

30W, Ultra wide input isolated & regulated dual/single output, DC/DC converter



FEATURES

- Ultra wide input voltage range (4:1)
- High efficiency up to 90% with full load
- High efficiency up to 82% with 5% load
- No-load power consumption as low as 0.14W
- Isolation voltage: 1.5K VDC
- Input under-voltage protection, output short circuit, over-voltage, over-current protection
- Operating temperature range: -40°C to +80°C
- Meet CISPR22/EN55022 CLASS A, without external components
- Six-sided metal shielding package
- Reverse voltage protection available with A2S(Chassis mounting) or A4S(35mm DIN-Rail mounting)
- IEC60950, UL60950, EN60950 approval

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

URA_LD-30WR3 & URB_LD-30WR3 series are isolated 30W DC-DC products with 4:1 input voltage. They feature efficiency up to 90%, 1.5K VDC isolation, operating temperature of -40°C to +80°C, input under-voltage protection, output short circuit protection, over-voltage protection, over-current protection and EMI meets CISPR22/EN55022 CLASS A, which make them widely applied in data transmission device, battery power supply device, tele-communication device, distributed power supply system, remote control system, industrial robot fields. And extension package A2S and A4S also enable them with reverse voltage protection.

Selection Guide

| Certification | Part No. ① | Input Voltage (VDC) | | Output | | Efficiency ^③ (%Min./Typ.) @ Full Load | Max. Capacitive Load(μF) ^⑤ |
|---------------|-----------------|---------------------------------|-------------------|-------------------------|-----------------------------------|--|---|
| | | Nominal ^② (Range) | Max. ^④ | Output Voltage (VDC) | Output 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 | 86/88 | 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 | 86/88 | 10000 |
| | URB4812LD-30WR3 | | | 12 | 2500/0 | 86/88 | 2700 |
| | URB4815LD-30WR3 | | | 15 | 2000/0 | 87/89 | 1680 |
| | URB4824LD-30WR3 | | | 24 | 1250/0 | 87/89 | 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 Series with suffix "H" are heat sink mounting; series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example URB2405LD-30WR3A2S is chassis mounting of with heat sink, URB2405LD-30WR3A4S is DIN-Rail mounting of without heat sink; If the application has a higher requirement for heat dissipation, you can choose modules with heat sink;
 ② A2S (wiring) and A4S (rail) Model due to input reverse polarity protection function, input voltage range the minimum value and starting voltage is higher than 1VDC DIP package;
 ③ Absolute maximum rating without damage on the converter, but it isn't recommended;
 ④ Efficiency is measured in nominal input voltage and rated output load; A2S (wiring) and A4S (rail) Model due to input reverse polarity protection, minimum efficiency greater than Min.-2 is qualified;
 ⑤ 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 nominal input series, nominal input voltage | 3.3V output | -- | 970/60 | 993/100 | mA |
| | | 5V output | -- | 1420/60 | 1453/100 | |
| | | Others | -- | 1388/6 | 1488/12 | |
| | 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 | | |
| Starting Voltage | 24VDC nominal input series | -- | -- | 9 | | |
| | 48VDC nominal input series | -- | -- | 18 | | |
| Shutdown Voltage | 24VDC nominal input series | 5.5 | 6.5 | -- | | |
| | 48VDC nominal input series | 12.0 | 15.5 | -- | | |
| Starting Time | Nominal input voltage & constant resistance load | -- | 10 | -- | ms | |
| Input Filter | | Pi filter | | | | |
| Hot Plug | | Unavailable | | | | |
| Ctrl * | Module switch on | Ctrl suspended or connected to TTL high level (3.5-12VDC) | | | | |
| | Module switch off | Ctrl pin connected to GND or low level (0-1.2VDC) | | | | |
| | Input current when switched off | -- | 5 | 8 | mA | |

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

Output Specifications

| Item | Operating Conditions | Min. | Typ. | Max. | Unit | |
|--------------------------------|--|-----------------------------------|------|-------|------|--------|
| Output Voltage Accuracy | 5%-100% load | -- | ±1 | ±3 | % | |
| | 0%-5% load | -- | ±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 ^① | 5%-100% load | Positive output | -- | ±0.5 | | ±1 |
| | | Negative output | -- | ±0.5 | | ±1.5 |
| Cross Regulation | Dual output, main output 50% load, Supplement output from 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 ^② | 20MHz bandwidth, nominal input voltage, 100% load | Singe output | -- | 50 | 100 | Mv p-p |
| | | Dual output | -- | 50 | 150 | |
| Trim | | -- | ±10 | -- | %Vo | |
| Output Over-voltage Protection | | 110 | -- | 160 | | |
| Output Over-current Protection | Input voltage range | 110 | -- | 190 | | |
| Short circuit Protection | | Hiccup, Continuous, self-recovery | | | | |

