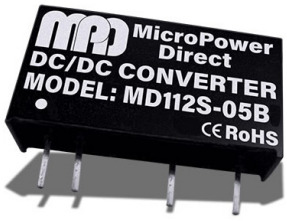
MD100B

1W, Single & Dual Output DC/DC Converters



Key Features:

- 1W Output Power
- Miniature SIP Case
- -40°C to +105°C Temp
- 3000VDC Isolation
- Efficiency to 89%
- Single & Dual Outputs
- Short Circuit Protection
- >3500 kHour MTBF
- 43 Standard Models
- Industry Standard Pin-Out

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, See Note 5	3.3 VDC Input	2.97	3.3	3.63	VDC
	5 VDC Input	4.5	5	5.5	
	12 VDC Input	10.8	12	13.2	
	15 VDC Input	13.5	15	16.5	
	24 VDC Input	21.6	24	26.4	
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		10		%
	5 VDC			8		
	9 VDC			8		
	12 VDC			7		
	15 VDC			6		
	24 VDC			6		
Ripple & Noise, See Note 2		20 MHz bandwidth		45	100	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	Full load, nominal input		220		kHz

Environmental

Parameter	Conditions	Min.	Typ	Max.	Units
Operating Temperature Range	See Fig. 1	-40		+105	°C
Storage Temperature Range		-55		+125	°C
Case Temperature Rise	Ta=25°C, nominal input and output		25		°C
Cooling	Free Air Convection				
Humidity, See Note 9	Non condensing			95	%RH

Physical

Case Size	0.77 x 0.24 x 0.40 in. (See Mechanical Diagrams on page 4)
Case Material	Back Plastic; flame-retardant and heat resistance (UL94V-0)
Weight	0.074 oz (2.1g) (See Mechanical Diagrams on page 4)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL-HDBK-217F@25°C	3500			kHours
Safety Standards	See Model Selection Guide				

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	
	12 VDC Input	-0.7		18	
	15 VDC Input	-0.7		21	
	24 VDC Input	-0.7		30	
Lead Temperature	1.5 mm from Case for 10 Sec.			300	°C

