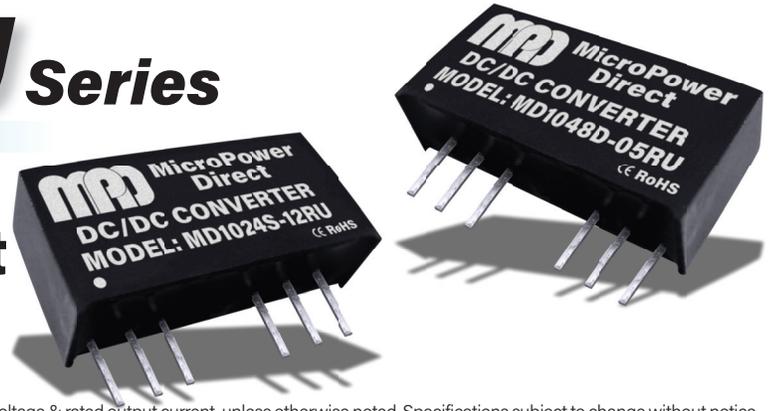


MD1000RU Series

Tightly Regulated, SIP 10W Single & Dual Out DC/DC Converters



Key Features:

- 10W Output Power
- Miniature SIP Package
- Wide 4:1 Input Range
- High Efficiency
- Short Circuit Protection
- -40°C to +85°C Operation
- Tightly Regulated
- Single & Dual Outputs
- Remote On/Off Control

RoHS



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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	24 VDC Input	9.0	24.0	36.0	VDC	
	48 VDC Input	18.0	48.0	75.0		
Input Filter	Capacitor Filter					

Output						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Output Voltage Accuracy			±1.0		%	
Minimum Load			0.0		%	
Line Regulation, For VIN Change of 1%	Single Output		±0.2		%	
	Dual Output		±0.5			
Load Regulation	See Note 2		±1.0		%	
Cross Regulation	See Note 3		±5.0		%	
Ripple & Noise (20 MHz)	5V Outputs		100		mV P - P	
	All Other Outputs		1.0		%VOUT	
Temperature Coefficient			±0.02		%/°C	
Over Power Protection	Autorecovery	110		180	%	
Output Short Circuit	Continuous (Autorecovery)					

General						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Isolation Voltage	60 Sec	2,250			VDC	
Isolation Resistance		10 ⁹			Ω	
Isolation Capacitance			1,000		pF	
Switching Frequency			450		kHz	

Remote On/Off						
Parameter	Conditions	Min.	Typ.	Max.	Units	
On			Open or High Impedance			
Off			4.0		mA	

Environmental						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Operating Temperature Range	Ambient	-40	+25	+85	°C	
	Case			+105		
Storage Temperature Range		-55		+125	°C	
Cooling	Free Air Convection					
Humidity	RH, Non-condensing			95	%	

Physical						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Case Size		See Mechanical Diagram (Page 4)				
Case Material		Non-Conductive Black Plastic (UL94-V0)				
Weight		See Mechanical Diagram (Page 4)				

Reliability Specifications						
Parameter	Conditions	Min.	Typ.	Max.	Units	
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.93			MHours	

