MPV1060RI4

Ultra Wide Input, Compact Industrial Grade, PV Power DC/DC Converters

Key Features:

- 5W & 10W Output Power
- 10:1 Input Range
- 4,000 VAC Isolation
- Meets EN 62109
- Wide -40°C to +70°C Oper.
- Reverse Input Volt Prot.
- Output Over Volt Protection
- Compact Case
- >300 kHours MTBF
- Chassis/DIN Rail Options

RoHS

CE

Electrical Specifications

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

Input

Parameter	Conditions		Min.	Typ.	Max.	Units
Input Voltage Range			100	600	1,000	VDC
	5W Model	200 VDC Input			38.0	mA
		600 VDC Input			15.0	
		1,000 VDC Input			10.0	
	10W Models	200 VDC Input			75.0	
		600 VDC Input			25.0	
		1,000 VDC Input			16.0	
Inrush Current		200 VDC Input		7.0		A
		600 VDC Input		20.0		
		1,000 VDC Input		30.0		
Start-Up Time	VIN = 200 - 1,000 VDC				1.0	S

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±1.0	±2.0	%
Line Regulation	VIN = MIN to MAX		±0.5	±1.0	%
Load Regulation	IOUT = 0% to 100%		±0.5	±1.0	%
Ripple & Noise (20 MHz)	See Note 1		100	200	mV P - P
Temperature Coefficient			±0.02		%/°C
Over Current Protection	Hiccup Circuit, Autorecovery	110			% IOUT
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	4,000			VAC
Switching Frequency				75	kHz

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions, See Note 2	EN 55022		Class A
Conducted Emissions, See Note 2	EN 55022		Class A
ESD	EN 61000-4-2	B	±6 kV Contact
			±8 kV Air
RS	EN 61000-4-3	A	10V/m
EFT, See Note 3	EN 61000-4-4	B	±4 kV
Surge, See Note 4	EN 61000-4-5	B	±2 kV L-L
CS	EN 61000-4-6	A	10 Vrms

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+70	°C
Storage Temperature Range		-40		+105	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size, Module, Chassis /DIN Rail Mount	See Mechanical Drawings (Starting Page 4)
Case Material	Black, Flame Retardant, Non-Conductive Plastic (UL94-V0)
Weight, Module, Chassis /DIN Rail Mount	See Mechanical Drawings (Starting Page 4)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	300			kHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Lead Temperature, See Note 5	Wave Soldering	255	260	265	°C
	Manual Soldering	350	360	370	

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

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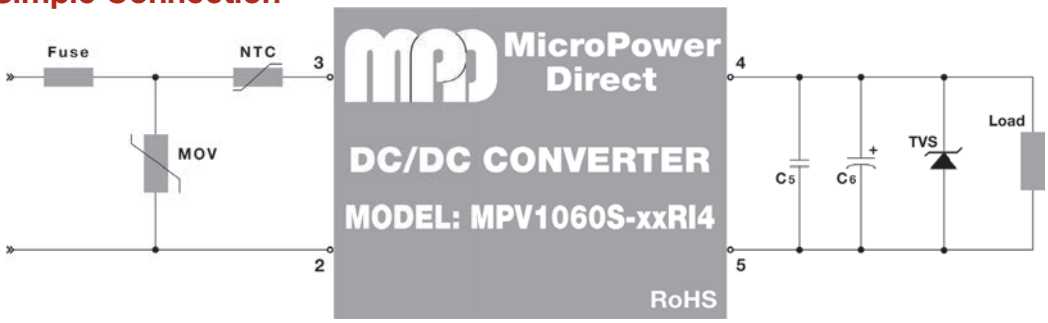
Model Selection Guide

Model Number	Input		Output			Efficiency (%, Typ)	Over Voltage Protection (VDC Typ)	Capacitive Load (µF, Max)	Fuse Rating Slow-Blow (A)
	Voltage (VDC)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range							
MPV0560S-05RI4	600	100 - 1,000	5.0	1,000	0.0	72	7.5	6,000	1.0
MPV1060S-05RI4	600	100 - 1,000	5.0	2,000	0.0	72	7.5	6,000	1.0
MPV1060S-09RI4	600	100 - 1,000	9.0	1,110	0.0	76	12.0	4,000	1.0
MPV1060S-24RI4	600	100 - 1,000	24.0	420	0.0	80	28.0	470	1.0

