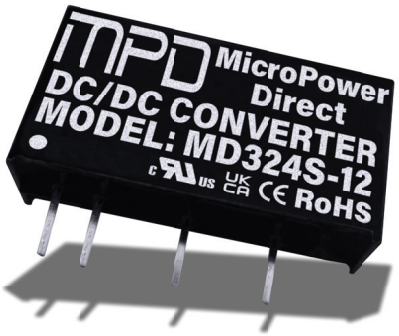
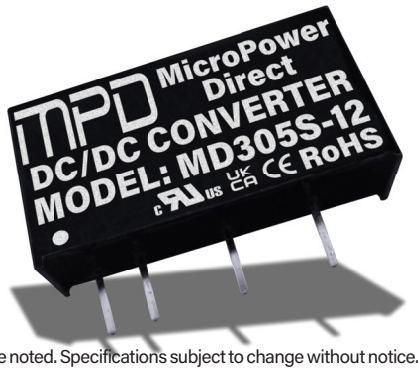
# MD300S

## Miniature 3W Single Output SIP DC/DC Converters




### Key Features:

- 3W Output Power
- Compact SIP-7 Case
- 5V, 12V & 24V Inputs
- EN 62368 Approved
- High Efficiency
- 1,000 VDC Isolation
- Semi-Regulated Output
- 2 MHour MTBF
- -40°C to +95°C Operation
- ***LOW COST***

### 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 | 5.00 | 5.50 | VDC |
| | 12 VDC Input | 10.8 | 12.0 | 13.2 | |
| | 24 VDC Input | 21.6 | 24.0 | 26.4 | |
| Reverse Polarity Input Current | | | | 0.5 | A |
| Internal Power Dissipation | | | 700 | | mW |
| Input Filter | Internal Capacitor | | | | |

**Output**

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Output Voltage Accuracy, | | | ±5.0 | | % |
| Line Regulation | For VIN Change of 1% | | ±1.01 | ±1.2 | % |
| Load Regulation, See Note 1 | See Model Selection Guide | | | | |
| Ripple & Noise (20 MHz) | See Note 2 | | 60 | 100 | mV P - P |
| Temperature Coefficient | | | ±0.01 | ±0.02 | %/°C |
| Output Short Circuit | Momentary (0.5 Sec) | | | | |

**General**

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Isolation Voltage | 60 Seconds | 1,000 | | | VDC |
| Isolation Resistance | 500 VDC | 1,000 | | | MΩ |
| Isolation Capacitance | 100 kHz/1.0V | | 60 | 120 | pF |
| Switching Frequency | | | 60 | | kHz |

**Environmental**

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Operating Temperature Range | Ambient | -40 | +25 | +85 | °C |
| | Case | | | +100 | |
| Storage Temperature Range | | -50 | | +125 | °C |
| Cooling | Free Air Convection | | | | |
| Humidity | RH, Non-condensing | | | 95 | % |

**Physical**

| | |
|---|---|
| Case Size | See Mechanical Drawing (Page 2) |
| Case Material | Non-Conductive Black Plastic (UL94-V0) |
| Weight | 0.07 Oz (2.2g) |

**Reliability Specifications**

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| MTBF | MIL HDBK 217F, 25°C, Gnd Benign | 2.0 | | | MHours |

**Absolute Maximum Ratings**

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|---|---|---|---|
| Input Voltage Surge (1 Sec) | 5 VDC Input | -0.7 | | 9.0 | VDC |
| | 12 VDC Input | -0.7 | | 18.0 | |
| | 24 VDC Input | -0.7 | | 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 Selection Guide

