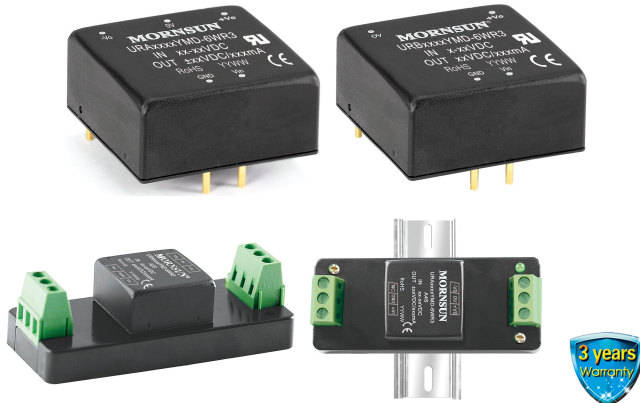


DC/DC Converter

URA_YMD-6WR3 & URB_YMD-6WR3 Series

MORNSUN®

6W Isolated DC-DC converter in YMD package
Ultra-wide input and regulated dual/single output



CB Report Patent Protection RoHS
 UL60950-1 EN62368-1 BS EN62368-1 IEC60950-1

FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 88%
- No-load power consumption as low as 0.12W
- I/O test isolation voltage: 1.5k VDC
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Operating ambient temperature range: -40°C to +85°C
- Meet CISPR32/EN55032 CLASS A, without extra components
- Input reverse polarity protection available with chassis(A2S) or Din-Rail mounting (A4S) version
- Industry standard pin-out

URA_YMD-6WR3 & URB_YMD-6WR3 series of isolated 6W DC-DC converter with 4:1 input voltage with efficiencies of up to 88%, 1500VDC input to output isolation and the converter safely operate ambient temperature of -40°C to +85°C, input under-voltage protection, output over-voltage, over-current, short-circuit protection. They meet CLASS A of CISPR32/EN55032 EMI standards without external components, optional packages are offered for chassis or DIN-rail mounting (A2S, A4S), adding additional input reverse polarity protection, which make them widely applied in medical care, industrial control, electric power, instruments and communication and railway fields.

Selection Guide

| Certification | Part No. ① | Input Voltage (VDC) | | Output | | Full Load Efficiency ^④ (%) Min./Typ. | Capacitive Load ^⑤ (μF)Max. |
|-----------------|-----------------|------------------------------|--------|---------------|------------------------|--|---------------------------------------|
| | | Nominal ^② (Range) | Max. ③ | Voltage (VDC) | Current (mA) Max./Min. | | |
| UL/EN/BS EN/IEC | URA2405YMD-6WR3 | 24 (9-36) | 40 | ±5 | ±600/0 | 81/83 | 470 |
| | URA2412YMD-6WR3 | | | ±12 | ±250/0 | 84/87 | 100 |
| | URA2415YMD-6WR3 | | | ±15 | ±200/0 | 83/85 | 100 |
| | URA2424YMD-6WR3 | | | ±24 | ±125/0 | 85/87 | 100 |
| | URB2403YMD-6WR3 | | | 3.3 | 1500/0 | 75/77 | 1800 |
| | URB2405YMD-6WR3 | | | 5 | 1200/0 | 80/83 | 1000 |
| | URB2409YMD-6WR3 | | | 9 | 667/0 | 82/84 | 680 |
| | URB2412YMD-6WR3 | | | 12 | 500/0 | 83/85 | 470 |
| | URB2415YMD-6WR3 | | | 15 | 400/0 | 84/86 | 220 |
| | URB2424YMD-6WR3 | | | 24 | 250/0 | 84/86 | 100 |
| | URA4805YMD-6WR3 | 48 (18-75) | 80 | ±5 | ±600/0 | 81/83 | 470 |
| | URA4812YMD-6WR3 | | | ±12 | ±250/0 | 85/87 | 100 |
| | URA4815YMD-6WR3 | | | ±15 | ±200/0 | 86/88 | 100 |
| | URB4803YMD-6WR3 | | | 3.3 | 1500/0 | 77/79 | 1800 |
| | URB4805YMD-6WR3 | | | 5 | 1200/0 | 81/83 | 1000 |
| | URB4812YMD-6WR3 | | | 12 | 500/0 | 85/87 | 470 |
| | URB4815YMD-6WR3 | | | 15 | 400/0 | 86/88 | 220 |
| | URB4824YMD-6WR3 | | | 24 | 250/0 | 86/88 | 100 |

