# DC/DC Converter
## E05_XT-1WR3 Series

MORNSUN®

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


Patent Protection



c UL us UL62368-1 | CE Report EN62368-1 | UK CA Report BS EN62368-1 | CB IEC 62368-1 | RoHS

## FEATURES

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

*E05_XT-1WR3 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 (%) Min./Typ. | Capacitive Load*(μF) Max. |
|---|---|---|---|---|---|---|
| | | Nominal (Range) | Voltage (VDC) | Current(mA) Max./Min. | | |
| -- | E0503XT-1WR3 | 5 (4.5-5.5) | ±3.3 | ±152/±15 | 70/74 | 1200 |
| UL/EN/BS EN/IEC | E0505XT-1WR3 | | ±5 | ±100/±10 | 78/82 | 1200 |
| | E0509XT-1WR3 | | ±9 | ±56/±6 | 79/83 | 470 |
| | E0512XT-1WR3 | | ±12 | ±42/±5 | 79/83 | 220 |
| | E0515XT-1WR3 | | ±15 | ±34/±4 | 79/83 | 220 |
| | E0524XT-1WR3 | | ±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 (full load / no-load) | 5VDC input | 3.3VDC output | -- | 270/5 | 286/25 | mA |
| | | 5VDC output | -- | 244/5 | 257/10 | |
| | | 9VDC/12VDC output | -- | 241/12 | 254/20 | |
| | | 15VDC/24VDC output | -- | 241/18 | 254/30 | |
| Reflected Ripple Current* | | | -- | 15 | -- | |
| 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% | 3.3VDC output | -- | -- | 1.5 | -- |
| | | Other output | -- | -- | 1.2 | |
| Load Regulation | 10%-100% load | 3.3VDC output | -- | 15 | 20 | % |
| | | 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 | -- | %/℃ |
| 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≥100℃ (see Fig. 2) | | -40 | -- | 105 | ℃ |
| Storage Temperature | | | -55 | -- | 125 | |
| Case Temperature Rise | Ta=25℃ | 3.3VDC output | -- | 25 | -- | |
| | | Other output | -- | 15 | -- | |
| Storage Humidity | Non-condensing | | -- | -- | 95 | %RH |
| Reflow Soldering Temperature* | | | Peak temp.≤245℃, maximum duration time≤60s over 217℃ | | | |
| Switching Frequency | Full load, nominal input voltage | | -- | 270 | -- | kHz |
| MTBF | MIL-HDBK-217F@25℃ | | 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 |

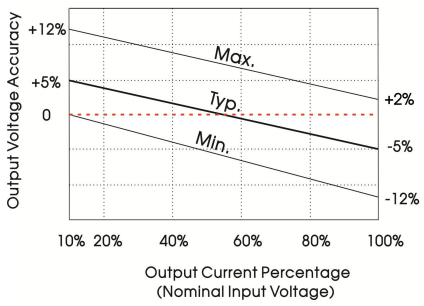
## Electromagnetic Compatibility (EMC)

| | | |
|---|---|---|
| Emissions | CE | CISPR32/EN55032 CLASS B (see Fig. 5 for recommended circuit) |
| | RE | CISPR32/EN55032 CLASS B (see Fig. 5 for recommended circuit) |
| Immunity | ESD | IEC/EN61000-4-2 Air ±8kV, Contact ±4kV perf. Criteria B |

