

# MG200x-XX Series

## Miniature, 2W DIP, Single & Dual Output DC/DC Converters



### Key Features:

- 2W Output Power
- 1 kV to 6kV Isolation
- 80 Standard Models
- Miniature DIP Case
- High Efficiency
- -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		
	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 V <sub>IN</sub> 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	2xxx-xx Models	1,000			VDC	
	2xxx-xxl Models	3,000				
	2xxx-xxl4 Models	4,000				
	2xxx-xxl5 Models	5,200				
	2xxx-xxl6 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	0.09 Oz (2.6g)					
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		
	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@micropowerelectronics.com  
W: www.micropowerelectronics.com



www.micropowerelectronics.com

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							
MG203S-03xx	3.3	2.97 - 3.63	808	26	3.3	400.0	0.0	75	20.0	470	2,000
MG203S-05xx	3.3	2.97 - 3.63	819	40	5.0	400.0	0.0	74	20.0	470	2,000
MG103S-07xx	3.3	2.97 - 3.63	808	40	7.2	277.7	0.0	75	20.0	470	2,000
MG103S-09xx	3.3	2.97 - 3.63	808	45	9.0	222.2	0.0	75	20.0	470	2,000
MG103S-12xx	3.3	2.97 - 3.63	767	50	12.0	166.7	0.0	79	20.0	470	2,000
MG103S-15xx	3.3	2.97 - 3.63	767	47	15.0	133.3	0.0	79	20.0	470	2,000
MG103S-18xx	3.3	2.97 - 3.63	787	50	18.0	111.1	0.0	77	20.0	470	2,000
MG103S-24xx	3.3	2.97 - 3.63	797	47	24.0	83.3	0.0	76	20.0	470	2,000
MG203D-03xx	3.3	2.97 - 3.63	808	25	±3.3	±200.0	±0.0	75	20.0	220	2,000
MG203D-05xx	3.3	2.97 - 3.63	808	45	±5.0	±200.0	±0.0	75	20.0	220	2,000
MG203D-07xx	3.3	2.97 - 3.63	797	40	±7.2	±138.8	±0.0	76	20.0	220	2,000
MG203D-09xx	3.3	2.97 - 3.63	797	40	±9.0	±111.1	±0.0	76	20.0	220	2,000
MG203D-12xx	3.3	2.97 - 3.63	777	45	±12.0	±83.3	±0.0	78	20.0	220	2,000
MG203D-15xx	3.3	2.97 - 3.63	777	45	±15.0	±66.6	±0.0	78	20.0	220	2,000
MG203D-18xx	3.3	2.97 - 3.63	777	45	±18.0	±55.5	±0.0	78	20.0	220	2,000
MG203D-24xx	3.3	2.97 - 3.63	777	45	±24.0	±41.6	±0.0	79	20.0	220	2,000
MG205S-03xx	5	4.5 - 5.5	367	30	3.3	400.0	0.0	72	20.0	470	1,000
MG205S-05xx	5	4.5 - 5.5	512	30	5.0	400.0	0.0	78	20.0	470	1,000
MG205S-07xx	5	4.5 - 5.5	500	30	7.2	277.7	0.0	80	20.0	470	1,000
MG205S-09xx	5	4.5 - 5.5	500	30	9.0	222.2	0.0	80	20.0	470	1,000
MG205S-12xx	5	4.5 - 5.5	487	30	12.0	166.7	0.0	82	20.0	470	1,000
MG205S-15xx	5	4.5 - 5.5	487	30	15.0	133.3	0.0	82	20.0	470	1,000
MG205S-18xx	5	4.5 - 5.5	487	30	18.0	111.1	0.0	82	20.0	470	1,000
MG205S-24xx	5	4.5 - 5.5	487	30	24.0	83.3	0.0	82	20.0	470	1,000
MG205D-03xx	5	4.5 - 5.5	406	30	±3.3	±200.0	±0.0	65	20.0	220	1,000
MG205D-05xx	5	4.5 - 5.5	555	30	±5.0	±200.0	±0.0	72	20.0	220	1,000
