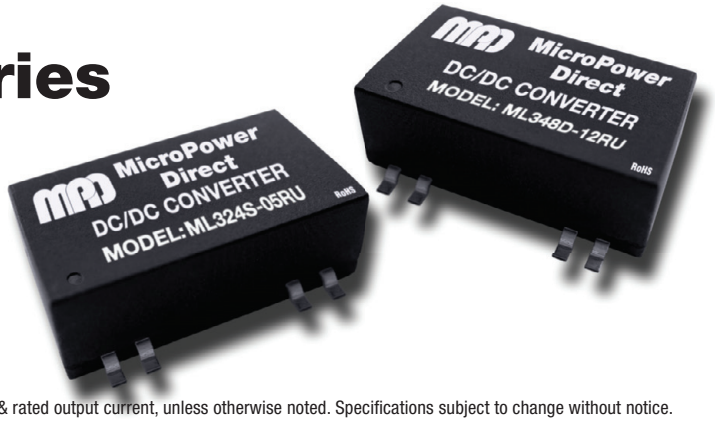
ML300RU Series

Ultra-Compact, 3W Wide 4:1 Input, SMT DC/DC Converters



Key Features:

- 3W Output Power
- Ultra-Compact SMT Case
- Wide 4:1 Input
- 1,500 VDC Isolation
- Single & Dual Outputs
- -40°C to +80°C Operation
- 16 Standard Models
- Tight Line/Load Regulation
- Available on Tape/Reel

RoHS

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	24 VDC Input	9.0	24.0	36.0	VDC
	48 VDC Input	18.0	48.0	75.0	
Start Up Voltage	24 VDC Input	4.5	6.0	8.5	VDC
	48 VDC Input	8.5	12.0	17.0	
Under Voltage Shutdown	24 VDC Input			8.0	VDC
	48 VDC Input			16.0	
Short Circuit Input Power				2,000	mW
Input Filter	π (Pi) Filter - Meets EN 55022 Class A				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±2.0	%
Output Voltage Balance	Dual Output, Balanced Loads		±1.0	±2.0	
Line Regulation	For V_{IN} = Min to Max		±0.5	±1.0	%
Load Regulation	For I_{OUT} = 15% to 100%		±0.5	±1.2	%
Ripple & Noise (20 MHz)	See Note 2		50	100	mV P - P
Transient Response Time, See Note 3	25% Load Step Change		300	600	µS
Transient Response Deviation			±3		%
Temperature Coefficient			±0.01	±0.02	%/°C
Overload Protection	Foldback Type	110	150		%
Output Short Circuit	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, 1V		350	500	pF
Switching Frequency			350		kHz

Remote On/Off, See Note 4

Parameter	Conditions	Min.	Typ.	Max.	Units
Supply On		2.5		5.5	VDC
Supply Off		-0.7		0.8	VDC
Standby Input Current				5	mA
Control Common	Referenced to Negative Input (pin 1)				

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+80	°C
Maximum Case Temperature	Case			+105	°C
Storage Temperature Range		-50		+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	0.14 Oz (4.2g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	300			kHours
Shock & Vibration	A random waveform 1~200 Hz/0.52 Grms, 30 min. on each axis (X, Y, Z) and 2~300 Hz/1.05 Grms, 30 min. on each axis (X, Y, and Z)				
Moisture Sensitivity Level (MSL)	IPC/JEDEC J-STD-020D.1		Level 2		

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	24 VDC Input			50.0	VDC
	48 VDC Input			100.0	
Peak Reflow Temperature	See Note 5			245	°C
Lead Temperature	1.5 mm From Case For 10 Sec.			260	°C

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

MicroPower Direct
292 Page Street
Suite D
Stoughton, MA 02072
USA

T: (781) 344-8226
F: (781) 344-8481
E: sales@micropowerdirect.com
W: www.micropowerdirect.com

