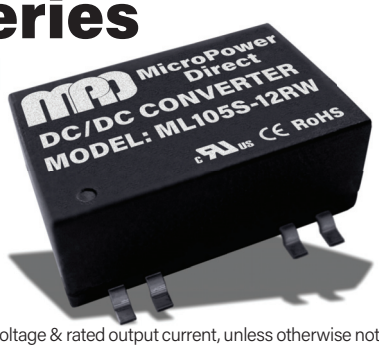
ML100RW Series

Ultra-Compact, 1W Wide 2:1 Input, SMT DC/DC Converters



Key Features:

- 1W Output Power
- Wide 2:1 Input Range
- Ultra-Compact SMT Case
- EN 62368 Approved
- 1,500 VDC Isolation
- Single And Dual Outputs
- Tight Line/Load Regulation
- -40°C to +85°C Operation
- 20 Standard Models
- 2.8 MH MTBF Minimum
- Available on Tape/Reel

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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	5 VDC Input	4.5	5.0	9.0	VDC
	12 VDC Input	9.0	12.0	18.0	
	24 VDC Input	18.0	24.0	36.0	
	48 VDC Input	36.0	48.0	75.0	
Start Up Voltage	5 VDC Input			4.5	VDC
	12 VDC Input			9.0	
	24 VDC Input			18.0	
	48 VDC Input			36.0	
Input Filter	Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±1.0	%
Output Voltage Balance	Dual Outputs, Balanced Loads			±1.0	%
Line Regulation	For VIN = Min to Max			±0.2	%
Load Regulation	For IOUT = 0% to 100%			±1.0	%
	Single, For IOUT = 10% to 90%			±0.5	
	Dual, For IOUT = 10% to 90%			±0.8	
Ripple & Noise (20 MHz)	See Note 2		75		mV P - P
Transient Response Time, See Note 3	25% Load Step Change		250		µS
Transient Response Deviation	25% Load Step Change		±3	±5	%
Temperature Coefficient				±0.02	%/°C
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			50	pF
Switching Frequency			220		kHz

Remote On/Off

Parameter	Conditions	Min.	Typ.	Max.	Units
Supply On		Open or High Impedance			
Supply Off	See Note 4	2.0		4.0	mA
Standby Input Current			2.5		mA

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+85	°C
Operating Temperature Range	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 2)
Case Material	Non-Conductive Black Plastic (UL94-V0)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.80			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
	12 VDC Input			25.0	
	24 VDC Input			50.0	
	48 VDC Input			100.0	
Peak Reflow Temperature	See Page 3			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.

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						
ML105S-05RW	5.0	4.5 - 9.0	256	40	5.0	200	0.0	78	1,680	500
ML105S-12RW	5.0	4.5 - 9.0	252	40	12.0	83	0.0	79	820	500
ML105S-15RW	5.0	4.5 - 9.0	248	40	15.0	67	0.0	81	680	500
ML105D-12RW	5.0	4.5 - 9.0	255	40	±12.0	±42	±0.0	79	470	500
ML105D-15RW	5.0	4.5 - 9.0	248	40	±15.0	±33	±0.0	80	330	500
ML112S-05RW	12	9.0 - 18.0	105	20	5.0	200	0.0	79	1,680	200
ML112S-12RW	12	9.0 - 18.0	105	20	12.0	83	0.0	79	820	200
ML112S-15RW	12	9.0 - 18.0	102	20	15.0	67	0.0	82	680	200
ML112D-12RW	12	9.0 - 18.0	104	20	±12.0	±42	±0.0	81	470	200
ML112D-15RW	12	9.0 - 18.0	103	20	±15.0	±33	±0.0	80	330	200
ML124S-05RW	24	18.0 - 36.0	53	10	5.0	200	0.0	79	1,680	100
ML124S-12RW	24	18.0 - 36.0	51	10	12.0	83	0.0	82	820	100
ML124S-15RW	24	18.0 - 36.0	51	10	15.0	67	0.0	82	680	100
ML124D-12RW	24	18.0 - 36.0	51	10	±12.0	±42	±0.0	82	470	100
ML124D-15RW	24	18.0 - 36.0	50	10	±15.0	±33	±0.0	82	330	100
ML148S-05RW	48	36.0 - 75.0	26	7	5.0	200	0.0	79	1,680	50
ML148S-12RW	48	36.0 - 75.0	26	7	12.0	83	0.0	80	820	50
ML148S-15RW	48	36.0 - 75.0	26	7	15.0	67	0.0	80	680	50
ML148D-12RW	48	36.0 - 75.0	26	7	±12.0	±42	±0.0	81	470	50
ML148D-15RW	48	36.0 - 75.0	25	7	±15.0	±33	±0.0	81	330	50

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 control input is current controlled. The unit operates when this input is open. When the input is "high" (current is flowing into the pin), the converter shuts down. The input current to this pin should be applied via a 1 kV resistor, and kept between 2 mA to 4 mA. Connecting this input directly to ground will not damage the converter.
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 5V input units an 8.2 μF is recommended, for 12V input units a 3.3 μF and for 24/48V input models, a 1.5 μF.
7. 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.

