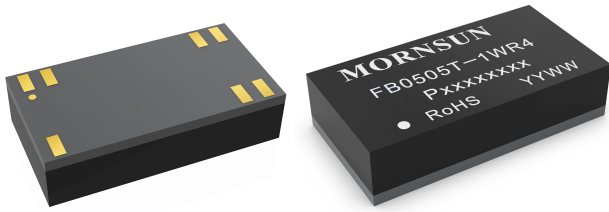


1W isolated DC-DC converter
Fixed input voltage, unregulated single output



Patent Protection RoHS



FEATURES

- Ultra-small, ultra-thin DFN package (13.20 x 7.00 x 3.10mm)
- Isolation capacitance as low as 8pF
- I/O isolation test voltage 3000VAC/4200VDC
- Operating ambient temperature range: -40°C to +125°C
- High efficiency up to 87%
- Continuous short-circuit protection
- Meet automotive EMC standards
- Meet IEC62368, UL62368, EN62368 standards
- AEC-Q100 approved (under testing)

FB05xxT-1WR4 is designed for use in distributed power supply systems and especially suitable in applications such as digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits. It also can be used in automobile motor control and drive system, such as motor vehicle communication system controller, engine control system, the ignition system, the motor voltage monitoring, the electronic accelerator pedal, automobile tire pressure detection system, doors and tail lights controller, air conditioning control and battery management system (BMS), etc.

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. | | |
| UL/CE/CB (Pending) | FB0505T-1WR4 | 5 (4.5-5.5) | 5 | 200/20 | 83/87 | 2400 |

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|--------------------|-------|--------|------|
| Input Current (full load / no-load) | 5VDC input | -- | 230/7 | 241/15 | mA |
| Reflected Ripple Current* | | -- | 10 | -- | |
| Surge Voltage (1sec. max.) | 5VDC input | -0.7 | -- | 9 | VDC |
| Input Filter | | Capacitance filter | | | |
| Hot Plug | | Unavailable | | | |

Note: * Please refer to DC-DC Converter Application Note for detailed description of reflected ripple current testing method.

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|--------------------------|---------------------------|--------------------------------------|-------|------|-------|
| Voltage Accuracy | | See output regulation curve (Fig. 1) | | | |
| Linear Regulation | Input voltage change: ±1% | -- | -- | 1.2 | -- |
| Load Regulation | 10%-100% load | -- | 8 | 15 | % |
| Ripple & Noise* | 20MHz bandwidth | -- | 30 | 75 | mVp-p |
| Temperature Coefficient | Full load | -- | ±0.02 | -- | %/°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. | 4200 | -- | -- | VDC |
| | | 3000 | -- | -- | VAC |
| Insulation Resistance | Input-output resistance at 500VDC | 1000 | -- | -- | MΩ |

| | | | | | |
|----------------------------------|---|--|-----|-----|---------|
| Isolation Capacitance | Input-output capacitance at 100kHz/0.1V | -- | 8 | -- | pF |
| Operating Temperature | Derating when operating temperature $\geq 105^{\circ}\text{C}$, (see Fig. 2) | -40 | -- | 125 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| Case Temperature Rise | Ta=25°C | -- | 7 | -- | |
| Storage Humidity | Non-condensing | -- | -- | 95 | %RH |
| Reflow Soldering Temperature* | | Peak temp. $\leq 245^{\circ}\text{C}$, maximum duration time $\leq 60\text{s}$ over 217°C | | | |
| Vibration | | 10-1000Hz, 1mm, 10G, along X, Y and Z four cycles each | | | |
| Switching Frequency | Full load, nominal input voltage | -- | 300 | -- | kHz |
| MTBF | MIL-HDBK-217F@25°C | 7500 | -- | -- | k hours |
| Moisture Sensitivity Level (MSL) | IPC/JEDEC J-STD-020D.1 | Level 3 | | | |

Note: * See also IPC/JEDEC J-STD-020D.1.

