

DC/DC Converter

SF_XT-2WR2 Series



SCHMID-M

2W, Fixed input voltage, isolated & unregulated single output



Continuous Short
Circuit Protection

FEATURES

- | Ultra Compact SMD package
- | Isolation voltage: 3KVDC
- | Operating temperature range: -40°C to +105°C
- | Efficiency up to 86%
- | Internal SMD construction
- | No external component required
- | International standard pin-out

SF_XT-2WR2 series is specially designed for applications where an isolated voltage is required in a distributed power supply system. It is suitable for:

1. Where the voltage of the input power supply is stable (voltage variation: $\pm 10\%V_{in}$);
2. Where isolation is necessary between input and output (isolation voltage $\leq 3000VDC$);
3. Where do not has high requirement of line regulation and load regulation;
4. Such as: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

Selection Guide

| Part No. | Input Voltage (VDC) | Output | | Efficiency (%.Min./Typ.) @ Full Load | Max. Capacitive Load (μF) |
|---------------|-------------------------------|-------------------------|------------------------------------|--|--|
| | | Output Voltage (VDC) | Output Current (mA) (Max./Min.) | | |
| SF0503XT-2WR2 | 4.5-5.5 (5VDC nominal) | 3.3 | 400/40 | 74/78 | 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 | |
| SF0524XT-2WR2 | | 24 | 83/8 | 80/84 | |
| SF1203XT-2WR2 | 10.8-13.2 (12VDC nominal)) | 3.3 | 400/40 | 74/78 | |
| SF1205XT-2WR2 | | 5 | 400/40 | 75/79 | |
| SF1209XT-2WR2 | | 9 | 222/22 | 78/82 | |
| SF1212XT-2WR2 | | 12 | 167/17 | 78/82 | |
| SF1215XT-2WR2 | | 15 | 133/13 | 79/83 | |
| SF1224XT-2WR2 | | 24 | 83/8 | 80/84 | |
| SF1505XT-2WR2 | 13.5-16.5 (15VDC nominal) | 5 | 400/40 | 75/79 | |
| SF1512XT-2WR2 | | 12 | 167/17 | 78/82 | |
| SF1515XT-2WR2 | | 15 | 133/13 | 79/83 | |
| SF1524XT-2WR2 | | 24 | 83/8 | 80/84 | |
| SF2403XT-2WR2 | 21.6-26.4 (24VDC nominal) | 3.3 | 400/40 | 74/78 | |
| SF2405XT-2WR2 | | 5 | 400/40 | 75/79 | |
| SF2409XT-2WR2 | | 9 | 222/22 | 78/82 | |
| SF2412XT-2WR2 | | 12 | 167/17 | 78/82 | |
| SF2415XT-2WR2 | | 15 | 133/13 | 79/83 | |
| SF2424XT-2WR2 | | 24 | 83/8 | 82/86 | |

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|------|--------|------|------|
| Input Current (full load / no-load) | 5V input | -- | 506/30 | -- | mA |
| | 12V input | -- | 212/25 | -- | |
| | 15V input | -- | 169/18 | -- | |
| | 24V input | -- | 105/15 | -- | |

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| | | | | | |
|----------------------------|--------------------|------|----|----|-----|
| 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 | |
| Reflected Ripple Current | | -- | 15 | -- | mA |
| Input Filter | Capacitance Filter | | | | |

Output Specifications

| Item | Operating Conditions | | Min. | Typ. | Max. | Unit |
|--------------------------|---------------------------------------|---------------|------|------|-------|-------|
| Output Voltage Accuracy | See tolerance envelope graph (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 | -- | 18 | -- | |
| | | 5VDC output | -- | 12 | -- | |
| | | 9VDC output | -- | 9 | -- | |
| | | 12VDC output | -- | 8 | -- | |
| | | 15VDC output | -- | 7 | -- | |
| | | 24VDC output | -- | 6 | -- | |
| Ripple & Noise* | 20MHz bandwidth | | -- | 100 | -- | mVp-p |
| Temperature Coefficient | 100% load | | -- | -- | ±0.03 | %/°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 |
|--|---|--|------|------|------|---------|
| Insulation Voltage | Input-output, with the test time of 1 minute and the leak current lower than 1mA. | | 3000 | -- | -- | VDC |
| Insulation Resistance | Input-output, isolation voltage 500VDC. | | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V. | | -- | 20 | -- | pF |
| Operating Temperature | 3.3V/5V output | Derating when operating temperature up to 71°C, (see Fig.2). | -40 | -- | 105 | °C |
| | Other output | Derating when operating temperature up to 85°C, (see Fig.2). | | | | |
| Storage Temperature | | | -55 | -- | 125 | |
| Casing Temperature Rise During Operating | Ta=25°C | | -- | 25 | -- | |
| Hand Soldering | Welding spot is 1.5mm away from the casing, 10 seconds. | | -- | -- | 300 | |
| Storage Humidity | Non-condensing | | -- | -- | 95 | |
| Switching Frequency | 100% load, nominal input voltage. | | -- | 100 | 300 | KHz |
| MTBF | MIL-HDFK-217F@25°C | | 3500 | -- | -- | K hours |

