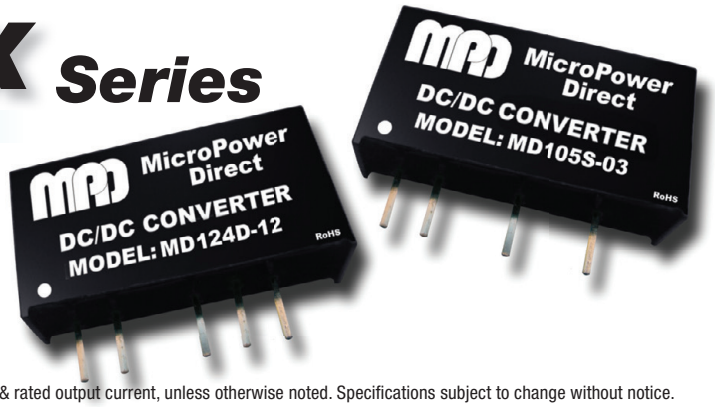
MD100x-xx Series

Isolated, 1W SIP, Single & Dual Output DC/DC Converters



Key Features:

- 1W Output Power
- 1 kV to 6kV Isolation
- 96 Standard Models
- Miniature SIP Case
- Efficiency to 86%
- -40°C to +85°C Operation
- Industry Standard Pin-Out
- Low Cost

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	5.0	5.5	
	12 VDC Input	10.8	12.0	13.2	
	15 VDC Input	13.5	15.0	16.5	
	24 VDC Input	21.6	24.0	26.4	
	48 VDC Input	43.2	48.0	52.8	
Input Filter	Capacitor Filter				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			±3.0		%
Line Regulation	For VIN Change of 1%		±1.2		%
Load Regulation	See Note 1		±10		%
Ripple & Noise (20 MHz)			75		mV P - P
Temperature Coefficient			±0.02		%/°C
Output Short Circuit	Momentary (0.5 Sec)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, 60 Sec	1xxx-xx Models	1,000			VDC
	1xxx-xxI Models	3,000			
	1xxx-xxI4 Models	4,000			
	1xxx-xxI5 Models	5,200			
	1xxx-xxI6 Models	6,000			
Isolation Resistance			1,000		MΩ
Isolation Capacitance			60		pF
Switching Frequency			80		kHz

EMI Characteristics

Parameter	Standard		Criteria	Level
Radiated Emissions		EN 55022		Class B
Conducted Emissions	See Note 3	EN 55022		Class B
ESD		EN 61000-4-2	A	±6 kV/±8kV
RS		EN 61000-4-3	A	10V/m
EFT	See Note 4	EN 61000-4-4	A	±2 kV
Surge	See Note 4	EN 61000-4-5	A	±2 kV
CS		EN 61000-4-6	A	10 Vrms
PFMF		EN 61000-4-8	A	1A/m

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
	Case			+100	
Storage Temperature Range		-40		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Diagram (Page 4)
Case Material	Non-Conductive Black Plastic (UL94-V0)
Weight	0.08 Oz (2.3g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	1.121			MHours

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (0.1 Sec)	3.3 VDC Input			6.0	VDC
	5 VDC Input			7.0	
	12 VDC Input			15.0	
	15 VDC Input			18.0	
	24 VDC Input			28.0	
	48 VDC Input			54.0	
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.

