MPV1060 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

RoHS

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		200 VDC Input		4.0		A
		600 VDC Input		12.0		
		1200 VDC Input		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 = 10% to 100%		±0.5	±1.0	%
Ripple & Noise (20 MHz)	See Note 1		80	150	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			VAC
Isolation Resistance	500 VDC	100			MΩ
Switching Frequency			65		kHz

EMI Characteristics

Parameter	Standard		Criterea	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/±8kV
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
CS		EN 61000-4-6	A	10 Vrms
PFM		EN 61000-4-8	A	10A/m
Voltage Dips		EN 61000-4-11	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	%

Physical

Case Size	See Mechanical Drawings (Page 4)
Case Material	Aluminum Alloy (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 (5-10 Sec)	255	260	265	°C
	Manual Soldering (3-5 Sec)	350	360	370	

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

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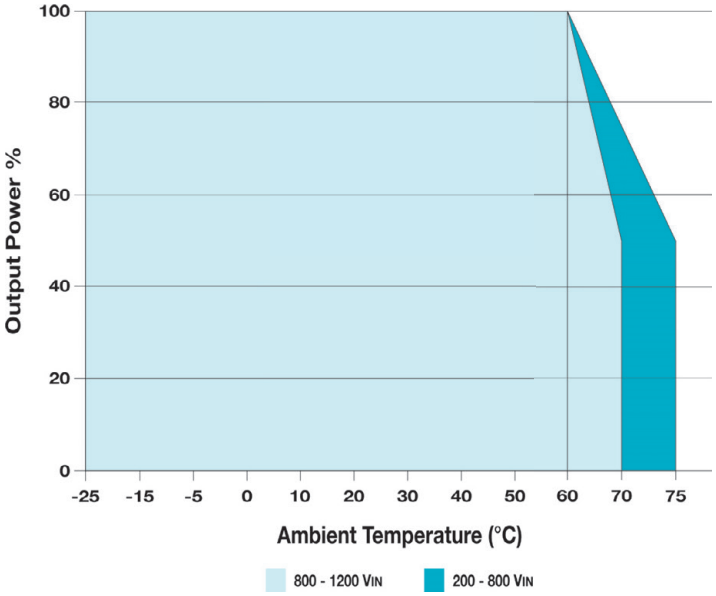
Model Selection Guide

Model Number	Input		Output			Efficiency (%, Typ)	Over Voltage Protection (VDC Typ)	Capacitive Load (µF, Max)	Fuse Rating Slow-Blow (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

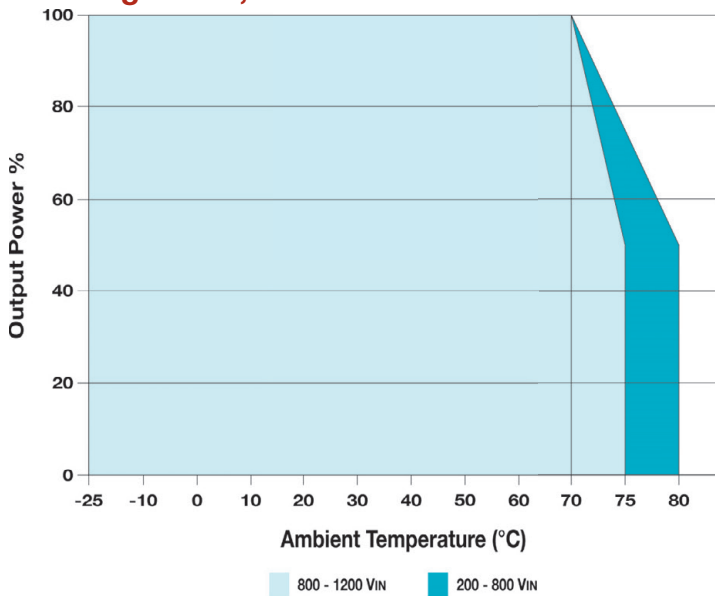
Notes:

1. To meet the specified ripple and noise levels, a 1 µF ceramic capacitor must be connected in parallel with a 10 µF electrolytic capacitor across the output of the module (pins 5 and 6). 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 (±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 (±1 kV/±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.

