

# MD100BR

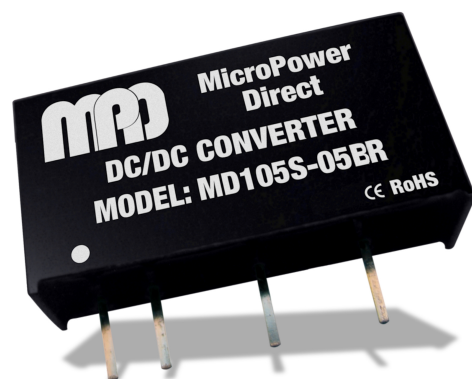
## 1W, Tightly Regulated, SIP, DC/DC Converters

### Key Features:

- 1W Output Power
- Miniature SIP Case
- Low Isolation Capacitance
- Tight Regulation
- 1500 VDC Isolation
- -40°C to +85°C Operating Temperature Range
- >3.5 MHour MTBF
- Short Circuit Protected
- Industry Standard Pin-Out



RoHS



### Electrical Specifications

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

| Input                    |              | Min. | Typ.               | Max. | Units |
|--------------------------|--------------|------|--------------------|------|-------|
| Parameter                | Conditions   |      |                    |      |       |
| Input Current            | 5 VDC Input  | 4.75 | 5                  | 5.25 | VDC   |
|                          | 9 VDC Input  | 8.55 | 9                  | 9.45 |       |
|                          | 12 VDC Input | 11.4 | 12                 | 12.6 |       |
|                          | 24 VDC Input | 22.8 | 24                 | 25.2 |       |
| Reflected Ripple Current |              |      | 15                 |      | mA    |
| Input Filter             |              |      | Capacitance Filter |      |       |

| Output                     |                             | Min.          | Typ.  | Max.  | Units |
|----------------------------|-----------------------------|---------------|-------|-------|-------|
| Parameter                  | Conditions                  |               |       |       |       |
| Output Voltage Accuracy    |                             |               |       | ±3    | %     |
| Line Regulation            | Input Voltage Variation ±1% |               |       | ±0.25 | %     |
| Load Regulation            | 10%-100% Load               | 3.3VDC Output |       | ±3    | %     |
|                            |                             | Others        |       | ±2    |       |
| Ripple & Noise, See Note 1 | 20 MHz band width           | 24VDC Output  | 50    | 120   | mVp-p |
|                            |                             | Others        | 30    | 80    |       |
| Temperature Coefficient    | Full load                   |               | ±0.02 |       | %/°C  |
| Output Short Circuit       | Continuous, self-recovery   |               |       |       |       |

### General

| Parameter             | Conditions                       | Min. | Typ. | Max. | Units |
|-----------------------|----------------------------------|------|------|------|-------|
| Isolation Voltage     | 60 seconds                       | 1500 |      |      | VDC   |
| Isolation Resistance  | 500 VDC                          | 1000 |      |      | MΩ    |
| Isolation Capacitance | 100 KHz /0.1V                    |      | 20   |      | pF    |
| Switching Frequency   | Full load, nominal input voltage |      | 220  |      | kHz   |

### Environmental

| Parameter                   | Conditions          | Min. | Typ. | Max. | Units |
|-----------------------------|---------------------|------|------|------|-------|
| Operating Temperature Range | See Figure 3        | -40  |      | +85  | °C    |
| Storage Temperature Range   |                     | -55  |      | +125 | °C    |
| Cooling                     | Free Air Convection |      |      |      |       |
| Humidity, See Note 7        | Non condensing      |      |      | 95   | %RH   |

### Physical

|               |                                                                   |  |  |  |  |
|---------------|-------------------------------------------------------------------|--|--|--|--|
| Case Size     | 0.77 in x 0.24 in x 0.40 in (See mechanical diagrams on page 4)   |  |  |  |  |
| Case Material | Black plastic; flame retardant and heat resistant (UL94V-0 rated) |  |  |  |  |
| Weight        | 0.0740z (2.1g) Typ.                                               |  |  |  |  |

