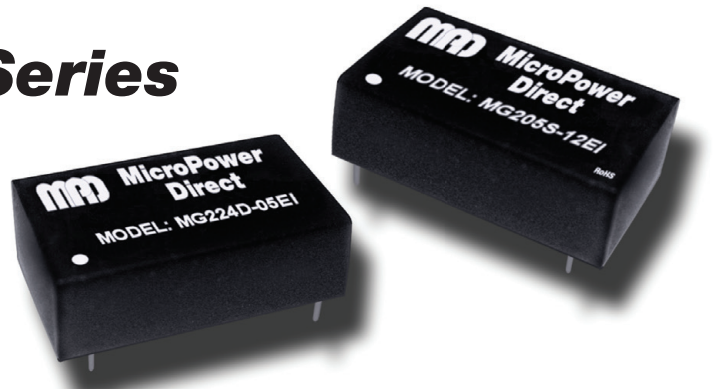


# MG200xEI Series

## High Isolation, 2W Compact MiniDIP DC/DC Converters



### Key Features:

- 2W Output Power
- Compact MiniDIP Case
- 3,000 VDC Isolation
- EN 60950 Approved
- Single and Dual Outputs
- >3.5 MHour MTBF
- -40°C to +85°C Operation
- LOW COST

1.5 kV Isolation Models Available



### 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



### 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	5 VDC Input	4.50	5.0	5.50	VDC	
	12 VDC Input	10.80	12.0	13.20		
	15 VDC Input	13.50	15.0	16.50		
	24 VDC Input	21.60	24.0	26.40		
Input Filter	Internal Capacitor					

Output						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Output Voltage Accuracy			±2.5		%	
Line Regulation	For VIN Change of 1%			±1.2	%	
Load Regulation, See Note 1	See Model Selection Guide					
Ripple & Noise (20 MHz), See Note 2	Output Voltage ≤12 VDC		60		mV P - P	
	15 VDC, 24 VDC Output		75			
Temperature Coefficient				±0.03	%/°C	
Output Short Circuit	5 VDC, 12 VDC & 15 VDC Input	Continuous (Autorecovery)				
	24 VDC Input	Momentary (1.0 Sec.)				

General						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Isolation Voltage	60 Seconds	3,000			VDC	
Isolation Resistance	500 VDC	1,000			MΩ	
Isolation Capacitance	100 kHz, 0.1V		20		pF	
Switching Frequency			100	300	kHz	

EMI Characteristics						
Parameter	Conditions	Min.	Typ.	Max.	Units	
EMI Compliance, See Note 4	Conducted	CISPR22/EN 55022 Level B				
	Radiated	CISPR22/EN 55022 Level B				
EMC Compliance, Single Output	Electrostatic Discharge (ESD)	EN 61000-4-2 Level B Contact ±8 kV				
EMC Compliance, Dual Output		EN 61000-4-2 Level B Contact ±6 kV				

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	0.787 x 0.394 x 0.323 Inches (20.0 x 10.0 x 8.2 mm)					
Case Material	Non-Conductive Black Plastic (UL-94V0)					
Weight	0.08 Oz (2.4g)					

Reliability Specifications						
Parameter	Conditions	Min.	Typ.	Max.	Units	
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	3.5			MHours	
Safety Approvals	UL 60950, EN 60950					

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		
	15 VDC Input			21.0		
	24 VDC Input			30.0		
Lead Temperature	1.5 mm From Case For 10 Sec			300	°C	

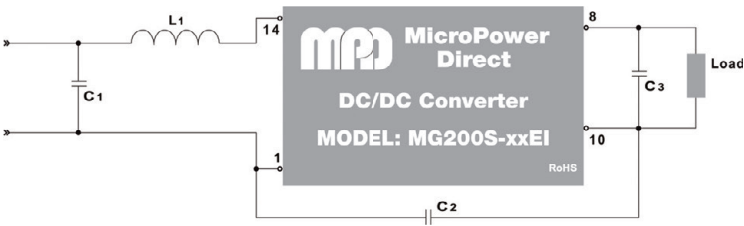
Caution: Exceeding Absolute Maximum Ratings may damage the module. These are not continuous operating ratings.

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Model Number	Input				Output			Load Regulation % Typ.	Output Capacitive Load ( $\mu$ F Max)	Efficiency (% Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MG205S-05EI	5	4.5 - 5.5	500	25	5.0	400	40.0	12.0	220	80	1,000
MG205S-12EI	5	4.5 - 5.5	476	25	12.0	167	17.0	8.0	220	84	1,000
MG205S-15EI	5	4.5 - 5.5	476	25	15.0	133	13.0	7.0	220	84	1,000
MG205D-05EI	5	4.5 - 5.5	500	25	$\pm$ 5.0	$\pm$ 200	$\pm$ 20.0	12.0	100	80	1,000
MG205D-12EI	5	4.5 - 5.5	476	25	$\pm$ 12.0	$\pm$ 83	$\pm$ 8.0	8.0	100	84	1,000
MG205D-15EI	5	4.5 - 5.5	476	25	$\pm$ 15.0	$\pm$ 67	$\pm$ 7.0	7.0	100	84	1,000
MG212S-05EI	12	10.8 - 13.2	205	15	5.0	400	40.0	12.0	220	81	500
MG212S-15EI	12	10.8 - 13.2	198	15	15.0	133	13.0	7.0	220	84	500
MG212D-15EI	12	10.8 - 13.2	198	15	$\pm$ 15.0	$\pm$ 67	$\pm$ 7.0	7.0	100	84	500
MG215D-15EI	15	13.5 - 16.5	157	10	$\pm$ 15.0	$\pm$ 67	$\pm$ 7.0	7.0	100	85	300
MG224S-05EI	24	21.6 - 26.4	101	8	5.0	400	40.0	12.0	220	82	250
MG224S-09EI	24	21.6 - 26.4	99	8	9.0	222	22.0	9.0	220	84	250
MG224S-15EI	24	21.6 - 26.4	99	8	15.0	133	13.0	7.0	220	84	250
MG224D-12EI	24	21.6 - 26.4	99	8	$\pm$ 12.0	$\pm$ 83	$\pm$ 8.0	8.0	100	84	250
MG224D-15EI	24	21.6 - 26.4	99	8	$\pm$ 15.0	$\pm$ 67	$\pm$ 7.0	7.0	100	84	250

