# DC/DC Converter

## FB0505XT-1WR3 Series

MORNSUN®

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


Continuous Short Circuit Protection

3 years Warranty

CE Report EN 62368-1

UKCA Report BS EN 62368-1

RoHS

Patent Protection

## FEATURES

- Continuous short-circuit protection
- Operating ambient temperature range: -40℃ to +105℃
- Compact SMD package
- I/O isolation test voltage: 3k VAC/4.2k VDC
- Industry standard pin-out

*FB0505XT-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 | | Full Load Efficiency (%) Min./Typ. | Capacitive Load(μF) Max. |
|---|---|---|---|---|---|---|
| | | Nominal (Range) | Voltage (VDC) | Current (mA) Max./Min. | | |
| EN/BS EN | FB0505XT-1WR3 | 5 (4.5-5.5) | 5 | 200/20 | 78/82 | 2200 |

## Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input Current (full load / no-load) | 5VDC input | -- | 244/5 | 257/10 | mA |
| Reflected Ripple Current* | | -- | 15 | -- | |
| Surge Voltage(1sec. max.) | 5VDC input | -0.7 | -- | 9 | VDC |
| Input Filter | | Capacitance filter | | | |
| 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 curves (Fig. 1) | | | |
| Linear Regulation | Input voltage change: ±1% | -- | -- | ±1.2 | -- |
| Load Regulation | 10%-100% load | -- | 10 | 15 | % |
| Ripple & Noise* | 20MHz bandwidth | --- | 60 | 100 | mVp-p |
| Temperature Coefficient | Full load | -- | ±0.02 | -- | %/℃ |
| 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 | Input-output electric strength test for 1 minute with a leakage current of 1mA max. | 4000 | -- | -- | VDC |
| | Input-output electric strength test for 1 minute with a leakage current of 5mA max. | 3000 | -- | -- | VAC |
| 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≥85℃, (see Fig. 2) | -40 | -- | 105 | ℃ |

| | | | | | |
|---|---|---|---|---|---|
| Storage Temperature | | -55 | -- | 125 | ℃ |
| Case Temperature Rise | Ta=25℃ | -- | 15 | -- | |
| Storage Humidity | Non-condensing | -- | -- | 95 | %RH |
| Reflow Soldering Temperature* | | Peak temp.≤245℃, maximum duration time≤60s over 217℃. | | | |
| Vibration | | 10-1000Hz, 10G, 1mm. along X, Y and Z(4 cycles) | | | |
| 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 | 1.3g(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 ±8kV, Contact ±4kV perf. Criteria B |

## Typical Performance Curves

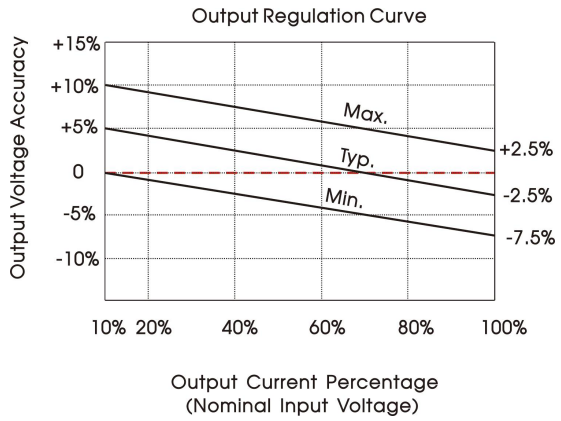



Fig. 1

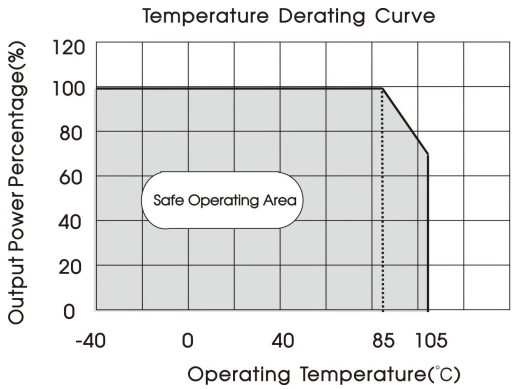



Fig. 2

## 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.

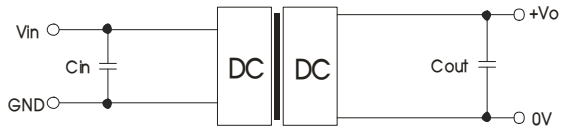



Fig. 3

Table 1: Recommended input and output capacitor values

| Vin | Cin | Vo | Cout |
|---|---|---|---|
| 5VDC | 4.7μF/25V | 5VDC | 10μF/16V |

## 2. EMC compliance circuit

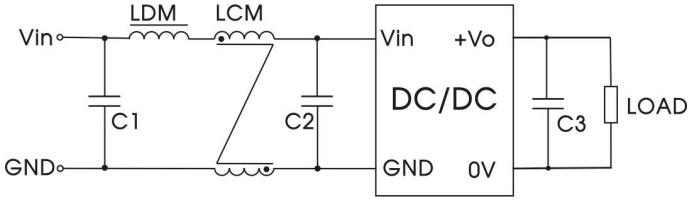



Fig. 4

Note: The use of this circuits will create output voltage drop, the input voltage needs to be increased according to the actual Application

Table 2: EMC recommended circuit value table

| | | |
|---|---|---|
| Emissions | Input voltage | 5VDC |
| | C1/C2 | 4.7μF /25V |
| | C3 | Refer to the Cout in table 1 |
| | LDM | 47μH |
| | LCM | 2.2mH |

## 3. Output load requirements

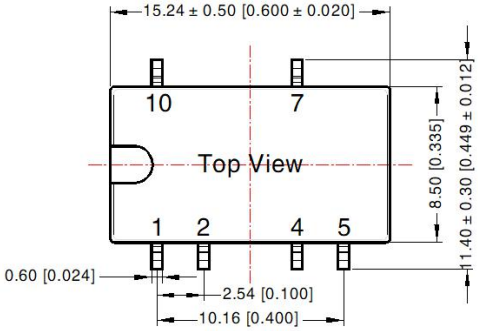
For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output (The sum of the efficient power and resistor consumption power is not less than 10%).