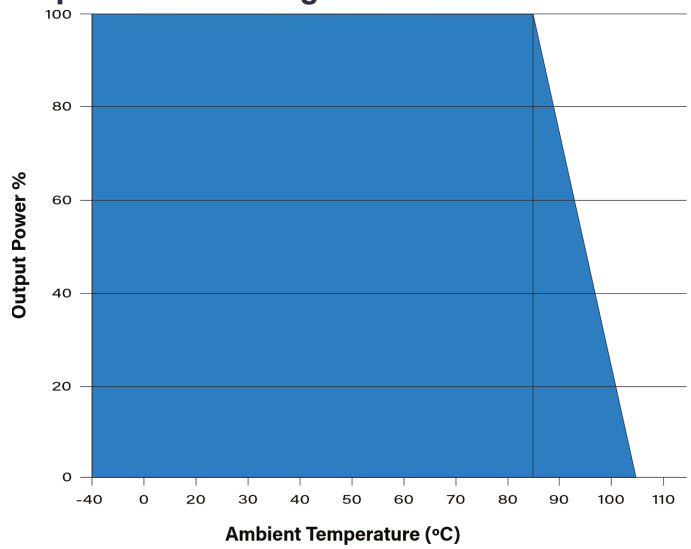


| Model Number | Input | | | | Output | | | Load Regulation (%/Typ) | Efficiency (%, Typ) | Capacitive Load (µF, Max) | Fuse Rating Slow-Blow (mA) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Voltage (VDC) | | Current (mA) | | Voltage (VDC) | Current (mA, Max) | Current (mA, Min) | | | | |
| | Nominal | Range | Full-Load | No-Load | | | | | | | |
| MD305S-05 | 5 | 4.50 - 5.50 | 723 | 50 | 5.0 | 600 | 12.0 | 8.0 | 83 | 220 | 2,000 |
| MD305S-09 | 5 | 4.50 - 5.50 | 689 | 50 | 9.0 | 333 | 6.0 | 7.0 | 87 | 220 | 2,000 |
| MD305S-12 | 5 | 4.50 - 5.50 | 701 | 50 | 12.0 | 250 | 4.5 | 7.0 | 85 | 220 | 2,000 |
| MD305S-15 | 5 | 4.50 - 5.50 | 686 | 50 | 15.0 | 200 | 3.0 | 6.0 | 87 | 220 | 2,000 |
| MD312S-05 | 12 | 10.8 - 13.2 | 298 | 40 | 5.0 | 600 | 12.0 | 6.0 | 84 | 220 | 1,000 |
| MD312S-09 | 12 | 10.8 - 13.2 | 285 | 40 | 9.0 | 333 | 6.0 | 5.0 | 87 | 220 | 1,000 |
| MD312S-12 | 12 | 10.8 - 13.2 | 284 | 40 | 12.0 | 250 | 4.5 | 4.5 | 88 | 220 | 1,000 |
| MD312S-15 | 12 | 10.8 - 13.2 | 281 | 40 | 15.0 | 200 | 3.0 | 4.0 | 88 | 220 | 1,000 |
| MD324S-05 | 24 | 21.6 - 26.4 | 152 | 30 | 5.0 | 600 | 12.0 | 5.8 | 82 | 220 | 500 |
| MD324S-09 | 24 | 21.6 - 26.4 | 147 | 30 | 9.0 | 333 | 6.0 | 4.8 | 85 | 220 | 500 |
| MD324S-12 | 24 | 21.6 - 26.4 | 146 | 30 | 12.0 | 250 | 4.5 | 4.3 | 85 | 220 | 500 |
| MD324S-15 | 24 | 21.6 - 26.4 | 147 | 30 | 15.0 | 200 | 3.0 | 3.5 | 85 | 220 | 500 |

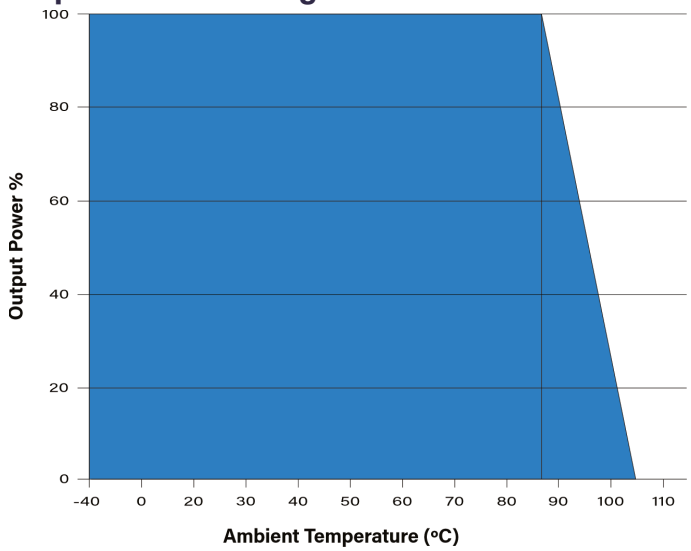
Notes:

1. Output load regulation is specified for a load change of 20% to 100%.
2. When measuring output ripple & noise, it is recommended that an external ceramic capacitor (0.33 µF typ.) be placed from the +Vout to the -Vout pins.
3. Free air convection is typically 20 LFM. The units should not be operated in still air (0 LFM).
4. Operation at no-load will not damage the unit, but 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.

