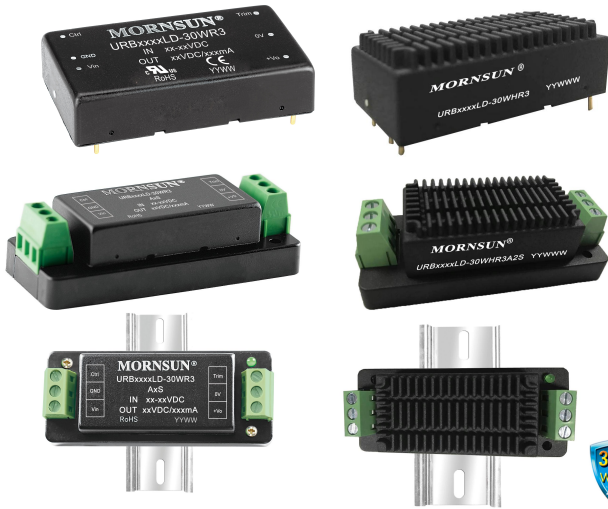


30W isolated DC-DC converter
Ultra-wide input and regulated dual/single output



FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 90% with full load and up to 82% with 5% load
- No-load power consumption as low as 0.14W
- I/O isolation test voltage: 1.5k VDC
- Input under-voltage protection, output short circuit, over-voltage, over-current protection
- Operating ambient temperature range: -40°C to +80°C
- CISPR32/EN55032 CLASS A EMI compliant without external components
- Six-sided metal shielded package
- Input reverse polarity protection available with chassis(A2S) or Din-Rail mounting (A4S) version
- IEC60950, UL60950, EN60950 approved

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

URA_LD-30WR3 & URB_LD-30WR3 series of isolated 30W DC-DC converter products with an ultra-wide 4:1 input voltage and feature efficiencies of up to 90%, input to output isolation is tested with 1500VDC and the converters safely operate ambient temperature of -40°C to +80°C, input under-voltage protection, output short-circuit, over-voltage, over-current 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 and they are widely used in applications such as data transmission device, battery power supply device, tele-communication device, distributed power supply system, hybrid module system, remote control system, industrial robot fields.

Selection Guide

| Certification | Part No. ① | Input Voltage (VDC) | | Output | | Full Load Efficiency ④ (%) Min./Typ. | Max. Capacitive Load(μF) ⑤ |
|---------------|-----------------|---------------------|--------|---------------|---------------------------|---|----------------------------|
| | | Nominal ② (Range) | Max. ③ | Voltage (VDC) | Current (mA) Max./Min. | | |
| UL/CE/CB | URB2403LD-30WR3 | 24 (9-36) | 40 | 3.3 | 6000/0 | 83/85 | 10000 |
| | URB2405LD-30WR3 | | | 5 | 6000/0 | 84/86 | 10000 |
| | URB2409LD-30WR3 | | | 9 | 3333/0 | 86/88 | 4700 |
| | URB2412LD-30WR3 | | | 12 | 2500/0 | 88/90 | 2700 |
| | URB2415LD-30WR3 | | | 15 | 2000/0 | 88/90 | 1680 |
| | URB2424LD-30WR3 | | | 24 | 1250/0 | 88/90 | 680 |
| CE | URA2405LD-30WR3 | | | ±5 | ±3000/0 | 84/86 | 2000 |
| | URA2412LD-30WR3 | | | ±12 | ±1250/0 | 87/89 | 1250 |
| | URA2415LD-30WR3 | | | ±15 | ±1000/0 | 87/89 | 680 |
| | URA2424LD-30WR3 | | | ±24 | ±625/0 | 87/89 | 470 |
| UL/CE/CB | URB4803LD-30WR3 | 48 (18-75) | 80 | 3.3 | 6000/0 | 84/86 | 10000 |
| | URB4805LD-30WR3 | | | 5 | 6000/0 | 85/87 | 10000 |
| | URB4812LD-30WR3 | | | 12 | 2500/0 | 86/88 | 2700 |
| | URB4815LD-30WR3 | | | 15 | 2000/0 | 87/89 | 1680 |
| | URB4824LD-30WR3 | | | 24 | 1250/0 | 85/87 | 680 |
| CE | URA4805LD-30WR3 | | | ±5 | ±3000/0 | 84/86 | 2000 |
| | URA4812LD-30WR3 | | | ±12 | ±1250/0 | 86/88 | 1250 |
| | URA4815LD-30WR3 | | | ±15 | ±1000/0 | 86/88 | 680 |

