MR75-xxSRW Series

Compact, 75W Wide Input Railway DC/DC Converter

Key Features:

- 75W Output Power
- Meets EN 50155
- EN 60950 Approved
- EN 50121-3-2 Compliant
- Wide Input Range
- 3,000 VAC rms Isolation
- Reinforced Insulation
- 92% Efficiency
- Meets EN 61373
- Remote On/Off

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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	72 VDC Input	43.0	72.0	101.0	VDC
	110 VDC Input	66.0	110.0	160.0	
Input Start Voltage	72 VDC Input			43.0	VDC
	110 VDC Input			66.0	
Under Voltage Shutdown	72 VDC Input		40.0		VDC
	110 VDC Input		63.0		
Input Filter	PI (π) Filter				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±1.0	%
Line Regulation	V_{IN} = Min to Max			±0.2	%
Load Regulation	I_{OUT} = 0% to 100%			±0.3	%
Ripple & Noise (20 MHz)	See Note 1			150	mV Pk-Pk
Transient Response Time, See Note 2	25% Load Change		250		μS
Temperature Coefficient				±0.02	%/°C
Output Over Load Protection	See Note 3		150		%I_{OUT}
Output Short Circuit	Continuous (Hiccup Mode)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, Reinforced Insulation	Input/Output	3,000			VAC rms
	Input/Output to Case	1,500			VDC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance	100 kHz/1V			3,000	pF
Switching Frequency			320		kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient, See Note 4	-40	+25	+61	°C
Thermal Impedance, Without Heat Sink	Natural Convection	7.5			°C/W
	100 LFM	6.1			
	200 LFM	5.3			
	400 LFM	3.9			
Thermal Impedance, With Heat Sink	Natural Convection	6.8			°C/W
	100 LFM	4.1			
	200 LFM	3.3			
	400 LFM	2.2			
Operating Temperature Range	Base Plate	-40		+105	°C
Thermal Shutdown	Base Plate		+110		°C
Cooling	See Derating Curves (Page 3)				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	2.28 x 1.45 x 0.78 Inches (57.90 x 36.8 x 20.00 mm)
Case Material	Black Anodized Aluminum Case with Aluminum Plate/Heat Sink
Weight	2.6 Oz (74.0g)

Remote On/Off

Parameter	Conditions	Min.	Typ.	Max.	Units
Unit On	3.5 VDC - 12.0 VDC or Open Circuit				
Unit Off	0 VDC - 1.2 VDC or Short Circuit				
Control Input Current, ON	V_{CTRL} = 5V		0.5		mA
Control Input Current, OFF	V_{CTRL} = 0V		-0.5		mA
Control Common	Referenced to $-V_{IN}$ (Pin 3)				
Standby Input Current			2.5		mA

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	143.8			kHrs

Absolute Maximum Ratings, See Note 5

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (100 mS)	77 VDC Input	-0.7		165.0	VDC
	110 VDC Input	-0.7		250.0	
Lead Temperature	1.5 mm From Case for 10 Sec			260	°C

Model Selection Guide

Model Number	Input				Output		Reflected Ripple Current (mA Typ)	Over Voltage Protection (VDC)	Capacitive Load (μF, Max)	Efficiency (%, Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (A)					
	Nominal	Range	Full-Load	No-Load							
MR75-72S05RW	72	43 - 101	1,170	50	5.0	15.000	35	6.2	25,500	89	3,200
MR75-72S12RW	72	43 - 101	1,132	45	12.0	6.250	35	15	4,400	92	3,200
MR75-72S15RW	72	43 - 101	1,132	45	15.0	5.000	35	18	2,800	92	3,200
MR75-72S24RW	72	43 - 101	1,145	55	24.0	3.125	35	27	1,100	91	3,200
MR75-110S05RW	110	66 - 160	766	40	5.0	15.000	35	6.2	25,500	89	2,100
MR75-110S12RW	110	66 - 160	749	35	12.0	6.250	35	15	4,400	91	2,100
MR75-110S15RW	110	66 - 160	749	35	15.0	5.000	35	18	2,800	91	2,100
MR75-110S24RW	110	66 - 160	758	50	24.0	3.125	35	27	1,100	90	2,100

Notes:

1. Output noise is measured with a 10 μF tantalum capacitor and a 1.0 μF ceramic capacitor connected in parallel across the output. Ripple & noise is 150 mV typical for 24 VDC output models.
2. Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
3. Output overload protection is provided by a “hiccup” mode circuit
4. The ambient temperature range is the maximum possible for a converter with a heatsink mounted. Natural convection is 20 LFM, not “still air”. See the power derating curves on page 3 for the operating temperature limits for specific models.
5. Exceeding absolute maximum ratings may damage the module. These are not continuous operating ratings.
7. Operation at no-load will not damage these units, but they may not meet all specifications.
8. If the remote sense outputs are not used, the +Sense (pin 7) should be connected to $+V_{OUT}$ (pin 8) and the -Sense (pin 5) should be connected to $-V_{OUT}$ (pin 4).
9. It is recommended that a fuse be used on the input of a power supply for protection. For the correct rating, see the model selection table above.

EMC Specifications

Parameter	Standard		Level
Radiated Emissions	See Note 1	EN 50121	Class A
Conducted Emissions	See Note 1	EN 55011	Class A
ESD		EN 61000-4-2	Criteria A; ±8 kV Air, ±6 kV Contact
RS		EN 61000-4-3	Criteria A; 10V/m
EFT	See Note 2	EN 61000-4-4	Criteria A; ±2 kV
Surge	See Note 2	EN 61000-4-5	Criteria A; ±1 kV
CS		EN 61000-4-6	Criteria A; 10 V/m

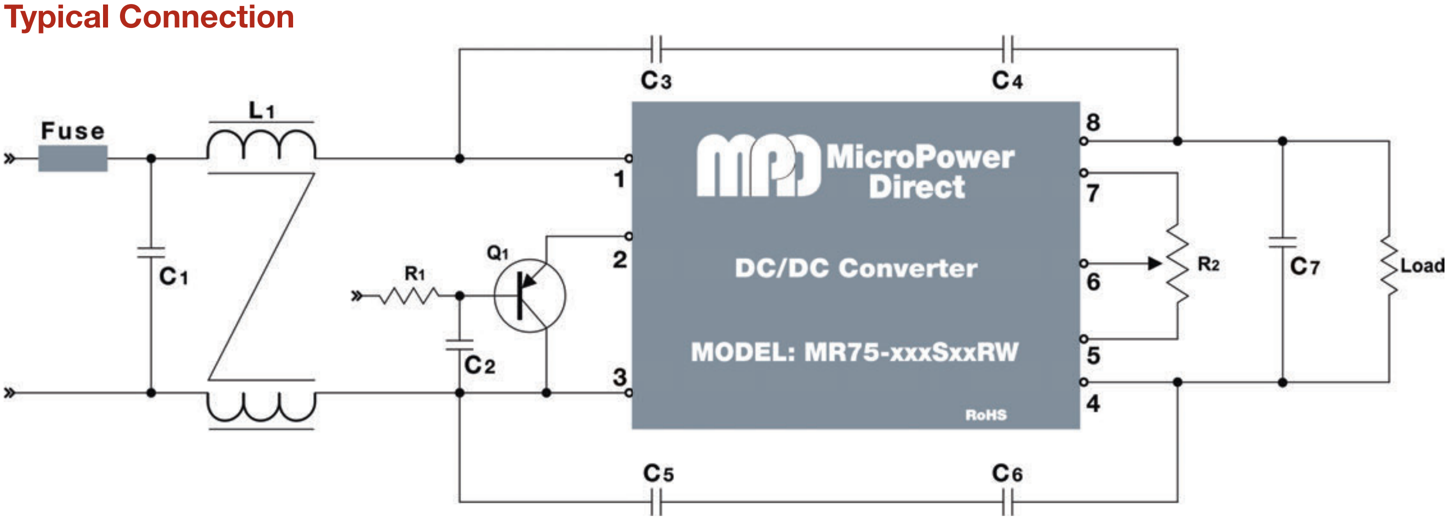
Notes:

1. To meet EN 55011 Class A, and EN 50121-3-2, an external input filter is required. See the connection diagram below for a typical circuit.
2. To meet EN 61000-4-4 and EN 61000-4-5, a capacitor should be connected across the input pins. See the connection diagram below for a typical example.