Note: ①When testing from 0% -100%load working conditions, load regulation index of ±5%;
②Ripple 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, insulation voltage 500VDC/60sec., Ta=25°C, humidity=75%RH | 1000 | -- | -- | MΩ |
| Isolation Capacitance | Input-output, 100KHz/0.1V | -- | 2000 | -- | pF |
| Operating Temperature | see Fig. 1, Fig. 2, Fig. 3 and Fig. 4 | -40 | -- | +80 | °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, Full load(Ground, Benign, controlled environment) | 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 | Horizontal package(without heat sink) | | 50.80*25.40*11.80 mm | | |
| | Horizontal package(with heat sink) | | 50.80*25.40*16.30 mm | | |
| | A2S wiring package (without heat sink) | | 76.00*31.50*21.20 mm | | |
| | A2S wiring package(with heat sink) | | 76.00*31.50*25.10 mm | | |
| | A4S rail package(without heat sink) | | 76.00*31.50*25.80 mm | | |
| | A4S rail package(with heat sink) | | 76.00*31.50*29.70 mm | | |
| Weight | without heat sink | Horizontal package/A2S wiring package/A4S rail package | 26g/48g/68g(Typ.) | | |
| | with heat sink | Horizontal package/A2S wiring package/A4S rail package | 34g/56g/76g(Typ.) | | |
| Cooling Method | Free air convection | | | | |

EMC Specifications

| | | | | | |
|-----|-------|---------------|-----------------|---|------------------|
| EMI | CE | Single output | CISPR22/EN55022 | CLASS A (Bare component)/ CLASS B (see Fig.6-② for recommended circuit) | |
| | | Dual output | CISPR22/EN55022 | CLASS A (Bare component)/ CLASS B (see Fig.7-② for recommended circuit) | |
| | RE | Single output | CISPR22/EN55022 | CLASS A (Bare component)/ CLASS B (see Fig.6-② for recommended circuit) | |
| | | Dual output | CISPR22/EN55022 | CLASS A (Bare component)/ CLASS B (see Fig.7-② 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 | 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 |

Product Characteristic Curve

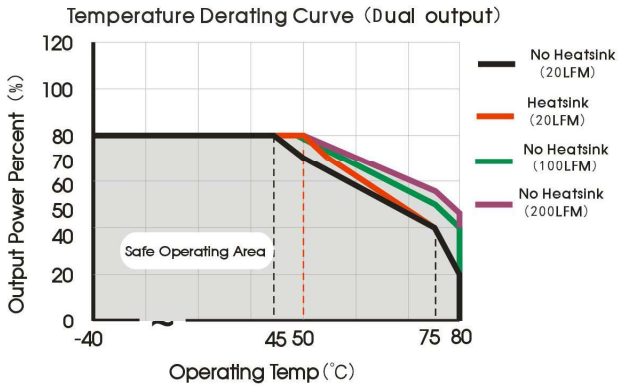


Fig. 1

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)

