

MSA_(M)D-3W & MSB_(M)D-3W Series 3W, WIDE INPUT, ISOLATED & REGULATED DUAL/SINGLE OUTPUT DIP DC-DC CONVERTER

RoHS multi-country patent protection

FEATURES

- Wide (2:1) Input Range
- Efficiency Up To 82%
- Operating Temperature: -40°C to +85°C
- 1.5KVDC Isolation
- Short Circuit Protection(automatic recovery)
- Internal SMD construction
- No Heat Sink Required
- No external component required
- UL94-V0 Package
- Industry Standard Pin out
- MTBF>1,000,000 hours
- RoHS Compliance

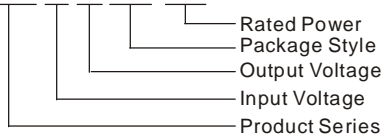
APPLICATIONS

The MSA_(M)D-3W & MSB_(M)D-3W Series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board. These products apply to:

- Where the voltage of the input power supply is wide range (voltage range $\leq 2:1$);
- Where isolation is necessary between input and output(isolation voltage $\leq 1500\text{VDC}$);
- Where the regulation of the output voltage and the output ripple noise are demanded.

MODEL SELECTION

MSA2405MD-3W



PRODUCT PROGRAM

| Part Number | Input | | | Output | | | Efficiency (% , Typ) | Certificate |
|----------------|---------------|-------|------|---------------|--------------|-----|----------------------|-------------|
| | Voltage (VDC) | | | Voltage (VDC) | Current (mA) | | | |
| | Nominal | Range | Max* | | Max | Min | | |
| MSA0505(M)D-3W | 5 | 4.5-9 | 11 | ±5 | ±300 | ±30 | 68 | |
| MSA0509(M)D-3W | | | | ±9 | ±167 | ±16 | 70 | |
| MSA0512(M)D-3W | | | | ±12 | ±125 | ±12 | 72 | |
| MSA0515(M)D-3W | | | | ±15 | ±100 | ±10 | 73 | |
| MSB0505(M)D-3W | | | | 5 | 600 | 60 | 68 | |
| MSB0509(M)D-3W | | | | 9 | 333 | 33 | 70 | |
| MSB0512(M)D-3W | | | | 12 | 250 | 25 | 72 | |
| MSB0515(M)D-3W | | | | 15 | 200 | 20 | 73 | |
| MSB0524(M)D-3W | | | | 24 | 125 | 12 | 74 | |
| MSA1205(M)D-3W | | | | 12 | 9-18 | 22 | ±5 | ±300 |
| MSA1209(M)D-3W | ±9 | ±167 | ±16 | | | | 78 | |
| MSA1212(M)D-3W | ±12 | ±125 | ±12 | | | | 79 | |
| MSA1215(M)D-3W | ±15 | ±100 | ±10 | | | | 80 | |
| MSB1205(M)D-3W | 5 | 600 | 60 | | | | 76 | |
| MSB1209(M)D-3W | 9 | 333 | 33 | | | | 78 | |
| MSB1212(M)D-3W | 12 | 250 | 25 | | | | 80 | |
| MSB1215(M)D-3W | 15 | 200 | 20 | | | | 81 | |
| MSB1224(M)D-3W | 24 | 125 | 12 | | | | 82 | |
| MSA2405(M)D-3W | 24 | 18-36 | 40 | | | | ±5 | ±300 |
| MSA2409(M)D-3W | | | | ±9 | ±167 | ±16 | 78 | |
| MSA2412(M)D-3W | | | | ±12 | ±125 | ±12 | 80 | |
| MSA2415(M)D-3W | | | | ±15 | ±100 | ±10 | 81 | |
| MSB2403(M)D-3W | | | | 3.3 | 909 | 90 | 74 | UL |
| MSB2405(M)D-3W | | | | 5 | 600 | 60 | 76 | UL |
| MSB2409(M)D-3W | | | | 9 | 333 | 33 | 78 | UL |
| MSB2412(M)D-3W | | | | 12 | 250 | 25 | 81 | UL |
| MSB2415(M)D-3W | | | | 15 | 200 | 20 | 80 | UL |
| MSB2424(M)D-3W | | | | 24 | 125 | 12 | 82 | |
| MSA4805(M)D-3W | 48 | 36-72 | 80 | ±5 | ±300 | ±30 | 76 | |
| MSA4809(M)D-3W | | | | ±9 | ±167 | ±16 | 78 | |
| MSA4812(M)D-3W | | | | ±12 | ±125 | ±12 | 80 | |
| MSA4815(M)D-3W | | | | ±15 | ±100 | ±10 | 81 | |
| MSB4803(M)D-3W | | | | 3.3 | 909 | 90 | 74 | |
| MSB4805(M)D-3W | | | | 5 | 600 | 60 | 76 | |
| MSB4809(M)D-3W | | | | 9 | 333 | 33 | 78 | |
| MSB4812(M)D-3W | | | | 12 | 250 | 25 | 81 | |
| MSB4815(M)D-3W | | | | 15 | 200 | 20 | 80 | |
| MSB4824(M)D-3W | | | | 24 | 125 | 12 | 82 | |

