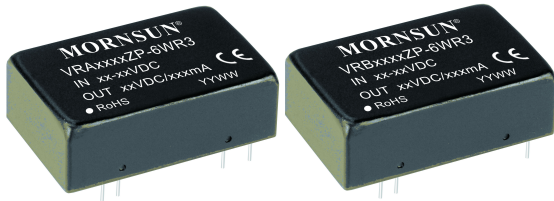


6W, wide input, isolated & regulated dual/single output, DIP package, DC-DC converter



CE Patent Protection RoHS

### FEATURES

- Wide input voltage range (2:1)
- High efficiency up to 88%
- No-load power consumption as low as 0.09W
- Isolation voltage : 1.5K VDC
- Operating temperature range: -40°C to +85°C
- Input under-voltage protection, output short circuit, over-current, over-voltage protection
- Meet CISPR22/EN55022 CLASS A without external components
- International standard pin-out
- EN60950 approval

VRA\_ZP-6WR3 & VRB\_ZP-6WR3 series products are of 6W output power, wide range of voltage input of 9-18VDC, 18-36VDC, 36-75VDC isolation voltage of 1500VDC, input under-voltage protection, output over-voltage, over-current, short circuit protection and EMI meets CISPR22/EN55022 CLASS A without external components; these products are widely used in fields such as industrial control, electric power, instruments and communication.

### Selection Guide

| Certification  | Part No.       | Input Voltage (VDC) |                   | Output                  |                                    | Efficiency <sup>②</sup> (%M<br>in./Typ.)<br>@ Full Load | Max. Capacitive<br>Load <sup>③</sup> (μF) |
|----------------|----------------|---------------------|-------------------|-------------------------|------------------------------------|---|---|
|                |                | Nominal<br>(Range)  | Max. <sup>①</sup> | Output Voltage<br>(VDC) | Output Current (mA)<br>(Max./Min.) |   |   |
| CE             | VRA1205ZP-6WR3 | 12<br>(9-18)        | 20                | ±5                      | ±600/0                             | 78/80   | 680                                       |
|                | VRA1212ZP-6WR3 |                     |                   | ±12                     | ±250/0                             | 82/84   | 330                                       |
|                | VRA1215ZP-6WR3 |                     |                   | ±15                     | ±200/0                             | 83/85   | 220                                       |
|                | VRA1224ZP-6WR3 |                     |                   | ±24                     | ±125/0                             | 82/84   | 100                                       |
|                | VRB1203ZP-6WR3 |                     |                   | 3.3                     | 1500/0                             | 73/75   | 1800                                      |
|                | VRB1205ZP-6WR3 |                     |                   | 5                       | 1200/0                             | 78/80   | 1000                                      |
|                | VRB1212ZP-6WR3 |                     |                   | 12                      | 500/0                              | 82/84   | 470                                       |
|                | VRB1215ZP-6WR3 |                     |                   | 15                      | 400/0                              | 83/85   | 220                                       |
|                | VRB1224ZP-6WR3 |                     |                   | 24                      | 250/0                              | 83/85   | 100                                       |
|                | VRA2405ZP-6WR3 | 24<br>(18-36)       | 40                | ±5                      | ±600/0                             | 81/83   | 680                                       |
|                | VRA2412ZP-6WR3 |                     |                   | ±12                     | ±250/0                             | 84/86   | 330                                       |
|                | VRA2415ZP-6WR3 |                     |                   | ±15                     | ±200/0                             | 85/87   | 220                                       |
|                | VRA2424ZP-6WR3 |                     |                   | ±24                     | ±125/0                             | 83/85   | 100                                       |
|                | VRB2403ZP-6WR3 |                     |                   | 3.3                     | 1500/0                             | 76/78   | 1800                                      |
|                | VRB2405ZP-6WR3 |                     |                   | 5                       | 1200/0                             | 80/82   | 1000                                      |
|                | VRB2412ZP-6WR3 |                     |                   | 12                      | 500/0                              | 83/85   | 470                                       |
|                | VRB2415ZP-6WR3 |                     |                   | 15                      | 400/0                              | 84/86   | 220                                       |
|                | VRB2424ZP-6WR3 |                     |                   | 24                      | 250/0                              | 84/86   | 100                                       |
|                | VRA4805ZP-6WR3 | 48<br>(36-75)       | 80                | ±5                      | ±600/0                             | 81/83   | 680                                       |
|                | VRA4812ZP-6WR3 |                     |                   | ±12                     | ±250/0                             | 85/87   | 330                                       |
|                | VRA4815ZP-6WR3 |                     |                   | ±15                     | ±200/0                             | 83/85   | 220                                       |
|                | VRA4824ZP-6WR3 |                     |                   | ±24                     | ±125/0                             | 83/85   | 100                                       |
|                | VRB4803ZP-6WR3 |                     |                   | 3.3                     | 1500/0                             | 77/79   | 1800                                      |
|                | VRB4805ZP-6WR3 |                     |                   | 5                       | 1200/0                             | 81/83   | 1000                                      |
| VRB4812ZP-6WR3 | 12             |                     |                   | 500/0                   | 85/87                              | 470   |   |
| VRB4815ZP-6WR3 | 15             |                     |                   | 400/0                   | 86/88                              | 220   |   |
| VRB4824ZP-6WR3 | 24             |                     |                   | 250/0                   | 85/87                              | 100   |   |

