# DC/DC Converter
## SF_XT-2WR2 Series

2W isolated DC-DC converter
Fixed input voltage, unregulated single output


3 years Warranty

CE Patent Protection RoHS

## FEATURES

- Operating ambient temperature range: -40℃ to +105℃
- High efficiency up to 84%
- Compact SMD package
- I/O isolation test voltage 3k VDC
- No external components required
- Industry standard pin-out
- EN60950 approved

*SF_XT-2WR2 series is designed for use in distributed power supply systems and especially suitable in applications such as pure digital circuits, low frequency analog circuits, noise and interference cancelling circuits, relay-driven circuits and data switching circuits, where*

1. *The voltage of the input power supply is relatively stable with a variation of ±10%Vin or less;*
2. *A high input to output isolation voltage of up to 3000VDC is necessary;*
3. *The requirement for ripple & noise or a tight output regulation is not as strict.*

## 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. | | |
| CE | SF0503XT-2WR2 | 5 (4.5-5.5) | 3.3 | 400/40 | 66/70 | 220 |
| | SF0505XT-2WR2 | | 5 | 400/40 | 75/79 | |
| | SF0509XT-2WR2 | | 9 | 222/22 | 78/82 | |
| | SF0512XT-2WR2 | | 12 | 167/17 | 78/82 | |
| | SF0515XT-2WR2 | | 15 | 133/13 | 79/83 | |
| | SF1205XT-2WR2 | 12 (10.8-13.2) | 5 | 400/40 | 75/79 | |
| | SF1212XT-2WR2 | | 12 | 167/17 | 78/82 | |
| | SF1215XT-2WR2 | | 15 | 133/13 | 79/83 | |
| | SF1224XT-2WR2 | | 24 | 83/8 | 80/84 | |
| -- | SF1505XT-2WR2 | 15 (13.5-16.5) | 5 | 400/40 | 73/77 | |
| CE | SF1515XT-2WR2 | | 15 | 133/13 | 79/83 | |
| | SF2405XT-2WR2 | 24 (21.6-26.4) | 5 | 400/40 | 75/79 | |
| | SF2412XT-2WR2 | | 12 | 167/17 | 78/82 | |
| | SF2415XT-2WR2 | | 15 | 133/13 | 79/83 | |
| | SF2424XT-2WR2 | | 24 | 83/8 | 80/84 | |

## Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Input Current (full load / no-load) | 5V input | -- | 571/30 | --/60 | mA |
| | 12V input | -- | 212/25 | --/50 | |
| | 15V input | -- | 169/18 | --/35 | |
| | 24V input | -- | 105/15 | --/30 | |
| Reflected Ripple Current | | -- | 15 | -- | |
| Surge Voltage (1sec. max.) | 5V input | -0.7 | -- | 9 | VDC |
| | 12V input | -0.7 | -- | 18 | |
| | 15V input | -0.7 | -- | 21 | |
| | 24V input | -0.7 | -- | 30 | |
| Input Filter | | Capacitance filter | | | |
| Hot Plug | | Unavailable | | | |

# DC/DC Converter

## SF_XT-2WR2 Series

## Output Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|---|
| Voltage Accuracy | | | See output regulation curve(Fig. 1) | | | |
| Linear Regulation | Input voltage change: ±1% | 3.3V output | -- | -- | ±1.5 | -- |
| | | Other output | -- | -- | ±1.2 | |
| Load Regulation | 10%-100% load | 3.3VDC output | -- | 18 | -- | % |
| | | 5VDC output | -- | 12 | -- | |
| | | 9VDC output | -- | 9 | -- | |
| | | 12VDC output | -- | 8 | -- | |
| | | 15VDC output | -- | 7 | -- | |
| | | 24VDC output | -- | 6 | -- | |
| Ripple & Noise* | 20MHz bandwidth | 3.3V output | -- | 100 | 150 | mVp-p |
| | | Others | -- | 100 | 200 | |
| Temperature Coefficient | Full load | | -- | -- | ±0.03 | %/℃ |
| Short-circuit Protection** | | | -- | -- | 1 | s |

Notes: * The "parallel cable" method is used for Ripple and noise test, please refer to DC-DC Converter Application Notes for specific information;
** At the end of the short circuit duration, the supply voltage must be disconnected from the modules.

