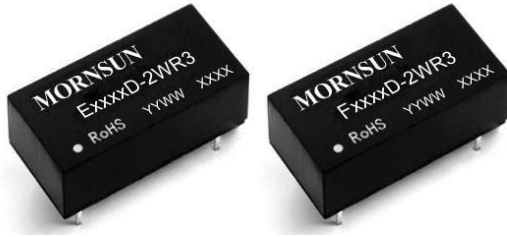


2W Isolated DC-DC converter  
Fixed input voltage, unregulated dual or single output



### FEATURES

- Continuous short-circuit protection
- No-load input current as low as 8mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 86%
- High power density
- I/O isolation test voltage 3k VDC
- Industry standard pin-out
- EN62368 approved
- Meets UL62368

CE Patent Protection RoHS



E\_D-2WR3 & F\_D-2WR3 series are specially designed for applications where an (two) isolated voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

### Selection Guide

| Certification | Part No.    | Input Voltage (VDC) | Output        |                           | Full Load Efficiency (%)<br>Min./Typ. | Capacitive Load*(μF)<br>Max. |
|---------------|-------------|---------------------|---------------|---------------------------|---------------------------------------|------------------------------|
|               |             | Nominal (Range)     | Voltage (VDC) | Current (mA)<br>Max./Min. |                                       |                              |
| CE            | E1203D-2WR3 | 12<br>(10.8-13.2)   | ±3.3          | ±303/±30                  | 71/75                                 | 1200                         |
|               | E1205D-2WR3 |                     | ±5            | ±200/±20                  | 76/80                                 |                              |
|               | E1212D-2WR3 |                     | ±12           | ±83/±8                    | 79/83                                 | 220                          |
|               | E1215D-2WR3 |                     | ±15           | ±67/±7                    | 79/83                                 |                              |
| --            | E1224D-2WR3 |                     | ±24           | ±42/±4                    | 81/85                                 | 100                          |
|               | F1205D-2WR3 |                     | 5             | 400/40                    | 78/82                                 | 2400                         |
|               | F1209D-2WR3 |                     | 9             | 222/23                    | 78/82                                 | 1200                         |
|               | F1212D-2WR3 |                     | 12            | 167/17                    | 80/84                                 | 560                          |
|               | F1215D-2WR3 |                     | 15            | 133/13                    | 81/85                                 |                              |
|               | F1224D-2WR3 |                     | 24            | 83/8                      | 82/86                                 | 220                          |
|               | E1509D-2WR3 | 15<br>(13.5-16.5)   | ±9            | ±111/±11                  | 77/81                                 | 560                          |
|               | E1512D-2WR3 |                     | ±12           | ±83/±8                    | 77/81                                 | 220                          |
|               | E1515D-2WR3 |                     | ±15           | ±67/±7                    | 77/81                                 |                              |
|               | F1505D-2WR3 |                     | 5             | 400/40                    | 75/79                                 | 2400                         |
|               | F1509D-2WR3 |                     | 9             | 222/23                    | 78/82                                 | 1200                         |
|               | F1515D-2WR3 |                     | 15            | 133/13                    | 75/79                                 | 560                          |
| CE            | E2405D-2WR3 | 24<br>(21.6-26.4)   | ±5            | ±200/±20                  | 74/80                                 | 1200                         |
| --            | E2412D-2WR3 |                     | ±12           | ±83/±8                    | 79/83                                 | 220                          |
| CE            | E2415D-2WR3 |                     | ±15           | ±67/±7                    | 77/83                                 |                              |
| --            | E2424D-2WR3 |                     | ±24           | ±42/±4                    | 80/84                                 | 100                          |
|               | F2405D-2WR3 |                     | 5             | 400/40                    | 76/80                                 | 2400                         |
|               | F2409D-2WR3 |                     | 9             | 222/23                    | 76/80                                 | 1200                         |
|               | F2412D-2WR3 |                     | 12            | 167/17                    | 80/84                                 | 560                          |
|               | F2415D-2WR3 |                     | 15            | 133/13                    | 82/86                                 |                              |
|               | F2424D-2WR3 |                     | 24            | 83/8                      | 82/86                                 | 220                          |

Note: \* The specified maximum capacitive load for positive and negative output is identical.

