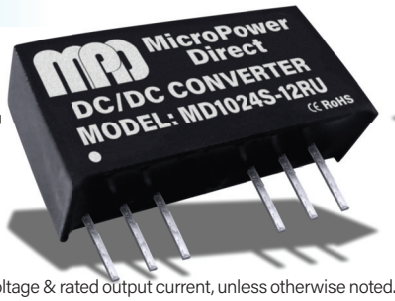
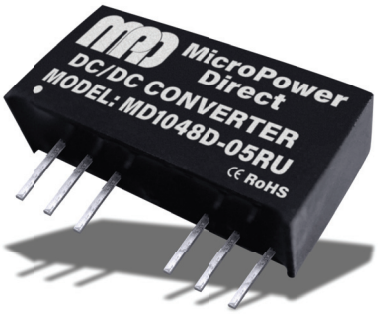
MD1000RU Series

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

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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

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

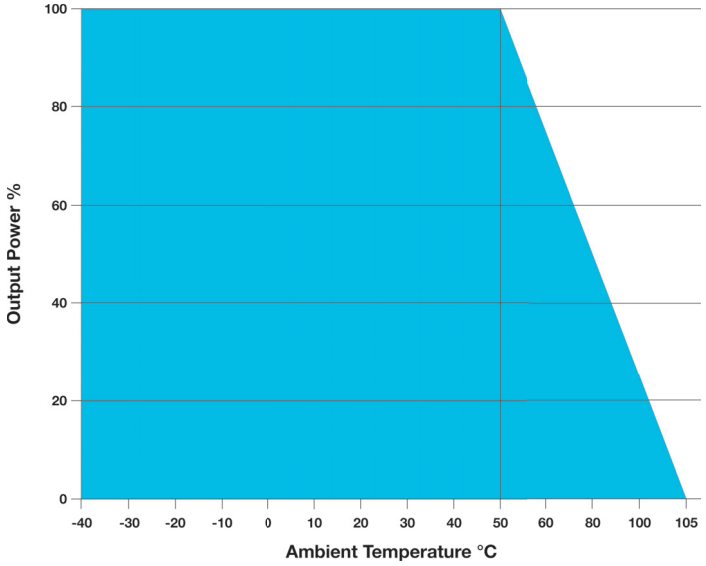
Model Selection Guide

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

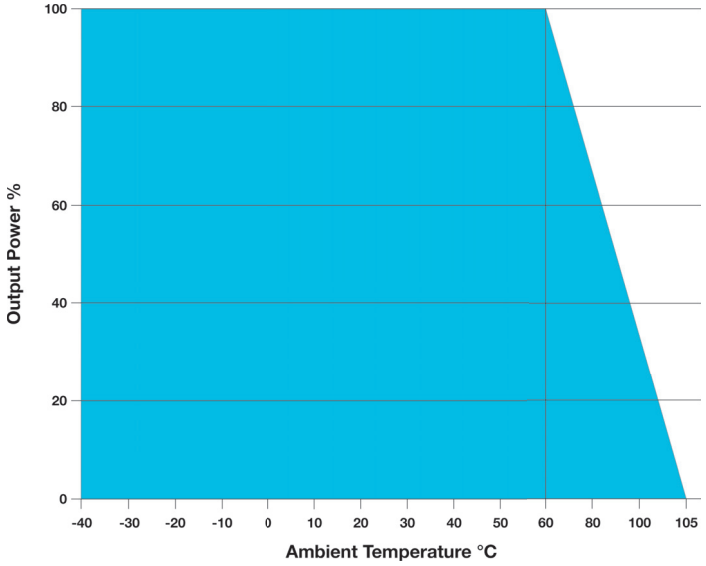
Notes:

1. Output capacitive load is specified for each output.
2. Load regulation is measured over a range of 0% IOUT to 100% IOUT.
3. 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%.
4. 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.
5. Operation at no-load will not damage the unit, but they may not meet all specifications.
6. 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.

