

3W, wide input isolated & regulated
DC-DC converter



Patent Protection RoHS

FEATURES

- Wide range of input voltage (2:1)
- DIP package
- Efficiency up to 86%
- 1.5KVDC isolation
- Short circuit protection (automatic recovery)
- Operating temperature range: -40°C ~ +85°C
- Meet CISPR22/EN55022 CLASS A
- Meet EN60950

The WRA_ZP-3WR2 & WRB_ZP-3WR2 Series are specially designed for applications where a wide range input voltage power supplies are isolated from the input power supply in a distributed power supply system on a circuit board. For these DC-DC converters, you can reduce the failure points of design, and save the manpower, material and time cost in developing micro power supply, and also ensure better quality, stability, safety protection, and reliability for the end products.

These products apply to where:

- 1) Input voltage range $\leq 2:1$;
- 2) 1.5KVDC input and output isolation;
- 3) Output regulated and low ripple noise is required.

In circuits such as industrial control, electric power, communication system power supply, etc.

Selection Guide

| Part No. | Input Voltage (VDC) | | Output | | Efficiency (% Typ.) @ Full Load | Max. Capacitive Load [®] (μ F) | certification |
|----------------|---------------------|-------------------|----------------------|------------------------------------|------------------------------------|---|---------------|
| | Nominal (Range) | Max. ^① | Output Voltage (VDC) | Output Current (mA) (Max./Min.) | | | |
| WRA0505ZP-3WR2 | 5 (4.5-9) | 11 | ± 5 | $\pm 300/\pm 15$ | 76 | 2200 | |
| WRA0512ZP-3WR2 | | | ± 12 | $\pm 125/\pm 6$ | 78 | 1800 | |
| WRA0515ZP-3WR2 | | | ± 15 | $\pm 100/\pm 5$ | 78 | 1000 | |
| WRB0505ZP-3WR2 | | | 5 | 600/30 | 74 | 4700 | |
| WRB0512ZP-3WR2 | | | 12 | 250/12 | 77 | 2700 | |
| WRB0515ZP-3WR2 | | | 15 | 200/10 | 77 | 2200 | |
| WRA1205ZP-3WR2 | 12 (9-18) | 20 | ± 5 | $\pm 300/\pm 15$ | 81 | 2200 | - |
| WRA1209ZP-3WR2 | | | ± 9 | $\pm 166/\pm 8$ | 84 | 2000 | |
| WRA1212ZP-3WR2 | | | ± 12 | $\pm 125/\pm 6$ | 84 | 1800 | |
| WRA1215ZP-3WR2 | | | ± 15 | $\pm 100/\pm 5$ | 85 | 1000 | |
| WRB1203ZP-3WR2 | | | 3.3 | 909/46 | 74 | 4700 | |
| WRB1205ZP-3WR2 | | | 5 | 600/30 | 81 | 4700 | |
| WRB1212ZP-3WR2 | | | 12 | 250/12 | 83 | 2700 | |
| WRB1215ZP-3WR2 | | | 15 | 200/10 | 82 | 2200 | |
| WRB1224ZP-3WR2 | | | 24 | 125/6 | 83 | 1800 | |
| WRA2405ZP-3WR2 | | | 24 (18-36) | 40 | ± 5 | $\pm 300/\pm 15$ | |
| WRA2412ZP-3WR2 | ± 12 | $\pm 125/\pm 6$ | | | 84 | 1800 | |
| WRA2415ZP-3WR2 | ± 15 | $\pm 100/\pm 5$ | | | 84 | 1000 | |
| WRB2403ZP-3WR2 | 3.3 | 909/46 | | | 78 | 4700 | |
| WRB2405ZP-3WR2 | 5 | 600/30 | | | 81 | 4700 | |
| WRB2412ZP-3WR2 | 12 | 250/12 | | | 86 | 2700 | |
| WRB2415ZP-3WR2 | 15 | 200/10 | | | 86 | 2200 | |
| WRB2424ZP-3WR2 | 24 | 125/6 | | | 85 | 1800 | |

| | | | | | | | |
|----------------|---------------|----|-----|----------|----|------|---|
| WRA4805ZP-3WR2 | 48 (36-75) | 80 | ±5 | ±300/±15 | 82 | 2200 | - |
| WRA4812ZP-3WR2 | | | ±12 | ±125/±6 | 84 | 1800 | |
| WRA4815ZP-3WR2 | | | ±15 | ±100/±5 | 85 | 1000 | |
| WRB4803ZP-3WR2 | | | 3.3 | 909/46 | 76 | 4700 | |
| WRB4805ZP-3WR2 | | | 5 | 600/30 | 82 | 4700 | |
| WRB4812ZP-3WR2 | | | 12 | 250/12 | 86 | 2700 | |
| WRB4815ZP-3WR2 | | | 15 | 200/10 | 86 | 2200 | |

Note:

①. Absolute maximum rating without damage on the converter, but it isn't recommended;

②. For dual output converter, the given value is the same for each output.

Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|------------------------------------|----------------------|------|-----------|------|------|
| Input Current (full load /no-load) | 5VDC input | - | 811/40 | - | mA |
| | 12VDC input | | 309/30 | | |
| | 24VDC input | | 155/15 | | |
| | 48VDC input | | 77/5 | | |
| Reflected Ripple Current | 5VDC input | - | 20 | - | |
| | 12VDC input | | 30 | | |
| | 24VDC input | | 30 | | |
| | 48VDC input | | 30 | | |
| Input Impulse Voltage (1sec. max.) | 5VDC input | -0.7 | - | 12 | VDC |
| | 12VDC input | | - | 25 | |
| | 24VDC input | | - | 50 | |
| | 48VDC input | | - | 100 | |
| Starting Voltage | 5VDC input | - | - | 4.5 | |
| | 12VDC input | - | - | 9 | |
| | 24VDC input | - | - | 18 | |
| | 48VDC input | - | - | 36 | |
| Input Filter | | | Pi filter | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|---------------------------------|--|---------------------------|-------|-------|--------|
| Output Voltage Accuracy | | - | ±1 | ±3 | % |
| No load output Voltage Accuracy | Input voltage range | - | ±1.5 | ±5 | |
| Balance of Output Voltage | Dual output, balanced load | - | ±0.5 | ±1 | |
| Linear Regulation | Full load, the input voltage is from low voltage to high voltage | - | ±0.2 | ±0.5 | |
| Load Regulation | 5%-100% load | - | ±0.2 | ±0.5 | |
| Transient Recovery Time | 25% load step change | - | 0.5 | 2 | ms |
| Transient Response Deviation | | - | ±2 | ±5 | % |
| Temperature Coefficient | Full load | - | ±0.02 | ±0.03 | %/°C |
| Ripple&Noise* | 20MHz bandwidth | - | 50 | 80 | mV p-p |
| Short circuit Protection | Input voltage range | 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 | 1500 | - | - | VDC |
| Insulation Resistance | Input-output, isolation voltage 500VDC | 1000 | - | - | MΩ |

| | | | | | |
|-------------------------------|---|------|-----|-----|--------------------|
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 120 | -- | pF |
| Operating Temperature | Derating if the temperature is $\geq 85^{\circ}\text{C}$ (see Fig. 1) | -40 | -- | 85 | $^{\circ}\text{C}$ |
| Storage Temperature | | -55 | -- | 125 | |
| Casing Temperature Rise | $T_a=25^{\circ}\text{C}$ | -- | 25 | -- | |
| Hand Soldering | Welding spot is 1.5mm away from the casing, 10 seconds | -- | -- | 300 | |
| Storage Humidity | Non-condensing | -- | -- | 95 | % |
| Switching Frequency(PFM mode) | 100% load, nominal input voltage | -- | 200 | -- | KHz |
| MTBF | MIL-HDBK-217F@25 $^{\circ}\text{C}$ | 1000 | -- | -- | K hours |

Physical Specifications

| | |
|-----------------|----------------------|
| Casing Material | Aluminum Alloy |
| Dimensions | 32.00*20.00*10.80 mm |
| Weight | 14g(Typ.) |
| Cooling | Free convection |

