

1W Isolated DC-DC converter  
Fixed input voltage, unregulated dual output



RoHS Patent Protection

### FEATURES

- Continuous short-circuit protection
- No-load input current as low as 5mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 85%
- Compact SMD package
- I/O isolation test voltage 3k VDC
- Industry standard pin-out

E05\_XT-1WR3-TR series are specially designed for applications where 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. |                                       |                              |
| UL/EN/BS EN   | E0505XT-1WR3-TR | 5<br>(4.5-5.5)      | ±5            | ±100/±10                 | 78/82                                 | 1200                         |
|               | E0509XT-1WR3-TR |                     | ±9            | ±56/±6                   | 79/83                                 | 470                          |
|               | E0512XT-1WR3-TR |                     | ±12           | ±42/±5                   | 79/83                                 | 220                          |
|               | E0515XT-1WR3-TR |                     | ±15           | ±34/±4                   | 79/83                                 | 220                          |
|               | E0524XT-1WR3-TR |                     | ±24           | ±21/±3                   | 81/85                                 | 100                          |

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) | 5VDC input           | 5VDC output        | --                  | 244/5  | 257/-- | mA   |
|                                        |                      | 9VDC/12VDC output  | --                  | 241/12 | 254/-- |      |
|                                        |                      | 15VDC/24VDC output | --                  | 241/18 | 254/-- |      |
| Reflected Ripple Current*              |                      |                    | --                  | 15     | --     | mA   |
| Surge Voltage (1sec. max.)             | 5VDC input           |                    | -0.7                | --     | 9      | VDC  |
| Input Filter                           |                      |                    | Capacitance filters |        |        |      |
| Hot Plug                               |                      |                    | Unavailable         |        |        |      |

Note: \* Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

### Output Specifications

| Item                    | Operating Conditions      |              | Min.                                | Typ.  | Max. | Unit  |
|-------------------------|---------------------------|--------------|-------------------------------------|-------|------|-------|
| Voltage Accuracy        |                           |              | See output regulation curve(Fig. 1) |       |      |       |
| Linear Regulation       | Input voltage change: ±1% |              | --                                  | --    | 1.2  | --    |
| Load Regulation         | 10%-100% load             | 5VDC output  | --                                  | 10    | 15   | %     |
|                         |                           | 9VDC output  | --                                  | 8     | 10   |       |
|                         |                           | 12VDC output | --                                  | 7     | 10   |       |
|                         |                           | 15VDC output | --                                  | 6     | 10   |       |
|                         |                           | 24VDC output | --                                  | 5     | 10   |       |
| Ripple & Noise*         | 20MHz bandwidth           | Other output | --                                  | 30    | 75   | mVp-p |
|                         |                           | 24VDC output | --                                  | 50    | 100  |       |
| Temperature Coefficient | Full load                 |              | --                                  | ±0.02 | --   | %/°C  |

|                                                                                                                                                    |  |                           |
|----------------------------------------------------------------------------------------------------------------------------------------------------|--|---------------------------|
| Short-circuit Protection                                                                                                                           |  | Continuous, self-recovery |
| Note: * 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                        | 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 $\geq 100^{\circ}\text{C}$ (see Fig. 2)         | -40                                                                                                        | --   | 105  | $^{\circ}\text{C}$ |
| Storage Temperature              |                                                                                     | -55                                                                                                        | --   | 125  |                    |
| Case Temperature Rise            | $T_a=25^{\circ}\text{C}$                                                            | --                                                                                                         | 15   | --   |                    |
| Storage Humidity                 | Non-condensing                                                                      | --                                                                                                         | --   | 95   | %RH                |
| Reflow Soldering Temperature*    |                                                                                     | Peak temp. $\leq 245^{\circ}\text{C}$ , maximum duration time $\leq 60\text{s}$ over $217^{\circ}\text{C}$ |      |      |                    |
| Switching Frequency              | Full load, nominal input voltage                                                    | --                                                                                                         | 270  | --   | kHz                |
| MTBF                             | MIL-HDBK-217F@ $25^{\circ}\text{C}$                                                 | 3500                                                                                                       | --   | --   | k hours            |
| Moisture Sensitivity Level (MSL) | IPC/JEDEC J-STD-020D.1                                                              | Level 1                                                                                                    |      |      |                    |

Note: \* For actual application, please refer to IPC/JEDEC J-STD-020D.1.