Notes: ① Use "H" suffix for heat sink mounting, "A2S" suffix for chassis mounting and "A4S" suffix for DIN-Rail mounting. We recommend to choose modules with a heat sink for enhanced heat dissipation and applications with extreme temperature requirements;
 ② Minimum input voltage and start-up voltage are increased by 1V for all models with A2S and A4S suffixes because of the input reverse polarity function;
 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 positive and negative output is identical.

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 | -- | 970/60 | 993/100 | mA |
| | | 5V output | -- | 1454/60 | 1488/100 | |
| | | Others | -- | 1388/6 | 1488/16 | |
| | 48VDC nominal input series, nominal input voltage | 3.3V output | -- | 474/20 | 485/30 | |
| | | 5V output | -- | 710/20 | 726/35 | |
| | | Others | -- | 702/5 | 744/10 | |
| Reflected Ripple Current | Nominal input voltage | -- | 40 | -- | | |
| 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 | | |
| Shut-down Voltage | 24VDC nominal input series | 5.5 | 6.5 | -- | | |
| | 48VDC nominal input series | 12.0 | 15.5 | -- | | |
| Start-up Time | Nominal input voltage & constant resistance load | -- | 10 | -- | ms | |
| Input Filter | | PI filter | | | | |
| Hot Plug | | Unavailable | | | | |
| Ctrl * | Module on | Ctrl pin open or pulled high (3.5-12VDC) | | | | |
| | Module off | Ctrl pin pulled low to GND (0-1.2VDC) | | | | |
| | Input current when off | -- | 5 | 8 | mA | |

Note: *The Ctrl pin voltage is referenced to input GND.

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|------------------------------|---|-----------------------------------|------|-------|------|--------|
| Voltage Accuracy | 5%-100% load | -- | ±1 | ±3 | % | |
| | 0%-5% load | -- | ±1 | ±5 | | |
| Linear Regulation | Input voltage variation from low to high at full load | Vo1 | -- | ±0.2 | | ±0.5 |
| | | Vo2 | -- | ±0.5 | | ±1 |
| Load Regulation ^① | 5%-100% load | Vo1 | -- | ±0.5 | | ±1 |
| | | Vo2 | -- | ±0.5 | | ±1.5 |
| Cross Regulation | Dual output, 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 ^② | 20MHz bandwidth, nominal input voltage, 100% load | Singe output | -- | 50 | 100 | Mv p-p |
| | | Dual output | -- | 50 | 150 | |
| Trim | | -- | ±10 | -- | %Vo | |
| Over-voltage Protection | | 110 | -- | 160 | | |
| Over-current Protection | Input voltage range | 110 | -- | 190 | | |
| Short-circuit Protection | | Hiccup, continuous, self-recovery | | | | |

Note: ①Load regulation for 0%-100% load is ±5%;
②The "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/60sec | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output capacitance at 100KHz/0.1V | -- | 2000 | -- | pF |
| Operating Temperature | See Fig. 1, Fig. 2, Fig. 3 and Fig. 4 | -40 | -- | +80 | ℃ |
| Storage Temperature | | -55 | -- | +125 | |
| Storage Humidity | Non-condensing | 5 | -- | 95 | %RH |
| Pin Soldering Resistance Temperature | Soldering spot is 1.5mm away from case for 10 seconds | -- | -- | +300 | ℃ |
| Vibration | | 10-55Hz, 2G, 30 Min. along X, Y and Z | | | |
| Switching Frequency * | PWM mode | -- | 300 | -- | KHz |
| MTBF | MIL-HDBK-217F@25℃ | 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 (without heat sink) | | 50.80 x 25.40 x 11.80 mm | | |
| | Horizontal package (with heat sink) | | 51.40 x 26.20 x 16.50 mm | | |
| | A2S chassis mounting (without heat sink) | | 76.00 x 31.50 x 21.20 mm | | |
| | A2S chassis mounting (with heat sink) | | 76.00 x 31.50 x 25.30 mm | | |
| | A4S Din-rail mounting (without heat sink) | | 76.00 x 31.50 x 25.80 mm | | |
| | A4S Din-rail mounting (with heat sink) | | 76.00 x 31.50 x 29.90 mm | | |
| Weight | without heat sink | Horizontal package/A2S chassis mounting/A4S Din-rail mounting | | 27.8g/52.0g/72.0g(Typ.) | |
| | with heat sink | Horizontal package/A2S chassis mounting/A4S Din-rail mounting | | 37.0g/60.0g/80.0g(Typ.) | |
| Cooling Method | Free air convection | | | | |