## 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 | 3.3V/5V output | Derating when operating temperature ≥71°C ( see Fig. 2) | -40 | -- | 105 | ℃ |
| | Other output | Derating when operating temperature ≥85°C ( see Fig. 2) | | | | |
| Storage Temperature | | | -55 | -- | 125 | |
| Case Temperature Rise | Ta=25℃, nominal input, full load output | | -- | 25 | -- | |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | | -- | -- | 300 | |
| Storage Humidity | Non-condensing | | -- | -- | 95 | %RH |
| Reflow Soldering Temperature | | | Peak temp.≤245℃, maximum duration time≤60s over 217℃. For actual application, please refer to IPC/JEDEC J-STD-020D.1. | | | |
| Switching Frequency | Full load, nominal input voltage | 3.3V output | -- | 125 | -- | KHz |
| | | Others | -- | 100 | -- | |
| MTBF | MIL-HDBK-217F@25℃ | | 3500 | -- | -- | K hours |

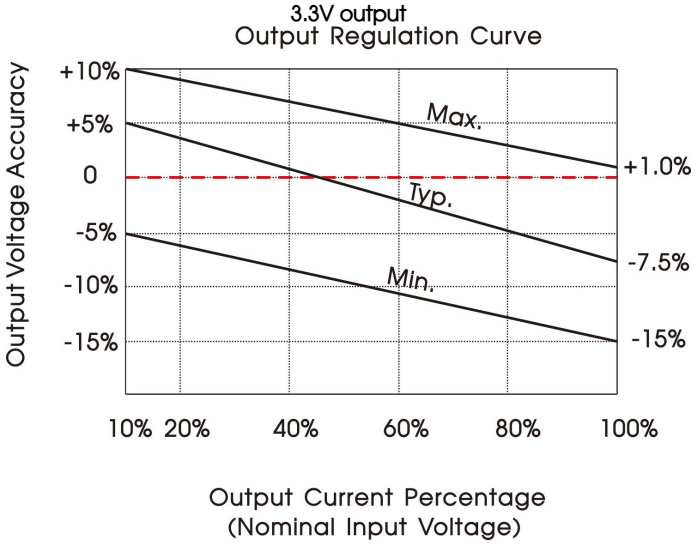
## Mechanical Specifications

| | |
|---|---|
| Case Material | Black Epoxy resin; flame-retardant and heat-resistant (UL94-V0) |
| Dimensions | 12.70 x 11.20 x 7.25 mm |
| Weight | 1.6g(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 Contact ±8KV perf. Criteria B |