Notes:

1. To meet the specified ripple and noise levels, external capacitors are required. See the "Simple Connection" diagram below. Recommended values for all external components are given in the table at the bottom of the page. For more information, please contact the factory.
2. All units will meet EN 55022 (CE/RE) class A with the input circuit shown in the "Typical Connection" diagram below. Contact the factory for more information.
3. All units will meet EN 61000-4-4 (±4 kV) with the input circuit shown in the "Typical Connection" diagram below. Contact the factory for more information.
4. All units will meet the requirements of EN 61000-4-5 (±1 kV/±2 kV), with the input circuit shown in the "Typical Connection" diagram below. Contact the factory for more information.
5. Lead temperature is measured 1.5 mm from the case.
6. Operation at no load will not damage the units, however, they may not meet all specifications.
7. It is recommended that a fuse be used on the input of a power supply for protection. For the **MPV0560RI4** & **MPV1060RI4** series, a 1.0A slow blow, with a voltage rating over 1 kV, should be used.

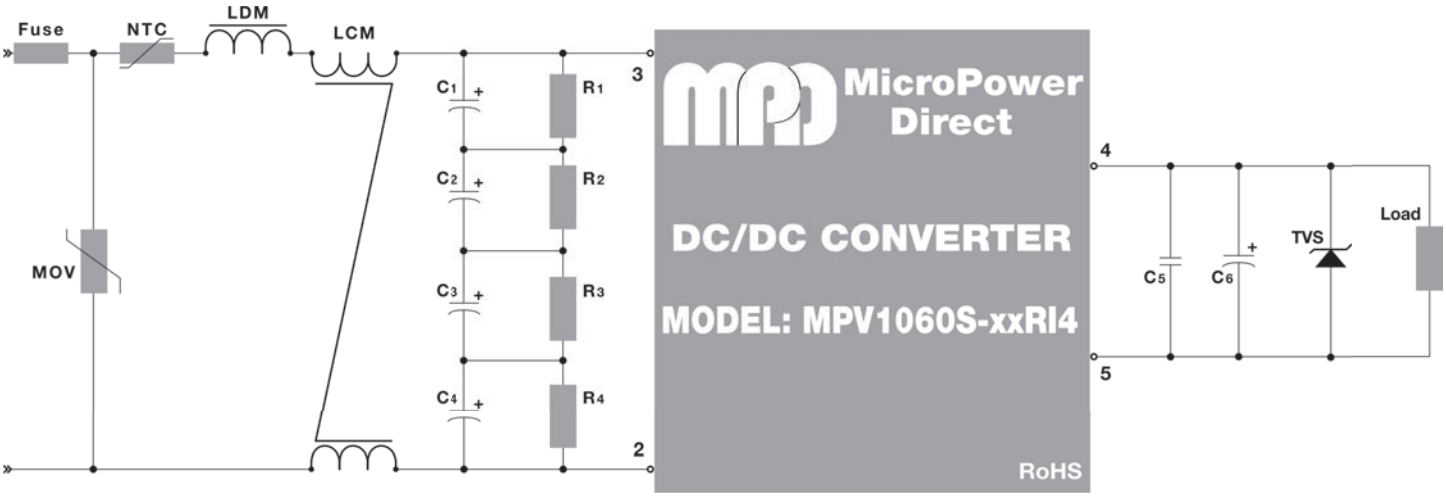
Simple Connection



The diagram at left illustrates a typical connection of the **MPV0560SRI4** & **MPV1060SRI4** series. Output capacitors C_6 and C_5 are filtering components. They are required to meet ripple and noise specifications. Capacitor C_5 is ceramic and capacitor C_6 is a high frequency, low ESR electrolytic.

The recommended input components are a fuse, NTC, and MOV. The recommended component values for these are given in the table below.