* Input voltage over it may cause permanent damage to the device.

Note: 1. Metal package style's series is MSA_MD-3W & MSB_MD-3W.

2. The load shouldn't be less than 10%, otherwise ripple will increase dramatically.

3. Operation under 10% load will not damage the converter; However, they may not meet all specification listed.

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ISOLATION SPECIFICATIONS

| Item | Test conditions | Min | Typ | Max | Units |
|-----------------------|---------------------------------|------|-----|-----|-------|
| Isolation voltage | Tested for 1 minute and 1mA max | 1500 | | | VDC |
| Isolation resistance | Test at 500VDC | 1000 | | | MΩ |
| Isolation Capacitance | Input/Output | | 80 | | pF |

OUTPUT SPECIFICATIONS

| Item | Test conditions | Min | Typ | Max | Units |
|---------------------------|----------------------------------|-----|------|-------|-------|
| Output power | See below products program | 0.3 | | 3 | W |
| Positive voltage accuracy | Refer to recommended circuit | | ±1 | ±3 | % |
| Negative voltage accuracy | Refer to recommended circuit | | ±3 | ±5 | |
| Load regulation | From 10% to 100% load | | ±0.5 | ±1* | |
| Line regulation | Input Voltage From Low to High | | ±0.2 | ±0.5 | |
| Temperature drift(Vout) | Refer to recommended circuit | | | ±0.03 | %/°C |
| Ripple & Noise** | 20MHz bandwidth | | 50 | 100 | mVp-p |
| Switching frequency | 100% load, nominal input voltage | | 300 | | KHz |

*Dual output models unbalanced load: ±5%.

**Test ripple and noise by "parallel cable" method. See detailed operation instructions at Testing of Power Converter section, application notes.

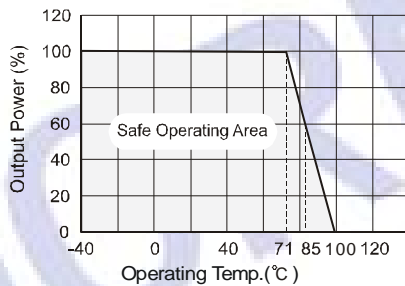
COMMON SPECIFICATIONS

| Item | Test Conditions | Min | Typ | Max | Units |
|---------------------------|--|------|-----|-----|---------|
| Storage humidity | | | | 95 | % |
| Operating temperature | | -40 | | 85 | °C |
| Storage temperature | | -55 | | 125 | |
| Temp. rise at full load | | | 15 | | |
| Lead temperature | 1.5mm from case for 10 seconds | | | 300 | |
| No-load Power consumption | | | 0.2 | | W |
| Cooling | Free air convection | | | | |
| Short circuit protection | Continuous, Automatic Recovery | | | | |
| Case material | D: Plastic (UL94-V0); MD: Steel, Nickel Coated | | | | |
| MTBF | | 1000 | | | K hours |
| Weight | | | 15 | | g |