Electromagnetic Compatibility (EMC)

| | | | | | |
|-----------|-------|---------------|-----------------|---|------------------|
| Emissions | CE | Single output | CISPR32/EN55032 | CLASS A (without external components)/ CLASS B (see Fig.6-② for recommended circuit) | |
| | | Dual output | CISPR32/EN55032 | CLASS A (without external components)/ CLASS B (see Fig.7-② for recommended circuit) | |
| | RE | Single output | CISPR32/EN55032 | CLASS A (without external components)/ CLASS B (see Fig.6-② for recommended circuit) | |
| | | Dual output | CISPR32/EN55032 | CLASS A (without external components)/ CLASS B (see Fig.7-② 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 | Single output | IEC/EN61000-4-4 | ±2KV (see Fig.6-① for recommended circuit) | perf. Criteria B |
| | | Dual output | IEC/EN61000-4-4 | ±2KV (see Fig.7-① for recommended circuit) | perf. Criteria B |
| | Surge | Single output | IEC/EN61000-4-5 | line to line ±2KV (see Fig.6-① for recommended circuit) | perf. Criteria B |
| | | Dual output | IEC/EN61000-4-5 | line to line ±2KV (see Fig.7-① for recommended circuit) | perf. Criteria B |
| | CS | Single output | IEC/EN61000-4-6 | 3 Vr.m.s | perf. Criteria A |
| | | Dual output | IEC/EN61000-4-6 | 10Vr.m.s | perf. Criteria A |

Typical Characteristic Curves

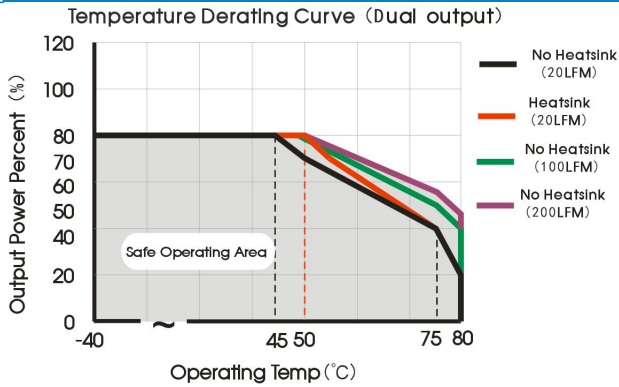


Fig. 1

Apply model: URA2405LD-30W(H)R3 (9-18V input voltage),
URA2424LD-30W(H)R3 (9-18V input voltage),
URA4805LD-30W(H)R3 (18-36V input voltage)

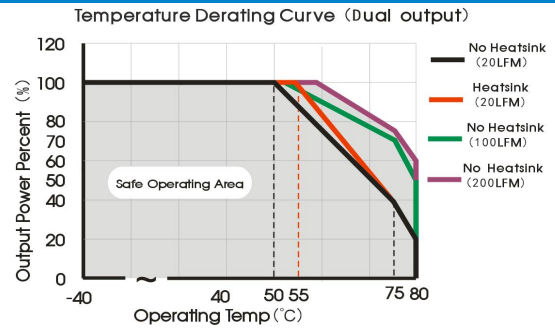


Fig. 2

Apply model: URA2405LD-30W(H)R3 (18-36V input voltage),
URA2424LD-30W(H)R3 (18-36V input voltage),
URA4805LD-30W(H)R3 (36-75V input voltage),
URA2412LD-30W(H)R3, URA2415LD-30W(H)R3,
URA4812LD-30W(H)R3, URA4815LD-30W(H)R3