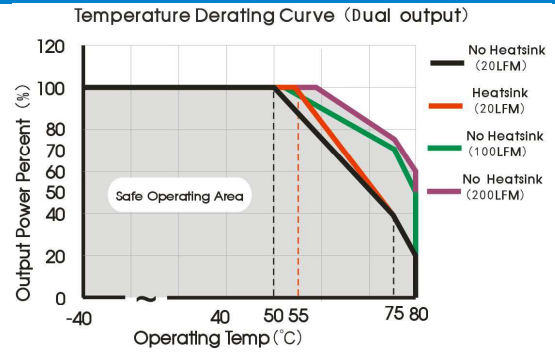


Fig. 2

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

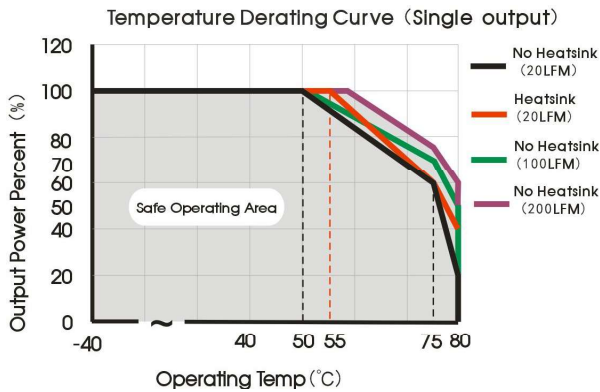


Fig. 3

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

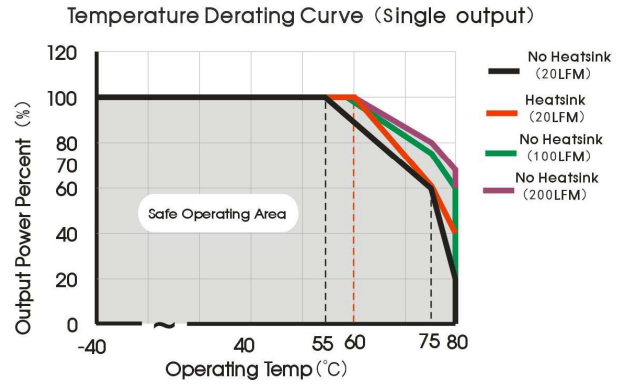
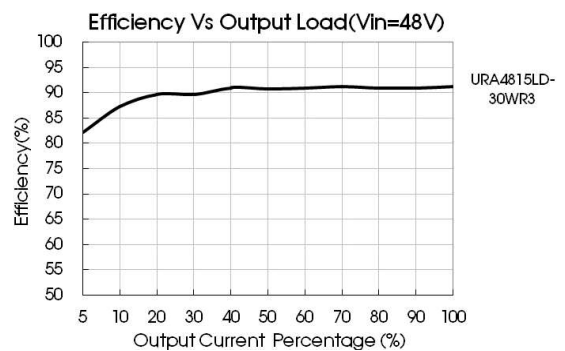
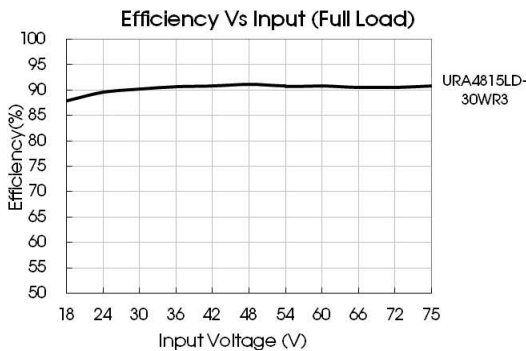
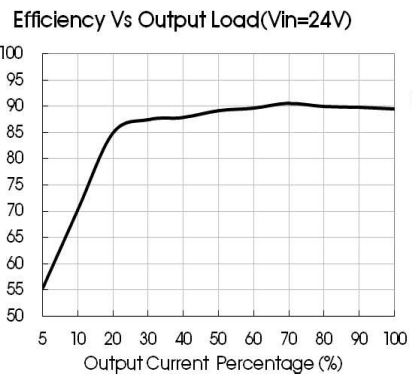
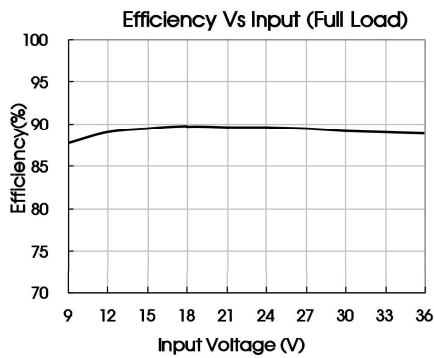


Fig. 4

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-30sW(H)R3



Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 5) 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.

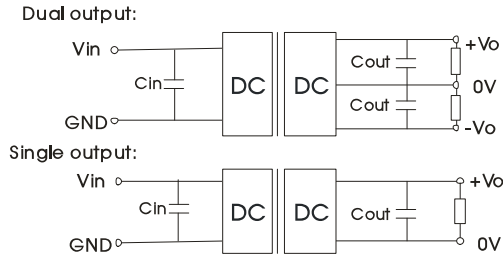


Fig. 5

| 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 solution-recommended circuit

Single output:

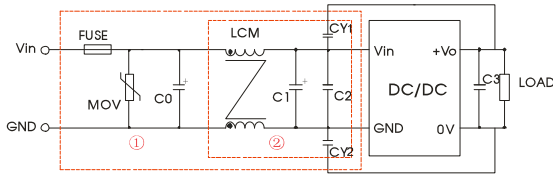


Fig. 6

Notes: Part ① in the Fig. 6 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 | |
| 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-30-102s | |
| CY1, CY2 | 1nF/2KV | |

Dual output:

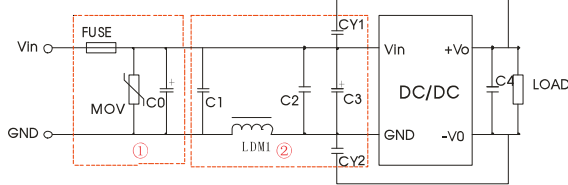
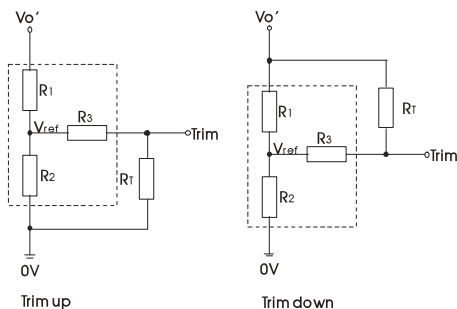


Fig.7

Notes: Part ① in the Fig. 7 is used for EMS test and part ② for EMI filtering; selected based on needs.

| Model | Vin:24V | Vin:48V |
|----------|--|------------|
| FUSE | Choose according to actual input current | |
| MOV | S20K30 | S14K60 |
| C0 | 680μF/50V | 330μF/100V |
| C1 | 2.2μF/50V | 2.2μF/100V |
| 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. Application of Trim and calculation of Trim resistance



Applied circuits of Trim (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

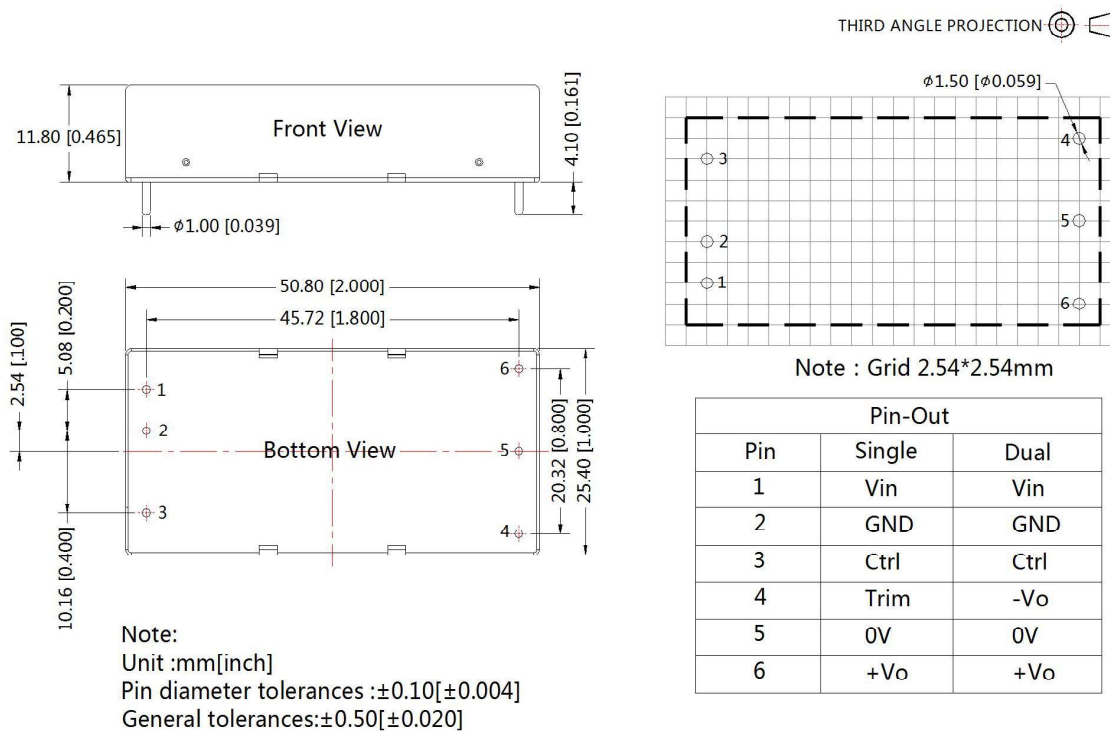
$$\begin{aligned} \text{up: } R_T &= \frac{aR_2}{R_2-a} - R_3 & a &= \frac{V_{ref}}{V_o' - V_{ref}} \cdot R_1 \\ \text{down: } R_T &= \frac{aR_1}{R_1-a} - R_3 & a &= \frac{V_o' - V_{ref}}{V_{ref}} \cdot R_2 \end{aligned}$$