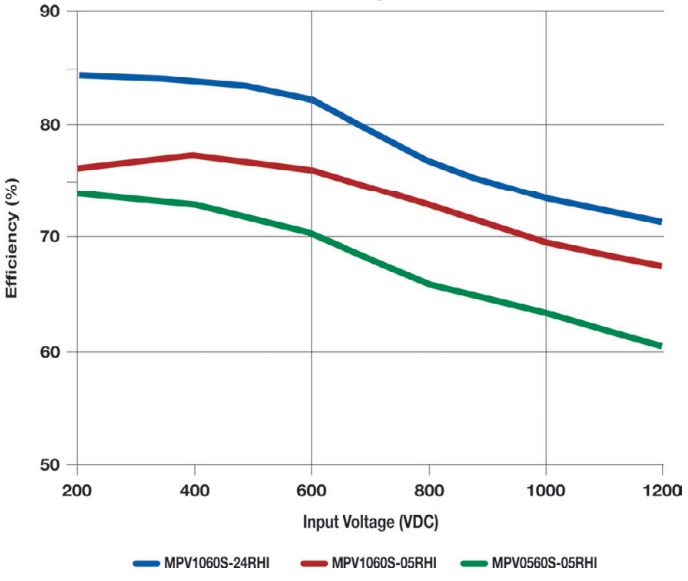
Derating Curve, MPV1060S-05



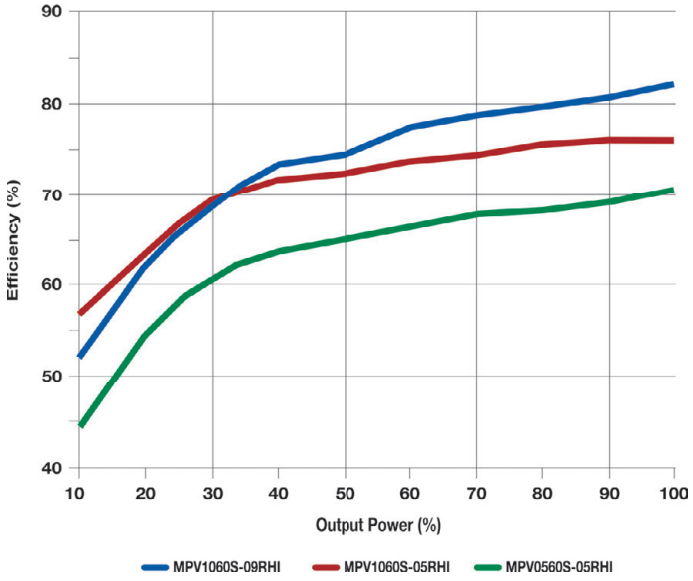
Derating Curve, MPV0560S-05 & MPV1060S-24



Efficiency vs Input Voltage (Full Load)

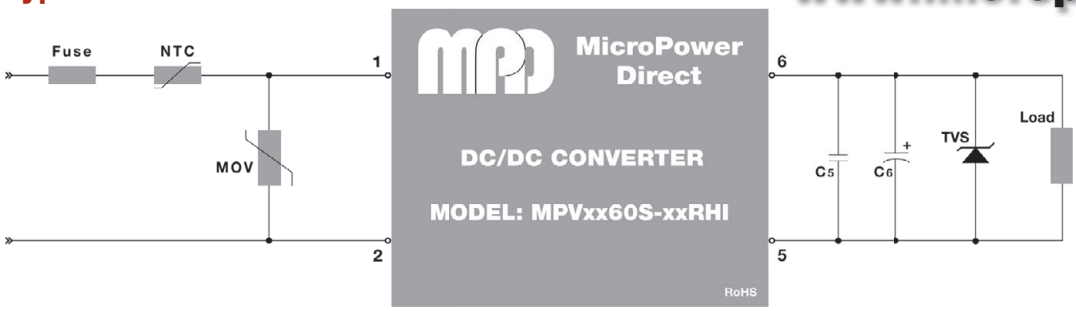


Efficiency vs Output Power (VIN= 600 VDC)