### Input Specifications

| Item                                   | Operating Conditions | Min. | Typ.  | Max.   | Unit |
|----------------------------------------|----------------------|------|-------|--------|------|
| Input Current<br>(full load / no-load) | 12V input            | --   | 208/8 | 219/-- | mA   |
|                                        | 15V input            | --   | 169/8 | 178/-- |      |

|                            |           |                    |       |       |     |
|----------------------------|-----------|--------------------|-------|-------|-----|
|                            | 24V input | --                 | 104/8 | 113-- |     |
| Reflected Ripple Current   |           | --                 | 15    | --    | mA  |
| Surge Voltage (1sec. max.) | 12V input | -0.7               | --    | 18    | VDC |
|                            | 15V input | -0.7               | --    | 21    |     |
|                            | 24V input | -0.7               | --    | 30    |     |
| Input Filter               |           | Capacitance filter |       |       |     |
| Hot Plug                   |           | Unavailable        |       |       |     |

## Output Specifications

| Item                     | Operating Conditions            |               | Min.                                 | Typ.       | Max.      | Unit  |
|--------------------------|---------------------------------|---------------|--------------------------------------|------------|-----------|-------|
| Voltage Accuracy         |                                 |               | See output regulation curve (Fig. 1) |            |           |       |
| Linear Regulation        | Input voltage change: $\pm 1\%$ | 3.3VDC output | --                                   | --         | $\pm 1.5$ | --    |
|                          |                                 | Others        | --                                   | --         | $\pm 1.2$ |       |
| Load Regulation          | 10%-100% load                   | 3.3VDC output | --                                   | 15         | 20        | %     |
|                          |                                 | 5VDC output   | --                                   | 7          | 15        |       |
|                          |                                 | 9VDC output   | --                                   | 5          | 10        |       |
|                          |                                 | 12VDC output  | --                                   | 5          | 10        |       |
|                          |                                 | 15VDC output  | --                                   | 4          | 10        |       |
|                          |                                 | 24VDC output  | --                                   | 3          | 10        |       |
| Ripple & Noise*          | 20MHz bandwidth                 | Others        | --                                   | 75         | 180       | mVp-p |
|                          |                                 | 24VDC output  | --                                   | 75         | 200       |       |
| Temperature Coefficient  | Full load                       |               | --                                   | $\pm 0.02$ | --        | %/°C  |
| Short-circuit Protection | Continuous, self-recovery       |               |                                      |            |           |       |

Notes: \* The "parallel cable" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

## General Specifications

| Item                                 | Operating Conditions                                                                | Min.                                   | Typ. | Max. | Unit    |
|--------------------------------------|-------------------------------------------------------------------------------------|----------------------------------------|------|------|---------|
| Isolation Voltage                    | Input-output Electric strength test for 1 minute with a leakage current of 1mA max. | 3000                                   | --   | --   | VDC     |
| Insulation Resistance                | Input-output resistance at 500VDC                                                   | 1000                                   | --   | --   | MΩ      |
| Isolation Capacitance                | Input-output capacitance at 100kHz/0.1V                                             | --                                     | 20   | --   | pF      |
| Operating Temperature                | Derating when operating temperature $\geq 85^\circ\text{C}$ ( see Fig. 2)           | -40                                    | --   | 105  | °C      |
| Storage Temperature                  |                                                                                     | -55                                    | --   | 125  |         |
| Case Temperature Rise                | $T_a = 25^\circ\text{C}$                                                            | --                                     | 25   | --   |         |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds                               | --                                     | --   | 300  |         |
| Storage Humidity                     | Non-condensing                                                                      | 5                                      | --   | 95   | %RH     |
| Vibration                            |                                                                                     | 10-150Hz, 5G, 0.75mm, along X, Y and Z |      |      |         |
| Switching Frequency                  | 100% load, nominal input voltage                                                    | --                                     | 260  | --   | kHz     |
| MTBF                                 | MIL-HDBK-217F@25°C                                                                  | 3500                                   | --   | --   | K hours |