## Typical Characteristic Curves



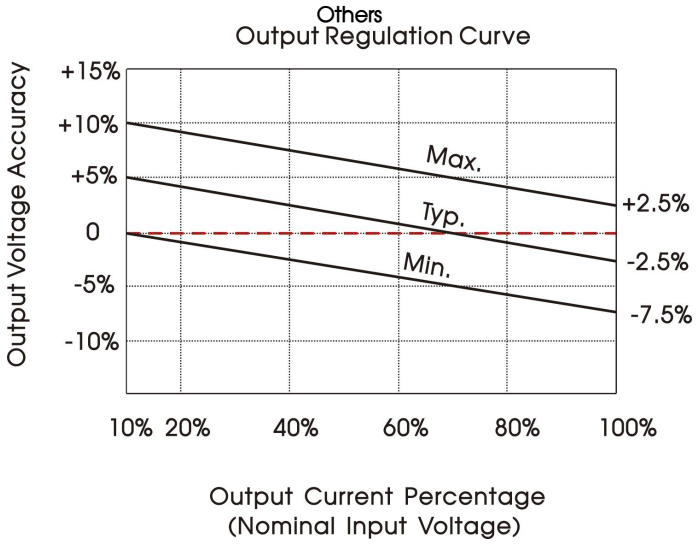




Fig. 1

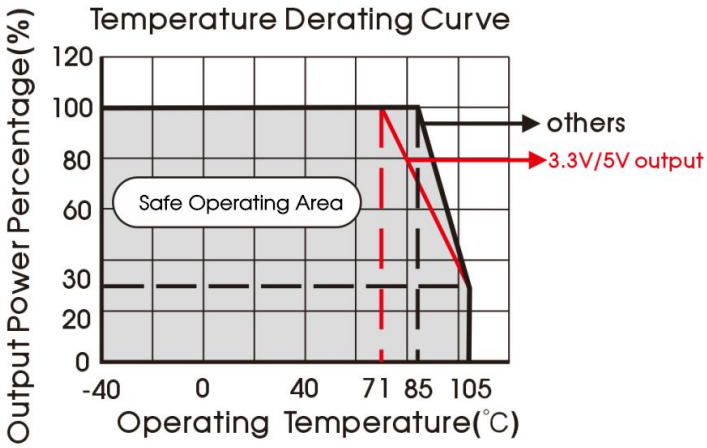
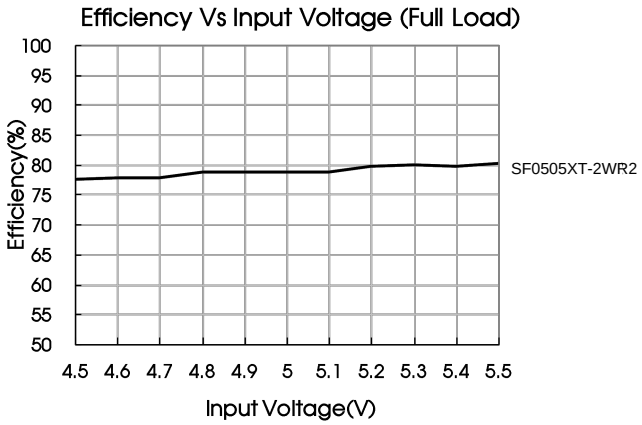
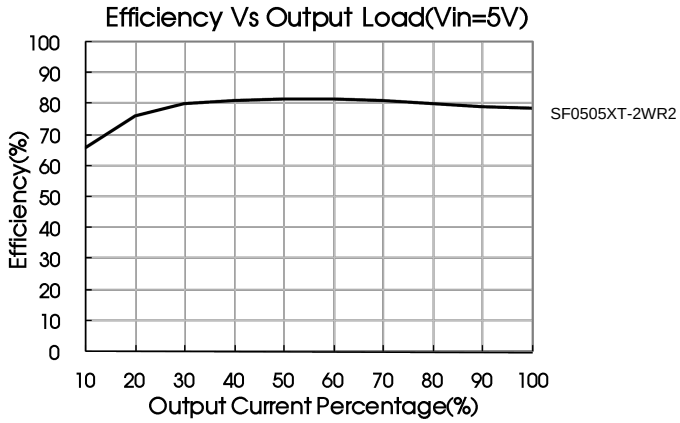
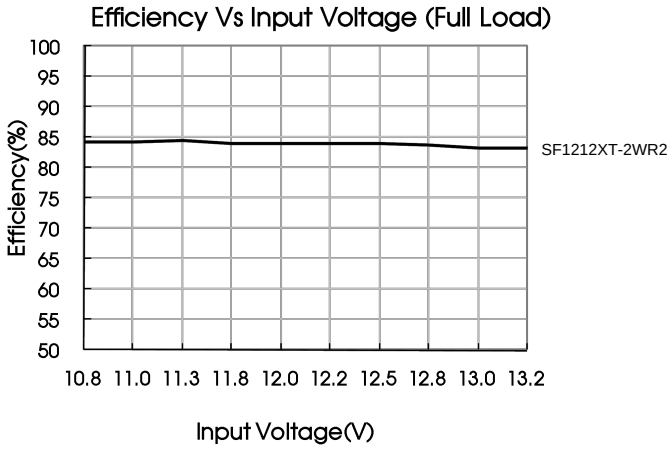
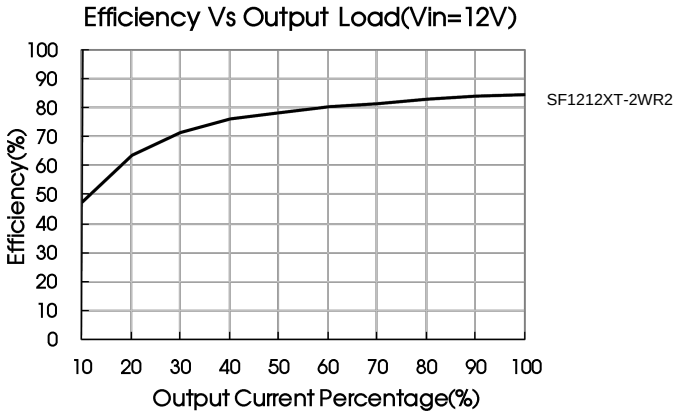