MG205D-07xx	5	4.5 - 5.5	555	30	±7.2	±138.8	±0.0	72	20.0	220	1,000
MG205D-09xx	5	4.5 - 5.5	519	30	±9.0	±111.1	±0.0	77	20.0	220	1,000
MG205D-12xx	5	4.5 - 5.5	512	30	±12.0	±83.3	±0.0	78	20.0	220	1,000
MG205D-15xx	5	4.5 - 5.5	500	30	±15.0	±66.6	±0.0	80	20.0	220	1,000
MG205D-18xx	5	4.5 - 5.5	500	30	±18.0	±55.5	±0.0	80	20.0	220	1,000
MG205D-24xx	5	4.5 - 5.5	500	30	±24.0	±41.6	±0.0	80	20.0	220	1,000
MG212S-03xx	12	10.8 - 13.2	152	20	3.3	400.0	0.0	72	20.0	470	600
MG212S-05xx	12	10.8 - 13.2	216	20	5.0	400.0	0.0	77	20.0	470	600
MG212S-07xx	12	10.8 - 13.2	208	20	7.2	277.7	0.0	80	20.0	470	600
MG212S-09xx	12	10.8 - 13.2	208	20	9.0	222.2	0.0	80	20.0	470	600
MG212S-12xx	12	10.8 - 13.2	208	20	12.0	166.7	0.0	80	20.0	470	600
MG212S-15xx	12	10.8 - 13.2	208	20	15.0	133.3	0.0	80	20.0	470	600
MG212S-18xx	12	10.8 - 13.2	208	20	18.0	111.1	0.0	80	20.0	470	600
MG212S-24xx	12	10.8 - 13.2	208	20	24.0	83.3	0.0	80	20.0	470	600
MG212D-03xx	12	10.8 - 13.2	164	20	±3.3	±200.0	±0.0	67	20.0	220	600
MG212D-05xx	12	10.8 - 13.2	222	20	±5.0	±200.0	±0.0	75	20.0	220	600
MG212D-07xx	12	10.8 - 13.2	219	20	±7.2	±138.8	±0.0	76	20.0	220	600
MG212D-09xx	12	10.8 - 13.2	216	20	±9.0	±111.1	±0.0	77	20.0	220	600
MG212D-12xx	12	10.8 - 13.2	203	20	±12.0	±83.3	±0.0	82	20.0	220	600
MG212D-15xx	12	10.8 - 13.2	203	20	±15.0	±66.6	±0.0	82	20.0	220	600
MG212D-18xx	12	10.8 - 13.2	203	20	±18.0	±55.5	±0.0	82	20.0	220	600
MG212D-24xx	12	10.8 - 13.2	203	20	±24.0	±41.6	±0.0	82	20.0	220	600
MG224S-03xx	24	21.6 - 26.4	76	10	3.3	400.0	0.0	72	20.0	470	200
MG224S-05xx	24	21.6 - 26.4	105	10	5.0	400.0	0.0	79	20.0	470	200
MG224S-07xx	24	21.6 - 26.4	115	10	7.2	277.7	0.0	72	20.0	470	200
MG224S-09xx	24	21.6 - 26.4	104	10	9.0	222.2	0.0	80	20.0	470	200
MG224S-12xx	24	21.6 - 26.4	104	10	12.0	166.7	0.0	80	20.0	470	200
MG224S-15xx	24	21.6 - 26.4	104	10	15.0	133.3	0.0	82	20.0	470	200
MG224S-18xx	24	21.6 - 26.4	104	10	18.0	111.1	0.0	82	20.0	470	200
MG224S-24xx	24	21.6 - 26.4	104	10	24.0	83.3	0.0	80	20.0	470	200
MG224D-03xx	24	21.6 - 26.4	80	10	±3.3	±200.0	±0.0	68	20.0	220	200
MG224D-05xx	24	21.6 - 26.4	111	10	±5.0	±200.0	±0.0	75	20.0	220	200
MG224D-07xx	24	21.6 - 26.4	111	10	±7.2	±138.8	±0.0	75	20.0	220	200
MG224D-09xx	24	21.6 - 26.4	104	10	±9.0	±111.1	±0.0	80	20.0	220	200
MG224D-12xx	24	21.6 - 26.4	101	10	±12.0	±83.3	±0.0	82	20.0	220	200
MG224D-15xx	24	21.6 - 26.4	101	10	±15.0	±66.6	±0.0	82	20.0	220	200
MG224D-18xx	24	21.6 - 26.4	101	10	±18.0	±55.5	±0.0	82	20.0	220	200
MG224D-24xx	24	21.6 - 26.4	101	10	±24.0	±41.6	±0.0	82	20.0	220	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 "lx" is added to the Model number, as shown in the table at right.

