual soldering it is specified for 3 to 5 seconds with a tolerance of ±10°C.
- It is recommended that a fuse be used on the input of a power supply for protection. For the MPM20SEPB series, a 3.15A/250 VAC slow blow should be used.

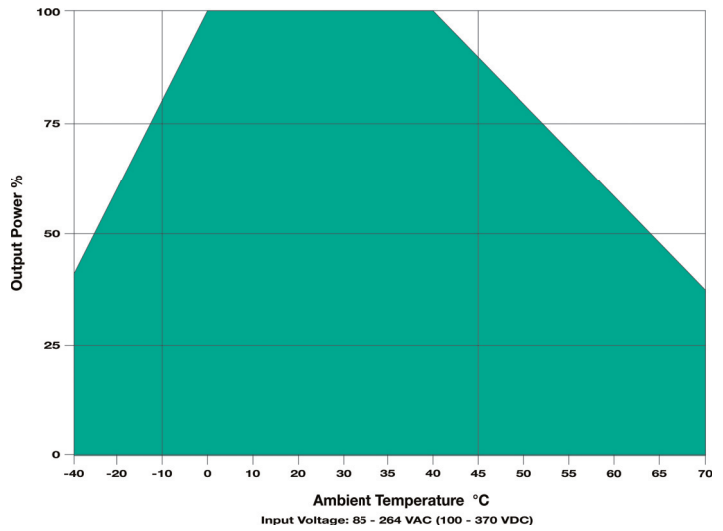
For the A2S adapter board option, add the suffix "-A2S" to the model number (i.e. MPM-20S-15EPB-A2S) See Page 5

For the A4S adapter board option, add the suffix "-A4S" to the model number (i.e. MPM-20S-24EPB-A4S) See Page 6

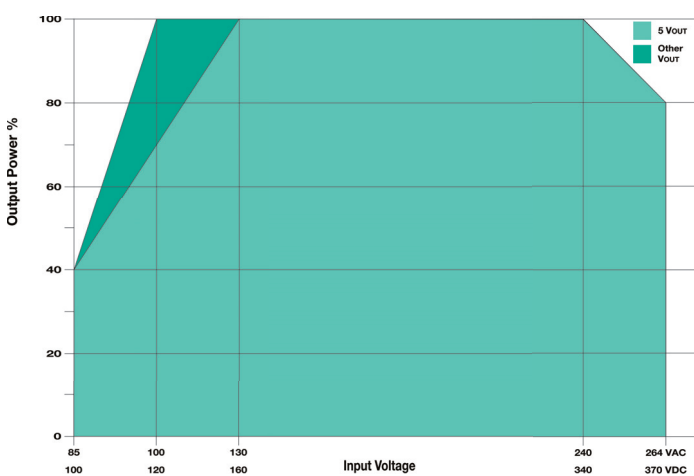
**Temperature Derating: 3.3 & 5 VOUT**



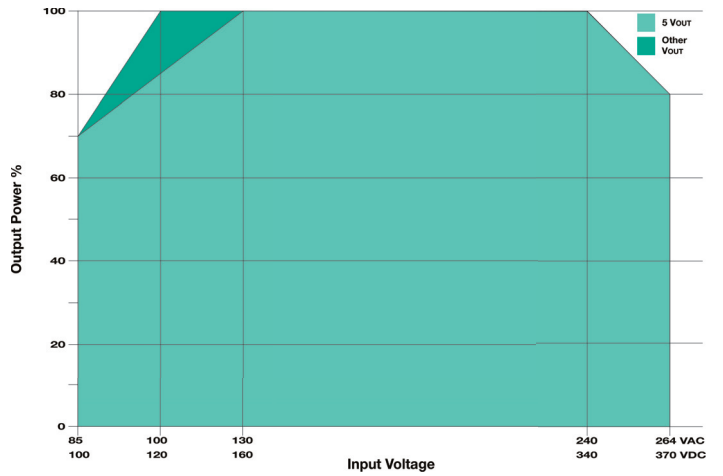
**Temperature Derating: All Other Models**