EMC Specifications

| | | | |
|-----|--|------------------|---|
| EMI | Conducted emission | CISPR22/EN55022 | CLASS A(Bare component) CLASS B (see Fig.3-② for recommended circuit) |
| | Radiated emission | CISPR22/EN55022 | CLASS A(Bare component) CLASS B (see Fig.3-② for recommended circuit) |
| EMS | Electrostatic discharge | IEC/EN61000-4-2 | Contact $\pm 4\text{KV}$ / Air $\pm 8\text{KV}$ perf. Criteria B |
| | Radiation immunity | IEC/EN61000-4-3 | 10V/m perf. Criteria A |
| | EFT | IEC/EN61000-4-4 | $\pm 2\text{KV}$ (see Fig.3-① for recommended circuit) perf. Criteria B |
| | Surge immunity | IEC/EN61000-4-5 | $\pm 2\text{KV}$ (see Fig.3-① for recommended circuit) perf. Criteria B |
| | Conducted disturbance immunity | IEC/EN61000-4-6 | 3 Vr.m.s perf. Criteria A |
| | Immunities of voltage dip, drop and short interruption | IEC/EN61000-4-29 | 0-70% perf. Criteria B |

Product Characteristic Curve

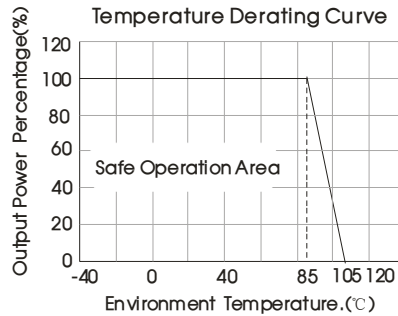
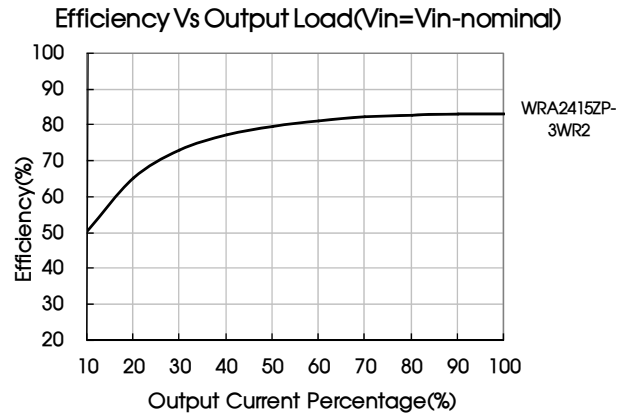
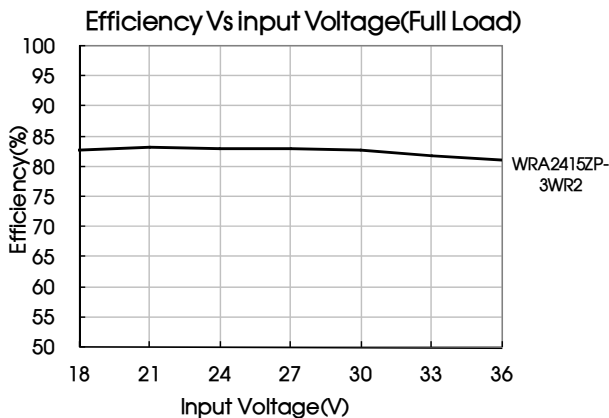
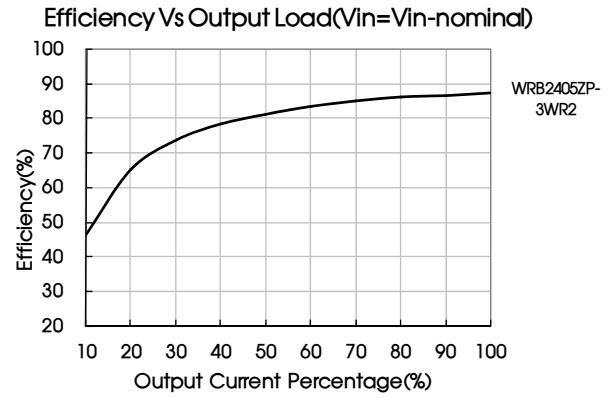
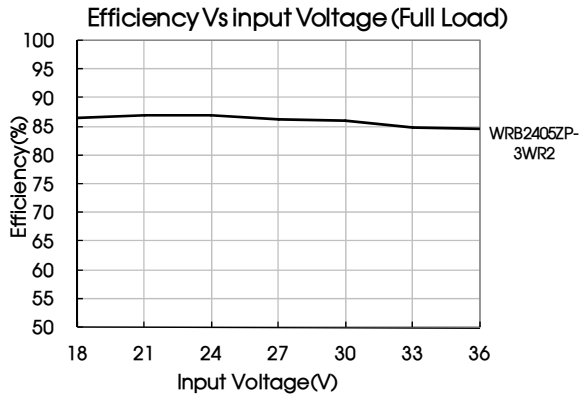