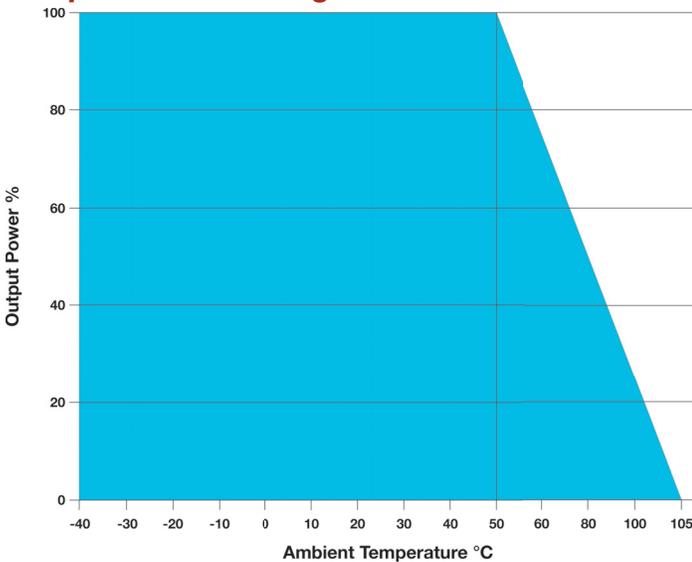
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Model Number	Input				Output			Efficiency (% Typ)	Capacitive Load (µF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)			
	Nominal	Range	Full-Load	No-Load						
MD1024S-05RU	24.0	9.0 - 36.0	496	10	5.0	2,000	0.0	84.0	2,000	2,000
MD1024S-12RU	24.0	9.0 - 36.0	471	10	12.0	833	0.0	88.5	1,000	2,000
MD1024S-15RU	24.0	9.0 - 36.0	468	10	15.0	666	0.0	89.0	680	2,000
MD1024S-24RU	24.0	9.0 - 36.0	471	10	24.0	417	0.0	88.5	220	2,000
MD1024D-05RU	24.0	9.0 - 36.0	493	10	±5.0	±1,000	0.0	84.5	1,000	2,000
MD1024D-12RU	24.0	9.0 - 36.0	474	10	±12.0	±417	0.0	88.0	470	2,000
MD1024D-15RU	24.0	9.0 - 36.0	474	10	±15.0	±333	0.0	88.0	330	2,000
MD1048S-05RU	48.0	18.0 - 75.0	248	5.0	5.0	2,000	0.0	84.0	2,000	1,000
MD1048S-12RU	48.0	18.0 - 75.0	238	5.0	12.0	833	0.0	87.5	1,000	1,000
MD1048S-15RU	48.0	18.0 - 75.0	238	5.0	15.0	666	0.0	87.5	680	1,000
MD1048S-24RU	48.0	18.0 - 75.0	235	5.0	24.0	417	0.0	88.5	220	1,000
MD1048D-05RU	48.0	18.0 - 75.0	247	5.0	±5.0	±1,000	0.0	84.5	1,000	1,000
MD1048D-12RU	48.0	18.0 - 75.0	237	5.0	±12.0	±417	0.0	88.0	470	1,000
MD1048D-15RU	48.0	18.0 - 75.0	238	5.0	±15.0	±333	0.0	87.5	330	1,000

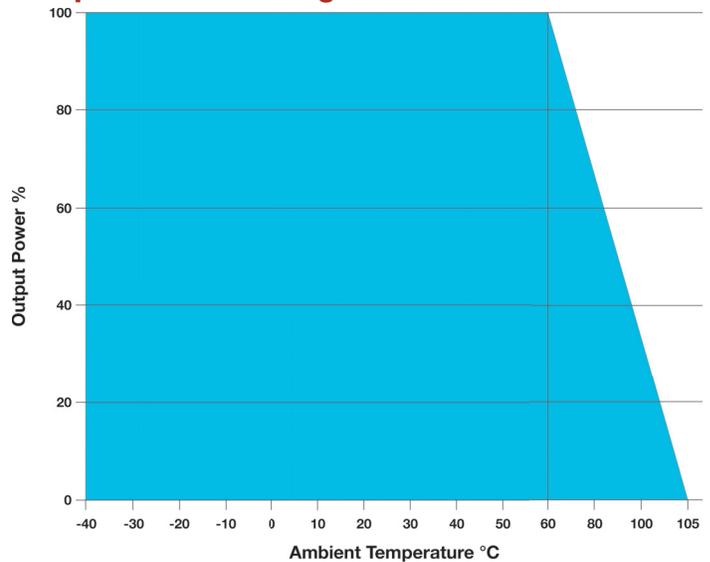
Notes:

- Output capacitive load is specified for each output.
- Load regulation is measured over a range of 0% IOUT to 100% IOUT.
- Measured with one load changing from 10% to 100% load while the other output is at 100% load. Output voltage is set to within ±5%.
- To meet the requirements of EN 61000-4-4 and EN 61000-4-5, external components are needed. See page 3 for a typical connection. Contact the factory for more information.
- Operation at no-load will not damage the unit, but they may not meet all specifications.
- It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection tables for the correct rating.