Environmental Standards

Parameter	Standard
Vibration & Shock	EN 61373
Cooling Test	EN 60068-2-1
Dry Heat	EN 60068-2-2
Damp Heat	EN 60068-2-30

Typical Connection



For applications that require meeting EMC/EMI standards, the diagram above illustrates a typical connection of the **MR75-xxxSxxRW** series. The units do not require external components to operate as specified. Some notes on this diagram (starting with the input circuit) are:

1. It is recommended that an external slow blow fuse be used. The recommended fuse rating is shown in the table at right.
2. To meet EN 55011 Class A & EN 50121-3-2, an external input filter is required. In the diagram this filter consists of C_1 and L_1. The recommended component values are shown in the table at right.
3. To meet EN 61000-4-4 and EN 61000-4-5, a capacitor should be connected across the input pins. In the connection diagram above, the value of C_1 should be changed to 470 μF/200V.
4. Recommended values for components are:

Component	72 V_{IN}	110 V_{IN}
Fuse	3,200 mA	2,100 mA
C_1	68 μF/200V	68 μF/200V
L_1	450 μH	450 μH
C_3	2,200 pF/3 kV	2,200 pF/3 kV
C_4	2,200 pF/3 kV	2,200 pF/3 kV
C_5	2,200 pF/3 kV	2,200 pF/3 kV
C_6	2,200 pF/3 kV	2,200 pF/3 kV
C_7	4.7 μF	4.7 μF

5. The circuit consisting of R_1, Q_1 and C_2 illustrates a simple open collector connection for the remote on/off control. The resistor (R_1) limits the current on the control line and the capacitor (C_2) bypasses noise spikes, helping to prevent phantom triggering of the control. If the control pin is not being used, it should be left open.
7. The resister R_2 is connected as an output adjust. The output adjustment capability is explained further on page 3.
8. The output sense pins (pin 7 and pin 5) may be used to compensate for the losses incurred over long leads to an output load. If not used for load compensation or output adjustment, the sense pins should be connected directly to the appropriate output pins, pin 7 to pin 8 and pin 5 to pin 4.
9. The output filtering capacitor (C_7) is a low ESR (<1Ω) electrolytic capacitor. Care must be taken in choosing this capacitor not to exceed the capacitive load specification for the unit.

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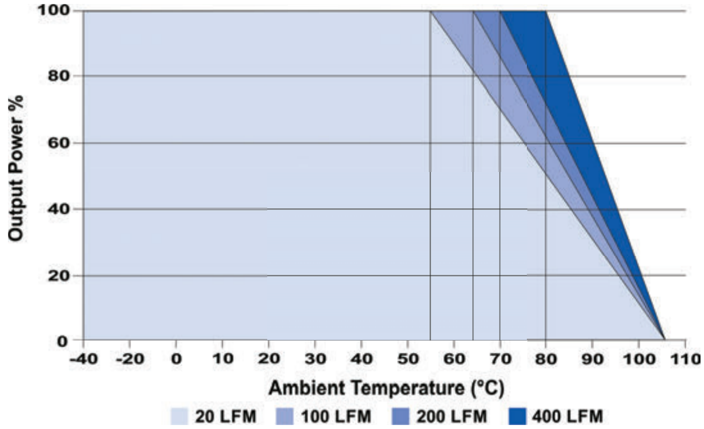
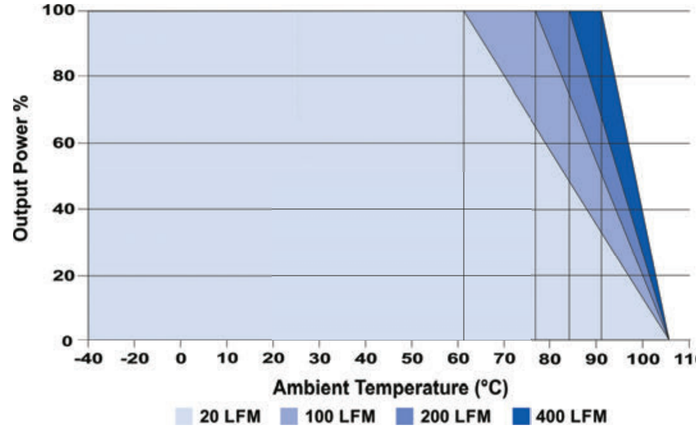
Derating Curves

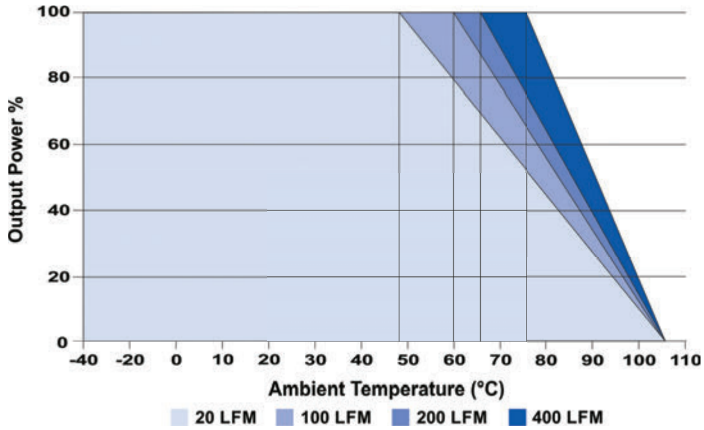
MR75-72S12RW & MR75-72S15RW without Heatsink