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:

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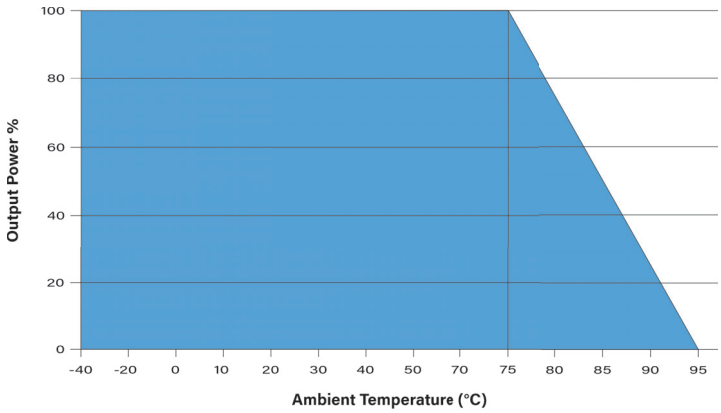
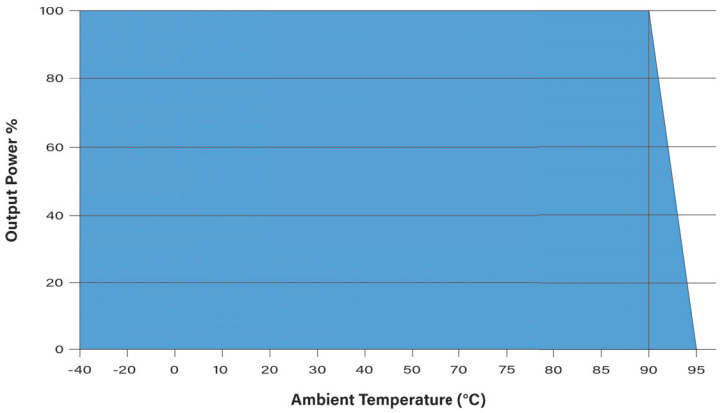
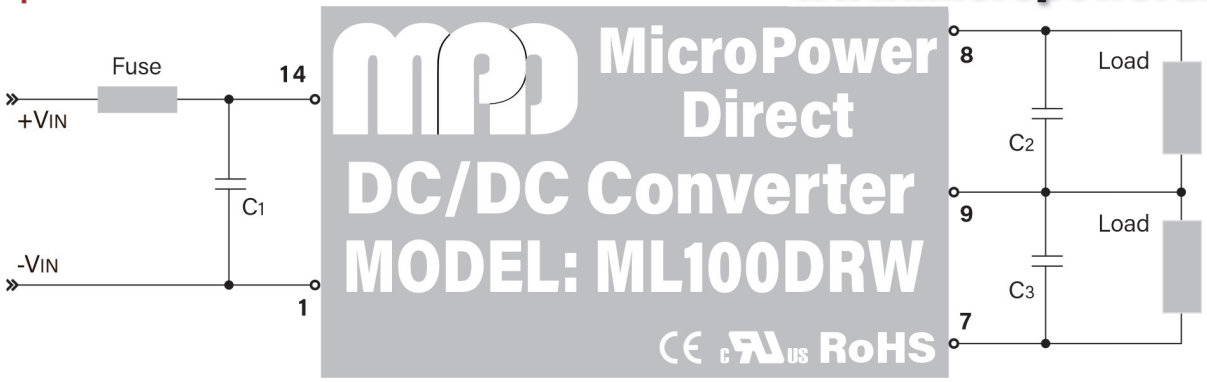
Derating Curve, Free Air (20 LFM)



Derating Curve , 400 LFM)



