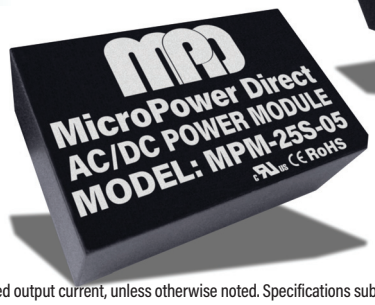
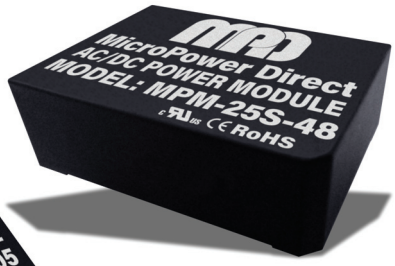
MPM-25S Series

Universal Input, 25W High Performance, AC/DC Power Supplies





Key Features:

- 25W Output Power
- EN 62368 Approved (UL)
- Universal 85-264 VAC Input
- 4,000 VAC I/O Isolation
- -40°C to 85°C Temp Range
- Industry Standard Pin-Out
- Meets EN 55032 Class B
- >300 kHour MTBF
- Chassis Mount Available
- DIN Rail Mount Available
- ***Low Cost***

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		20.0		A Pk
	230 VAC		40.0		

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage	See Model Selection Guide				
Output Current	See Model Selection Guide				
Minimum Load	See Note 1	0			%
Output Voltage Accuracy	3.3 VDC Output		±3.0		%
	All Other Outputs		±2.0		
Line Regulation	See Note 2		±0.5		%
Load Regulation	I_{OUT} = 0% to 100%		±1.0		%
Ripple & Noise (20 MHz)	See Note 3		50	100	mV Pk - Pk
Hold-Up Time	115 VAC		10		mSec
	230 VAC		60		
Temperature Coefficient			±0.02		%/°C
Overload Protection	Autorecovery	140			%I_{OUT}
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
	Input to PE	2,500			
Switching Frequency			65		kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
Storage Temperature Range		-40		+85	°C
Lead Temperature, See Note 6	Wave Solder			260	°C
	Hand Solder			360	
Cooling	Free Air Convection (See Derating Curve)				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Diagrams (Page 5, 6)
Case Material	Non-Conductive Black Plastic (UL94-V0)
Weight	See Mechanical Diagrams (Page 5, 6)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	300			kHours
Safety Standards	UL/cUL 62368-1 recognition (UL certificate)				
Safety Class	Class I				

MicroPower Direct
292 Page Street
Suite D
Stoughton, MA 02072
USA

T: (781) 344-8226
F: (781) 344-8481
E: sales@micropowerdirect.com
W: www.micropowerdirect.com

Model Selection Guide

Model Number	Input Current (A)		Output Voltage (VDC)	Output Current (A Max)	Output Power (W)	Over Voltage Protection (VDC)	Capacitive Load (μF, Max)	Efficiency (230 VAC, %, Typ)	Fuse Rating Slow-Blow
	115 VAC	230 VAC							
MPM-25S-03	0.60	0.34	3.3	4.100	13.53	7.50	48,000	74	3.15A/250V
MPM-25S-05	0.60	0.34	5.0	4.100	20.50	7.50	12,240	79	3.15A/250V
MPM-25S-09	0.60	0.34	9.0	2.500	25.00	15.0	5,600	81	3.15A/250V
MPM-25S-12	0.60	0.34	12.0	2.100	25.00	20.0	5,400	83	3.15A/250V
MPM-25S-15	0.60	0.34	15.0	1.600	25.00	20.0	2,400	84	3.15A/250V
MPM-25S-24	0.60	0.34	24.0	1.100	25.00	30.0	1,440	85	3.15A/250V
MPM-25S-48	0.60	0.34	48.0	0.500	25.00	60.0	600	87	3.15A/250V