Model No	Isolation Level
MG2xxx-xx	1 kVDC
MG2xxx-xxl	3 kVDC
MG2xxx-xxl4	4 kVDC
MG2xxx-xxl5	5.2 kVDC
MG2xxx-xxl6	6 kVDC

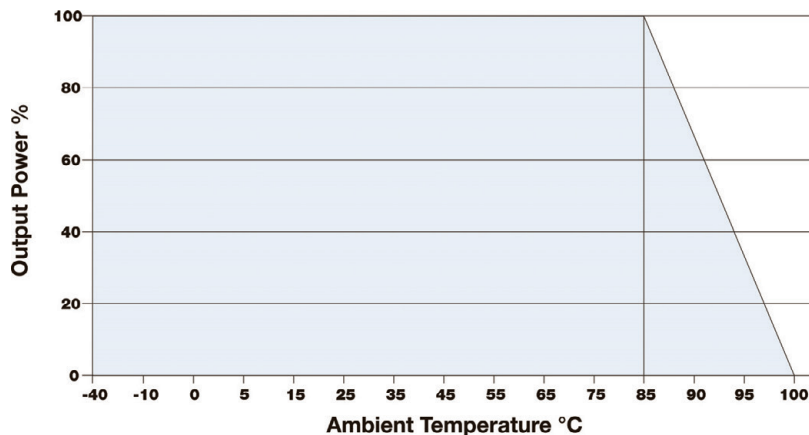


Model Number	Input				Output			Efficiency (% Typ)	Reflected Ripple Current (mA Pk-Pk)	Capacitive Load (μF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MG148S-03xx	48	43.2 - 52.8	48	6	3.3	400.0	0.0	60	20.0	470	100
MG148S-05xx	48	43.2 - 52.8	48	6	5.0	400.0	0.0	77	20.0	470	100
MG148S-07xx	48	43.2 - 52.8	48	6	7.2	277.7	0.0	77	20.0	470	100
MG148S-09xx	48	43.2 - 52.8	48	6	9.0	222.2	0.0	77	20.0	470	100
MG148S-12xx	48	43.2 - 52.8	48	6	12.0	166.7	0.0	78	20.0	470	100
MG148S-15xx	48	43.2 - 52.8	48	6	15.0	133.3	0.0	78	20.0	470	100
MG148S-18xx	48	43.2 - 52.8	48	6	18.0	111.1	0.0	78	20.0	470	100
MG148S-24xx	48	43.2 - 52.8	48	6	24.0	83.3	0.0	75	20.0	470	100
MG248D-03xx	48	43.2 - 52.8	45	6	±3.3	±200.0	±0.0	60	20.0	220	100
MG248D-05xx	48	43.2 - 52.8	57	6	±5.0	±200.0	±0.0	73	20.0	220	100
MG248D-07xx	48	43.2 - 52.8	54	6	±7.2	±138.8	±0.0	77	20.0	220	100
MG248D-09xx	48	43.2 - 52.8	54	6	±9.0	±111.1	±0.0	77	20.0	220	100
MG248D-12xx	48	43.2 - 52.8	52	6	±12.0	±83.3	±0.0	80	20.0	220	100
MG248D-15xx	48	43.2 - 52.8	52	6	±15.0	±66.6	±0.0	80	20.0	220	100
MG248D-18xx	48	43.2 - 52.8	52	6	±18.0	±55.5	±0.0	80	20.0	220	100
MG248D-24xx	48	43.2 - 52.8	52	6	±24.0	±41.6	±0.0	80	20.0	220	100

Notes:

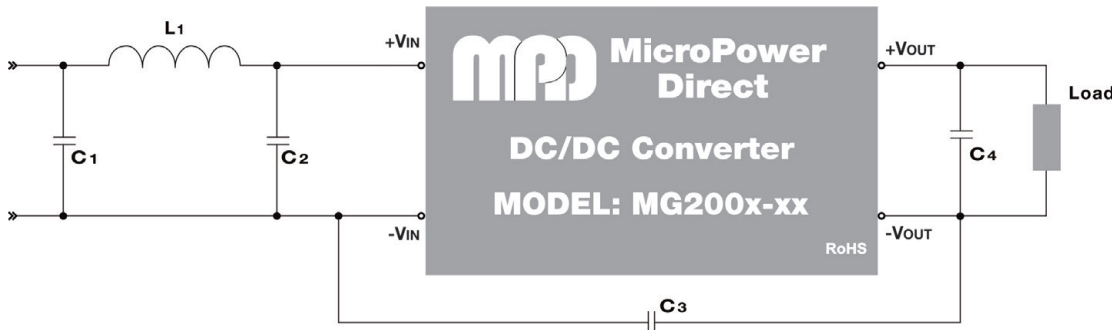
1. Load regulation is measured over a range of 20% load to 100% load. Load regulation for 3.3 VDC output models is specified at ±20% typical.
2. Operation at no-load will not damage the unit, but they may not meet all specifications.
3. With the addition of input filter components, all models will meet 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 MG200x-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.



