

# DC/DC Converter

## URA\_ZP-6WR3 & URB\_ZP-6WR3 Series

# MORNSUN®

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



**UL** **CB** **CE** Patent Protection **RoHS**

### FEATURES

- Wide range of input voltage (4:1)
- Efficiency up to 88%
- No-load power consumption as low as 0.12W
- Isolation voltage : 1.5K VDC
- Operating temperature range: -40°C to +85°C
- Input under-voltage protection, short circuit , over-voltage & Over-current protection output
- Meet CISPR32/EN55032 CLASS A
- International standard pin-out
- Meet UL60950 , EN60950 and IEC60950

URA\_ZP-6WR3 & URB\_ZP-6WR3 series products are of 6W output power, extremely wide range of voltage input of 9-36VDC, 18-75VDC, isolation voltage of 1500VDC, output over-voltage protection and output short circuit protection with the bare component in compliance with CISPR32/EN55032 CLASS A; 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><br>(%,Min./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.) |                                                         |                                           |
| UL/CE/CB      | URA2405ZP-6WR3 | 24<br>(9-36)        | 40                | ±5                      | ±600/0                             | 81/83                                                   | 680                                       |
|               | URA2409ZP-6WR3 |                     |                   | ±9                      | ±333/0                             | 84/86                                                   | 220                                       |
|               | URA2412ZP-6WR3 |                     |                   | ±12                     | ±250/0                             | 85/87                                                   | 330                                       |
|               | URA2415ZP-6WR3 |                     |                   | ±15                     | ±200/0                             | 86/88                                                   | 220                                       |
|               | URA2424ZP-6WR3 |                     |                   | ±24                     | ±125/0                             | 85/87                                                   | 100                                       |
|               | URB2403ZP-6WR3 |                     |                   | 3.3                     | 1500/0                             | 77/79                                                   | 1800                                      |
|               | URB2405ZP-6WR3 |                     |                   | 5                       | 1200/0                             | 81/83                                                   | 1000                                      |
|               | URB2409ZP-6WR3 |                     |                   | 9                       | 667/0                              | 82/84                                                   | 1000                                      |
|               | URB2412ZP-6WR3 |                     |                   | 12                      | 500/0                              | 85/87                                                   | 470                                       |
|               | URB2415ZP-6WR3 |                     |                   | 15                      | 400/0                              | 86/88                                                   | 220                                       |
|               | URB2424ZP-6WR3 |                     |                   | 24                      | 250/0                              | 85/87                                                   | 100                                       |
|               | URA4805ZP-6WR3 | 48<br>(18-75)       | 80                | ±5                      | ±600/0                             | 81/83                                                   | 680                                       |
|               | URA4812ZP-6WR3 |                     |                   | ±12                     | ±250/0                             | 85/87                                                   | 330                                       |
|               | URA4815ZP-6WR3 |                     |                   | ±15                     | ±200/0                             | 86/88                                                   | 220                                       |
|               | URB4803ZP-6WR3 |                     |                   | 3.3                     | 1500/0                             | 78/80                                                   | 1800                                      |
|               | URB4805ZP-6WR3 |                     |                   | 5                       | 1200/0                             | 82/84                                                   | 1000                                      |
|               | URB4809ZP-6WR3 |                     |                   | 9                       | 667/0                              | 83/85                                                   | 680                                       |
|               | URB4812ZP-6WR3 |                     |                   | 12                      | 500/0                              | 85/87                                                   | 470                                       |
|               | URB4815ZP-6WR3 |                     |                   | 15                      | 400/0                              | 86/88                                                   | 220                                       |
| UL/CE/CB      | URB4824ZP-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) | 24VDC input          | --   | 301/5 | 309/12 | mA   |
|                                     | 48VDC input          | --   | 148/4 | 154/8  |      |
| Reflected Ripple Current            |                      | --   | 20    | --     |      |
| Input Impulse Voltage (1sec. max.)  | 24VDC input          | -0.7 | --    | 50     | VDC  |
|                                     | 48VDC input          | -0.7 | --    | 100    |      |