Typical Connection: With External EMC Components

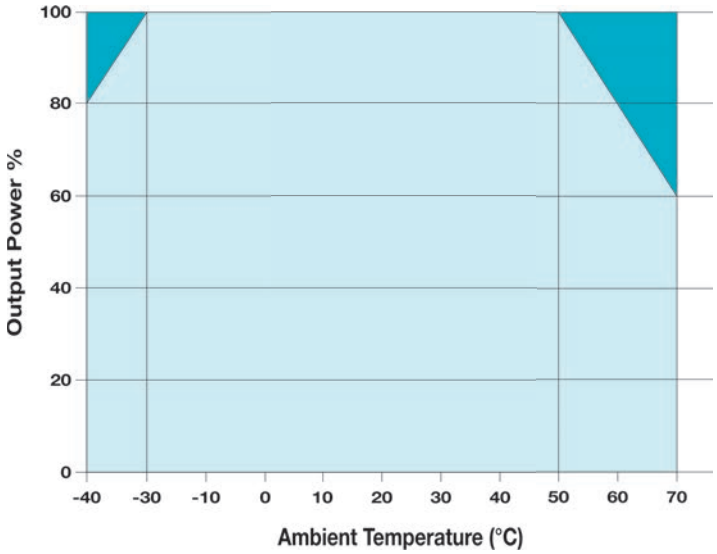


For applications that require meeting higher EMC standards, the circuit shown above is recommended. Some notes on this diagram (starting with the input circuit) are:

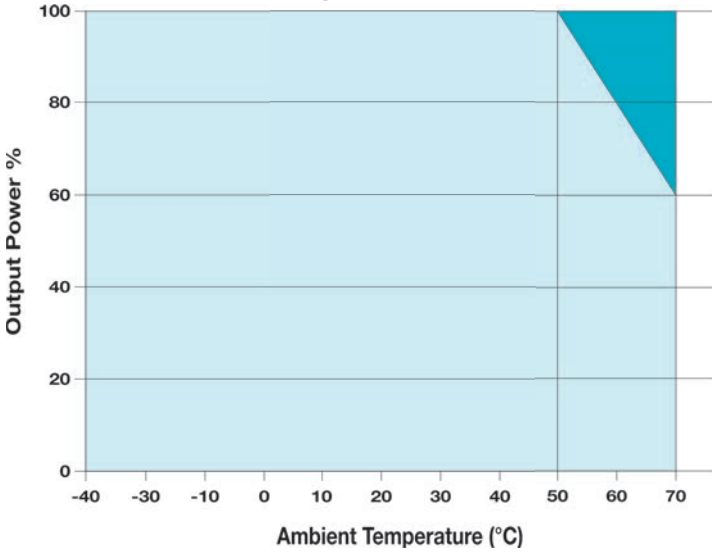
1. It is recommended that an external fuse be used. The recommended fuse is 2A/1,000V.
2. The NTC helps to prevent damage to the module in the event an input current surge occurs. The recommended value is given in the table below.
3. The MOV helps to prevent damage to the module in case an input voltage surge occurs. The recommended value is given in the table below.
4. Capacitors C_1, C_2, C_3 and C_4 are input filter components (connected in series to achieve the required capacitance level). Resistors R_1, R_2, R_3 and R_4 help to balance the current across the capacitors.
5. Recommended values for components are:
6. Capacitor C_5 is ceramic. This capacitor is used to filter high frequency noise. A recommended value is given in the table below.
7. Capacitor C_6 is an electrolytic. A low ESR, high frequency capacitor should be used. The recommended value is given in the table below.
8. The output TVS will help protect system circuitry if power supply fails. A recommended value is given in the table below.
9. Derating on all capacitors should be 80% or more.
10. To meet safety regulations, the board trace widths should be ≥3 mm, the distance between traces should be ≥6 mm, and the distance between traces and ground should be ≥6 mm. Contact the factory for more information.

Model Number	External Components									
	Fuse	MOV	NTC	LDM	LCM	C_1, C_2, C_3, C_4	R_1, R_2, R_3, R_4	C_5	C_6	TVS
MPV0560S-05RI4	1A/1 kV	SK14880	10D-11	4.7 mH/0.38A	10 mH/0.5A	47 µF/400V	1 MΩ/2W	1 µF/50V	220 µF/25V	SMBJ7.0A
MPV1060S-05RI4										SMBJ7.0A
MPV1060S-09RI4										SMBJ12A
MPV1060S-24RI4									68 µF/35V	SMBJ33A