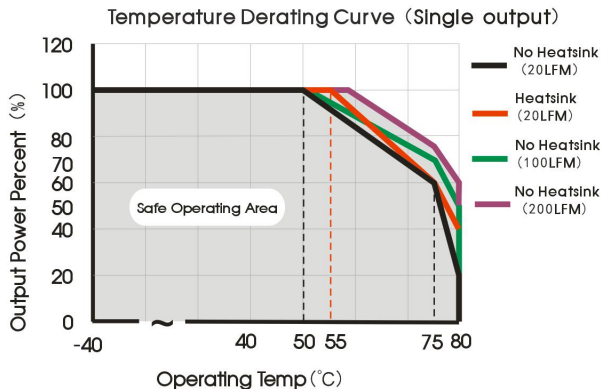


Fig. 3

Apply model: URB2403LD-30W(H)R3, URB2405LD-30W(H)R3,
URB4803LD-30W(H)R3, URB4805LD-30W(H)R3

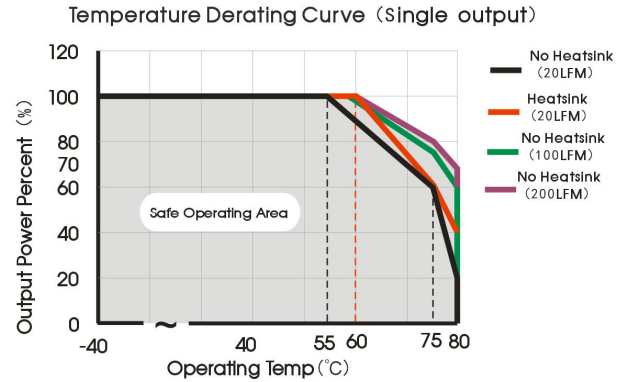
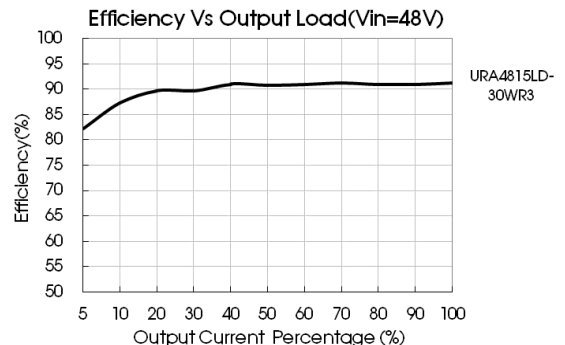
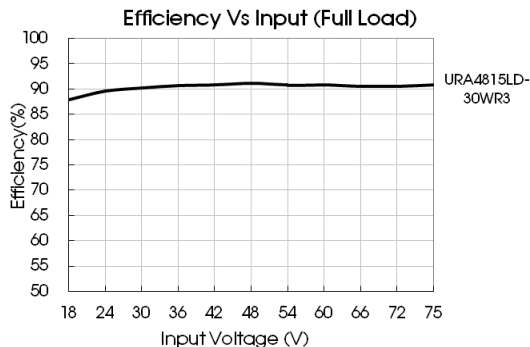
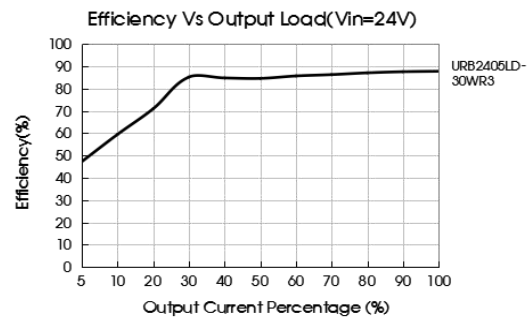
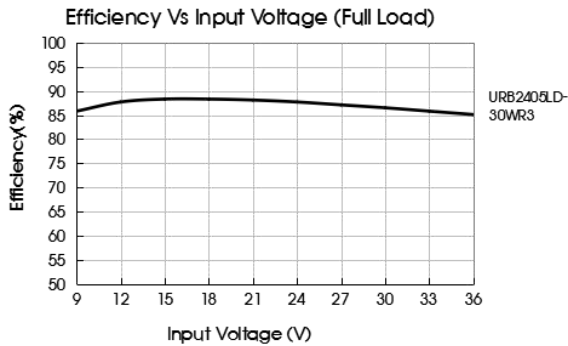