**Input Voltage Derating: -40°C to -25°C**



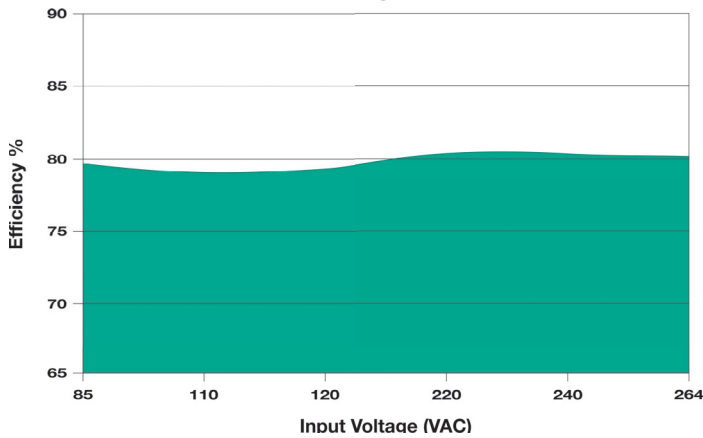
**Input Voltage Derating: -25°C to +70°C**



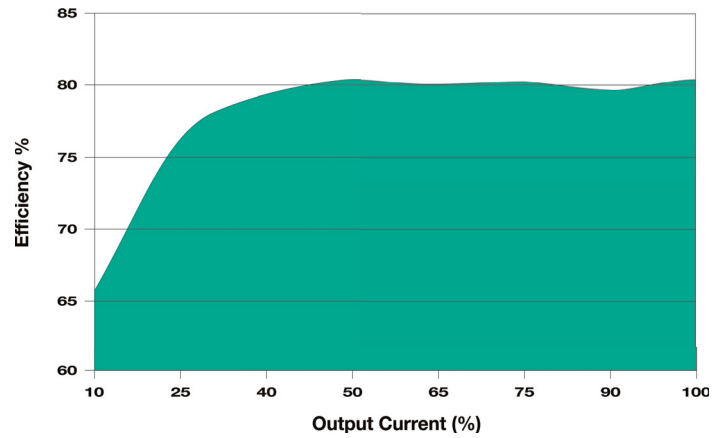
Parameter	Output Voltage	Min	Typ	Max	Units
-40°C to -0°C	All Models	1.67			%/°C
+45°C to +70°C	3.3 & 5.0 V <sub>OUT</sub>	2.66			%/°C
	All Other Models	2.33			

85 VAC to 130 VAC	5.0 V <sub>OUT</sub>	-40°C to -25°C	0.66		% /VAC
		-25°C to +70°C	1.33		
85 VAC to 100 VAC	All Other Models	-40°C to -25°C	2.0		% /VAC
		-25°C to +70°C	4.0		
240 VAC to 264 VAC	All Models	0.83			% /VAC

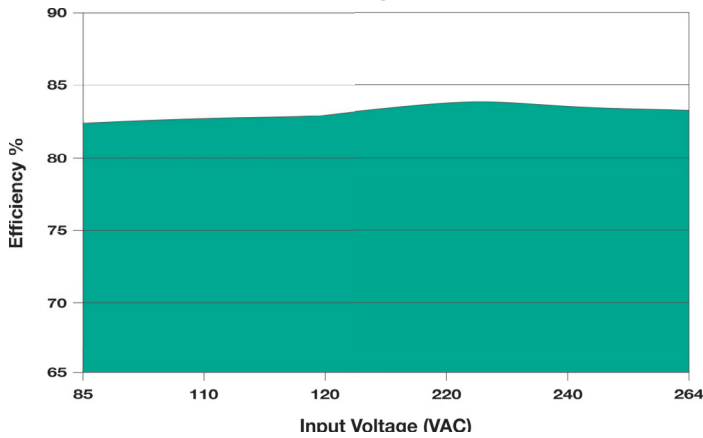
**Efficiency vs Input Voltage: 5 V<sub>OUT</sub> Models**



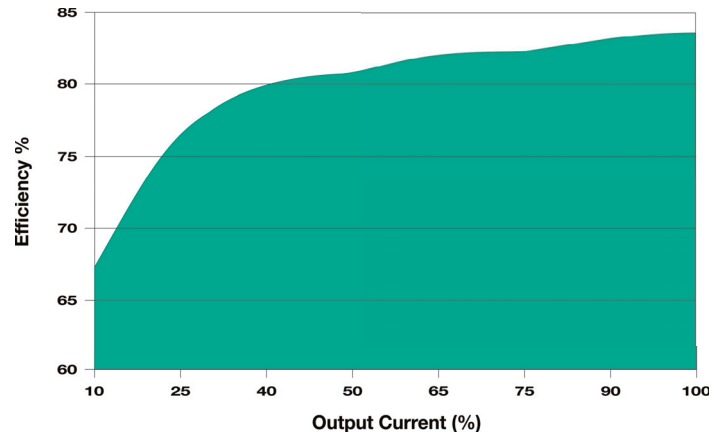
**Efficiency vs Output Load: 5 V<sub>OUT</sub> Models**



