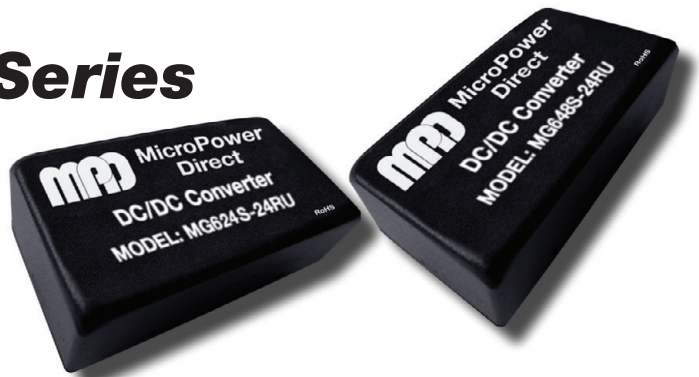


# MG600RU Series

## Compact, 6W 4:1 Input, MiniDIP DC/DC Converters



### Key Features:

- 6W Output Power
- Very Small MiniDIP Case
- EN 60950 Approved
- Wide 4:1 Input Range
- High Efficiency
- 1,500 VDC Isolation
- Single and Dual Outputs
- >2.95 MHour MTBF
- -40°C to +90°C Operation
- LOW COST



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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.

Input						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Input Voltage Range	24 VDC Input	9.0	24.0	36.0	VDC	
	48 VDC Input	18.0	48.0	75.0		
Input Start-up Threshold	24 VDC Input			9.0	VDC	
	48 VDC Input			18.0		
Under Voltage Shutdown	24 VDC Input		8.0		VDC	
	48 VDC Input		16.0			
Input Filter	π (PI) Filter					
Output						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Output Voltage Accuracy				±2.0	%	
Output Voltage Balance	Dual Output, Balanced Loads		±1.0	±2.0	%	
Line Regulation	V <sub>IN</sub> = Min To Max		±0.2	±0.8	%	
Load Regulation	I <sub>OUT</sub> = 0% To 100%		±0.5	±1.0	%	
Ripple & Noise (20 MHz)	See Note 2			55	mV P - P	
Transient Recovery Time	See Note 3			500	µSec	
Transient Response Deviation			±3.0	±5.0	%	
Overload Protection	See Note 4		150		%	
Temperature Coefficient			±0.01	±0.02	%/°C	
Output Short Circuit	See Note 5		Continuous (Autorecovery)			
General						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Isolation Voltage	60 Seconds	1,500			VDC	
	1 Second	1,800				
Isolation Resistance	500 VDC	1,000			MΩ	
Isolation Capacitance	100 kHz, 1V		500		pF	
Switching Frequency			370		kHz	
EMI Characteristics						
Parameter	Standard	Criteria		Level		
Radiated Emissions	EN 55022			Class A		
Conducted Emissions	EN 55022			Class A		
ESD	EN 61000-4-2	A		±6 kV Contact/±8kV Air		
RS	EN 61000-4-3	A		10V/m		
EFT, See Note 6	EN 61000-4-4	A		±2 kV		
Surge, See Note 6	EN 61000-4-5	A		±1 kV		
CS	EN 61000-4-6	A		10 Vrms		
Environmental						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Operating Temperature Range	Ambient	-40	+25	+90	°C	
Max Case Temperature				+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	Aluminum Alloy, Black Anodized Coating (UL-94V0)					
Weight	0.20 Oz (6.1g)					
Reliability Specifications						
Parameter	Conditions	Min.	Typ.	Max.	Units	
MTBF	MIL HDBK 217F, 25°C, Gnd Benign	2.95			MHours	
Safety Standards	UL 60950, EN 60950					
Absolute Maximum Ratings						
Parameter	Conditions	Min.	Typ.	Max.	Units	
Input Voltage Surge (1 Sec)	24 VDC Input			50.0	VDC	
	48 VDC Input			100.0		
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			Output Capacitive Load ( $\mu\text{F}$ 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						
MG624S-03RU	24	9.0 - 36.0	212	10	3.3	1,200	0.0	680	78	1,000
MG624S-05RU	24	9.0 - 36.0	305	10	5.0	1,200	0.0	680	82	1,500
MG624S-12RU	24	9.0 - 36.0	294	10	12.0	500	0.0	330	85	1,500
MG624S-15RU	24	9.0 - 36.0	294	10	15.0	400	0.0	330	85	1,500
MG624S-24RU	24	9.0 - 36.0	291	10	24.0	250	0.0	150	86	1,500
MG624D-12RU	24	9.0 - 36.0	294	10	$\pm 12.0$	$\pm 250$	$\pm 0.0$	150	85	1,500
MG624D-15RU	24	9.0 - 36.0	291	10	$\pm 15.0$	$\pm 200$	$\pm 0.0$	150	86	1,500
MG648S-03RU	48	18.0 - 75.0	106	8	3.3	1,200	0.0	680	78	600
MG648S-05RU	48	18.0 - 75.0	154	8	5.0	1,200	0.0	680	81	1,000
MG648S-12RU	48	18.0 - 75.0	147	8	12.0	500	0.0	330	85	1,000
MG648S-15RU	48	18.0 - 75.0	147	8	15.0	400	0.0	330	85	1,000
MG648S-24RU	48	18.0 - 75.0	145	8	24.0	250	0.0	150	86	1,000
MG648D-12RU	48	18.0 - 75.0	145	8	$\pm 12.0$	$\pm 250$	$\pm 0.0$	150	86	1,000
MG648D-15RU	48	18.0 - 75.0	145	8	$\pm 15.0$	$\pm 200$	$\pm 0.0$	150	86	1,000