Fig. 4

Apply model: URB2409LD-30W(H)R3, URB2412LD-30W(H)R3,
URB2415LD-30W(H)R3, URB2424LD-30W(H)R3,
URB4812LD-30W(H)R3, URB4815LD-30W(H)R3,
URB4824LD-30W(H)R3



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.

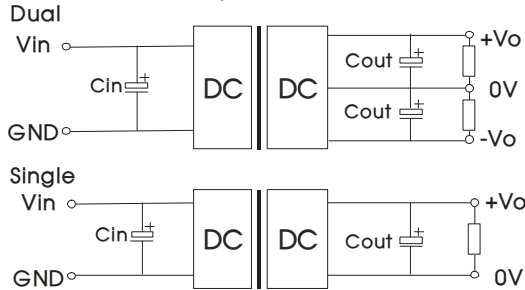


Fig. 5

| Single output voltage (VDC) | Cout (µF) | Cin (µF) | Dual output voltage (VDC) | Cout (µF) | Cin (µF) |
|-----------------------------|-----------|----------|---------------------------|-----------|----------|
| 3.3/5/9 | 220 | 100 | ±5/±12/±15 | 220 | 100 |
| 12/15/24 | 100 | | ±24 | 100 | |

2. EMC compliance circuit

Single output

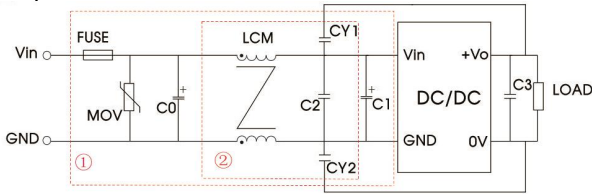


Fig. 6

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

Parameter description

| Model | Vin:24V | Vin:48V |
|----------|---|------------|
| FUSE | Choose according to actual input current | |
| MOV | S20K30 | S14K60 |
| C0 | 680µF/50V | 330µF/100V |
| C1 | 330µF/50V | 330µF/100V |
| C2 | 4.7µF/50V | 2.2µF/100V |
| C3 | Refer to the Cout in Fig.5 | |
| LCM | 1mH, recommended to use MORNSUN's FL2D-30-102 | |
| CY1, CY2 | 1nF/2KV | |

Dual output

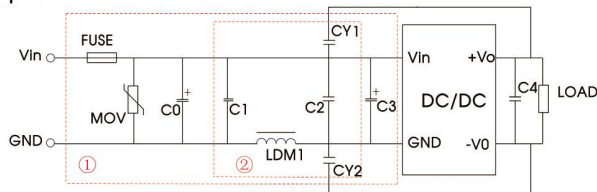
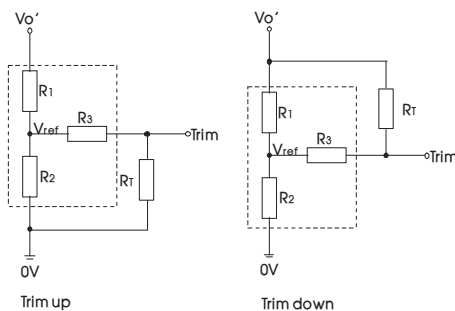


Fig. 7

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

| Model | Vin:24V | Vin:48V |
|----------|--|------------|
| FUSE | Choose according to actual input current | |
| MOV | S20K30 | S14K60 |
| C0 | 680µF/50V | 330µF/100V |
| C1, C2 | 2.2µF/50V | 2.2µF/100V |
| C3 | 330µF/50V | 330µF/100V |
| C4 | Refer to the Cout in Fig.5 | |
| LDM1 | 3.3µH | |
| CY1, CY2 | 2.2nF/400VAC Safety Y Capacitor | |

