

1W isolated DC-DC converter with Fixed Input Voltage and Regulated Single Output



CE Patent Protection **RoHS**

FEATURES

- Continuous short-circuit protection
- High efficiency up to 75%
- Operating ambient temperature range -40°C to +85°C
- I/O isolation test voltage 1.5k VDC
- Miniature SMD package
- No external components required
- Industry standard pin-out
- EN60950 Approval

IB_XT-1WR2 series are especially designed for distributed power supply systems where an isolated voltage is required with the following application characteristics:

1. The voltage to the input of the power supply is relatively stable with a variation of $\pm 5\%V_{in}$ nominal;
2. Input to Output isolation of up to 1500VDC is necessary;
3. Applications with a tight line and load regulation requirement combined with low ripple & noise on the output.

Selection Guide

| Certification. | Part No. | Input Voltage (VDC) | Output | | Full Load Efficiency(%) Min./Typ. | Capacitive Load (μ F) Max. |
|----------------|---------------|---------------------|-------------------|---------------------------|--------------------------------------|---------------------------------|
| | | Nominal (Range) | Voltage (VDC) | Current (mA) Max./Min. | | |
| CE | IB0503XT-1WR2 | 5 (4.75-5.25) | 3.3 | 243/25 | 54/58 | 220 |
| | IB0505XT-1WR2 | | 5 | 200/20 | 68/72 | |
| | IB0512XT-1WR2 | | 12 | 84/9 | 69/73 | |
| | IB0515XT-1WR2 | | 15 | 67/7 | 70/74 | |
| | IB1205XT-1WR2 | 12 (11.4-12.6) | 5 | 200/20 | 69/73 | |
| | IB1212XT-1WR2 | | 12 | 84/9 | 69/73 | |
| | IB1215XT-1WR2 | | 15 | 67/7 | 71/75 | |
| | IB2405XT-1WR2 | | 24 (22.8-25.2) | 5 | 200/20 | |
| IB2412XT-1WR2 | 12 | 84/9 | | 69/73 | | |

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|--------------------|--------|------|------|
| Input Current (full load / no-load) | 5V input | -- | 270/15 | -- | mA |
| | 12V input | -- | 115/10 | -- | |
| | 24V input | -- | 56/7 | -- | |
| Surge Voltage (1sec. max.) | 5V input | -0.7 | -- | 9 | VDC |
| | 12V input | -0.7 | -- | 18 | |
| | 24V input | -0.7 | -- | 30 | |
| Reflected Ripple Current | | -- | 15 | -- | mA |
| Input Filter | | Capacitance filter | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------|---------------------------------|---------------|------|------------|------|
| Voltage Accuracy | 100% load | -- | -- | ± 3 | % |
| Linear Regulation | Input voltage change: $\pm 1\%$ | -- | -- | ± 0.25 | |
| Load Regulation | 10%-100% load | 3.3VDC output | -- | 3 | |
| | | Other output | -- | 2 | |

| | | | | | |
|--|---------------------------|----|----|-------|-------|
| Ripple* | 20MHz bandwidth | -- | 10 | -- | mVp-p |
| Noise* | | -- | 50 | -- | |
| Temperature Coefficient | 100% load | -- | -- | ±0.03 | %/°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. | 1500 | -- | -- | 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 up to 71°C (See Fig. 1) | -40 | -- | 85 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| Case Temperature Rise | Ta =25°C | -- | 25 | -- | |
| Reflow Soldering Temperature | | Peak temperature ≤245°C, duration ≤60s max. over 217°C. See also IPC/JEDEC J-STD-020D.1. | | | |
| Storage Humidity | Non-condensing | -- | -- | 95 | % |
| Switching Frequency | 100% load, nominal input voltage | -- | 100 | 300 | KHz |
| MTBF | MIL-HDBK-217F@25°C | 3500 | -- | -- | K hours |