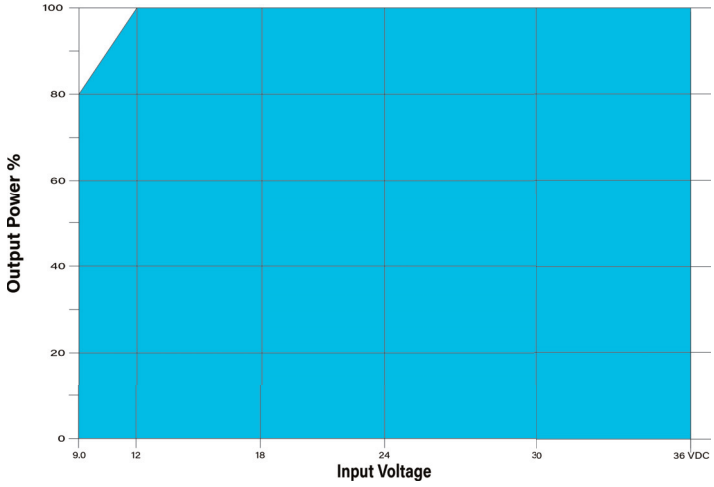
Temperature Derating: 5 VOUT Models



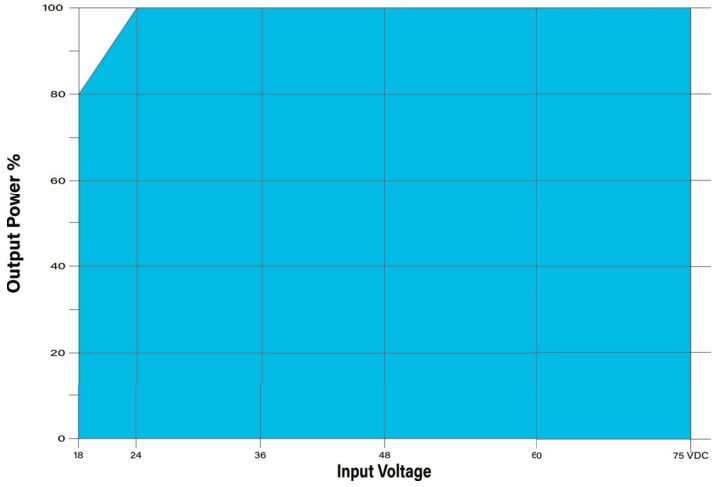
Temperature Derating: All Other Models



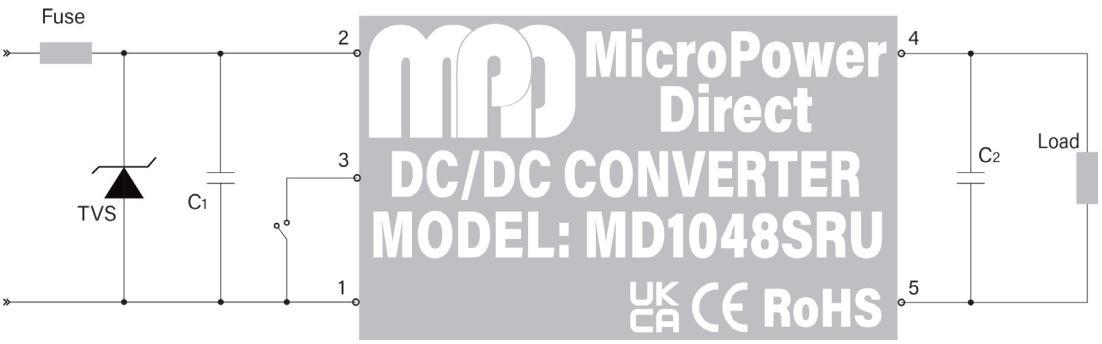
Input Voltage Derating: 24 VIN Models



Input Voltage Derating: 48 VIN Models

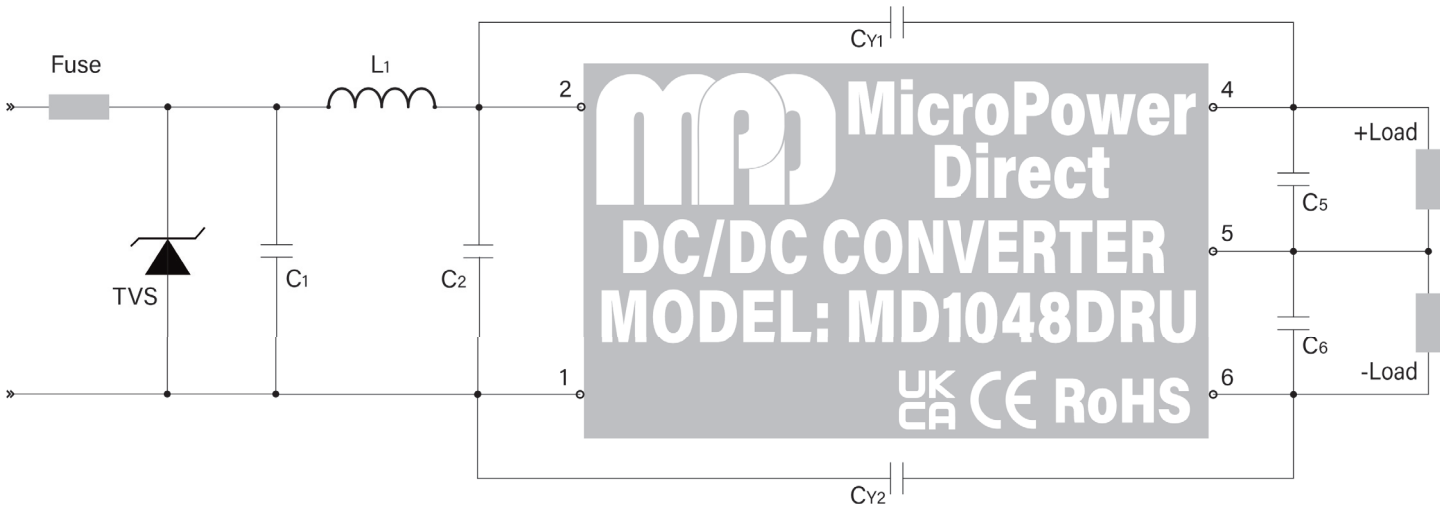


Simple Connection



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 C_1 and C_2 will reduce input/output ripple and improve the converter stability over time and temperature. The recommended component values are 100 μF for C_1 and 10 μF for C_2.

EMI Connection



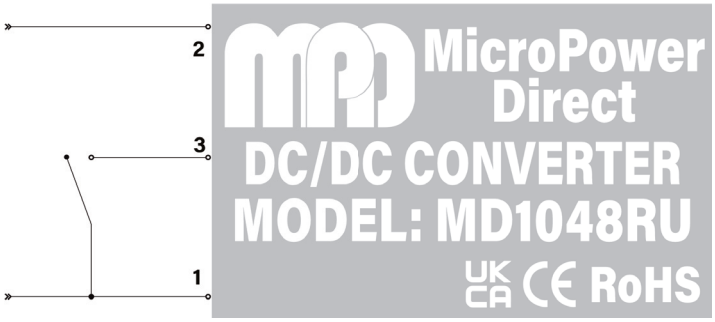
The diagram above shows a typical connection of the **MD1000RU** series for an application that requires compliance to EMI/EMC standards (as specified on page 1). Some notes on these components are:

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 (C_5 and C_6) 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
C_1	10 μF/50V	4.7 μF/100V
L_1	4.7 μH	10 μH
C_2	10 μF/100V	4.7 μF/100V
C_{Y1}/C_{Y2}	1k pF/3 kV	1k pF/3 kV
C_5/C_6	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.