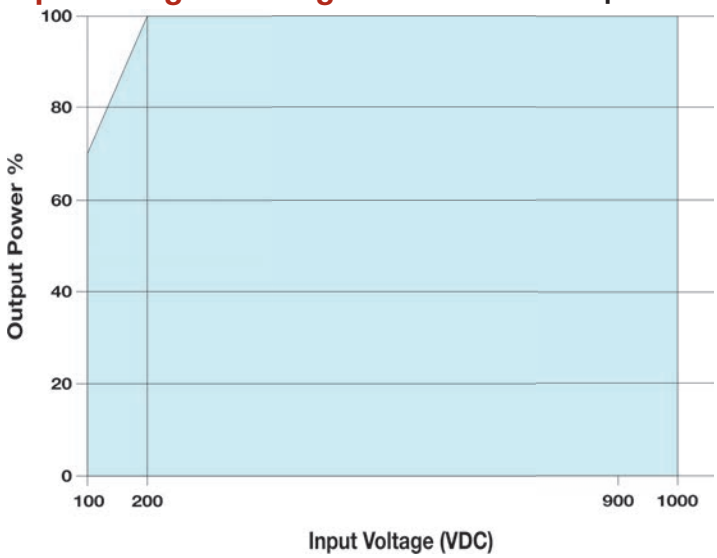
Temperature Derating Curve: VIN = 100 to 150V



Temperature Derating Curve: VIN = 150 to 1,000V



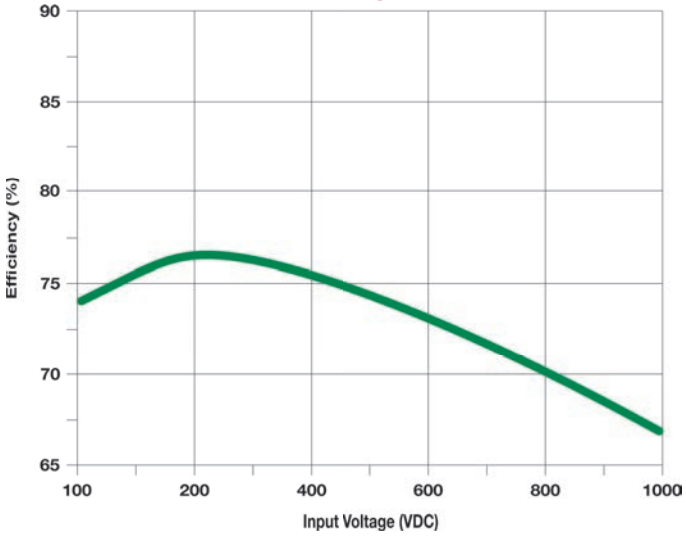
Input Voltage Derating Curve: Ambient Temp = 25°C



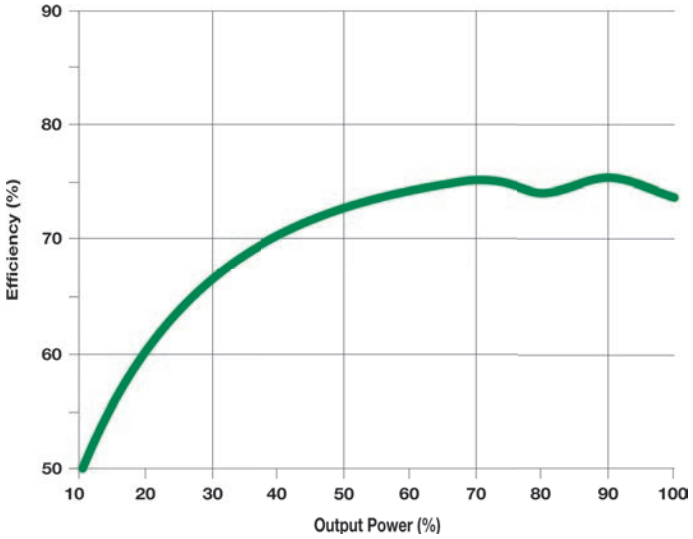
The **MPV0560SRI4** & **MPV1060SRI4** are designed to be operated in an environment that has natural air cooling. It should not be used in a closed or sealed environment. For more information, contact the factory.