Notes:

- ① Use "A2S" suffix for chassis mounting and "A4S" suffix for Din-Rail mounting;
- ② The A2S and A4S Model's start-up and minimum input voltages are increased by 1VDC due to the input reverse polarity protection circuit;
- ③ Exceeding the maximum input voltage may cause permanent damage;
- ④ Efficiency is measured at nominal input voltage and rated output load; efficiencies for A2S and A4S Model's is decreased by 2% due to the input reverse polarity protection circuit;
- ⑤ The specified maximum capacitive load value for Vo1 and Vo2 output is identical.

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Input Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|--|--|-------------|------|-------|--------|----|
| Input Current (full load / no-load) | 24VDC nominal input series, nominal input voltage | 3.3V output | -- | 268/5 | 275/12 | mA |
| | | Others | -- | 301/5 | 312/12 | |
| | 48VDC nominal input series, nominal input voltage | 3.3V output | -- | 130/4 | 134/8 | |
| | | Others | -- | 150/4 | 155/8 | |
| Reflected Ripple Current | Nominal input voltage | -- | 20 | -- | | |
| Surge Voltage (1sec. max.) | 24VDC nominal input series | -0.7 | -- | 50 | VDC | |
| | 48VDC nominal input series | -0.7 | -- | 100 | | |
| Start-up Voltage | 24VDC nominal input series | -- | -- | 9 | | |
| | 48VDC nominal input series | -- | -- | 18 | | |
| Input Under-voltage Protection | 24VDC nominal input series | 5.5 | 6.5 | -- | | |
| | 48VDC nominal input series | 12 | 15.5 | -- | | |
| Input Filter | | Pi filter | | | | |
| Hot Plug | | Unavailable | | | | |

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit |
|-------------------------------|---|---------------------------|------|-------|--------|
| Voltage Accuracy ^① | 0% - 100% load | -- | ±1 | ±3 | % |
| Linear Regulation | Input voltage variation from low to high at full load | Vo1 | ±0.2 | ±0.5 | |
| | | Vo2 | ±0.5 | ±1 | |
| Load Regulation ^② | 5% - 100% load | Vo1 | ±0.5 | ±1 | |
| | | Vo2 | ±0.5 | ±1.5 | |
| Cross Regulation | Dual outputs, Vo1 load at 50%, Vo2 load at range of 10% - 100% | -- | -- | ±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 ^③ | 20MHz bandwidth, 5% - 100% load | -- | 60 | 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: ① Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;
 ② Load regulation for 0%-100% load is ±5%;
 ③ Ripple & Noise at ≤ 5% load is 5%Vo Max. 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. | 1500 | -- | -- | VDC |
| Insulation Resistance | Input-output resistance at 500VDC | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output capacitance at 100kHz/0.1V | -- | 1000 | -- | pF |
| Operating Temperature | See Fig. 1 | -40 | -- | +85 | °C |
| Storage Humidity | Non-condensing | 5 | -- | 95 | %RH |
| Storage Temperature | | -55 | -- | +125 | °C |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | +300 | |
| Vibration | | IEC/EN61373 - Category 1, Grade B | | | |
| Switching Frequency * | PWM mode | -- | 300 | -- | kHz |

| | | | | | |
|------|--------------------|------|----|----|---------|
| MTBF | MIL-HDBK-217F@25°C | 1000 | -- | -- | k hours |
|------|--------------------|------|----|----|---------|

Note:*Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

Mechanical Specifications

| | | |
|----------------|--|--------------------------|
| Case Material | Aluminum alloy | |
| Dimensions | Horizontal package | 25.40 x 25.40 x 11.70 mm |
| | A2S chassis mounting | 76.00 x 31.50 x 21.20 mm |
| | A4S DIN-rail mounting | 76.00 x 31.50 x 25.80 mm |
| Weight | Horizontal package/A2S wiring package/A4S rail package 12.5g /36.0g /56.0g(Typ.) | |
| Cooling method | Free air convection | |