Fig. 1





Design Reference

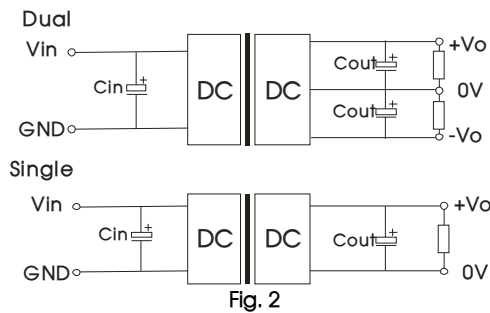
1. Output load requirements

To ensure that the module can work efficiently and reliably, its output min. load shall be no lower than 5% of the rated load when using, or the output ripple may increase rapidly. Ensure that the product working load must be higher than 5% of the rated load.

2. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.

If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors C_{in} and C_{out} or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.



| | | |
|-----------|-------------|-----------------------|
| V_{in} | 5V&12V | 24V&48V |
| C_{in} | 100 μ F | 10 μ F~47 μ F |
| C_{out} | 10 μ F | |

3. EMC solution-recommended circuit

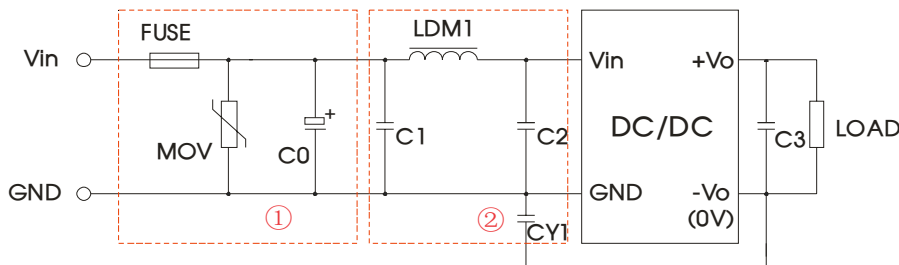


Fig. 3

Parameter description:

| Model | Vin:5V | Vin:12V | Vin:24V | Vin:48V |
|-------|--|---------|-----------|-------------|
| FUSE | Slow blown fuses according to the actual input current selections of the clients | | | |
| MOV | -- | S14K25 | S14K35 | S14K60 |
| C0 | 1000μF | 1000μF | 330μF/50V | 330μF/100V |
| C1 | 4.7μF/50V | | | 4.7μF/100V |
| LDM1 | 12μH | | | |
| C2 | 4.7μF/50V | | | 4.7μF /100V |
| C3 | 10μF | | | |
| CY1 | 1nF/2KV | | | |

Note: ①.Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering, selected based on needs.
②.If there is no recommended parameters, the model no require the external component.

EMC solution-recommended circuit PCB layout

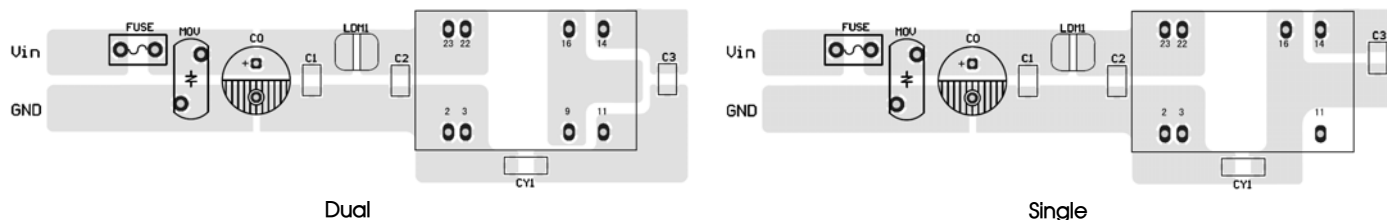


Fig. 4

Note: Note: the min. distance of the bonding pads between input grounding and output grounding shall be $\geq 2\text{mm}$.

4. Input current

When the electricity is provided by the unstable power supply, please make sure that the range of the output voltage fluctuation and the ripple voltage of the power supply do not exceed the indicators of the modules. Input current of power supply should afford the flash startup current of this kind of DC/DC module(see Fig. 5).