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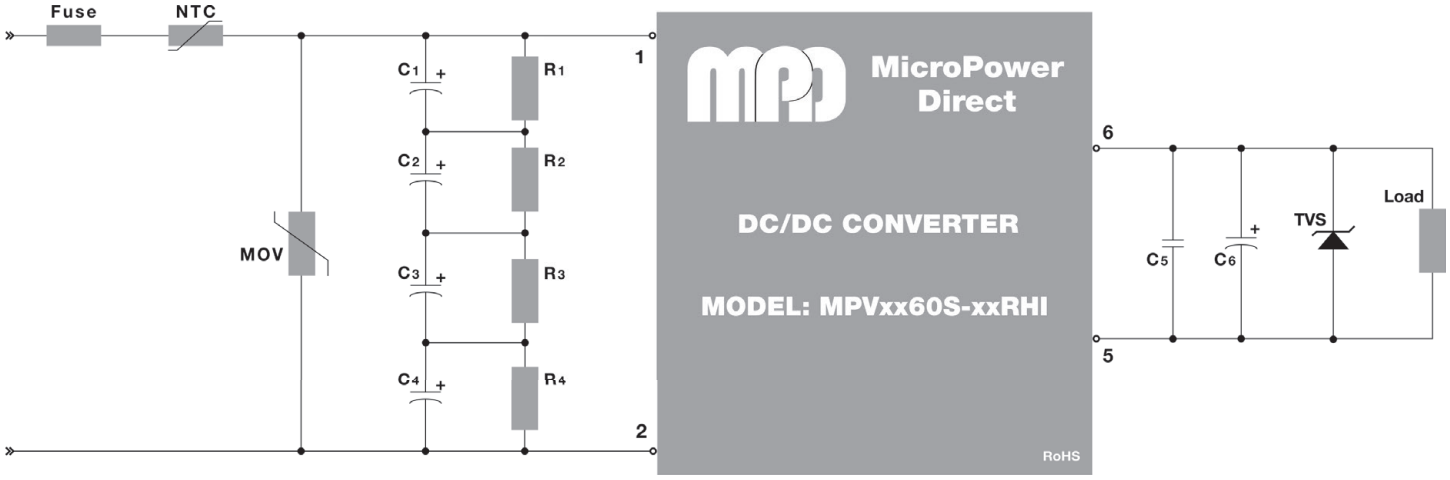
Typical Connection 1



The diagram at left illustrates a typical connection of the **MPV0560S-xxRHI** or **MPV1060S-xxRHI** series. Output capacitors C_6 and C_5 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

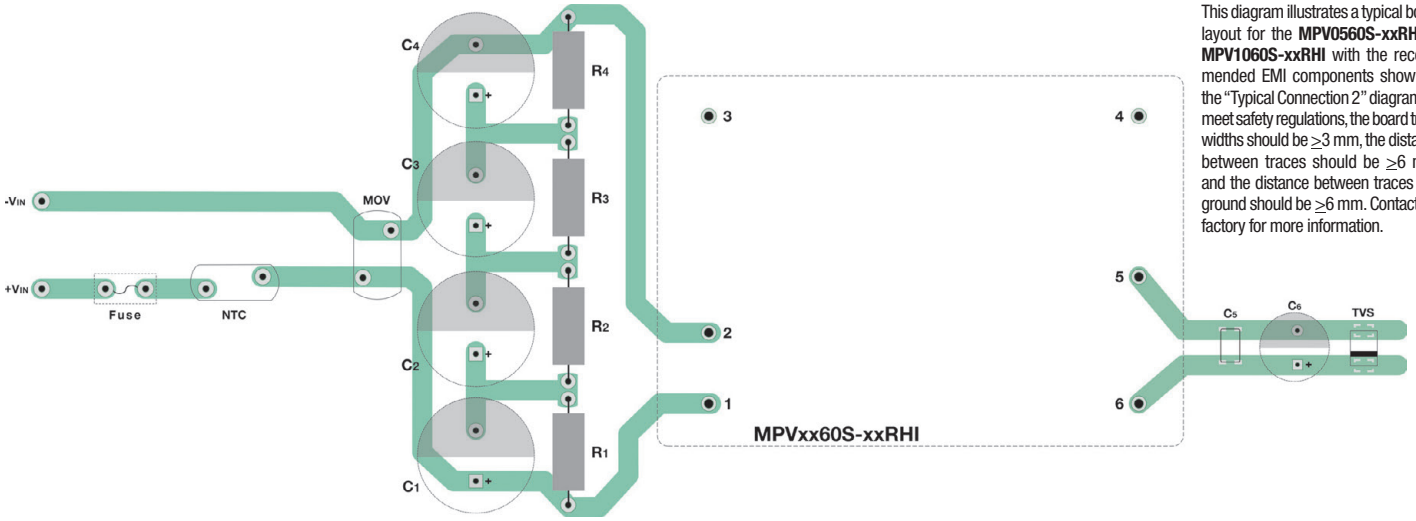


For applications that require meeting higher EMC standards, the circuit shown above is recommended. Some notes on this diagram (starting with the input circuit) are:

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 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.

