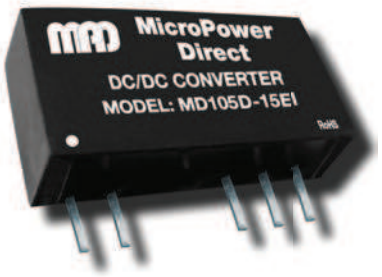
MD100xEI Series

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°C to +105°C Operation
- **LOW COST**

1.5 kV Isolation Models Available

RoHS

Cost Cutter

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	5 VDC Input	4.50	5.0	5.50	VDC
	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	For VIN Change of 1%			±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, 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 0.368 Inches (19.5 x 6.0 x 9.35 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)	5 VDC Input	-0.7		9.0	VDC
	12 VDC Input	-0.7		18.0	
	12 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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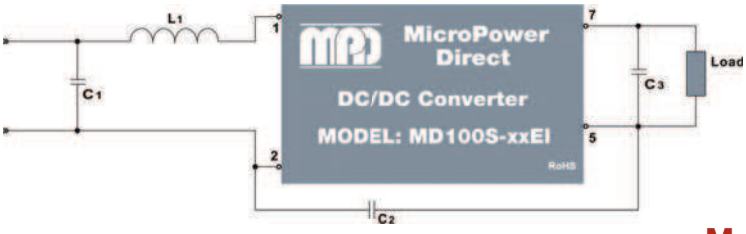
Model Selection Guide

Model Number	Input				Output			Load Regulation		Output Capacitive Load	Efficiency	Fuse Rating Slow-Blow
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)	% Typ.	% Max	(µF Max)	(%, Typ)	(mA)
	Nominal	Range	Full-Load	No-Load								
MD105S-05EI	5	4.5 - 5.5	250	20	5.0	200.0	20.0	10.0	15.0	220	80	500
MD105S-12EI	5	4.5 - 5.5	250	20	12.0	83.0	9.0	8.0	15.0	220	80	500
MD105S-15EI	5	4.5 - 5.5	248	20	15.0	67.0	7.0	7.0	15.0	220	81	500
MD105S-24EI	5	4.5 - 5.5	248	20	24.0	42.0	5.0	6.0	15.0	220	81	500
MD105D-05EI	5	4.5 - 5.5	250	20	±5.0	±100.0	±10.0	10.0	15.0	100	80	500
MD105D-12EI	5	4.5 - 5.5	250	20	±12.0	±42.0	±5.0	8.0	15.0	100	80	500
MD105D-15EI	5	4.5 - 5.5	248	20	±15.0	±33.0	±4.0	7.0	15.0	100	81	500
MD105D-24EI	5	4.5 - 5.5	248	20	±24.0	±21.0	±2.0	6.0	15.0	100	81	500
MD112S-05EI	12	10.8 - 13.2	92	15	5.0	200.0	20.0	10.0	15.0	220	80	200
MD112S-12EI	12	10.8 - 13.2	92	15	12.0	83.0	9.0	8.0	15.0	220	80	200
MD112S-15EI	12	10.8 - 13.2	90	15	15.0	67.0	7.0	7.0	15.0	220	81	200
MD112D-05EI	12	10.8 - 13.2	92	15	±5.0	±100.0	±10.0	10.0	15.0	100	80	200
MD112D-12EI	12	10.8 - 13.2	90	15	±12.0	±42.0	±5.0	8.0	15.0	100	81	200
MD112D-15EI	12	10.8 - 13.2	90	15	±15.0	±33.0	±4.0	7.0	15.0	100	81	200
MD115S-05EI	15	13.5 - 16.5	84	10	5.0	200.0	20.0	10.0	15.0	220	80	200
MD115S-15EI	15	13.5 - 16.5	84	10	15.0	67.0	7.0	7.0	15.0	220	81	200
MD115D-05EI	15	13.5 - 16.5	84	10	±5.0	±100.0	±10.0	10.0	15.0	100	80	200
MD115D-15EI	15	13.5 - 16.5	84	10	±15.0	±33.0	±4.0	7.0	15.0	100	81	200
MD124S-05EI	24	21.6 - 26.4	56	7	5.0	200.0	20.0	10.0	15.0	220	79	100
MD124S-12EI	24	21.6 - 26.4	51	7	12.0	83.0	9.0	8.0	15.0	220	81	100
MD124S-15EI	24	21.6 - 26.4	52	7	15.0	67.0	7.0	7.0	15.0	220	82	100
MD124D-05EI	24	21.6 - 26.4	53	7	±5.0	±100.0	±10.0	10.0	15.0	100	80	100
MD124D-12EI	24	21.6 - 26.4	51	7	±12.0	±42.0	±5.0	8.0	15.0	100	81	100
MD124D-15EI	24	21.6 - 26.4	51	7	±15.0	±33.0	±4.0	7.0	15.0	100	79	100

