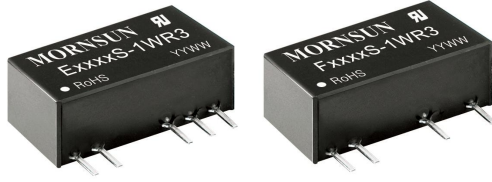


1W isolated DC-DC converter
Fixed input voltage, unregulated dual/single output



UL US CE UK CB Report RoHS Patent Protection

UL 62368-1 EN 62368-1 BS EN 62368-1 IEC 62368-1

E05_S-1WR3 & F05_S-1WR3 series are specially designed for applications where an isolated (two isolated) voltage is required in a distributed power supply system. They are suitable for: pure digital circuits, low frequency analog circuits, relay-driven circuits and data switching circuits.

FEATURES

- Continuous short-circuit protection
- No-load input current as low as 5mA
- Operating ambient temperature range: -40°C to +105°C
- High efficiency up to 85%
- I/O isolation test voltage: 3k VDC
- Industry standard pin-out
- SIP package

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. | | |
| EN/BS EN UL/EN/BS EN/IEC | E0503S-1WR3 | 5 (4.5-5.5) | ±3.3 | ±152/±15 | 70/74 | 1200 |
| | E0505S-1WR3 | | ±5 | ±100/±10 | 78/82 | 1200 |
| | E0509S-1WR3 | | ±9 | ±56/±6 | 79/83 | 470 |
| | E0512S-1WR3 | | ±12 | ±42/±5 | 79/83 | 220 |
| | E0515S-1WR3 | | ±15 | ±34/±4 | 79/83 | |
| | E0524S-1WR3 | | ±24 | ±21/±3 | 81/85 | 100 |
| | F0503S-1WR3 | | 3.3 | 303/30 | 70/74 | 2400 |
| | F0505S-1WR3 | | 5 | 200/20 | 78/82 | |
| | F0509S-1WR3 | | 9 | 111/12 | 79/83 | 1000 |
| | F0512S-1WR3 | | 12 | 84/9 | 79/83 | 560 |
| | F0515S-1WR3 | | 15 | 67/7 | 79/83 | |
| | F0524S-1WR3 | | 24 | 42/4 | 81/85 | 220 |

Note: *The specified maximum capacitive load for positive and negative output is identical.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|--------------------|--------|--------|------|
| Input Current (full load / no-load) | 3.3VDC/5VDC output | -- | 270/5 | 286/10 | mA |
| | 9VDC/12VDC output | -- | 241/12 | 254/20 | |
| | 15VDC/24VDC output | -- | 241/18 | 254/30 | |
| Reflected Ripple Current* | | -- | 15 | -- | |
| Surge Voltage (1sec. max.) | 5 VDC input | -0.7 | -- | 9 | VDC |
| Input Filter | | Capacitance filter | | | |
| Hot Plug | | Unavailable | | | |

Note: * Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|-------------------|---------------------------|-------------------------------------|------|------|------|----|
| Voltage Accuracy | | See output regulation curve(Fig. 1) | | | | |
| Linear Regulation | Input voltage change: ±1% | 3.3 VDC output | -- | -- | 1.5 | -- |
| | | Other output | -- | -- | 1.2 | |

| | | | | | | |
|--------------------------|-----------------|---------------|----|-------|-----|---------------------------|
| Load Regulation | 10%-100% load | 3.3VDC output | -- | 15 | 20 | % |
| | | 5VDC output | -- | 10 | 15 | |
| | | 9VDC output | -- | 8 | 10 | |
| | | 12VDC output | -- | 7 | 10 | |
| | | 15VDC output | -- | 6 | 10 | |
| | | 24VDC output | -- | 5 | 10 | |
| Ripple & Noise* | 20MHz bandwidth | Other output | -- | 30 | 75 | mVp-p |
| | | 24VDC output | -- | 50 | 100 | |
| Temperature Coefficient | 100% 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 |
| 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 ≥ 85°C, (see Fig. 2) | -40 | -- | 105 | °C |
| Storage Temperature | | -55 | -- | 125 | |
| Case Temperature Rise | Ta=25°C | 3.3VDC output | -- | 25 | |
| | | Others | -- | 15 | -- |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | 300 | |
| Storage Humidity | Non-condensing | -- | -- | 95 | %RH |
| Switching Frequency | 100% load, nominal input voltage | -- | 270 | -- | kHz |
| MTBF | MIL-HDBK-217F@25°C | 3500 | -- | -- | k hours |