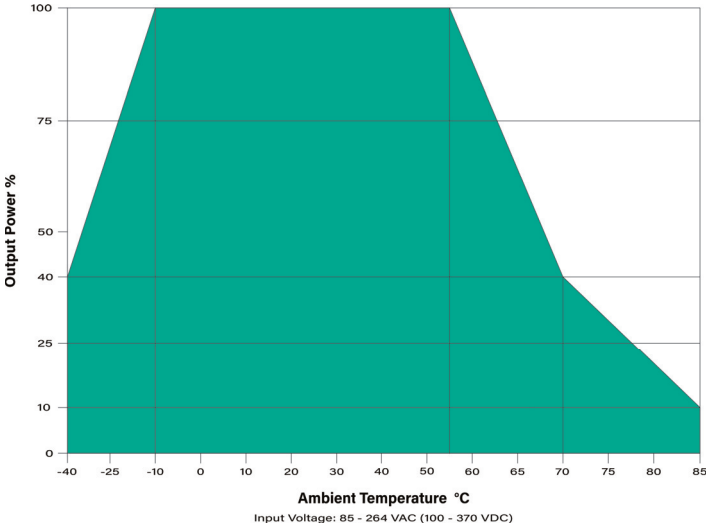
Notes:

1. Operation at no load will not damage the units, however, they may not meet all specifications.
2. Line regulation is measured with the unit at full load while the input is varied from 85 VAC to 264 VAC.
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 +VOUT pin to the -VOUT pin.
4. Output short circuit protection is provided by a "hiccup mode" circuit. The unit recovers automatically when the fault condition is removed.
5. Input-output isolation is tested for 60 sec with a leakage current of <5 mA.
6. Lead temperature for wave soldering is specified for 5 to 10 seconds with a tolerance of ±5°C. For manual soldering it is specified for 3 to 5 seconds with a tolerance of ±10°C.
7. It is recommended that a fuse be used on the input of a power supply for protection. For the **MPM-25S** series, a 3.15A/250 VAC slow blow should be used.

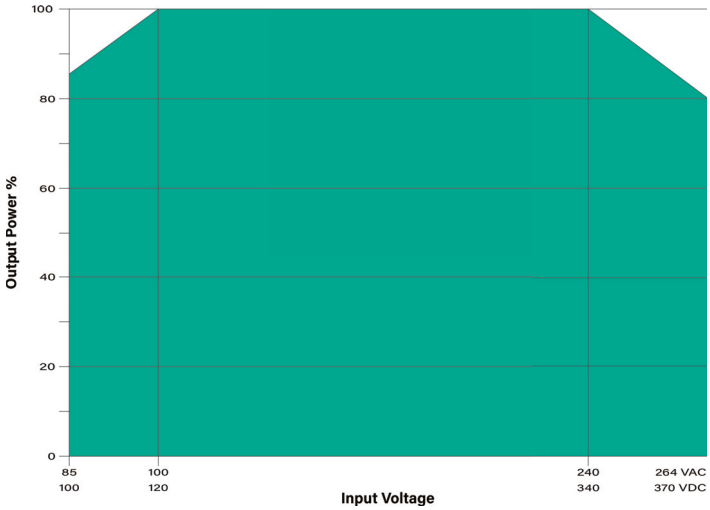
For the A2S adapter board option, add the suffix "-A2S" to the model number (i.e. **MPM-25S-12-A2S**) See Page 6

For the A4S adapter board option, add the suffix "-A4S" to the model number (i.e. **MPM-25S-48-A4S**) See Page 6