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Model Selection Guide

UL	Model Number	Input				Output			Full Load Efficiency (%, Typ)	Reflected Ripple Current (mA Typ)	Capacitive Load (µF Max) (See Note 8)	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							
	MD103S-03B	3.3	2.97 - 3.63	370	12	3.3	303	30	82	15	4000	750
	MD103S-05B	3.3	2.97 - 3.63	370	12	5.0	200	20	83	15	4000	750
	MD103S-09B	3.3	2.97 - 3.63	370	12	9.0	111	11	84	15	2000	750
	MD103S-12B	3.3	2.97 - 3.63	370	12	12.0	84	8	85	15	1000	750
	MD103D-12B	3.3	2.97 - 3.63	370	10	±12.0	±42	±4	85	15	560	750
	MD105S-03B	5	4.5 - 5.5	230	10	3.0	303	30	83	15	4000	500
	MD105S-05B	5	4.5 - 5.5	230	10	5.0	200	20	86	15	4000	500
	MD105S-09B	5	4.5 - 5.5	230	10	9.0	111	11	86	15	2000	500
▪	MD105S-12B	5	4.5 - 5.5	225	18	12.0	84	8	88	15	1000	500
▪	MD105S-15B	5	4.5 - 5.5	230	10	15.0	67	6	88	15	680	500
	MD105S-24B	5	4.5 - 5.5	230	10	24.0	42	4	89	15	560	500
	MD105D-03B	5	4.5 - 5.5	227	26	±3.3	±152	±15	84	15	2000	500
	MD105D-05B	5	4.5 - 5.5	230	12	±5.0	±100	±10	86	15	2000	500
	MD105D-09B	5	4.5 - 5.5	230	12	±9.0	±56	±5	86	15	1000	500
	MD105D-12B	5	4.5 - 5.5	230	12	±12.0	±42	±4	88	15	560	500
	MD105D-15B	5	4.5 - 5.5	230	12	±15.0	±34	±3	88	15	220	500
	MD105D-24B	5	4.5 - 5.5	227	26	±24.0	±21	±3	88	15	100	500
	MD112S-03B	12	10.8 – 13.2	99	7	3.3	303	30	84	15	4000	200
	MD112S-05B	12	10.8 – 13.2	99	7	5.0	200	20	86	15	4000	200
	MD112S-09B	12	10.8 – 13.2	99	7	9.0	111	11	87	15	2000	200
	MD112S-12B	12	10.8 – 13.2	99	7	12.0	84	8	87	15	1000	200
	MD112S-15B	12	10.8 – 13.2	99	7	15.0	67	6	88	15	680	200
	MD112S-24B	12	10.8 – 13.2	99	7	24.0	42	4	89	15	560	200
	MD112D-03B	12	10.8 – 13.2	99	7	±3.3	±152	±15	84	15	2000	200
	MD112D-05B	12	10.8 – 13.2	99	7	±5.0	±100	±10	86	15	2000	200
	MD112D-09B	12	10.8 – 13.2	99	7	±9.0	±56	±5	87	15	1000	200
	MD112D-12B	12	10.8 – 13.2	99	7	±12.0	±42	±4	87	15	560	200
	MD112D-15B	12	10.8 – 13.2	99	7	±15.0	±34	±3	88	15	220	200
	MD115S-05B	15	13.5 – 16.5	78	5	5.0	200	20	86	15	2400	175
	MD115S-09B	15	13.5 – 16.5	78	5	9.0	111	11	87	15	1000	175
	MD115S-12B	15	13.5 – 16.5	78	5	12.0	84	8	87	15	560	175
	MD115S-15B	15	13.5 – 16.5	78	5	15.0	67	6	88	15	560	175
	MD115D-05B	15	13.5 – 16.5	78	5	±5.0	±100	±10	86	15	2000	175
	MD115D-12B	15	13.5 – 16.5	78	5	±12.0	±42	±4	87	15	560	175
	MD115D-15B	15	13.5 – 16.5	78	5	±15.0	±34	±3	88	15	220	175
	MD124S-03B	24	21.6 – 26.4	51	3	3.3	303	30	84	15	2400	100
	MD124S-05B	24	21.6 – 26.4	51	3	5.0	200	20	87	15	2400	100
	MD124S-09B	24	21.6 – 26.4	51	3	9.0	111	11	88	15	1000	100
	MD124S-12B	24	21.6 – 26.4	51	3	12.0	84	8	88	15	560	100
	MD124S-15B	24	21.6 – 26.4	51	3	15.0	67	6	88	15	560	100
	MD124S-24B	24	21.6 – 26.4	51	3	24.0	42	4	89	15	220	100
	MD124D-05B	24	21.6 – 26.4	51	3	±5.0	±100	±10	87	15	2000	100
	MD124D-09B	24	21.6 – 26.4	51	3	±9.0	±56	±5	88	15	1000	100
	MD124D-12B	24	21.6 – 26.4	51	3	±12.0	±42	±4	88	15	560	100
	MD124D-15B	24	21.6 – 26.4	51	3	±15.0	±34	±3	88	15	220	100
	* MD105S-12B, -15B have UL/cUL 62368 recognition (UL certificate). Contact factory for safety standard status of other models.											

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. 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 6. 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.
3. For EMC typical recommended circuit, see Figure 6.
4. 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).
5. The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage.
6. 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.
7. Suggested dual output module load imbalance: ≤ ± 5%. If it exceeds ± 5%, it cannot be guaranteed that the product performance meets all performance indicators in this manual.
8. The maximum capacitive load is tested within the input voltage range and under full load conditions.
9. Unless otherwise specified, all indicators in this manual are measured at Ta=25 °C, humidity<75% RH, nominal input voltage, and output rated load.

