

MG200MRRI4

Medical Approved Compact MiniDIP, 2W DC/DC Converters



Key Features:

- EN 60601 3RD Ed. Approved
- 2W Output Power
- 4.0 kVrms Isolation
- Reinforced Insulation
- 1 x MOPP & 2 x MOOP per EN 60601-1 3RD Edition & ANSI/AAMI ES 60601-1
- 2 μ A Leakage Current Max
- Compact MiniDIP Case
- Single & Dual Outputs
- 2.0 MH MTBF

RoHS



**ANSI/AAMI
ES 60601-1**



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Electrical Specifications

Specifications typical @ +25°C, nominal input voltage & rated output current, unless otherwise noted. Specifications subject to change without notice.

Parameter	Conditions	Min.	Typ.	Max.	Units
Input Voltage Range	5 VDC Input	4.5	5.0	5.5	VDC
	12 VDC Input	10.8	12.0	13.2	
	24 VDC Input	21.6	24.0	26.4	
Input Filter	Internal Capacitor				

Output

Parameter	Conditions	Min.	Typ.	Max.	Units
Output Voltage Accuracy			± 2.0	± 4.0	%
Output Voltage Balance	Dual Outputs, Balanced Loads		± 0.1	± 1.0	%
Line Regulation	$V_{IN} = \text{Min to Max}$		± 1.2	± 1.5	%
Load Regulation, See Note 2	See Model Selection Guide				
Ripple & Noise (20 MHz)	See Note 3		100	150	mV P - P
Temperature Coefficient			± 0.01	± 0.02	%/°C
Output Short Circuit	0.5 Sec. Max (Autorecovery)				

General

Parameter	Conditions	Min.	Typ.	Max.	Units
Isolation Voltage, Rated	60 Seconds	4,000			Vrms
Reinforced Insulation Working Voltage	300 Vrms				
Leakage Current				2.0	μ A
Isolation Resistance	500 VDC	10			G Ω
Isolation Capacitance	100 kHz, 1V		15	20	pF
Switching Frequency		50	80	100	kHz

EMI Characteristics

Parameter	Standard	Criteria	Level
EMC	Complies With EN 55011 4 TH Edition		
EMS	Complies With EN 60601-1-2		

Environmental

Parameter	Conditions	Min.	Typ.	Max.	Units
Operating Temperature Range	Ambient	-25		+80	°C
	Case			+105	°C
Storage Temperature Range		-50		+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 (UL94-V0)				
Weight	0.18 Oz (5.1g)				

Reliability Specifications

Parameter	Conditions	Min.	Typ.	Max.	Units
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.0			MHours
Safety Standards	IEC/EN 60601-1, EN 60601-1 3 RD Edition, 1xMOPP & 2xMOPP				
	ANSI/AAMI ES 60601-1 1xMOPP & 2xMOPP Recognition (UL Certificate)				
	ANSI/AAMI ES 60601-1, CAN/CSA-C22.2 No.60601-1				

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			260	°C

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

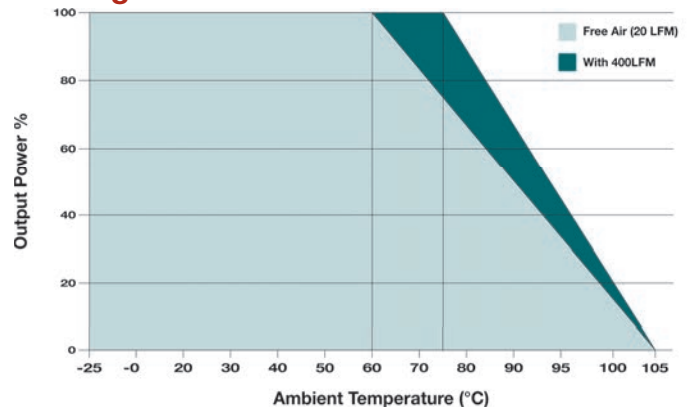
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Model Number	Input				Output			Capacitive Load (μ F, Max)	Load Regulation (% , Max)	Efficiency (% , Typ)	Fuse Rating Slow-Blow (mA)
	Voltage (VDC)		Current (mA)		Voltage (VDC)	Current (mA, Max)	Current (mA, Min)				
	Nominal	Range	Full-Load	No-Load							
MG205SMR-05RI4	5	4.5 - 5.5	606	60	5.0	400.0	8.0	330	12	66	1,200
MG205SMR-12RI4	5	4.5 - 5.5	600	60	12.0	165.0	3.0	330	10	66	1,200
MG205SMR-15RI4	5	4.5 - 5.5	605	60	15.0	133.0	2.5	330	10	66	1,200
MG205DMR-12RI4	5	4.5 - 5.5	553	60	\pm 12.0	\pm 83.0	\pm 1.5	100	10	72	1,200
MG205DMR-15RI4	5	4.5 - 5.5	542	60	\pm 15.0	\pm 66.0	\pm 1.0	100	10	73	1,200
MG212SMR-05RI4	12	10.8 - 13.2	253	30	5.0	400.0	8.0	330	12	66	500
MG212SMR-12RI4	12	10.8 - 13.2	250	30	12.0	165.0	3.0	330	10	66	500
MG212SMR-15RI4	12	10.8 - 13.2	252	30	15.0	133.0	2.5	330	10	66	500
MG212DMR-12RI4	12	10.8 - 13.2	224	30	\pm 12.0	\pm 83.0	\pm 1.5	100	10	74	500
MG212DMR-15RI4	12	10.8 - 13.2	220	30	\pm 15.0	\pm 66.0	\pm 1.0	100	10	75	500
MG224SMR-05RI4	24	21.6 - 26.4	126	15	5.0	400.0	8.0	330	12	66	250
MG224SMR-12RI4	24	21.6 - 26.4	125	15	12.0	165.0	3.0	330	10	66	250
MG224SMR-15RI4	24	21.6 - 26.4	126	15	15.0	133.0	2.5	330	10	66	250
MG224DMR-12RI4	24	21.6 - 26.4	112	15	\pm 12.0	\pm 83.0	\pm 1.5	100	10	74	250
MG224DMR-15RI4	24	21.6 - 26.4	110	15	\pm 15.0	\pm 66.0	\pm 1.0	100	10	75	250

