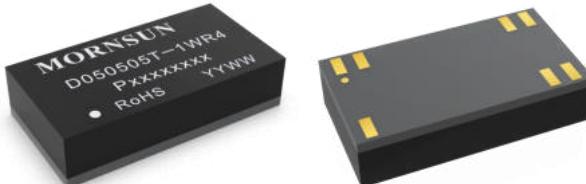


1W dual isolated DC-DC converter  
Fixed input voltage, unregulated dual output



Patent Protection RoHS



## FEATURES

- Ultra-small, ultra-thin DFN package (13.20 x 7.00 x 3.10mm)
- Isolation capacitance as low as 15pF
- I/O isolation test voltage 3k VDC, O1/O2 isolation test voltage 1.5k VDC
- Operating ambient temperature range: -40°C to +125°C
- High efficiency up to 87%
- Continuous short-circuit protection

D050505T-1WR4 are specially designed for applications where two isolated voltage is required in a distributed power supply system and especially suitable in applications such as 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. |        |                                    |                           |
| —             | D050505T-1WR4 | 5 (4.5-5.5)         | Vo1           | 5 | Io1                   | 100/10 | 83/87                              | 1200                      |
|               |               |                     | Vo2           | 5 | Io2                   | 100/10 |                                    |                           |

Note: \*Each of the two outputs has the same maximum capacitive load.

### 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. | 3000 | --   | --   | VDC  |
|                       | Vo1-Vo2 electric strength test for 1 minute with a leakage current of 1mA max.      | 1500 | --   | --   |      |
| Insulation Resistance | Input-output, Vo1-Vo2 resistance at 500VDC  | 1000 | --   | --   | MΩ   |
| Isolation Capacitance | Input-output, Vo1-Vo2 capacitance at 100kHz/0.1V                                    | --   | 15   | --   | 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            | $\Delta T = 25^{\circ}\text{C}$  | --      | 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 $217^{\circ}\text{C}$ |         |     |     |         |
| Vibration                        | 10-150Hz, 0.75mm, 5G, 90 min. along X, Y and Z   |         |     |     |         |
| Switching Frequency              | Full load, nominal input voltage   | --      | 300 | --  | kHz     |
| MTBF                             | MIL-HDBK-217F@ $25^{\circ}\text{C}$  | 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) |
|           | RE  | CISPR32/EN55032 | CLASS B (see Fig. 4 for recommended circuit) |
| Immunity  | ESD | IEC/EN61000-4-2 | Contact $\pm 8\text{kV}$ perf. Criteria B    |
|           | RS  | IEC/EN61000-4-3 | 10V/m perf. Criteria A                       |
|           | CS  | IEC/EN61000-4-6 | 3Vr.m.s perf. Criteria A                     |