Notes:

- Output load regulation is specified for a load change of 10% to 100%.
- When measuring output ripple, it is recommended that an external 1  $\mu$ F ceramic capacitor & 10  $\mu$ F 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.
- Operation at no load will not damage these units, however, they may not meet all specifications.
- 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. The simple connection shown below will typically meet EN 55022 Class B. For dual output units, a capacitor should be connected from each output to common.



V <sub>IN</sub>	C <sub>1</sub>	C <sub>2</sub>	L <sub>1</sub>	V <sub>OUT</sub>	C <sub>3</sub>
5 VDC	4.7 $\mu$ F/50V	---	6.8 $\mu$ H	5 VDC	10 $\mu$ F
12 VDC	2.2 $\mu$ F/50V	470 pF/3 kV	6.8 $\mu$ H	9 VDC	4.7 $\mu$ F
15 VDC	2.2 $\mu$ F/50V	470 pF/3 kV	6.8 $\mu$ H	12 VDC	2.2 $\mu$ F
24 VDC	1.0 $\mu$ F/50V	470 pF/3 kV	6.8 $\mu$ H	15 VDC	1.0 $\mu$ F
				$\pm$ 5 VDC	4.7 $\mu$ F
				$\pm$ 12 VDC	1.0 $\mu$ F
				$\pm$ 15 VDC	0.47 $\mu$ F

- 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.

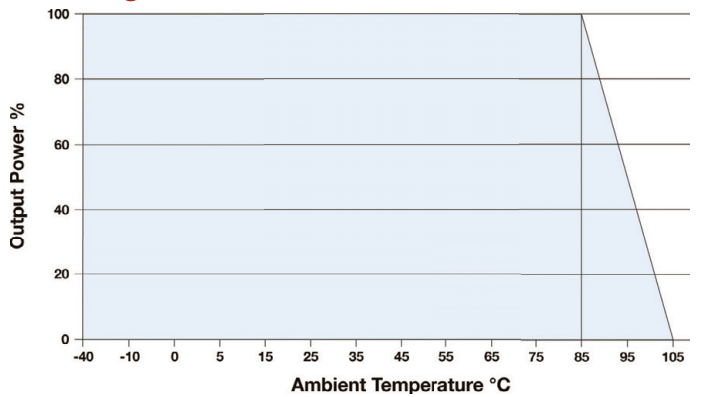
Pin Connections

Pin	Single	Dual	Pin	Single	Dual
1	-VIN	-VIN	9	No Pin	Common
7	NC	NC	10	-VOUT	-VOUT
8	+VOUT	+VOUT	14	+VIN	+VIN

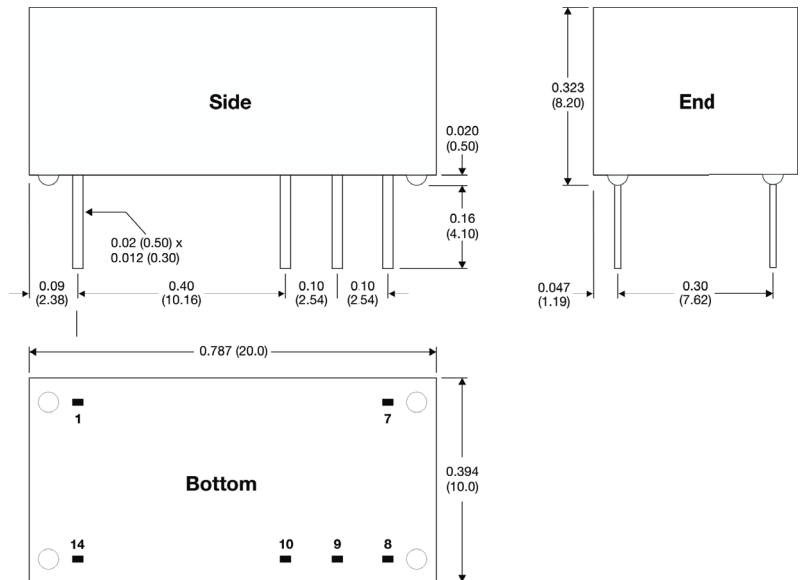
NC = No Connection



Derating Curve



Mechanical Dimensions



Notes:

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