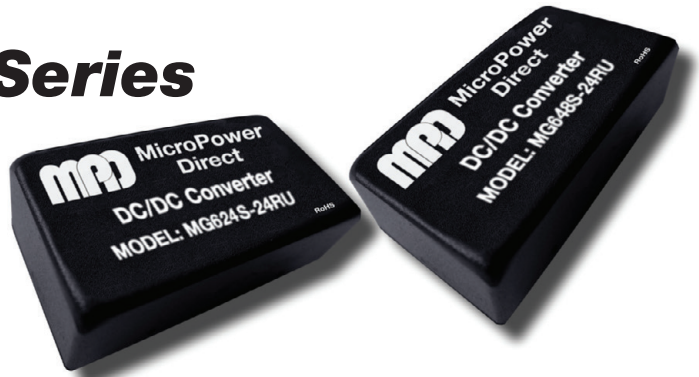


MG600RU Series

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 _{IN} = Min To Max | | ±0.2 | ±0.8 | % | |
| Load Regulation | I _{OUT} = 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 (μF 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 | ± 12.0 | ± 250 | ± 0.0 | 150 | 85 | 1,500 |
| MG624D-15RU | 24 | 9.0 - 36.0 | 291 | 10 | ± 15.0 | ± 200 | ± 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 | ± 12.0 | ± 250 | ± 0.0 | 150 | 86 | 1,000 |
| MG648D-15RU | 48 | 18.0 - 75.0 | 145 | 8 | ± 15.0 | ± 200 | ± 0.0 | 150 | 86 | 1,000 |

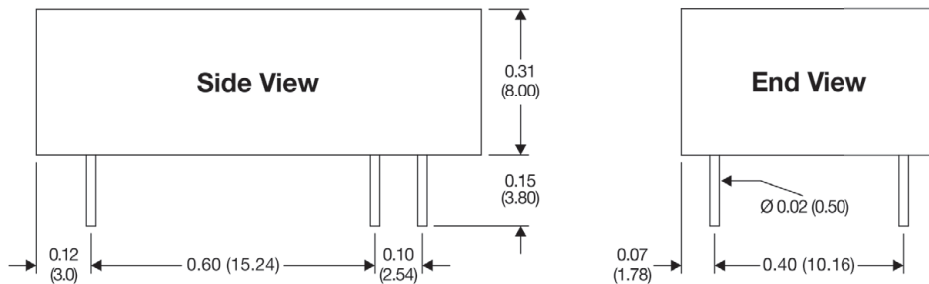
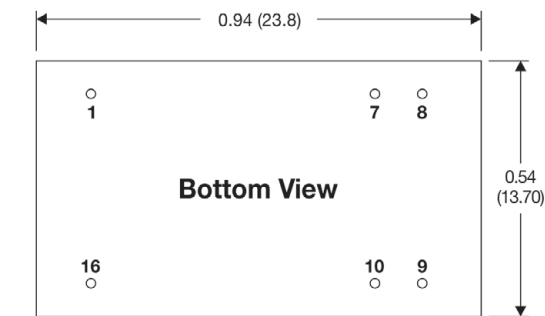
- Notes:
- The specified maximum capacitive load is for each output.
 - When measuring output ripple, it is recommended that an external 0.47 μF ceramic capacitor be placed in parallel from the +Vout pin to the -Vout pin for single output models, or from each output to common for dual output models.
 - 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 Ω at 100 kHz) capacitor connected across the input. It is recommended that a 2.2 μF be used. To improve the output ripple performance, a 3.3 μF is connected across the output. For dual output units, a 3.3 μF 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

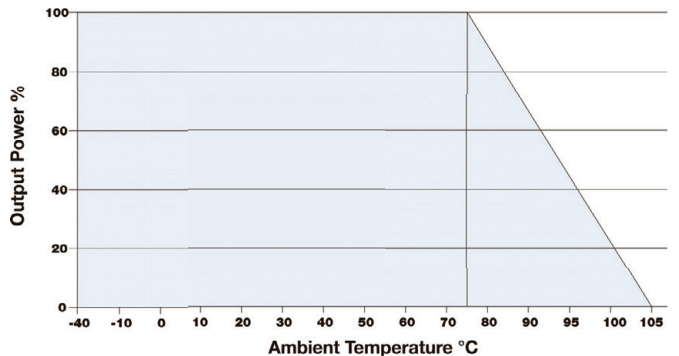


- Notes:
- To meet the specified EN 61000-4-4 and EN 61000-4-5 limits, an external capacitor must be connected across the input pins of the module (C1). A 220 $\mu\text{F}/100\text{V}$ capacitor is recommended. This capacitor should be mounted as close to the module as possible.

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 = ± 0.02 (± 0.50)
- Pin 1 is marked by a "dot" or indentation on the unit