Physical Specifications

| | |
|-----------------|-----------------------|
| Casing Material | Epoxy resin (UL94-V0) |
| Dimensions | 12.70*11.20*7.25mm |
| Weight | 1.5g (Typ.) |
| Cooling | Free convection |

EMC Specifications

| | | | |
|-----|-------------------------|-----------------|--|
| EMI | Conducted emission | CISPR22/EN55022 | CLASS B (see Fig. 4 for recommended circuit) |
| | Radiated emission | CISPR22/EN55022 | CLASS B (see Fig. 4 for recommended circuit) |
| EMS | Electrostatic discharge | IEC/EN61000-4-2 | Contact ±8KV perf. Criteria B |

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Product Characteristic Curve

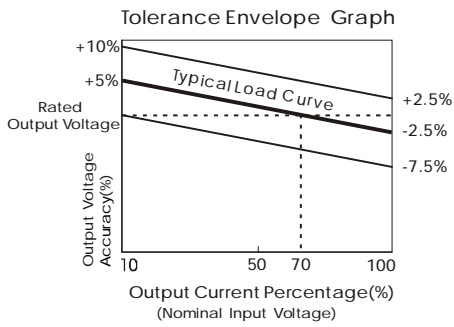


Fig. 1

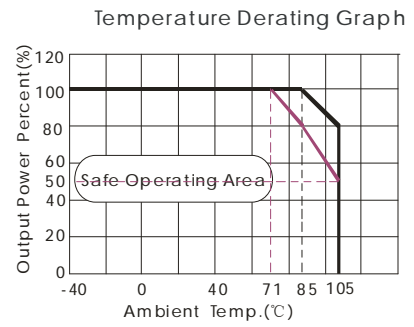
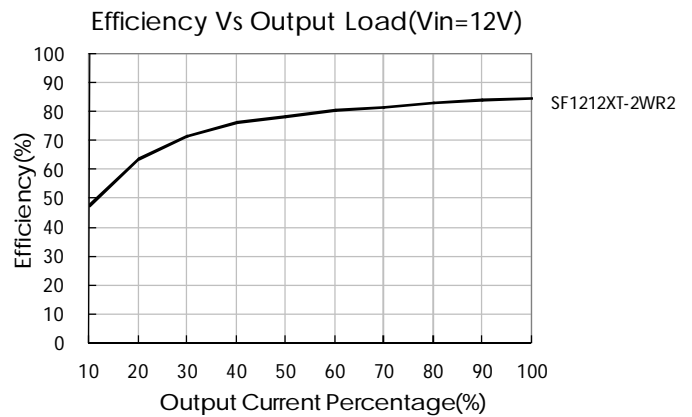
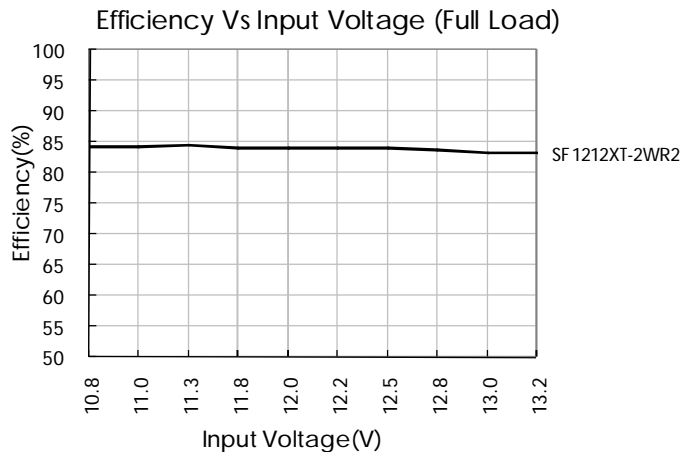
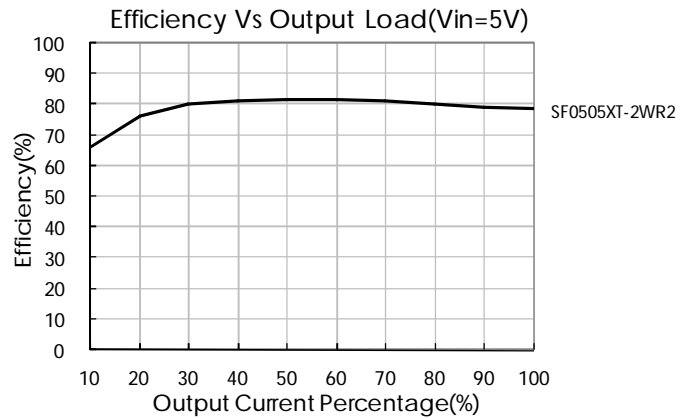
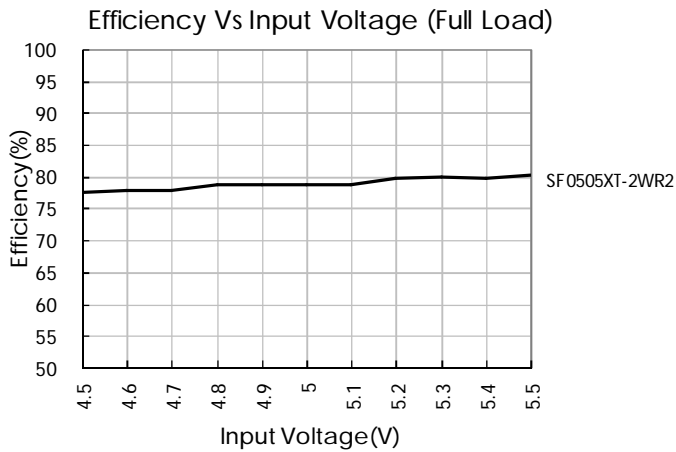
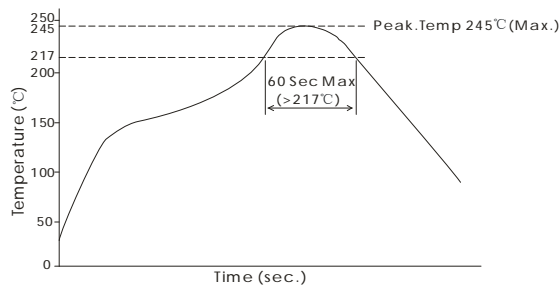