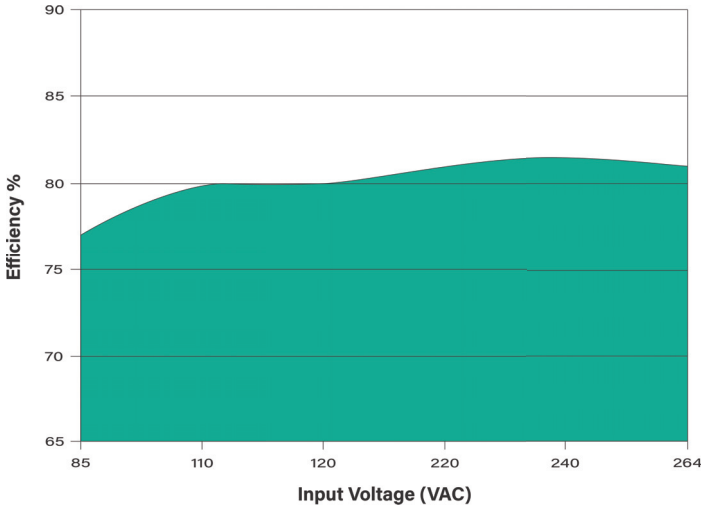
Temperature Derating



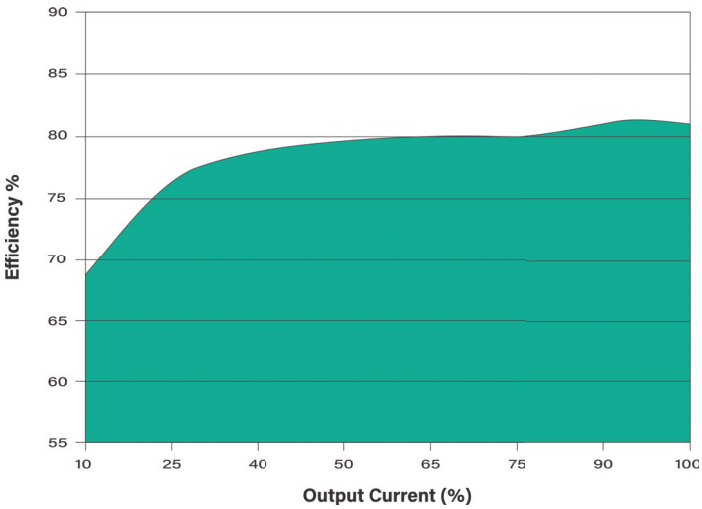
Input Voltage Derating: -25°C to +70°C



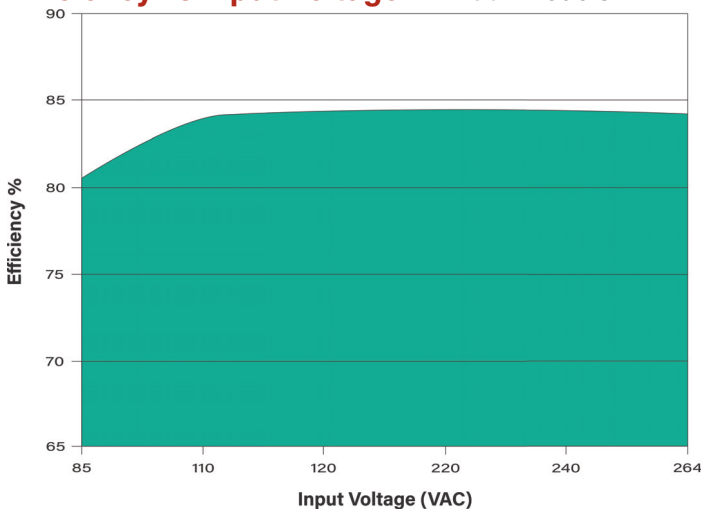
Efficiency vs Input Voltage: 5 VOUT Models



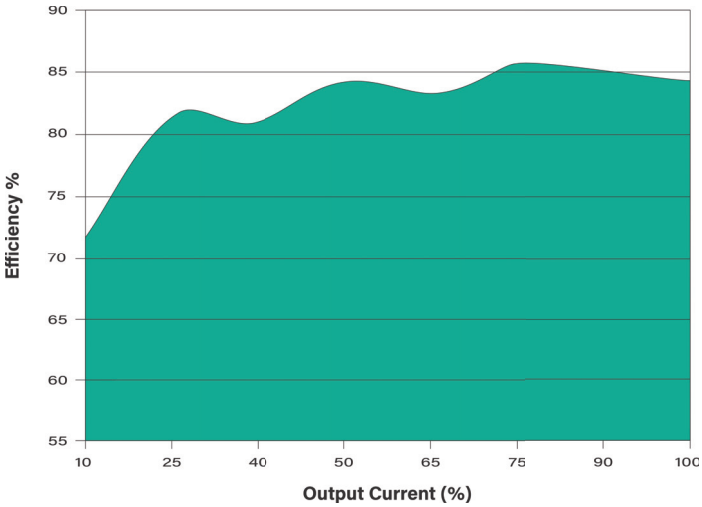
Efficiency vs Output Load: 5 VOUT Models