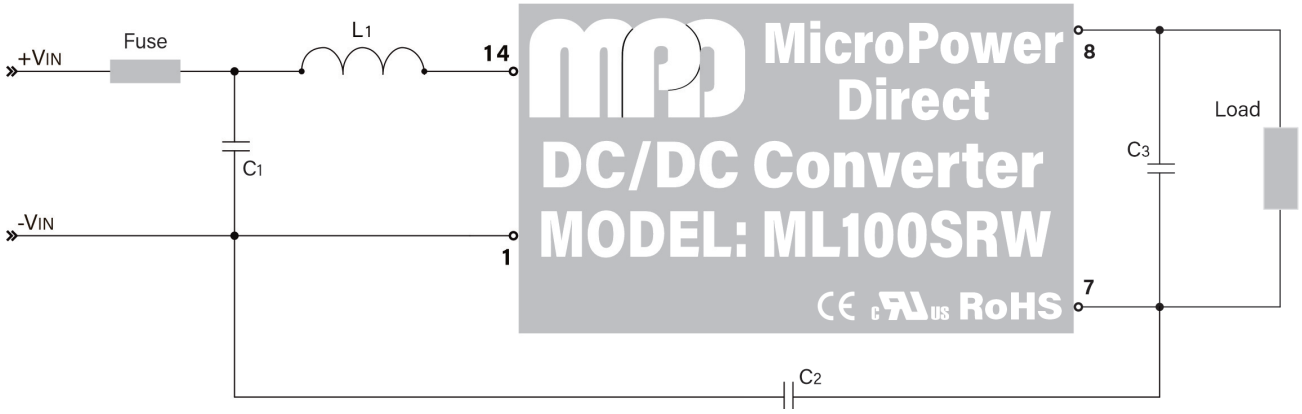
Simple Connection



The diagram above illustrates a simple connection of the **ML100RW** series. Capacitor C1 is recommended to insure the unit starts in applications where power to the device is supplies over long lines or h=where the output loading is high. The capacitors C3 and C4 will reduce output ripple and improve the converter stability over time and temperature. The recommended component values are given in the table at right.

VIN	C1	C2	C3
5 VDC	8.2 µF	3.3 µF	3.3 µF
12 VDC	3.2 µF	3.3 µF	3.3 µF
24/48 VDC	1.5 µF	3.3 µF	3.3 µF

Typical Connection

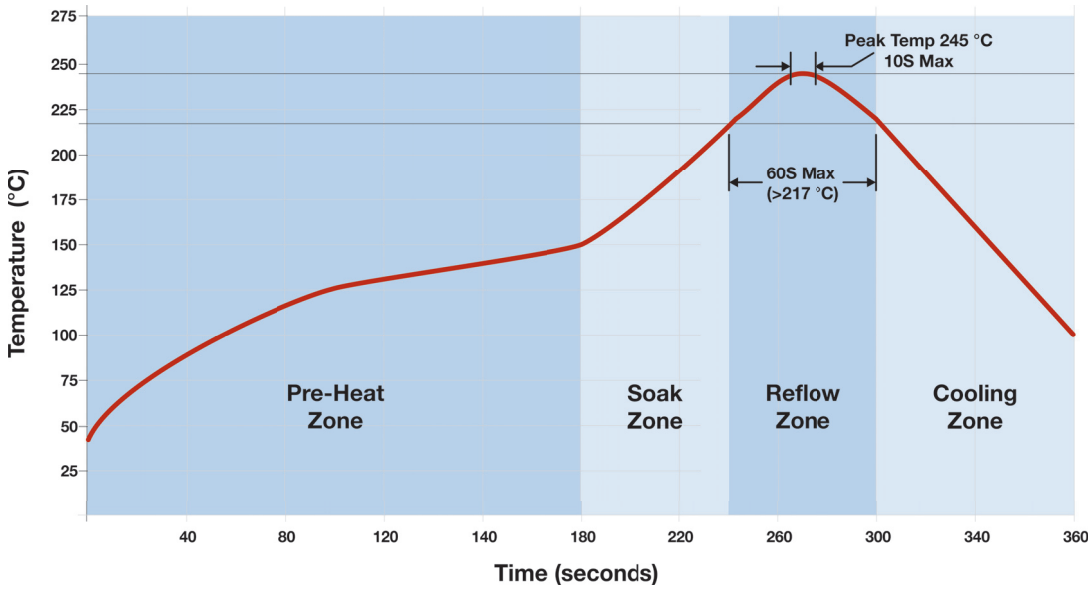


The diagram above illustrates a typical connection of the **ML100RW** series. To help meet conducted emissions requirements (EN 55032 class A), the input filter components (L1, C1 & C2) in the diagram above should be used. The capacitor C3 will reduce output ripple and improve the converter stability over time and temperature. The recommended component values are given in the table at right.