## Mechanical Specifications

|                |                                                              |
|----------------|--------------------------------------------------------------|
| Case Material  | Black plastic; flame-retardant and heat-resistant (UL94 V-0) |
| Dimensions     | 20.32 x 10.16 x 8.20mm                                       |
| Weight         | 2.4g(Typ.)                                                   |
| Cooling Method | Free air convection                                          |

## Electromagnetic Compatibility (EMC)

|          |     |                                                                                  |
|----------|-----|----------------------------------------------------------------------------------|
| Emission | CE  | CISPR32/EN55032 CLASS B                                                          |
|          | RE  | CISPR32/EN55032 CLASS B                                                          |
| Immunity | ESD | IEC/EN61000-4-2 Air $\pm 8\text{kV}$ , Contact $\pm 6\text{kV}$ perf. Criteria B |

Note: Refer to Figure 4 for recommended circuit test.

## Typical Characteristic Curves

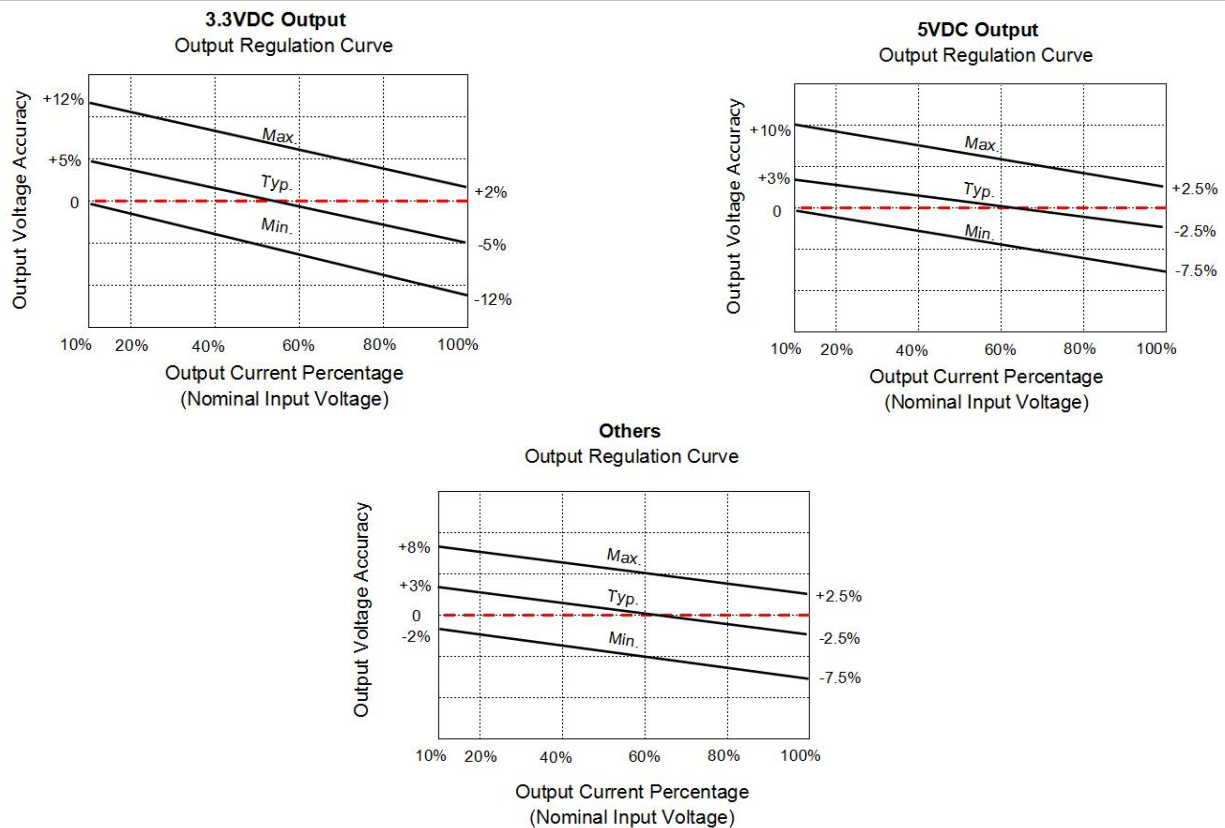


Fig. 1

