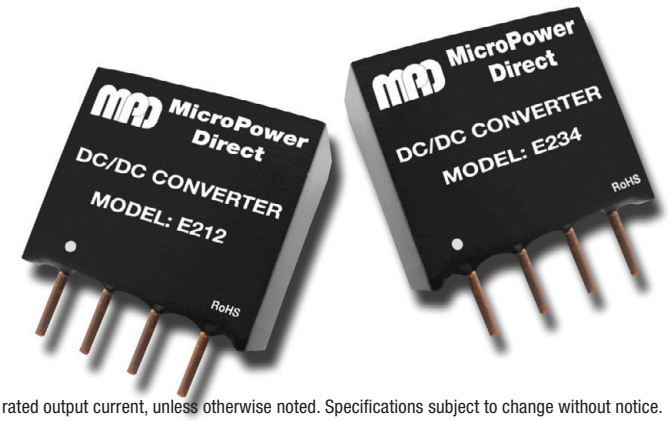
E200I Series

Isolated, 2W Ultra-Miniature SIP DC/DC Converters



Key Features:

- 2W Output Power
- Ultra-Miniature SIP Case
- 17 Standard Models
- 3,000 VDC Isolation
- >1.121 MHour MTBF
- -40°C to +85°C Operation

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	5 VDC Input	4.50	5.0	5.50	VDC
	12 VDC Input	10.80	12.0	13.20	
	24 VDC Input	21.60	24.0	26.40	
	48 VDC Input	43.20	48.0	52.80	
Input Reflected Ripple Current			20		mA P - P
Input Filter	Internal Capacitors				

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	See Model Selection Guide				
Ripple & Noise (20 MHz)	See Note 2		150		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 Seconds	3,000			VDC
Isolation Resistance		1,000			MΩ
Isolation Capacitance			60		pF
Switching Frequency			70		kHz

EMI Characteristics

Parameter	Standard		Criteria	Level
Radiated Emissions		EN 55022		Class A
Conducted Emissions	See Note 3	EN 55022		Class A
ESD		EN 61000-4-2	A	±6 kV/±8kV
RS		EN 61000-4-3	A	10V/m
EFT	See Note 3	EN 61000-4-4	A	±2 kV
Surge	See Note 3	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		+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 2)
Case Material	Non-Conductive Black Plastic (UL-94V0)
Weight	0.05 Oz (1.5g)

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 (1 Sec)	5 VDC Input			7.0	VDC
	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.

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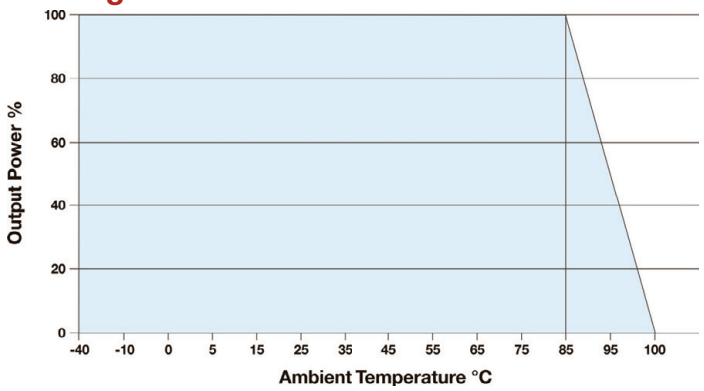
Model Selection Guide

