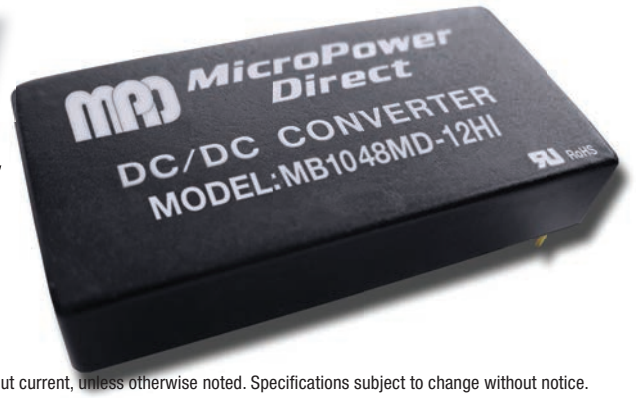
MB1000MHI

Medical Approved, 10W Compact 1 x 2 Inch DC/DC Converters



Key Features:

- 10W Output Power
- 4.2 kVAC rms Isolation
- Reinforced Insulation
- 10 µA Leakage Current Max
- Wide 2:1 Input Range
- Compact 1 x 2 In Case
- Single & Dual Outputs
- Meets EN55022
- 1.0 MH MTBF
- **EN 60950 Approved**
- **EN 60601 Approved**

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 Start Voltage	12 VDC Input	7.0	8.0	9.0	VDC
	24 VDC Input	13.0	15.0	18.0	
	48 VDC Input	30.0	33.0	36.0	
Under Voltage Shutdown	12 VDC Input			8.5	VDC
	24 VDC Input			16.0	
	48 VDC Input			34.0	
Input Filter	π (Pi) Filter (Complies with EN55022 Class A)				
Leakage Current	240 VAC, 60 Hz			10	µA
Short Circuit Input Power				3,000	mW

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy				±1.0	%
Output Voltage Balance	Dual Output , Balanced Loads		±0.5	±2.0	%
Line Regulation	V_{IN} = Min to Max		±0.3	±0.5	%
Load Regulation	I_{OUT} = 15% to 100%		±0.5	±1.0	%
	I_{OUT} = 5% to 100%		±0.6	±1.2	
Ripple & Noise (20 MHz), See Note 1	5V/5.1V Output		75	100	mV P - P
	All Other Outputs		100	150	
Output Power Protection		120	150		%
Transient Recovery Time, See Note 2	25% Load Step Change		300	600	µSec
Transient Response Deviation			±3.0	±5.0	%
Temperature Coefficient			±0.02	±0.05	%/°C
Output Short Circuit	Continuous (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, Rated	60 Seconds	4,200			VAC rms
Isolation Test Voltage	Flash Tested For 1 Sec	6,000			VPk
Reinforced Insulation Working Voltage		300			VAC
Isolation Resistance	500 VDC	10			GΩ
Isolation Capacitance	100 kHz, 1V		60	80	pF
Switching Frequency		120	150	180	kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40		+75	°C
Operating Temperature Range	Case			+95	°C
Storage Temperature Range		-50		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	2.00 x 1.00 x 0.47 Inches (50.8 x 25.4 x 12.0 mm)
Case Material	Non-Conductive Black Plastic (UL94-V0)
Weight	0.86 Oz (24.5g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.0			MHours
Safety Approvals	UL 60601, UL 60950, EN 60601, EN 60950				

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	12 VDC Input	-0.7		25.0	VDC
	24 VDC Input	-0.7		50.0	
	48 VDC Input	-0.7		100.0	
Lead Temperature	1.5 mm From Case For 10 Sec			260	°C
Internal Power Dissipation	All Models			4,000	mW

Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

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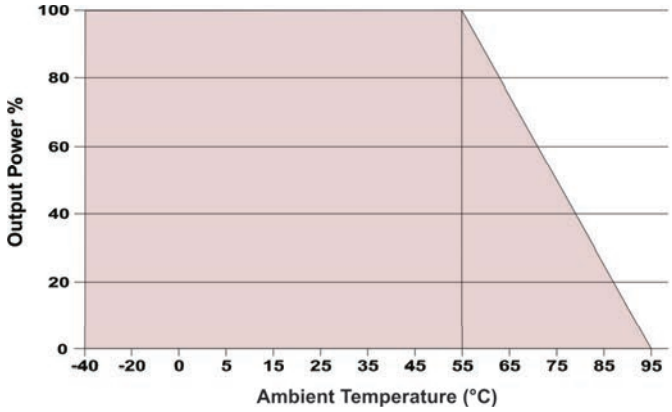
Model Selection Guide