## Typical Characteristic Curves

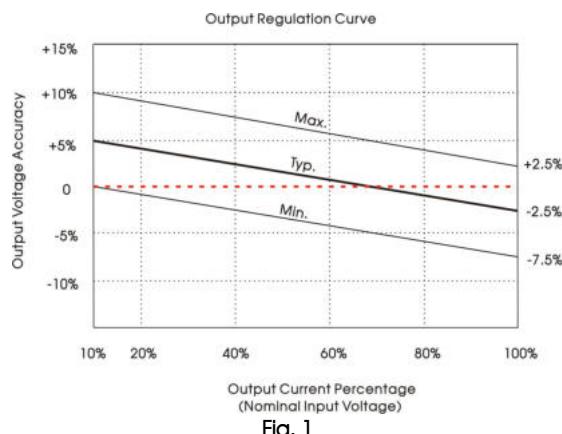


Fig. 1

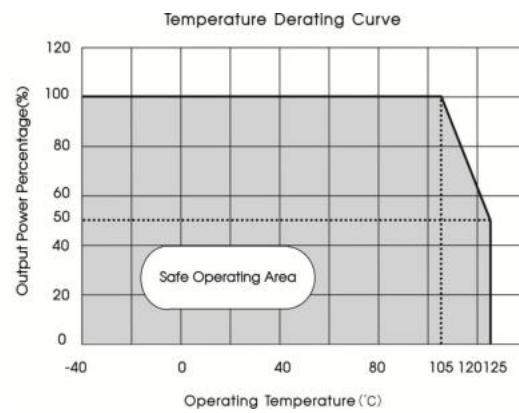
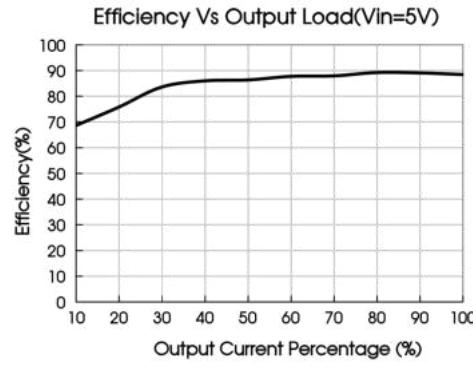
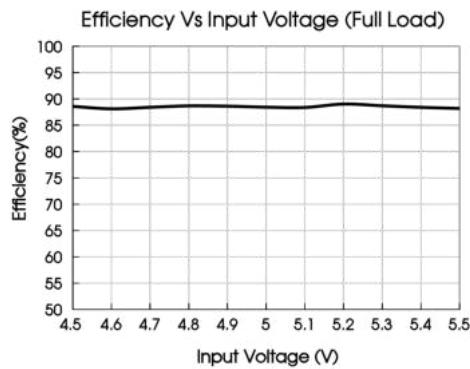


Fig. 2



## 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.

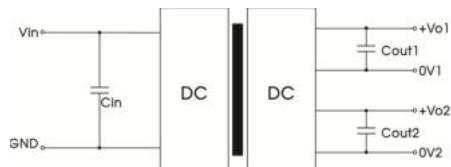


Fig.3

Table 1: Recommended input and output capacitor values

| Vin  | Cin       | Vo1  | Cout1    | Vo2  | Cout2    |
|------|-----------|------|----------|------|----------|
| 5VDC | 4.7μF/25V | 5VDC | 10μF/25V | 5VDC | 10μF/25V |

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

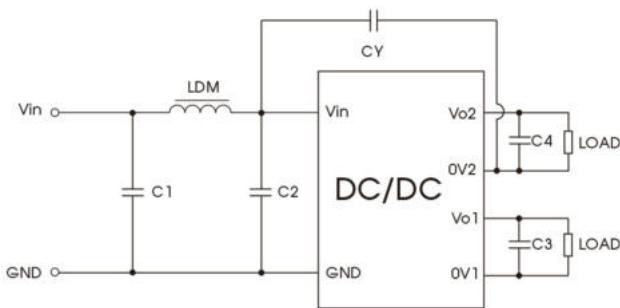


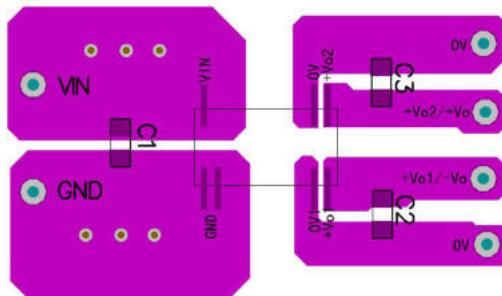
Fig. 4

Table 2: Recommended EMC filter values

| Input voltage<br>5VDC | Output voltage<br>5VDC |                              |
|-----------------------|------------------------|------------------------------|
|                       | Emissions              | 5VDC                         |
|                       | C1/C2                  | 4.7μF /25V                   |
|                       | CY                     | 100pF /4kVDC                 |
|                       | C3/C4                  | Refer to the Cout in table 1 |
|                       | LDM                    | 6.8μH                        |

