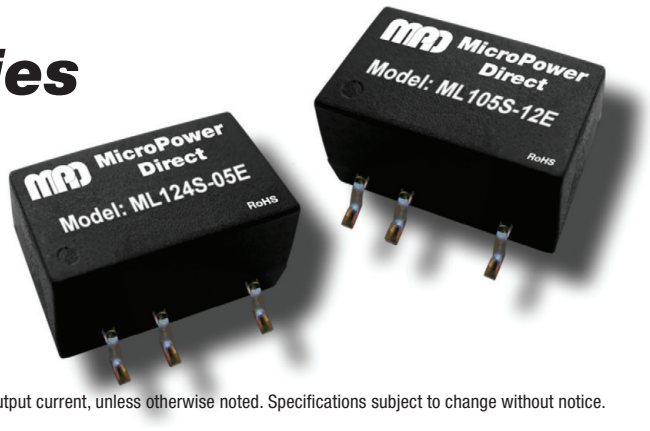
ML100SE Series

Low Cost, Single Output Ultra-Miniature SMT DC/DC Converters



Key Features:

- 1W Output Power
- Ultra-Miniature SMT Case
- 1,500 VDC Isolation
- Short Circuit Protected
- Single Output
- -40°C to +105°C Operation
- >3.5 MHour MTBF
- 18 Standard Models
- ***LOW COST!***

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	3.3 VDC Input	2.97	3.3	3.63	VDC
	5 VDC Input	4.5	5.0	5.5	
	12 VDC Input	10.8	12.0	13.2	
	15 VDC Input	13.5	15.0	16.5	
	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					220	µF
Line Regulation	3.3 VIN Models	For Vin Change of 1%			±1.5	%
	All Other Models				±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		24 VIN Models	Momentary (1S)			
		All Other Models	Continuous (Autorecovery)			

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	1,500			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	Electrostatic Discharge (ESD)	EN 61000-4-2 Level B Contact ±8 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	0.05 Oz (1.52g)

Reliability Specifications

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

Absolute Maximum Ratings

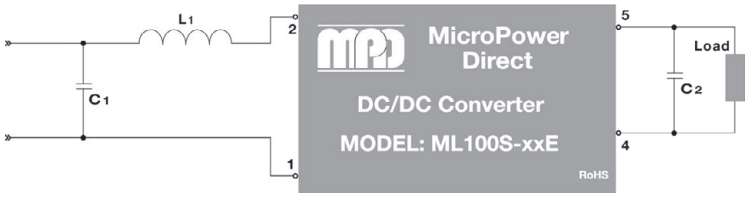
Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	3.3 VDC Input	-0.7		5.0	VDC
	5 VDC Input	-0.7		9.0	
	12 VDC Input	-0.7		18.0	
	15 VDC Input	-0.7		21.0	
	24 VDC Input	-0.7		30.0	
Peak Reflow Temperature	See Note 5			245	°C
Lead Temperature	1.5 mm From Case For 10 Sec			300	°C

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

Model Selection Guide

Model Number	Input				Output			Load Regulation	Efficiency (%, Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)	% Typ.		
	Nominal	Range	Full-Load	No-Load						
ML103S-03E	3.3	2.97 - 3.63	415	25	3.3	303.0	30.0	18.0	73	1,000
ML103S-05E	3.3	2.97 - 3.63	388	25	5.0	200.0	20.0	12.0	78	1,000
ML103S-12E	3.3	2.97 - 3.63	381	25	12.0	84.0	9.0	7.0	80	1,000
ML105S-03E	5	4.50 - 5.50	263	20	3.3	303.0	30.0	18.0	76	500
ML105S-05E	5	4.50 - 5.50	250	20	5.0	200.0	20.0	12.0	80	500
ML105S-09E	5	4.50 - 5.50	250	20	9.0	111.0	12.0	8.0	80	500
ML105S-12E	5	4.50 - 5.50	250	20	12.0	84.0	9.0	7.0	80	500
ML105S-15E	5	4.50 - 5.50	250	20	15.0	67.0	7.0	6.0	80	500
ML105S-24E	5	4.50 - 5.50	250	20	24.0	42.0	4.0	5.0	80	500
ML112S-03E	12	10.8 - 13.2	111	15	3.3	303.0	30.0	18.0	75	200
ML112S-05E	12	10.8 - 13.2	104	15	5.0	200.0	20.0	12.0	80	200
ML112S-09E	12	10.8 - 13.2	104	15	9.0	111.0	12.0	8.0	80	200
ML112S-12E	12	10.8 - 13.2	103	15	12.0	84.0	9.0	7.0	81	200
ML112S-15E	12	10.8 - 13.2	103	15	15.0	67.0	7.0	6.0	81	200
ML115S-15E	15	13.5 - 16.5	82	10	15.0	67.0	7.0	6.0	81	200
ML124S-05E	24	21.6 - 26.4	52	7	5.0	200.0	20.0	12.0	80	100
ML124S-09E	24	21.6 - 26.4	52	7	9.0	110.0	11.0	8.0	80	100
ML124S-15E	24	21.6 - 26.4	51	7	15.0	67.0	7.0	6.0	81	100
ML124S-24E	24	21.6 - 26.4	51	7	24.0	42.0	4.0	5.0	81	100