### Mechanical Specifications

|                |                                                             |
|----------------|-------------------------------------------------------------|
| Case Material  | Black plastic; flame-retardant and heat-resistant (UL94V-0) |
| Dimensions     | 15.24 x 11.40 x 7.25 mm                                     |
| Weight         | 1.4g (Typ.)                                                 |
| Cooling Method | Free air convection                                         |

### Electromagnetic Compatibility (EMC)

|           |     |                 |                                                                  |
|-----------|-----|-----------------|------------------------------------------------------------------|
| Emissions | CE  | CISPR32/EN55032 | CLASS B (see Fig. 4 for recommended circuit)                     |
|           | RE  | CISPR32/EN55032 | CLASS B (see Fig. 4 for recommended circuit)                     |
| Immunity  | ESD | IEC/EN61000-4-2 | Air $\pm 8\text{kV}$ , Contact $\pm 4\text{kV}$ perf. Criteria B |

### Typical Characteristic Curves

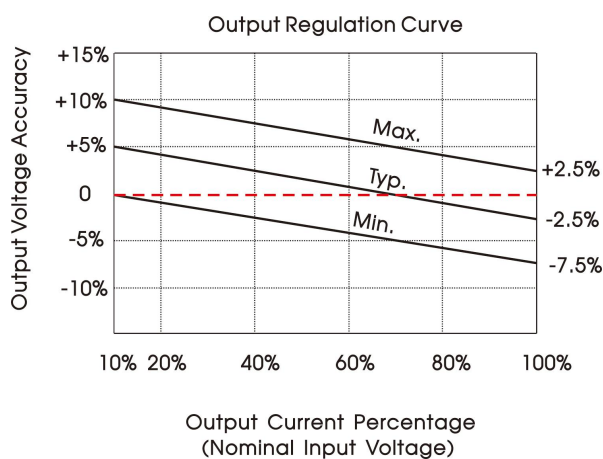


Fig. 1

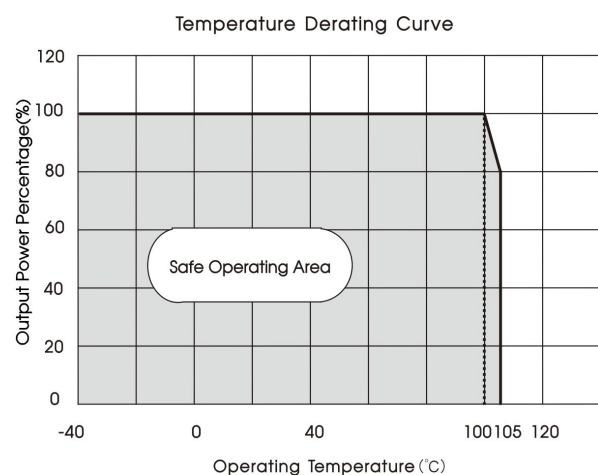
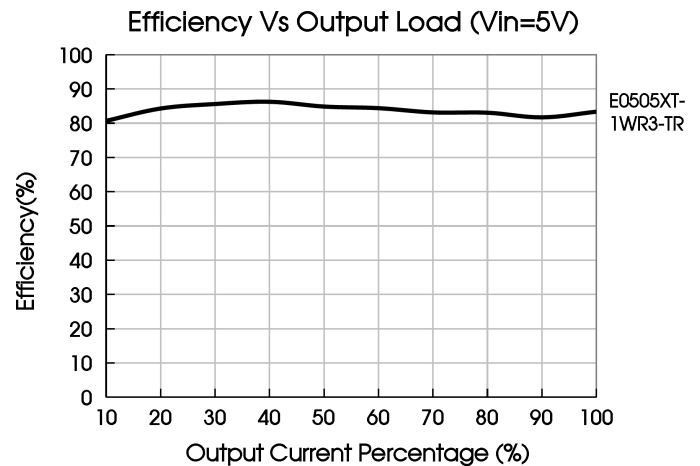
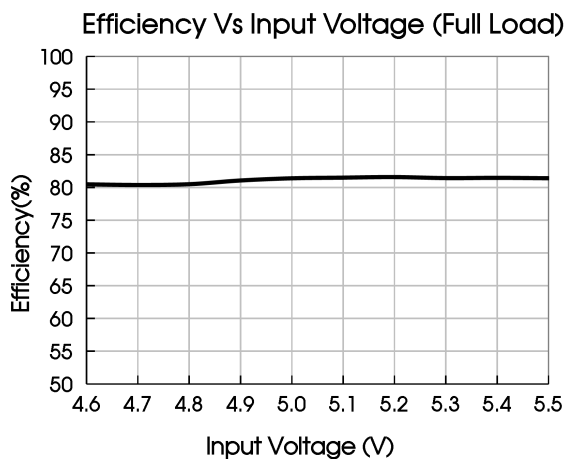