Model Number	Input				Reflected Ripple Current (mA, Typ)	Output			Efficiency (%, Typ)	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							
MB1012MS-05HI	12	9.0 - 18.0	877	30	100	5.0	1,600	0.0	76	1,000	3,000
MB1012MS-051HI	12	9.0 - 18.0	907	30	100	5.1	1,600	0.0	75	1,000	3,000
MB1012MS-12HI	12	9.0 - 18.0	1,044	30	100	12.0	835	0.0	80	470	3,000
MB1012MD-12HI	12	9.0 - 18.0	1,042	30	100	±12.0	±417	0.0	80	220	3,000
MB1012MD-15HI	12	9.0 - 18.0	1,028	30	100	±15.0	±333	0.0	81	220	3,000
MB1024MS-05HI	24	18.0 - 36.0	541	20	50	5.0	1,600	0.0	77	1,000	1,500
MB1024MS-051HI	24	18.0 - 36.0	559	20	50	5.1	1,600	0.0	76	1,000	1,500
MB1024MS-12HI	24	18.0 - 36.0	516	20	50	12.0	835	0.0	81	470	1,500
MB1024MD-12HI	24	18.0 - 36.0	516	20	50	±12.0	±417	0.0	81	220	1,500
MB1024MD-15HI	24	18.0 - 36.0	508	20	50	±15.0	±333	0.0	82	220	1,500
MB1048MS-05HI	48	36.0 - 75.0	271	10	25	5.0	1,600	0.0	77	1,000	750
MB1048MS-051HI	48	36.0 - 75.0	280	10	25	5.1	1,600	0.0	76	1,000	750
MB1048MS-12HI	48	36.0 - 75.0	258	10	25	12.0	835	0.0	81	470	750
MB1048MD-12HI	48	36.0 - 75.0	258	10	25	±12.0	±417	0.0	81	220	750
MB1048MD-15HI	48	36.0 - 75.0	254	10	25	±15.0	±333	0.0	82	220	750

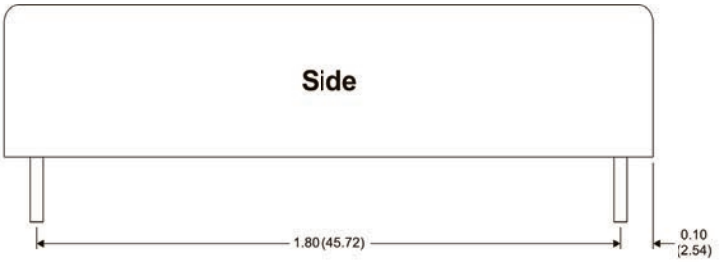
Notes:

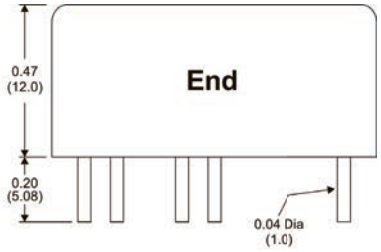
1. When measuring output ripple, it is recommended that an external 0.47 µF ceramic capacitor be placed from the +Vout pin to the -Vout pin for single output units and from each output to common for dual output units. For noise sensitive applications, the use of 3.3 µF capacitors will reduce the output ripple.
2. Transient recovery is measured to within a 1% error band for a load step change of 75% to 100%.
3. Dual output units may be connected to provide a 24 VDC or 30 VDC output. To do this, connect the load across the positive (+Vout) and negative (-Vout) outputs and float the output common.
4. 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 (ESR <1.0Ω at 100 kHz) capacitor be mounted close to the converter. For 12V input units a 10.0 µF is recommended, for 24V a 4.7 µF and for 48V units a 2.2 µF.
5. 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.

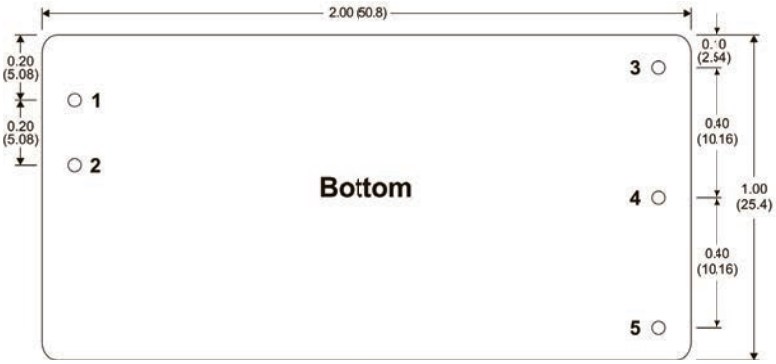
Derating Curve



Mechanical Dimensions







Pin Connections

Pin	Single	Dual
1	+Vin	+Vin
2	-Vin	-Vin
3	+Vout	+Vout
4	No Pin	Comm.
5	-Vout	-Vout

Mechanical Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.01 (±0.25)

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