### Reliability Specifications

| Parameter | Conditions         | Min. | Typ. | Max. | Units  |
|-----------|--------------------|------|------|------|--------|
| MTBF      | MIL-HDBK-217F@25°C | 3.5  |      |      | MHours |

### EMI Characteristics

| Parameter           | Standard         | Criteria | Level                    |
|---------------------|------------------|----------|--------------------------|
| Radiated Emissions  | CISPR32/EN 55032 |          | Class B (Fig. 5)         |
| Conducted Emissions | CISPR32/EN 55032 |          | Class B (Fig. 5)         |
| ESD                 | EN 61000-4-2     | B        | ±6 kV Contact, ±8 kV Air |

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## Model Selection Guide

| Model Number | Input         |                  |                 |         | Output        |                   | Full Load Efficiency (% Typ) | Reflected Ripple Current (mA Typ) | Capacitive Load (μF Max) (See Note 6) | Fuse Rating Slow-Blow (mA) |
|--------------|---------------|------------------|-----------------|---------|---------------|-------------------|------------------------------|-----------------------------------|---------------------------------------|----------------------------|
|              | Voltage (VDC) |                  | Current (mA)    |         | Voltage (VDC) | Current (mA, Max) |                              |                                   |                                       |                            |
|              | Nominal       | Range See Note 4 | Full-Load (Typ) | No-Load |               |                   |                              |                                   |                                       |                            |
| MD105S-03BR  | 5             | 4.75-5.25        | 286             | 15      | 3.3           | 250               | 67                           | 15                                | 2400                                  | 600                        |
| MD105S-05BR  | 5             | 4.75-5.25        | 286             | 15      | 5             | 200               | 70                           | 15                                | 2400                                  | 600                        |
| MD105S-12BR  | 5             | 4.75-5.25        | 286             | 15      | 12            | 84                | 71                           | 15                                | 560                                   | 600                        |
| MD105S-15BR  | 5             | 4.75-5.25        | 286             | 15      | 15            | 67                | 72                           | 15                                | 560                                   | 600                        |
| MD105S-24BR  | 5             | 4.75-5.25        | 286             | 15      | 24            | 41                | 73                           | 15                                | 100                                   | 600                        |
| MD112S-03BR  | 12            | 11.4-12.6        | 115             | 8       | 3.3           | 250               | 67                           | 15                                | 2400                                  | 250                        |
| MD112S-05BR  | 12            | 11.4-12.6        | 115             | 8       | 5             | 200               | 70                           | 15                                | 2400                                  | 250                        |
| MD112S-12BR  | 12            | 11.4-12.6        | 115             | 8       | 12            | 84                | 72                           | 15                                | 560                                   | 250                        |
| MD124S-03BR  | 24            | 22.8-25.2        | 59              | 4       | 3.3           | 250               | 67                           | 15                                | 2400                                  | 125                        |
| MD124S-05BR  | 24            | 22.8-25.2        | 59              | 4       | 5             | 200               | 72                           | 15                                | 2400                                  | 125                        |
| MD124S-12BR  | 24            | 22.8-25.2        | 59              | 4       | 12            | 83                | 73                           | 15                                | 560                                   | 125                        |

## Notes:

- To further reduce input and output ripple, a capacitor filtering network can be connected at the input and output terminals. The application circuit is shown in Figure 4. However, care should be taken to select a suitable filter capacitor. If the capacitance is too large, it is likely to cause start-up problems. For each output, the recommended capacitive load values are shown in "Recommended Capacitive Load Value Table" for safe and reliable operation.
- See Figure 5 for EMC typical recommended circuit
- In order to ensure that the module can work efficiently and reliably, the minimum output load should not be less than 10% of the rated load when used. If the power required is really small, connect a resistor in parallel to the output end (the sum of the power consumed by the resistance and the power actually used is greater than or equal to 10% of the rated power).
- The input voltage should not exceed the specified range value, otherwise it may cause permanent and irreparable damage.
- It is recommended to use at a load of over 5%. If the load is below 5%, the ripple index of the product may exceed the specifications, but it does not affect the reliability of the product.
- The maximum capacitive load is tested within the input voltage range and under full load conditions.
- Unless otherwise specified, all indicators in this manual are measured at Ta=25 °C, humidity<75% RH, nominal input voltage, and output rated load.
- All indicator testing methods in this manual are based on our company's corporate standards.
- Our company can provide product customization, and specific requirements can be directly contacted by our technical personnel.
- Product specifications are subject to change without prior notice.