R_T is Trim resistance ,a is a self-defined parameter, with no real meaning. V_{o'} for the actual needs of the up or down regulated voltage

| 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 |

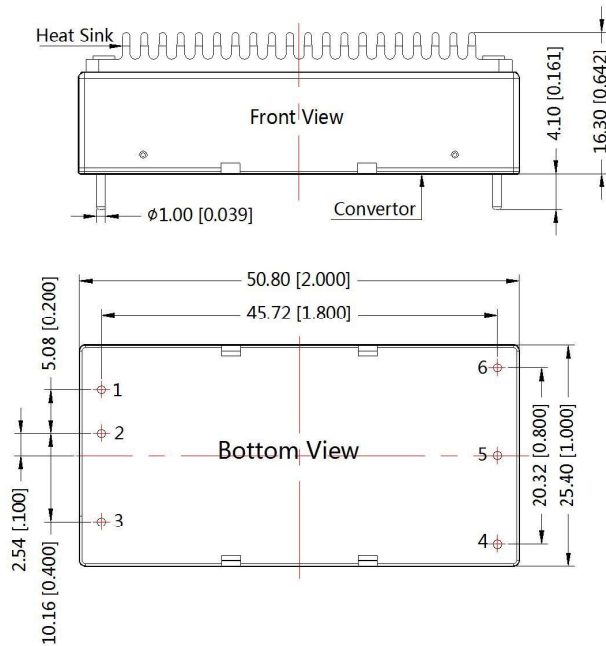
- It is not allowed to connect modules output in parallel to enlarge the power
- For more information please find DC-DC converter application notes on www.mornsun-power.com

Horizontal Package (without heat sink) Dimensions and Recommended Layout



Horizontal Package (with heat sink) Dimensions

THIRD ANGLE PROJECTION

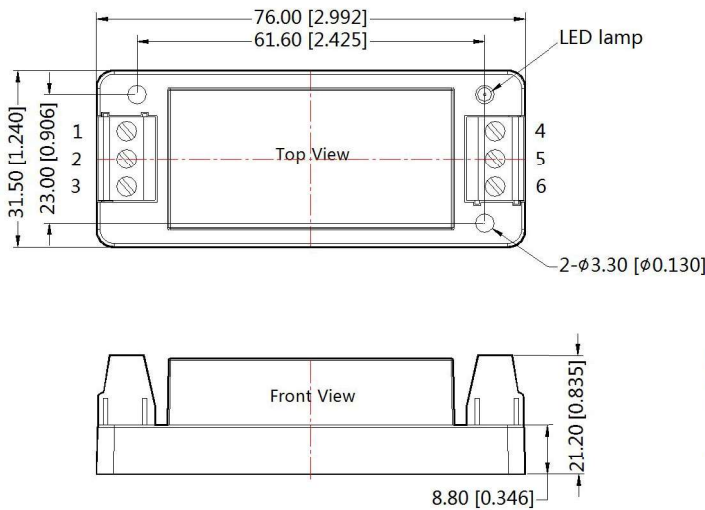


| Pin-Out | | |
|---------|--------|------|
| Pin | Single | Dual |
| 1 | Vin | Vin |
| 2 | GND | GND |
| 3 | Ctrl | Ctrl |
| 4 | Trim | -Vo |
| 5 | 0V | 0V |
| 6 | +Vo | +Vo |

Note:
 Unit :mm[inch]
 General tolerances:±0.50[±0.020]
 If use heatsinks,make sure there is enough space for a special size in ther above graph

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

THIRD ANGLE PROJECTION

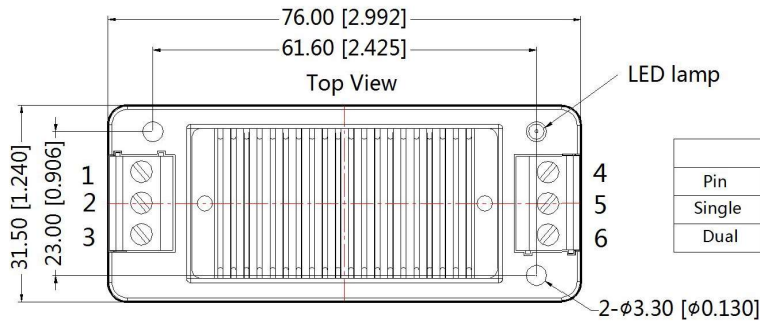


| Pin-Out | | | | | | |
|---------|------|-----|-----|------|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | Ctrl | GND | Vin | Trim | 0V | +Vo |
| Dual | Ctrl | GND | Vin | -Vo | 0V | +Vo |