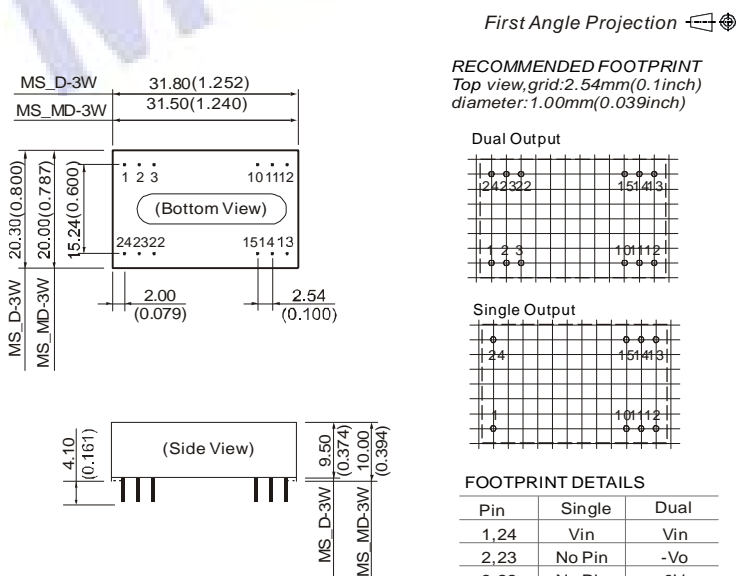
Note:

- All specifications measured at TA=25°C, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
- See below recommended circuits for more details.

TYPICAL CHARACTERISTICS



OUTLINE DIMENSIONS & PIN CONNECTIONS



Note:
Unit:mm(inch)
Pin diameter:0.50mm(0.020inch)
Pin diameter tolerances:±0.05mm(±0.002inch)
General tolerances:±0.25mm(±0.010inch)

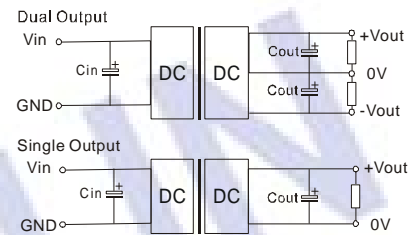
APPLICATION NOTE

Requirement On Output Load

In order to ensure the product operate efficiently and reliably, in addition to a max load (namely full load), a minimum load is specified for this kind of DC/DC converter. Make sure the specified range of input voltage is not exceeded, the minimum output load no less than 10% load. If the actual load is less than the specified minimum load, the output ripple may increase sharply while its efficiency and reliability will reduce greatly. If the actual output power is very small, please add an appropriate resistor as extra loading, or contact our company for other lower output power products.

Recommended Circuit

All the MSA_(M)D-3W & MSB_(M)D-3W Series have been tested according to the following recommended testing circuit before leaving factory. This series should be tested under load. Never be tested under no load (see Figure 1).



(Figure 1)

If you want to further decrease the input/output ripple, you can increase capacitance properly or choose capacitors with low ESR. However, the capacitance of the output filter capacitor must be proper. If the capacitance is too big, a startup problem might arise. For every channel of output, provided the safe and reliable operation is ensured, the greatest capacitance of its filter capacitor sees (Table 1). Generally: If you want to use the products in high EMI, please choose our metal packaged products (MSA_MD-3W & MSB_MD-3W). Generally:

Cin: 5V&12V 100µF
24V&48V 10µF-47µF
Cout: 10µF/100mA

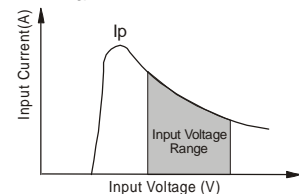
Output External Capacitor Table (Table 1)

| Single Vout (VDC) | Cout (µF) | Dual Vout (VDC) | Cout (µF) |
|-------------------|-----------|-----------------|-----------|
| 5 | 1000 | ±5 | 680 |
| 9 | 680 | ±9 | 470 |
| 12 | 470 | ±12 | 330 |
| 15 | 330 | ±15 | 220 |
| 24 | 220 | ±24 | 100 |

Input Current

When it is used in unregulated power supply, be sure that the fluctuating range of the power supply and the rippled voltage do not exceed the module standard. Input current of power supply should afford the startup current of this kind of DC/DC module (See figure 2), Generally:

$$I_p \leq 1.4 \cdot I_{in-max}$$



(Figure 2)

No parallel connection or plug and play.