Mechanical Specifications

| | |
|----------------|--|
| Case Material | Black epoxy resin; flame-retardant and heat-resistant (UL94 V-0) |
| Dimensions | 13.20 x 7.00 x 3.10 mm |
| Weight | 0.7(Typ.) |
| Cooling Method | Free air convection |

Electromagnetic Compatibility (EMC)

| | | | |
|-----------|-----|-----------------|--|
| Emissions | CE | CISPR32/EN55032 | CLASS B (see Fig. 4 for recommended circuit) |
| | | CISPR25/EN55025 | CLASS 3 (see Fig. 5 for recommended circuit) |
| | RE | CISPR32/EN55032 | CLASS B (see Fig. 4 for recommended circuit) |
| | | CISPR25/EN55025 | CLASS 3 (see Fig. 5 for recommended circuit) |
| Immunity | ESD | ISO10605 | Contact $\pm 8\text{kV}$ perf. Criteria B |
| | RS | ISO11452-2 | 100V/m perf. Criteria A |
| | CS | ISO11452-4 | 200mA perf. Criteria A |

Typical Characteristic Curves

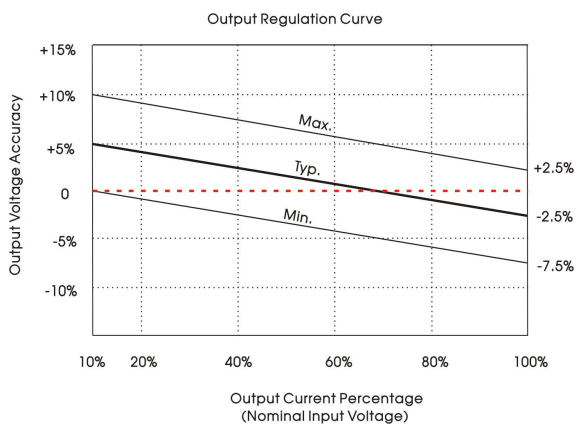


Fig. 1

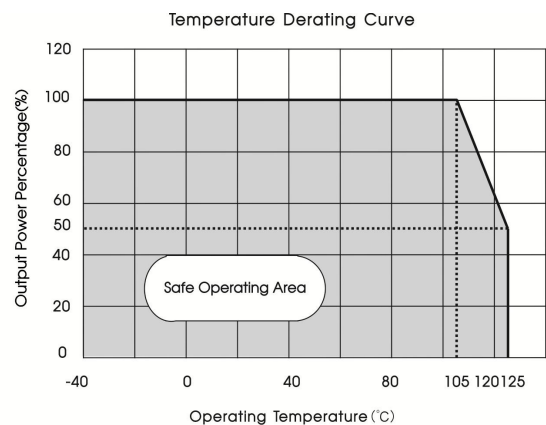
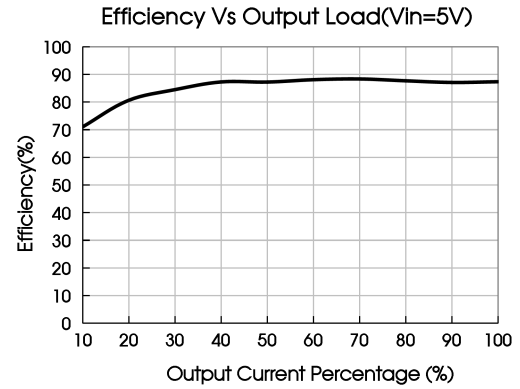
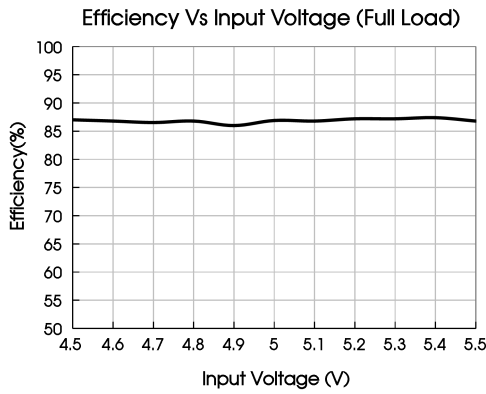


Fig. 2



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. For recommended input and output capacitor values refer to Table 1.