MPV0560RI4 Curves

Efficiency vs Input Voltage (Full Load)

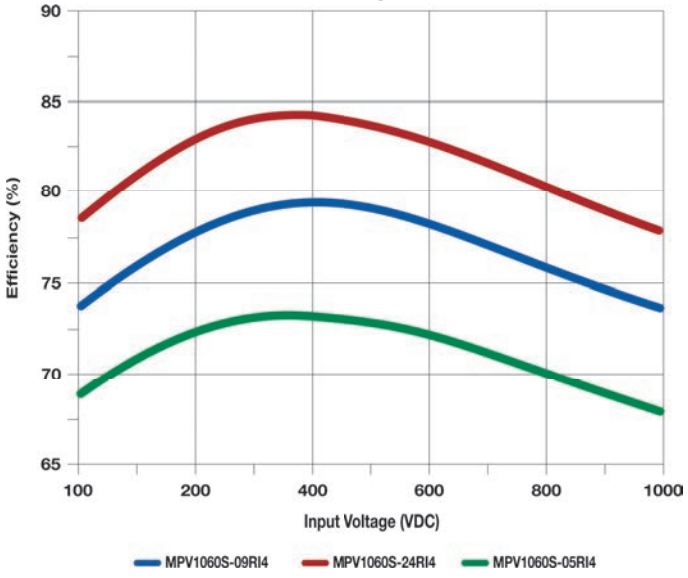


Efficiency vs Output Power (VIN= 500 VDC)

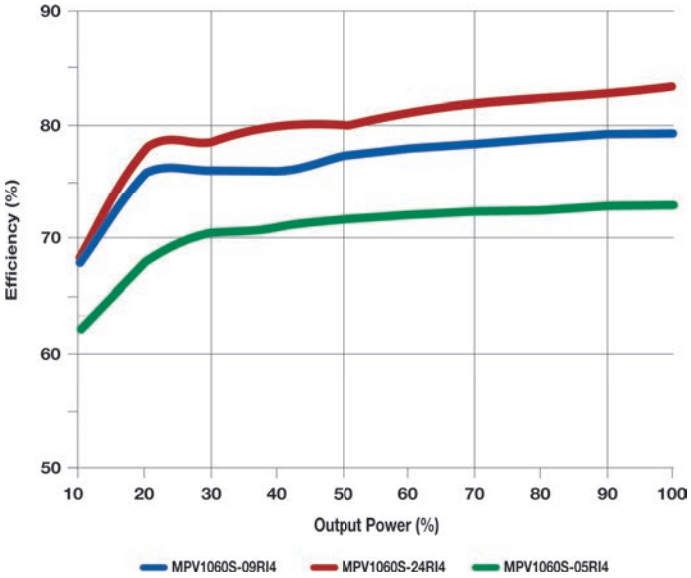


MPV1060RI4 Curves

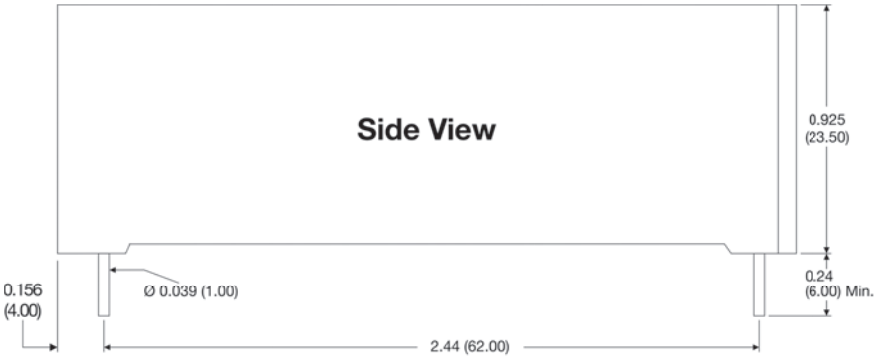
Efficiency vs Input Voltage (Full Load)