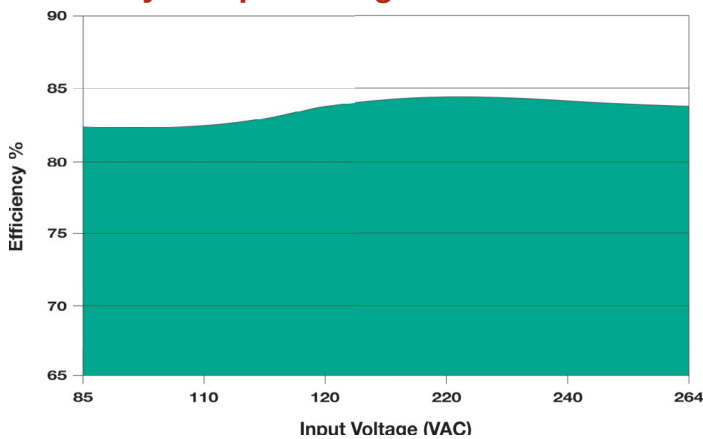
**Efficiency vs Input Voltage: 15 V<sub>OUT</sub> Models**



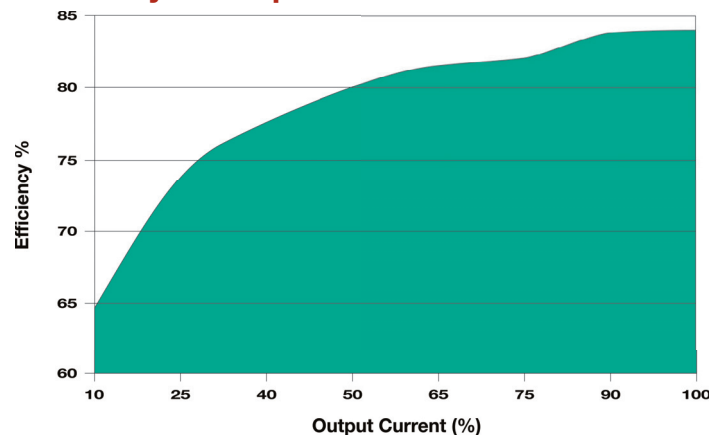
**Efficiency vs Output Load: 15 V<sub>OUT</sub> Models**



**Efficiency vs Input Voltage: 24 V<sub>OUT</sub> Models**



**Efficiency vs Output Load: 24 V<sub>OUT</sub> Models**



### Simple Connection



The diagram above illustrates a typical application connection of the MPM20SEPB series. Notes on this circuit (starting with the input circuit) are:

1. It is recommended that an external fuse be used. The suggested fuse is a 3.15A/250 VAC slow blow.
2. All units are rated for EN 55032 (CE/RE) class B without external components.
3. The MOV connected across the input protects the unit from possible line surges.
4. 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	MOV	C1	C2	TVS
MPM-20S-03EPB	S20K300	1.0 $\mu$ F/50V	220 $\mu$ F/16V	SMBJ7.0A
MPM-20S-05EPB	S20K300	1.0 $\mu$ F/50V	220 $\mu$ F/16V	SMBJ7.0A
MPM-20S-09EPB	S20K300	1.0 $\mu$ F/50V	120 $\mu$ F/25V	SMBJ12A
MPM-20S-12EPB	S20K300	1.0 $\mu$ F/50V	120 $\mu$ F/25V	SMBJ20A
MPM-20S-15EPB	S20K300	1.0 $\mu$ F/50V	120 $\mu$ F/25V	SMBJ20A
MPM-20S-24EPB	S20K300	1.0 $\mu$ F/50V	68 $\mu$ F/35V	SMBJ30A