Mechanical Specifications

| | |
|-----------------|---|
| Case Material | Black plastic; flame-retardant and heat-resistant (UL94V-0) |
| Dimensions | 19.65 x 6.00 x 10.16mm |
| Weight | 2.1g(Typ.) |
| Cooling methods | 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 | Air ±8kV, Contact ±4kV perf. Criteria B |

Typical Characteristic Curves

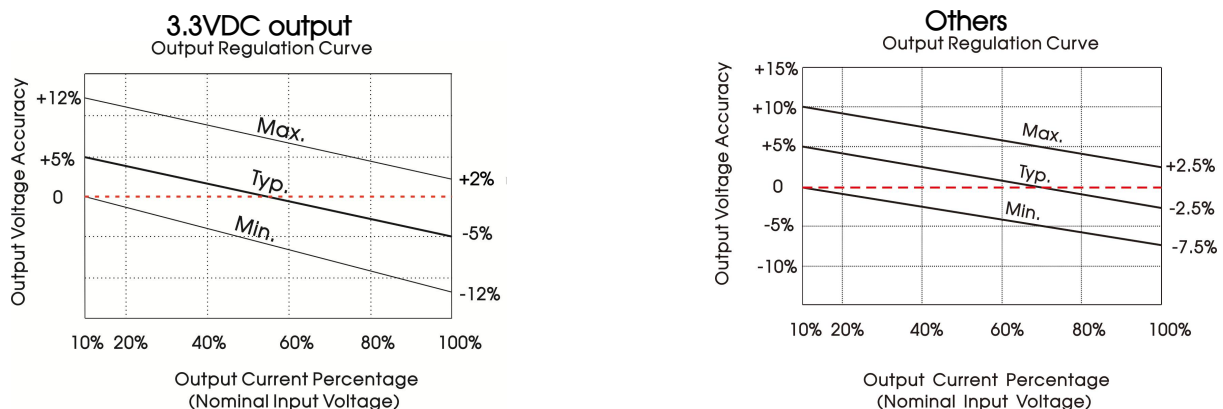


Fig. 1

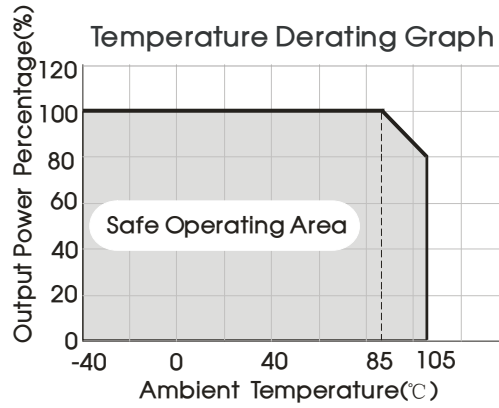
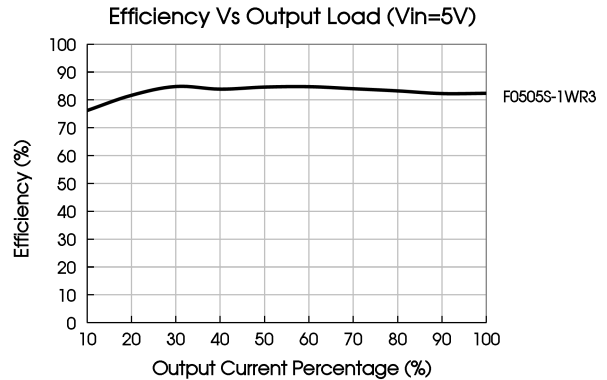
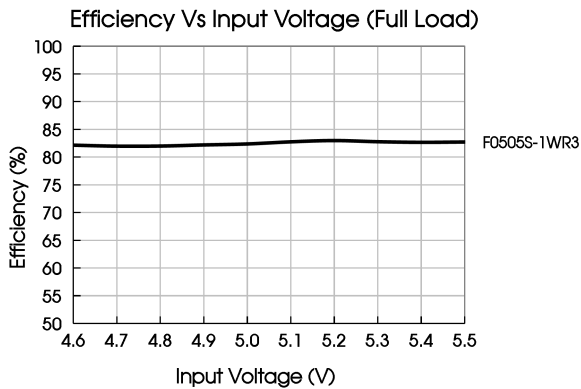
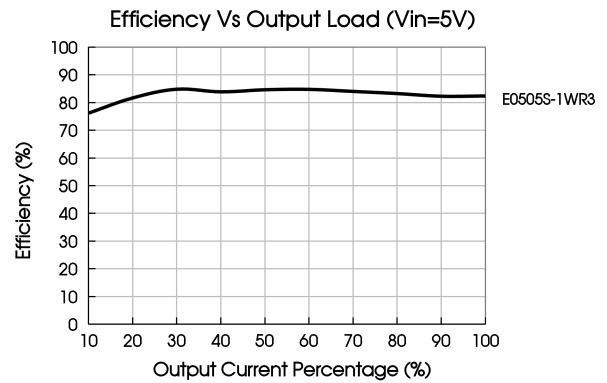
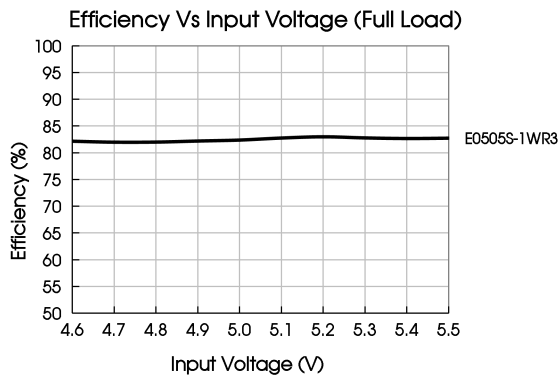


