

# MPV10RHI Series



## Compact, 6:1 Input PV Power 5 & 10W DC/DC Converters

### Key Features:

- 5W & 10W Output Power
- 200 - 1200 VDC Input Range
- 4,000 VDC Isolation
- Input Under Volt Protection
- Output Over Volt Protection
- Compact Case
- -25°C to +70°C Operation
- >300 kHours MTBF



### 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			200	600	1,200	VDC
Input Start Voltage			185		195	VDC
Under Voltage Shutdown			175		185	VDC
Input Current	MPV05	200 VDC Input			36.0	mA
		600 VDC Input			13.0	
		1200 VDC Input			8.0	
	MPV10	200 VDC Input			69.0	
		600 VDC Input			24.0	
		1200 VDC Input			14.0	
Inrush Current				4.0		A
				12.0		
				25.0		
Start-Up Time					500	mS

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 = 5% to 100%			±0.5	±1.0	%
Ripple & Noise (20 MHz)	See Note 1			50	100	mV P - P
Temperature Coefficient				±0.02		%/°C
Over Power Protection	Autorecovery			110		%IOUT
Output Short Circuit	Continuous (Autorecovery)					

General						
Parameter	Conditions		Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds		4,000			VDC
Isolation Resistance	500 VDC		100			MΩ
Switching Frequency				65		kHz

EMI Characteristics						
Parameter	Standard		Min.	Typ.	Max.	Units
Radiated Emissions	See Note 2	EN 55022				Class A
Conducted Emissions	See Note 2	EN 55022				Class A
ESD		EN 61000-4-2				Criteria B; ±6 kV/±8
RS		EN 61000-4-3				Criteria A; 10V/m
EFT	See Note 3	EN 61000-4-4				Criteria B; ±4 kV
Surge	See Note 4	EN 61000-4-5				Criteria B; ±1 kV /±2 kV
CS		EN 61000-4-6				Criteria A; 10 Vrms
PFM		EN 61000-4-8				Criteria A; 10A/m
Voltage Dips		EN 61000-4-11				Criteria B; 0% - 70%

Environmental						
Parameter	Conditions		Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient		-25	+25	+70	°C
Storage Temperature Range			-25		+105	°C
Cooling	Free Air Convection					
Humidity	RH, Non-condensing				95	%
<b>Physical</b>						
Case Size						See Mechanical Drawings (Page 4)
Case Material						Aluminum Alloy With Non-Conductive Base (UL94-V0)
Weight						6.92 Oz (195g)

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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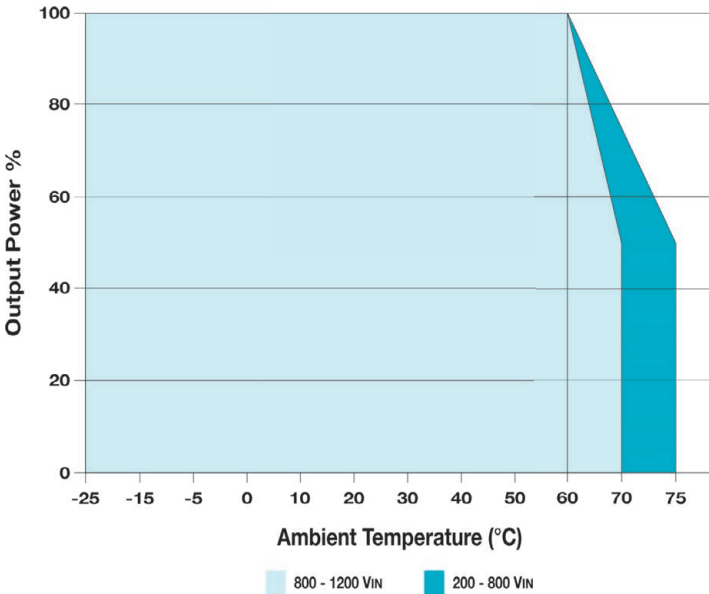