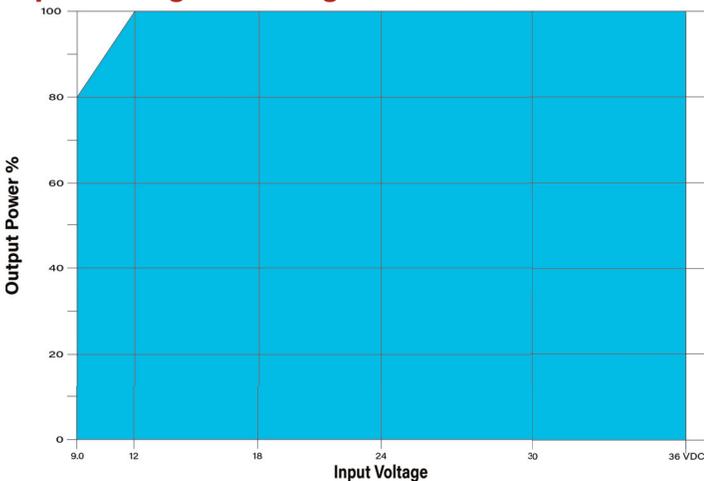
Temperature Derating: 5 VOUT Models



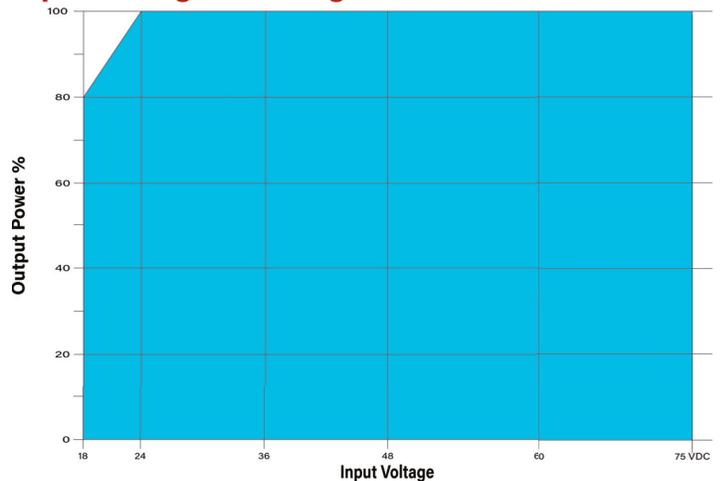
Temperature Derating: All Other Models



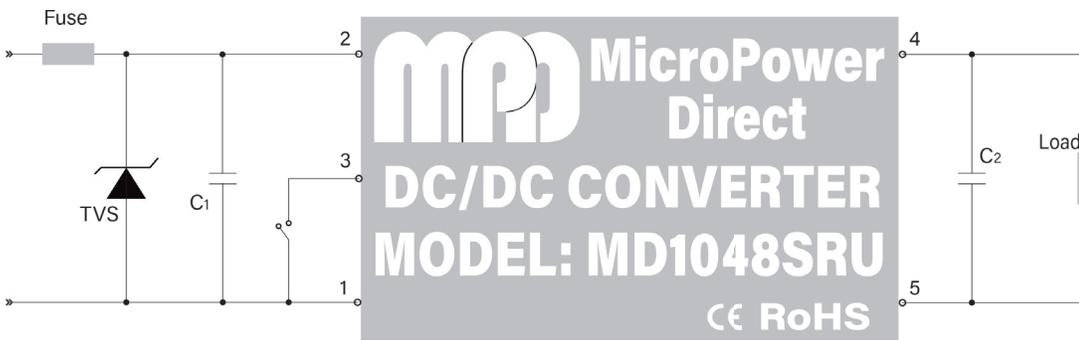
Input Voltage Derating: 24 VIN Models



Input Voltage Derating: 48 VIN Models

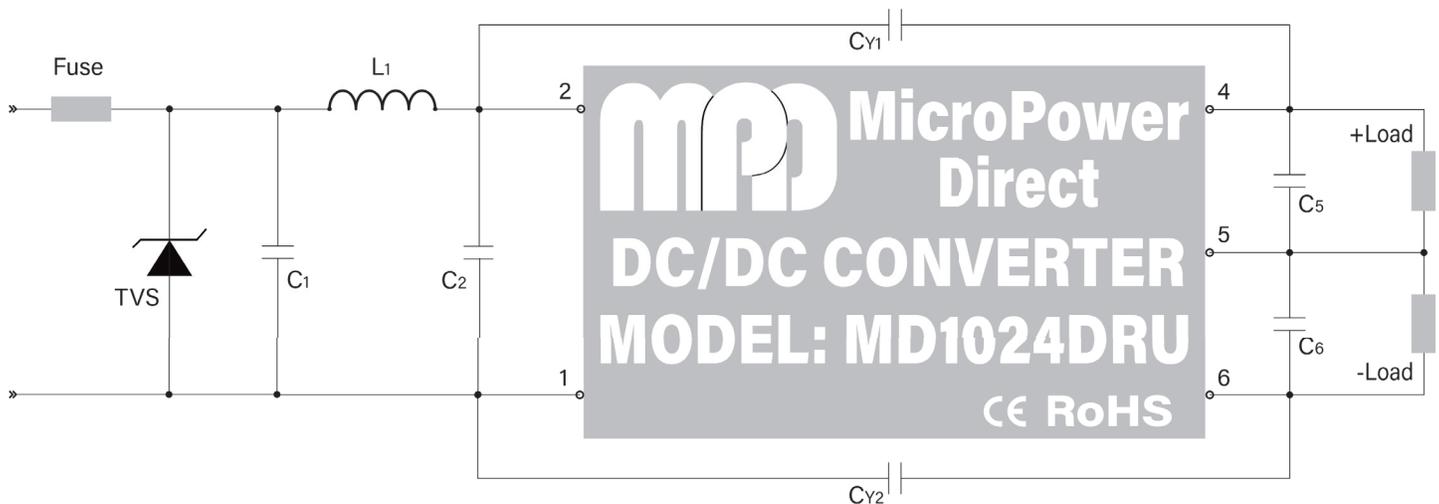


Simple Connection



The diagram at left illustrates a simple connection of the MD1000RU series. The TVS provides protection against voltage spikes on the input line. For applications that do not require the circuit to meet EMI/EMC specifications, the capacitors C1 and C2 will reduce input/output ripple and improve the converter stability over time and temperature. The recommended component values are 100 μF for C1 and 10 μF for C2.

EMI Connection



The diagram above shows a typical connection of the MD1000RU series for an application that requires compliance to EMI/EMC standards (as specified on page 1). Some notes on these components are:

1. An external fuse is recommended to protect the unit in the event of a fault on the input line. A recommended value is given in model selection table on page 2.
2. To protect against voltage spikes, it is recommended that a TVS be used on the input. For a suggested value, see the table at right.