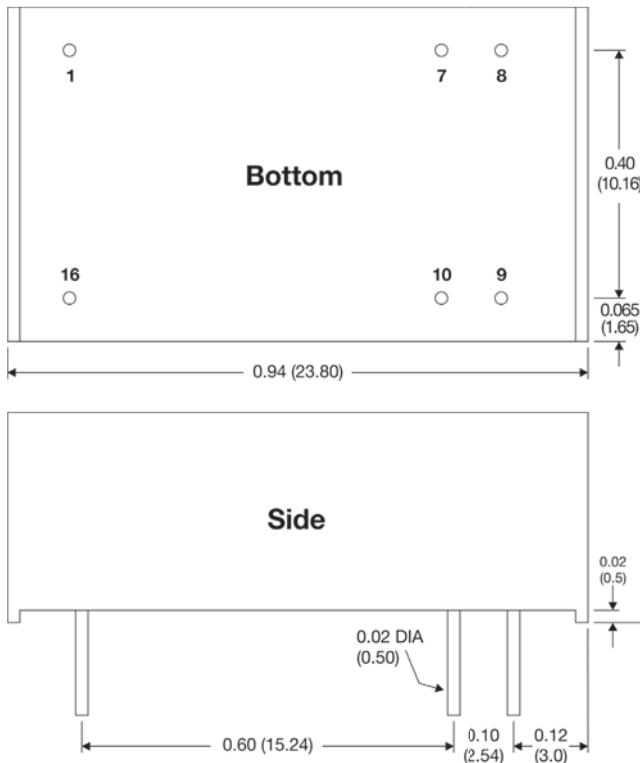
Notes:

1. The specified maximum capacitive load is for each output.
2. Load regulation is measured for a load change of 20% to 100%.
3. When measuring output ripple, it is recommended that an external 0.47 μ F ceramic capacitor be placed from the +Vout pin to the -Vout pin for single output units and from each output to common for dual output units. For noise sensitive applications, the use of 3.3 μ F capacitors will reduce the output ripple.
4. Operation at no-load will not damage these units. However, they may not meet all specifications.
5. For dual output units, the maximum capacitive load is given for each output.
6. The converter should be connected to a low ac-impedance source. An input source with a highly inductive impedance may affect the stability of the converter. In applications where the converter output loading is high and input power is supplied over long lines, it may be necessary to use a capacitor on the input to insure start-up. In this case, it is recommended that a low ESR (ESR <1.0 Ω at 100 kHz) capacitor be mounted close to the converter. For 5V input units a 2.2 μ F is recommended, for 12V input units, a 1.0 μ F; and for 24V units a 0.47 μ F.
7. It is recommended that a fuse be used on the input of a power supply for protection. See the table above for the correct rating.

Derating Curve



Mechanical Dimensions



Pin Connections

Pin	Single	Dual
1	-Vin	-Vin
7	NC	NC
8	NC	Common
9	+Vout	+Vout
10	-Vout	-Vout
16	+Vin	+Vin

NC = No Connection



Mechanical Notes:

- All dimensions are typical in inches (mm)
- Tolerance x.xx = \pm 0.01 (\pm 0.25)