## Typical Characteristic Curves

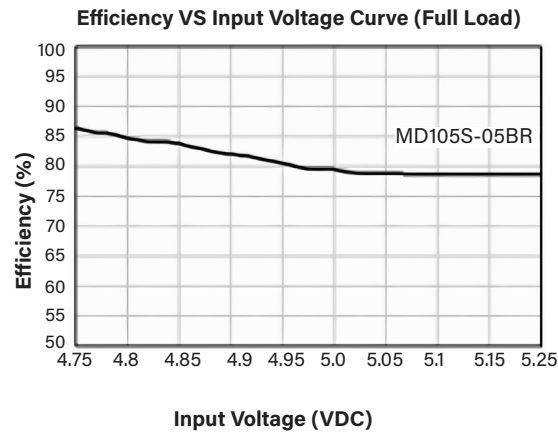


Fig. 1

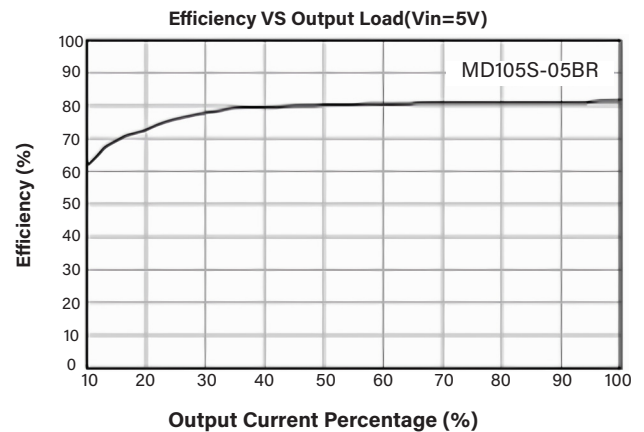


Fig. 2

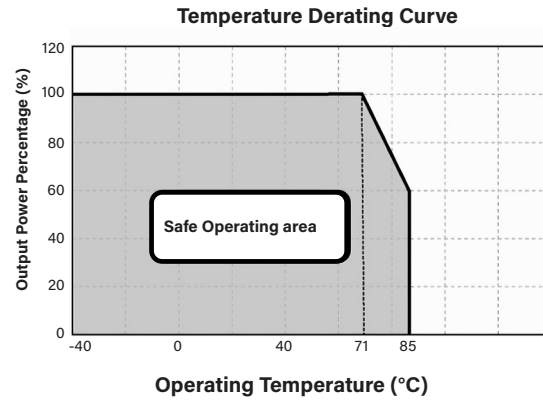


Fig. 3

## Application Circuits

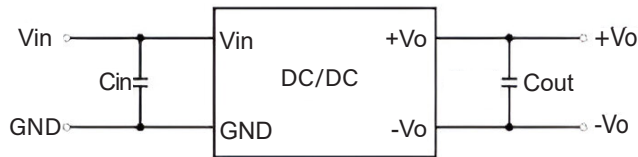


Fig. 4

| Recommended Capacitive Load Value Table |               |         |                |
|-----------------------------------------|---------------|---------|----------------|
| VIN(VDC)                                | Cin( $\mu$ F) | Vo(VDC) | Cout( $\mu$ F) |
| 5VDC                                    | 4.7uF16V      | 3.3/15  | 10             |
| 12/15VDC                                | 2.2           | 9/12    | 2.2            |
| 24VDC                                   | 1.0           | 15/24   | 1.0            |