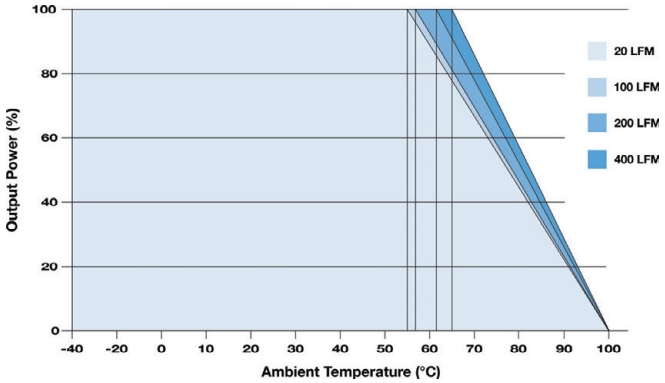
Model Selection Guide

Model Number	Input				Output			Efficiency (%, Typ)	Output Capacitive Load (µF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)			
	Nominal	Range	Full-Load	No-Load						
ML324S-03RU	24	9.0 - 36.0	110	30	3.3	600	90	75	220	800
ML324S-05RU	24	9.0 - 36.0	160	30	5.0	600	90	78	220	800
ML324S-12RU	24	9.0 - 36.0	156	30	12.0	250	38	80	47	800
ML324S-15RU	24	9.0 - 36.0	156	30	15.0	200	30	80	47	800
ML324S-24RU	24	9.0 - 36.0	156	30	24.0	125	19	80	47	800
ML324D-05RU	24	9.0 - 36.0	162	30	±5.0	±300	±45	77	47	800
ML324D-12RU	24	9.0 - 36.0	156	30	±12.0	±125	±19	80	47	800
ML324D-15RU	24	9.0 - 36.0	156	30	±15.0	±100	±15	80	47	800
ML348S-03RU	48	18.0 - 75.0	55	20	3.3	600	90	75	220	400
ML348S-05RU	48	18.0 - 75.0	80	20	5.0	600	90	78	220	400
ML348S-12RU	48	18.0 - 75.0	78	20	12.0	250	38	80	47	400
ML348S-15RU	48	18.0 - 75.0	78	20	15.0	200	30	80	47	400
ML348S-24RU	48	18.0 - 75.0	78	20	24.0	125	19	80	47	400
ML348D-05RU	48	18.0 - 75.0	81	20	±5.0	±300	±45	77	47	400
ML348D-12RU	48	18.0 - 75.0	78	20	±12.0	±125	±19	80	47	400
ML348D-15RU	48	18.0 - 75.0	78	20	±15.0	±100	±15	80	47	400

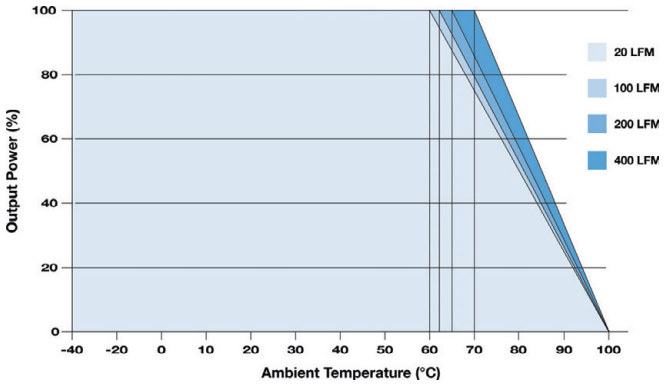
Notes:

1. The specified maximum capacitive load is for each output.
2. When measuring output ripple, it is recommended that an external 0.47 µF ceramic capacitor be placed from +Vout to -Vout for single output models or from each output to common for dual output models. For noise sensitive applications, the use of 3.3 µF capacitors will reduce the output ripple.
3. Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
4. The maximum control current at the on/off input (pin 2) during a logic high (+5V) is 400 µA. The maximum control current to the on/off pin at logic low (0V) is -400 µA. If the on/off pin is left open, the unit operates. If grounded, the unit will shut off.
5. The recommended reflow settings are a peak temperature of 245 °C for a maximum period (Tpk) of 10S and a time above liquidous (TL) of ≤60 seconds at 217 °C. For more information, please contact the factory.
6. Operation at no-load will not damage these units. However, they may not meet all specifications.
7. 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 (<1.0Ω at 100 kHz) capacitor be mounted close to the converter. For 24V input units a 4.7 µF is recommended and for 48V input models, a 2.2 µF.
8. 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.

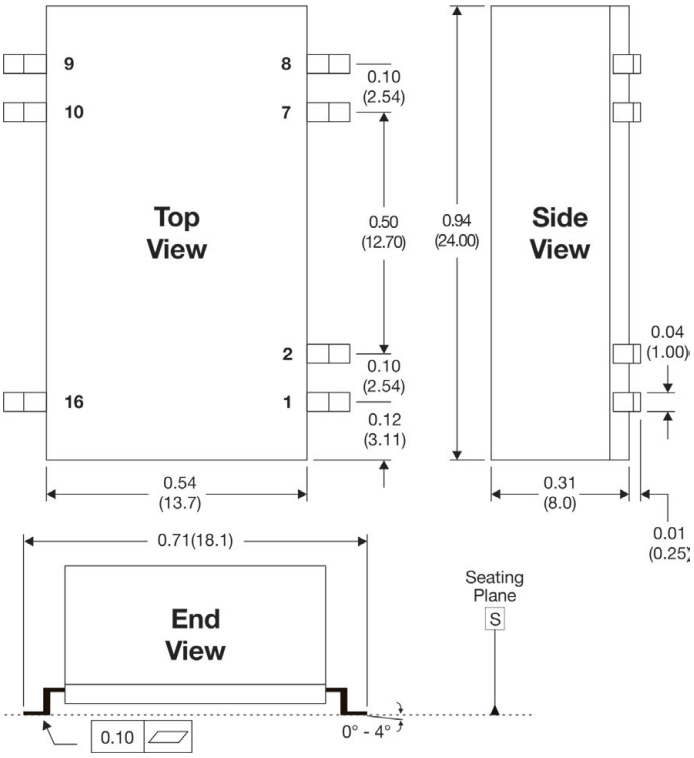
Derating Curve, 3.3V & 5V Outputs



Derating Curve, All Other Outputs



Mechanical Dimensions

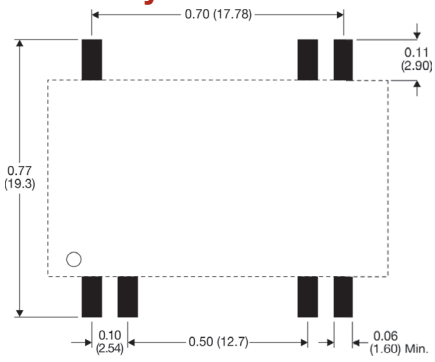


Pin Connections

Pin	Single	Dual
1	-Vin	-Vin
2	Remote On/Off	
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin	+Vin

NC = No connection

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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292 Page Street Ste D Stoughton, MA 02072 • TEL: (781) 344-8226 • FAX: (781) 344-8481 • E-Mail: sales@micropowerdirect.com