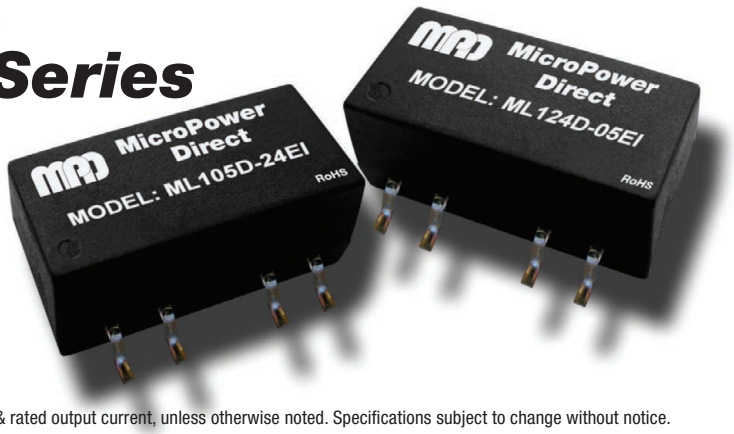
ML100DEI Series

1W, High Isolation Ultra-Miniature SMT DC/DC Converters



Key Features:

- 1W Output Power
- Ultra-Miniature SMT Case
- 3,000 VDC Isolation
- EN 60950 Approved
- Short Circuit Protected
- Dual Output
- -40°C to +105°C Operation
- >3.5 MHour MTBF
- ***LOW COST!***

RoHS

Cost Cutter

Tape & Reel

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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	3.3 VDC Input	2.97	3.3	3.63	VDC
	5.0 VDC Input	4.5	5.0	5.5	
	12 VDC Input	10.8	12.0	13.2	
	24 VDC Input	21.6	24.0	26.4	
Input Filter	Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±3.0		%
Capacitive Load				100	µF
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		60		mV P - P
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 (CE)		CISPR22/EN 55022 Level B		
	Radiated (RE)		CISPR22/EN 55022 Level B		
EMC Compliance	Electrostatic Discharge (ESD)		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	See Mechanical Drawing (Page 2)
Case Material	Non-Conductive Black Plastic (UL94-V0)
Weight	0.06 Oz (1.80g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	3.5			MHours
Safety Standards	EN 60950				

Absolute Maximum Ratings

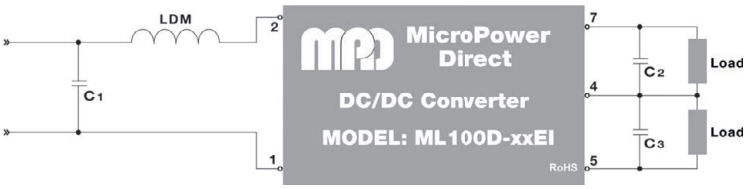
Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	3.3 VDC Input	-0.7		5.0	VDC
	5 VDC Input	-0.7		9.0	
	12 VDC Input	-0.7		18.0	
	24 VDC Input	-0.7		30.0	
Peak Reflow Temperature	See Note 5			245	°C
Lead Temperature	1.5 mm From Case For 10 Sec			300	°C

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

Model Selection Guide

Model Number	Input				Output			Load Regulation (% Typ)	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						
ML103D-05EI	3.3	2.97 - 3.63	388	25	±5.0	±100.0	±10.0	12.0	78	750
ML103D-12EI	3.3	2.97 - 3.63	388	25	±12.0	±42.0	±5.0	7.0	78	750
ML105D-05EI	5	4.50 - 5.50	250	20	±5.0	±100.0	±10.0	12.0	80	500
ML105D-09EI	5	4.50 - 5.50	250	20	±9.0	±56.0	±6.0	8.0	80	500
ML105D-12EI	5	4.50 - 5.50	247	20	±12.0	±42.0	±5.0	7.0	81	500
ML105D-15EI	5	4.50 - 5.50	247	20	±15.0	±33.0	±3.0	6.0	81	500
ML105D-24EI	5	4.50 - 5.50	247	20	±24.0	±21.0	±2.0	5.0	81	500
ML112D-05EI	12	10.8 - 13.2	104	15	±5.0	±100.0	±10.0	12.0	80	250
ML112D-09EI	12	10.8 - 13.2	104	15	±9.0	±56.0	±6.0	8.0	80	250
ML112D-12EI	12	10.8 - 13.2	103	15	±12.0	±42.0	±5.0	7.0	81	250
ML112D-15EI	12	10.8 - 13.2	103	15	±15.0	±33.0	±3.0	6.0	81	250
ML112D-24EI	12	10.8 - 13.2	103	15	±24.0	±21.0	±2.0	5.0	81	250
ML124D-05EI	24	21.6 - 26.4	51	7	±5.0	±100.0	±10.0	12.0	82	100
ML124D-09EI	24	21.6 - 26.4	51	7	±9.0	±56.0	±6.0	8.0	82	100
ML124D-12EI	24	21.6 - 26.4	51	7	±12.0	±42.0	±5.0	7.0	82	100
ML124D-15EI	24	21.6 - 26.4	51	7	±15.0	±33.0	±3.0	6.0	82	100
ML124D-24EI	24	21.6 - 26.4	51	7	±24.0	±21.0	±2.0	5.0	82	100