MicroPower Direct
292 Page Street
Suite D
Stoughton, MA 02072
USA

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

Model Selection Guide

Model Number	Input				Output			Efficiency (%, Typ)	Reflected Ripple Current (mA Pk-Pk)	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							
MD103S-03xx	3.3	2.97 - 3.63	399	28	3.3	303	0.0	76	20.0	220	1,000
MD103S-05xx	3.3	2.97 - 3.63	389	22	5.0	200	0.0	78	20.0	220	1,000
MD103S-07xx	3.3	2.97 - 3.63	389	25	7.2	139	0.0	78	20.0	220	1,000
MD103S-09xx	3.3	2.97 - 3.63	379	35	9.0	111	0.0	80	20.0	220	1,000
MD103S-12xx	3.3	2.97 - 3.63	394	30	12.0	83	0.0	77	20.0	220	1,000
MD103S-15xx	3.3	2.97 - 3.63	389	30	15.0	67	0.0	78	20.0	220	1,000
MD103S-18xx	3.3	2.97 - 3.63	415	30	18.0	56	0.0	73	20.0	220	1,000
MD103S-24xx	3.3	2.97 - 3.63	415	30	24.0	42	0.0	73	20.0	220	1,000
MD103D-03xx	3.3	2.97 - 3.63	459	30	±3.3	±152	±0.0	66	20.0	±100	1,000
MD103D-05xx	3.3	2.97 - 3.63	433	30	±5.0	±100	±0.0	70	20.0	±100	1,000
MD103D-07xx	3.3	2.97 - 3.63	421	30	±7.2	±69	±0.0	72	20.0	±100	1,000
MD103D-09xx	3.3	2.97 - 3.63	404	26	±9.0	±56	±0.0	75	20.0	±100	1,000
MD103D-12xx	3.3	2.97 - 3.63	384	30	±12.0	±42	±0.0	77	20.0	±100	1,000
MD103D-15xx	3.3	2.97 - 3.63	389	25	±15.0	±33	±0.0	78	20.0	±100	1,000
MD103D-18xx	3.3	2.97 - 3.63	404	25	±18.0	±28	±0.0	75	20.0	±100	1,000
MD103D-24xx	3.3	2.97 - 3.63	404	25	±24.0	±21	±0.0	75	20.0	±100	1,000
MD105S-03xx	5	4.5 - 5.5	256	15	3.3	303	0.0	78	20.0	220	500
MD105S-05xx	5	4.5 - 5.5	247	17	5.0	200	0.0	81	20.0	220	500
MD105S-07xx	5	4.5 - 5.5	247	16	7.2	139	0.0	81	20.0	220	500
MD105S-09xx	5	4.5 - 5.5	244	15	9.0	111	0.0	82	20.0	220	500
MD105S-12xx	5	4.5 - 5.5	253	17	12.0	83	0.0	79	20.0	220	500
MD105S-15xx	5	4.5 - 5.5	233	17	15.0	67	0.0	86	20.0	220	500
MD105S-18xx	5	4.5 - 5.5	241	16	18.0	56	0.0	83	20.0	220	500
MD105S-24xx	5	4.5 - 5.5	244	20	24.0	42	0.0	82	20.0	220	500
MD105D-03xx	5	4.5 - 5.5	299	20	±3.3	±152	±0.0	67	20.0	±100	500
MD105D-05xx	5	4.5 - 5.5	270	20	±5.0	±100	±0.0	74	20.0	±100	500
MD105D-07xx	5	4.5 - 5.5	253	15	±7.2	±69	±0.0	79	20.0	±100	500
MD105D-09xx	5	4.5 - 5.5	247	15	±9.0	±56	±0.0	81	20.0	±100	500
MD105D-12xx	5	4.5 - 5.5	250	20	±12.0	±42	±0.0	80	20.0	±100	500
MD105D-15xx	5	4.5 - 5.5	244	20	±15.0	±33	±0.0	82	20.0	±100	500