**Notes:**

- The specified maximum capacitive load is for each output.
- When measuring output ripple, it is recommended that an external 0.47  $\mu\text{F}$  ceramic 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.
- Transient recovery is measured to within a 1% error band for a load step change of 25%.
- Output overload protection is provided by a Hiccup circuit with auto-recovery.
- Output short circuit protection is provided by a Hiccup circuit with auto-recovery.
- These converters are specified for operation without external components. However, in some applications the addition of input/output capacitors, as shown in the typical connection diagram at right, will enhance stability and reduce output ripple. This simple connection includes a low ESR (<1 $\Omega$  at 100 kHz) capacitor connected across the input. It is recommended that a 2.2  $\mu\text{F}$  be used. To improve the output ripple performance, a 3.3  $\mu\text{F}$  is connected across the output. For dual output units, a 3.3  $\mu\text{F}$  capacitor should be connected from each output to common. For applications where the circuit must meet or exceed EN 61000-4-4 (5), refer to the note under the typical connection diagram.
- Operation at no load will not damage these units, however, they may not meet all specifications.
- 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.

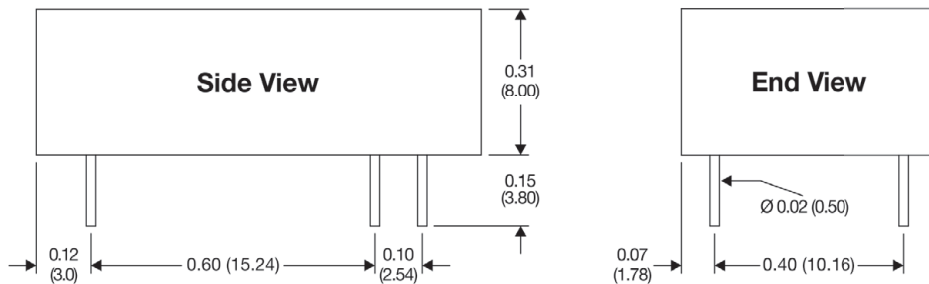
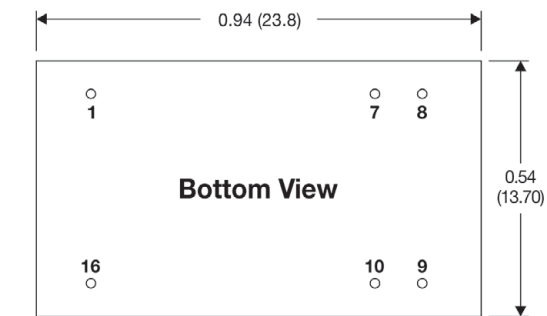
### Typical Connection



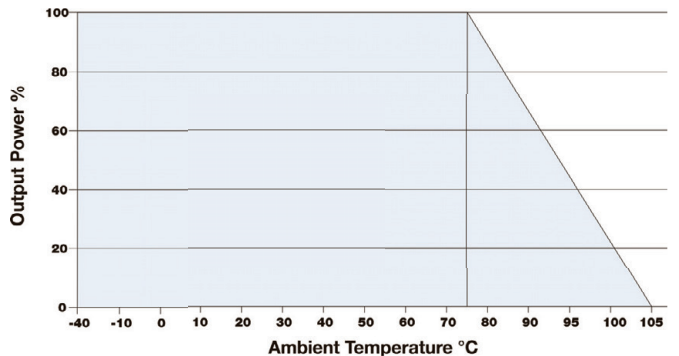
**Notes:**

To meet the specified EN 61000-4-4 and EN 61000-4-5 limits, an external capacitor must be connected across the input pins of the module (C1). A 220  $\mu\text{F}/100\text{V}$  capacitor is recommended. This capacitor should be mounted as close to the module as possible.

### Mechanical Dimensions



### Derating Curve



### 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

**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