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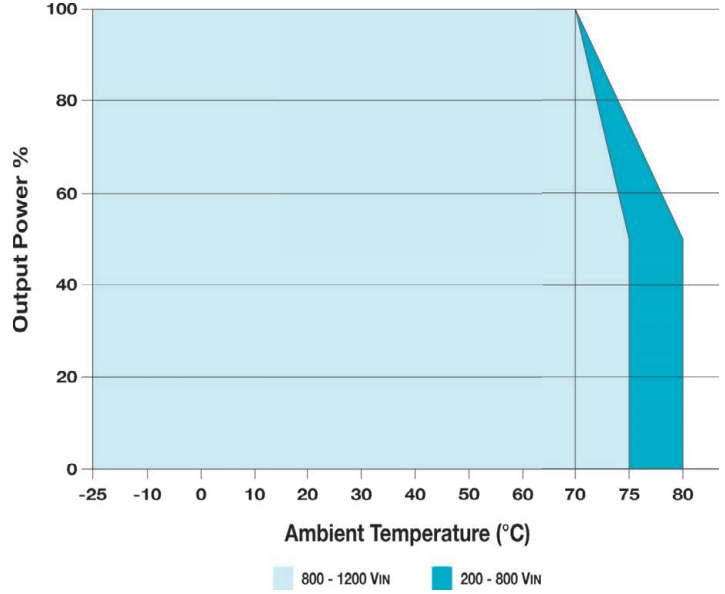
Model Number	Input		Output			Efficiency (% Typ)	Over Voltage Protection (VDC Typ)	Capacitive Load ( $\mu$ F, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range							
MPV0560S-05RHI	600	200 - 1200	5.0	1,000	0.0	73	7.5	10,000	1,000
MPV1060S-05RHI	600	200 - 1200	5.0	2,000	0.0	75	7.5	6,000	1,000
MPV1060S-24RHI	600	200 - 1200	24.0	420	0.0	82	29.0	1,500	1,000

- Notes:**
1. To meet the specified ripple and noise levels, external capacitors are required. see the typical connection information on page three for recommended values. 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 2" diagram on page 3. Contact the factory for more information.
  3. All units will meet EN 61000-4-4 ( $\pm 4$  kV) with the input circuit shown in the "Typical Connection 2" diagram on page 3. Contact the factory for more information.
  4. All units will meet the requirements of EN 61000-4-5 ( $\pm 1$  kV/ $\pm 2$  kV), with the input circuit shown in the "Typical Connection 2" diagram on page 3. 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 **MPV0560-xxRHI** & **MPV1060-xxRHI** series, a 1.0A slow blow should be used.

