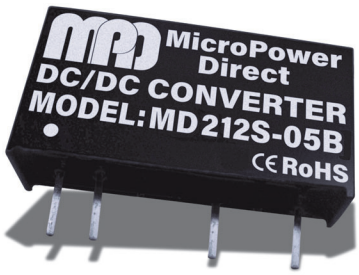
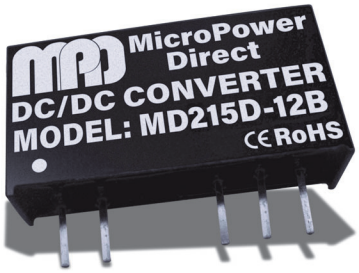
MD200B

2W, Isolated, Miniature SIP Case, DC/DC Converters





Key Features:

- 2W Output Power
- Miniature SIP Case
- -40°C to +105°C Operating Temperature Range
- 3000VDC Isolation
- Single & Dual Outputs
- Short Circuit Protection
- >3.5 Mhour MTBF
- 48 Standard Models
- Industry Standard Pin-Out

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	3.3 VDC Input	2.97	3.3	3.63	VDC
	5 VDC Input	4.5	5	5.5	VDC
	12 VDC Input	10.8	12	13.2	VDC
	15 VDC Input	13.5	15	16.5	VDC
	24 VDC Input	21.6	24	26.4	VDC
Reflected Ripple Current			15		mA
Input Filter			Capacitance Filter		

Output

Parameter		Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy		See Tolerance Graphs				
Line Regulation	3.3 VDC Output	Vin Change of 1%	-	±1.5		%
	Other Outputs		-	±1.2		
Load Regulation	3.3 VDC	10%-100% Load	-	14		%
	5 VDC		-	10		
	9 VDC			9		
	12 VDC			8		
	15 VDC			7		
	24 VDC			6		
Ripple & Noise, See Note 4		20 MHz bandwidth	-	60	120	mVp-p
Temperature Coefficient		Full load	-		±0.03	%/°C
Output Short Circuit		Continuous, 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 /0. 1V	-	20	-	pF
Switching Frequency	PWM		220		kHz

Environmental

Parameter	Conditions	Min.	Typ	Max.	Units
Operating Temperature Range	See Fig 2	-40	-	+105	°C
Storage Temperature Range		-55	-	+125	°C
Cooling	Free Air Convection				
Humidity, See Note 3	Non condensing		-	95	%RH

Physical

Case Size	0.770 x 0.398 x 0.278 in (See mechanical diagrams on page 4)
Case Material	Back Plastic; flame-retardant an heat resistance (UL94V-0)
Weight	0.0713Oz(2.02g) 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)	3.3 VDC Input	-0.7		5	VDC
	5 VDC Input	-0.7		9	VDC
	12 VDC Input	-0.7		18	VDC
	15 VDC Input	-0.7		21	VDC
	24 VDC Input	-0.7		30	VDC
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.

