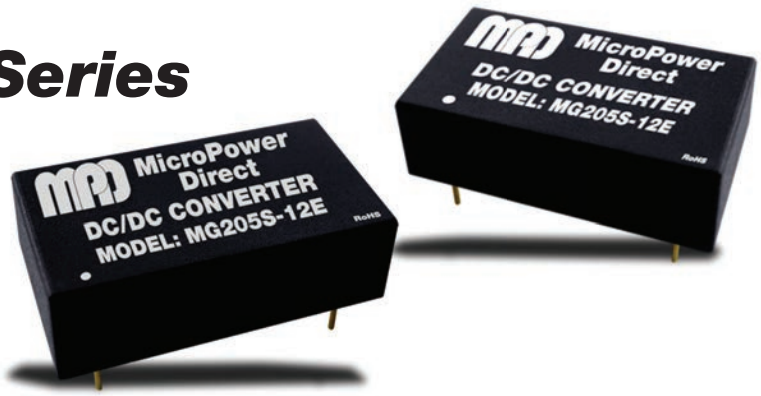
MG200xE Series

Low Cost, 2W Single & Dual Output DC/DC Converters



Key Features:

- 2W Output Power
- Compact DIP Case
- EN 60950 Approved
- 1,500 VDC Isolation
- Single and Dual Outputs
- >3.5 MHour MTBF
- -40°C to +85°C Operation
- LOW COST

3.0 kV Isolation Models Available

RoHS

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

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	4.50	5.0	5.50	
	12 VDC Input	10.80	12.0	13.20	
	24 VDC Input	21.60	24.0	26.40	
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy	See Tolerance Envelope Graphs on Page 3				
Line Regulation	For VIN Change of 1%			±1.2	%
Load Regulation, See Note 2	See Model Selection Guide				
Ripple & Noise (20 MHz)	See Note 3		75	200	mV P - P
Temperature Coefficient				±0.03	%/°C
Output Short Circuit		Momentary (1.0 Sec.)			

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage	60 Seconds	1,500			VDC
Isolation Resistance	500 VDC	1,000			MΩ
Isolation Capacitance, See Note 4	100 kHz, 0.1V		20		pF
Switching Frequency			100		kHz

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-40	+25	+85	°C
Storage Temperature Range		-55		+125	°C
Cooling	Free Air Convection				
Humidity	RH, Non-condensing			95	%

Physical

Case Size	See Mechanical Dimensions (Page 4)
Case Material	Non-Conductive Black Plastic (UL-94V0)
Weight	0.093 Oz (2.8g)

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	3.5			MHours
Safety Approvals	UL/cUL 60950-1 recognition (UL certificate)				

Absolute Maximum Ratings

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Surge (1 Sec)	5 VDC Input			9.0	VDC
	12 VDC Input			18.0	
	24 VDC Input			30.0	
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.

