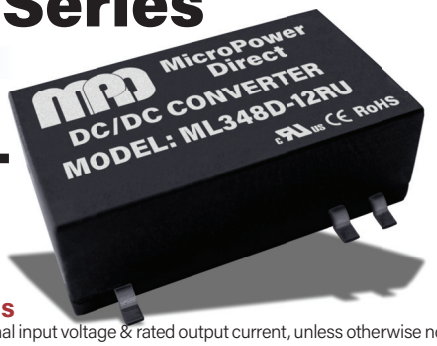
ML300RU Series

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



Key Features:

- 3W Output Power
- Wide 4:1 Input Range
- Ultra-Compact SMT Case
- EN 62368 Approved
- 1,500 VDC Isolation
- Single And Dual Outputs
- Tight Line/Load Regulation
- -40°C to +80°C Operation
- 16 Standard Models
- 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
Start Up Voltage	5 VDC Input			4.5	VDC
	24 VDC Input			9.0	
	48 VDC Input			18.0	
Start Up Time				30	mS
Short Circuit Input Power				1,500	mW
Input Filter	π (Pi) Filter				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±1.0	%
Output Voltage Balance	Dual Output, Balanced Loads			±2.0	
Line Regulation	For VIN = Min to Max			±0.5	%
Load Regulation	For IOUT = 0% to 100%			±1.0	%
Cross Regulation (Dual Output)	25/100% Asymetrical Load			±5.0	%
Ripple & Noise (20 MHz)	See Note 2			50	mV P - P
Transient Response Time, See Note 3	25% Load Step Change		250		μS
Transient Response Deviation			±3	±5	%
Temperature Coefficient				±0.02	%/°C
Overload Protection	Foldback Type		160		%
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	1,500			VDC
	1 Second	1,800			VDC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance	100 kHz, 1V		500		pF
Switching Frequency		100			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			+95	°C
Storage Temperature Range		-55		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size and Weight	See Mechanical Drawing (Page 5)
Case Material	Non-Conductive Black Plastic (UL94-V0)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	5.086			MHours
Safety Standards	UL/cUL 62368-1 recognition (UL certificate)				
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)	5 VDC Input			15.0	VDC
	24 VDC Input			50.0	
	48 VDC Input			100.0	
Peak Reflow Temperature	See "Reflow Settings" Page 2			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.

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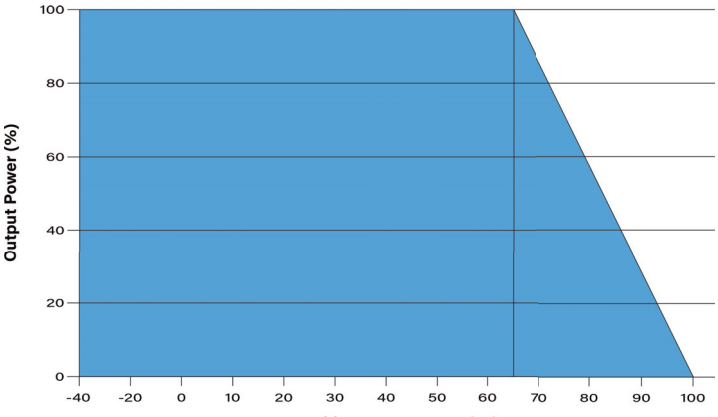
Model Selection Guide