MicroPower Direct
46 Eastman Street
Unit 1
Easton, MA 02375
USA

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

MICROPOWER DIRECT

Model Selection Guide

Model Number	Input				Output			Full Load Efficiency (%, Typ)	Reflected Ripple Current (mA Typ)	Capacitive Load (µF Max)	Fuse Rating Slow-Blow (mA) See Note 1
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MD203S-03B	3.3	2.97 - 3.63	370	3	3.3	400	0.0	77	15	2400	750
MD203S-05B	3.3	2.97 - 3.63	370	3	5.0	400	0.0	79	15	2400	750
MD203S-09B	3.3	2.97 - 3.63	370	3	9.0	222	0.0	80	15	1000	750
MD203S-12B	3.3	2.97 - 3.63	370	3	12.0	167	0.0	81	15	820	750
MD205S-03B	5	4.5 - 5.5	506	4	3.0	400	0.0	83	15	2400	1000
MD205S-05B	5	4.5 - 5.5	506	4	5.0	400	0.0	85	15	2400	1000
MD205S-09B	5	4.5 - 5.5	506	4	9.0	222	0.0	85	15	1000	1000
MD205S-12B	5	4.5 - 5.5	506	4	12.0	167	0.0	86	15	820	1000
MD205S-15B	5	4.5 - 5.5	506	4	15.0	133	0.0	87	15	680	1000
MD205S-24B	5	4.5 - 5.5	506	4	24.0	83	0.0	88	15	560	1000
MD205D-03B	5	4.5 - 5.5	506	4	±3.3	±303	0.0	83	15	1000	1000
MD205D-05B	5	4.5 - 5.5	506	4	±5.0	±200	0.0	85	15	1000	1000
MD205D-09B	5	4.5 - 5.5	506	4	±9.0	±111	0.0	85	15	560	1000
MD205D-12B	5	4.5 - 5.5	506	4	±12.0	±83	0.0	86	15	560	1000
MD205D-15B	5	4.5 - 5.5	506	4	±15.0	±67	0.0	87	15	220	1000
MD212S-03B	12	10.8 – 13.2	208	4	3.0	400	0.0	84	15	2400	500
MD212S-05B	12	10.8 – 13.2	208	4	5.0	400	0.0	85	15	2400	500
MD212S-09B	12	10.8 – 13.2	208	4	9.0	222	0.0	86	15	1000	500
MD212S-12B	12	10.8 – 13.2	208	4	12.0	167	0.0	87	15	820	500
MD212S-15B	12	10.8 – 13.2	208	4	15.0	133	0.0	88	15	680	500
MD212S-24B	12	10.8 – 13.2	208	4	24.0	83	0.0	89	15	560	500
MD212D-03B	12	10.8 – 13.2	208	4	±3.3	±303	0.0	84	15	1000	500
MD212D-05B	12	10.8 – 13.2	208	4	±5.0	±200	0.0	85	15	1000	500
MD212D-09B	12	10.8 – 13.2	208	4	±9.0	±111	0.0	86	15	560	500
MD212D-12B	12	10.8 – 13.2	208	4	±12.0	±83	0.0	87	15	560	500
MD212D-15B	12	10.8 – 13.2	208	4	±15.0	±67	0.0	88	15	220	500
MD215S-03B	15	13.5 – 16.5	167	4	3.0	400	0.0	84	15	2400	500
MD215S-05B	15	13.5 – 16.5	167	4	5.0	400	0.0	85	15	2400	500
MD215S-09B	15	13.5 – 16.5	167	4	9.0	222	0.0	86	15	1000	500
MD215S-12B	15	13.5 – 16.5	167	4	12.0	167	0.0	87	15	820	500
MD215S-15B	15	13.5 – 16.5	167	4	15.0	133	0.0	88	15	680	500
MD215S-24B	15	13.5 – 16.5	167	4	24.0	83	0.0	89	15	560	500
MD215D-03B	15	13.5 – 16.5	167	4	±3.3	±303	0.0	84	15	1000	500
MD215D-05B	15	13.5 – 16.5	167	4	±5.0	±200	0.0	85	15	1000	500
MD215D-09B	15	13.5 – 16.5	167	4	±9.0	±111	0.0	86	15	560	500
MD215D-12B	15	13.5 – 16.5	167	4	±12.0	±83	0.0	87	15	560	500
MD215D-15B	15	13.5 – 16.5	167	4	±15.0	±67	0.0	88	15	220	500
MD224S-03B	24	21.6 – 26.4	104	4	3.0	400	0.0	84	15	2400	200
MD224S-05B	24	21.6 – 26.4	104	4	5.0	400	0.0	86	15	2400	200
MD224S-09B	24	21.6 – 26.4	104	4	9.0	222	0.0	87	15	1000	200
MD224S-12B	24	21.6 – 26.4	104	4	12.0	167	0.0	88	15	820	200
MD224S-15B	24	21.6 – 26.4	104	4	15.0	133	0.0	89	15	680	200
MD224S-24B	24	21.6 – 26.4	104	4	24.0	83	0.0	90	15	560	200
MD224D-03B	24	21.6 – 26.4	104	4	±3.3	±303	0.0	84	15	1000	200
MD224D-05B	24	21.6 – 26.4	104	4	±5.0	±200	0.0	86	15	1000	200
MD224D-09B	24	21.6 – 26.4	104	4	±9.0	±111	0.0	87	15	560	200
MD224D-12B	24	21.6 – 26.4	104	4	±12.0	±83	0.0	88	15	560	200
MD224D-15B	24	21.6 – 26.4	104	4	±15.0	±67	0.0	89	15	220	200