3. Trim Function for Output Voltage Adjustment (open if unused)



Calculating Trim resistor values:

$$\text{up: } R_T = \frac{aR_2}{R_2 - a} - R_3 \quad a = \frac{V_{ref}}{V_{o'} - V_{ref}} \cdot R_1$$

$$\text{down: } R_T = \frac{aR_1}{R_1 - a} - R_3 \quad a = \frac{V_{o'} - V_{ref}}{V_{ref}} \cdot R_2$$

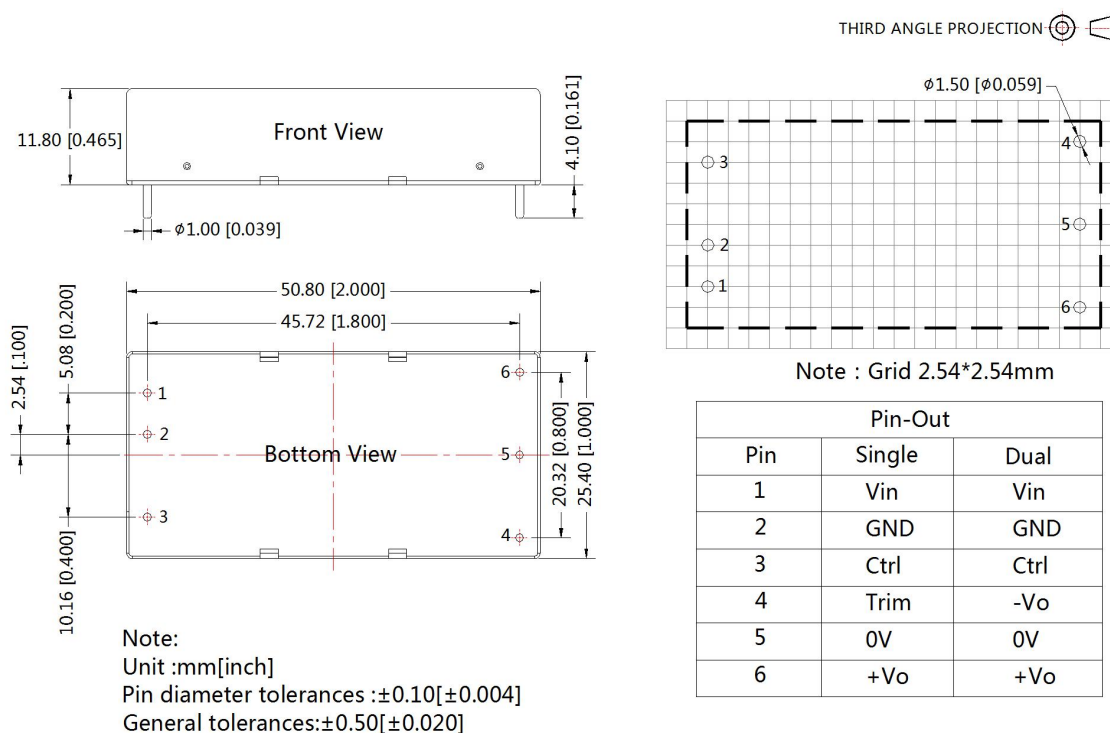
R_T = Trim Resistor value;
 a = self-defined parameter;
 $V_{o'}$ = desired output voltage.

TRIM resistor connection (dashed line shows internal resistor network)

| Vout(VDC) | R1(KΩ) | R2(KΩ) | R3(KΩ) | Vref(V) |
|-----------|--------|--------|--------|---------|
| 3.3 | 4.801 | 2.87 | 12.4 | 1.24 |
| 5 | 2.883 | 2.87 | 10 | 2.5 |
| 9 | 7.500 | 2.87 | 15 | 2.5 |
| 12 | 11.000 | 2.87 | 15 | 2.5 |
| 15 | 14.494 | 2.87 | 15 | 2.5 |
| 24 | 24.872 | 2.87 | 17.8 | 2.5 |