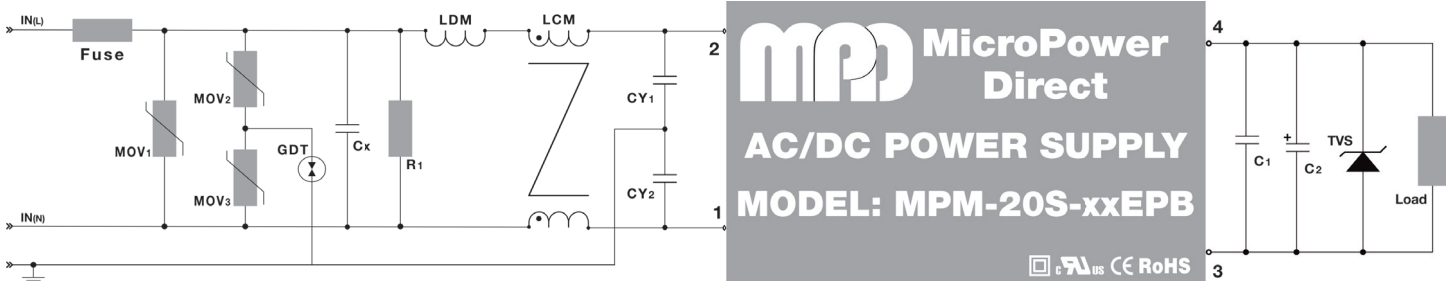
### EMI Characteristics

Parameter	Conditions	Criteria	Level
Radiated Emissions	EN 55032		Class B
Conducted Emissions	EN 55032		Class B
ESD	EN 61000-4-2	B	$\pm$ 8 kV Air
			$\pm$ 6 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT, See Note 1 At Right	EN 61000-4-4	B	$\pm$ 4 kV
Surge, See Note 2 At Right	EN 61000-4-5	B	$\pm$ 2 kV Line to Line
		B	$\pm$ 4 kV Line to Line
Surge, See Note 3 At Right	EN 61000-4-5	B	$\pm$ 6 kV Line to Grnd
		A	10V rms
CS	EN 61000-4-6	A	10V rms
Voltage Dips, Short, Interruptions	EN 61000-4-11	B	0% - 70%

#### Notes:

1. To meet the requirements of EN 61000-4-4 ( $\pm$ 4 kV), use the "Simple Connection" as shown above. Contact the factory for more information.
2. To meet the requirements of EN 61000-4-5 ( $\pm$ 2 kV line to line), use the "Simple Connection" as shown above. Contact the factory for more information.
3. To meet the requirements of EN 61000-4-5 ( $\pm$ 4 kV line to line,  $\pm$ 6 kV line to Grnd), use the "Typical Connection" as shown below. Contact the factory for more information.

### Typical Connection: With Input Protection/Filtering Components



The diagram above illustrates a typical connection of the MPM20SEPB 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:

