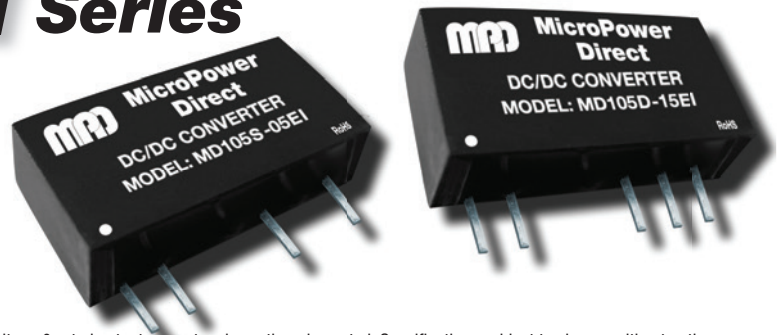


MD100xEI Series

Low Cost, 1W High Isolation, SIP DC/DC Converters



Key Features:

- 1W Output Power
- Miniature SIP Case
- Short Circuit Protected
- 3,000 VDC Isolation
- Single and Dual Outputs
- >3.5 MHour MTBF
- -40 to +105°C Operation
- LOW COST

1.5 kV Isolation
Models
Available

RoHS



MicroPower Direct

292 Page Street
Suite D
Stoughton, MA 02072
USA

T: (781) 344-8226
F: (781) 344-8481
E: sales@micropowerdirect.com
W: www.micropowerdirect.com



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	3.3 VDC Input	2.97	3.3	3.63	VDC
	5 VDC Input	4.50	5.0	5.50	
	12 VDC Input	10.80	12.0	13.20	
	15 VDC Input	13.50	15.0	16.50	
	24 VDC Input	21.60	24.0	26.40	
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±2.5		%
Output Voltage Balance			±0.5	±1.0	%
Line Regulation	3.3 VOUT Models All Other Models	For VIN Change of 1%		±1.5 ±1.2	%
Load Regulation, See Note 1	See Model Selection Guide				
Ripple & Noise (20 MHz), See Note 2	Output Voltage ≤12 VDC		30		mV P - P
	15 VDC, 24 VDC Output		60		
Temperature Coefficient				±0.03	%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	3,000			VDC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance	100 kHz, 0.1V		20		pF
Switching Frequency			100	300	kHz

EMI Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Units
EMI Compliance, See Note 4	Conducted	CISPR22/EN 55022 Level B			
EMC Compliance, Single Output	Electrostatic Discharge (ESD)	EN 61000-4-2 Level B Contact ±8 kV			
EMC Compliance, Dual Output		EN 61000-4-2 Level B Contact ±6 kV			

Environmental

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

Physical

Case Size	0.768 x 0.236 x 0.366 Inches (19.5 x 6.0 x 9.3 mm)				
Case Material	Non-Conductive Black Plastic (UL-94V0)				
Weight	0.08 Oz (2.4g)				

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	3.5			MHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	3.3 VDC Input	-0.7		5.0	VDC
	5 VDC Input	-0.7		9.0	
	12 VDC Input	-0.7		18.0	
	15 VDC Input	-0.7		21.0	
	24 VDC Input	-0.7		30.0	
Lead Temperature	1.5 mm From Case For 10 Sec			300	°C

