

1W, Fixed input voltage, isolated & unregulated dual/single output

FEATURES

- Miniature SIP package, International standard pin-out
- Conversion efficiency high up to 81%
- Isolation voltage: 3K VDC
- Operating temperature range: -40°C to +105°C
- EN60950,UL60950 Approval



UL **us** **CE** Patent Protection **RoHS**

E_S-1WR2 & F_S-1WR2 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, load regulation and low ripple noise;
4. Such as: pure digital circuits, low frequency analog circuits and relay-driven circuits.etc.

Selection Guide

| Certification | Part No. | Input Voltage (VDC) | Output | | Efficiency (%Min./Typ.) @ Full Load | Max. Capacitive Load* (μF) |
|---------------|-------------|---------------------|----------------------|---------------------------------|-------------------------------------|-----------------------------------|
| | | Nominal (Range) | Output Voltage (VDC) | Output Current (mA) (Max./Min.) | | |
| -- | E0312S-1WR2 | 3.3 (2.97-3.63) | ± 12 | $\pm 42/\pm 5$ | 72/76 | 100 |
| | F0303S-1WR2 | | 3.3 | 303/30 | 69/73 | |
| | F0305S-1WR2 | | 5 | 200/20 | 74/78 | 220 |
| | F0324S-1WR2 | | 24 | 42/5 | 74/78 | |
| UL/CE | E0505S-1WR2 | 5 (4.5-5.5) | ± 5 | $\pm 100/\pm 10$ | 76/80 | 100 |
| | E0509S-1WR2 | | ± 9 | $\pm 56/\pm 6$ | 76/80 | |
| | E0512S-1WR2 | | ± 12 | $\pm 42/\pm 5$ | 76/80 | |
| | E0515S-1WR2 | | ± 15 | $\pm 33/\pm 4$ | 77/81 | |
| | E0524S-1WR2 | | ± 24 | $\pm 21/\pm 2$ | 77/81 | |
| UL/CE | F0503S-1WR2 | 5 (4.5-5.5) | 3.3 | 303/30 | 69/73 | 220 |
| | F0505S-1WR2 | | 5 | 200/20 | 76/80 | |
| | F0509S-1WR2 | | 9 | 111/12 | 76/80 | |
| | F0512S-1WR2 | | 12 | 83/9 | 76/80 | |
| | F0515S-1WR2 | | 15 | 67/7 | 77/81 | |
| | F0524S-1WR2 | | 24 | 42/5 | 77/81 | |
| -- | E0909S-1WR2 | 9 (8.1-9.9) | ± 9 | $\pm 56/\pm 6$ | 76/80 | 100 |
| | F0909S-1WR2 | | 9 | 111/12 | 76/80 | 220 |
| UL/CE | E1205S-1WR2 | 12 (10.8-13.2) | ± 5 | $\pm 100/\pm 10$ | 76/80 | 100 |
| | E1212S-1WR2 | | ± 12 | $\pm 42/\pm 5$ | 77/81 | |
| | E1215S-1WR2 | | ± 15 | $\pm 33/\pm 4$ | 77/81 | |
| | E1224S-1WR2 | | ± 24 | $\pm 21/\pm 2$ | 76/80 | |
| UL/CE | F1203S-1WR2 | 12 (10.8-13.2) | 3.3 | 303/30 | 71/75 | 220 |
| | F1205S-1WR2 | | 5 | 200/20 | 76/80 | |
| | F1209S-1WR2 | | 9 | 111/12 | 76/80 | |
| | F1212S-1WR2 | | 12 | 83/9 | 76/80 | |
| | F1215S-1WR2 | | 15 | 67/7 | 77/81 | |
| | F1224S-1WR2 | | 24 | 42/5 | 77/81 | |
| -- | E1505S-1WR2 | 15 (13.5-16.5) | ± 5 | $\pm 100/\pm 10$ | 76/80 | 100 |
| | E1515S-1WR2 | | ± 15 | $\pm 33/\pm 4$ | 77/81 | |
| CE | F1505S-1WR2 | 15 (13.5-16.5) | 5 | 200/20 | 76/80 | 220 |