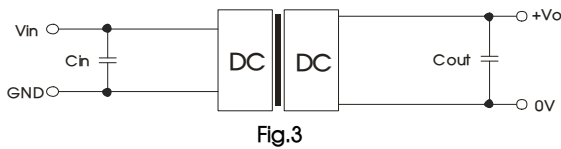


Table 1: Recommended input and output capacitor values

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

2. EMC (CISPR32/EN55032 CLASS B) compliance circuit

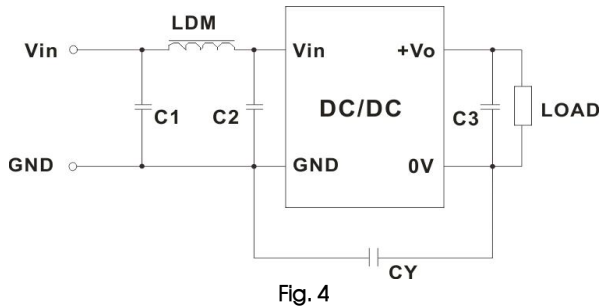


Table 2: Recommended EMC filter values

| Input voltage 5VDC | Output voltage(VDC) | |
|-----------------------|---------------------|------------------------------|
| | Emissions | 5 |
| | C1/C2 | 4.7μF/25V |
| | CY | 47pF/5kVDC |
| | C3 | Refer to the Cout in table 1 |
| | LDM | 6.8μH |

3. EMC (CISPR25/EN55025 CLASS 3) compliance circuit

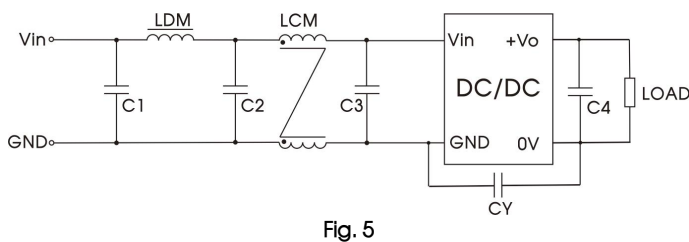
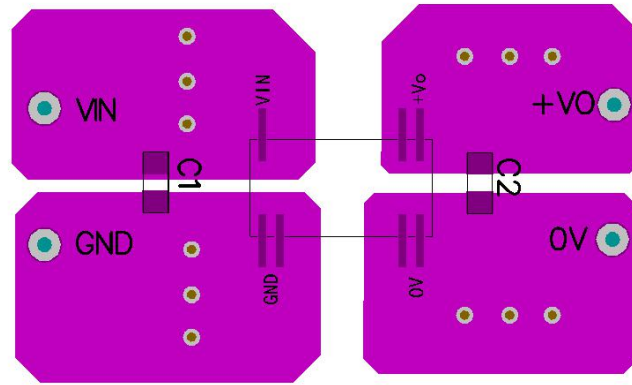


Table 3: Recommended EMC filter values

| Input voltage 5VDC | Output voltage(VDC) | |
|-----------------------|---------------------|------------------------------|
| | Emissions | 5 |
| | C1/C2/C3 | 10μF/25V |
| | C4 | Refer to the Cout in table 1 |
| | LDM | 4.7uH |
| | LCM | 4.7mH |
| | CY | 47pF/5kVDC |

4. For additional information, please refer to DC-DC converter application notes on www.mornsun-power.com

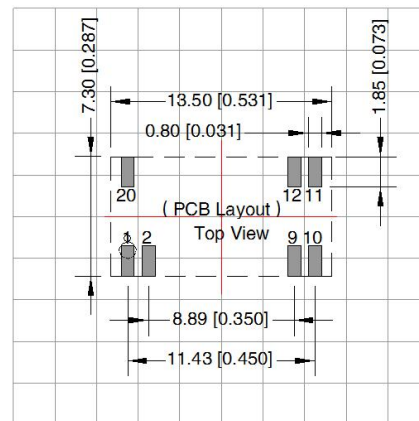
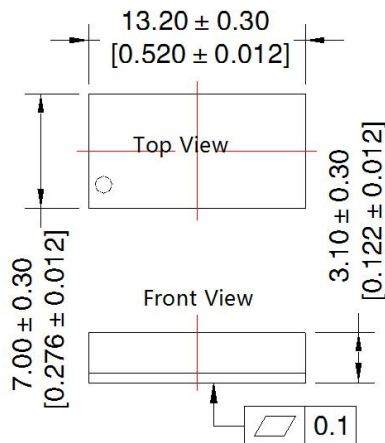
Temperature Rise Test PCB Layout