Fig. 2



## Design Reference

### 1. Typical application circuit

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.

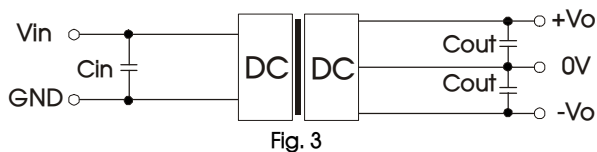


Fig. 3

Table 1: Recommended capacitive load value table

| Vin  | Cin       | Vo         | Cout      |
|------|-----------|------------|-----------|
| 5VDC | 4.7μF/16V | ±5VDC      | 4.7μF/16V |
|      |           | ±9VDC      | 2.2μF/16V |
|      |           | ±12VDC     | 1μF/25V   |
|      |           | ±15/±24VDC | 1μF/50V   |

### 2. EMC (CLASS B) compliance circuit

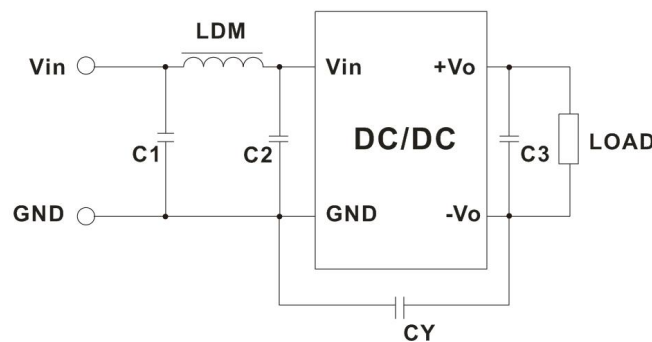


Fig. 4

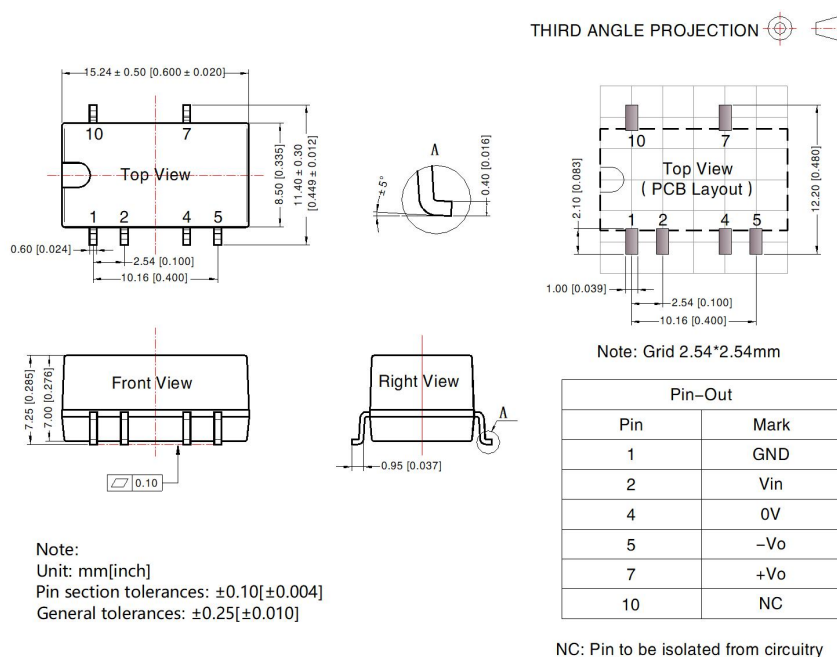
Table 2: EMC recommended circuit value table