Notes:

1. 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.
2. The input voltage cannot exceed the specified range value, otherwise permanent and irreparable damage may be caused.
3. Unless otherwise specified,the parameters in this datasheet were measured at 25°C, humidity 40%~75%, input nominal voltage and output pure resistance mode under full load.
4. To further reduce input and output ripple, a capacitor filtering network can be connected at the input and output terminals.The application circuit is shown in Figure 5. However, care should be taken to select a suitable filter capacitor. If the capacitance is too large, it is likely to cause start-up problems. For each output, the recommended capacitive load values are shown in " Recommended Capacitive Load Value Table" for safe and reliable operation.
5. For EMC typical recommended circuit, See Figure 6
6. In order to ensure that the module can work efficiently and reliably, the minimum output load should not be less than 10% of the rated load when used. If the power required is really small, connect a resistor in parallel to the output end (the sum of the power consumed by the resistance and the power actually used is greater than or equal to 10% of the rated power).
7. All index test methods are based on our company's enterprise standards.

Typical Characteristic Curves

Output Regulation Curve (Nominal Input Voltage)

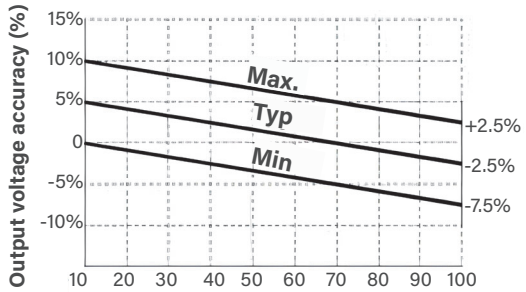


Fig. 1

Temperature Derating Curve

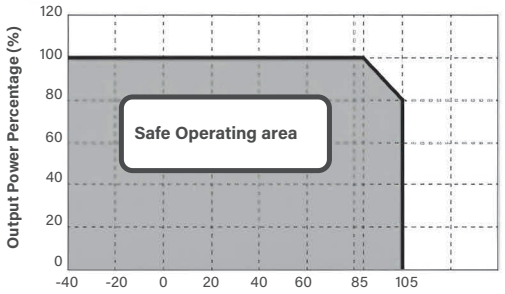


Fig. 2

Efficiency VS Input Voltage Curve (full load)

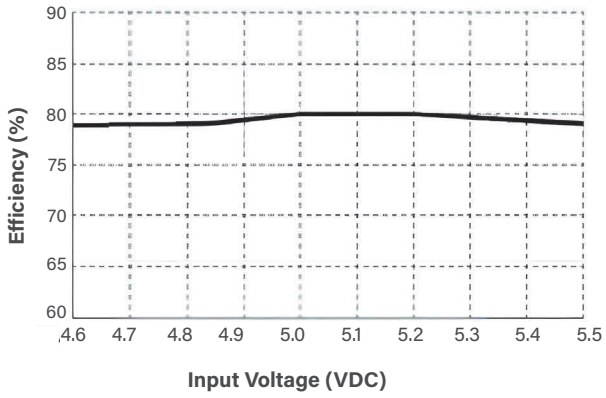


Fig. 3

Efficiency VS Output Load (V in=5V)