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						
ML305S-05RU	5.0	4.5 - 12.0	741	40	5.0	600	90	80	1,680	1,600
ML305S-12RU	5.0	4.5 - 12.0	714	40	12.0	250	38	85	820	1,600
ML305S-15RU	5.0	4.5 - 12.0	714	40	15.0	200	30	85	680	1,600
ML305S-24RU	5.0	4.5 - 12.0	714	40	24.0	125	19	85	390	1,600
ML305D-12RU	5.0	4.5 - 12.0	723	40	±12.0	±125	±19	84	470	1,600
ML305D-15RU	5.0	4.5 - 12.0	723	40	±15.0	±100	±15	84	330	1,600
ML324S-05RU	24	9.0 - 36.0	156	20	5.0	600	90	80	1,680	300
ML324S-12RU	24	9.0 - 36.0	147	20	12.0	250	38	85	820	300
ML324S-15RU	24	9.0 - 36.0	147	20	15.0	200	30	85	680	300
ML324S-24RU	24	9.0 - 36.0	147	20	24.0	125	19	85	390	300
ML324D-12RU	24	9.0 - 36.0	149	20	±12.0	±125	±19	84	470	300
ML324D-15RU	24	9.0 - 36.0	149	20	±15.0	±100	±15	84	330	300
ML348S-05RU	48	18.0 - 75.0	78	13	5.0	600	90	80	1,680	200
ML348S-12RU	48	18.0 - 75.0	74	13	12.0	250	38	84	820	200
ML348S-15RU	48	18.0 - 75.0	74	13	15.0	200	30	84	680	200
ML348S-24RU	48	18.0 - 75.0	74	13	24.0	125	19	85	390	200
ML348D-12RU	48	18.0 - 75.0	75	13	±12.0	±125	±19	83	470	200
ML348D-15RU	48	18.0 - 75.0	76	13	±15.0	±100	±15	82	330	200

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. Operation at no-load will not damage these units. However, they may not meet all specifications.
6. 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.

Temperature Derating Curve



EMI/EMC Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	EN 55032		Class B
Conducted Emissions	EN 55032		Class B
ESD	EN 61000-4-2	A	±8 kV Air
		A	±6 kV Contact
RS	EN 61000-4-3	A	10V/m
EFT, See Note 1	EN 61000-4-4	A	±2 kV
Surge, See Note 1	EN 61000-4-5	A	±1 kV
CS	EN 61000-4-6	A	10 Vrms
PFMF	EN 61000-4-8	A	3 A/m

Notes:

1. To meet the EFT & surge requirements an external capacitor must be connected across the converter input. The suggesteed value is 220 uF/100V.

MPD offers a wide variety of SMT mount DC/DC's. Product families range from 1W to 6W output power and offer a full range of features that include:

- Ultra-Miniature Size
- Tape/Reel Packaging
- Wide Temp Operation
- Up To 3 kV I/O Isolation
- Single & Dual Outputs
- Short Circuit Protection
- Low Cost

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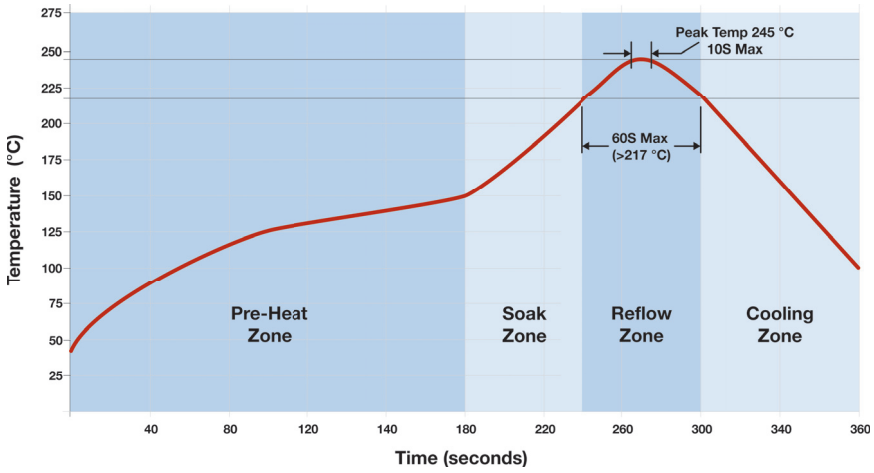
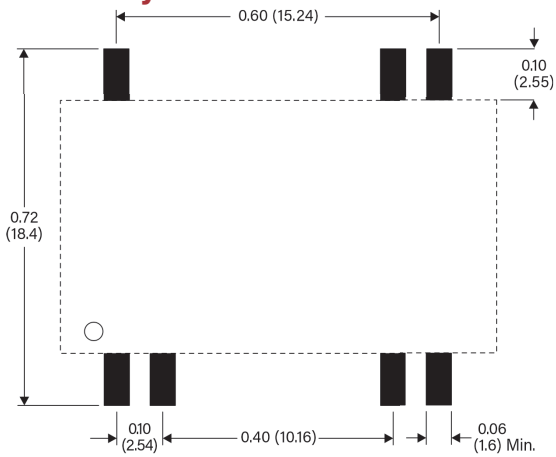
Reflow Solder Settings