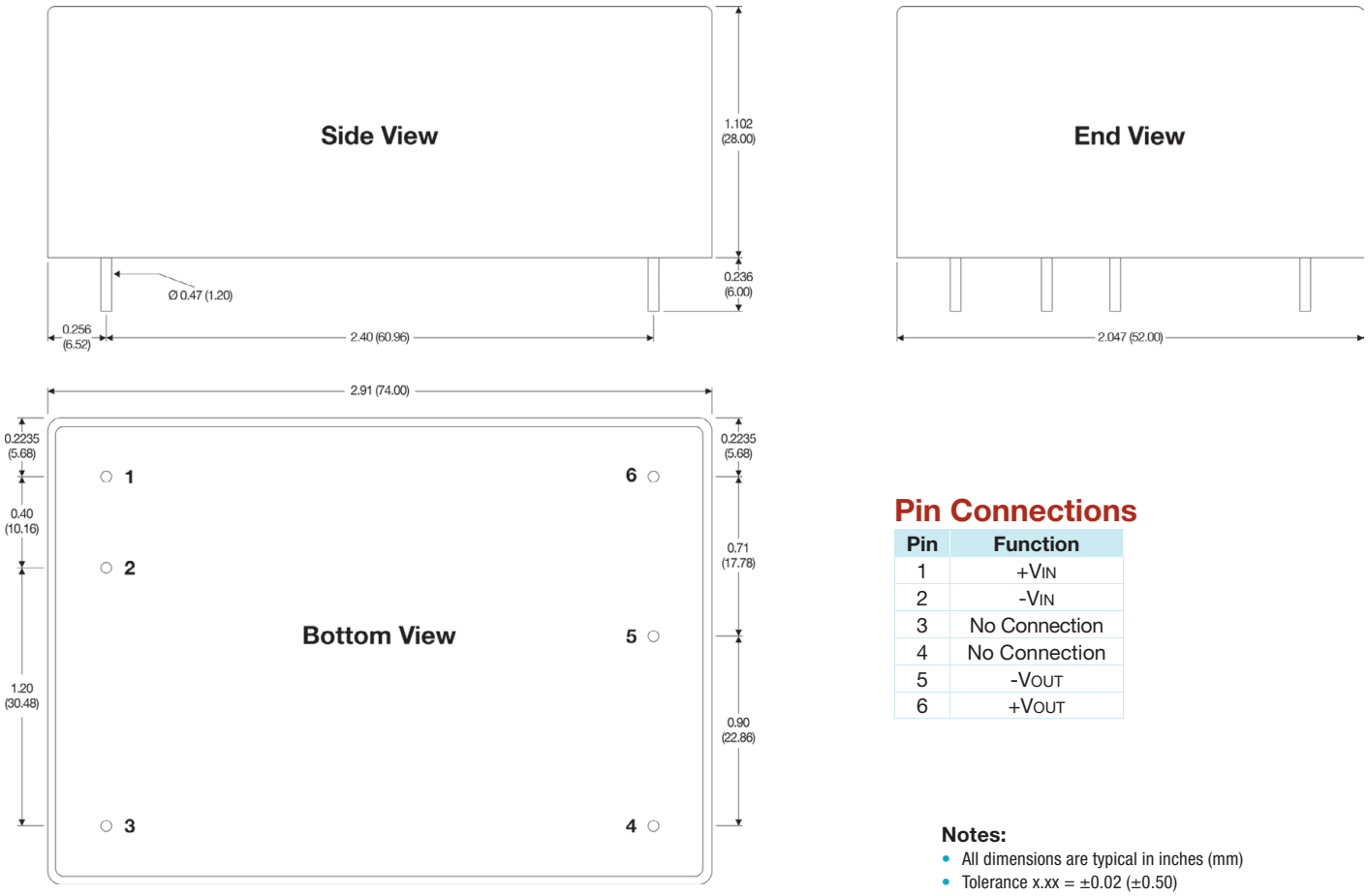
Model Number	External Components						
	NTC	MOV	C_1, C_2, C_3, C_4	R_1, R_2, R_3, R_4	C_5	C_6	TVS
MPV0560S-05RHI	5D-9	SK201000	47 μF/450V	1 MΩ/2W	1.0 μF/50V	220 μF/25V	SMBJ7.0A
MPV1060S-05RHI							
MPV1060S-24RHI						120 μF/35V	SMBJ30A

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 ≥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.

Mechanical Dimensions



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 = ±0.02 (±0.50)

More Ultra-Wide Input DC/DC Products

MicroPower Direct offers a two more DC/DC product families with specifications that are ideal for use in photovoltaic applications. The **MPV1560S** and **MPV4060S** offer a unique combination of compact size, very wide input range, very high isolation and low cost. Features Include:

- **15W & 40W Output Power**
- **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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