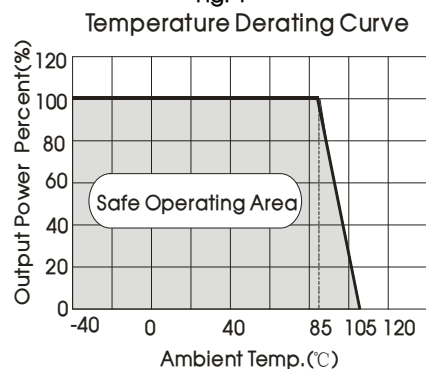


Fig. 2

## Design Reference

### 1. Typical application

Input and/or output ripple can be further reduced, by connecting a filter capacitor from the input and/or output terminals to ground as shown in Fig.3.

Choosing suitable filter capacitor values is very important for a smooth operation of the modules, particularly to avoid start-up problems caused by capacitor values that are too high. For recommended input and output capacitor values refer to Table 1.

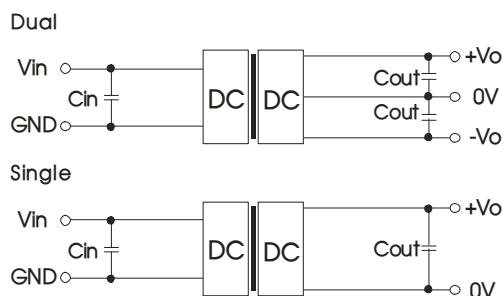


Fig.3

Table 1: Recommended input and output capacitor values

| Vin   | Cin       | Single Vout | Cout*     | Dual Vout | Cout*      |
|-------|-----------|-------------|-----------|-----------|------------|
| --    | --        | --          | --        | ±3.3VDC   | 4.7μF/16V  |
| 12VDC | 2.2μF/25V | 5VDC        | 10μF/16V  | ±5VDC     | 4.7μF/16V  |
| 15VDC | 2.2μF/25V | 15VDC       | 2.2μF/25V | ±15VDC    | 1μF/25V    |
| 24VDC | 1μF/50V   | 9/12VDC     | 2.2μF/25V | ±12VDC    | 1μF/25V    |
| --    | --        | 24VDC       | 1μF/50V   | ±24VDC    | 0.47μF/50V |

Note: \*The capacitor value of the positive and the negative output is identical.