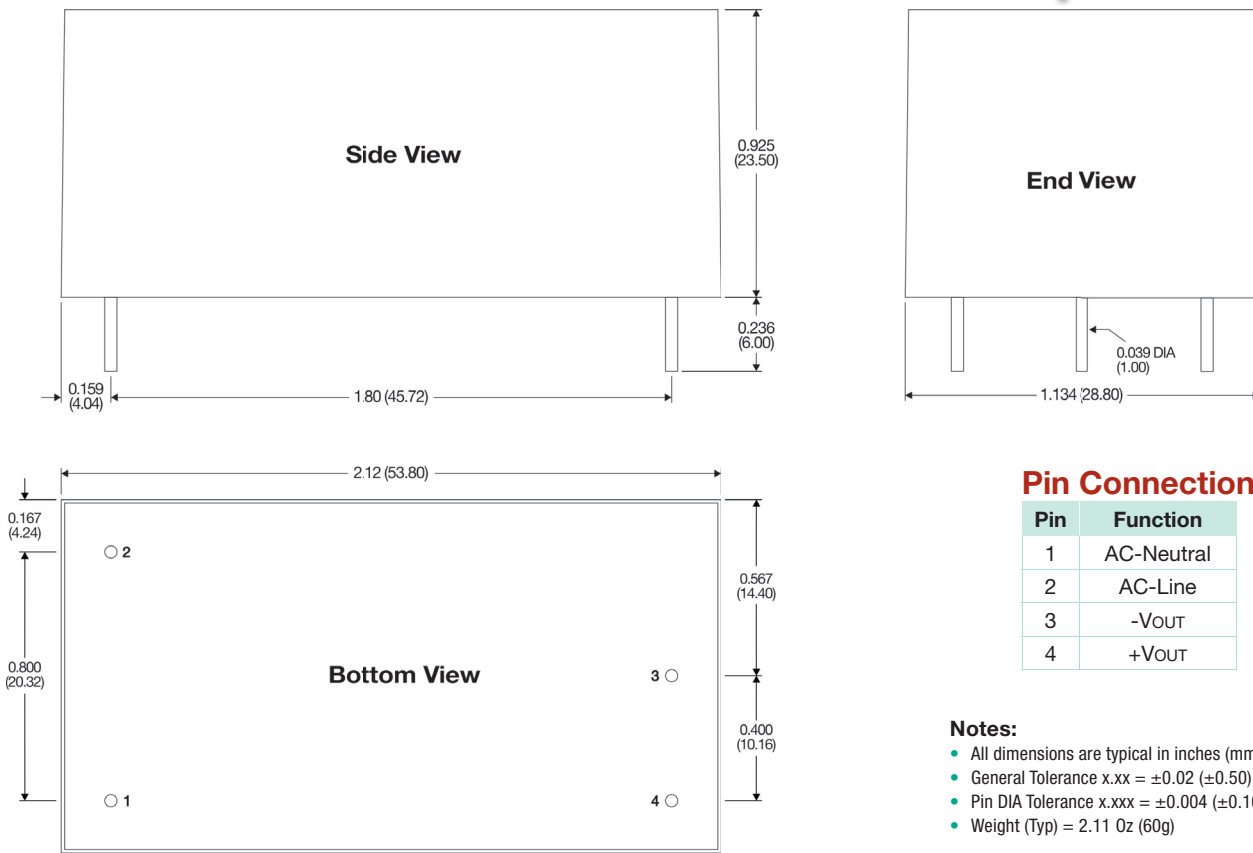
1. It's recommended that an external fuse be used. The suggested fuse size is a 3.15A/250 VAC slow blow.
2. All units are rated for EN 61000-4-4 ( $\pm$ 4 kV) with the addition of the MOV shown in the typical connection at the top of the page (MOV1 in the Typical Connection diagram).
3. All units are rated for EN 61000-4-5 ( $\pm$ 2 kV LL) with the addition of the MOV shown in the typical connection at the top of the page. They will meet EN 61000-4-5 ( $\pm$ 4 kV LL/ $\pm$ 6 kV LG) with the additional input components shown in the Typical Connection diagram shown above. All component values are given in the table at right.
4. The output filtering capacitors (C1 & C2) and TVS are discussed in the notes for the typical connection at the top of the page. Recommended values are given in the table above.

5. Suggested component values are:

Component	MPM-20S-03EPB	MPM-20S-05EPB	MPM-20S-09EPB	MPM-20S-12EPB	MPM-20S-15EPB	MPM-20S-24EPB
Fuse	6.3A/250 VAC	6.3A/250 VAC	6.3A/250 VAC	6.3A/250 VAC	6.3A/250 VAC	6.3A/250 VAC
MOV1	S20K300	S20K300	S20K300	S20K300	S20K300	S20K300
MOV2	S10K300	S10K300	S10K300	S10K300	S10K300	S10K300
MOV3	S10K300	S10K300	S10K300	S10K300	S10K300	S10K300
GDT	EM3600XS	EM3600XS	EM3600XS	EM3600XS	EM3600XS	EM3600XS
Cx	0.22 $\mu$ F/275VAC	0.22 $\mu$ F/275VAC	0.22 $\mu$ F/275VAC	0.22 $\mu$ F/275VAC	0.22 $\mu$ F/275VAC	0.22 $\mu$ F/275VAC
R1	1 M $\Omega$ /2W	1 M $\Omega$ /2W	1 M $\Omega$ /2W	1 M $\Omega$ /2W	1 M $\Omega$ /2W	1 M $\Omega$ /2W
LDM	4.7 $\mu$ H	4.7 $\mu$ H	4.7 $\mu$ H	4.7 $\mu$ H	4.7 $\mu$ H	4.7 $\mu$ H
LCM	2 mH	2 mH	2 mH	2 mH	2 mH	2 mH
CY1/CY2	1 nF/400 VAC	1 nF/400 VAC	1 nF/400 VAC	1 nF/400 VAC	1 nF/400 VAC	1 nF/400 VAC

6. Input protection and filtering modules are available for a number of MPD AC/DC power supplies. For pricing or full technical information please contact the factory.

