MPV15RHI Series

Compact, 12:1 Input PV Power 15W DC/DC Converters

Key Features:

- 15W Output Power
- 100 - 1200 VDC Input Range
- 4,000 VDC Isolation
- Input Under Volt Protection
- Output Over Volt Protection
- Compact Case
- Optional Chassis Mount
- Optional DIN Rail Mount
- -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		100	600	1,200	VDC
Input Current	200 VDC Input			92.0	mA
	600 VDC Input			31.0	
	1200 VDC Input			17.0	
Inrush Current	200 VDC Input		7.0		A
	600 VDC Input		23.0		
	1200 VDC Input		50.0		
Start-Up Time				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 = 5% to 100%		±0.5	±1.0	%
Ripple & Noise (20 MHz)	See Note 1		100	200	mV P - P
Temperature Coefficient			±0.02		%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	4,000			VDC
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; ±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	%

Physical

Case Size	Module	See Mechanical Drawing (Page 4)
	Chassis (A2) Mount	See Mechanical Drawing (Page 4)
	DIN (A4) Mount	See Mechanical Drawing (Page 4)
Case Material	Aluminum Alloy With Non-Conductive Base (UL94-V0)	
Weight	Module	4.01 Oz (113g)
	Chassis (A2) Mount	6.03 Oz (170g)
	DIN (A4) Mount	7.45 Oz (210g)

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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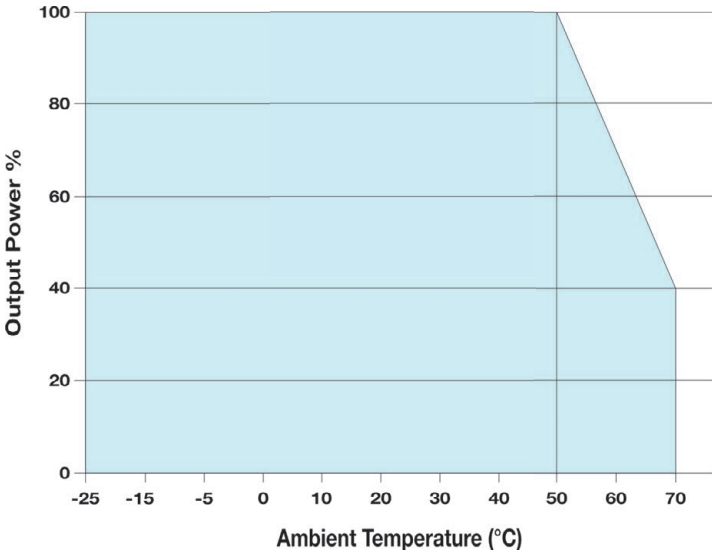
Model Selection Guide

Model Number	Input		Output			Efficiency (%, Typ)	Over Voltage Protection (VDC Typ)	Capacitive Load (µF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range							
MPV1560S-12RHI	600	100 - 1200	12.0	1,250	0.0	78	15.0	2,000	3,500
MPV1560S-15RHI	600	100 - 1200	15.0	1,000	0.0	79	19.0	1,200	3,500
MPV1560S-24RHI	600	100 - 1200	24.0	625	0.0	80	27.0	680	3,500

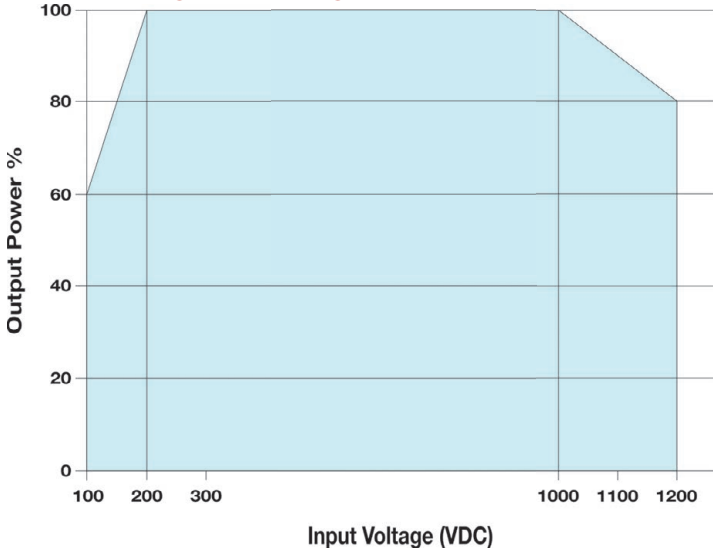
Notes:

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 (±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 **MPV1560-xxRHI** series, a 3.15A slow blow should be used.