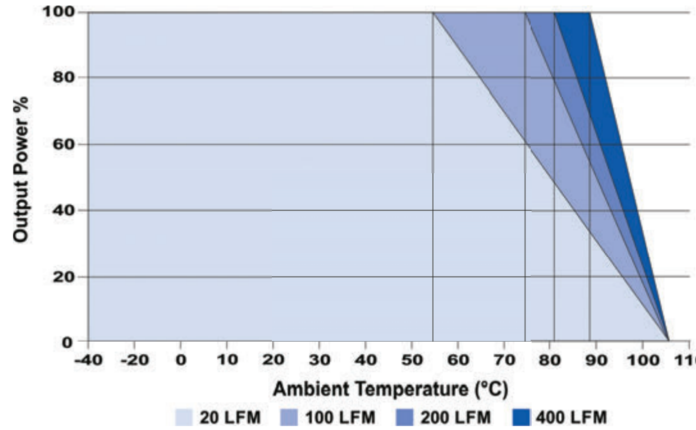
MR75-72S12RW & MR75-72S15RW with Heatsink



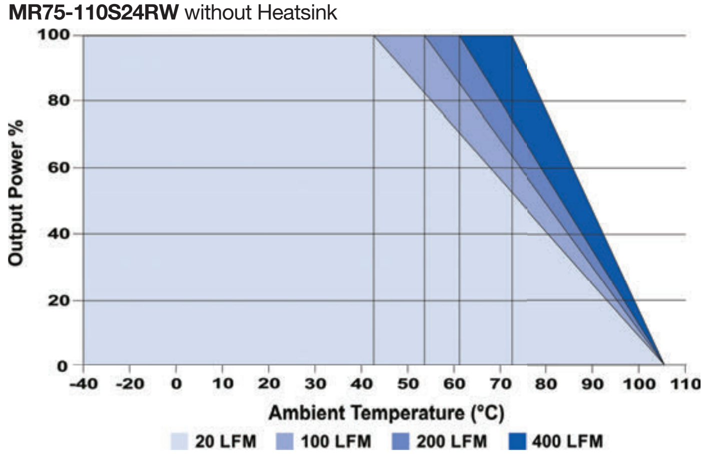
MR75-72S24RW, **MR75-110S12RW** & **MR75-110S15RW** without Heatsink



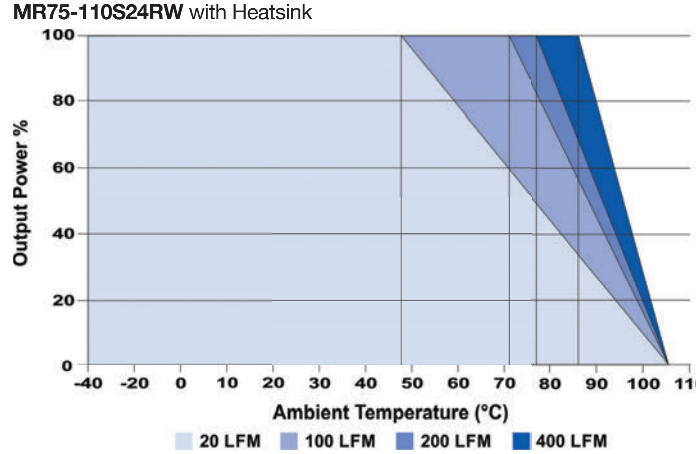
MR75-72S24RW, **MR75-110S12RW** & **MR75-110S15RW** with Heatsink