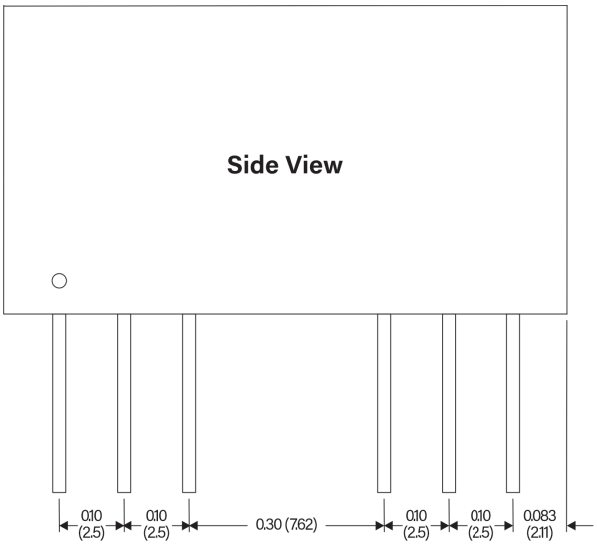
Remote ON/OFF Control

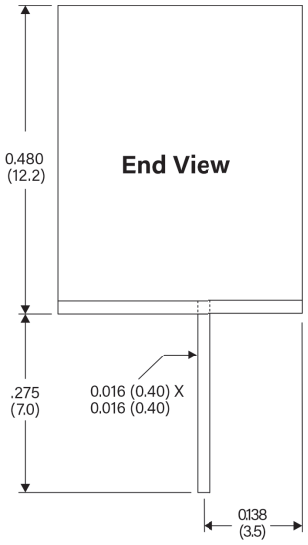


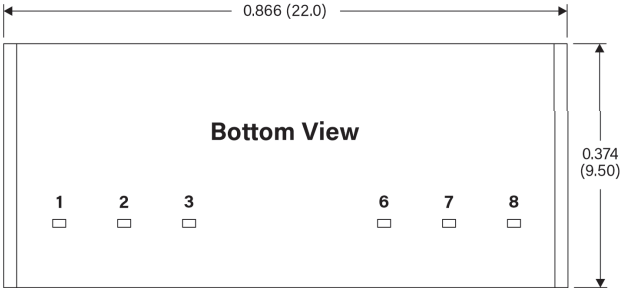
The **MD1000RU** includes a remote control input. This input (pin 3) is referenced to the minus input (pin 1). The unit operates when this pin is left open, as shown in the diagram at left..

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







Pin Connections

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

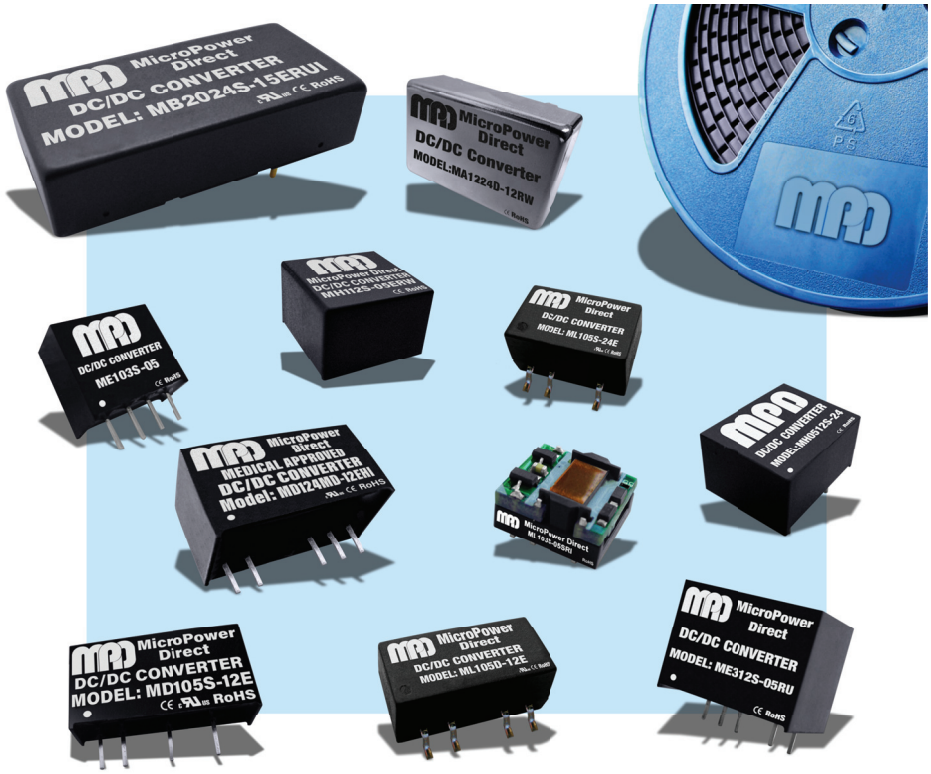
Pin	Dual Output
1	-VIN
2	+VIN
3	Remote Control
6	+VOUT
7	Common
8	-VOUT

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 Ø 0.039 (Ø 1.00)
- Weight (Typ) = 0.194 Oz (5.5g)

MPD offers a very wide variety of DC/DC converters. Our standard product line includes SMT, SIP, and DIP potted modules, industry standard 1 x 1" & 1 x 2" modules, as well as new models in an ultra miniature DFN package. Our units are used in applications ranging from high speed gate drive circuits to instrumentation to industrial equipment and medical equipment/instrumentation. Units are available over a power range of 0.25 to 60W. Most models meet international EMC/EMI standards and many are fully approved to EN 62368. Call today, or go to our website to find the right DC/DC power module for your application.

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