Generally: Vin=5V Iave =1400mA
 Vin=12V Iave=620mA
 Vin=24V Iave=310mA
 Vin=48V Iave =150mA

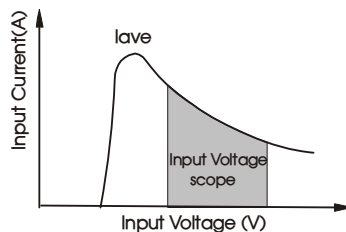
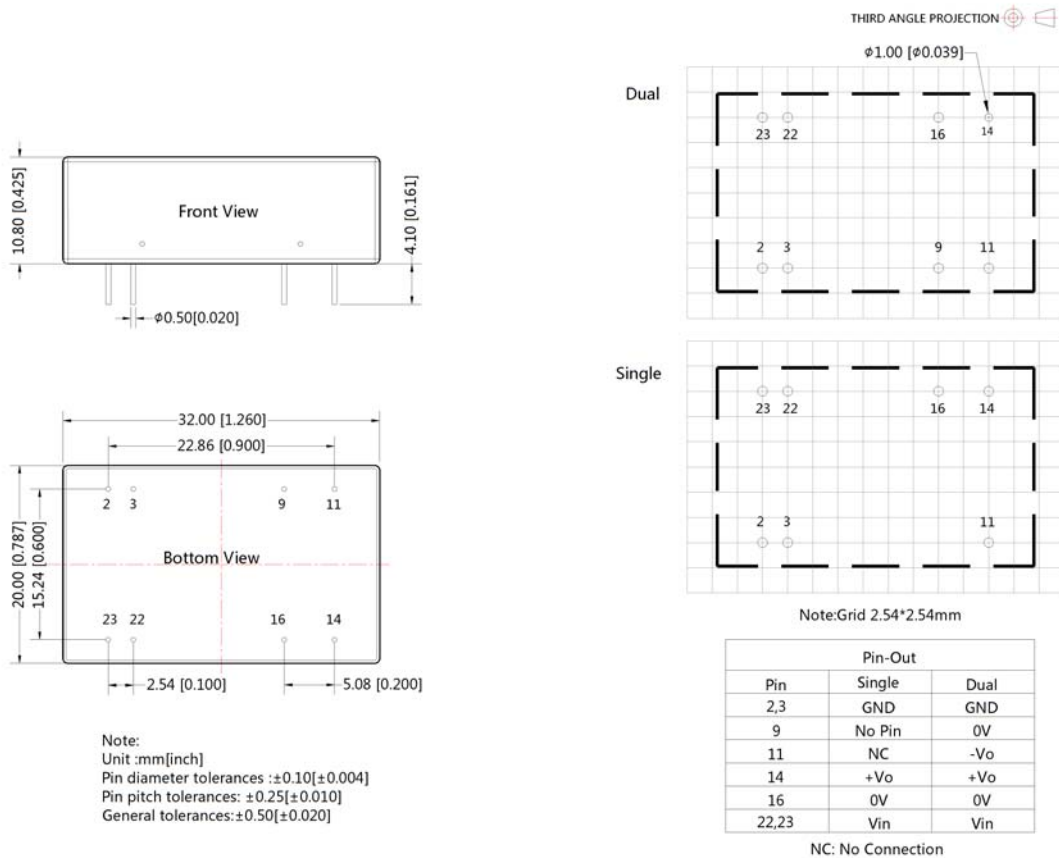


Fig. 5

5. For more information please find DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



- Note:
1. Packing Information please refer to 'Product Packing Information'. Packing bag number: 58210008;
 2. The min. load shall be no lower than 5%, or the output ripple may increase rapidly; If the product is operated under the min. required load, the product performance cannot be guaranteed to comply with all performance indexes in the Manual, but the reliability of the product will not be influenced;
 3. The unbalance degree of the recommended dual output module load: ≤ 5%; if the degree exceeds ±5%, then the product performances cannot be guaranteed to comply with all the performance indicators in the manual, and please directly contact our technicians for specific information;
 4. The max. capacitive load should be tested within the input voltage range and under full load conditions;
 5. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25°C, humidity<75% when inputting nominal voltage and outputting rated load;
 6. All index testing methods in this datasheet are based on our Company's corporate standards;
 7. The performance indexes of the product models listed in this datasheet 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;
 8. We can provide product customization service;
 9. Specifications of this product are subject to changes without prior notice.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Luogang District, Guangzhou, P. R. China
Tel: 86-20-38601850-8801 Fax: 86-20-38601272 E-mail: info@mornsun.cn