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

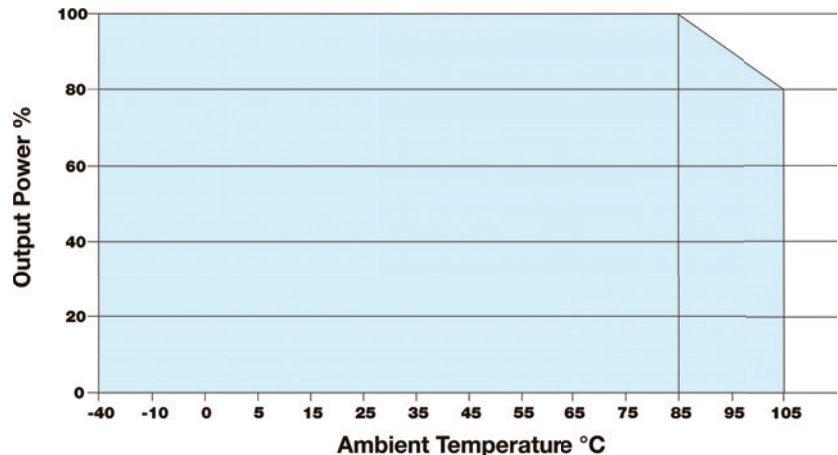
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Model Number	Input				Output			Load Regulation (% Typ)	Output Capacitive Load (µF Max)	Efficiency (% Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MD103S-03EI	3.3	2.97 - 3.63	415	25	3.3	303.0	30.0	18.0	220	73	800
MD103S-05EI	3.3	2.97 - 3.63	388	25	5.0	200.0	20.0	12.0	220	78	800
MD105S-03EI	5	4.5 - 5.5	267	20	3.3	303.0	30.0	18.0	220	75	500
MD105S-05EI	5	4.5 - 5.5	250	20	5.0	200.0	20.0	10.0	220	80	500
MD105S-12EI	5	4.5 - 5.5	250	20	12.0	83.0	9.0	8.0	220	80	500
MD105S-15EI	5	4.5 - 5.5	247	20	15.0	67.0	7.0	7.0	220	81	500
MD105S-24EI	5	4.5 - 5.5	247	20	24.0	42.0	5.0	6.0	220	81	500
MD105D-03EI	5	4.5 - 5.5	274	20	±3.3	±152.0	±15.0	18.0	100	73	500
MD105D-05EI	5	4.5 - 5.5	250	20	±5.0	±100.0	±10.0	12.0	100	80	500
MD105D-12EI	5	4.5 - 5.5	250	20	±12.0	±42.0	±5.0	8.0	100	80	500
MD105D-15EI	5	4.5 - 5.5	247	20	±15.0	±33.0	±4.0	7.0	100	81	500
MD105D-24EI	5	4.5 - 5.5	247	20	±24.0	±21.0	±2.0	6.0	100	81	500
MD112S-03EI	12	10.8 - 13.2	111	15	3.3	303.0	30.0	18.0	220	75	200
MD112S-05EI	12	10.8 - 13.2	104	15	5.0	200.0	20.0	12.0	220	80	200
MD112S-12EI	12	10.8 - 13.2	104	15	12.0	83.0	9.0	8.0	220	80	200
MD112S-15EI	12	10.8 - 13.2	103	15	15.0	67.0	7.0	7.0	220	81	200
MD112D-03EI	12	10.8 - 13.2	114	15	±3.3	±152.0	±15.0	18.0	100	73	200
MD112D-05EI	12	10.8 - 13.2	104	15	±5.0	±100.0	±10.0	12.0	100	80	200
MD112D-12EI	12	10.8 - 13.2	104	15	±12.0	±42.0	±5.0	8.0	100	81	200
MD112D-15EI	12	10.8 - 13.2	103	15	±15.0	±33.0	±4.0	7.0	100	81	200
MD115S-05EI	15	13.5 - 16.5	84	10	5.0	200.0	20.0	12.0	220	80	150
MD115S-15EI	15	13.5 - 16.5	83	10	15.0	67.0	7.0	7.0	220	81	150
MD115D-05EI	15	13.5 - 16.5	84	10	±5.0	±100.0	±10.0	12.0	100	80	150
MD115D-15EI	15	13.5 - 16.5	83	10	±15.0	±33.0	±4.0	7.0	100	81	150
MD124S-03EI	24	21.6 - 26.4	56	7	3.3	303.0	30.0	18.0	220	75	100
MD124S-05EI	24	21.6 - 26.4	53	7	5.0	200.0	20.0	12.0	220	79	100
MD124S-12EI	24	21.6 - 26.4	51	7	12.0	83.0	9.0	8.0	220	81	100
MD124S-15EI	24	21.6 - 26.4	51	7	15.0	67.0	7.0	7.0	220	81	100
MD124S-24EI	24	21.6 - 26.4	51	7	24.0	42.0	5.0	6.0	220	81	100
MD124D-03EI	24	21.6 - 26.4	58	7	±3.3	±152.0	±15.0	18.0	100	73	100
MD124D-05EI	24	21.6 - 26.4	53	7	±5.0	±100.0	±10.0	12.0	100	80	100
MD124D-12EI	24	21.6 - 26.4	51	7	±12.0	±42.0	±5.0	8.0	100	81	100
MD124D-15EI	24	21.6 - 26.4	53	7	±15.0	±33.0	±4.0	7.0	100	79	100
MD124D-24EI	24	21.6 - 26.4	53	7	±24.0	±21.0	±2.0	6.0	100	80	100