Mechanical Specifications

| | |
|----------------|--|
| Case Material | Black Epoxy resin; flame-retardant and heat-resistant (UL94 V-0) |
| Dimensions | 15.24 x 11.20 x 7.25 mm |
| Weight | 2.0g (Typ.) |
| Cooling Method | Free air convection |

Electromagnetic Compatibility (EMC)

| | | | |
|-----------|-----|-----------------|--|
| Emissions | CE | CISPR32/EN55032 | CLASS B (see Fig. 3 for recommended circuit) |
| | RE | CISPR32/EN55032 | CLASS B (see Fig. 3 for recommended circuit) |
| Immunity | ESD | IEC/EN61000-4-2 | Contact ±6KV perf. Criteria B |

Typical Characteristic Curves

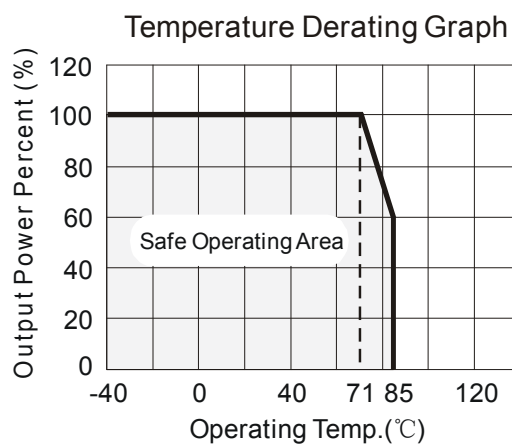
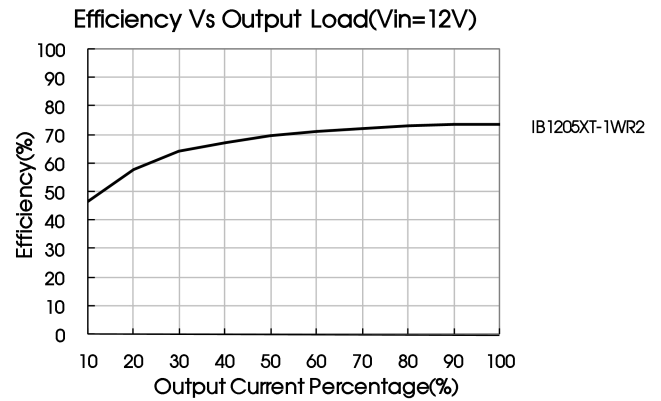
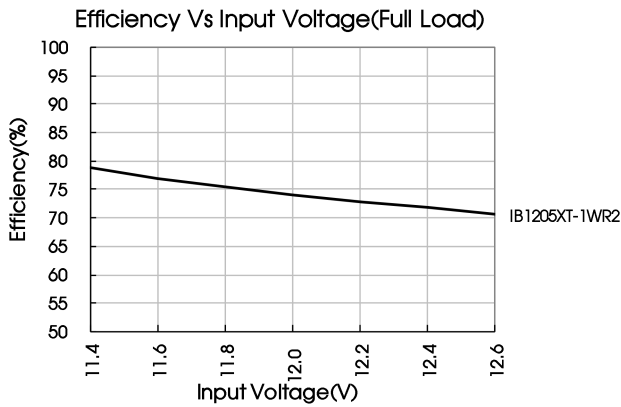
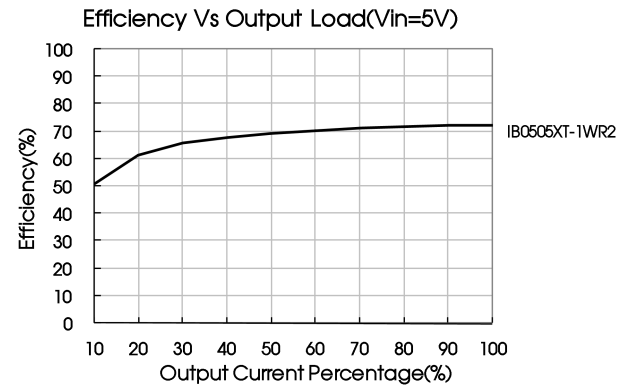
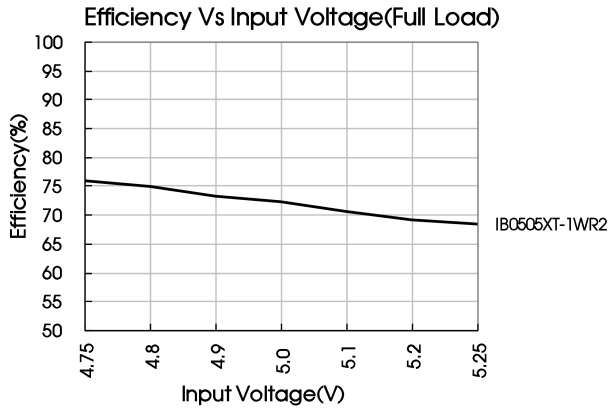