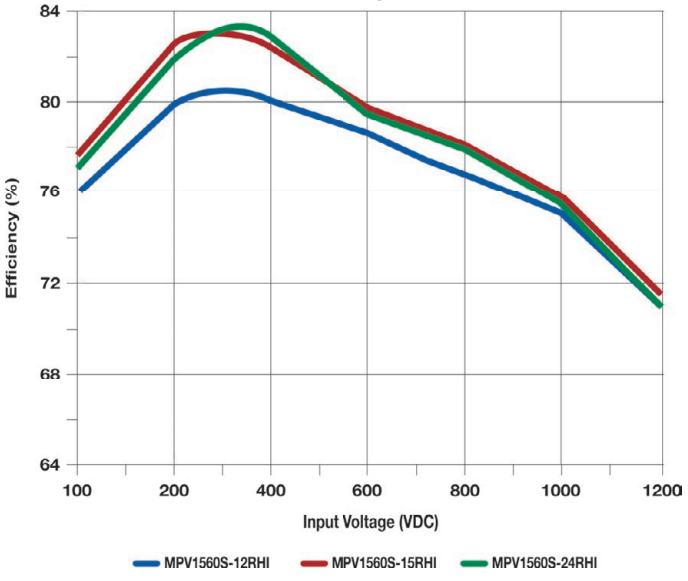
Derating Curve



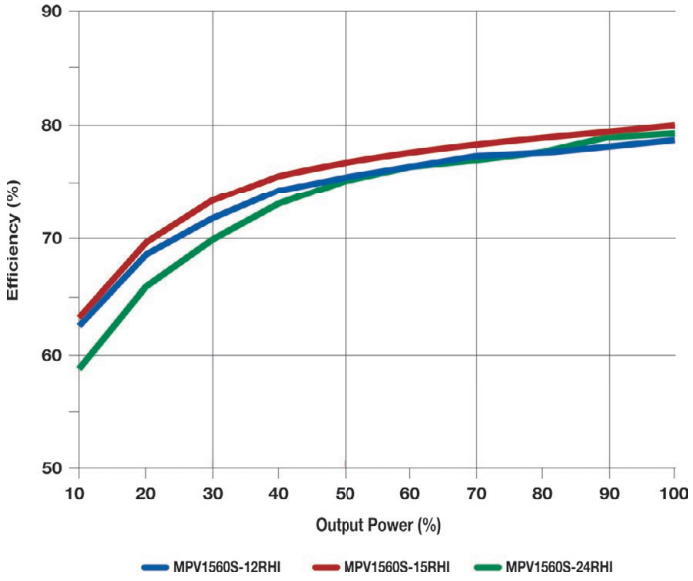
Input Voltage Derating Curve



Efficiency vs Input Voltage (Full Load)



Efficiency vs Output Power (VIN= 600 VDC)



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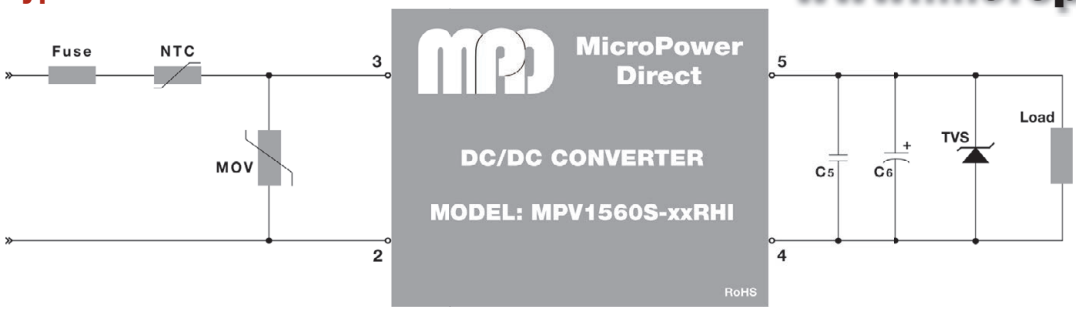
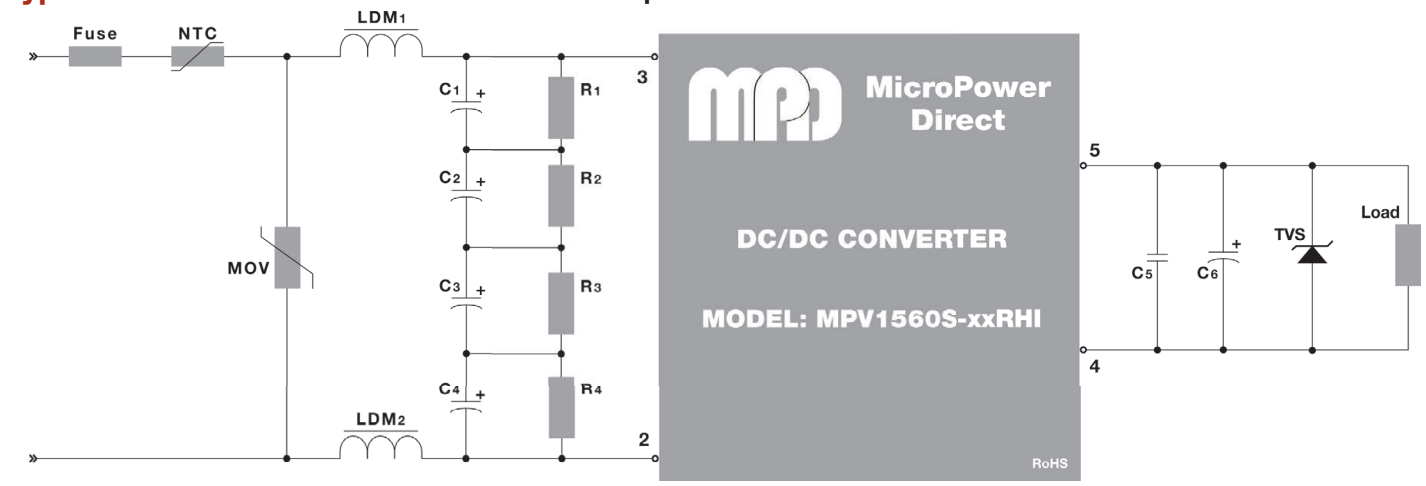
Typical Connection 1



