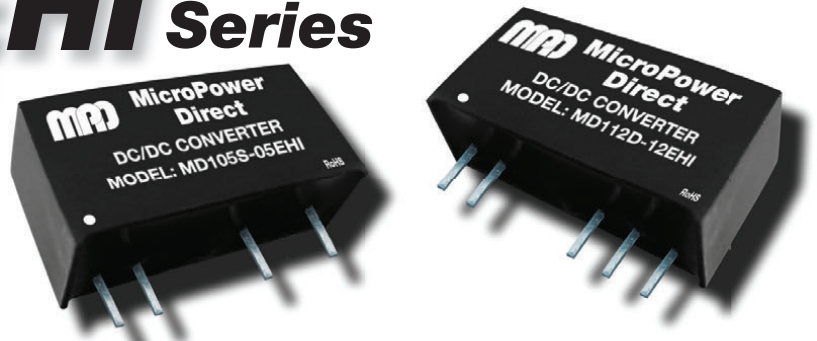


MD100xEHI Series

Low Cost, 1W 6 kV Isolation, SIP DC/DC Converters



Key Features:

- 1W Output Power
- Miniature SIP Case
- Short Circuit Protected
- 6,000 VDC Isolation
- Single and Dual Outputs
- >3.5 MHour MTBF
- -40°C to +105°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 | 5.0 | 5.50 | VDC |
| | 12 VDC Input | 10.80 | 12.0 | 13.20 | |
| | 15 VDC Input | 13.50 | 15.0 | 16.50 | |
| | 24 VDC Input | 21.60 | 24.0 | 26.40 | |

Input Filter

Internal Capacitor

Output

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-------------------------------------|------------------------------|------|------|-------|----------|
| Output Voltage Accuracy | | | ±2.5 | | % |
| Line Regulation | For V_{IN} Change of 1% | | | ±1.2 | % |
| Load Regulation, See Note 1 | See Model Selection Guide | | | | |
| Ripple & Noise (20 MHz), See Note 2 | Output Voltage \leq 12 VDC | | 100 | | mV P - P |
| | 15 VDC, 24 VDC Output | | 150 | | |
| Temperature Coefficient | | | | ±0.03 | %/°C |
| Output Short Circuit | Continuous (Autorecovery) | | | | |

General

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-----------------------|---------------|-------|------|------|-------|
| Isolation Voltage | 60 Seconds | 6,000 | | | VDC |
| Isolation Resistance | 500 VDC | 1,000 | | | MΩ |
| Isolation Capacitance | 100 kHz, 0.1V | | 10 | | pF |
| Switching Frequency | | | 50 | | kHz |

EMI Characteristics

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|----------------------------|-------------------------------|------------------------------------|--------------------------|------|-------|
| EMI Compliance, See Note 4 | Conducted | | CISPR22/EN 55022 Level B | | |
| | Radiated | | CISPR22/EN 55022 Level B | | |
| EMC Compliance, | Electrostatic Discharge (ESD) | EN 61000-4-2 Level B Contact ±8 kV | | | |

Environmental

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-----------------------------|---------------------|------|------|------|-------|
| Operating Temperature Range | Ambient | -40 | +25 | +105 | °C |
| Storage Temperature Range | | -55 | | +125 | °C |
| Cooling | Free Air Convection | | | | |
| Humidity | RH, Non-condensing | | | 95 | % |

Physical

| | | | | | |
|---------------|---|--|--|--|--|
| Case Size | 0.768 x 0.386 x 0.492 Inches (19.5 x 9.8 x 12.5 mm) | | | | |
| Case Material | Non-Conductive Black Plastic (UL-94V0) | | | | |
| Weight | 0.14 Oz (4.2g) | | | | |

Reliability Specifications

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|-----------|---------------------------------|------|------|------|--------|
| MTBF | MIL HDBK 217F, 25°C, Gnd Benign | 3.5 | | | 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 | |
| | 15 VDC Input | -0.7 | | 21.0 | |
| | 24 VDC Input | -0.7 | | 30.0 | |
| Lead Temperature | 1.5 mm From Case For 10 Sec | | | 300 | °C |