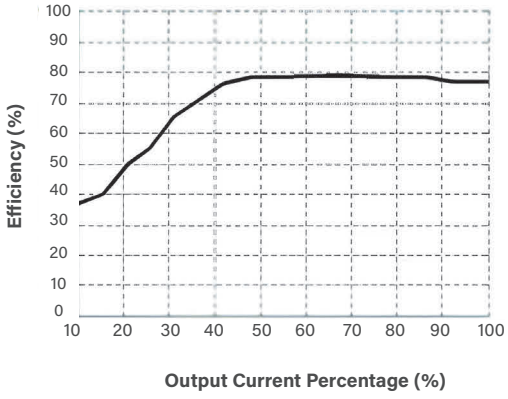


Fig. 4

Circuit Design and Application

Fig. 5

Recommended Capacitive Load Value Table

Vin (VDC)	Cin (μF)	Single output voltage Vo(VDC)	Cout (μF)	Double output voltage Vo(VDC)	Cout (μF)
5	4.7	3.3/5	10	±3.3/±5	4.7
12	2.2	9/12	2.2	±9/±12	1
15	2.2	15/24	1	±15/±24	0.47
24	1	--	--	--	--

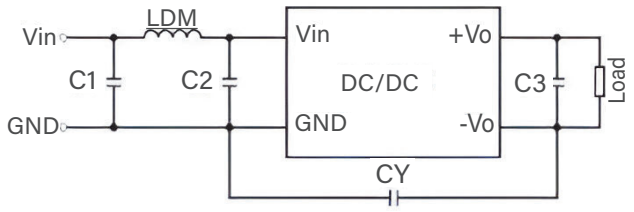


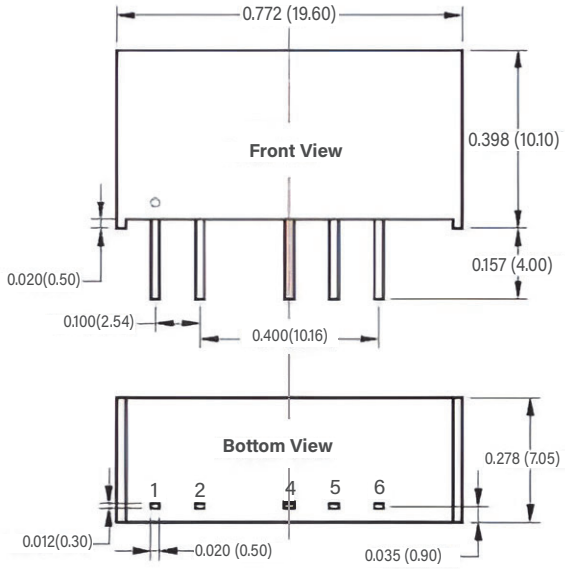
Fig. 6

EMI Recommended Parameter Table		
EMI	C1/C2	4.7μF/50V
	CY	1nF/2KV
	C3	REFER TO THE COUT PARAMETER IN FIGURE 5
	LDM	6.8μH

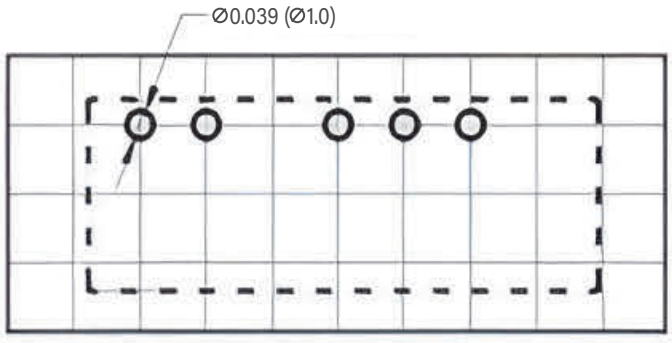
EMI Characteristics

Parameter		Standard	Criteria	Level
Radiated Emissions		CISPR32/EN 55032		Class B
Conducted Emissions		CISPR32/EN 55032		Class B
ESD	Single Output	EN 61000-4-2	B	±6 kV Contact
	Dual Output			±8 kV Contact

Mechanical Dimensions



PCB Layout



The grid distance is 2.54 x 2.54 mm

Pin Definition Table

Pin	Function Single	Function Dual
1	Vin	Vin
2	GND	GND
4	-Vo	-Vo
5	No Pin	COM
6	+Vo	+Vo

Note:

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