## Mechanical Dimensions



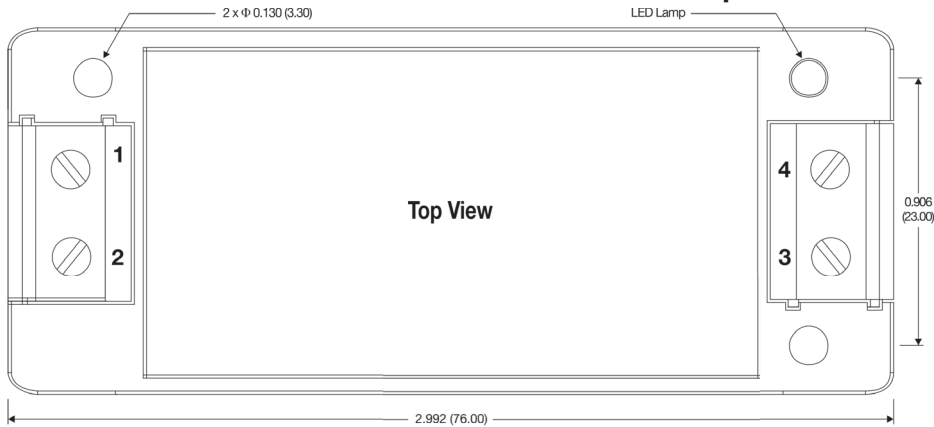
## Pin Connections

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

### Notes:

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.02 (±0.50)
- Pin DIA Tolerance x.xxx = ±0.004 (±0.100)
- Weight (Typ) = 2.11 Oz (60g)

