

1W, Fixed input voltage, isolated & unregulated  
single output



ULus CE Patent Protection RoHS

## FEATURES

- Continuous short-circuit protection
- No-load input current as low as 5mA
- Operating temperature range: -40℃ to +105℃
- High efficiency up to 85%
- Compact SMD package
- Isolation voltage: 1.5K VDC
- International standard pin-out
- UL62368, EN62368 approval

B05\_XT-1WR3 series are specially designed for applications where an 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                  |                                   | Efficiency<br>(%.Min./Typ.)<br>@ Full Load | Max. Capacitive<br>Load<br>(μF) |
|---------------|--------------|---------------------|-------------------------|-----------------------------------|--------------------------------------------|---------------------------------|
|               |              | Nominal<br>(Range)  | Output Voltage<br>(VDC) | Output Current<br>(mA)(Max./Min.) |                                            |                                 |
| UL/CE         | B0503XT-1WR3 | 5<br>(4.5-5.5)      | 3.3                     | 303/30                            | 70/74                                      | 2400                            |
|               | B0505XT-1WR3 |                     | 5                       | 200/20                            | 78/82                                      | 2400                            |
|               | B0509XT-1WR3 |                     | 9                       | 111/12                            | 79/83                                      | 1000                            |
|               | B0512XT-1WR3 |                     | 12                      | 84/9                              | 79/83                                      | 560                             |
|               | B0515XT-1WR3 |                     | 15                      | 67/7                              | 79/83                                      | 560                             |
|               | B0524XT-1WR3 |                     | 24                      | 42/4                              | 81/85                                      | 220                             |

## Input Specifications

| Item                                   | Operating Conditions |                    | Min.             | Typ.   | Max.   | Unit |
|----------------------------------------|----------------------|--------------------|------------------|--------|--------|------|
| Input Current<br>(full load / no-load) | 5VDC input           | 3.3VDC/5VDC output | --               | 270/5  | 286/10 | mA   |
|                                        |                      | 9VDC/12VDC output  | --               | 241/12 | 254/20 |      |
|                                        |                      | 15VDC/24VDC output | --               | 241/18 | 254/30 |      |
| Reflected Ripple Current*              |                      |                    | --               | 15     | --     | mA   |
| Surge Voltage (1sec. max.)             | 5VDC input           |                    | -0.7             | --     | 9      | VDC  |
| Input Filter                           |                      |                    | Filter capacitor |        |        |      |
| Hot Plug                               |                      |                    | Unavailable      |        |        |      |

Note: \* Reflected ripple current testing method please see DC-DC Converter Application Notes for specific operation.

## Output Specifications

| Item                    | Operating Conditions         |               | Min.                                  | Typ. | Max. | Unit |
|-------------------------|------------------------------|---------------|---------------------------------------|------|------|------|
| Output Voltage Accuracy |                              |               | See tolerance envelope graph (Fig. 1) |      |      |      |
| Line Regulation         | Input voltage<br>change: ±1% | 3.3VDC output | --                                    | --   | 1.5  | %/%  |
|                         |                              | Other outputs | --                                    | --   | 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 outputs             | -- | 30    | 75  | mVp-p |
|                          |                 | 24VDC output              | -- | 50    | 100 |       |
| Temperature Coefficient  | Full load       |                           | -- | ±0.02 | --  | %/°C  |
| Short Circuit Protection |                 | Continuous, self-recovery |    |       |     |       |

Note: \* Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.

## General Specifications

| Item                             | Operating Conditions                                                             | Min.                                                   | Typ. | Max. | Unit    |
|----------------------------------|----------------------------------------------------------------------------------|--------------------------------------------------------|------|------|---------|
| Isolation Voltage                | Input-output, with the test time of 1 minute and the leak current lower than 1mA | 1500                                                   | --   | --   | VDC     |
| Isolation Resistance             | Input-output, isolation voltage 500VDC                                           | 1000                                                   | --   | --   | MΩ      |
| Isolation Capacitance            | Input-output, 100KHz/0.1V                                                        | --                                                     | 20   | --   | pF      |
| Operating Temperature            | Derating if the temperature ≥100°C (see Fig. 2)                                  | -40                                                    | --   | 105  | °C      |
| Storage Temperature              |                                                                                  | -55                                                    | --   | 125  |         |
| Casing Temperature Rise          | Ta=25°C                                                                          | 3.3VDC output                                          | --   | 25   |         |
|                                  |                                                                                  | Other outputs                                          | --   | 15   |         |
| Storage Humidity                 | Non-condensing                                                                   | --                                                     | --   | 95   | %RH     |
| Reflow Soldering Temperature     |                                                                                  | Peak temp. ≤245°C, maximum duration time ≤60s at 217°C |      |      |         |
| Switching Frequency              | Full load, nominal input voltage                                                 | --                                                     | 270  | --   | KHz     |
| MTBF                             | MIL-HDBK-217F@25°C                                                               | 3500                                                   | --   | --   | K hours |
| Moisture Sensitivity Level (MSL) | IPC/JEDEC J-STD-020D.1                                                           | Level 2                                                |      |      |         |