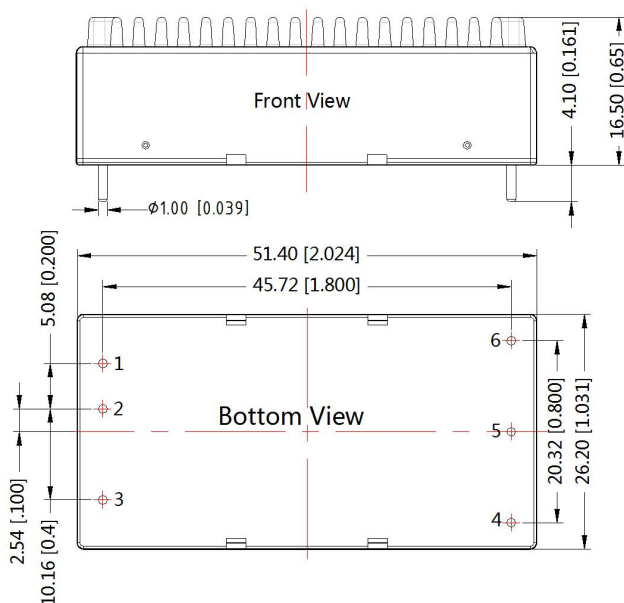
- The products do not support parallel connection of their output
- For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Horizontal Package (without heat sink) Dimensions and Recommended Layout



Horizontal Package (with heat sink) Dimensions

THIRD ANGLE PROJECTION 

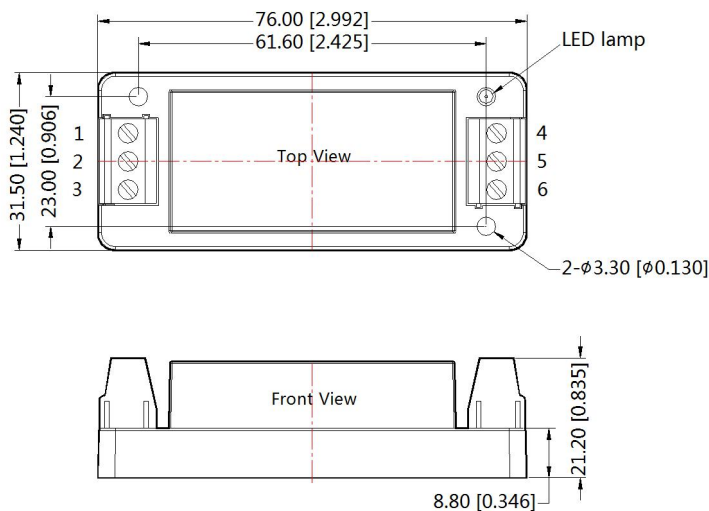


| Pin-Out | | |
|---------|--------|------|
| Pin | Single | Dual |
| 1 | Vin | Vin |
| 2 | GND | GND |
| 3 | Ctrl | Ctrl |
| 4 | Trim | -Vo |
| 5 | 0V | 0V |
| 6 | +Vo | +Vo |

Note:
Unit: mm[inch]
General tolerances: $\pm 0.50[\pm 0.020]$

URA_LD-30WR3A2S & URB_LD-30WR3A2S(without heat sink) Dimensions


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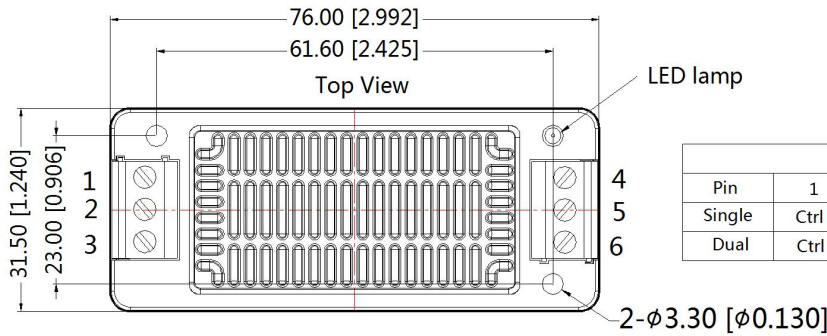


| Pin-Out | | | | | | |
|---------|------|-----|-----|------|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | Ctrl | GND | Vin | Trim | 0V | +Vo |
| Dual | Ctrl | GND | Vin | -Vo | 0V | +Vo |