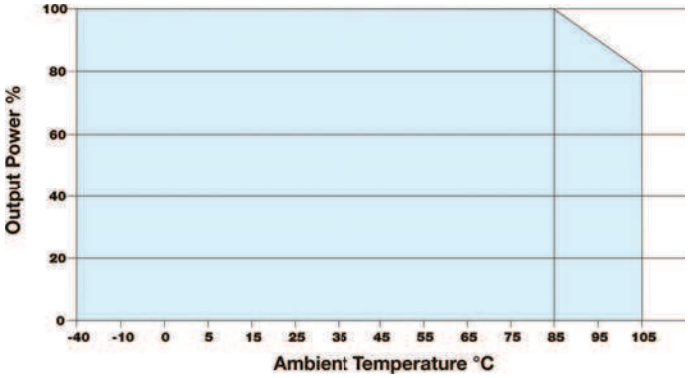
Notes:
1. Output load regulation is specified for a load change of 10% to 100%.
2. When measuring output ripple, it is recommended that an external 0.33 µF ceramic capacitor be placed from the +Vout pin to the -Vout pin for single output models, or from each output to common for dual output models.
3. 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, in some applications the addition of input/output capacitors will enhance stability and reduce output ripple. The circuit in the simple connection diagram below will typically meet EN 55022 Class B. For dual output units, a capacitor should be connected from each output to common (C_2 is connected to pin 5 on dual output models).



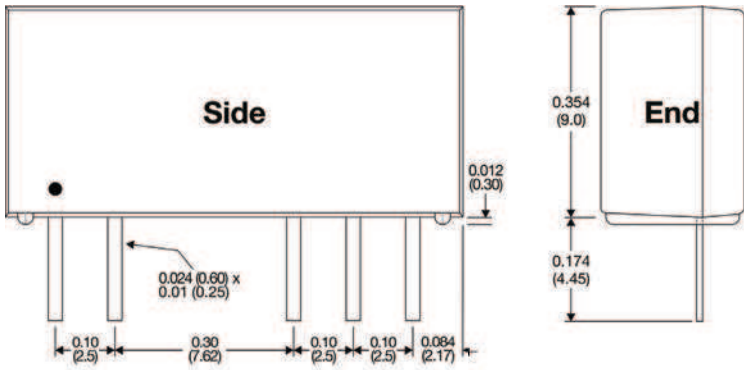
Vin	C1	L1	C2	Vout	C3
5 VDC	4.7 µF/50V	6.8 µH	---	5 VDC	10 µF
12 VDC	4.7 µF/50V	6.8 µH	---	12 VDC	2.2 µF
15 VDC	4.7 µF/50V	6.8 µH	470 pF/3kV	15 VDC	1.0 µF
24 VDC	4.7 µF/50V	6.8 µH	470 pF/3kV	24 VDC	1.0 µF
				±5 VDC	4.7 µF
				±12 VDC	1.0 µF
				±15 VDC	0.47 µF
				±24 VDC	0.47 µF

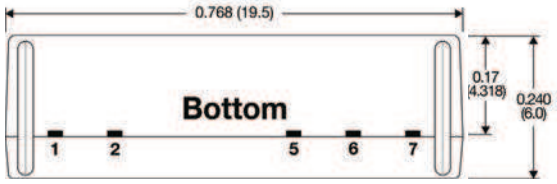
6. It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection table above for the correct rating.

Derating Curve



Mechanical Dimensions





Pin Connections

Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
5	-Vout	-Vout

Pin	Single	Dual
6	No Pin	Common
7	+Vout	+Vout

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Notes:
- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)
- Pin 1 is marked by a "dot" or indentation on the unit