| Model | Series | Output Voltage (V) | Output Current (A) | Efficiency (%) | Power (W) |
|-------|-------------|--------------------|--------------------|----------------|-----------|
| -- | F1509S-1WR2 | 24 (21.6-26.4) | 9 | 111/12 | 76/80 |
| | F1512S-1WR2 | | 12 | 83/9 | 76/80 |
| CE | F1515S-1WR2 | | 15 | 67/7 | 77/81 |
| UL/CE | E2405S-1WR2 | | ±5 | ±100/±10 | 76/80 |
| | E2409S-1WR2 | | ±9 | ±56/±6 | 76/80 |
| | E2412S-1WR2 | | ±12 | ±42/±5 | 77/81 |
| | E2415S-1WR2 | | ±15 | ±33/±4 | 75/79 |
| | E2424S-1WR2 | | ±24 | ±21/±2 | 76/80 |
| -- | F2403S-1WR2 | | 3.3 | 303/30 | 71/75 |
| UL/CE | F2405S-1WR2 | | 5 | 200/20 | 75/79 |
| | F2409S-1WR2 | | 9 | 111/12 | 76/80 |
| | F2412S-1WR2 | | 12 | 83/9 | 77/81 |
| | F2415S-1WR2 | | 15 | 67/7 | 77/81 |
| | F2424S-1WR2 | | 24 | 42/5 | 77/81 |

Note: *The capacitive loads of positive and negative outputs are identical.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------------|----------------------|------------------|--------|-------|------|
| Input Current (full load / no-load) | 3.3 VDC input | -- | 415/25 | --/70 | mA |
| | 5 VDC input | -- | 274/20 | --/60 | |
| | 9 VDC input | -- | 139/20 | --/55 | |
| | 12 VDC input | -- | 114/15 | --/50 | |
| | 15 VDC input | -- | 84/10 | --/35 | |
| | 24 VDC input | -- | 58/7 | --/30 | |
| Surge Voltage (1sec. max.) | 3.3 VDC input | -0.7 | -- | 5 | VDC |
| | 5 VDC input | -0.7 | -- | 9 | |
| | 9 VDC input | -0.7 | -- | 12 | |
| | 12 VDC input | -0.7 | -- | 18 | |
| | 15 VDC input | -0.7 | -- | 21 | |
| | 24 VDC input | -0.7 | -- | 30 | |
| Input Filter | | Capacitor filter | | | |
| Hot Plug | | Unavailable | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|-------------------------------|--|---------------------------------------|------|-------|------|-------|
| Output Voltage Accuracy | | See tolerance envelope curve(Fig. 1) | | | | |
| Line Regulation | Input voltage change: ±1% | 3.3 VDC 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 | The output voltage is 12VDC and under | -- | 30 | -- | mVp-p |
| | | 15VDC and 24VDC output voltage | -- | 60 | -- | |
| Temperature Drift Coefficient | 100% load | -- | -- | ±0.03 | %/°C | |
| Short Circuit Protection | E0524S-1WR2/F0524S-1WR2/ E24xxS-1WR2/ F24xxS-1WR2 | -- | -- | 1 | s | |
| | Others | Continuous, self-recovery | | | | |

Note: * Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.

**Supply voltage must be discontinued at the end of short circuit duration for E0524S-1WR2/F0524S-1WR2/E24xxS-1WR2/F24xxS-1WR2 models.

General Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|--|------|------|------|---------|
| Isolation Voltage | Input-output, with the test time of 1 minute and the leak current lower than 1mA | 3000 | -- | -- | VDC |
| Isolation Resistance | Input-output, isolation voltage 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 20 | -- | pF |
| Operating Temperature | Derating if the temperature ≥85℃(see Fig. 2) | -40 | -- | 105 | ℃ |
| Storage Temperature | | -55 | -- | 125 | |
| Casing Temperature Rise | Tα=25℃ | -- | 25 | -- | ℃ |
| Pin Welding Resistance Temperature | 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 | -- | KHz |
| MTBF | MIL-HDFK-217F@25℃ | 3500 | -- | -- | K hours |

Physical Specifications

| | |
|--------------------|--|
| Casing Material | Black flame-retardant heat-proof epoxy resin (UL94-V0) |
| Package Dimensions | 19.50*6.00*9.30 mm |
| Weight | 2.40g(Typ.) |
| Cooling Method | Free air convection |

EMC Specifications

| | | | | |
|-----|-------------------------|--|-----------------|-------------------------------|
| EMI | Conducted disturbance | 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 | E_S-1WR2 | IEC/EN61000-4-2 | Contact ±6KV perf. Criteria B |
| | | F_S-1WR2 | IEC/EN61000-4-2 | Contact ±8KV perf. Criteria B |