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

RoHS



Cost Cuts



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| Model Number | Input | | | | Output | | | Load Regulation % Typ. | 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 | | | | | | | |
| MD105S-03EHI | 5 | 4.5 - 5.5 | 278 | 30 | 3.3 | 303 | 30.0 | 15.0 | 220 | 72 | 500 |
| MD105S-05EHI | 5 | 4.5 - 5.5 | 256 | 30 | 5.0 | 200 | 20.0 | 12.0 | 220 | 78 | 500 |
| MD105S-09EHI | 5 | 4.5 - 5.5 | 253 | 30 | 9.0 | 111 | 12.0 | 8.0 | 220 | 79 | 500 |
| MD105S-12EHI | 5 | 4.5 - 5.5 | 253 | 30 | 12.0 | 84 | 9.0 | 7.0 | 220 | 79 | 500 |
| MD105S-15EHI | 5 | 4.5 - 5.5 | 253 | 30 | 15.0 | 67 | 7.0 | 6.0 | 220 | 79 | 500 |
| MD105S-24EHI | 5 | 4.5 - 5.5 | 250 | 30 | 24.0 | 42 | 4.0 | 5.0 | 220 | 80 | 500 |
| MD105D-05EHI | 5 | 4.5 - 5.5 | 256 | 30 | ±5.0 | ±100 | ±10.0 | 12.0 | 220 | 78 | 500 |
| MD105D-07EHI | 5 | 4.5 - 5.5 | 256 | 30 | ±7.2 | ±70 | ±7.0 | 8.0 | 220 | 78 | 500 |
| MD105D-09EHI | 5 | 4.5 - 5.5 | 253 | 30 | ±9.0 | ±56 | ±6.0 | 8.0 | 220 | 79 | 500 |
| MD105D-12EHI | 5 | 4.5 - 5.5 | 253 | 30 | ±12.0 | ±42 | ±5.0 | 7.0 | 220 | 79 | 500 |
| MD105D-15EHI | 5 | 4.5 - 5.5 | 253 | 30 | ±15.0 | ±33 | ±4.0 | 6.0 | 220 | 79 | 500 |
| MD112S-05EHI | 12 | 10.8 - 13.2 | 104 | 20 | 5.0 | 200 | 20.0 | 12.0 | 220 | 80 | 250 |
| MD112S-07EHI | 12 | 10.8 - 13.2 | 104 | 20 | 7.2 | 139 | 14.0 | 8.0 | 220 | 80 | 250 |
| MD112S-09EHI | 12 | 10.8 - 13.2 | 102 | 20 | 9.0 | 111 | 12.0 | 8.0 | 220 | 82 | 250 |
| MD112S-12EHI | 12 | 10.8 - 13.2 | 103 | 20 | 12.0 | 84 | 9.0 | 7.0 | 220 | 81 | 250 |
| MD112S-15EHI | 12 | 10.8 - 13.2 | 102 | 20 | 15.0 | 67 | 7.0 | 6.0 | 220 | 82 | 250 |
| MD112D-05EHI | 12 | 10.8 - 13.2 | 104 | 20 | ±5.0 | ±100 | ±10.0 | 12.0 | 220 | 80 | 250 |
| MD112D-07EHI | 12 | 10.8 - 13.2 | 104 | 20 | ±7.2 | ±70 | ±7.0 | 8.0 | 220 | 80 | 250 |
| MD112D-09EHI | 12 | 10.8 - 13.2 | 102 | 20 | ±9.0 | ±56 | ±6.0 | 8.0 | 220 | 82 | 250 |
| MD112D-12EHI | 12 | 10.8 - 13.2 | 103 | 20 | ±12.0 | ±42 | ±5.0 | 7.0 | 220 | 81 | 250 |
| MD112D-15EHI | 12 | 10.8 - 13.2 | 102 | 20 | ±15.0 | ±33 | ±4.0 | 6.0 | 220 | 82 | 250 |
| MD115S-05EHI | 15 | 13.5 - 16.5 | 82 | 15 | 5.0 | 200 | 20.0 | 12.0 | 220 | 80 | 200 |
| MD115S-15EHI | 15 | 13.5 - 16.5 | 82 | 15 | 9.0 | 111 | 12.0 | 8.0 | 220 | 80 | 200 |
| MD115D-05EHI | 15 | 13.5 - 16.5 | 82 | 15 | ±5.0 | ±100 | ±10.0 | 12.0 | 220 | 80 | 200 |
| MD115D-15EHI | 15 | 13.5 - 16.5 | 81 | 15 | ±15.0 | ±33 | ±4.0 | 6.0 | 220 | 81 | 200 |
| MD124S-03EHI | 24 | 21.6 - 26.4 | 58 | 10 | 3.3 | 303 | 30.0 | 15.0 | 220 | 72 | 125 |
| MD124S-05EHI | 24 | 21.6 - 26.4 | 52 | 10 | 5.0 | 200 | 20.0 | 12.0 | 220 | 80 | 125 |
| MD124S-12EHI | 24 | 21.6 - 26.4 | 52 | 10 | 12.0 | 84 | 9.0 | 7.0 | 220 | 80 | 125 |
| MD124S-15EHI | 24 | 21.6 - 26.4 | 52 | 10 | 15.0 | 67 | 7.0 | 6.0 | 220 | 80 | 125 |
| MD124D-12EHI | 24 | 21.6 - 26.4 | 52 | 10 | ±12.0 | ±42 | ±5.0 | 7.0 | 220 | 80 | 125 |