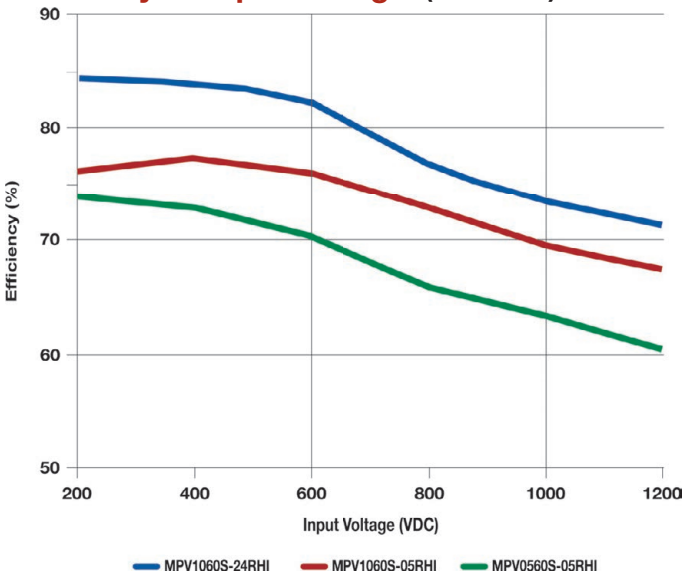
**Derating Curve, MPV1060S-05**



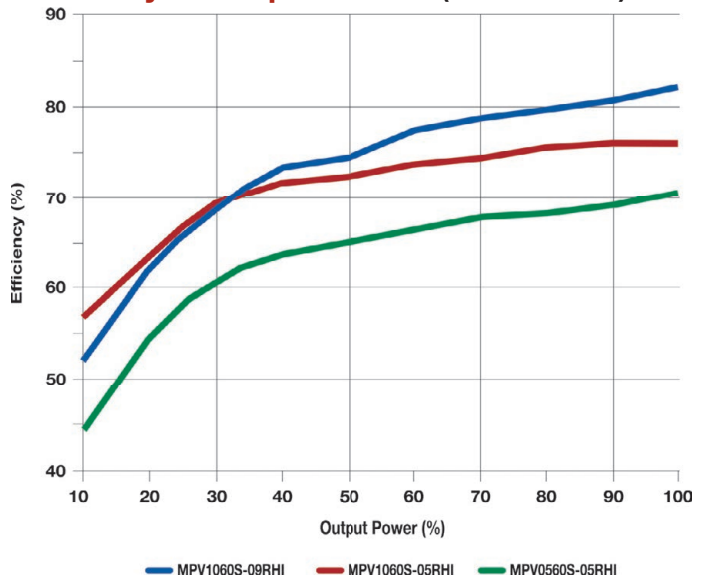
**Derating Curve, MPV0560S-05 & MPV1060S-24**



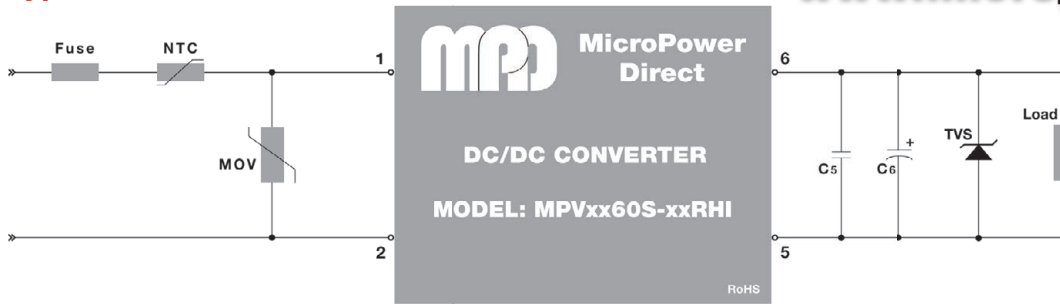
**Efficiency vs Input Voltage (Full Load)**