3. The filtering components shown are needed to meet the conducted emissions requirements for EN 55032 Class A. All components should be mounted as close to the converter as possible.

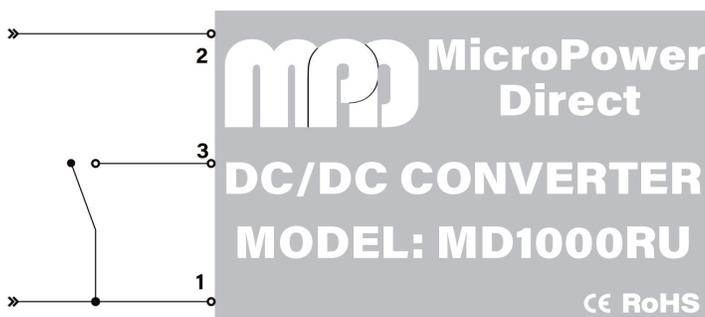
4. The output filtering capacitors (C5 and C6) are high frequency, low resistance electrolytic capacitors. Care must be taken in choosing these capacitors not to exceed the capacitive load specification for the unit. Voltage derating of capacitors should be 80% or above.

3. Suggested component values are:

Component	MD1024RU	MD1048RU
Fuse	2,000 mA	1,000 mA
TVS	SMCJ48A	SMCJ90A
C1	10 μF /50V	4.7 μF /100V
L1	4.7 μH	10 μH
C2	10 μF /100V	4.7 μF /100V
CY1/CY2	1k pF/3 kV	1k pF/3 kV
C5/C6	10 μF	10 μF

4. In many applications, simply adding input/output capacitors will enhance the input surge protection & and reduce output ripple sufficiently. In this case, the unit could be connected as shown in the simple connection above, without the other filter components. Recommended capacitor values are given above.

Remote ON/OFF Control

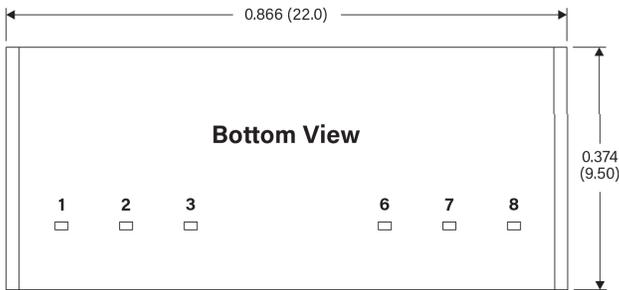
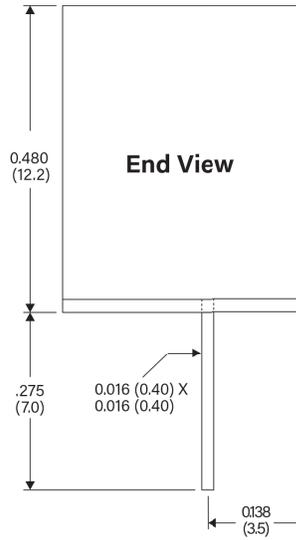
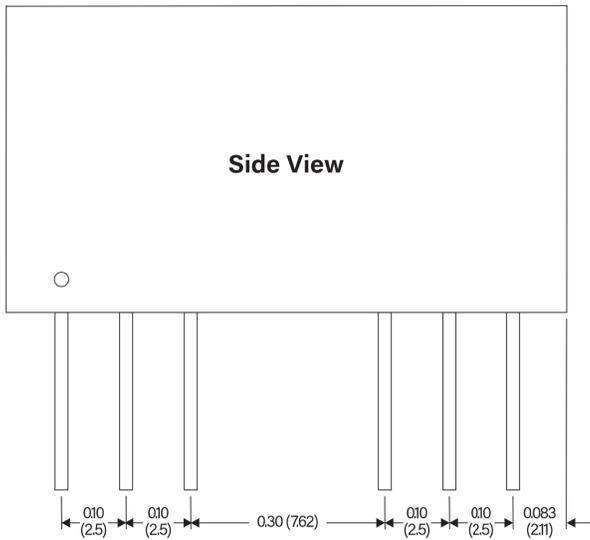