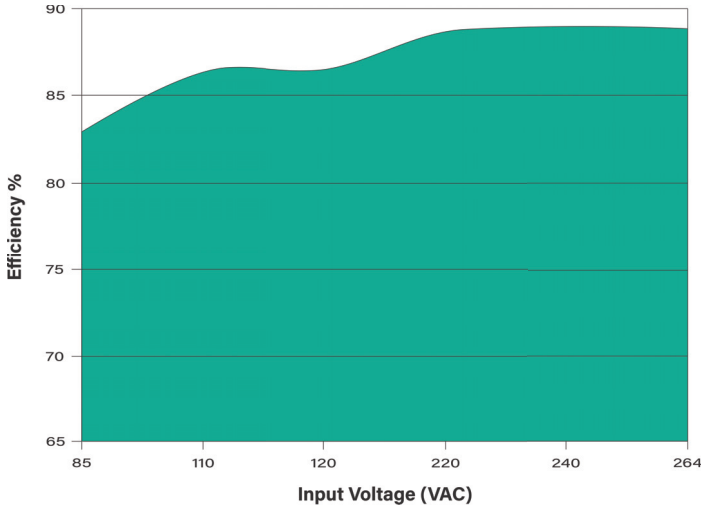
Efficiency vs Input Voltage: 12 VOUT Models



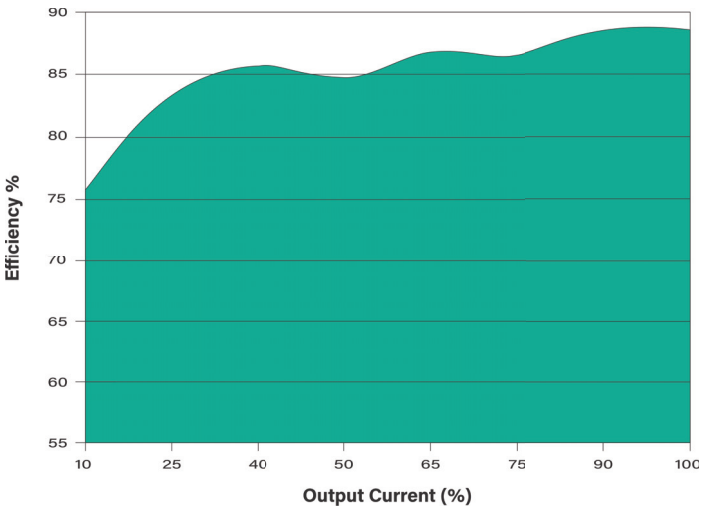
Efficiency vs Output Load: 12 VOUT Models



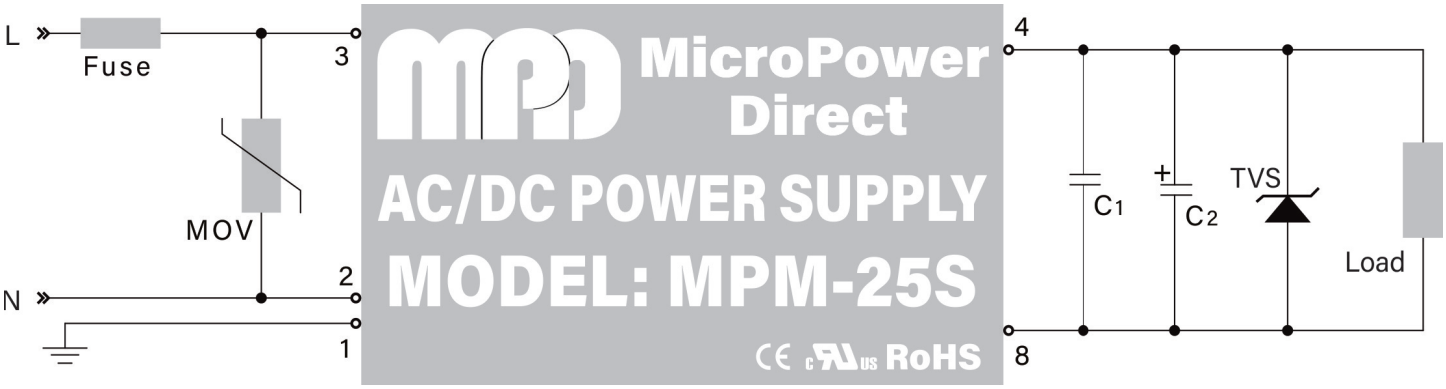
Efficiency vs Input Voltage: 24 VOUT Models



Efficiency vs Output Load: 24 VOUT Models



Simple Connection



The diagram above illustrates a typical application connection of the **MPM-25S** 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 C_1 and C_2 should be sufficient for most applications. The recommended values are shown in the table at right. The output filtering capacitor C_2 is a high frequency, low resistance electrolytic capacitor. Capacitor C_1 is ceramic. Voltage derating of capacitors should be 80% or above.
5. The TVS is added to protect circuits being powered from damage if the module fails.