Temperature Derating

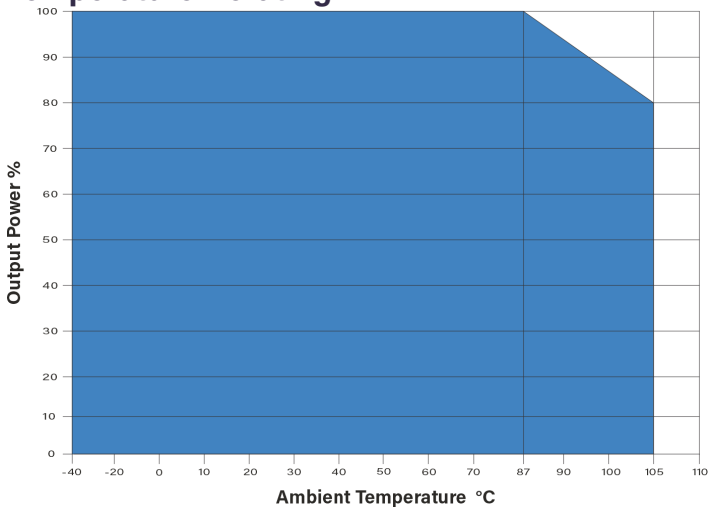


Fig. 1

Output Regulation

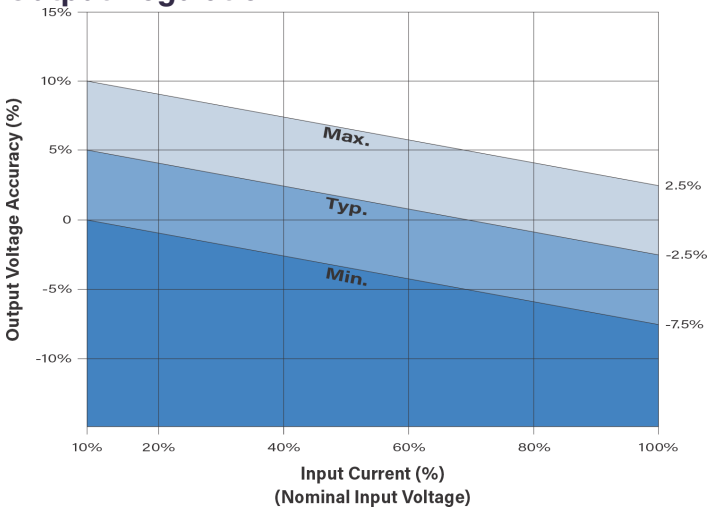


Fig. 2

Efficiency vs Input Voltage (Full Load)

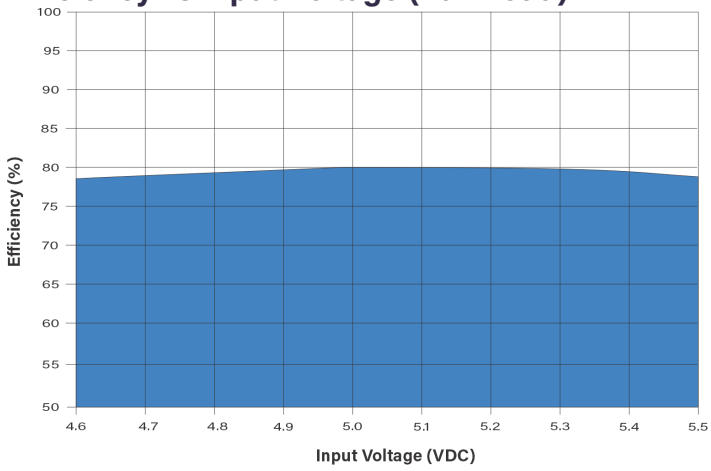


Fig. 3

Efficiency vs Output Load (5V Input)