Electromagnetic Compatibility (EMC)

| | | | | |
|-----------|---|------------------|--|------------------|
| Emissions | CE | CISPR32/EN55032 | CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit) | |
| | RE | CISPR32/EN55032 | CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit) | |
| Immunity | 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 |
| | Voltage dips, short interruptions and voltage variations immunity | IEC/EN61000-4-29 | 0%, 70% | perf. Criteria B |

Electromagnetic Compatibility (EMC) (EN50155)

| | | | | |
|-----------|-------------|---------------|---|--|
| Emissions | CE | EN50121-3-2 | 150kHz-500kHz | 99dBuV (see Fig.3-② for recommended circuit) |
| | | EN55016-2-1 | 500kHz-30MHz | 93dBuV (see Fig.3-② for recommended circuit) |
| Immunity | RE | EN50121-3-2 | 30MHz-230MHz | 40dBuV/m at 10m (see Fig.3-② for recommended circuit) |
| | | EN55016-2-1 | 230MHz-1GHz | 47dBuV/m at 10m (see Fig.3-② for recommended circuit) |
| | ESD | EN50121-3-2 | Contact ±6kV/Air ±8kV perf. Criteria A | |
| | RS | EN50121-3-2 | 20V/m perf. Criteria A | |
| | EFT | EN50121-3-2 | ±2kV 5/50ns 5kHz | (see Fig.3-① for recommended circuit) perf. Criteria A |
| | Surge | EN50121-3-2 | line to line ±1kV (42Ω, 0.5μF) (see Fig.3-① for recommended circuit) perf. Criteria A | |
| CS | EN50121-3-2 | 0.15MHz-80MHz | 10V r.m.s perf. Criteria A | |

Typical Characteristic Curve

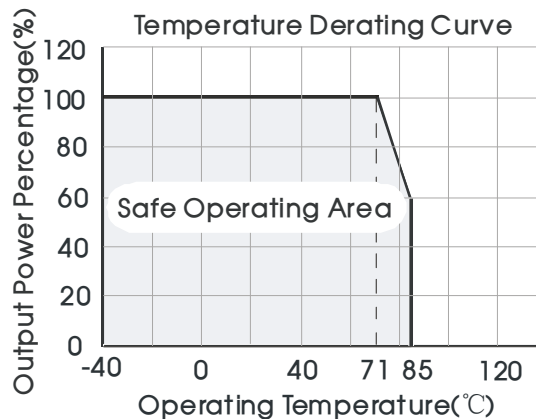
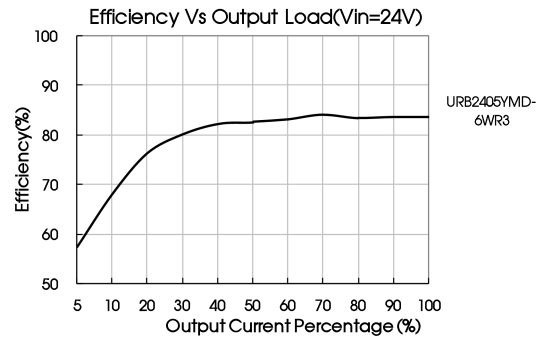
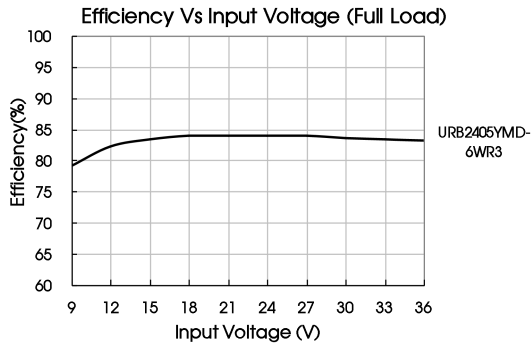
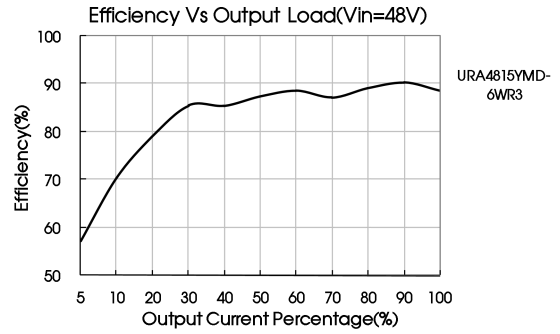
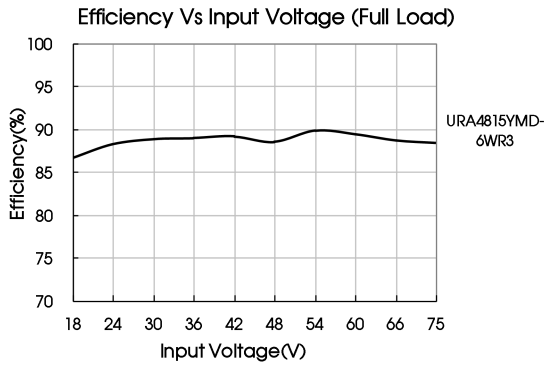


