ML200B

2W, Single Output, Ultra-Miniature SMT DC/DC Converters

Key Features:

- 2W Output Power
- Ultra-Miniature SMT Case
- -40°C to +105°C Operating Temperature Range
- 1500VDC Isolation Voltage
- Single Isolated Output
- Efficiency up to 84%
- >3.5 MHour MTBF
- No-load input to 3mA

CE

RoHS

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	13.2	VDC
	15 VDC Input	13.5	15	16.5	VDC
Reflected Ripple Current			15		mA
Input Filter			Capacitor		

Output

Parameter	Conditions		Min.	Typ.	Max.	Units
Output Voltage Accuracy			-	±5		%
Line Regulation	For Vin Change of 1%		-	±1.5		%
Load Regulation	10%-100% Of Load	5 VDC	-	8	15	%
		12 VDC	-	5	10	
		15 VDC		4	10	
Ripple & Noise, See Note 8	20 MHz Bandwidth		-	60	150	mVp-p
Temperature Coefficient	Full load		-	-	±0.02	%/°C
Output Short Circuit	Continious Self-recovery					

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 seconds	3000	-	-	VDC
Isolation Resistance	500 VDC	1000			MΩ
Isolation Capacitance	100 KHz / 1V	-	20	-	pF
Switching Frequency	Full load, nominal input voltage	-	220	-	kHz

Environmental

Parameter	Conditions	Min.	Typ	Max.	Units
Operating Temperature Range	Ambient	-40	-	+105	°C
Storage Temperature Range		-55	-	+125	°C
Case Temperature Rise			25		
Cooling	Free Air Convection				
Humidity, See Note 5	Non condensing	5	-	95	%RH

Physical

Case Size	0.531 in x 0.437 in x 0.285 in (See mechanical diagrams on page 4)
Case Material	Black plastic; flame retardant and heat resistant (UL94V-0 rated)
Weight	0.06 oz (Typ.)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL-HDBK-217F@25°C	3.5			MHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	5 VDC Input		-	9	VDC
	12 VDC Input			18	VDC
	15 VDC Input	-		20	VDC
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 Selection Guide

Model Number	Input				Output			Efficiency (%, Typ)	Reflected Ripple Current (mA Typ	Capacitive Load (μF, Max) See Note 4	Fuse Rating Slow-Blow (mA) See Note 6
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
ML205S-05B	5	4.5 – 5.5	333	12	5	400	40	83	15.0	2400	750
ML205S-12B	5	4.5 – 5.5	333	12	12	167	17	84	15.0	560	750
ML205S-15B	5	4.5 – 5.5	333	12	15	133	13	84	15.0	560	750
ML212S-05B	12	10.8 – 13.2	333	12	5	400	40	83	15.0	2400	750
ML212S-12B	12	10.8 – 13.2	333	12	12	167	17	84	15.0	560	750
ML212S-15B	12	10.8 – 13.2	333	12	15	133	13	84	15.0	560	750
ML215S-05B	15	13.5 – 16.5	333	12	5	400	40	83	15.0	2400	750
ML215S-12B	15	13.5 – 16.5	333	12	12	167	17	84	15.0	560	750
ML215S-15B	15	13.5 – 16.5	333	12	15	133	13	84	15.0	560	750

Notes:

1. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage.
2. It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product.
3. The maximum capacitive load is tested within the input voltage range and under full load conditions.
4. Unless otherwise specified, all indicators in this manual are measured at Ta=25 °C, humidity<75% RH, nominal input voltage, and output rated load.
5. 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.
6. These converters are designed to meet the IPC/JEDEC standard J-STD-020D.1 for reflow soldering. The recommended reflow settings are a peak temperature of 245°Cfor a maximum period (TPK) of 10S and a time above liquidous (TL) of <60 seconds at 217°C.
7. If further reduction of input and output ripple is required, a capacitor filtering network can be connected at the input and output terminals, and the application circuit is shown in Fig. 6. However, attention should be paid to selecting appropriate filtering capacitors. If the capacitance is too large, it is likely to cause startup problems. For each output, while ensuring safe and reliable operation, the recommended capacitive load values are detailed in the table.
8. For Typical recommended circuit, see Fig. 7.
9. To ensure the efficient and reliable operation of the module, its minimum output load should not be less than 10% of the rated load when in use. If your required power is indeed small, please connect a resistor in parallel at the output end (the sum of the power consumed by the resistor and the actual power used is greater than or equal to 10% of the rated power).
10. All indicator testing methods in this manual are based on our company's corporate standards.
11. Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel.
12. Product specifications are subject to change without prior notice.