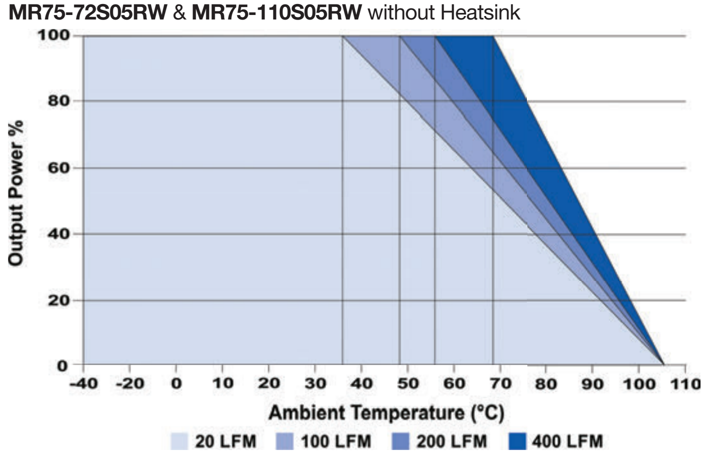
MR75-110S24RW without Heatsink



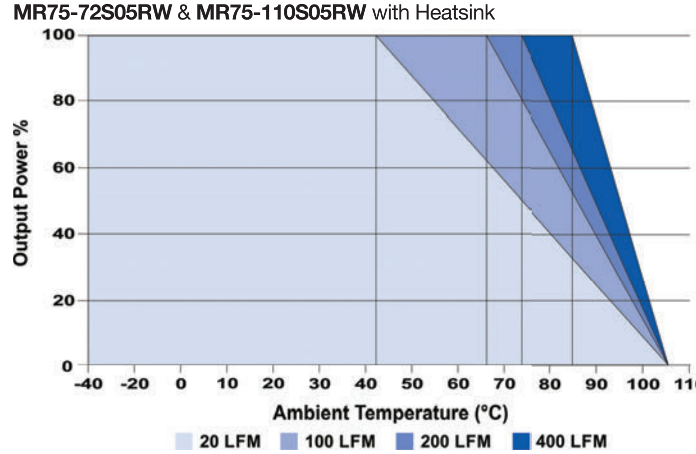
MR75-110S24RW with Heatsink



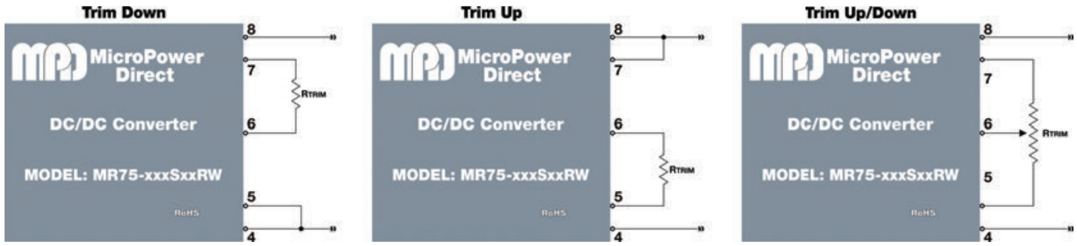
MR75-72S05RW & **MR75-110S05RW** without Heatsink