MD105D-18xx	5	4.5 - 5.5	247	22	±18.0	±28	±0.0	81	20.0	±100	500
MD105D-24xx	5	4.5 - 5.5	247	22	±24.0	±21	±0.0	81	20.0	±100	500
MD112S-03xx	12	10.8 - 13.2	111	12	3.3	303	0.0	75	20.0	220	300
MD112S-05xx	12	10.8 - 13.2	105	14	5.0	200	0.0	79	20.0	220	300
MD112S-07xx	12	10.8 - 13.2	111	14	7.2	139	0.0	75	20.0	220	300
MD112S-09xx	12	10.8 - 13.2	104	9	9.0	111	0.0	80	20.0	220	300
MD112S-12xx	12	10.8 - 13.2	105	13	12.0	83	0.0	79	20.0	220	300
MD112S-15xx	12	10.8 - 13.2	102	10	15.0	67	0.0	82	20.0	220	300
MD112S-18xx	12	10.8 - 13.2	103	11	18.0	56	0.0	81	20.0	220	300
MD112S-24xx	12	10.8 - 13.2	110	20	24.0	42	0.0	76	20.0	220	300
MD112D-03xx	12	10.8 - 13.2	123	13	±3.3	±152	±0.0	68	20.0	±100	300
MD112D-05xx	12	10.8 - 13.2	113	10	±5.0	±100	±0.0	74	20.0	±100	300
MD112D-07xx	12	10.8 - 13.2	110	10	±7.2	±69	±0.0	76	20.0	±100	300
MD112D-09xx	12	10.8 - 13.2	107	13	±9.0	±56	±0.0	78	20.0	±100	300
MD112D-12xx	12	10.8 - 13.2	102	10	±12.0	±42	±0.0	82	20.0	±100	300
MD112D-15xx	12	10.8 - 13.2	102	10	±15.0	±33	±0.0	82	20.0	±100	300
MD112D-18xx	12	10.8 - 13.2	102	10	±18.0	±28	±0.0	82	20.0	±100	300
MD112D-24xx	12	10.8 - 13.2	111	20	±24.0	±21	±0.0	75	20.0	±100	300
MD115S-03xx	15	13.5 - 16.5	83	10	3.3	303	0.0	80	20.0	220	200
MD115S-05xx	15	13.5 - 16.5	82	7	5.0	200	0.0	81	20.0	220	200
MD115S-07xx	15	13.5 - 16.5	85	10	7.2	139	0.0	78	20.0	220	200
MD115S-09xx	15	13.5 - 16.5	85	10	9.0	111	0.0	78	20.0	220	200
MD115S-12xx	15	13.5 - 16.5	83	8	12.0	83	0.0	80	20.0	220	200
MD115S-15xx	15	13.5 - 16.5	84	12	15.0	67	0.0	79	20.0	220	200
MD115S-18xx	15	13.5 - 16.5	83	10	18.0	56	0.0	80	20.0	220	200
MD115S-24xx	15	13.5 - 16.5	80	5	24.0	42	0.0	83	20.0	220	200
MD115D-03xx	15	13.5 - 16.5	89	20	±3.3	±152	±0.0	75	20.0	±100	200
MD115D-05xx	15	13.5 - 16.5	89	20	±5.0	±100	±0.0	75	20.0	±100	200
MD115D-07xx	15	13.5 - 16.5	89	18	±7.2	±69	±0.0	75	20.0	±100	200
MD115D-09xx	15	13.5 - 16.5	87	18	±9.0	±56	±0.0	77	20.0	±100	200
MD115D-12xx	15	13.5 - 16.5	87	20	±12.0	±42	±0.0	77	20.0	±100	200
MD115D-15xx	15	13.5 - 16.5	87	20	±15.0	±33	±0.0	77	20.0	±100	200
MD115D-18xx	15	13.5 - 16.5	89	15	±18.0	±28	±0.0	75	20.0	±100	200
MD115D-24xx	15	13.5 - 16.5	89	15	±24.0	±21	±0.0	75	20.0	±100	200