Fig. 1



Design Reference

1. Typical application

All the DC/DC converters of this series are tested before delivery using the recommended circuit shown in Fig. 2.

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values C_{in} and C_{out} and/or by selecting capacitors with a low ESR (equivalent series resistance). Also make sure that the capacitance is not exceeding the specified max. capacitive load value of the product.

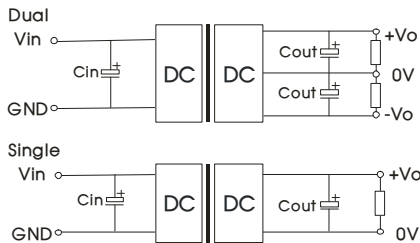


Fig. 2

| Vin(VDC) | Cin | Cout |
|----------|------------------|----------|
| 24 | 100μF/50V | 10μF/50V |
| 48 | 10 μF- 47μF/100V | 10μF/50V |

2. EMC compliance circuit

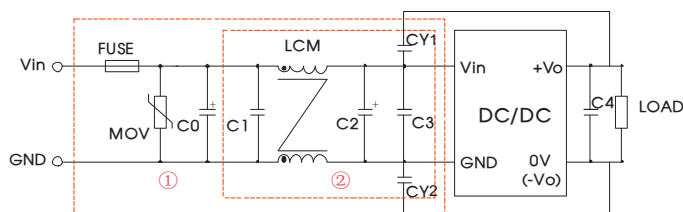


Fig. 3

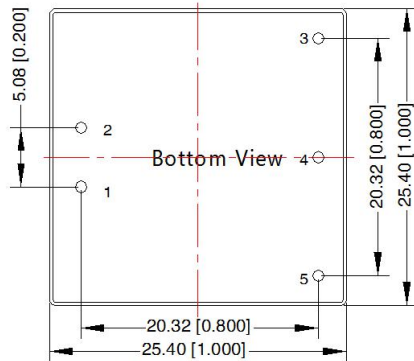
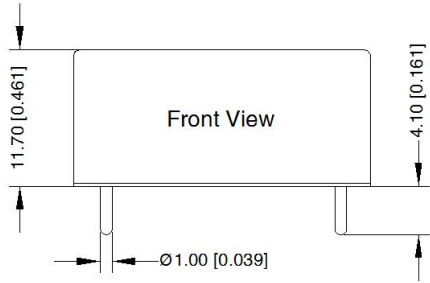
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

| Model | Vin:24VDC | Vin:48VDC |
|---------|--|------------|
| FUSE | Choose according to actual input current | |
| MOV | S20K30 | S14K60 |
| C0 | 680μF/50V | 680μF/100V |
| C1 | 1μF/50V | 1μF/100V |
| C2 | 330μF/50V | 330μF/100V |
| C3 | 4.7μF/50V | 4.7μF/100V |
| C4 | Refer to the Cout in Fig.2 | |
| LCM | 4.7mH | |
| CY1/CY2 | 1nF/2KV | |

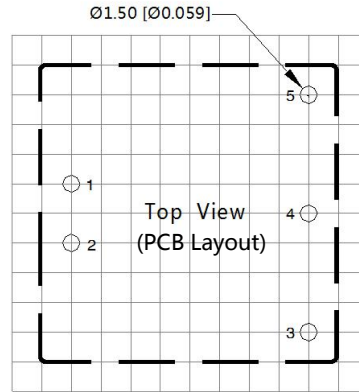
- The products do not support parallel connection of their output
- For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