| Input voltage<br>5VDC | Output voltage |       | 5/9VDC                       | 12/15/24VDC                                             |
|-----------------------|----------------|-------|------------------------------|---------------------------------------------------------|
|                       | Emissions      | C1/C2 | 4.7μF /25V                   | 4.7μF /25V                                              |
|                       |                | CY    | --                           | 1nF /4kVDC<br>VISHAY HGZ102MBP<br>TDK CD45-E2GA102M-GKA |
|                       |                | C3    | Refer to the Cout in table 1 |                                                         |
|                       |                | LDM   | 6.8μH                        | 6.8μH                                                   |

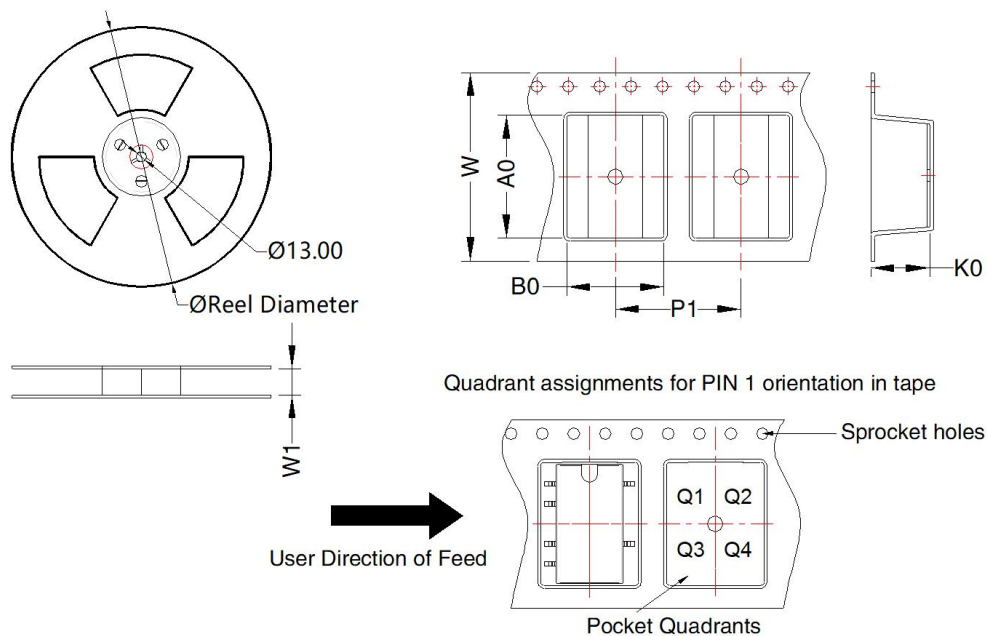
Note: In the case of actual use, the requirements for emissions are high, it is subject to CY.

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



## Tape and Reel Info



| Device       | Package Type | Pin | MPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----|-----|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| E_XT-1WR3-TR | SMD          | 6   | 500 | 330.0              | 24.5               | 15.64   | 12.4    | 7.45    | 16.0    | 24.0   | Q1            |

Notes:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Tube Packaging bag number: 58210034 ;
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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