Notes:

- ① Absolute maximum rating without damage on the converter, but it isn't recommended;
- ② Efficiency is measured in nominal input voltage and rated output load;
- ③ 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) | 12VDC input          | 3.3V output | --   | 550/7 | 566/25 | mA |
|                                     |                      | Others      | --   | 607/7 | 641/25 |    |
|                                     | 24VDC input          | 3.3V output | --   | 265/7 | 272/25 |    |
|                                     |                      | Others      | --   | 296/7 | 313/25 |    |
|                                     | 48VDC input          | 3.3V output | --   | 131/7 | 134/25 |    |
|                                     |                      | Others      | --   | 147/7 | 155/25 |    |
| Reflected Ripple Current            |                      | --          | 20   | --    |        |    |
| Surge Voltage (1sec. max.)          | 12VDC input          | -0.7        | --   | 25    | VDC    |    |
|                                     | 24VDC input          | -0.7        | --   | 50    |        |    |
|                                     | 48VDC input          | -0.7        | --   | 100   |        |    |
| Starting Voltage                    | 12VDC input          | --          | --   | 9     |        |    |
|                                     | 24VDC input          | --          | --   | 18    |        |    |
|                                     | 48VDC input          | --          | --   | 36    |        |    |
| Shutdown Voltage                    | 12VDC input          | 5.5         | 6.5  | --    |        |    |
|                                     | 24VDC input          | 13          | 15   | --    |        |    |
|                                     | 48VDC input          | 26          | 30   | --    |        |    |
| Input Filter                        |                      | PI filter   |      |       |        |    |
| Hot Plug                            |                      | Unavailable |      |       |        |    |

Output Specifications

| Item                                 | Operating Conditions  | Min.                      | Typ. | Max.  | Unit   |      |
|--------------------------------------|---|---------------------------|------|-------|--------|------|
| Output Voltage Accuracy <sup>①</sup> | Positive output   | --                        | ±1   | ±3    | %      |      |
|                                      | Negative output   | --                        | ±1   | ±3    |        |      |
| Line Regulation                      | Full load, the input voltage is from low voltage to high voltage              | Positive output           | --   | ±0.2  |        | ±0.5 |
|                                      |   | Negative output           | --   | ±0.5  |        | ±1   |
| Load Regulation <sup>②</sup>         | 5%-100% load  | Positive output           | --   | ±0.5  |        | ±1   |
|                                      |   | Negative output           | --   | ±0.5  |        | ±1.5 |
| Cross Regulation                     | Dual output, main circuit with 50% load, auxiliary circuit with 10%-100% load | --                        | --   | ±5    |        |      |
| Transient Recovery Time              |   | --                        | 300  | 500   |        | μs   |
| Transient Response Deviation         | 25% load step change, Nominal input voltage                                   | 3.3V, 5V, ±5V output      | --   | ±5    |        | ±8   |
|                                      |   | Others                    | --   | ±3    | ±5     |      |
| Temperature Coefficient              | Full load   | --                        | --   | ±0.03 | %/°C   |      |
| Ripple & Noise <sup>③</sup>          | 20MHz bandwidth, 5%-100% load   | --                        | --   | 100   | mV p-p |      |
| Over-voltage Protection              |   | 110                       | --   | 160   | %Vo    |      |
| Over-current Protection              | Input voltage range   | 110                       | 140  | 190   | %Io    |      |
| Short circuit Protection             |   | Continuous, self-recovery |      |       |        |      |