Model Number	Input				Output		Load Regulation (% Typ)	Efficiency (%, Typ)	Capacitive Load (µF, Max)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)				
	Nominal	Range	Full-Load	No-Load						
E201I	5.0	4.50 - 5.50	371	35	3.3	400.0	±20	71	470	1,000
E202I	5.0	4.50 - 5.50	519	35	5.0	400.0	±10	77	470	1,000
E203I	5.0	4.50 - 5.50	500	35	9.0	222.0	±10	80	470	1,000
E204I	5.0	4.50 - 5.50	487	35	12.0	167.0	±10	82	470	1,000
E205I	5.0	4.50 - 5.50	487	35	15.0	133.0	±10	82	470	1,000
E211I	12	10.8 - 13.2	152	20	3.3	400.0	±20	72	470	500
E212I	12	10.8 - 13.2	213	20	5.0	400.0	±10	78	470	500
E213I	12	10.8 - 13.2	203	20	9.0	222.0	±10	82	470	500
E214I	12	10.8 - 13.2	198	20	12.0	167.0	±10	80	470	500
E215I	12	10.8 - 13.2	198	20	15.0	133.0	±10	84	470	500
E222I	24	21.6 - 26.4	104	10	5.0	400.0	±10	80	470	200
E223I	24	21.6 - 26.4	99	10	9.0	222.0	±10	84	470	200
E224I	24	21.6 - 26.4	99	10	12.0	167.0	±10	84	470	200
E225I	24	21.6 - 26.4	99	10	15.0	133.0	±10	84	470	200
E232I	48	43.2 - 52.8	53	7	5.0	400.0	±10	78	470	100
E233I	48	43.2 - 52.8	51	7	9.0	222.0	±10	82	470	100
E234I	48	43.2 - 52.8	52	7	12.0	167.0	±10	80	470	100

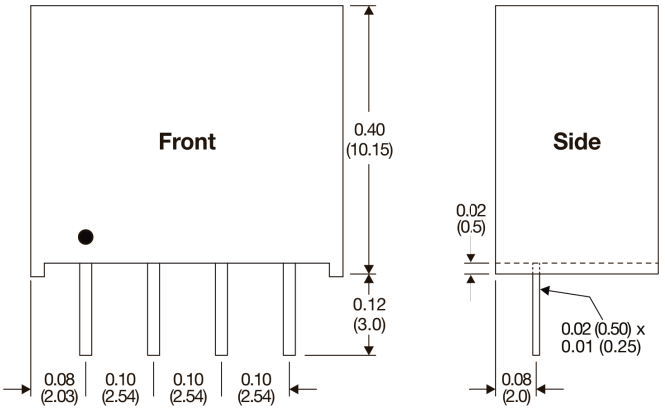
Notes:

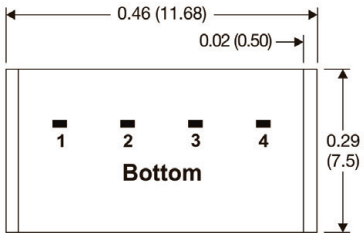
1. Output load regulation is specified for a load change of 20% to 100%.
2. When measuring output ripple, it is recommended that an external 0.33 µF ceramic capacitor be placed from the +Vout pin to the -Vout pin.
3. These converters will operate without external components. However, to meet the specified EMI limits, a simple external input filter is required. See the input filter note below for more information.
4. Operation at no-load will not damage these units. However, they may not meet all specifications.
5. 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



Mechanical Dimensions

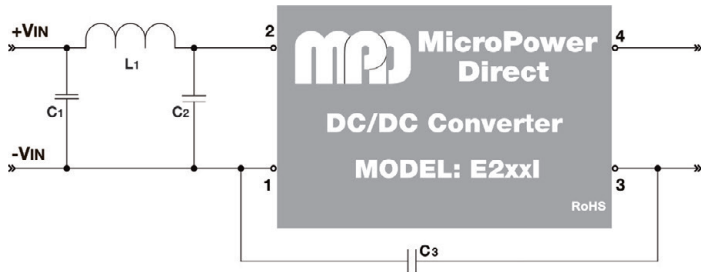




Notes:

- 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 front of the unit

Input Filter



VIN (VDC)	C1 (µF)	L1 (µH)	C2 (µF)	C3 (pF)
5.0	2.2	18.0		
12	2.2	18.0		
24	2.2	18.0	2.2	470
48	10.0	18.0	2.2	470

Pin Connections

Pin	Description
1	-VIN
2	+VIN
3	-VOUT
4	+VOUT

The filter (C_1, C_2, C_3 & L_1) shown in the figure above is required to meet EN 55022 level B. Recommended component values are shown in the table above. Capacitor C_1 is a 1210, 100V/ceramic, except for the 48V input which is a 100V/electrolytic. Capacitor C_2 is 1210 100V/ceramic. Capacitor C_3 is a 1206 4 kV/ceramic.
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.
All components should be mounted as close to the unit as possible.

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