**Efficiency vs Output Power (VIN= 600 VDC)**



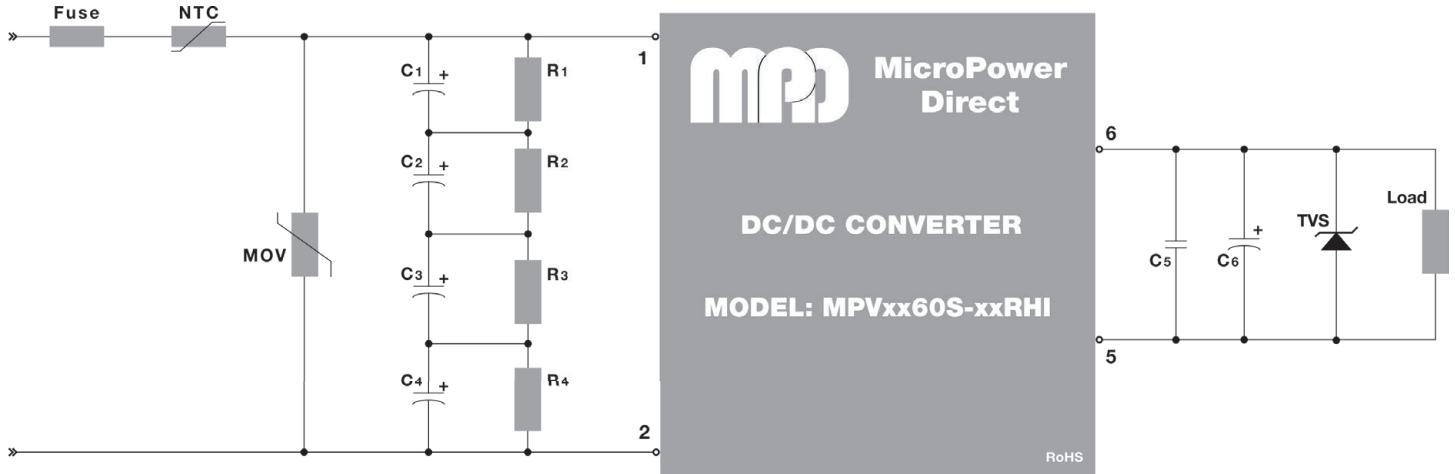
### Typical Connection 1



The diagram at left illustrates a typical connection of the MPV0560S-xxRHI or MPV1060S-xxRHI series. Output capacitors C6 and C5 are filtering components. They are required to meet ripple and noise specifications.

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

### Typical Connection 2: With External EMC Components



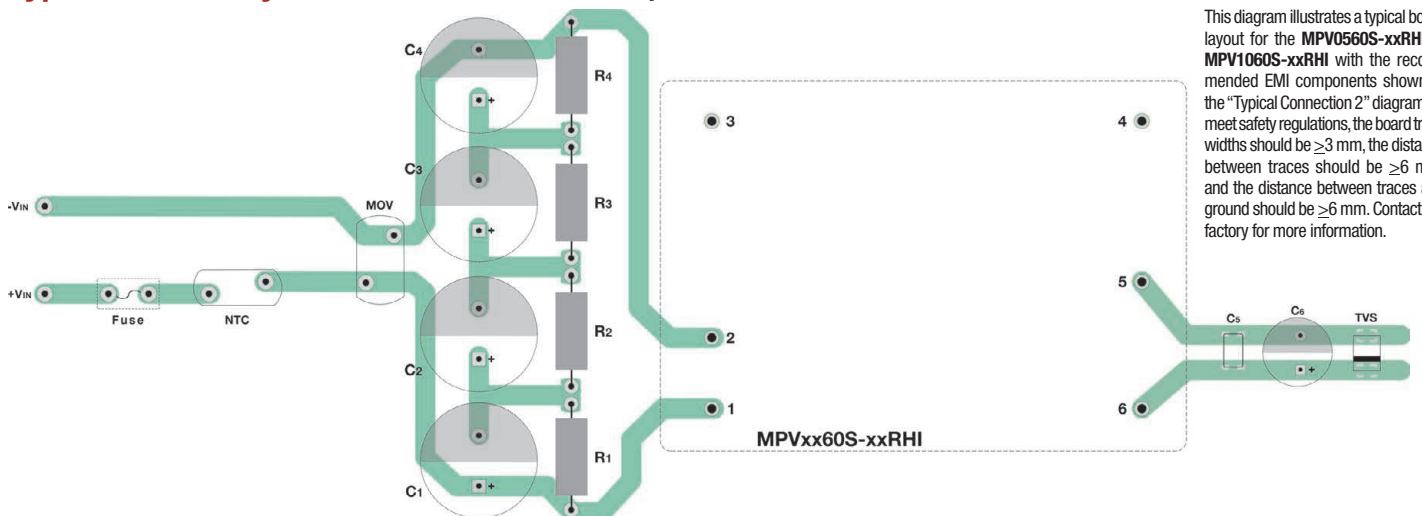
For applications that require meeting higher EMC standards, the circuit shown above is recommended. Some notes on this diagram (starting with the input circuit) are:

1. It is recommended that an external fuse be used. The recommended fuse is 1A/250V.
2. The NTC helps to prevent damage to the module in case 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 C1, C2, C3 and C4 are input filter components (connected in series to achieve the required capacitance level). Resistors R1, R2, R3 and R4 help to balance the current across the capacitors.
5. Recommended values for components are:

6. Capacitor C5 is ceramic. This capacitor is used to filter high frequency noise. A recommended value is given in the table below.
7. Capacitor C6 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.