## Mechanical Dimensions: A2S Chassis Mount Adapter

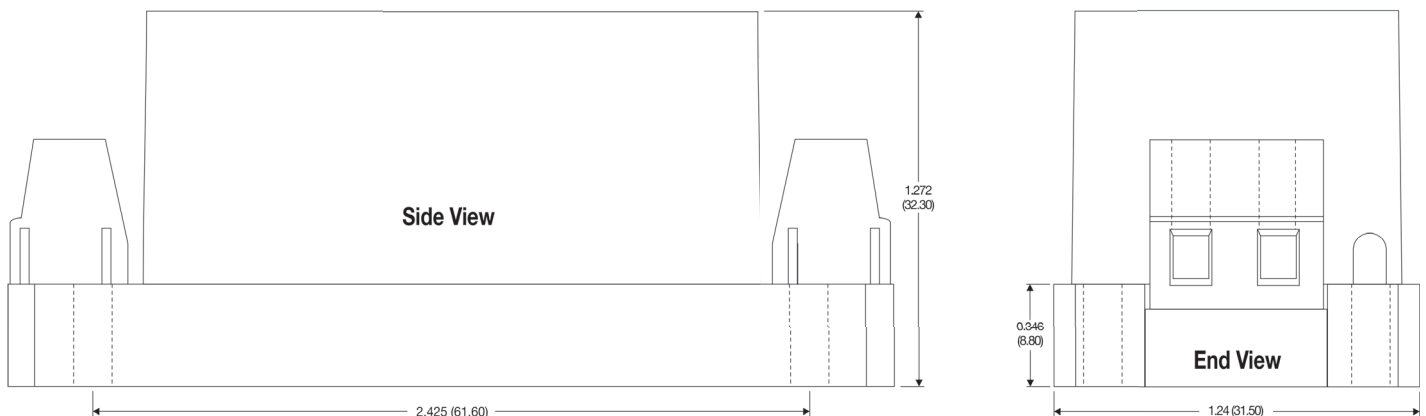


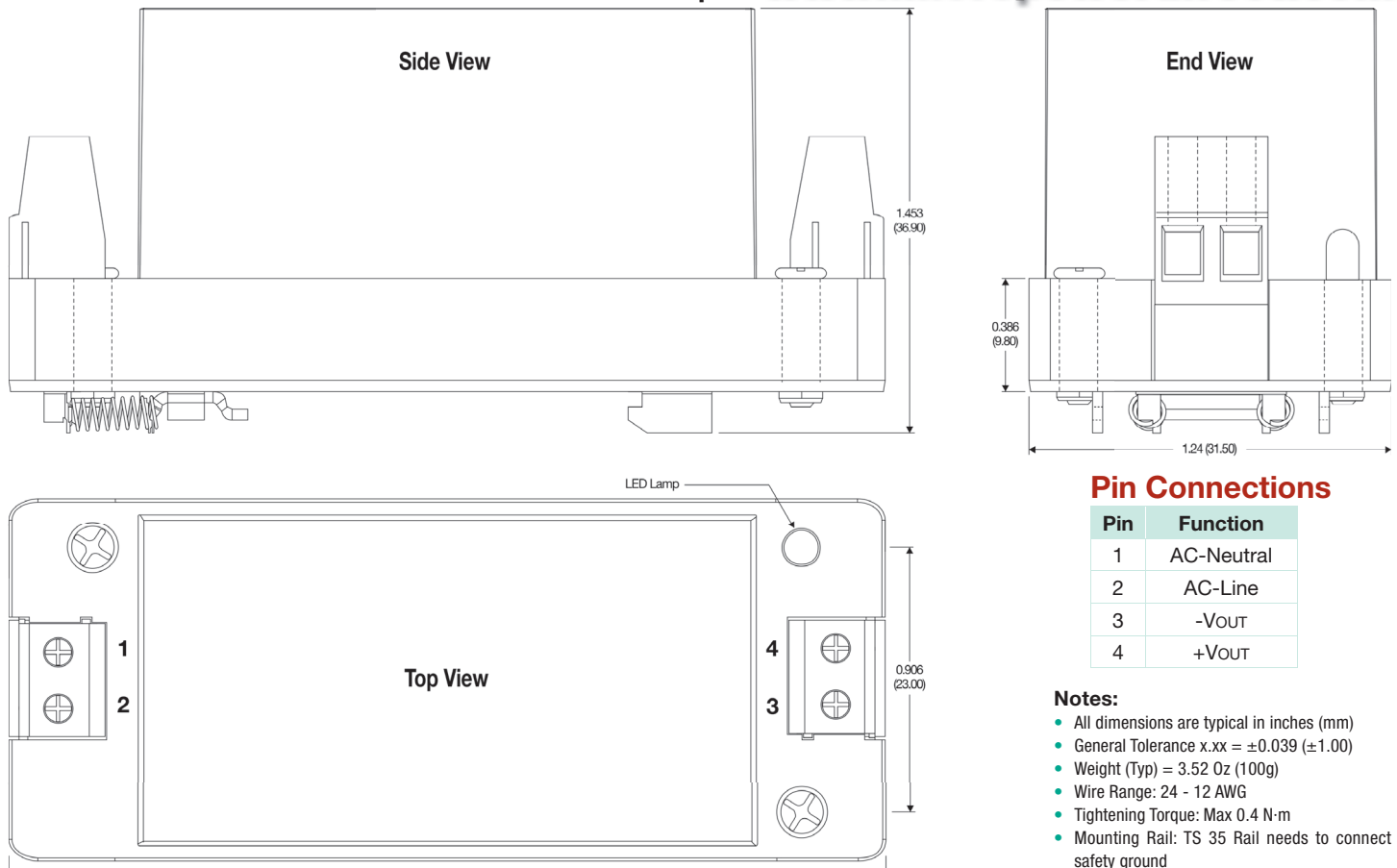
## Pin Connections

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

### Notes:

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.039 (±1.00)
- Weight (Typ) = 2.82 Oz (80g)
- Wire Range: 24 - 12 AWG
- Tightening Torque: Max 0.4 N·m





**Pin Connections**

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

**Notes:**

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.039 (±1.00)
- Weight (Typ) = 3.52 Oz (100g)
- Wire Range: 24 - 12 AWG
- Tightening Torque: Max 0.4 N·m
- Mounting Rail: TS 35 Rail needs to connect safety ground

MPD offers a very wide range of high performance AC/DC power supplies ranging from 600W UChannel units to 1W units in miniature Single-In-Line (SIP) packages. All are designed and certified to international safety and EMC/EMI standards.

We also offer AC/DC supplies approved for use in medical equipment, DIN rail supplies, "Green" energy supplies and constant power supplies.

We also offer a wide variety of DC/DC converters, LED Drivers, POL regulators and IGBT drivers. All products are available with short lead times. Call today for complete information or product samples. Or go to our website:

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