Note: ① At 0%~5% load, the Max. output voltage accuracy of ±5VDC output converter is ±5%.  
 ② When testing from 0% to 100% load working conditions, load regulation index of ±5%;  
 ③ 0%-5% load ripple & Noise is no more than 5%Vo. 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 |
|-----------------------|--|------|------|------|------|
| Isolation Voltage     | Input-output, with the test time of 1 minute and the leak current lower than 1mA | 1500 | --   | --   | VDC  |
| Insulation Resistance | Input-output, insulation voltage 500VDC  | 1000 | --   | --   | MΩ   |
| Isolation Capacitance | Input-output, 100KHz/0.1V  | --   | 1000 | --   | pF   |
| Operating Temperature | see Fig. 1   | -40  | --   | 85   | °C   |
| Storage Temperature   |  | -55  | --   | 125  |      |

|                                    |  |  |     |     |         |
|------------------------------------|--|--|-----|-----|---------|
| Storage Humidity                   | Non-condensing   | 5                                      | --  | 95  | %RH     |
| Pin Welding Resistance Temperature | Welding spot is 1.5mm away from the casing, 10 seconds | --                                     | --  | 300 | °C      |
| Vibration                          |  | 10-55Hz, 10G, 30 Min. along X, Y and Z |     |     |         |
| Switching Frequency *              | PWM mode   | --                                     | 300 | --  | KHz     |
| MTBF                               | MIL-HDBK-217F@25°C                                     | 1000                                   | --  | --  | K hours |

Note: \* This series of products using reduced frequency technology, the switching frequency is test value of full load. When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Physical Specifications

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

EMC Specifications

|     |  |                  |  |
|-----|--|------------------|--|
| EMI | CE   | CISPR22/EN55022  | CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)  |
|     | RE   | CISPR22/EN55022  | CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)  |
| EMS | ESD  | IEC/EN61000-4-2  | Contact ±4KV perf. Criteria B  |
|     | RS   | IEC/EN61000-4-3  | 10V/m perf. Criteria A   |
|     | EFT  | IEC/EN61000-4-4  | ±2KV (see Fig.3-① for recommended circuit) perf. Criteria B              |
|     | Surge  | IEC/EN61000-4-5  | line to line ±2KV (see Fig.3-① for recommended circuit) perf. Criteria B |
|     | CS   | 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