I/O Isolation

Models are available with input/output isolation levels ranging from 1 kVDC to 6 kVDC. To order units with higher isolation levels an "Ix" is added to the Model number, as shown in the table at right.

Model No	Isolation Level
MD1xxx-xx	1 kVDC
MD1xxx-xxI	3 kVDC
MD1xxx-xxI4	4 kVDC
MD1xxx-xxI5	5.2 kVDC
MD1xxx-xxI6	6 kVDC

292 Page Street Ste D Stoughton, MA 02072 • TEL: (781) 344-8226 • FAX: (781) 344-8481 • E-Mail: sales@micropowerdirect.com

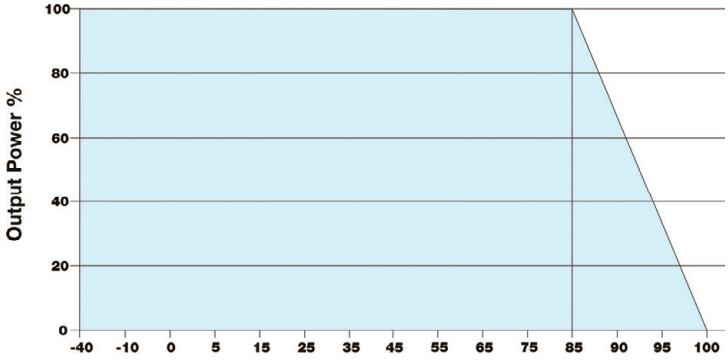
Model Selection Guide

Model Number	Input				Output			Efficiency (%, Typ)	Reflected Ripple Current (mA Pk-Pk)	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							
MD124S-03xx	24	21.6 - 26.4	56	8	3.3	303	0.0	74	20.0	220	100
MD124S-05xx	24	21.6 - 26.4	54	6	5.0	200	0.0	77	20.0	220	100
MD124S-07xx	24	21.6 - 26.4	57	6	7.2	139	0.0	73	20.0	220	100
MD124S-09xx	24	21.6 - 26.4	55	6	9.0	111	0.0	76	20.0	220	100
MD124S-12xx	24	21.6 - 26.4	53	6	12.0	83	0.0	78	20.0	220	100
MD124S-15xx	24	21.6 - 26.4	52	5	15.0	67	0.0	80	20.0	220	100
MD124S-18xx	24	21.6 - 26.4	51	5	18.0	56	0.0	82	20.0	220	100
MD124S-24xx	24	21.6 - 26.4	52	8	24.0	42	0.0	80	20.0	220	100
MD124D-03xx	24	21.6 - 26.4	62	7	±3.3	±152	±0.0	67	20.0	±100	100
MD124D-05xx	24	21.6 - 26.4	56	6	±5.0	±100	±0.0	74	20.0	±100	100
MD124D-07xx	24	21.6 - 26.4	53	7	±7.2	±69	±0.0	78	20.0	±100	100
MD124D-09xx	24	21.6 - 26.4	53	7	±9.0	±56	±0.0	78	20.0	±100	100
MD124D-12xx	24	21.6 - 26.4	52	6	±12.0	±42	±0.0	80	20.0	±100	100
MD124D-15xx	24	21.6 - 26.4	52	8	±15.0	±33	±0.0	80	20.0	±100	100
MD124D-18xx	24	21.6 - 26.4	51	6	±18.0	±28	±0.0	81	20.0	±100	100
MD124D-24xx	24	21.6 - 26.4	51	8	±24.0	±21	±0.0	82	20.0	±100	100
MD148S-03xx	48	43.2 - 52.8	29	5	3.3	303	0.0	73	20.0	220	75
MD148S-05xx	48	43.2 - 52.8	29	5	5.0	200	0.0	73	20.0	220	75
MD148S-07xx	48	43.2 - 52.8	28	5	7.2	139	0.0	75	20.0	220	75
MD148S-09xx	48	43.2 - 52.8	27	5	9.0	111	0.0	76	20.0	220	75
MD148S-12xx	48	43.2 - 52.8	27	5	12.0	83	0.0	76	20.0	220	75
MD148S-15xx	48	43.2 - 52.8	27	5	15.0	67	0.0	77	20.0	220	75
MD148S-18xx	48	43.2 - 52.8	28	5	18.0	56	0.0	75	20.0	220	75
MD148S-24xx	48	43.2 - 52.8	27	6	24.0	42	0.0	76	20.0	220	75
MD148D-03xx	48	43.2 - 52.8	34	6	±3.3	±152	±0.0	62	20.0	±100	75
MD148D-05xx	48	43.2 - 52.8	31	5	±5.0	±100	±0.0	68	20.0	±100	75
MD148D-07xx	48	43.2 - 52.8	29	5	±7.2	±69	±0.0	72	20.0	±100	75
MD148D-09xx	48	43.2 - 52.8	29	5	±9.0	±56	±0.0	73	20.0	±100	75
MD148D-12xx	48	43.2 - 52.8	28	6	±12.0	±42	±0.0	74	20.0	±100	75
MD148D-15xx	48	43.2 - 52.8	27	5	±15.0	±33	±0.0	77	20.0	±100	75
MD148D-18xx	48	43.2 - 52.8	28	5	±18.0	±28	±0.0	75	20.0	±100	75
MD148D-24xx	48	43.2 - 52.8	28	6	±24.0	±21	±0.0	74	20.0	±100	75