Fig. 2



Design Reference

1. Typical application circuit

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.

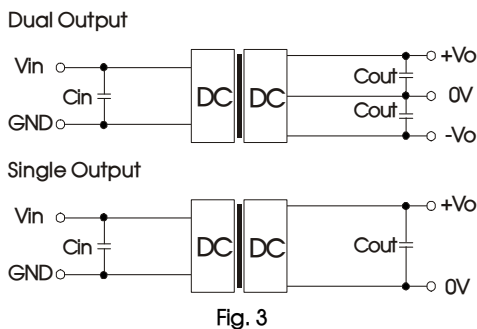


Fig. 3

Recommended capacitive load value table (Table 1)

| Vin | Cin | Single output | Cout | Dual output | Cout |
|------|-----------|---------------|-----------|-------------|------------|
| 5VDC | 4.7μF/16V | 3.3/5VDC | 10μF/16V | ±3.3/±5VDC | 4.7μF/16V |
| -- | -- | 9/12VDC | 2.2μF/25V | ±9/±12VDC | 1μF/25V |
| -- | -- | 15/24VDC | 1μF/50V | ±15/±24VDC | 0.47μF/50V |

2. EMC (CLASS B) compliance circuit

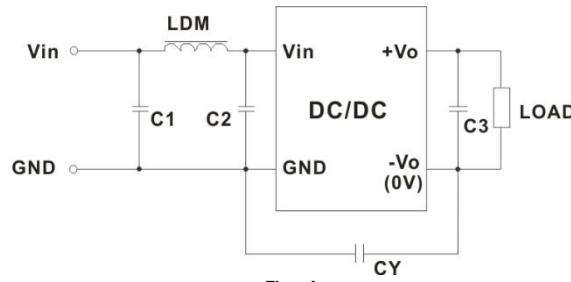


Fig. 4

EMC recommended circuit value table (Table 2)

| Input voltage 5VDC | Emissions | Output voltage | 3.3/5/9VDC | 12/15/24VDC |
|-----------------------|-----------|------------------------------|---|-------------|
| | | C1/C2 | 4.7μF /25V | 4.7μF /25V |
| | CY | -- | 1nF /4kVDC VISHAY HGZ102MBP TDK CD45-E2GA102M-GKA | |
| | C3 | Refer to the Cout in table 1 | | |
| | LDM | 6.8μH | 6.8μH | |

Note: In the case of actual use, the requirements for EMI are high, it is subject to CY (CY: 1nF/4kV).

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

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION

Front View
Dimensions: 0.50 [0.020] (height), 10.16 [0.400] (width), 4.10 [0.161] (height), 0.50 [0.020] (width)

Bottom View
Dimensions: 19.65 [0.774] (width), 0.90 [0.035] (height), 6.00 [0.236] (height), 2.21 ± 0.50 [0.087 ± 0.020] (width), 12.70 [0.500] (width), 2.54 [0.100] (width)

Dual Output Top View (PCB layout)
Pin 1: Ø1.00 [Ø0.039]

Single Output Top View (PCB layout)

Note: Grid 2.54*2.54mm

| Pin | Single | Dual |
|-----|--------|------|
| 1 | Vin | Vin |
| 2 | GND | GND |
| 5 | 0V | -Vo |
| 6 | No Pin | 0V |
| 7 | +Vo | +Vo |

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