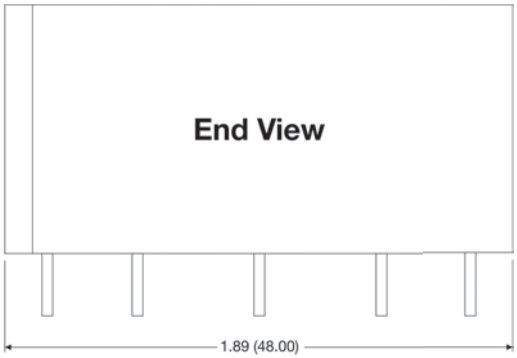


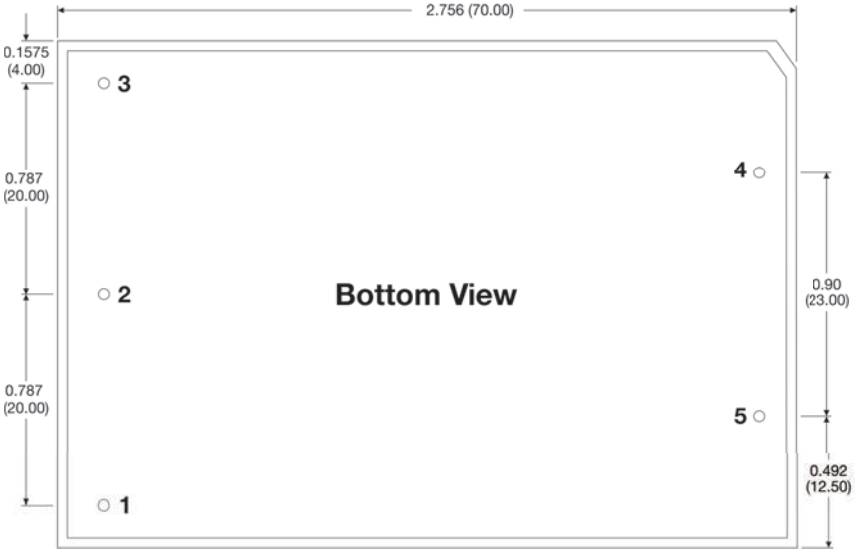
Efficiency vs Output Power (VIN= 500 VDC)



Mechanical Dimensions







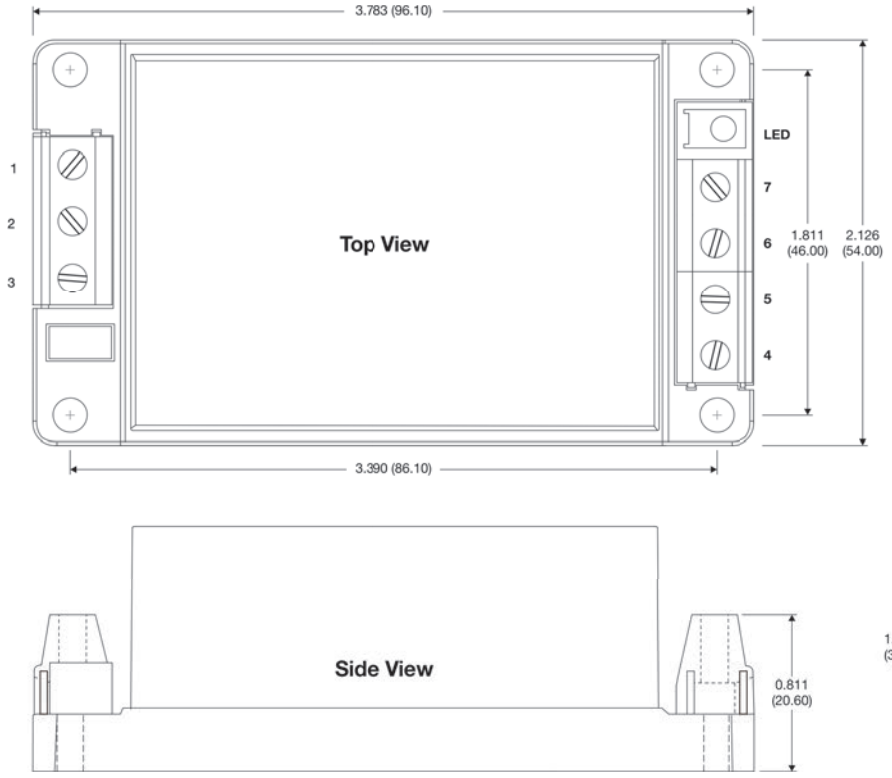
Pin Connections

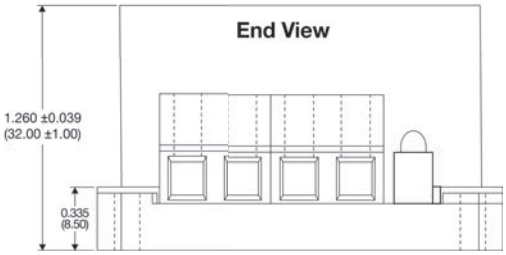
Pin	Function
1	No Connection
2	-VIN
3	+VIN
4	+VOUT
5	-VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Dimension Tolerance x.xx = ±0.02 (±0.50)
- Pin Diameter Tolerance x.xxx = ±0.004 (±0.100)
- Weight: 0.3.35 Oz (95g)

Mechanical Dimensions, A2C: With Chassis Mount & Power Good LED





All models of the **MPV1060SRI4** series are available assembled on adapter plates for mounting to a chassis or on a DIN rail. Mechanical dimensions for these dapters are shown in the diagrams below. To order the product assembled on an adapter, add the designation for the adapter to the end of the product number. For example: **MPV1060S-24RI4-A2C**. Please contact the factory for more information.