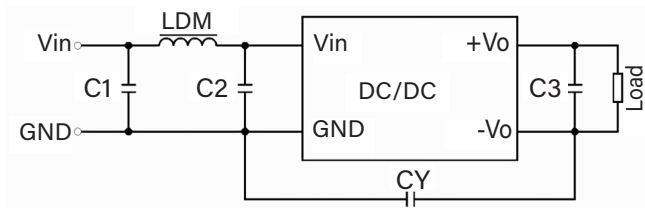
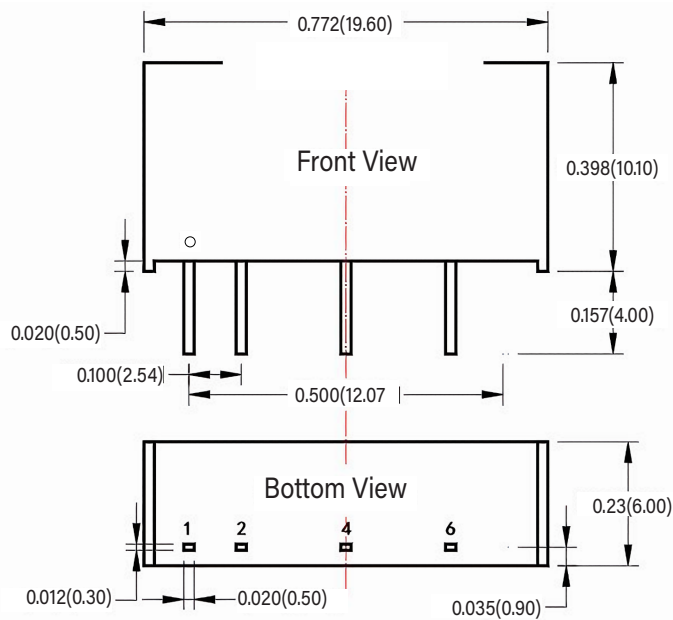


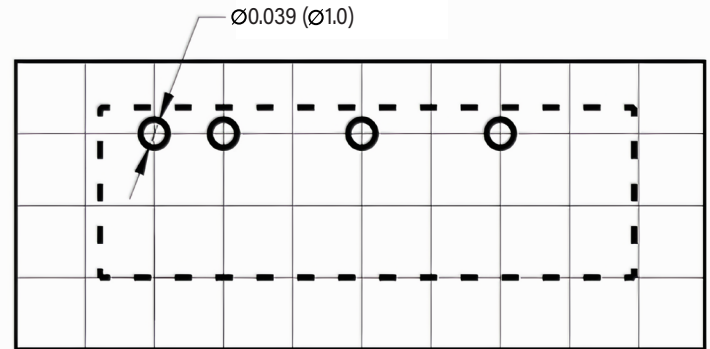
Fig. 5

| EMI Recommended Parameter Table |       |                                       |         |
|---------------------------------|-------|---------------------------------------|---------|
| Input Voltage                   |       | 5VDC                                  |         |
| Output Voltage (VDC)            |       | 5/12/15                               | 24      |
| EMI                             | C1/C2 | 4.7 $\mu$ F / 50V                     |         |
|                                 | CY    | --                                    | 1nF/2KV |
|                                 | C3    | Refer to the Cout parameter in Fig. 4 |         |
|                                 | LDM   | 6.8 $\mu$ H                           |         |

## Mechanical Dimensions



## PCB Layout



The grid distance is 2.54 x 2.54 mm

## Pin Definition Table

| Pin | Function        |
|-----|-----------------|
| 1   | V <sub>in</sub> |
| 2   | GND             |
| 4   | -V <sub>o</sub> |
| 6   | +V <sub>o</sub> |

**Note:**

Unit: inches(mm)

Pin section tolerances:  $\pm 0.004$  ( $\pm 0.10$ )General tolerances:  $\pm 0.020$  ( $\pm 0.50$ )