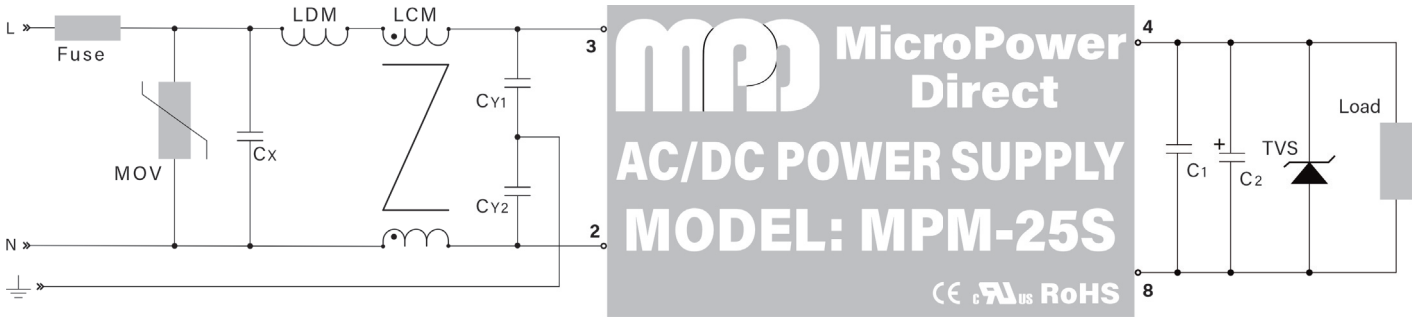
Model	MOV	C1	C2	TVS
MPM-25S-03	S14K300	1.0 µF/50V	330 µF/16V	SMBJ7.0A
MPM-25S-05			330 µF/16V	SMBJ7.0A
MPM-25S-09			330 µF/25V	SMBJ12A
MPM-25S-12			330 µF/25V	SMBJ20A
MPM-25S-15			330 µF/25V	SMBJ20A
MPM-25S-24			120 µF/35V	SMBJ30A
MPM-25S-48			68 µF/60V	SMBJ64A

EMI Characteristics

Parameter	Conditions	Criteria	Level
Radiated Emissions	EN 55032		Class B
Conducted Emissions	EN 55032		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 At Right	EN 61000-4-4	B	±2 kV
			±4 kV
Surge, See Note 2 At Right	EN 61000-4-5	B	±1 kV Line to Line
			±2 kV Line to Grnd
Surge, See Note 3 At Right	EN 61000-4-5	B	±2 kV Line to Line
		B	±4 kV Line to Grnd
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 (±2 kV), use the "Simple Connection" as shown on page 3. To meet EN 61000-4-4 (±4 kV) use the "Typical Connection" as shown below. Contact the factory for more information.
2. To meet the requirements of EN 61000-4-5 (±1 kV line to line, ±2 kV line to Grnd), use the "Simple Connection" as shown on page 3. Contact the factory for more information.
3. To meet the requirements of EN 61000-4-5 (±2 kV line to line, ±4 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 **MPM-25S** 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 (±2 kV) with the addition of the MOV shown in the connection diagram. They will meet EN 61000-4-4 (±4 kV) with the additional input components shown in the Typical Connection diagram shown above. All component values are given in the table at right.
3. All units are rated for EN 61000-4-5 (±1 kV LL/ ±2 kV LG) with the addition of the MOV shown in the connection diagram. They will meet EN 61000-4-5 (±2 kV LL/±4 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 (C_1 & C_2) and TVS are discussed in the notes for the simple connection diagram on page 3. Recommended values are given in the table with that diagram.
5. Suggested component values are:

Component	3.3 VOUT	5.0 VOUT	9.0 VOUT	12 VOUT	15 VOUT	24 VOUT	48 VOUT
Fuse	3.15A/250 VAC						
MOV	S14K300						
C_X	0.1 μF/275VAC						
LDM	4.7 μH/2A						
LCM	10 mH						
C_{Y1}	1000 pF/400 VAC						
C_{Y1}	1000 pF/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.