Product Characteristic Curve

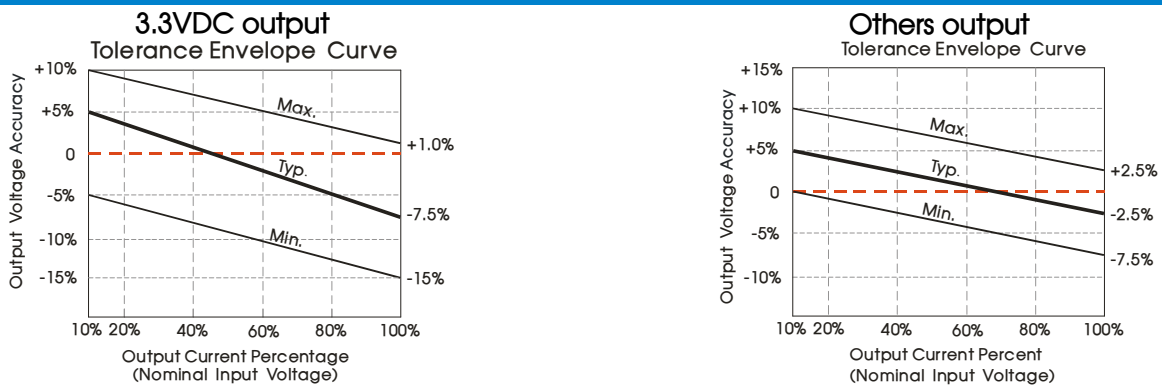


Fig. 1

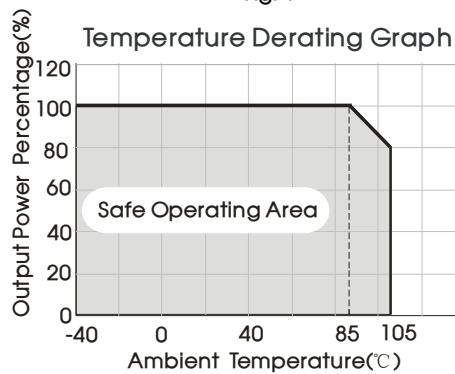
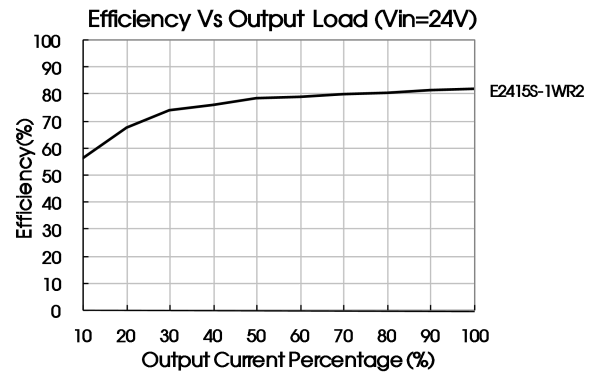
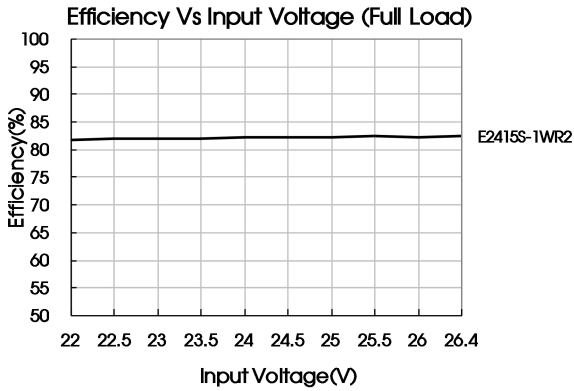
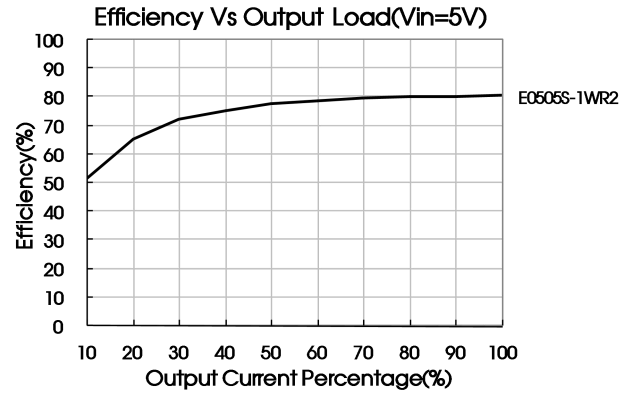
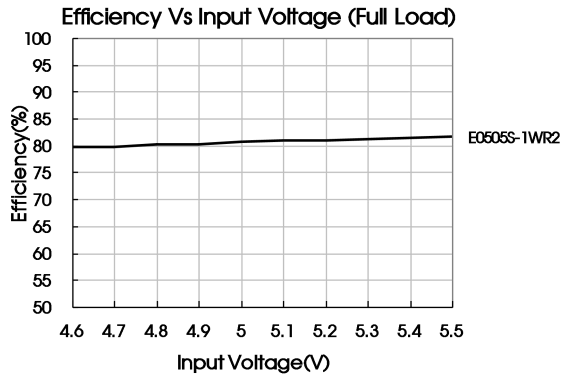


Fig. 2



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.

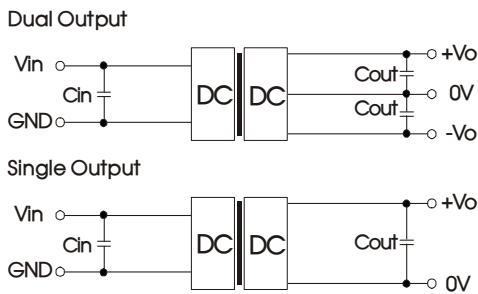


Fig.3

Recommended capacitive load value table (Table 1)

| Vin (VDC) | Cin (μF) | Single output (VDC) | Cout (μF) | Dual output (VDC) | Cout (μF) |
|-----------|----------|---------------------|-----------|-------------------|-----------|
| 3.3/5 | 4.7 | 3.3/5/9 | 10 | ±3.3/±5 | 4.7 |
| 9/12 | 2.2 | 12 | 2.2 | ±9/±12 | 1 |
| 15 | 2.2 | 15/24 | 1 | ±15/±24 | 0.47 |
| 24 | 1 | -- | -- | -- | -- |