Model Selection Guide

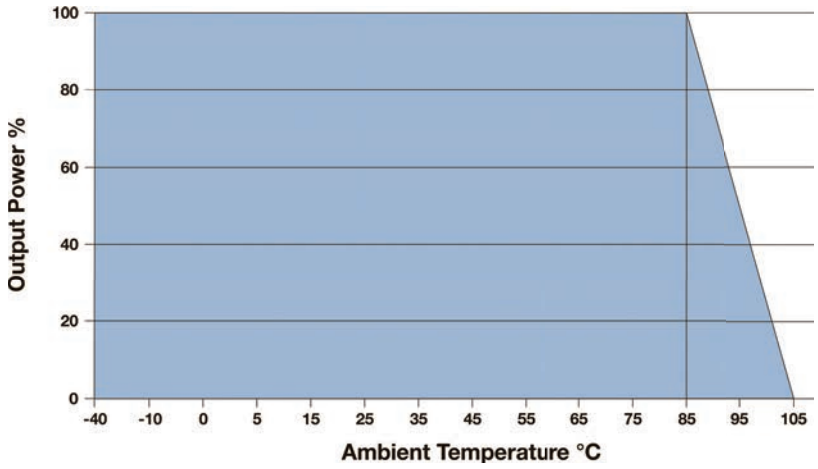
Model Number	Input				Output			Load Regulation	Output Capacitive Load	Efficiency	Fuse Rating Slow-Blow
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)		(µF Max)	(%, Typ)	(mA)
	Nominal	Range	Full-Load	No-Load				% Typ.			
MG205S-05E	5	4.5 - 5.5	500	35	5.0	400	40.0	12.0	220	80	1,000
MG205S-09E	5	4.5 - 5.5	476	35	9.0	222	22.0	9.0	220	84	1,000
MG205S-12E	5	4.5 - 5.5	476	35	12.0	167	17.0	8.0	220	84	1,000
MG205S-15E	5	4.5 - 5.5	476	35	15.0	133	13.0	7.0	220	84	1,000
MG205S-24E	5	4.5 - 5.5	476	35	24.0	83	8.0	6.0	220	83	1,000
MG205D-05E	5	4.5 - 5.5	500	35	±5.0	±200	±20.0	12.0	100	80	1,000
MG205D-09E	5	4.5 - 5.5	482	35	±9.0	±111	±11.0	9.0	100	83	1,000
MG205D-12E	5	4.5 - 5.5	476	35	±12.0	±83	±8.0	8.0	100	84	1,000
MG205D-15E	5	4.5 - 5.5	476	35	±15.0	±67	±7.0	7.0	100	84	1,000
MG205D-24E	5	4.5 - 5.5	476	35	±24.0	±42	±4.0	6.0	100	84	1,000
MG212S-05E	12	10.8 - 13.2	208	20	5.0	400	40.0	12.0	220	80	500
MG212S-09E	12	10.8 - 13.2	200	20	9.0	222	22.0	9.0	220	83	500
MG212S-12E	12	10.8 - 13.2	203	20	12.0	167	17.0	8.0	220	82	500
MG212S-15E	12	10.8 - 13.2	198	20	15.0	133	13.0	7.0	220	84	500
MG212S-24E	12	10.8 - 13.2	198	20	24.0	83	8.0	6.0	220	84	500
MG212D-05E	12	10.8 - 13.2	208	20	±5.0	±200	±20.0	12.0	100	80	500
MG212D-09E	12	10.8 - 13.2	198	20	±9.0	±111	±11.0	9.0	100	84	500
MG212D-12E	12	10.8 - 13.2	200	20	±12.0	±83	±8.0	8.0	100	83	500
MG212D-15E	12	10.8 - 13.2	198	20	±15.0	±67	±7.0	7.0	100	84	500
MG212D-24E	12	10.8 - 13.2	198	20	±24.0	±42	±4.0	6.0	100	84	500
MG224S-05E	24	21.6 - 26.4	105	10	5.0	400	40.0	12.0	220	79	250
MG224S-09E	24	21.6 - 26.4	98	10	9.0	222	22.0	9.0	220	85	250
MG224S-12E	24	21.6 - 26.4	100	10	12.0	167	17.0	8.0	220	83	250
MG224S-15E	24	21.6 - 26.4	99	10	15.0	133	13.0	7.0	220	84	250
MG224S-24E	24	21.6 - 26.4	99	10	24.0	83	8.0	6.0	220	84	250
MG224D-05E	24	21.6 - 26.4	105	10	±5.0	±200	±20.0	12.0	100	79	250
MG224D-09E	24	21.6 - 26.4	99	10	±9.0	±111	±11.0	9.0	100	84	250
MG224D-12E	24	21.6 - 26.4	100	10	±12.0	±83	±8.0	8.0	100	83	250
MG224D-15E	24	21.6 - 26.4	99	10	±15.0	±67	±7.0	7.0	100	84	250
MG224D-24E	24	21.6 - 26.4	99	10	±24.0	±42	±4.0	6.0	100	84	250

Models may be available with inputs of 3.3 VDC, 9 VDC or 15 VDC. Contact the factory for more information.

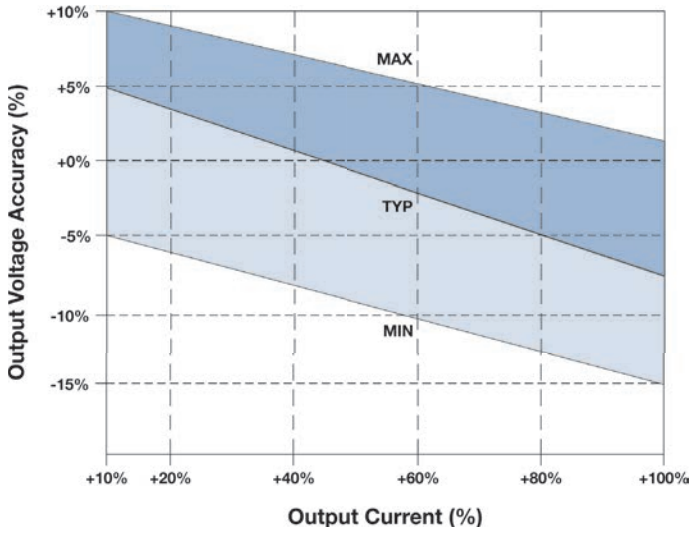
Notes:

1. Output capacitive load is specified for each output
2. Output load regulation is specified for a load change of 10% to 100%.
3. When measuring output ripple, it is recommended that an external 1 µF ceramic capacitor & 10 µF electrolytic capacitor be placed in parallel from the +Vout pin to the -Vout pin for single output models, or from each output to common for dual output models.
4. The isolation capacitance for 24 VIN models is 50 pF.
5. Operation at no load will not damage these units, however, they may not meet all specifications.
6. These converters are specified for operation without external components. However, in some applications the addition of input/output capacitors will enhance stability and reduce output ripple. See the EMI Connection information on page 4.
7. 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.