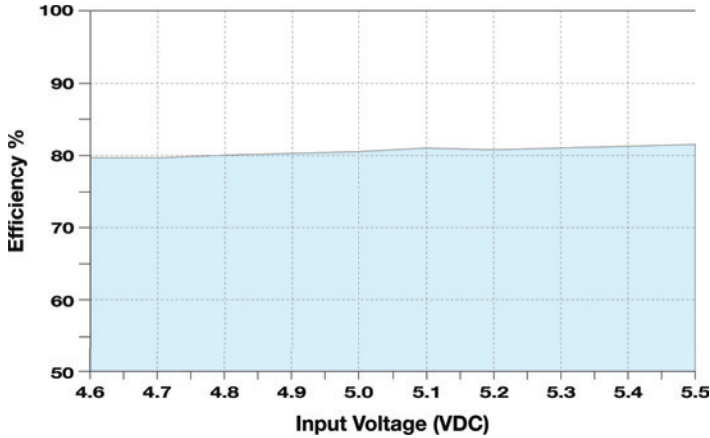
Notes:

1. Output load regulation is specified for a load change of 10% to 100%.
2. When measuring output ripple, it is recommended that an external 1.0 µF ceramic capacitor and a 10 µF ceramic capacitor be connected in parallel from the +Vout pin to the -Vout pin for single output models, or from each output to common for dual output models.
3. Operation at no load will not damage these units, however, they may not meet all specifications.
4. These converters are specified for operation without external components. However, to meet specific EMC standards, some external components may be required. Typical connections are shown on page three.
5. 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.

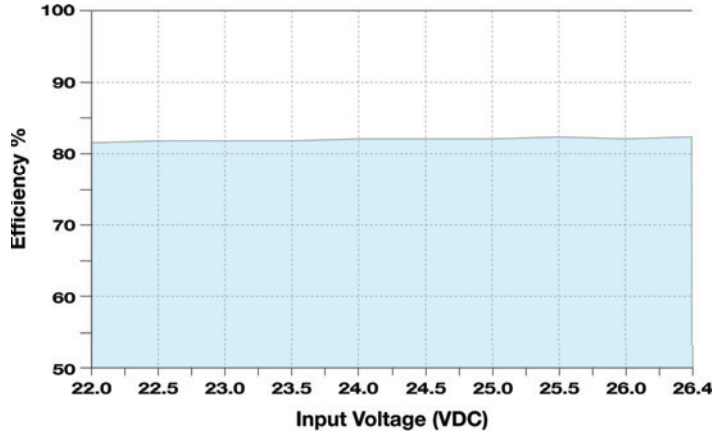
Derating Curve



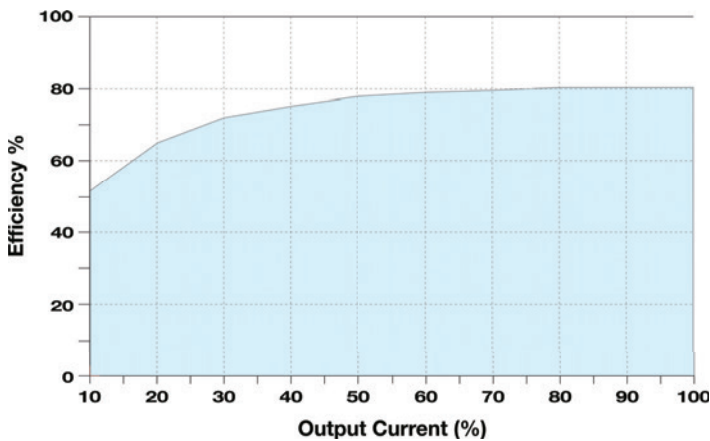
Typical Efficiency vs Input, 5 VIN Models



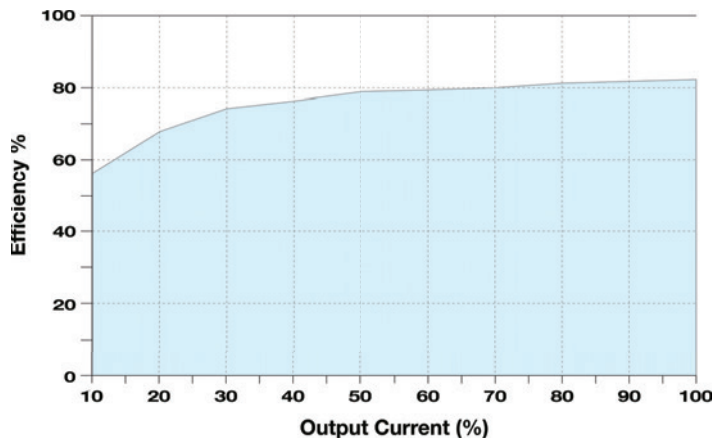
Typical Efficiency vs Input, 24 VIN Models