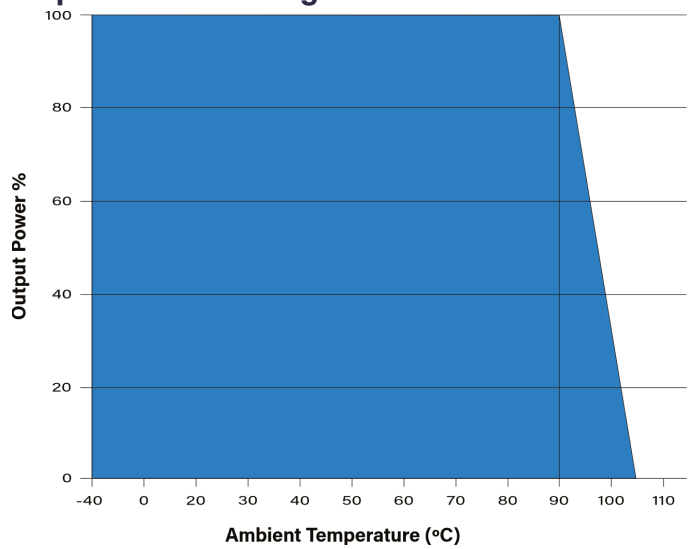
### Temperature Derating Curve: With 20 LFM