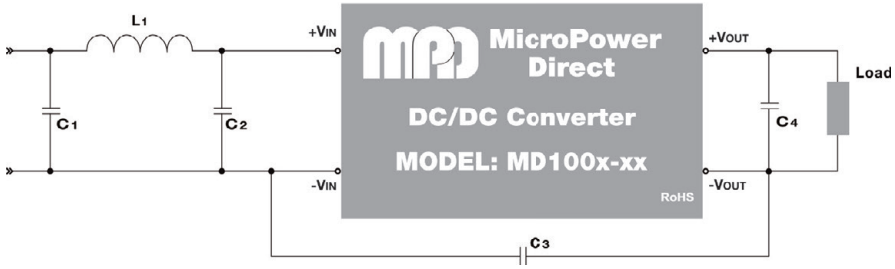
Notes:

1. Load regulation is measured over a range of 20% I_{OUT} to 100% I_{OUT}. Load regulation for 3.3 VDC output models is specified at ±20% typical.
2. Operation at no-load will not damage the unit, but they may not meet all specifications.
3. With the addition of input filter components, all models will meet EN 55022 class B. A suggested circuit is shown in the connection diagram below. Contact the factory for more information.
4. To meet the requirements of EN 61000-4-4 and EN 61000-4-5, external components are needed. The diagram below shows a typical connection. Contact the factory for more information.
5. It is recommended that a fuse be used on the input of a power supply for protection. See the Model Selection tables for the correct rating.

Derating Curve



Typical Connection



For applications that require meeting EMC standards, the diagram above illustrates a typical connection of the **MD100x-xx** series. The units do not require external components to operate as specified. All components should be mounted as close to the unit as possible.

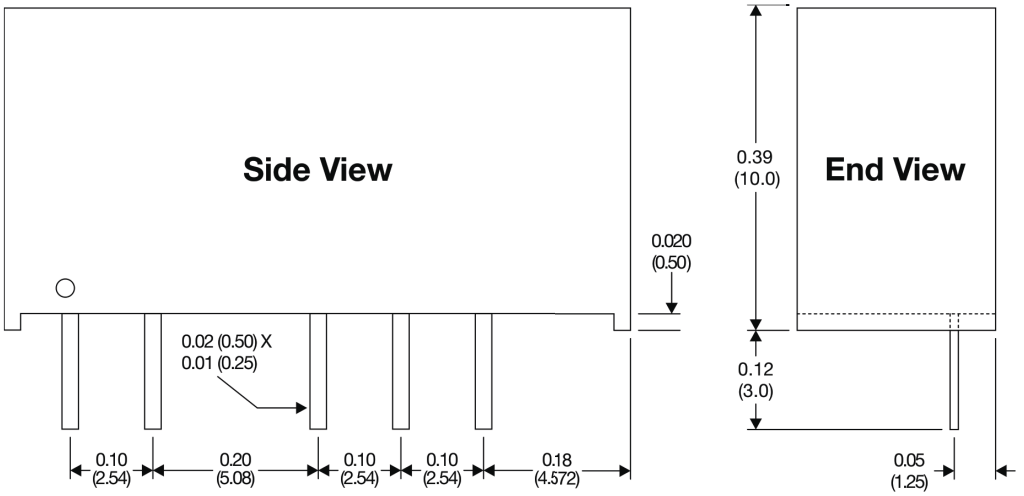
The voltage rating on capacitor C_3 needs to be greater than the isolation voltage rating of the unit. To meet the requirements of EN 61000-4-4 and EN 61000-4-5, the value of capacitor C_1 should be changed to 470 µF/100V.

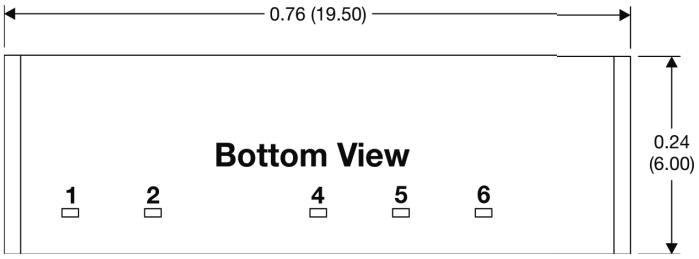
Capacitor C_4 is not required to meet specifications, but may be used if a lower level of output ripple is required.