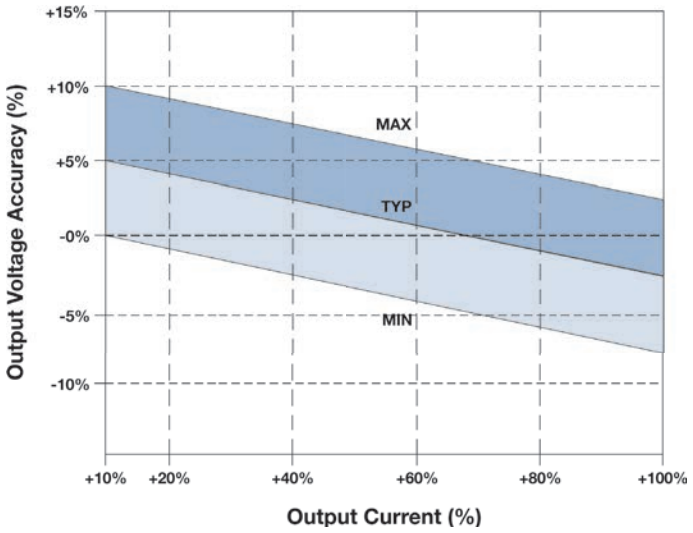
Derating Curve



Tolerance Envelope, 3.3 VDC Output Models

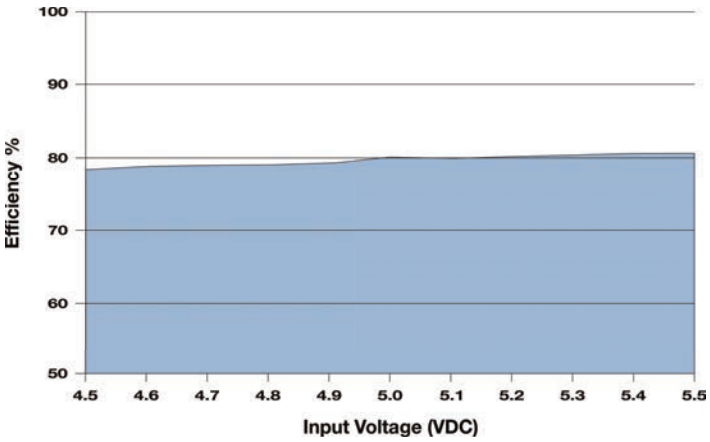


Tolerance Envelope, All Other Models

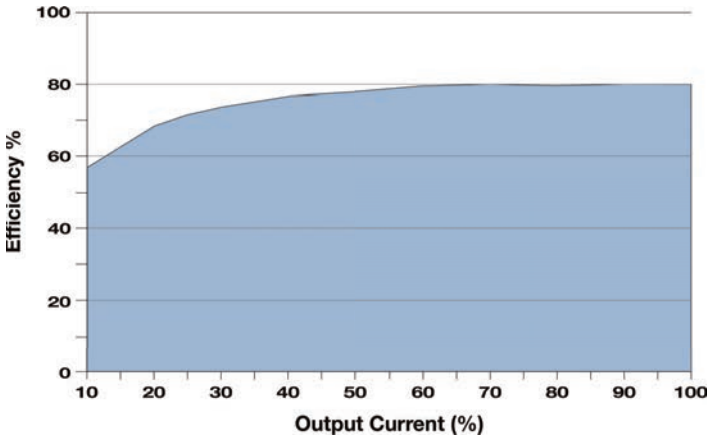


Tolerance envelope is plotted with the unit at nominal input.