### 2. EMC compliance circuit

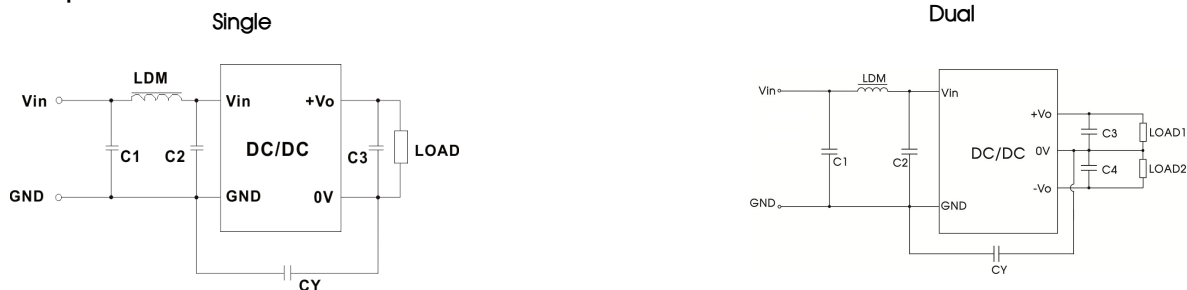
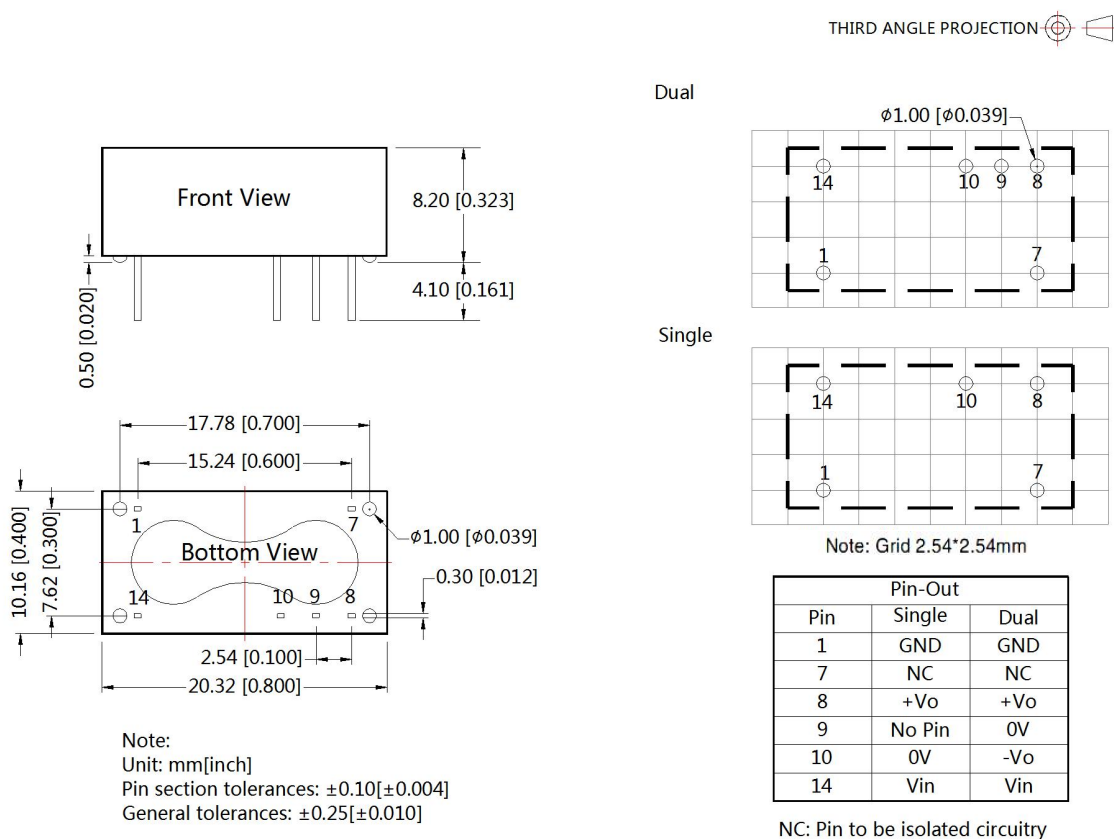


Fig.4

| Input voltage |       | 12/15/24VDC                |
|---------------|-------|----------------------------|
| Emissions     | C1/C2 | 4.7μF/50V                  |
|               | CY    | 270pF/3kV                  |
|               | C3/C4 | Refer to the Cout in Fig.3 |
|               | LDM   | 6.8μH                      |

3. For additional information, please refer to DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

### Dimensions and Recommended Layout



Notes:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58200009;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. Unless otherwise specified, parameters in this datasheet were measured under the conditions of  $T_a=25^{\circ}\text{C}$ , humidity<75%RH with nominal input voltage and rated output load;
5. All index testing methods in this datasheet are based on our company corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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