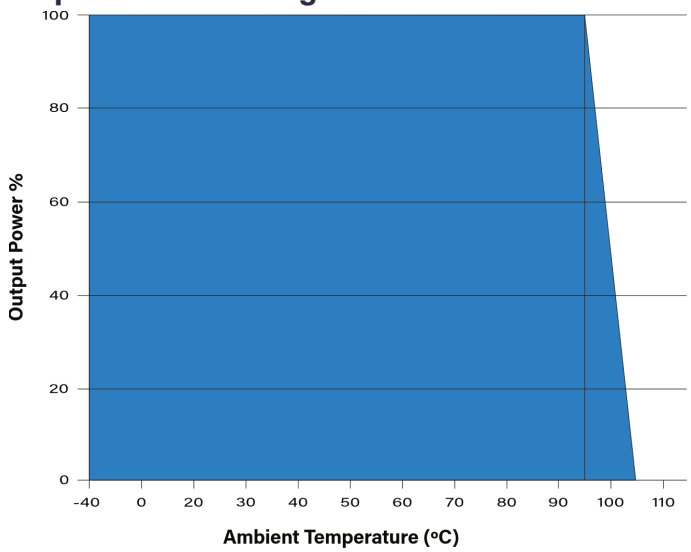

### Temperature Derating Curve: With 100 LFM




### Temperature Derating Curve: With 200 LFM

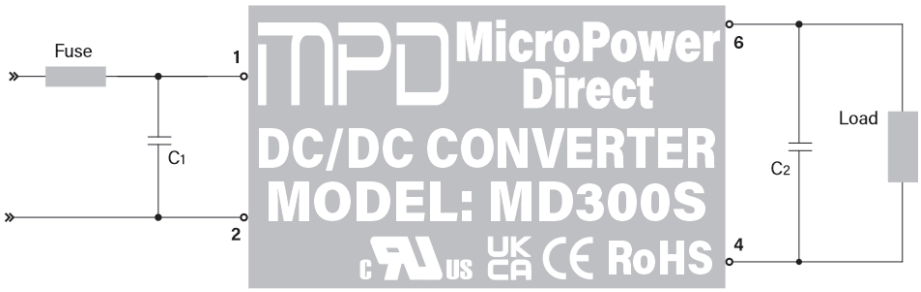



### Temperature Derating Curve: With 400 LFM



## Typical Connection

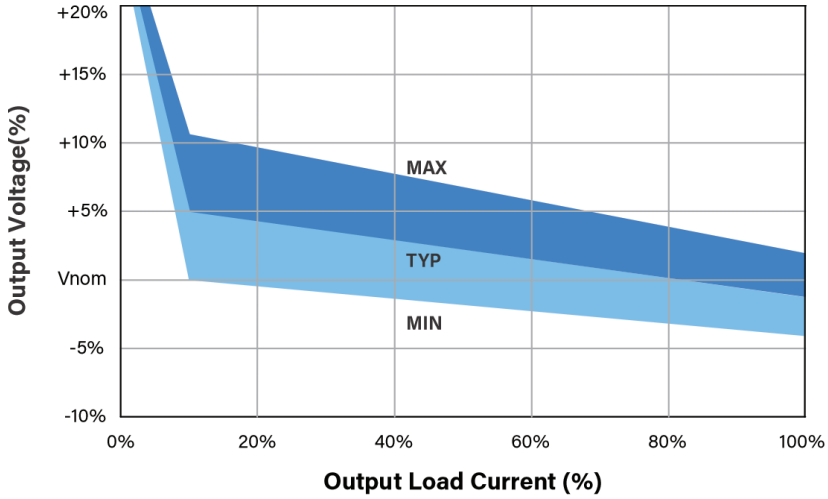





The diagram above illustrates a typical connection of the **MD300S**. For applications that do not require the circuit to meet EMI/EMC specifications, the capacitors C1 and C2 will reduce input/output ripple and improve the converter stability over time and temperature. The recommended component values are given in the table at left.

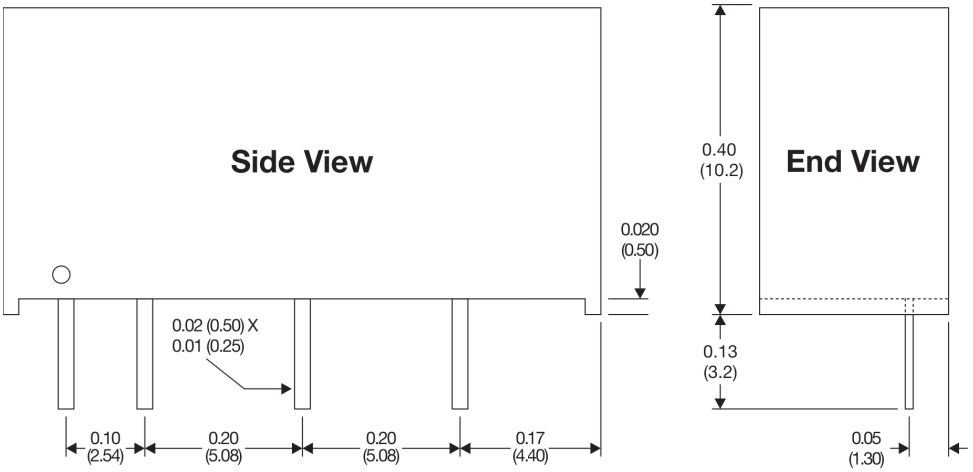
| Model | C1 | C2 |
|---|---|---|
| MD305S | 2.2 µF/50V | 1.0 µF/50V |
| MD312S | 1.0 µF/50V | 1.0 µF/50V |
| MD324S | 0.47 µF/100V | 1.0 µF/50V |

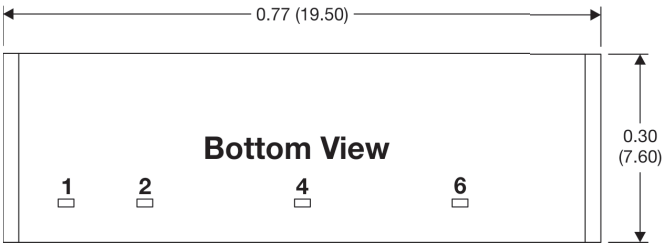
## Output Voltage Tolerance




The graph at left shows the typical output voltage tolerance for the **MD300S** series. Contact the factory for more information on specific models.

## Mechanical Dimensions




## Pin Connections

| Pin | Function |
|---|---|
| 1 | +VIN |
| 2 | -VIN |
| 4 | -VOUT |
| 6 | +VOUT |

**Notes:**

- All dimensions are typical in inches (mm)
- General Tolerance x.xx = ±0.01 (±0.25)
- Pin 1 is marked by a "dot" or indentation on the top of the unit

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