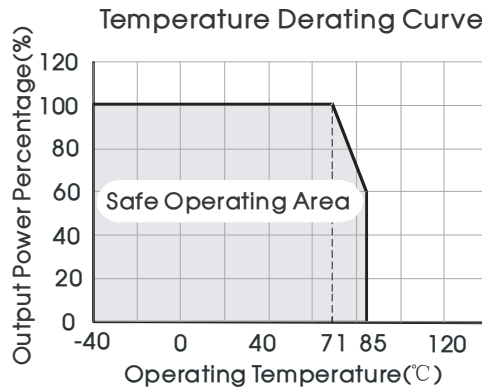
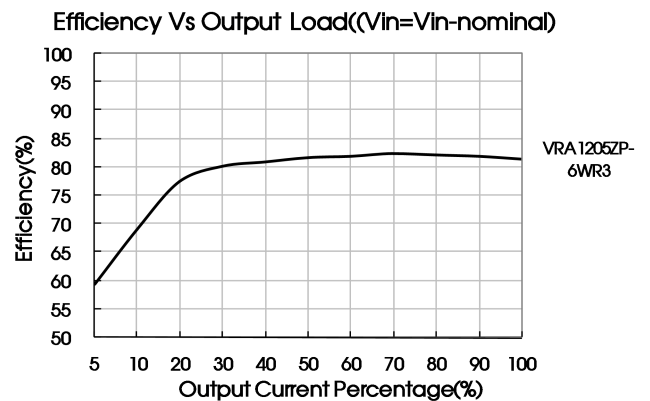
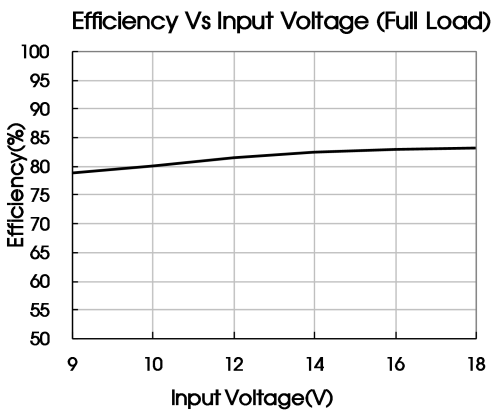
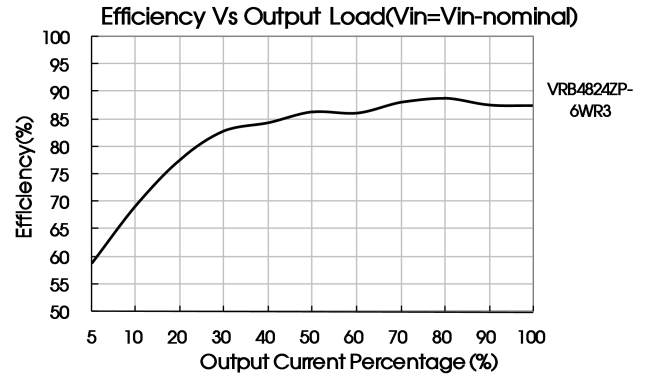
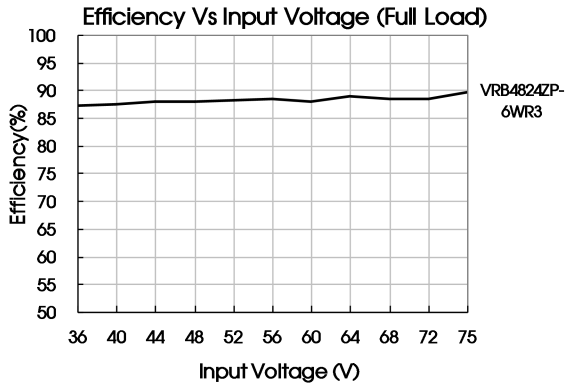


Fig. 1





Design Reference

1. 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 Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

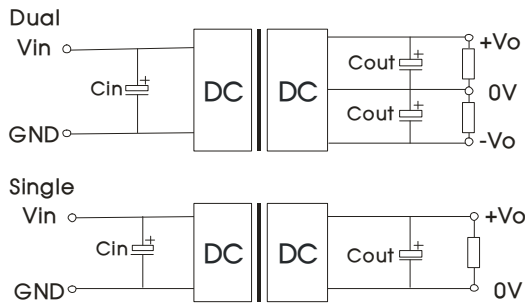


Fig. 2

| Vin(VDC) | Cin        | Cout |
|----------|------------|------|
| 12/24    | 100μF      | 10μF |
| 48       | 10μF ~47μF | 10μF |

2. EMC solution-recommended circuit

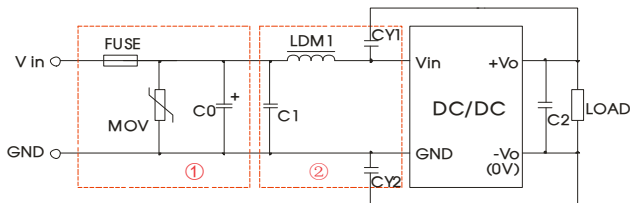


Fig. 3

Notes: Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs.