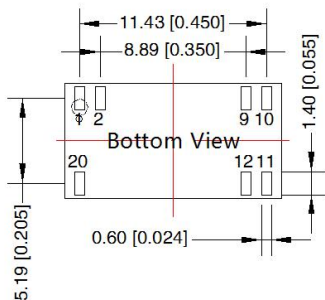
FB05xxT-1WR4

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



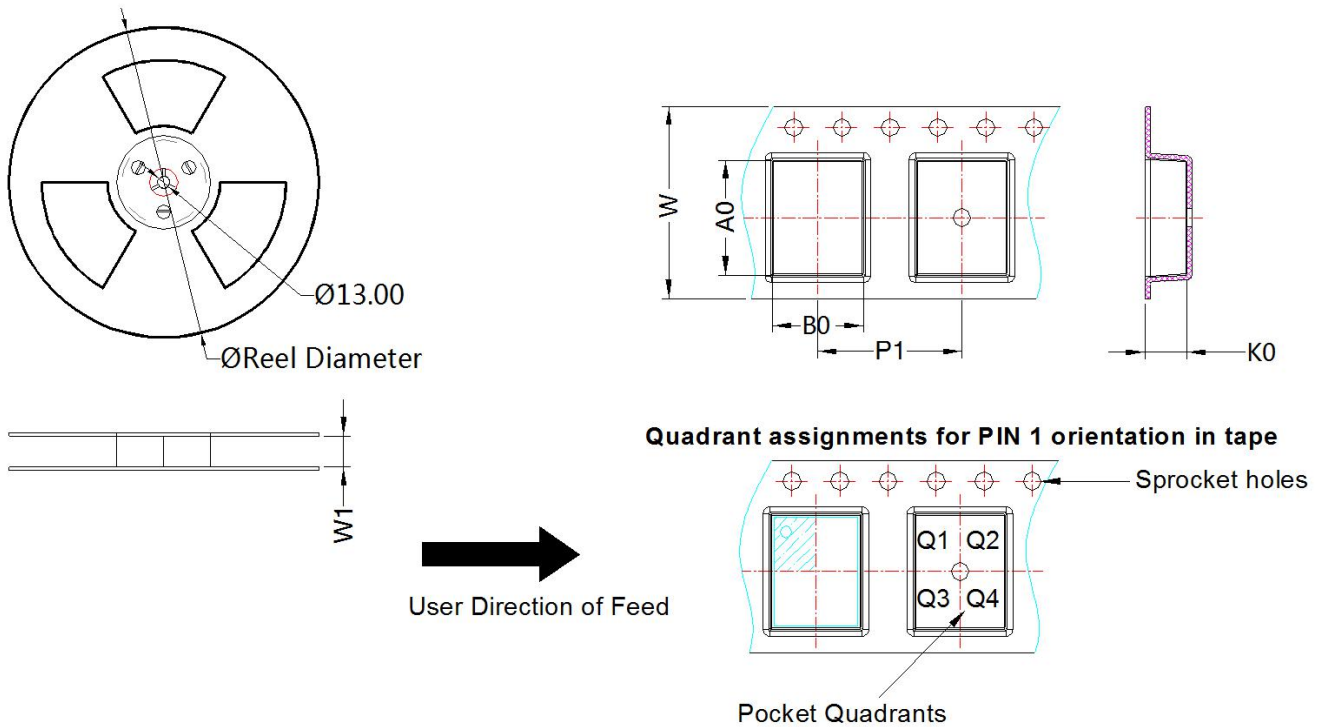
Note: Grid 2.54*2.54mm



| Pin-Out | |
|---------|----------|
| Pin | Function |
| 1,2 | GND |
| 9,10 | 0V |
| 11,12 | +Vo |
| 20 | Vin |

Note:
Unit: mm[inch]
General tolerances: ±0.10[±0.004]

Tape/Reel packaging



| Device | Package Type | Pin | MPQ | Reel Diameter (mm) | Reel Width W1 (mm) | A0 (mm) | B0 (mm) | K0 (mm) | P1 (mm) | W (mm) | Pin1 Quadrant |
|--------------|--------------|-----|------|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| FB0505T-1WR4 | DFN 13.2x7 | 7 | 1200 | 330.0 | 24.4 | 14.05 | 7.75 | 3.8 | 12 | 24.0 | Q1 |

Notes:

- For additional information on Product Packaging please refer to www.mornsun-power.com. Tape/Reel packaging bag number: 58200084;
- Refer to *IPC 7093* for the welding process design of this product. For detailed operation guidance, please refer to *Hot Air Gun Welding Operation Instruction for DFN Package Product* or *Welding Operation Instruction for DFN Package Product*;
- 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 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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