Model Number	External Components						
	NTC	MOV	C1, C2, C3, C4	R1, R2, R3, R4	C5	C6	TVS
MPV0560S-05RHI	5D-9	SK201000	47 $\mu$ F/450V	1 M $\Omega$ /2W	1.0 $\mu$ F/50V	220 $\mu$ F/25V	SMBJ7.0A
MPV1060S-05RHI							120 $\mu$ F/35V
MPV1060S-24RHI							

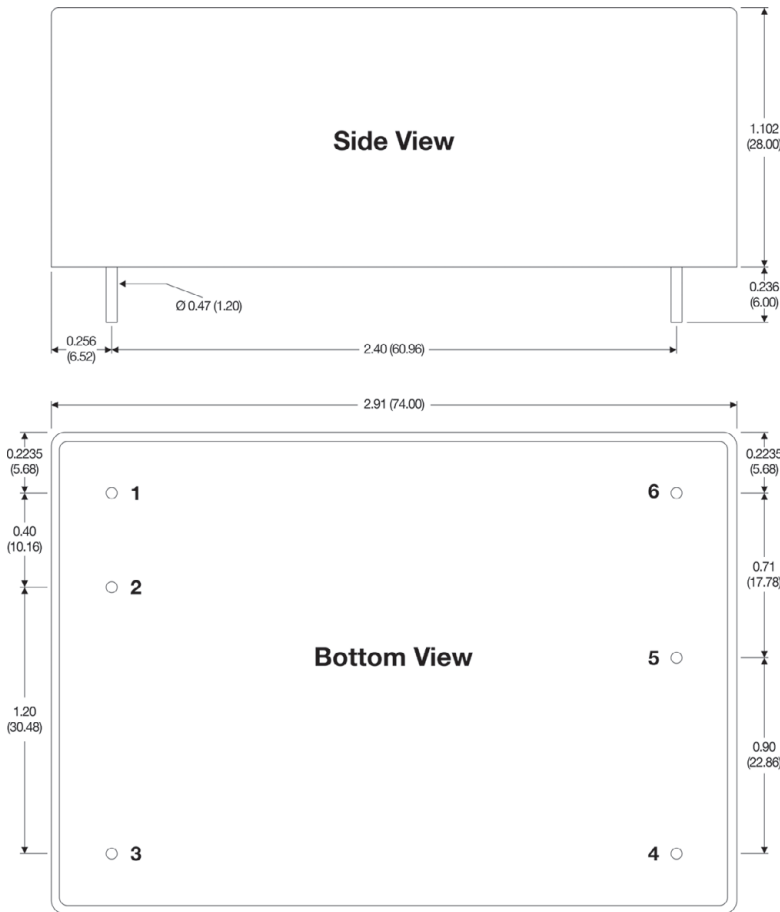
### Typical Board Layout: With External EMC Components



This diagram illustrates a typical board layout for the MPV0560S-xxRHI or MPV1060S-xxRHI with the recommended EMI components shown in the "Typical Connection 2" diagram. To meet safety regulations, the board trace widths should be  $\geq 3$  mm, the distance between traces should be  $\geq 6$  mm, and the distance between traces and ground should be  $\geq 6$  mm. Contact the factory for more information.

## Mechanical Dimensions

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## Pin Connections

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

### Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx =  $\pm 0.02$  ( $\pm 0.50$ )

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- 200 - 1200 VDC Input Range
- 4,000 VDC Isolation
- Under Input Volt Protection
- Over Output Volt Protection
- Short Circuit Protection
- High Efficiency
- Compact Packaging
- -25°C to +70°C Operation
- High MTBF

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