

ML100SEI Series

Low Cost, Single Output 1W High Isolation SMT DC/DC Converters



Key Features:

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



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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	
	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	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, See Note 3	100 kHz, 0.1V		20		pF
Switching Frequency			100	300	kHz

EMI Characteristics

Parameter	Conditions	Min.	Typ.	Max.	Units
EMI Compliance, See Note 5	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
Safety Standards, See Note 6	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	
	15 VDC Input	-0.7		21.0	
	24 VDC Input	-0.7		30.0	
Peak Reflow Temperature	See Note 7			245	°C
Lead Temperature	1.5 mm From Case For 10 Sec			300	°C

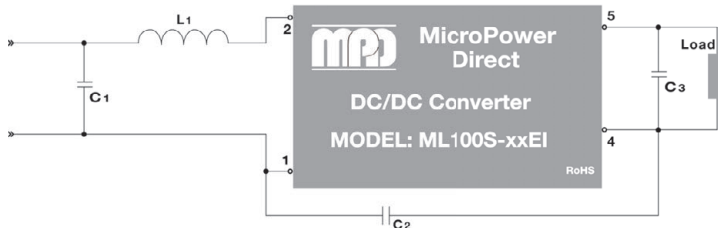
Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

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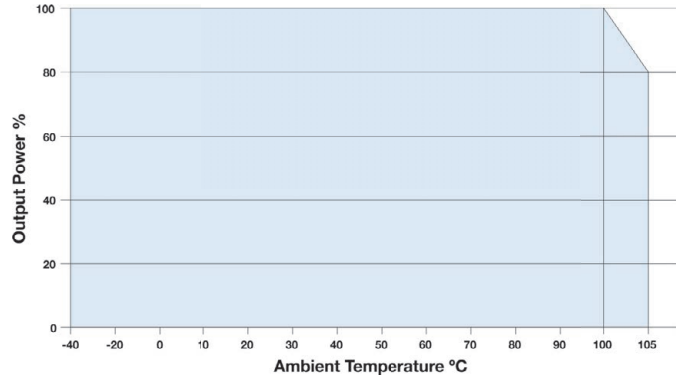
Model Number	Input				Output			Load Regulation (% Typ)	Efficiency (% Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)			
	Nominal	Range	Full-Load	No-Load						
ML103S-03EI	3.3	2.97 - 3.63	415	25	3.3	303.0	30.0	18.0	78	800
ML103S-05EI	3.3	2.97 - 3.63	388	25	5.0	200.0	20.0	12.0	78	800
ML105S-05EI	5	4.50 - 5.50	250	20	5.0	200.0	20.0	12.0	80	500
ML105S-09EI	5	4.50 - 5.50	250	20	9.0	111.0	12.0	8.0	80	500
ML105S-12EI	5	4.50 - 5.50	250	20	12.0	84.0	9.0	7.0	80	500
ML105S-15EI	5	4.50 - 5.50	250	20	15.0	67.0	7.0	6.0	80	500
ML105S-24EI	5	4.50 - 5.50	250	20	24.0	42.0	4.0	5.0	80	500
ML112S-05EI	12	10.8 - 13.2	104	15	5.0	200.0	20.0	12.0	80	200
ML112S-09EI	12	10.8 - 13.2	104	15	9.0	111.0	12.0	8.0	80	200
ML112S-12EI	12	10.8 - 13.2	103	15	12.0	84.0	9.0	7.0	81	200
ML112S-15EI	12	10.8 - 13.2	103	15	15.0	67.0	7.0	6.0	81	200
ML115S-15EI	15	13.5 - 16.5	82	10	15.0	67.0	7.0	6.0	81	200
ML124S-05EI	24	21.6 - 26.4	52	7	5.0	200.0	20.0	12.0	80	100
ML124S-09EI	24	21.6 - 26.4	52	7	9.0	111.0	12.0	8.0	80	100
ML124S-15EI	24	21.6 - 26.4	51	7	15.0	67.0	7.0	6.0	81	100
ML124S-24EI	24	21.6 - 26.4	51	7	24.0	42.0	4.0	5.0	81	100

Notes:

- Output load regulation is specified for a load change of 10% to 100%.
- When measuring output ripple, it is recommended that an external 0.33 μ F ceramic capacitor be placed from the +Vout pin to the -Vout pin.
- The isolation capacitance of model **ML124S-24EI** is 30 pF.
- Operation at no load will not damage these units, however, they may not meet all specifications.
- 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.



Derating Curve



V _{IN}	C ₁	L ₁	C ₂	V _{OUT}	C ₃
3.3 VDC	4.7 μ F/50V	6.8 μ H	---	5 VDC	10 μ F
5 VDC	4.7 μ F/50V	6.8 μ H	---	9 VDC	4.7 μ F
12 VDC	4.7 μ F/50V	6.8 μ H	---	12 VDC	2.2 μ F
15 VDC	4.7 μ F/50V	6.8 μ H	470 pF/3kV	15 VDC	1.0 μ F
24 VDC	4.7 μ F/50V	6.8 μ H	470 pF/3kV	24 VDC	0.47 μ F

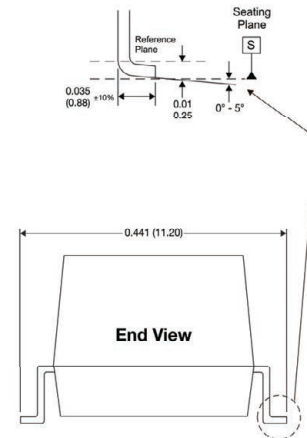
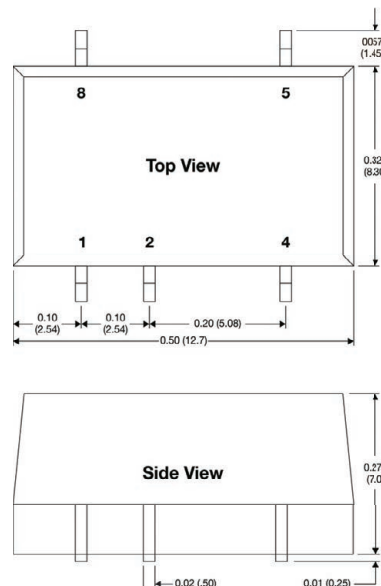
Pin Connections

Pin	Description	Pin	Description
1	-V _{IN}	4	-V _{OUT}
2	+V _{IN}	5	+V _{OUT}
		8	NC

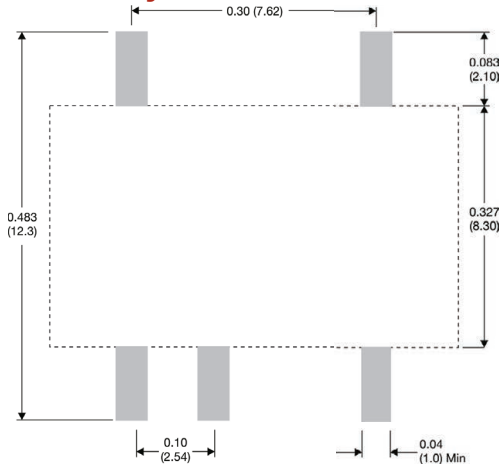
NC = No Connection

- Models with a 15 VDC input are not EN 60950 approved.
- The recommended time above liquidous (T_L) is ≤ 60 seconds at 217 °C. For more information, please contact the factory.
- 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.

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