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

## Physical Specifications

|                 |                                                            |
|-----------------|------------------------------------------------------------|
| Casing Material | Black flame-retardant and heat-resistant plastic(UL94 V-0) |
| Dimensions      | 13.20*11.40*7.25 mm                                        |
| Weight          | 1.4g(Typ.)                                                 |
| Cooling Method  | Free air convection                                        |

## EMC Specifications

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

## Product Characteristic Curve

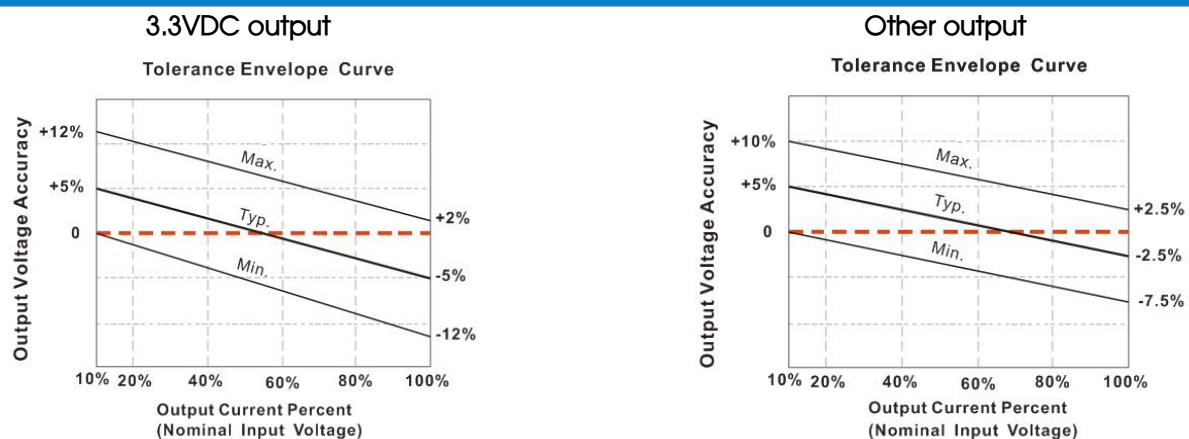
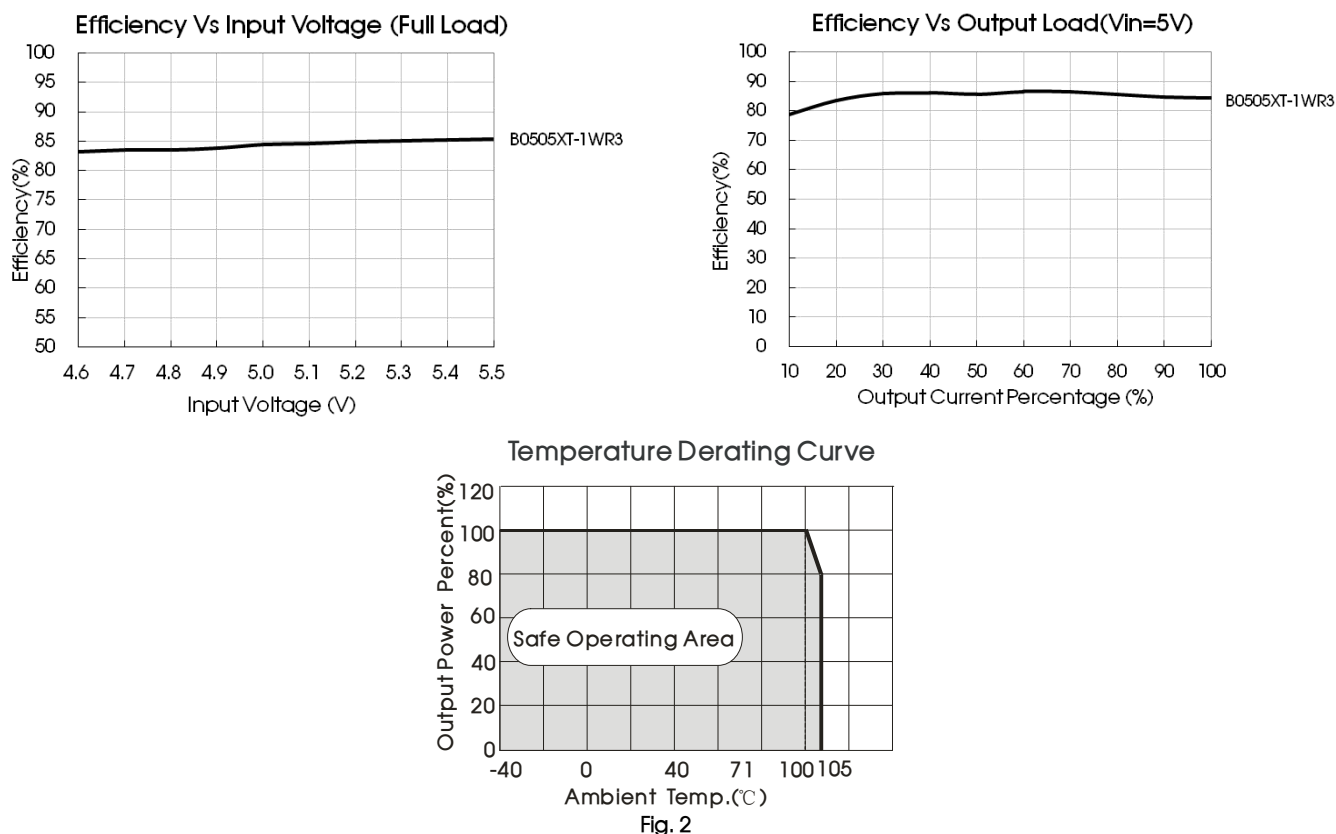