MR75-72S05RW & **MR75-110S05RW** with Heatsink



Output Voltage Adjustment

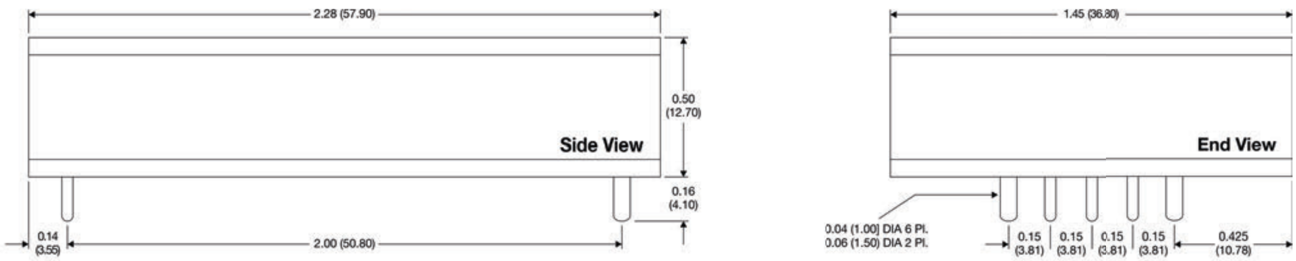


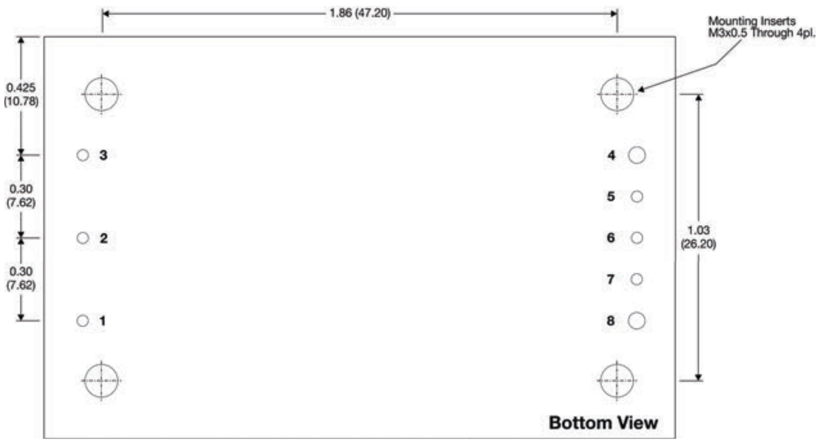
A simple external circuit may be used to adjust the converter output. The range of adjustment is ±10%.

To adjust the output down, connect a 5%, 3W resistor from the plus sense pin (7) to the VOUT trim pin (6). To adjust the output up, connect a 5%, 3W resistor from the minus sense pin (5) to the VOUT trim pin. For up/down trimming, connect a 10 kΩ potentiometer from the plus to the minus sense pins. Connect the wiper arm to the VOUT trim pin.

For a table of trim resistor values, contact the factory.

Mechanical Dimensions



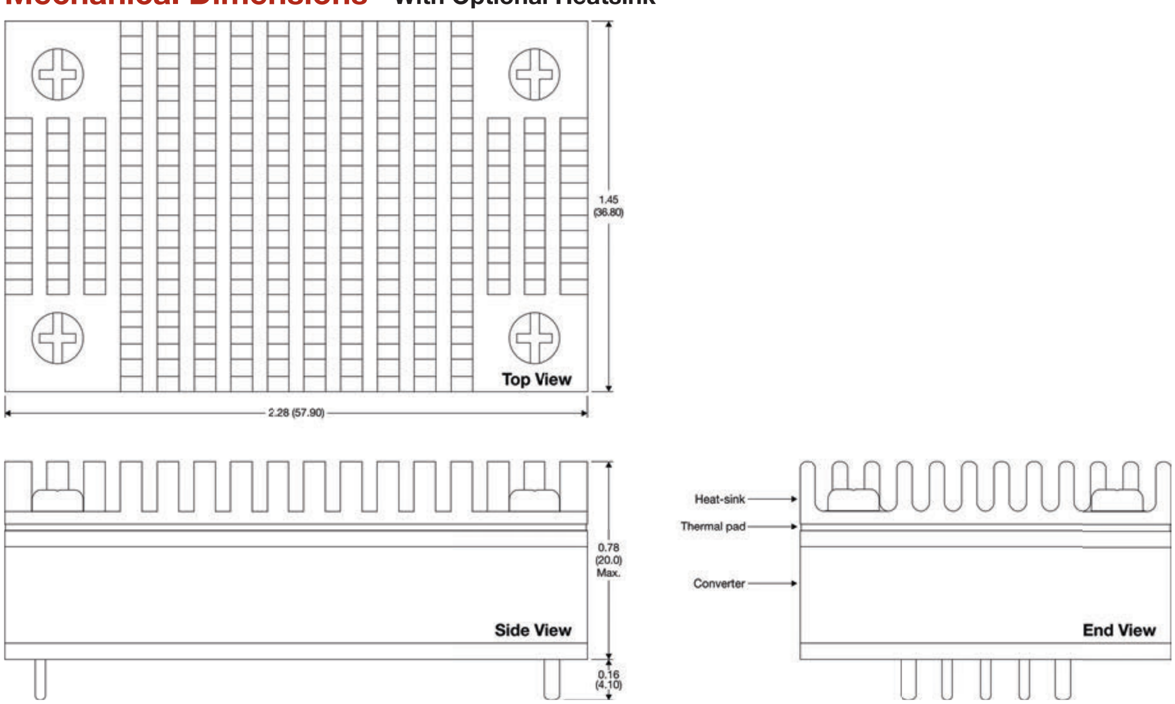


Pin Connections

Pin	Description
1	+VIN
2	Remote On/Off
3	-VIN
4	-VOUT
5	-Sense
6	Trim
7	+Sense
8	+VOUT

For the heatsink option, add suffix "H" to the model number (i.e. **MR75-110S12RW-H**)

Mechanical Dimensions - With Optional Heatsink



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

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