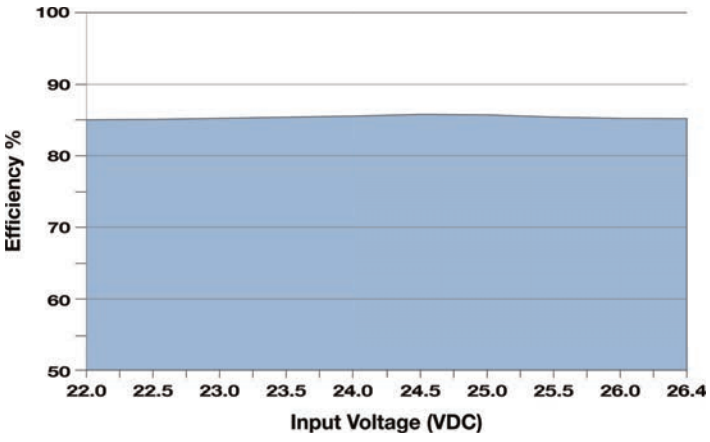
Typical Efficiency vs Input, MG205S-05E



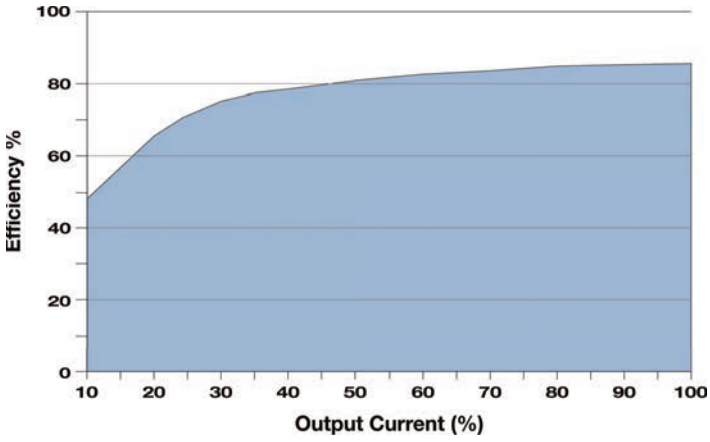
Typical Efficiency vs Input, MG205S-05E



Typical Efficiency vs Output, MG224S-15E



Typical Efficiency vs Output, MG224S-15E



Efficiency vs input is plotted with the unit at full load. Efficiency vs output is plotted with the unit at nominal input.

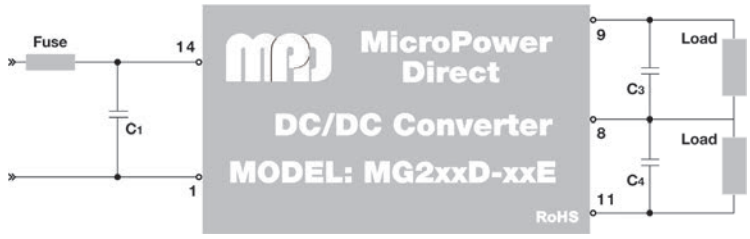
EMC Specifications

Simple Connection, Dual Output Models

The MG200E series is specified for operation without external components. However, in some applications the addition of input & output capacitors (as shown in the simple connection diagram at right) will enhance stability and reduce output ripple. For these applications, the suggested capacitor values are given in table 1.

Table: 1

VIN	C1	VOUT	C3	VOUT	C3 / C4
5 VDC	4.7 µF/50V	5 VDC	10 µF	±5 VDC	4.7 µF
12 VDC	2.2 µF/50V	9 VDC	4.7 µF	±9 VDC	2.2 µF
24 VDC	1.0 µF/50V	12 VDC	2.2 µF	±12 VDC	1.0 µF
		15 VDC	1.0 µF	±15 VDC	0.47 µF
		24 VDC	1.0 µF	±24 VDC	0.47 µF



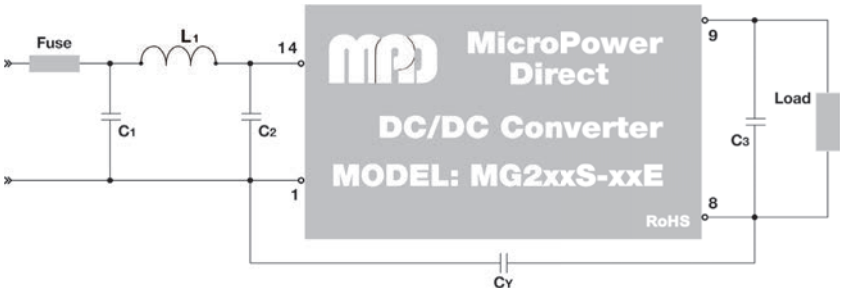
EMC Connection, Single Output Models

For applications that require meeting EMC standards, the diagram at right shows a connection that should meet the standards listed below. For these applications, the suggested component values are given in table 2.