Typical Characteristic Curves

Output Regulation Curve, 3.3VDC Output, Nominal Input Voltage

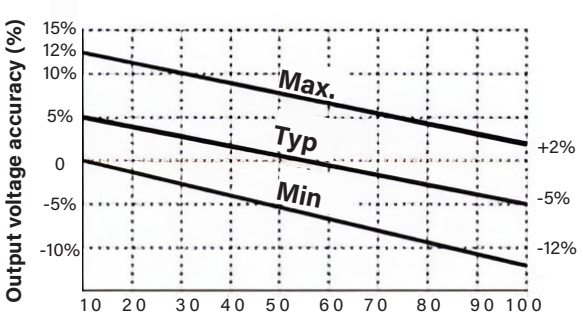


Fig. 1

Output Regulation Curve, Other, Nominal Input Voltage

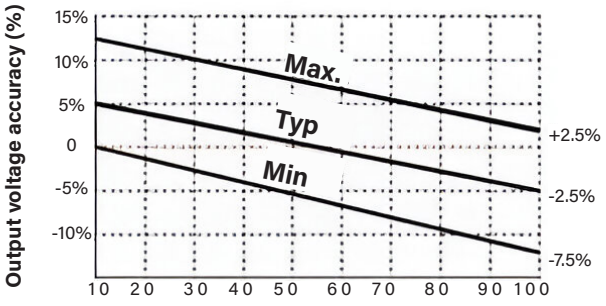


Fig. 2

Efficiency VS Input Voltage Curve (full load)

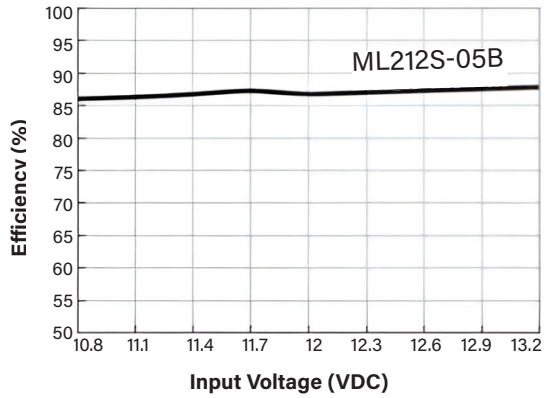


Fig. 3

Efficiency VS Out put load (vin=12v)