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|                        |             |             |      |    |     |
|------------------------|-------------|-------------|------|----|-----|
| Starting Voltage       | 24VDC input | --          | --   | 9  | VDC |
|                        | 48VDC input | --          | --   | 18 |     |
| under-voltage turn-off | 24VDC input | 5.5         | 6.5  | -- | VDC |
|                        | 48VDC input | 12          | 15.5 | -- |     |
| 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                                                               |                      |                           |      |       |        |
| Balance of Output Voltage            | Dual output, balanced load                                                    |                      | --                        | ±0.5 | ±1.5  |        |
| 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              | 25% load step change                                                          |                      | --                        | 300  | 500   | μs     |
| Transient Response Deviation         |                                                                               | 3.3V, 5V, ±5V output | --                        | ±5   | ±8    | %      |
|                                      |                                                                               | Others               | --                        | ±3   | ±5    |        |
| Temperature Drift Coefficient        | Full load                                                                     |                      | --                        | --   | ±0.03 | %/℃    |
| Ripple*&Noise <sup>③</sup>           | 20MHz bandwidth                                                               |                      | --                        | --   | 85    | mV p-p |
| Over-voltage Protection              | Input voltage range                                                           |                      | 110                       | --   | 160   | %Vo    |
| Over-current Protection              |                                                                               |                      | 110                       | 140  | 190   | %Io    |
| Short circuit Protection             |                                                                               |                      | Continuous, self-recovery |      |       |        |

Note: ①At 0%~5% load, the Max. output voltage accuracy of ±5VDC/±9VDC output converter is ±5%.

②When testing from 0% to 100% load working conditions, load regulation index of ±5%;

③Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.

## 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, insulation voltage 500VDC                                          | 1000 | --   | --   | MΩ      |
| Isolation Capacitance              | Input-output, 100KHz/0.1V                                                        | --   | 1000 | --   | pF      |
| Operating Temperature              | Derating if the temperature is ≥71°C (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  |         |
| 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                                                        | CISPR32/EN55032 CLASS A (Bare component)/<br>CLASS B (see Fig.3-② for recommended circuit) |                                                        |                  |
|     | RE                                                        | CISPR32/EN55032 CLASS A (Bare component)/<br>CLASS B (see Fig.3-② for recommended circuit) |                                                        |                  |
| EMS | ESD                                                       | IEC/EN61000-4-2                                                                            | Contact $\pm 4\text{kV}$                               | perf. Criteria B |
|     | RS                                                        | 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                                                     | IEC/EN61000-4-5                                                                            | $\pm 2\text{kV}$ (see Fig.3-① for recommended circuit) | perf. Criteria B |
|     | CS                                                        | IEC/EN61000-4-6                                                                            | 3 V.r.m.s                                              | perf. Criteria A |
|     | Immunities of voltage dip,<br>drop and short interruption | IEC/EN61000-4-29                                                                           | 0-70%                                                  | perf. Criteria B |