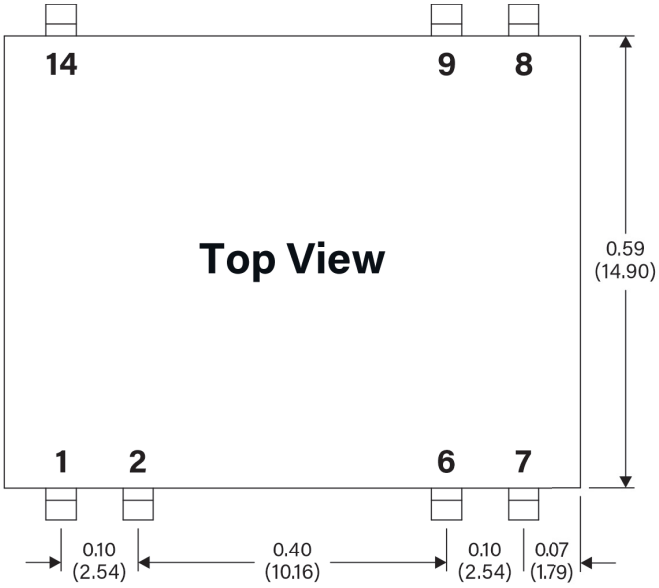


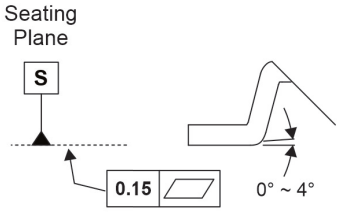
The **ML300RU** series is designed to meet the IPC/JEDEC standard J-STD-020D for reflow soldering. The recommended reflow settings are a peak temperature of 245°C for a maximum period (TPK) of 10S and a time above liquidous (TL) of ≤60 seconds at 217°C, as illustrated above. For more information, please contact the factory.

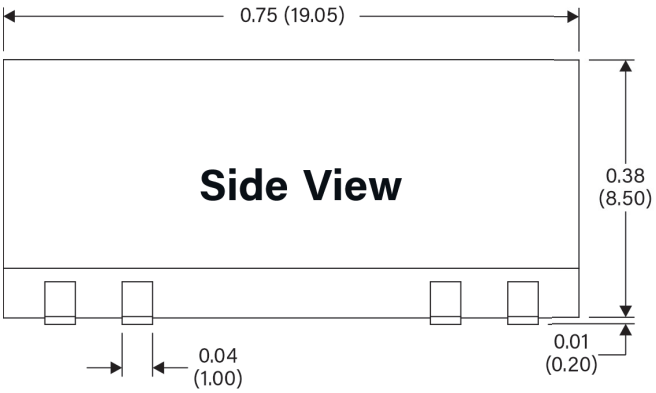
Board Layout

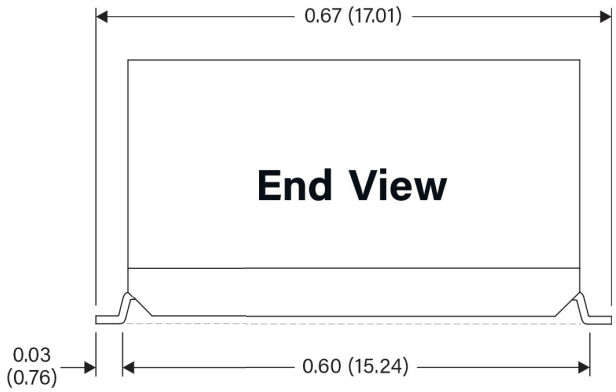


Mechanical Dimensions









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
- Pin material is tinned copper
- Weight = 0.123 Oz (3.5g)

Pin Connections

Pin	Single	Dual
1	-VIN	-VIN
2	Remote On/Off	
6	NC	Common
7	NC	-VOUT
8	+VOUT	+VOUT
9	-VOUT	Common
14	+VIN	+VIN

NC = No connection

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