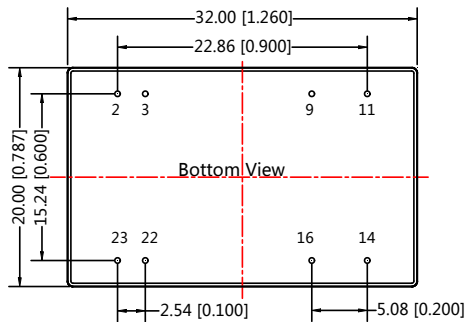
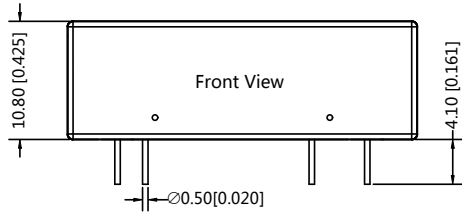
Parameter description:

| Model    | Vin:12V                                  | Vin:24V    | Vin:48V    |
|----------|--|------------|------------|
| FUSE     | Choose according to actual input current |            |            |
| MOV      | S14K20                                   | S20K30     | S14K60     |
| C0       | 1000μF/35V                               | 1000μF/50V | 680μF/100V |
| C1       | 1μF/50V                                  |            | 1μF/100V   |
| C2       | Refer to the Cout in Fig.2               |            |            |
| LDM1     | 4.7μH                                    |            |            |
| CY1, CY2 | 1nF/2KV                                  |            |            |

3. The product does not support output in parallel with power per liter

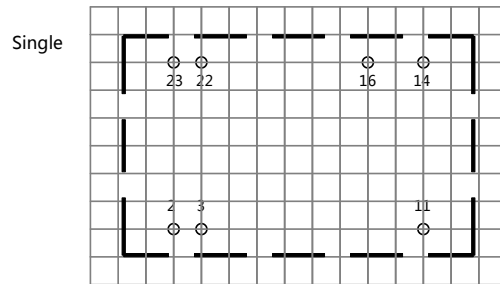
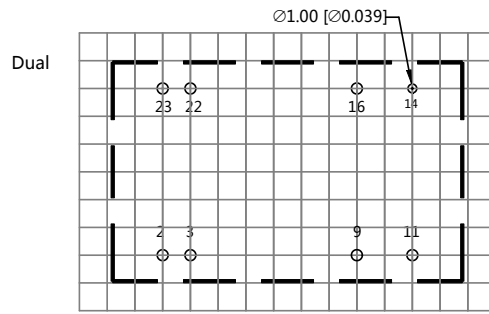
4. For more information please find the application notes on [www.mornsun-power.com](http://www.mornsun-power.com)

Dimensions and Recommended Layout



Note:  
Unit :mm[inch]  
Pin diameter tolerances :±0.10[±0.004]  
General tolerances:±0.50[±0.020]

THIRD ANGLE PROJECTION



Note:Grid 2.54\*2.54mm

| Pin-Out |        |      |
|---------|--------|------|
| Pin     | Single | Dual |
| 2,3     | GND    | GND  |
| 9       | No Pin | 0V   |
| 11      | NC     | -Vo  |
| 14      | +Vo    | +Vo  |
| 16      | 0V     | 0V   |
| 22,23   | Vin    | Vin  |

NC: No Connection

Notes:

1. Packing Information please refer to 'Product Packing Information'. Packing bag number : 58210008;
2. The recommended unbalance degree of the dual output module load is  $\leq \pm 5\%$ ; if the degree exceeds  $\pm 5\%$ , than the product performance cannot be guaranteed to comply with all parameters in the datasheet. Please contact our technicians directly for specific information;
3. The maximum capacitive load offered were tested at input voltage range and full load;
4. 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;
5. All index testing methods in this datasheet are based on Company's corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Specifications are subject to change without prior notice.

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