Fig. 1



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.2.

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.

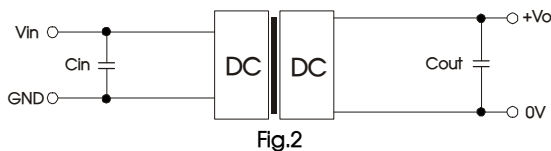


Fig.2

Table 1: Recommended input and output capacitor values

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

It is not recommended to connect any external capacitor when output power is less than 0.5W.

2. EMC compliance circuit

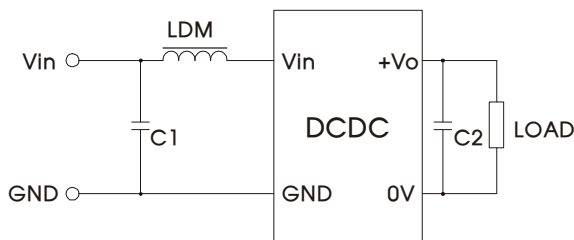


Fig. 3

Table 2: Recommended EMC filter values

| Input voltage (V) | | 5/12/24 |
|-------------------|-----|----------------------------|
| EMI | C1 | 4.7μF /50V |
| | C2 | Refer to the Cout in Fig.2 |
| | LDM | 6.8μH |

3. Minimum Output load requirements

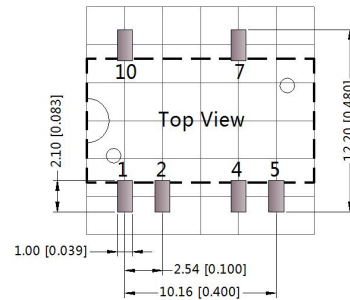
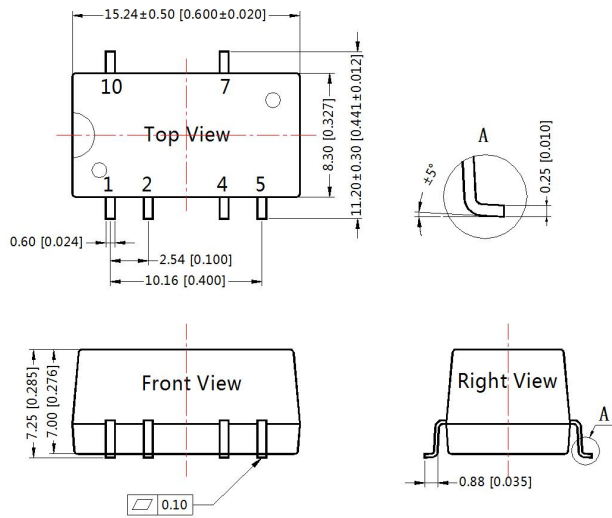
For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained at 10% minimum.

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

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

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

NC: Pin to be isolated from circuitry

Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number 58210023;
- 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 $T_a=25^\circ\text{C}$, 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;
- The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
- 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 ISO 14001 and related environmental laws and regulations, and shall be handled by qualified units.

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