## Product Characteristic Curve

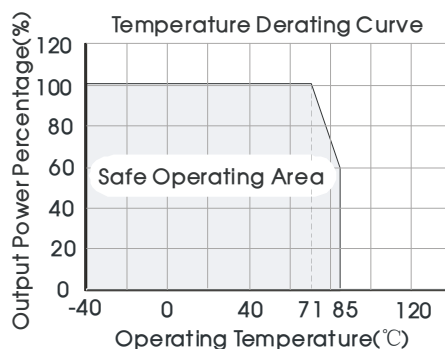
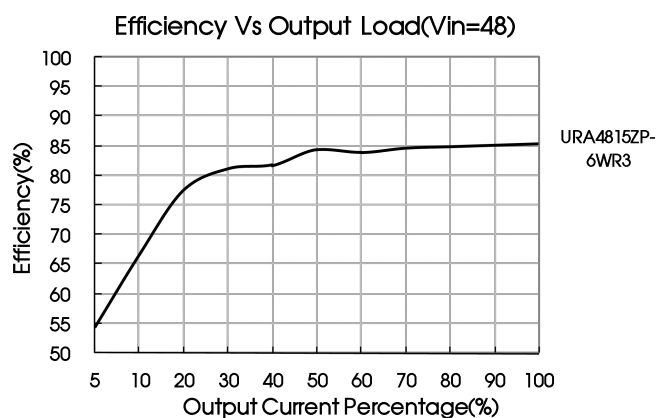
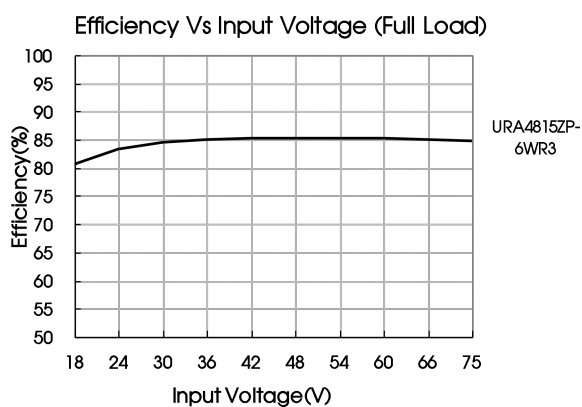
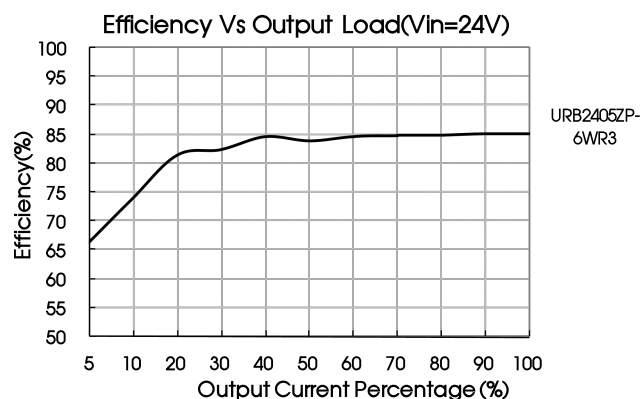
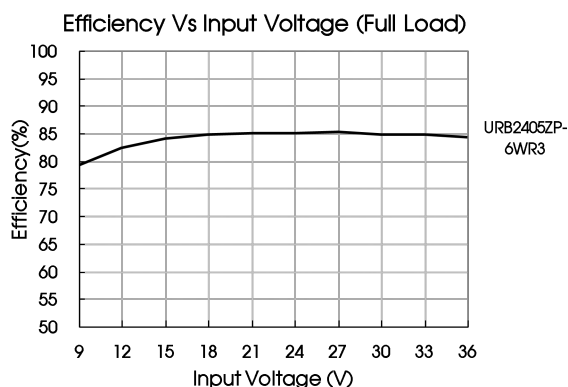


Fig. 1



## 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  $C_{in}$  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.

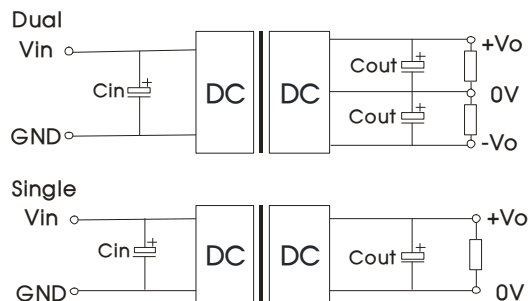
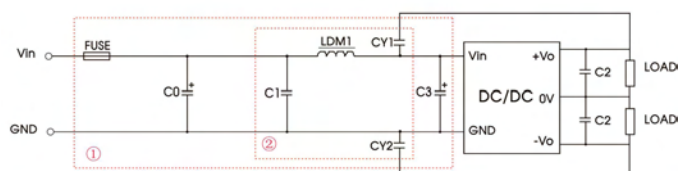