Typical Efficiency vs Output, 5 VIN Models



Typical Efficiency vs Output, 24 VIN Models



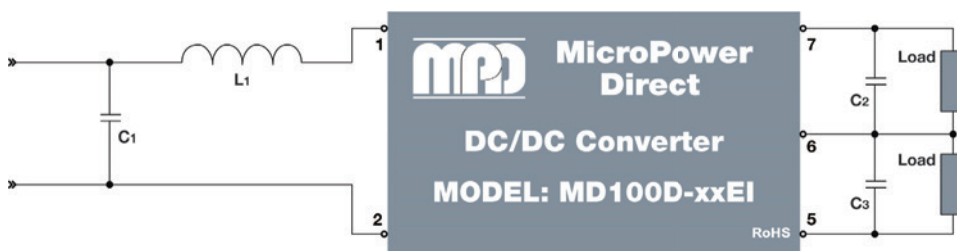
Efficiency vs input is plotted with the unit at full load. Efficiency vs output is plotted with the unit at nominal input.

Typical Connection, Single Output Models



VIN	C1	L1
3.3 VDC	4.7 μ F/50V	6.8 μ H
5 VDC	4.7 μ F/50V	6.8 μ H
12 VDC	4.7 μ F/50V	6.8 μ H
15 VDC	4.7 μ F/50V	6.8 μ H
24 VDC	4.7 μ F/50V	6.8 μ H

Typical Connection, Dual Output Models

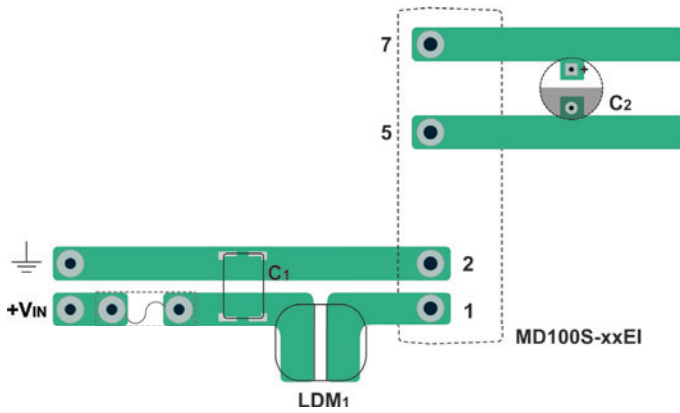


VOUT	C2	C3
3.3 VDC	10 μ F	10 μ F
5 VDC	10 μ F	10 μ F
12 VDC	2.2 μ F	2.2 μ F
15 VDC	1.0 μ F	1.0 μ F
24 VDC	1.0 μ F	1.0 μ F
\pm 3.3 VDC	4.7 μ F	4.7 μ F
\pm 5 VDC	4.7 μ F	4.7 μ F
\pm 12 VDC	1.0 μ F	1.0 μ F
\pm 15 VDC	0.47 μ F	0.47 μ F
\pm 24 VDC	0.47 μ F	0.47 μ F

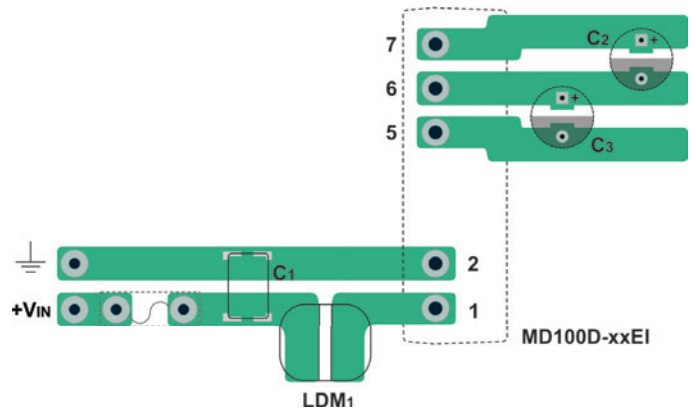
These converters are specified for operation without external components. However, in some applications the addition of input/output capacitors will enhance stability and reduce output ripple. For applications that require meeting EMC standards, the diagrams above illustrates a typical connection of the MD100x-xxEI series. Suggested component values are given in the table at right.

