

# ML100S Series

## Ultra-Miniature, 1W Single Output SMT DC/DC Converters



### Key Features:

- 1W Output Power
- Ultra-Miniature SMT Case
- 1,500 VDC Isolation
- 5V, 12, 15 & 24V Inputs
- -40°C to +85°C Operation
- 17 Standard Models
- 2.0 MH MTBF Minimum
- Available on Tape/Reel



### 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	4.5	5.0	5.5	VDC
	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	
Reverse Polarity Input Current				0.3	A
Input Filter	Capacitor				

#### Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±5.0		%
Line Regulation	For Vin Change of 1%		±1.2	±1.5	%
Load Regulation, See Note 1	See Model Selection Guide				
Ripple & Noise (20 MHz)	See Note 2		60	120	mV P - P
Ripple & Noise (20 MHz)	Over Line, Load & Temp.			150	mV P - P
Ripple & Noise (20 MHz)				15	mv rms
Temperature Coefficient			±0.01	±0.02	%/°C
Output Short Circuit	Momentary (0.5 Sec.)				

#### 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, 1V		40	100	pF
Switching Frequency		50	100	140	kHz

#### Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
Operating Temperature Range	Case			+90	°C
Storage Temperature Range		-50		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

#### Physical

Case Size	0.54 x 0.43 x 0.27 Inches (13.7 x 11.0 x 7.0 mm)				
Case Material	Molding (UL94-V0)				
Weight	0.06 Oz (1.7g)				

#### Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.0			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	
	15 VDC Input	-0.7		20.0	
	24 VDC Input	-0.7		30.0	
Lead Temperature	1.5 mm From Case For 10 Sec.			260	°C
Internal Power Dissipation	All Models			450	mW

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

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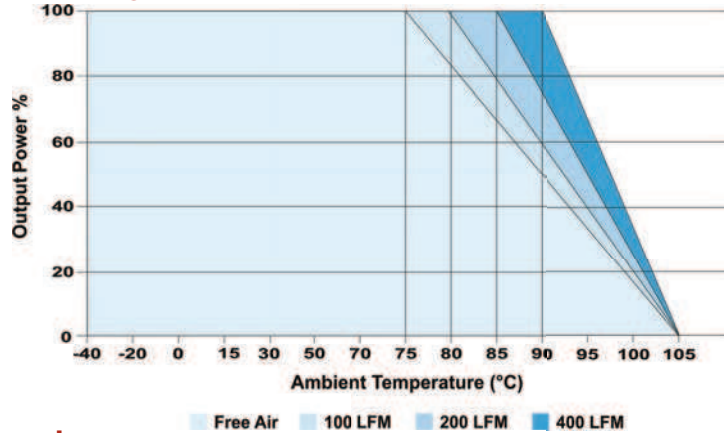
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Model Number	Input				Output			Load Regulation (% Max)	Efficiency (% Typ)	Output Capacitive Load ( $\mu$ F, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
ML105S-03	5	4.5 - 5.5	271	30	3.3	300	6.0	10	73	33	500
ML105S-05	5	4.5 - 5.5	256	30	5.0	200	4.0	10	78	33	500
ML105S-09	5	4.5 - 5.5	254	30	9.0	110	2.0	10	78	33	500
ML105S-12	5	4.5 - 5.5	259	30	12.0	84	1.5	8	78	33	500
ML105S-15	5	4.5 - 5.5	254	30	15.0	67	1.0	7	79	33	500
ML112S-03	12	10.8 - 13.2	112	15	3.3	300	6.0	8	74	33	200
ML112S-05	12	10.8 - 13.2	109	15	5.0	200	4.0	8	76	33	200
ML112S-09	12	10.8 - 13.2	106	15	9.0	110	2.0	8	78	33	200
ML112S-12	12	10.8 - 13.2	106	15	12.0	84	1.5	5	79	33	200
ML112S-15	12	10.8 - 13.2	105	15	15.0	67	1.0	5	80	33	200
ML115S-12	15	13.5 - 16.5	86	14	12.0	84	1.5	5	78	33	150
ML115S-15	15	13.5 - 16.5	86	14	15.0	67	1.0	5	78	33	150
ML124S-03	24	21.6 - 26.4	58	8	3.3	300	6.0	8	72	33	100
ML124S-05	24	21.6 - 26.4	54	8	5.0	200	4.0	8	78	33	100
ML124S-09	24	21.6 - 26.4	54	8	9.0	110	2.0	8	77	33	100
ML124S-12	24	21.6 - 26.4	55	8	12.0	84	1.5	5	77	33	100
ML124S-15	24	21.6 - 26.4	53	8	15.0	67	1.0	5	79	33	100