The diagram at left illustrates a typical connection of the **MPV1560S-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

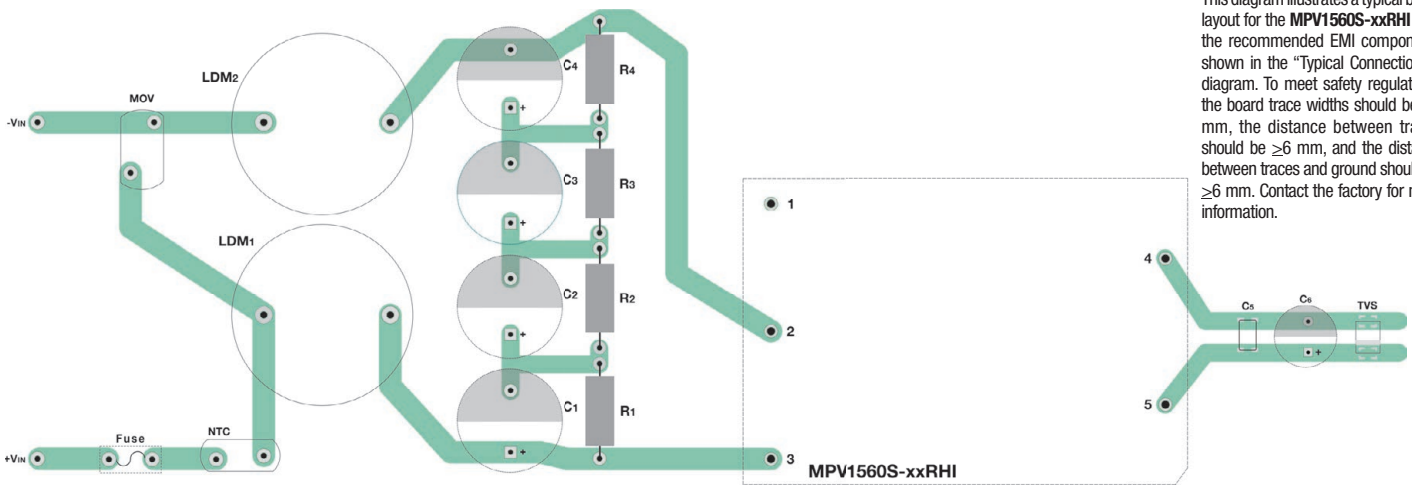


For applications that require meeting higher EMC standards, the circuit shown above is recommended. Some notes on this diagram (starting with the input circuit) are:

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.