Fig. 2

| Vin(VDC) | Cin                    | Cout       |
|----------|------------------------|------------|
| 24       | 100 $\mu$ F            | 10 $\mu$ F |
| 48       | 10 $\mu$ F ~47 $\mu$ F | 10 $\mu$ F |

### 2. EMC solution-recommended circuit

Dual



Single

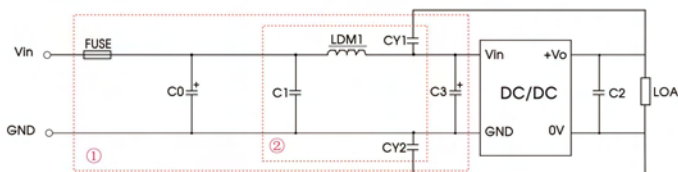


Fig. 3

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

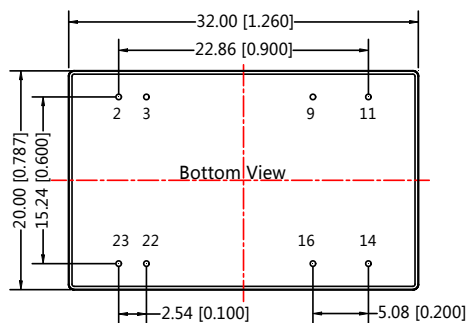
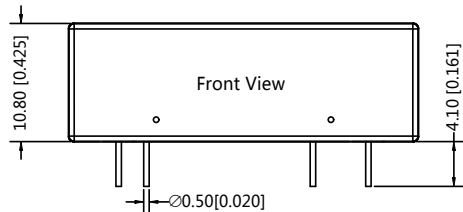
Parameter description:

| Model | Vin:24V                                  | Vin:48V          |
|-------|------------------------------------------|------------------|
| FUSE  | Choose according to actual input current |                  |
| C0/C3 | 330 $\mu$ F/50V                          | 330 $\mu$ F/100V |
| C1    | 1 $\mu$ F/50V                            | 1 $\mu$ F/100V   |
| C2    | Refer to the Cout in Fig.2               |                  |
| LDM1  | 4.7 $\mu$ H                              |                  |
| CY1   | 1nF/2KV                                  |                  |
| CY2   | 1nF/2KV                                  |                  |

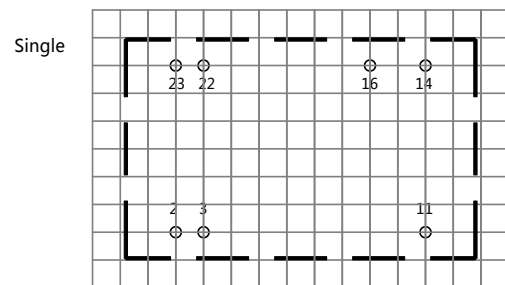
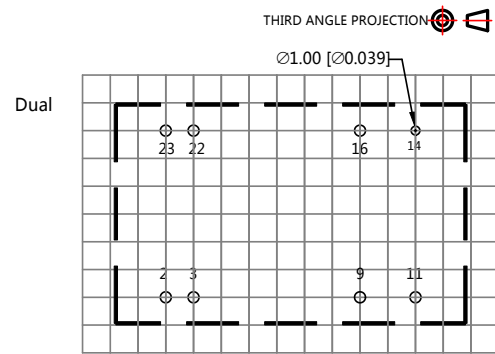
3. The product does not support output in parallel with power per liter

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]



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 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;
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 datasheet should be tested under the conditions of Ta=25℃, humidity<75%RH 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 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;
7. We can provide product customization service;
8. 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](mailto:info@mornsun.cn)