Fig. 2






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

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

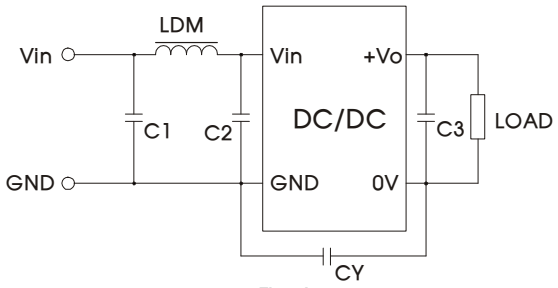



Fig. 4

Table 2: Recommended EMC filter values

| Input voltage (VDC) | | 5/12/15 | 24 |
|---|---|---|---|
| EMI | C1 | 4.7μF /50V | |
| | C2 | 4.7μF /50V | |
| | C3 | Refer to the Cout in Fig.3 | |
| | CY | -- | 1nF/3KV |
| | LDM | 6.8μH | |

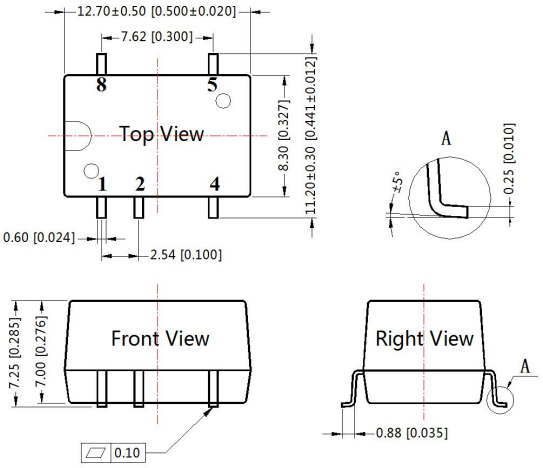
Note: For 24V input models use a Y-capacitor CY of 1nF/3kV).

### 3. Minimum Output Load Requirement

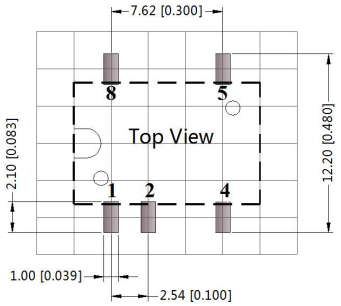
For a reliable and efficient operation of the converter, the minimum load should never be less than 10% of the rated output load. If the total required output power is below 10%, a parallel bleeding resistor is required on the output, ensuring that the sum of the power consumption is always maintained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

## 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:

1. 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;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on our company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. 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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