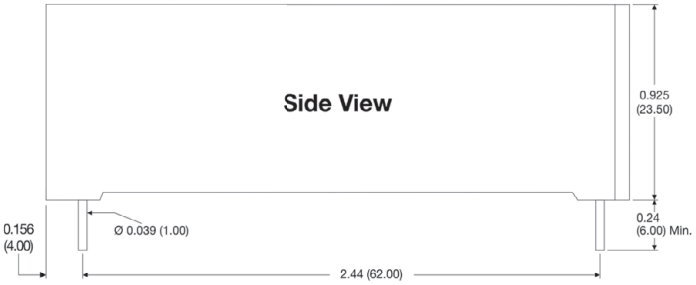
Model Number	External Components							
	NTC	MOV	LDM_1, LDM_2	C_1, C_2, C_3, C_4	R_1, R_2, R_3, R_4	C_5	C_6	TVS
MPV1560S-12RHI	5D-9	SK141000	1.2 mH/0.5A	22 µF/400V	1 MΩ/2W	0.22 µF/50V	120 µF/25V	SMBJ15A
MPV1560S-15RHI								SMBJ20A
MPV1560S-24RHI							68 µF/35V	SMBJ33A

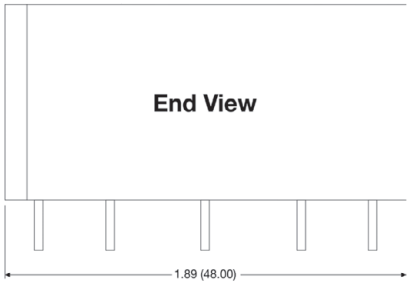
Typical Board Layout: With External EMC Components



This diagram illustrates a typical board layout for the **MPV1560S-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





All models of the **MPV1560S-xxRHI** series are available assembled on an adapter plate for mounting to a chassis or on a DIN rail. Mechanical dimensions for these adapters is shown at right. The photo below shows a product mounted on a similar adapter. Please contact the factory for more information.

For the chassis mount option, add suffix "A2" to the model number (i.e. **MPV1560S-xxRHI-A2**)

For the DIN rail mount option, add suffix "A4" to the model number (i.e. **MPV1560S-xxRHI-A4**)

Pin Connections

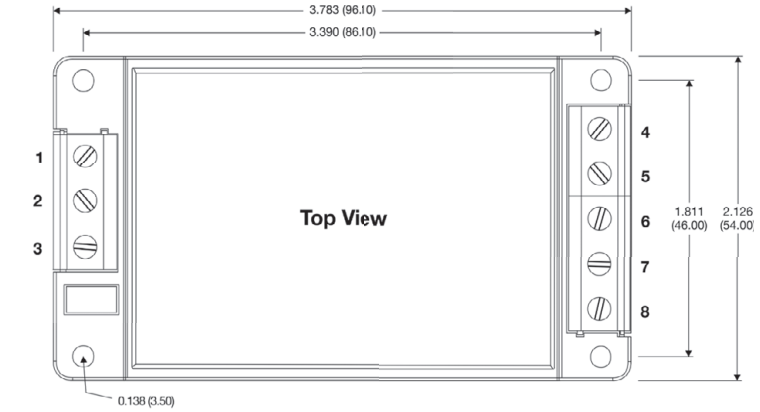
Pin	Function
1	-VIN
2	No Connection
3	+VIN
4	-VOUT
5	No Connection
6	No Connection
7	No Connection
8	+VOUT

Connection is the same for A2 & A4

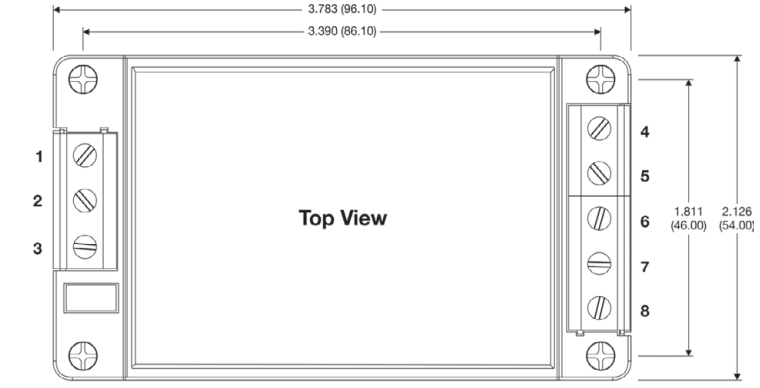
Pin Connections

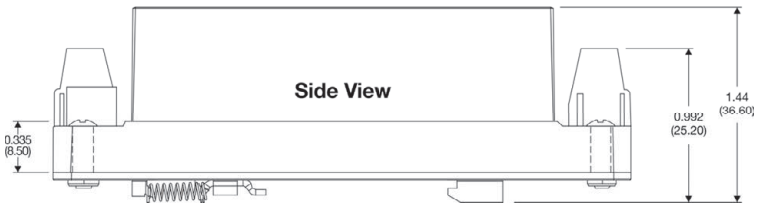
Pin	Function
1	No Connection
2	-VIN
3	+VIN
4	-VOUT
5	+VOUT

Mechanical Dimensions: With Chassis Mount Option (A2)



Mechanical Dimensions: With DIN Rail Option (A4)





Notes:
- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)

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