Note:
Unit: mm[inch]
Pin diameter tolerances: $\pm 0.10 [\pm 0.004]$
General tolerances: $\pm 0.50 [\pm 0.020]$

THIRD ANGLE PROJECTION

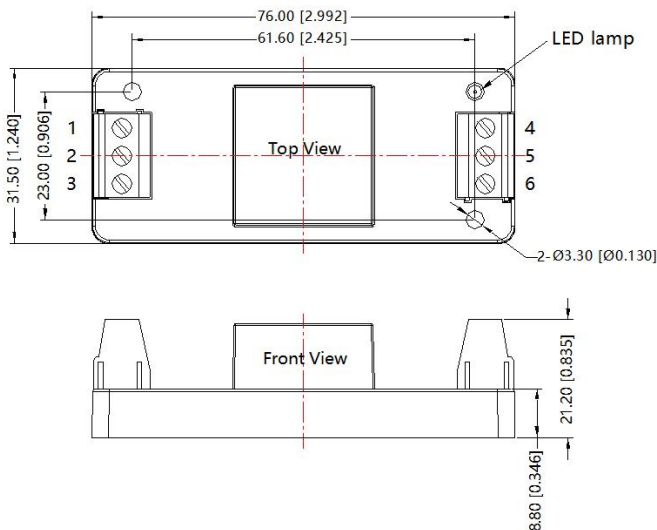


Note: Grid 2.54*2.54mm

| Pin-Out | | |
|---------|--------|------|
| Pin | Single | Dual |
| 1 | GND | GND |
| 2 | Vin | Vin |
| 3 | +Vo | +Vo |
| 4 | No Pin | 0V |
| 5 | 0V | -Vo |

URA_YMD-6WR3A2S & URB_YMD-6WR3A2S Dimensions

THIRD ANGLE PROJECTION

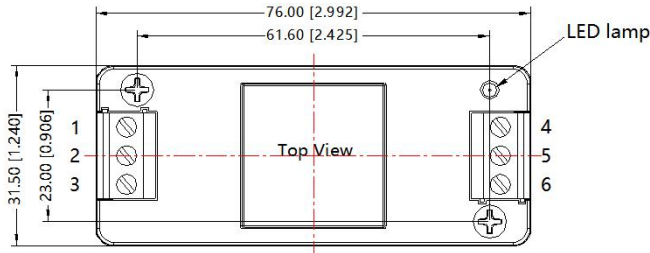


| Pin-Out | | | | | | |
|---------|----|-----|-----|-----|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Dual | NC | GND | Vin | -Vo | 0V | +Vo |
| Single | NC | GND | Vin | 0V | NC | +Vo |

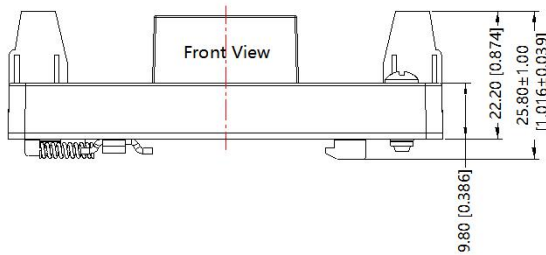
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: $\pm 1.00 [\pm 0.039]$

URA_YMD-6WR3A4S & URB_YMD-6WR3A4S Dimensions

THIRD ANGLE PROJECTION 



| Pin-Out | | | | | | |
|---------|----|-----|-----|-----|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Dual | NC | GND | Vin | -Vo | 0V | +Vo |
| Single | NC | GND | Vin | 0V | NC | +Vo |



Note:
 Unit: mm[inch]
 Mounting rail: TS35
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: ±1.00[±0.039]

- Note:
- For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58210003(DIP), 58220022(A2S/A4S package);
 - It is recommended that the load imbalance of the dual output is $\leq \pm 5\%$. If it exceeds $\pm 5\%$, the performance of the product cannot be guaranteed to meet as datasheet marked. For details, please contact our technical staff;
 - The maximum capacitive load offered were tested at input voltage range and full load;
 - 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;
 - All index testing methods in this datasheet are based on company corporate standards;
 - We can provide product customization service, please contact our technicians directly for specific information;
 - Products are related to laws and regulations: see "Features" and "EMC";
 - Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.

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