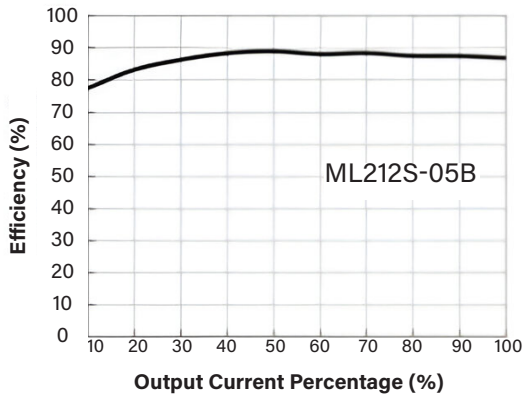


Fig. 4

Temperature Derating Curve

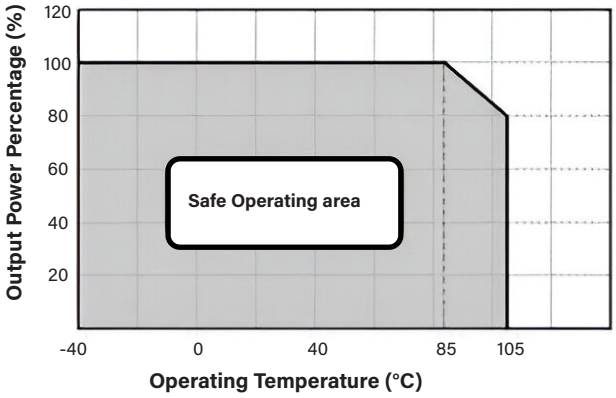


Fig. 5

Application Circuits

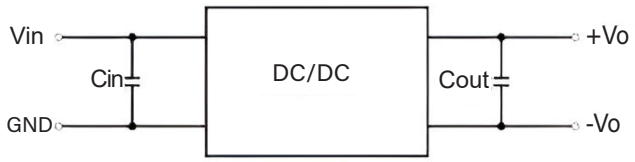


Fig. 6

Recommended Capacitive Load Value			
Vin	Sin	Vo	Cout
5VDC	10μF/10V	3.3V/5VDC	10μF/10V
12VDC	4.7μF/25V	12VDC	2.2μF/25V
15VDC	2.2μF/50V	15VDC	1μF/50V

EMC Compliance Circuit

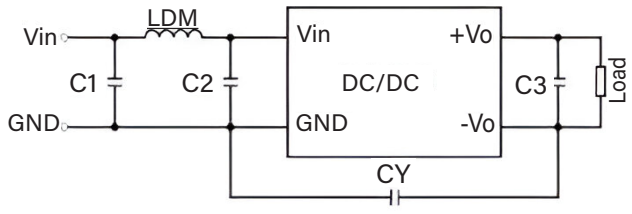


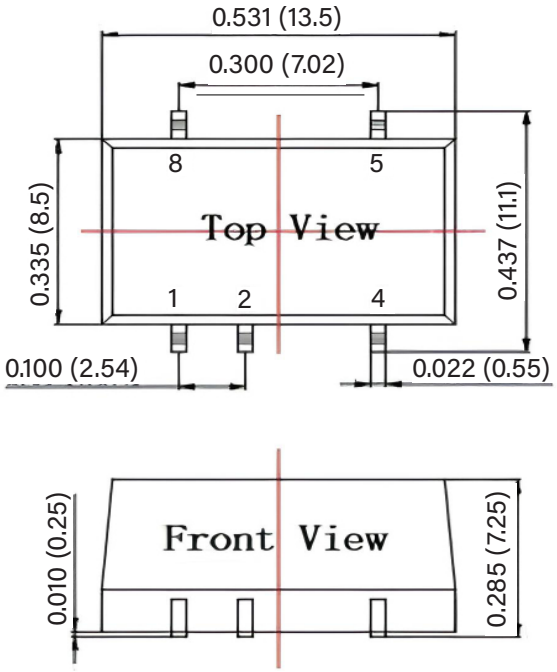
Fig. 7

EMI Recommended Parameter		
EMI	C1	4.7μF / 50μF
	C2	4.7μF / 50μF
	C3	Refer to the Cout parameter table in Figure 6
	CY	270pF / 2kV
	LDM	6.8μH

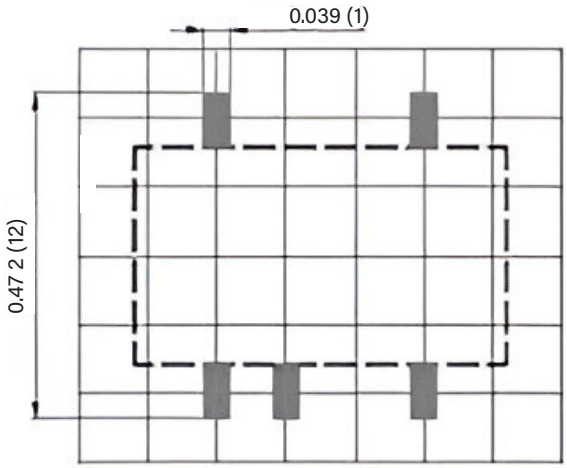
EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	CISPR32/EN 55032		Class B
Conducted Emissions	CISPR32/EN 55032		Class B
ESD	EN 61000-4-2	B	±8 kV Air
			±4 kV Contact

Mechanical Dimensions



PCB Layout



The grid distance is 2.54 x 2.54 mm

Note:
Unit: inches(mm)
Pin section tolerances: ±0.004 (±0.10)
General tolerances: ±0.020 (±0.50)

Pin Definition Table

Pin	Function
1	GND
2	Vin
4	-Vo
5	+Vo
8	NC