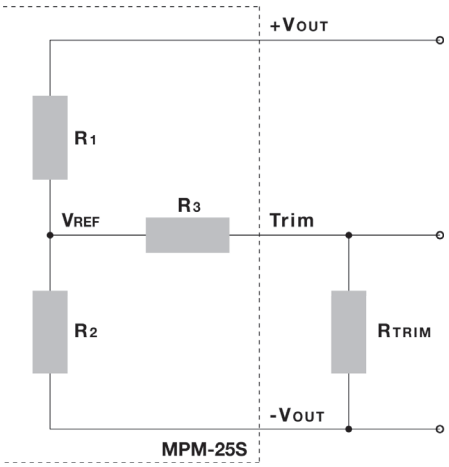
Input Filtering Components

Input protection and filtering modules are available for a number of **MPD** AC/DC and DC/DC power supplies. These include common mode filters, EMC filters, surge & pulse suppressors, and common mode filters.

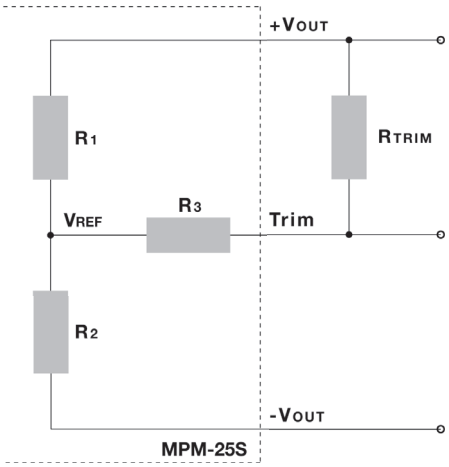
For use with the **MPM-25S** product series, the **MACFM-02A** filter module is recommended. For pricing or full technical information on the **MACFM-02A** (or any of our other modules) please contact the factory.

External Trim

Trim Up



Trim Down



An external resistor can be used to adjust the power supply output up/down by about 10%. The connection is shown in the diagrams above. The required resistor value is calculated by the formulas given below. The values of R1, R2, R3 and VREF are given in the table at right.

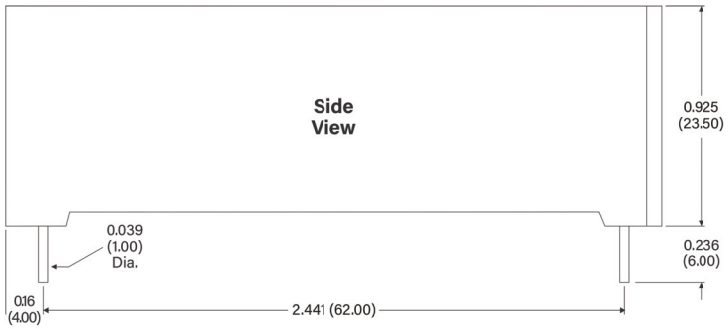
$$\text{Trim Up} = R_{TRIM} = \frac{A \times R_2}{R_2 - A} - R_3 \qquad \text{Where } A = \frac{V_{REF}}{V_{OUT} - V_{REF}} \times R_1$$

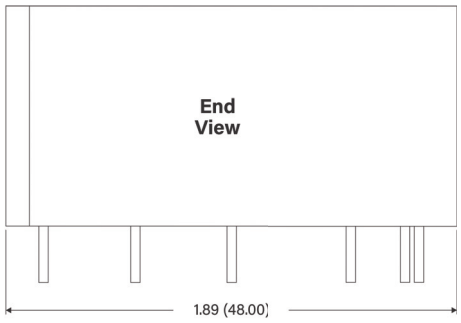
$$\text{Trim Down} = R_{TRIM} = \frac{A \times R_1}{R_1 - A} - R_3 \qquad \text{Where } A = \frac{V_{OUT} - V_{REF}}{V_{REF}} \times R_2$$

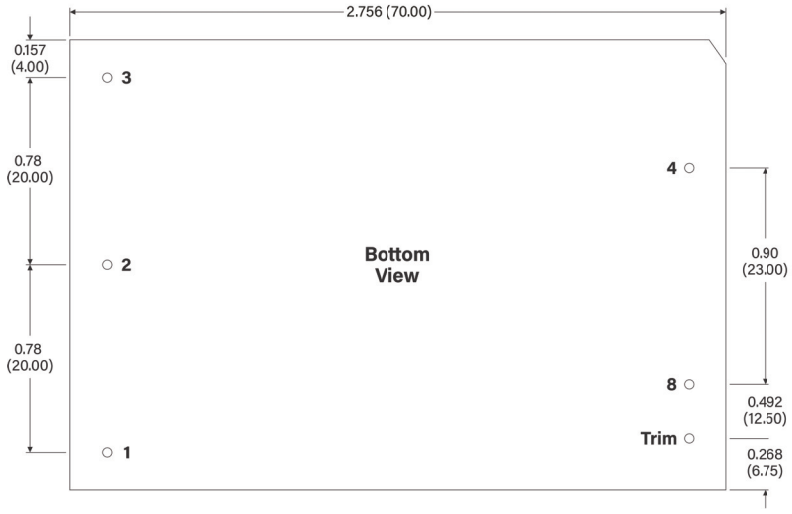
Where RTRIM = The value of the external trim resistor
A = A is defined as shown above
VOUT = The output voltage after regulation ±10%