Fig. 2



Specific reflow soldering process can refer to IPC/JEDEC J-STD-020D. The recommended reflow soldering profile of our products is as below:

Note: the profile is only suitable for hot air reflow soldering.



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Design Reference

1. Typical application

If it is required to further reduce input and output ripple, a filter capacitor can be connected to the input and output terminals, see Fig.3. Moreover, choosing suitable filter capacitor is very important, start-up problems may be caused by too large capacitance. To ensure the modules running well, the recommended capacitive load values as shown in Table 1.

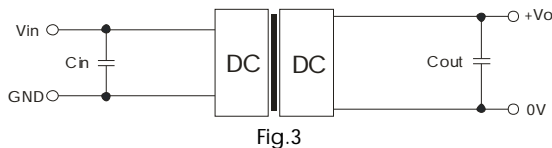


Fig.3

Recommended capacitive load value table (Table 1)

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

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

2. EMC typical recommended circuit (CLASS B)

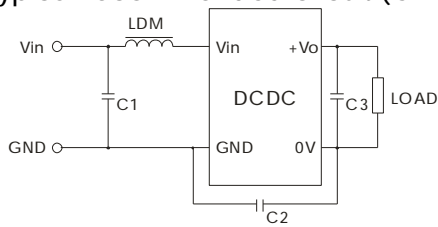


Fig. 4

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

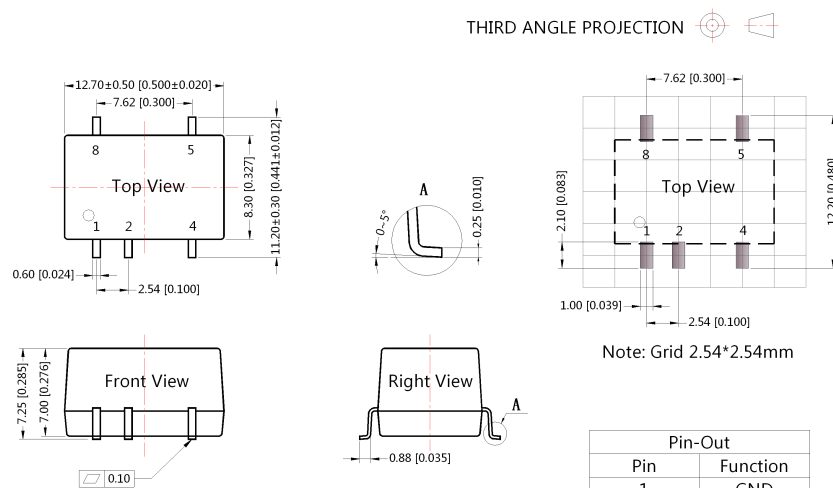
Note: 1. SF2424XT-2WR2 is subject to C2 (C2 : 470pF/3KV).

2. It is not needed to add the component in the peripheral circuit when parameter with the symbol of "--".

3. Output load requirements

To ensure the module work efficiently and reliably, during the operation, the min. output load should be no less than 10% of the full load. If the actual output power is low, please connect a resistor to the output terminal in parallel, with a recommended resistance which is 10% of the rated power, and derating is required during operation.

Dimensions and Recommended Layout



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

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

NC: No Connection

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Note:

1. If the product is operated out of the min. load requirement, the product performance may not meet all parameter indexes in this datasheet;
2. The max. capacitive load offered is tested at nominal input voltage and full load;
3. Unless otherwise specified, parameter indexes in this datasheet is measured under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75% with nominal input voltage and rated output load;
4. All testing methods in this datasheet are based on our Company's corporate standards;
5. The parameter indexes above are for the modules listed in this datasheet, for non-standard module's parameter indexes, please contact our technicians for specific information;
6. We can provide custom design;
7. Specifications are subject to change without prior notice.