2. EMC typical recommended circuit (CLASS B)

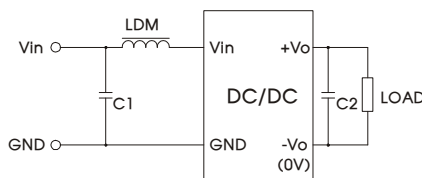


Fig. 4

| Input voltage(VDC) | | 3.3/5/9/12/15/24 |
|--------------------|-----|----------------------------|
| EMI | C1 | 4.7μF /50V |
| | C2 | Refer to the Cout in Fig.3 |
| | LDM | 6.8μH |

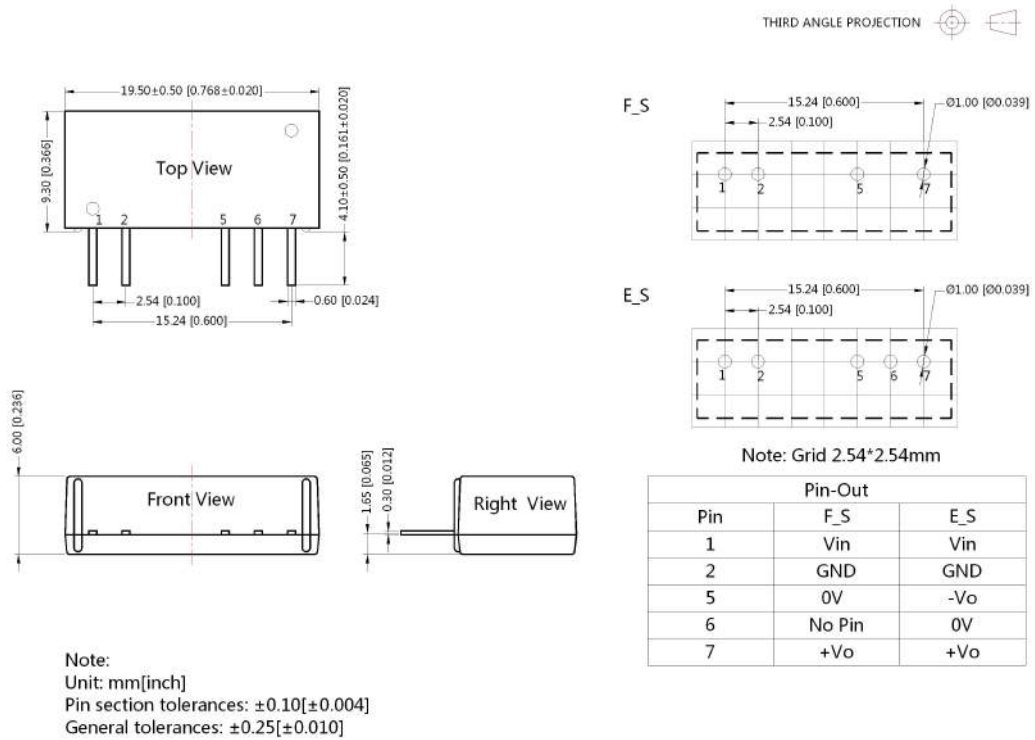
Note: It is not needed to add the component in the peripheral circuit when parameter with the symbol of "--"

3. Output load requirements

In order to ensure the converter can work reliably with high efficiency, the minimum load should not less than 10% rated load when it is used. If the needed power is indeed small, please parallel a resistor on the output side (The sum of the efficient power and resistor consumption power is not less than 10%).

4. For more information please find the application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Notes:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58200029;
2. If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in this datasheet;
3. The max. capacitive load should be tested within the input voltage range and under full load conditions;
4. Unless otherwise specified, data in this data sheet should be tested under the conditions of $T_a=25^{\circ}\text{C}$, humidity<75% when inputting nominal voltage and outputting rated load;
5. All index testing methods in this datasheet are based on our Company's corporate standards;
6. The performance indexes of the product models listed in this manual are as above, but some indexes of non-standard model products will exceed the above-mentioned requirements, and please directly contact our technicians for specific information;
7. We can provide product customization service;
8. Specifications of this product are subject to changes without prior notice.

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