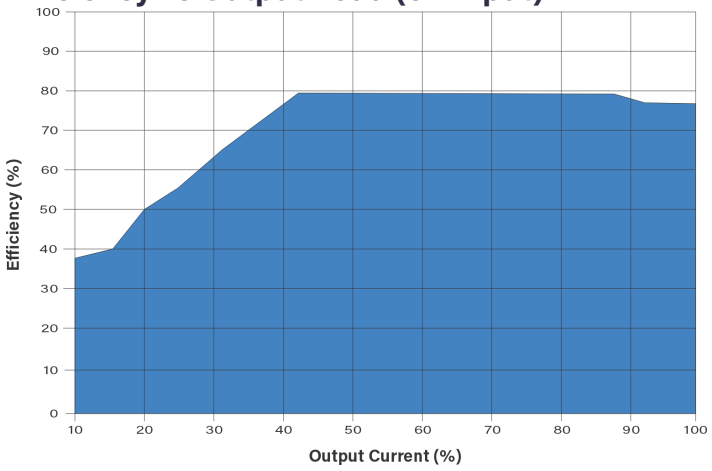


Fig. 4

Typical Application Circuit

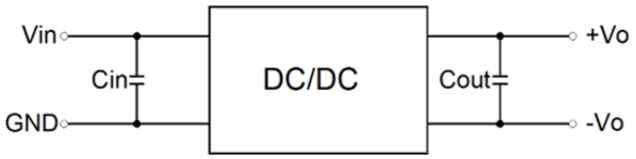


Fig. 5

Recommended Capacitive Load Values			
Vin	Cin	Vo	Cout (uF)
3.3/5 VDC	4.7uF/16V	3.3/5 VDC	10uF/16V
12 VDC	2.2uF/25V	9 VDC	4.7uF/16V
15 VDC	2.2uF/25V	12 VDC	2.2uF/25V
24 VDC	1uF/50V	15 VDC	1uF/25V
-	-	24 VDC	0.47uF/50V

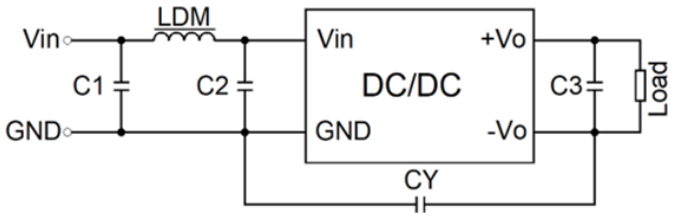


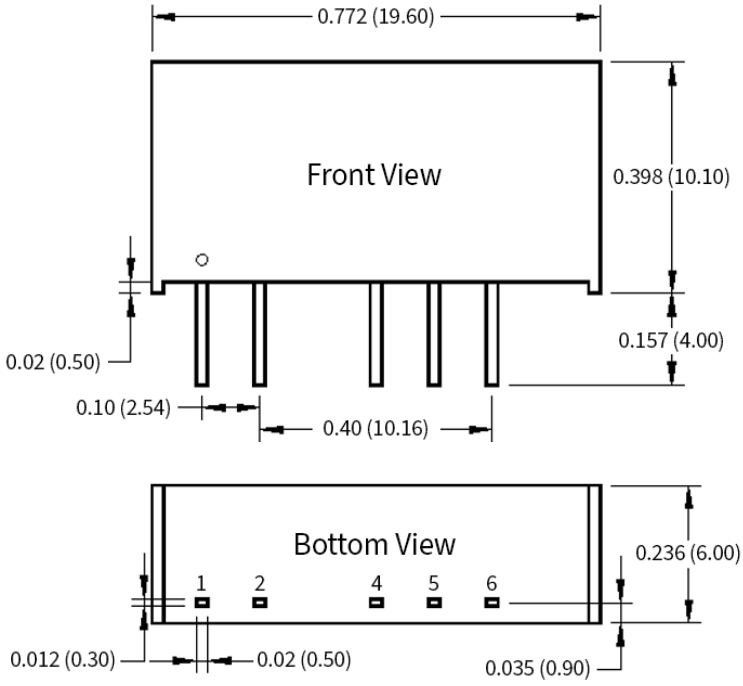
Fig. 6

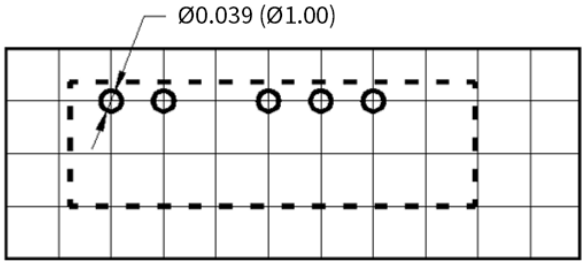
EMI Recommended Parameters	
C1	4.7uF/50V
C2	4.7uF/50V
C3	Refer to Cout in Fig. 5
CY	1000pF/2kV
LDM	6.8uH

EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	CISPR32/EN 55032		Class B (Fig. 6)
Conducted Emissions	CISPR32/EN 55032		Class B (Fig. 6)
ESD	EN 61000-4-2	B	±4 kV Contact
			±8 kV Air

Mechanical Dimensions





Grid distance is 2.54 x 2.54 mm

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

Notes:

- All dimensions are typical in inches (mm)
- Pin section tolerances: ±0.004 (±0.10)
- General tolerances: ±0.020 (±0.50)