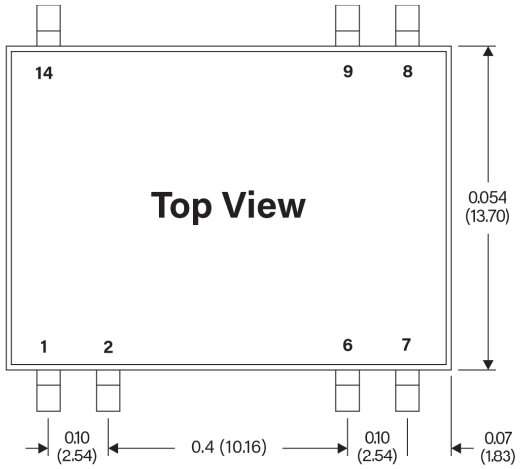
VIN	C1	L1	C2	C3
5 VDC	4.7 µF/50V 1210 XR7	4.7 µH SR0302/1.20A	2.2 µF/25V 1206 MLCC	3.3 µF
12 VDC	4.7 µF/50V 1210 XR7	4.7 µH SR0302/1.20A	2.2 µF/50V 1206 MLCC	3.3 µF
24 VDC	4.7 µF/50V 1210 XR7	18 µH SR0302/0.58A	2.2 µF/50V 1206 MLCC	3.3 µF
48 VDC	4.7 µF/100V 1210 XR7	18 µH SR0302/0.58A	2.2 µF/50V 1206 MLCC	3.3 µF

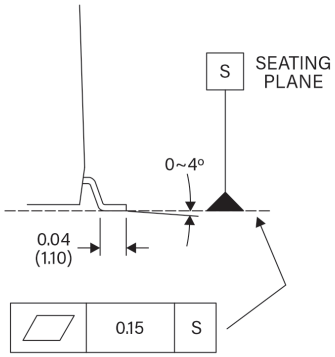
Reflow Solder Settings

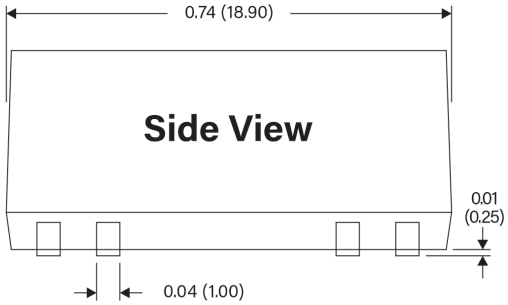
The **ML100RW** series is designed to meet the IPC/JEDEC standard J-STD-020D for reflow soldering. The recommended reflow settings are a peak temperature of 245°C for a maximum period (TPK) of 10S and a time above liquidous (TL) of ≤60 seconds at 217°C, as illustrated above. For more information, please contact the factory.

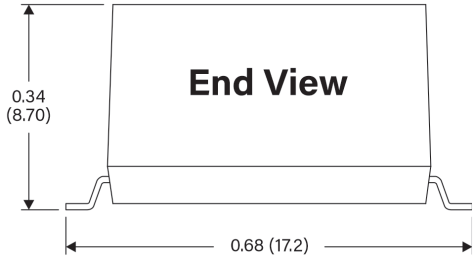


Mechanical Dimensions

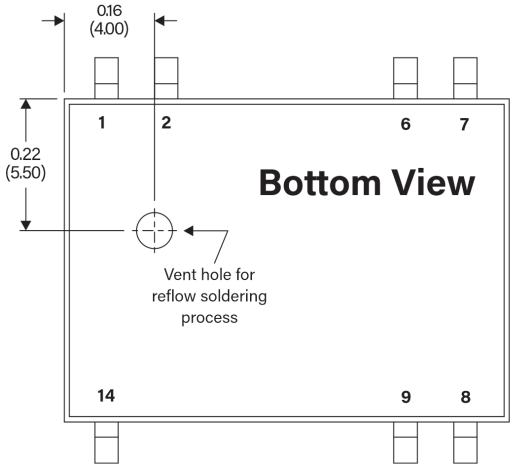


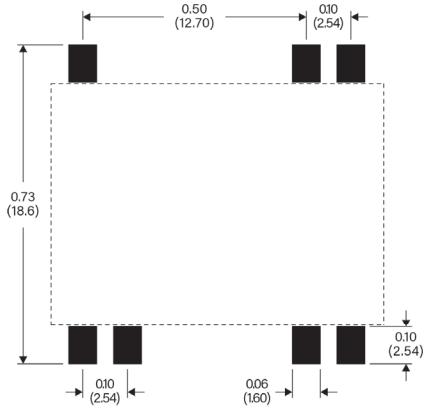






Board Layout





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
- Weight = 0.06 Oz (1.76g)

Pin Connections

Pin	Description
1	-VIN
2	+VIN
3	No Pin
4	-VOUT
5	+VOUT
6	No Pin
7	No Pin
8	NC

NC = Not for electrical connection

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