Table: 2

VIN	C1	L1	C2
5 VDC	4.7 µF/50V	6.8 µH	10 µF
12 VDC	2.2 µF/50V	9 VDC	4.7 µF
24 VDC	1.0 µF/50V	12 VDC	2.2 µF

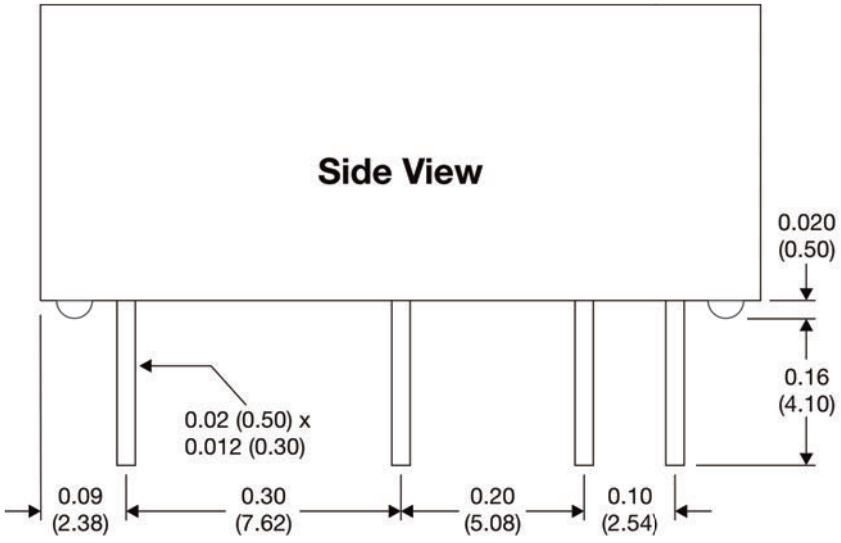
The capacitor CY is only required for 24 VIN models. The suggested value is 1nF/2 kV. The sugested value for output capacitors is the same as that shown in Table 1.

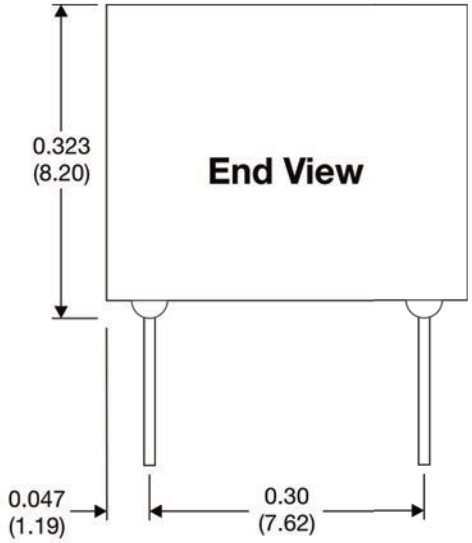


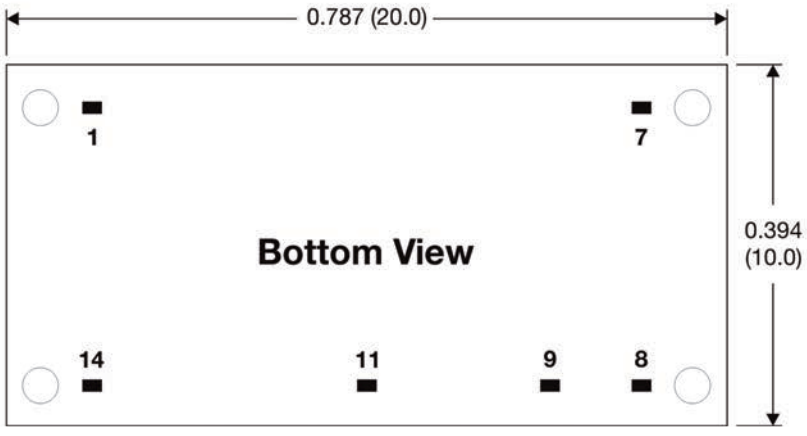
EMI Characteristics

Parameter	Standard	Criteria	Level
Radiated Emissions	EN 55022		Class B
Conducted Emissions	EN 55022		Class B
ESD, Single Output	EN 61000-4-2	A	±8 kV Contsct
ESD, Dual Output	EN 61000-4-2	A	±6 kV Contsct

Mechanical Dimensions







Pin Connections

Pin	Single	Dual
1	-VIN	-VIN
7	NC	NC
8	-VOUT	Common
9	+VOUT	+VOUT
11	No Pin	-VOUT
14	+VIN	+VIN

NC = No Connection

Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = ±0.02 (±0.50)
- Pin 1 is marked by a "dot" or indentation on the unit