Fig. 1



## Design Reference

### 1. Typical application circuit

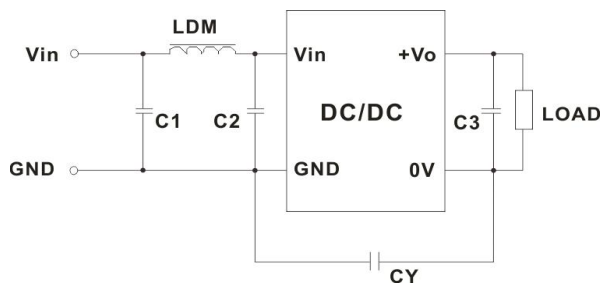
If it is required to further reduce input and output ripple, a filter capacitor may be connected to the input and output terminals, see Fig.3. Moreover, choosing a suitable filter capacitor is very important, start-up problems may be caused if the capacitance is too large. Under the condition of safe and reliable operation, the recommended capacitive load values are shown in Table 1.



Recommended capacitive load value table (Table 1)

| Vin(VDC) | Cin(μF) | Vo (VDC) | Cout(μF) |
|----------|---------|----------|----------|
| 5        | 4.7     | 3.3/5    | 10       |
|          |         | 9        | 4.7      |
|          |         | 12       | 2.2      |
|          |         | 15       | 1        |
|          |         | 24       | 0.47     |

### 2. EMC solution-recommended circuit



EMC recommended circuit value table (Table 2)

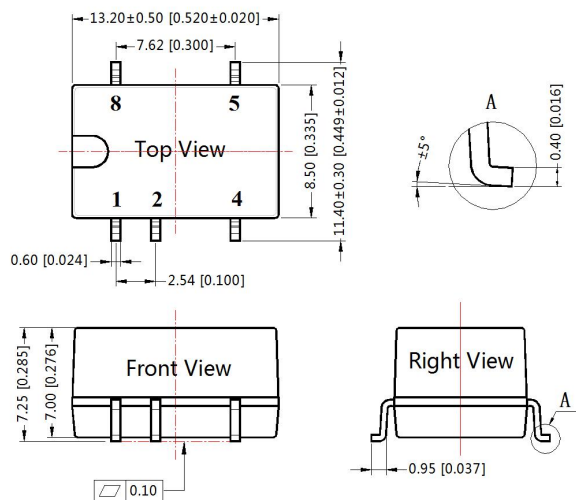
| Input<br>voltage<br>5VDC | Output voltage(VDC) |       | 3.3/5/9                      | 12/15/24                                                   |
|--------------------------|---------------------|-------|------------------------------|------------------------------------------------------------|
|                          | EMI                 | C1/C2 | 4.7 $\mu$ F /25V             | 4.7 $\mu$ F /25V                                           |
|                          |                     | CY    | --                           | 1nF/2KVDC<br>HEC C1206X102K202T<br>JOHANSON 202R18W102KV4E |
|                          |                     | C3    | Refer to the Cout in table 1 |                                                            |
|                          |                     | LDM   | 6.8 $\mu$ H                  | 6.8 $\mu$ H                                                |

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

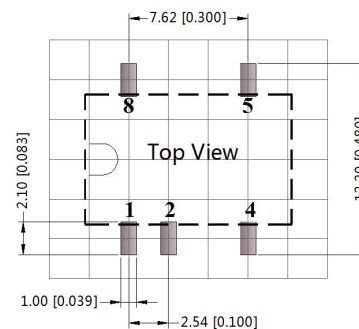
3. For more information please find DC-DC converter application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

## Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



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



Note: Grid 2.54\*2.54mm

| Pin-Out |          |
|---------|----------|
| Pin     | Function |
| 1       | GND      |
| 2       | Vin      |
| 4       | 0V       |
| 5       | +Vo      |
| 8       | NC       |

NC: Pin to be isolated from circuitry

### Notes:

- Packing information please refer to Product Packing Information which can be downloaded from [www.mornsun-power.com](http://www.mornsun-power.com). Tube Packing bag number: 58210024, Roll Packing bag number: 58200054;
- 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;
- The maximum capacitive load offered were tested at input voltage range and full load;
- 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;
- All index testing methods in this datasheet are based on our Company's corporate standards;
- We can provide product customization service, please contact our technicians directly for specific information;
- Products are related to laws and regulations: see "Features" and "EMC";
- 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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