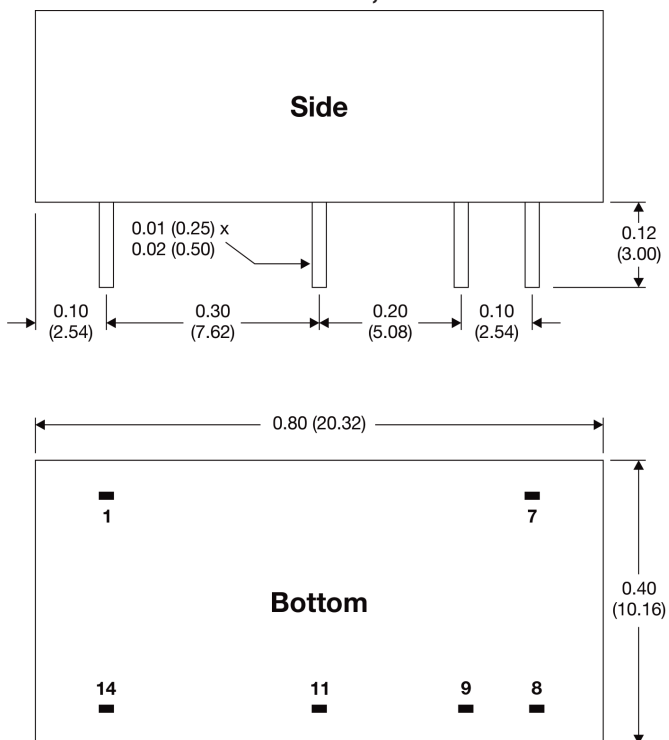
Recommended values for components are:

	MG203x-xxxx	MG205x-xxxx	MG212x-xxxx	MG224x-xxxx	MG248x-xxxx
C1	2.2 μF/100V	2.2 μF/100V	2.2 μF/100V	2.2 μF/100V	2.2 μF/100V
L1	18 μH	18 μH	18 μH	18 μH	18 μH
C2				1210, 2.2 μF/100V	1210, 2.2 μF/100V
C3				1206, 470 pF/2kV	1206, 470 pF/2kV
C4	10 μF	10 μF	10 μF	10 μF	10 μF

The voltage rating on capacitor C3 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 C1 should be changed to 470 μF/100V.

Capacitor C4 is not required to meet specifications, but may be used if a lower level of output ripple is required.

## Mechanical Dimensions, MG200X-xx Models

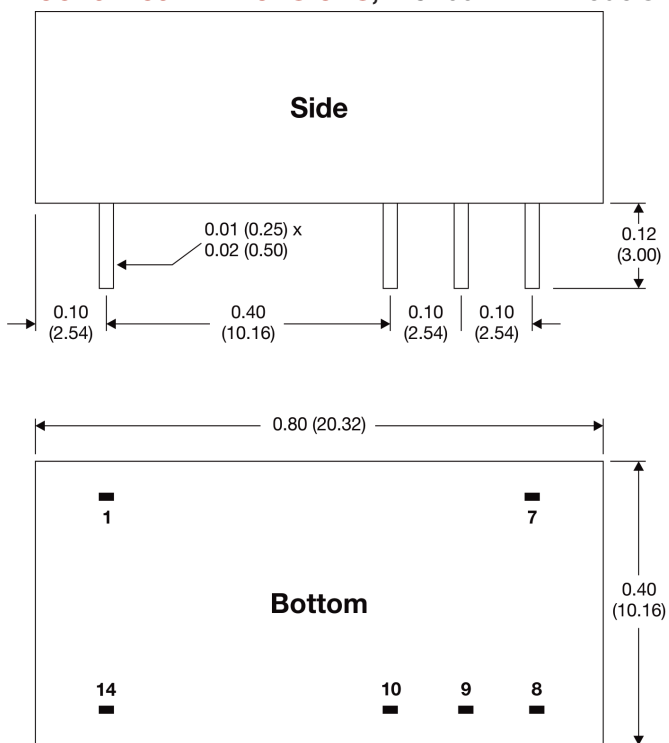


## Pin Connections

Pin	Single Output
1	-VIN
7	No Connection
8	No Pin
9	+VOUT
11	-VOUT
14	+VIN

Pin	Dual Output
1	-VIN
7	No Connection
8	Common
9	+VOUT
11	-VOUT
14	+VIN

## Mechanical Dimensions, MG200X-xxlx Models



## Pin Connections

Pin	Single Output
1	-VIN
7	No Connection
8	+VOUT
9	No Pin
10	-VOUT
14	+VIN

Pin	Dual Output
1	-VIN
7	No Connection
8	+VOUT
9	Common
10	-VOUT
14	+VIN

### 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!**