## Typical Characteristic Curves

3.3VDC output

Output Regulation Curve




Other output

Output Regulation Curve

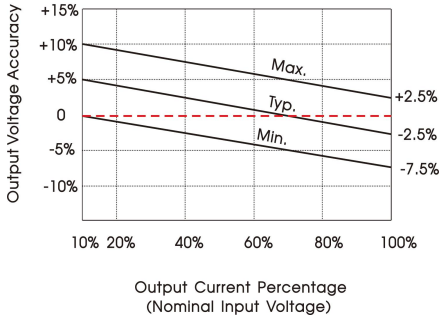



Fig. 1

Temperature Derating Curve

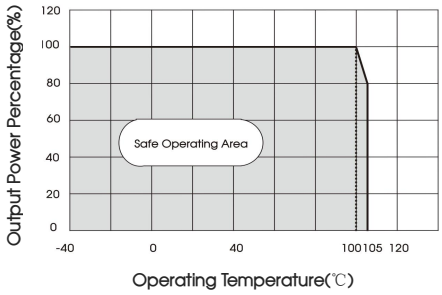
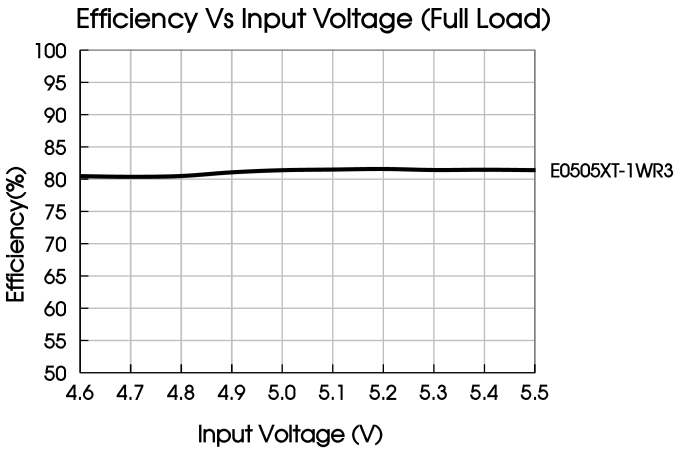
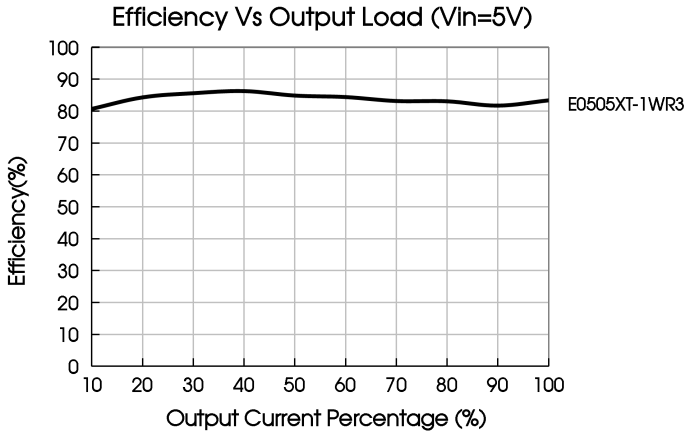



Fig. 2




## 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.

The simplest device for output voltage regulation, over-voltage and over-current protection is a linear voltage regulator with overheat protection that is connected to the input or output end in series (see Fig. 4).


Fig. 3

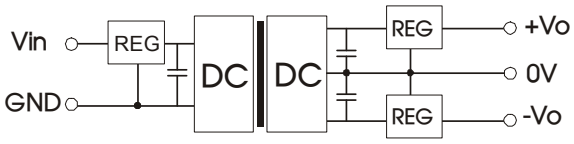



Fig. 4

Table 1: Recommended capacitive load value table

| Vin | Cin | Vo | Cout |
|---|---|---|---|
| 5VDC | 4.7μF/16V | ±3.3/±5VDC | 4.7μF/16V |
| | | ±9VDC | 2.2μF/16V |
| | | ±12VDC | 1μF/25V |
| | | ±15/±24VDC | 1μF/50V |

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

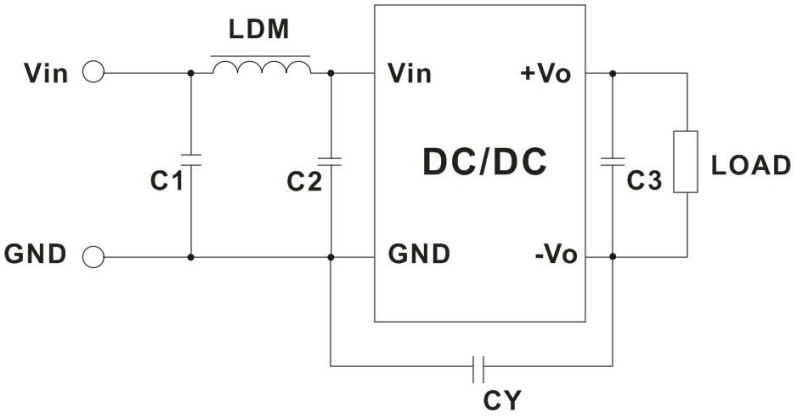



Fig. 5

Table 2: EMC recommended circuit value table

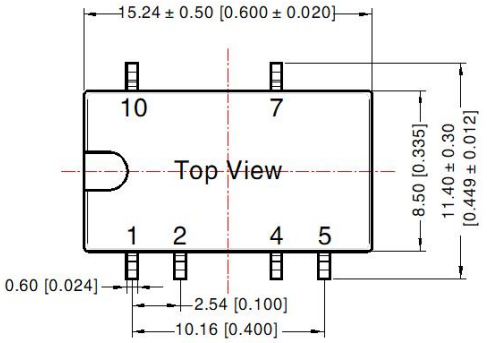
| | | | | |
|---|---|---|---|---|
| Input voltage 5VDC | Output voltage | | 3.3/5/9VDC | 12/15/24VDC |
| | Emissions | C1/C2 | 4.7μF /25V | 4.7μF /25V |
| | | CY | -- | 1nF /4kVDC<br>VISHAY HGZ102MBP<br>TDK CD45-E2GA102M-GKA |
| | | C3 | Refer to the Cout in table 1 | |
| | | LDM | 6.8μH | 6.8μH |

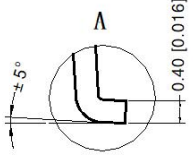
Note: In the case of actual use, the requirements for emissions are high, it is subject to CY.