Recommended values for components are:

Component	C_1	L_1	C_2	C_3	C_4
MD103x-xxxx	2.2 µF/100V	18 µH			10 µF
MD105x-xxxx	2.2 µF/100V	18 µH			10 µF
MD112x-xxxx	2.2 µF/100V	18 µH			10 µF
MD115x-xxxx	2.2 µF/100V	18 µH			10 µF
MD124x-xxxx	2.2 µF/100V	18 µH	1210, 2.2 µF/100V	1206, 470 pF/2kV	10 µF
MD148x-xxxx	2.2 µF/100V	18 µH	1210, 2.2 µF/100V	1206, 470 pF/2kV	10 µF

Mechanical Dimensions, MD100X-xx Models





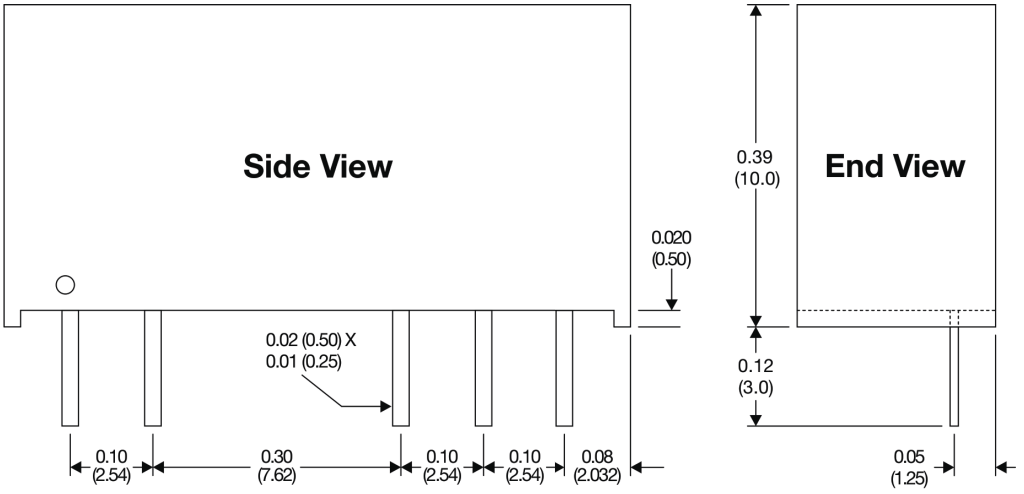
The width of 48 VDC input units is 0.28 (7.20). All other dimensions remain the same.

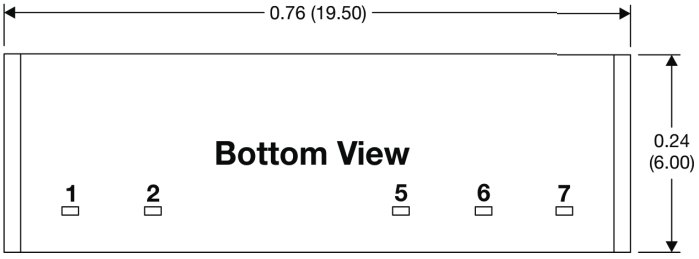
Pin Connections

Pin	Single Output
1	+VIN
2	-VIN
4	-VOUT
5	No Pin
6	+VOUT

Pin	Dual Output
1	+VIN
2	-VIN
4	-VOUT
5	Common
6	+VOUT

Mechanical Dimensions, MD100X-xxIx Models





The width of 48 VDC input units is 0.28 (7.20). All other dimensions remain the same.

Pin Connections

Pin	Single Output
1	+VIN
2	-VIN
5	-VOUT
6	No Pin
7	+VOUT

Pin	Dual Output
1	+VIN
2	-VIN
5	-VOUT
6	Common
7	+VOUT

Notes:

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.02 (±0.5)
- Pin 1 is marked by a "dot" or indentation on the unit

MicroPower Direct
We Power Your Success - For Less!
292 Page Street Ste D Stoughton, MA 02072 • TEL: (781) 344-8226 • FAX: (781) 344-8481 • E-Mail: sales@micropowerdirect.com