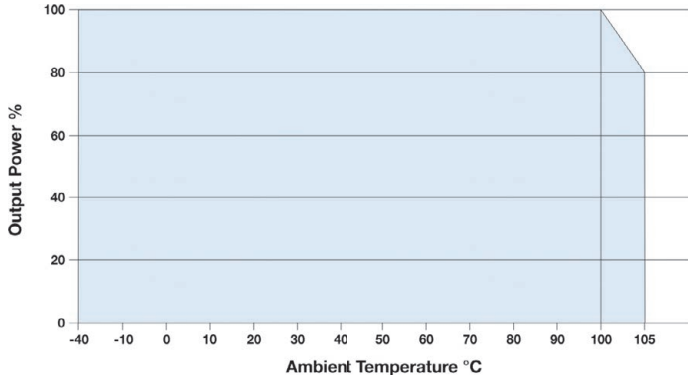
Notes:
1. Output load regulation is specified for a load change of 10% to 100%.
2. When measuring output ripple, it is recommended that a 1 μF capacitor and a 10 μF capacitor be placed in parallel from the +Vout pin to the -Vout pin.
3. It is recommended that the minimu output load should be at least 10%. Operation below this level will not damage the unit, but it 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 simple connection shown below will typically meet EN 55022 Class B.



VIN	C1	L1	VOUT	C2	C3
3.3 VDC	4.7 μF/50V	6.8 μH	5 VDC	4.7 μF	4.7 μF
5 VDC	4.7 μF/50V	6.8 μH	9 VDC	2.2 μF	2.2 μF
12 VDC	4.7 μF/50V	6.8 μH	12 VDC	1.0 μF	1.0 μF
24 VDC	4.7 μF/50V	6.8 μH	15 VDC	1.0 μF	1.0 μF
			24 VDC	0.47 μF	0.47 μF

5. The recommended time above liquidous (T_L) is $\leq$60 seconds at 217 °C. For more information, please contact the factory.
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



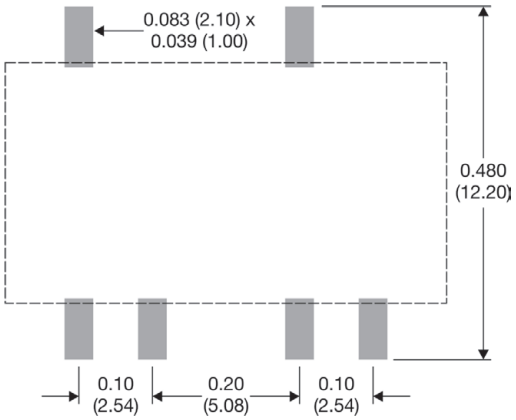
Pin Connections

Pin	Description
1	-VIN
2	+VIN

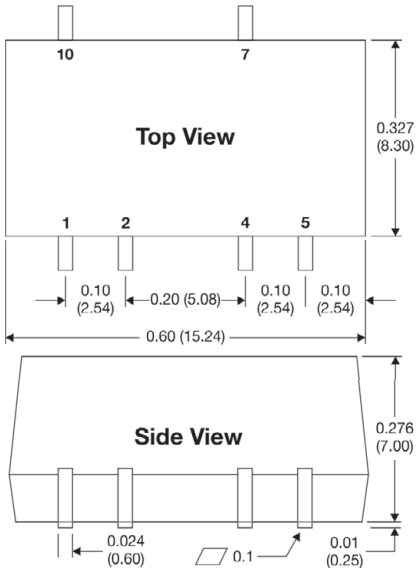
Pin	Description
4	-VOUT
5	+VOUT
8	NC

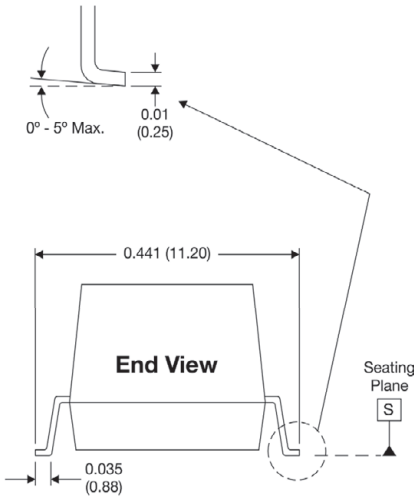
NC = No Connection

Board Layout



Mechanical Dimensions





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