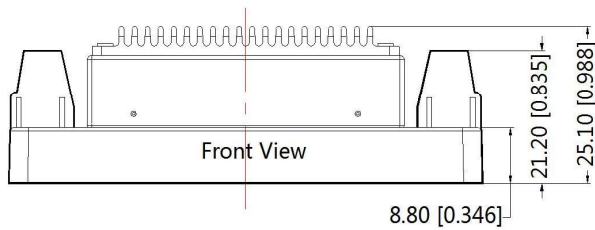
Note:
 Unit: mm[inch]
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: ±0.50[±0.020]

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

THIRD ANGLE PROJECTION



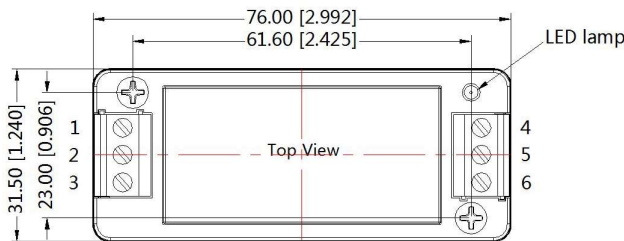
| Pin-Out | | | | | | |
|---------|------|-----|-----|------|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | Ctrl | GND | Vin | Trim | 0V | +Vo |
| Dual | Ctrl | GND | Vin | -Vo | 0V | +Vo |



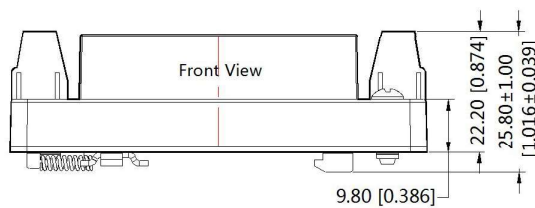
Note:
 Unit: mm[inch]
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: ±0.50[±0.020]

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

THIRD ANGLE PROJECTION



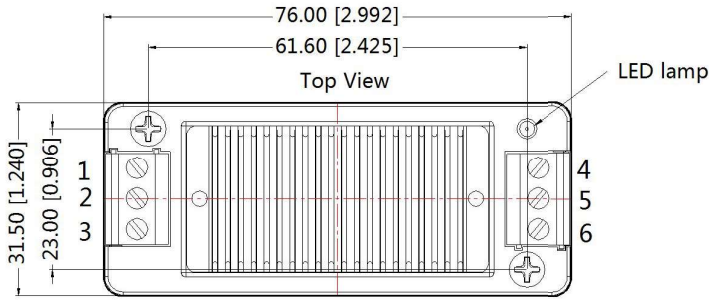
| Pin-Out | | | | | | |
|---------|------|-----|-----|------|----|-----|
| Pin | 1 | 2 | 3 | 4 | 5 | 6 |
| Single | Ctrl | GND | Vin | Trim | 0V | +Vc |
| Dual | Ctrl | GND | Vin | -Vo | 0V | +Vc |



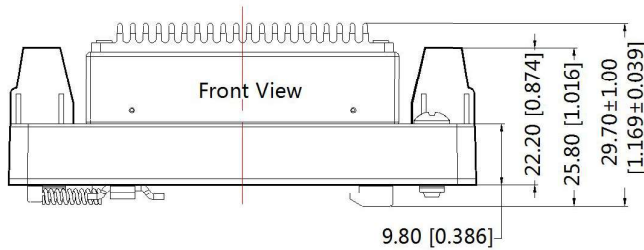
Note:
 Unit: mm[inch]
 Wire range: 24-12 AWG
 Tightening torque: Max 0.4 N·m
 General tolerances: ±0.50[±0.020]

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

Notes:

1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com.
 Horizontal Packing Bag Number: 58200035(without heat sink), 58200051(with heat sink), A2S/A4S Packing 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 Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on Company's corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Specifications are subject to change 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