- Notes:
- Output load regulation is specified for a load change of 10% to 100%.
 - Operation at no load will not damage these units, however, they may not meet all specifications.
 - These converters are specified for operation without external components. However, in some applications the addition of input/output capacitors will enhance stability and reduce output ripple. The simple connection shown below will typically meet EN 55022 Class B. For dual output units, a capacitor should be connected from each output to common.
 - 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

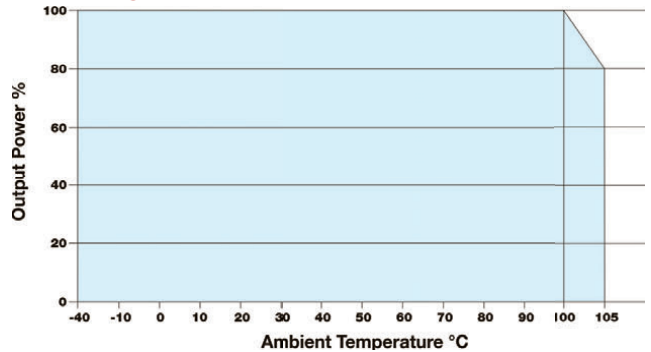


| V _{IN} | C ₁ | L ₁ | V _{OUT} | C ₂ |
|-----------------|----------------|----------------|------------------|----------------|
| 5 VDC | 4.7 µF/50V | 6.8 µH | 3.3 VDC | 10 µF |
| 12 VDC | 2.2 µF/50V | 6.8 µH | 5 VDC | 10 µF |
| 15 VDC | 2.2 µF/50V | 6.8 µH | 7.2 VDC | 4.7 µF |
| 24 VDC | 1.0 µF/50V | 6.8 µH | 9 VDC | 4.7 µF |
| | | | 12 VDC | 2.2 µF |
| | | | 15 VDC | 1.0 µF |
| | | | 24 VDC | 1.0 µF |
| | | | ±5 VDC | 4.7 µF |
| | | | ±7.2 VDC | 2.2 µF |
| | | | ±9 VDC | 2.2 µF |
| | | | ±12 VDC | 2.2 µF |
| | | | ±15 VDC | 1.0 µF |

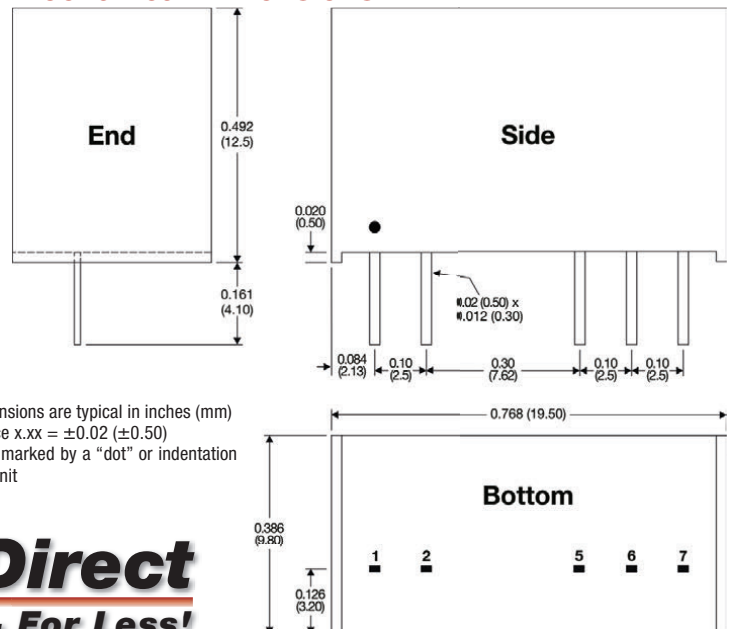
Pin Connections

| Pin | Single | Dual | Pin | Single | Dual |
|-----|--------|-------|-----|--------|--------|
| 1 | +VIN | +VIN | 6 | No Pin | Common |
| 2 | -VIN | -VIN | 7 | +VOUT | +VOUT |
| 5 | -VOUT | -VOUT | | | |

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 unit



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