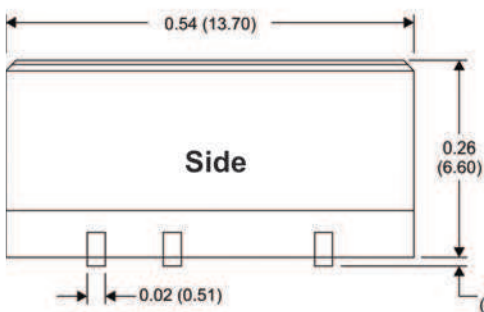
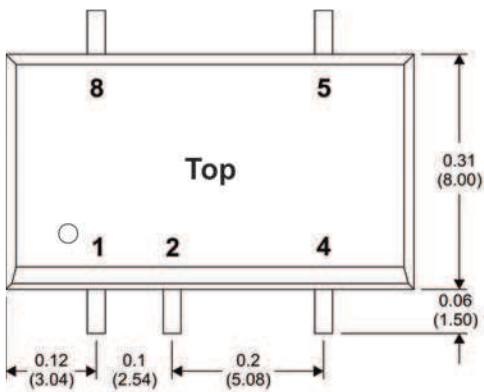
Notes:

- Load regulation is measured for an output change of 20% to 100%.
- When measuring output ripple, it is recommended that an external 0.33  $\mu$ F ceramic capacitor be placed from the +Vout pin to the -Vout pin. For noise sensitive applications, the use of 3.3  $\mu$ F capacitors will reduce the output ripple.
- Operation at no-load will not damage these units. However, they may not meet all specifications.
- The converter should be connected to a low ac-impedance source. An input source with a highly inductive impedance may affect the stability of the converter. In applications where the converter output loading is high and input power is supplied over long lines, it may be necessary to use a capacitor on the input to insure start-up. In this case, it is recommended that a low ESR (ESR <1.0 $\Omega$  at 100 kHz) capacitor be mounted close to the converter. For 5V input units a 2.2  $\mu$ F is recommended; a 1.0  $\mu$ F for 12V & 15V input units; and for 24V input models, a 0.47  $\mu$ F.
- It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

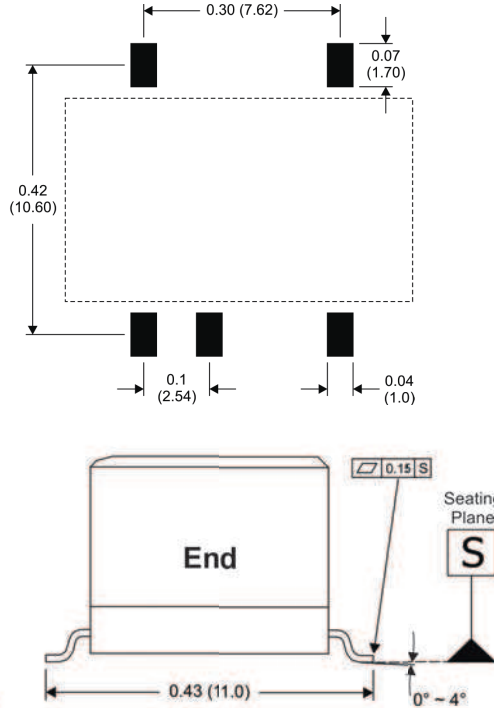
Derating Curve



Mechanical Dimensions



Board Layout



Pin Connections

Pin	Description
1	-Vin
2	+Vin
3	No Pin
4	-Vout
5	+Vout
6	No Pin
7	No Pin
8	NA

NA = Not for electrical connection

Notes:

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



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