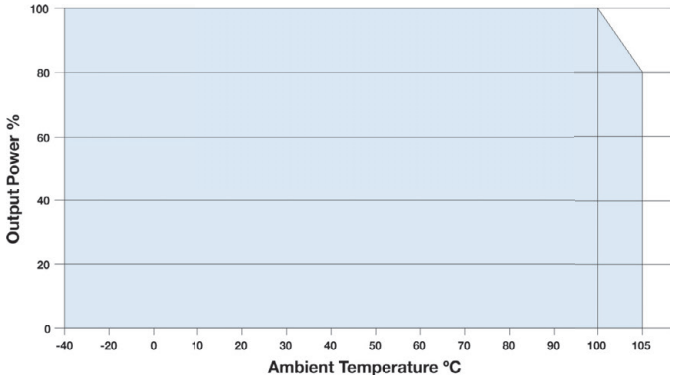
Notes:
1. Output load regulation is specified for a load change of 10% to 100%.
2. When measuring output ripple, it is recommended that an external 0.33 µF ceramic capacitor be placed from the +Vout pin to the -Vout pin.
3. Operation at no load will not damage these units, however, they may not meet 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 simple connection shown below will typically meet EN 55022 Class B.



VIN	C1	L1	VOUT	C3
3.3 VDC	4.7 µF/50V	6.8 µH	3.3 VDC	10 µF
5 VDC	4.7 µF/50V	6.8 µH	5 VDC	10 µF
12 VDC	4.7 µF/50V	6.8 µH	9 VDC	4.7 µF
15 VDC	4.7 µF/50V	6.8 µH	12 VDC	2.2 µF
24 VDC	4.7 µF/50V	6.8 µH	15 VDC	1.0 µF
			24 VDC	0.47 µF

5. The recommended time above liquidous (TL) is ≤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



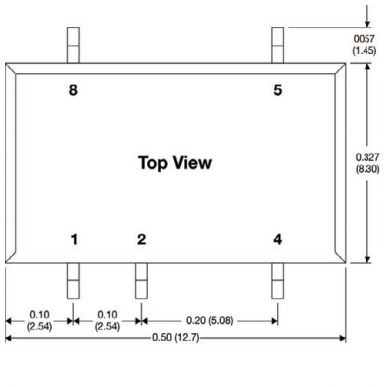
Pin Connections

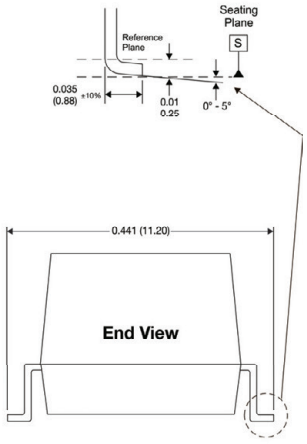
Pin	Description
1	-VIN
2	+VIN

Pin	Description
4	-VOUT
5	+VOUT
8	NC

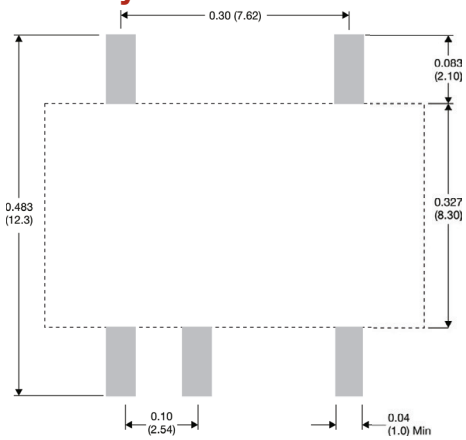
NC = No Connection

Mechanical Dimensions





Board Layout



Notes:
- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)
- Pin 1 is marked by a "dot" or indentation on the unit

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