Output Voltage	Resistor Value			
	R1 (kΩ)	R2 (kΩ)	R3 (kΩ)	VREF (V)
3.3 VDC	3.30	1.98	1.00	1.24
5.0 VDC	3.30	3.30	1.00	2.50
9.0 VDC	7.50	2.87	1.00	2.50
12 VDC	3.83	1.00	1.00	2.50
15 VDC	7.50	1.50	1.00	2.50
24 VDC	8.66	1.00	1.00	2.50
48 VDC	68.0	3.73	1.00	2.50

Mechanical Dimensions







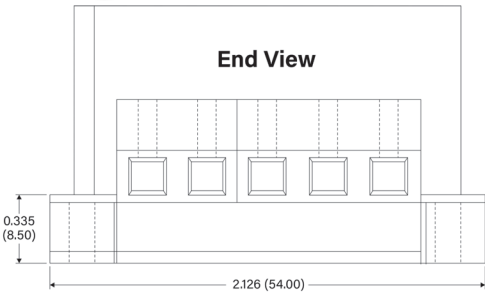
Pin Connections

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

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance = ±0.02 (±0.50)
- Pin Tolerance = ±0.004 (±0.10)
- Recommended pin hole size (on the application PC Board) is Ø 0.059 (Ø1.50)
- Weight (Typ) = 4.23 Oz (120g)

Mechanical Dimensions: A2S Chassis Mount Adapter



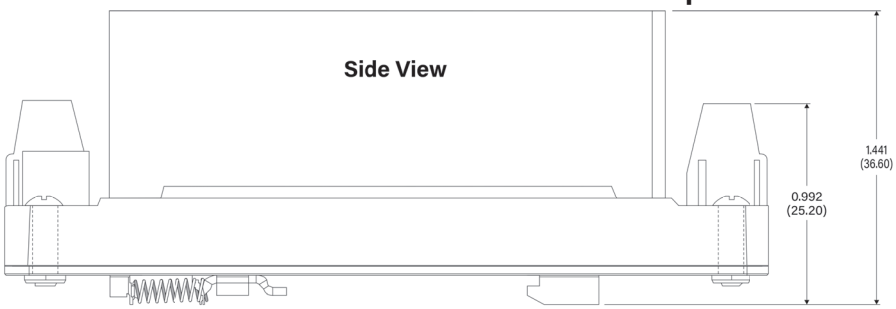
Pin Connections

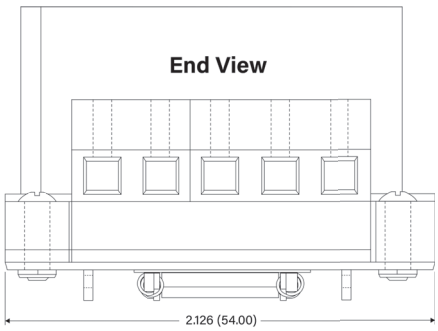
Pin	Function
1	AC-Ground
2	AC-Neutral
3	AC-Line
4	+VOUT
5	No Connection
6	No Connection
7	No Connection
8	-VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.039 (±1.00)
- Weight (Typ) = 5.99 Oz (170g)
- Wire Range: 24 - 12 AWG
- Tightening Torque: Max 0.4 N·m

Mechanical Dimensions: A4S DIN Rail Mount Adapter





Pin Connections

Pin	Function
1	AC-Ground
2	AC-Neutral
3	AC-Line
4	+VOUT
5	No Connection
6	No Connection
7	No Connection
8	-VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.039 (±1.00)
- Weight (Typ) = 7.41 Oz (210g)
- Wire Range: 24 - 12 AWG
- Tightening Torque: Max 0.4 N·m
- Mounting Rail: TS 35 Rail must be connected to safety ground

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