The MD1000RU includes a remote control input. This input (pin 3) is referenced to the minus input (pin 1). The unit operates when this pin is left open, as shown in the diagram at left..

If the connection between pin 1 & pin 3 is closed, a small amount of current will flow into pin 3 (approx. 4 mA). This will turn the unit off.

Mechanical Dimensions

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Pin Connections

Pin	Single Output
1	-VIN
2	+VIN
3	Remote Control
6	+VOUT
7	-VOUT
8	No Connection

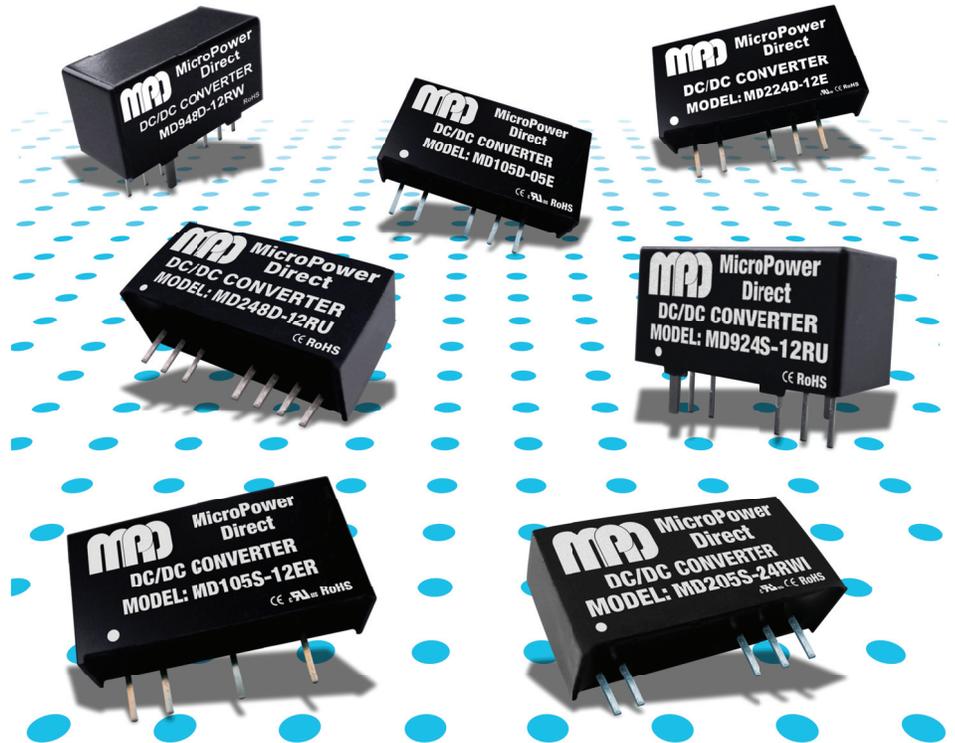
Pin	Dual Output
1	-VIN
2	+VIN
3	Remote Control
6	+VOUT
7	Common
8	-VOUT

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ± 0.02 (± 0.5)
- Pin pitch & Length tolerance = ± 0.014 (± 0.35)
- Pin 1 is marked by a "dot" or indentation on the unit
- Recommended pin hole size (on the application PC Board) is $\varnothing 0.039$ ($\varnothing 1.00$)
- Weight (Typ) = 0.194 Oz (5.5g)

MPD offers a wide range of miniature DC/DC converters in SIP (Single-In-Line) packages. Ranging from 1W to 10W, these compact, space saving converters offer wide input ranges, single & dual outputs, and I/O isolation between 1 kVDC and 5.2 kVDC. Most meet international standards for EMC/EMI and many are approved to EN 62368. For full information, go to our website or contact the factory.

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