Capacitors C2 and C3 are not required to meet specifications, but may be used if a lower level of output ripple is required.

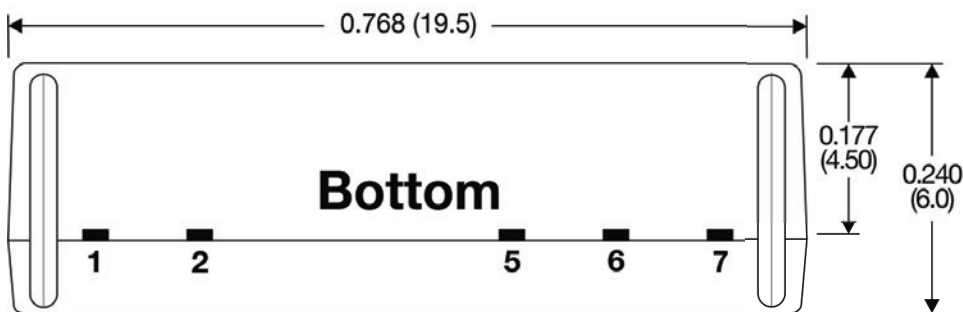
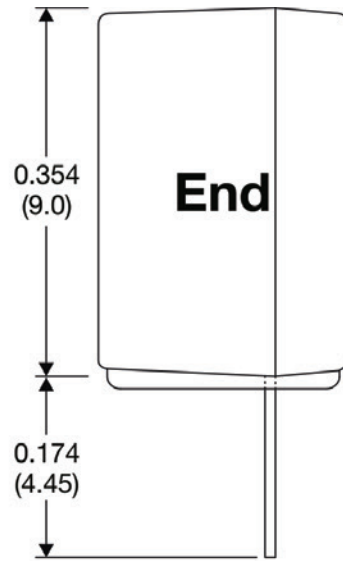
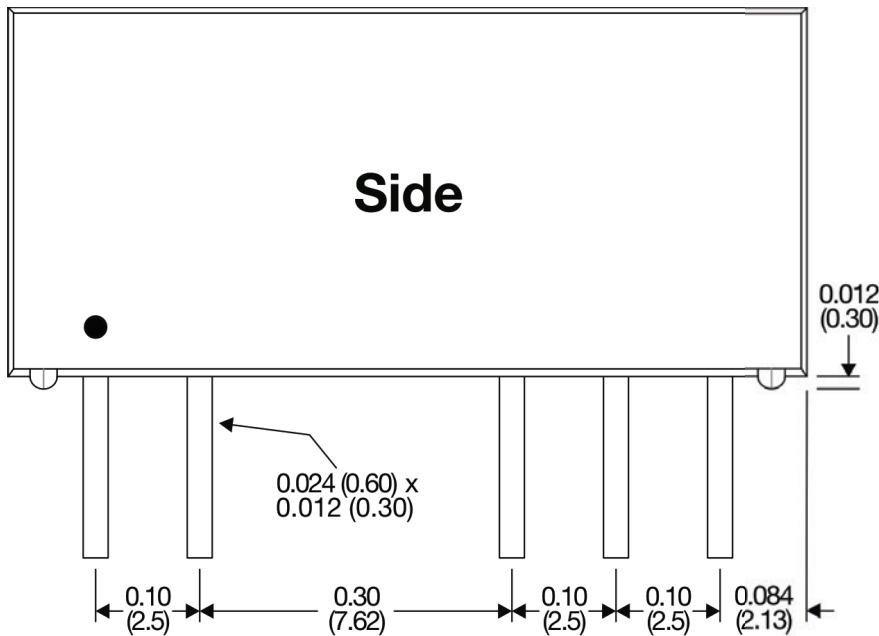
Typical Board Layout, Single Output Models



Typical Board Layout, Dual Output Models



Mechanical Dimensions



Pin Connections

Pin	Single Output
1	+VIN
2	-VIN
5	-VOUT
6	No Pin
7	+VOUT

Pin	Dual Output
1	+VIN
2	-VIN
5	-VOUT
6	Common
7	+VOUT

- Notes:**
- All dimensions are typical in inches (mm)
 - General Tolerance x.xx = ±0.02 (±0.5)
 - Pin 1 is marked by a "dot" or indentation on the unit



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