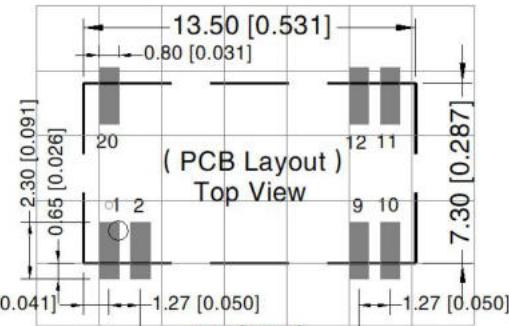
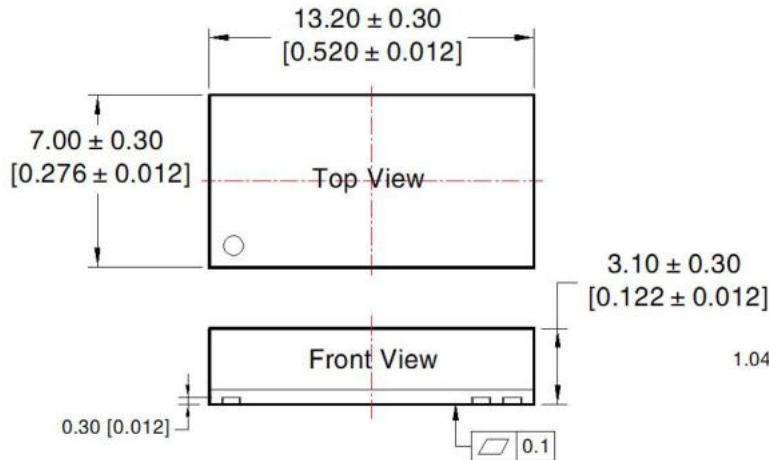
3. For additional information, please refer to DC-DC converter application notes on  
[www.mornsun-power.com](http://www.mornsun-power.com)

### Temperature Rise Test PCB Layout



Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



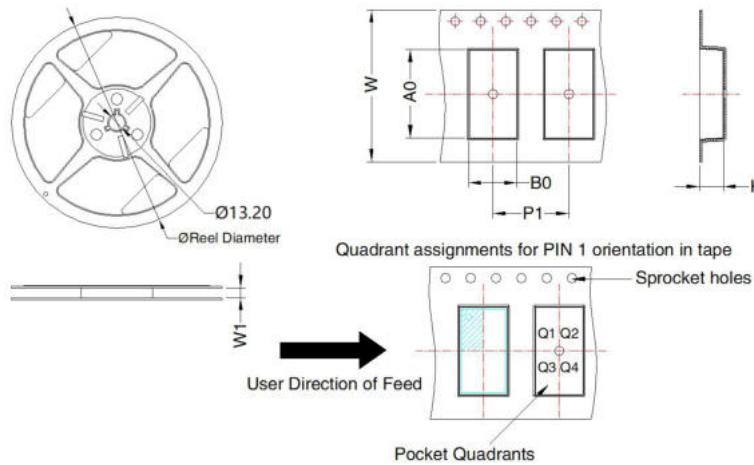
| Pin-Out |      |
|---------|------|
| Pin     | Mark |
| 1,2     | GND  |
| 9       | 0V1  |
| 10      | Vo1  |
| 11      | Vo2  |
| 12      | 0V2  |
| 20      | Vin  |

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 |
|---------------|--------------|-----|-----|--------------------|--------------------|---------|---------|---------|---------|--------|---------------|
| D050505T-1WR4 | DFN 7x13.2   | 7   | 350 | 180.0              | 24.4               | 14.05   | 7.75    | 3.8     | 12.0    | 24.0   | Q1            |

Notes:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Tape/Reel packaging bag number: 58240038;
2. 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*;
3. 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;
4. The maximum capacitive load offered were tested at input voltage range and full load;
5. 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;
6. All index testing methods in this datasheet are based on our company corporate standards;
7. We can provide product customization service, please contact our technicians directly for specific information;
8. Products are related to laws and regulations: see "Features" and "EMC";
9. 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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