Pin Connections

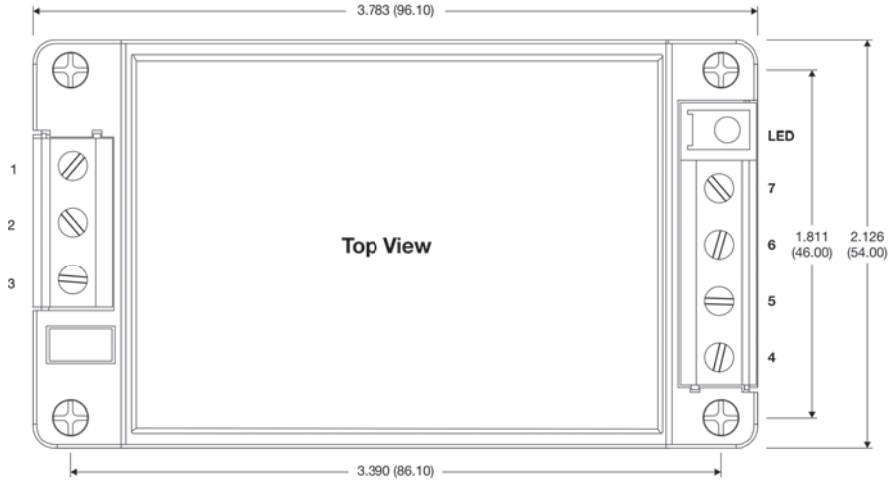
Pin	Function
1	-VIN
2	No Connection
3	+VIN
4	+VOUT

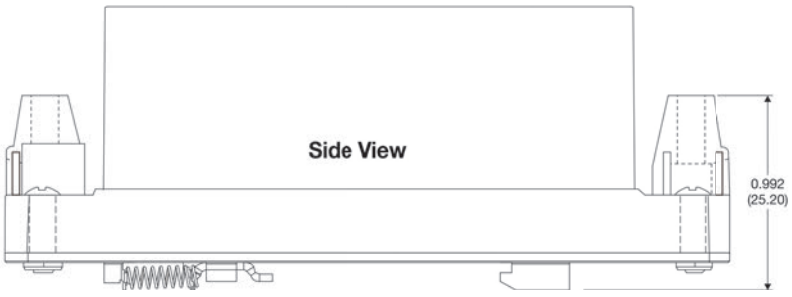
Pin	Function
5	No Connection
6	No Connection
7	-VOUT

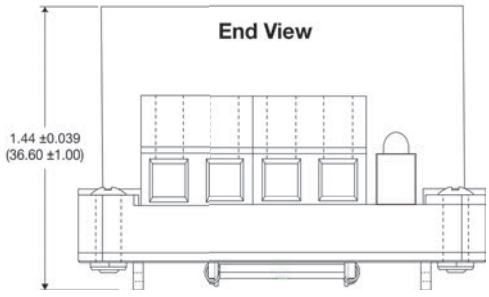
Notes:

- All dimensions are typical in inches (mm)
- General Dimension Tolerance x.xx = ±0.02 (±0.50)
- Wire Range: 12 to 24 AWG
- Tightening Torque: 0.4 Nm Max
- Weight: 0.5.26 Oz (150g)
- The LED indicates the output voltage is present (LED "On")

Mechanical Dimensions, A4C: With DIN Rail Mount Option & Power Good LED







Pin Connections

Pin	Function
1	-VIN
2	No Connection
3	+VIN
4	+VOUT

Pin	Function
5	No Connection
6	No Connection
7	-VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Dimension Tolerance x.xx = ±0.02 (±0.50)
- Wire Range: 12 to 24 AWG
- Tightening Torque: 0.4 Nm Max
- Weight: 6.66 Oz (190g)
- For use with a TS35 type DIN rail
- The LED indicates the output voltage is present (LED "On")