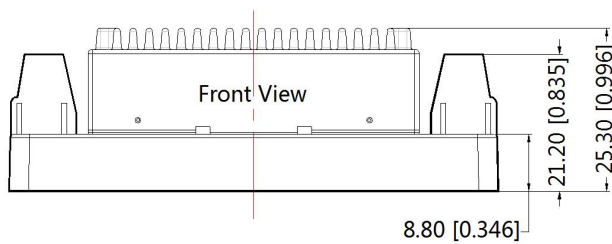
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: $\pm 0.50[\pm 0.020]$

URA_LD-30WR3A2S & URB_LD-30WR3A2S(with heat sink) Dimensions

THIRD ANGLE PROJECTION 



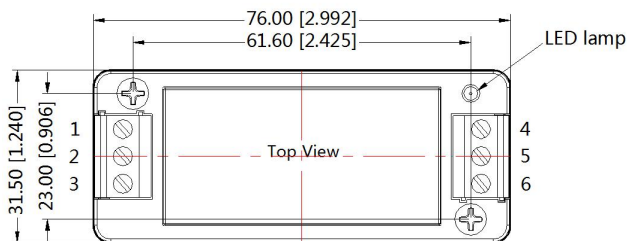
| | | Pin-Out | | | | | |
|--------|--|---------|-----|-----|------|----|-----|
| Pin | | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | | Ctrl | GND | Vin | Trim | 0V | +Vo |
| Dual | | Ctrl | GND | Vin | -Vo | 0V | +Vo |



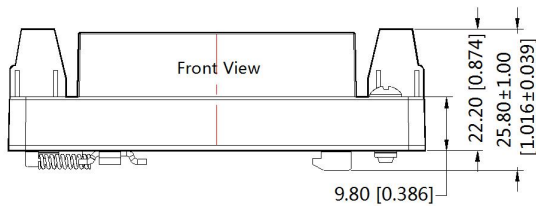
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±0.50[±0.020]

URA_LD-30WR3A4S & URB_LD-30WR3A4S(without heat sink) Dimensions

THIRD ANGLE PROJECTION 



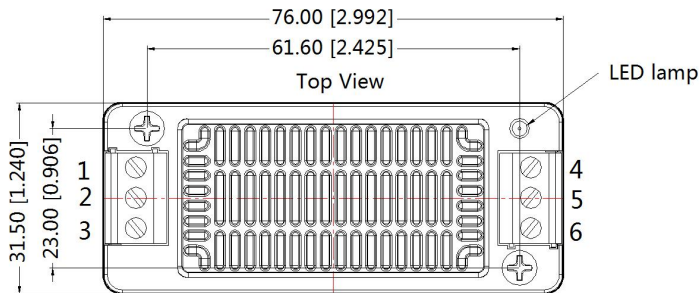
| | | Pin-Out | | | | | |
|--------|--|---------|-----|-----|------|----|-----|
| Pin | | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | | Ctrl | GND | Vin | Trim | 0V | +Vo |
| Dual | | Ctrl | GND | Vin | -Vo | 0V | +Vo |



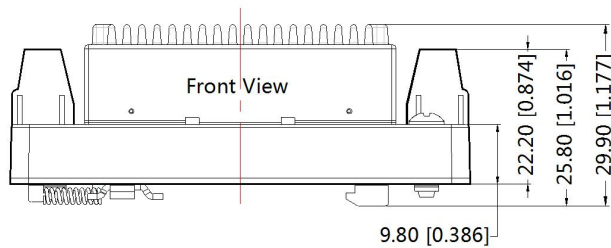
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ±0.50[±0.020]

URA_LD-30WR3A4S & URB_LD-30WR3A4S(with heat sink) Dimensions

THIRD ANGLE PROJECTION 



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

Notes:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Horizontal Packaging Bag Number: 58200035(without heat sink), 58200051(with heat sink), A2S/A4S Packaging Bag Number: 58220022;
2. The maximum capacitive load offered were tested at input voltage range and full load;
3. 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;
4. All index testing methods in this datasheet are based on company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. 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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