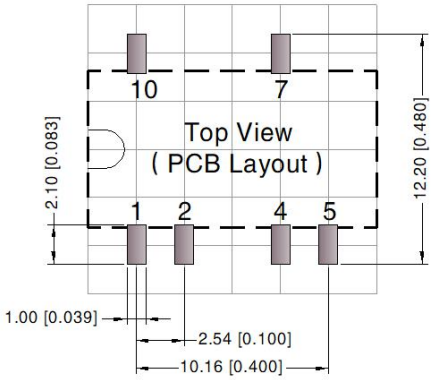
3. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

## Dimensions and Recommended Layout

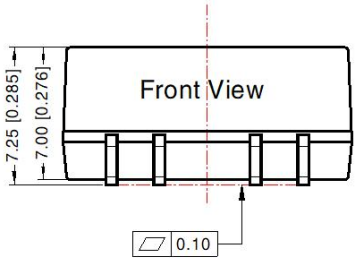
THIRD ANGLE PROJECTION

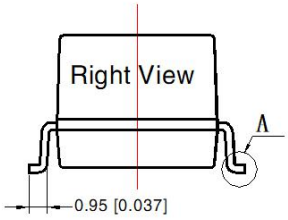



Note: Grid 2.54*2.54mm



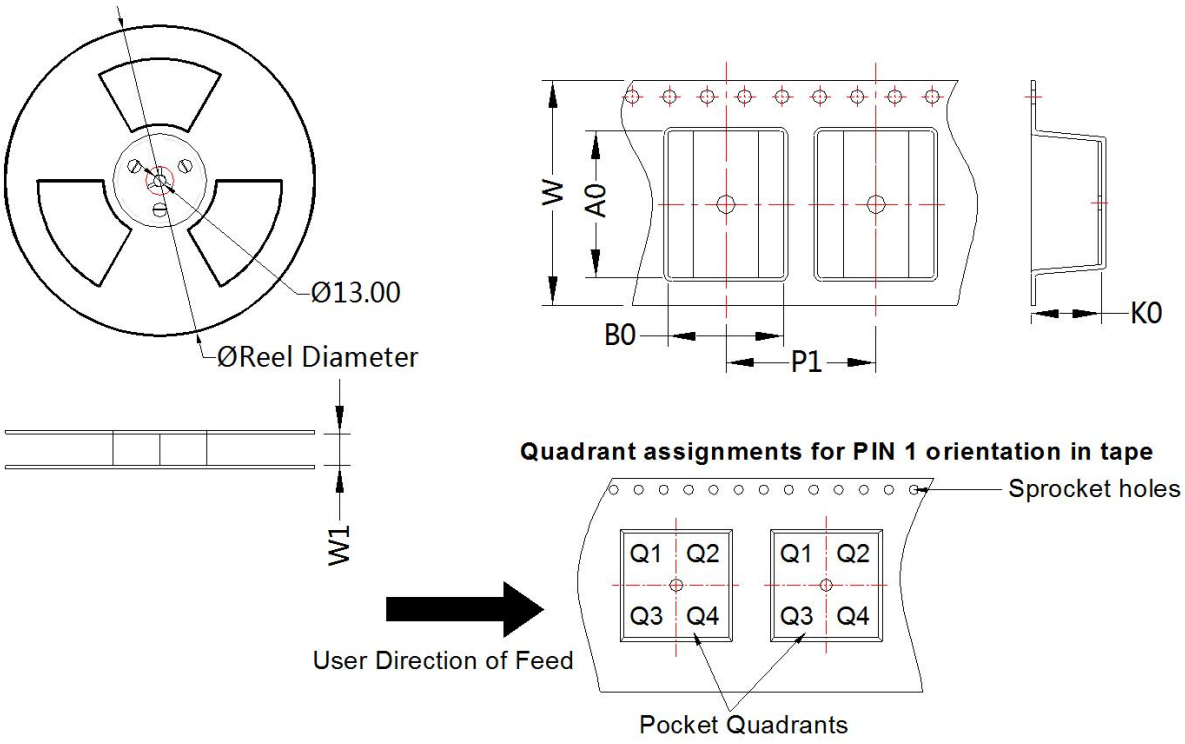




Note:
Unit: mm[inch]
Pin section tolerances: ±0.10[±0.004]
General tolerances: ±0.25[±0.010]

| Pin-Out | |
|---|---|
| Pin | Mark |
| 1 | GND |
| 2 | Vin |
| 4 | 0V |
| 5 | -Vo |
| 7 | +Vo |
| 10 | NC |

NC: Pin to be isolated from circuitry

## Tape and Reel Info




| Device | Package Type | Pin | SPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|---|---|---|---|---|---|---|---|---|---|---|---|
| E05_XT-1WR3 | 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. Tube Packaging bag number: 58210023, Roll 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 Ta=25℃, 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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