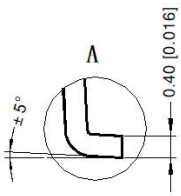
## 4. For additional information please refer to DC-DC converter application notes on

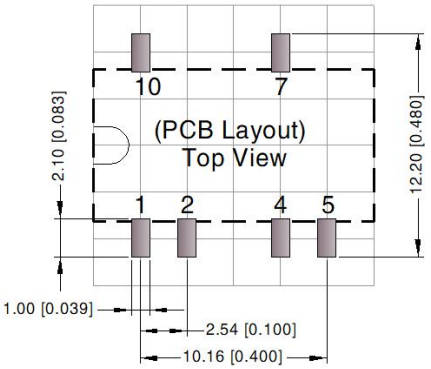
www.mornsun-power.com

## Dimensions and Recommended Layout

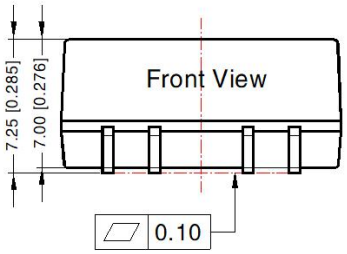
THIRD ANGLE PROJECTION

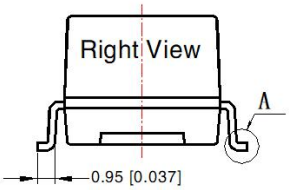



Note: Grid 2.54*2.54mm



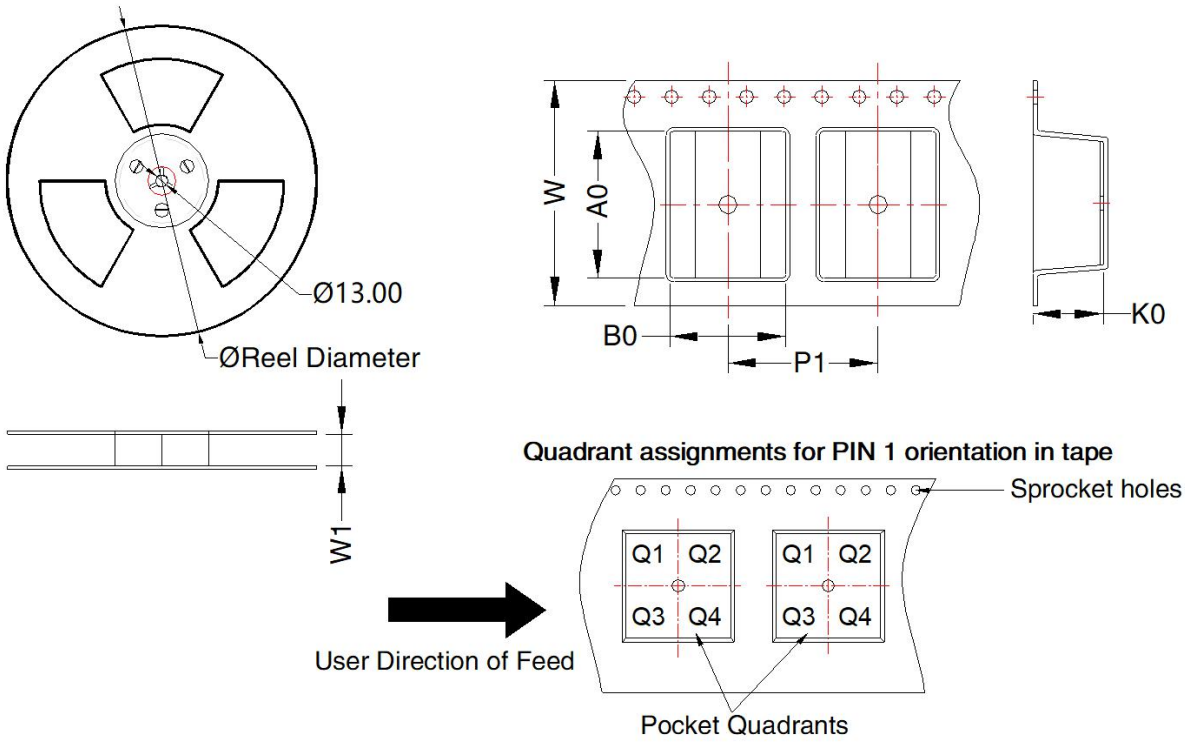




| Pin–Out | |
|---|---|
| Pin | Mark |
| 1 | GND |
| 2 | Vin |
| 4 | 0V |
| 5 | NC |
| 7 | +Vo |
| 10 | NC |

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

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 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| FB0505XT-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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