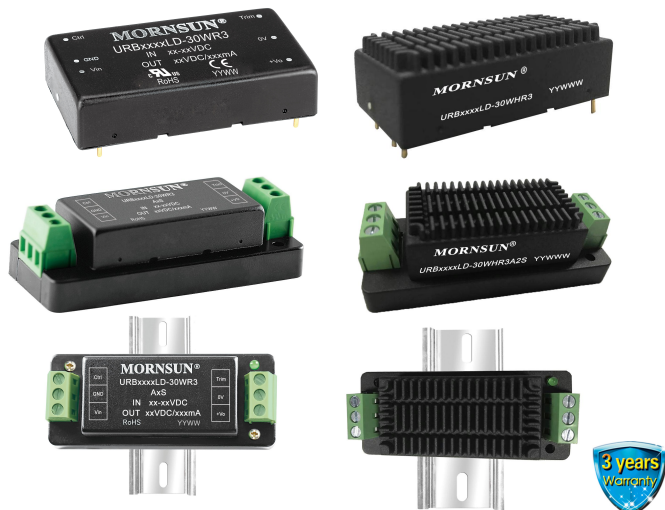


30W isolated DC-DC converter with Ultra-wide Input and Regulated Dual/Single Output



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

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 35mm DIN-Rail mounting (A4S) version
- IEC60950, UL60950, EN60950 Approval

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	48 (18-75)	80	±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	48 (18-75)	80	±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 Absolute maximum stress rating without damage (not recommended);
 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
		5V output	--	1454/60	1488/100
		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	
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	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 with Positive output at 50% load and Negative 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
Over-voltage Protection	Input voltage range	110	--	160	
Over-current Protection		110	--	190	%Io
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

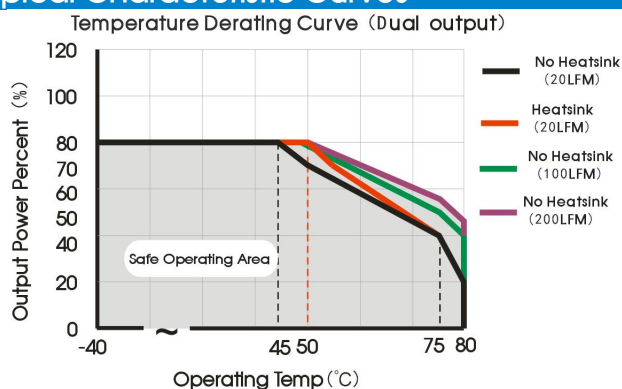


Fig. 1

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)

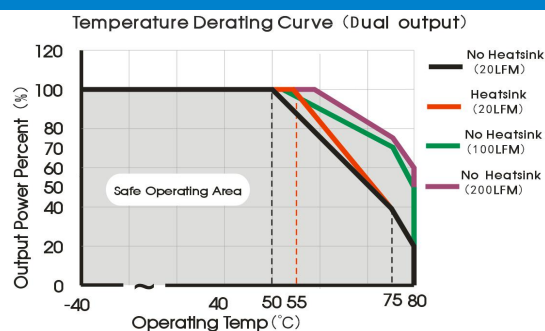


Fig. 2

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

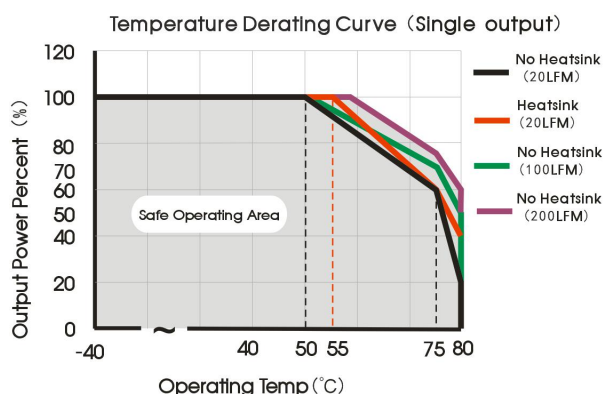


Fig. 3

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

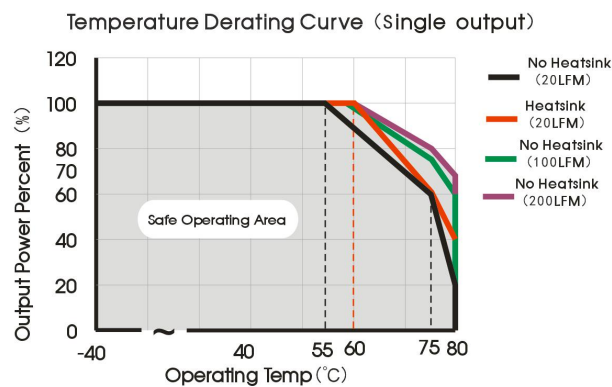
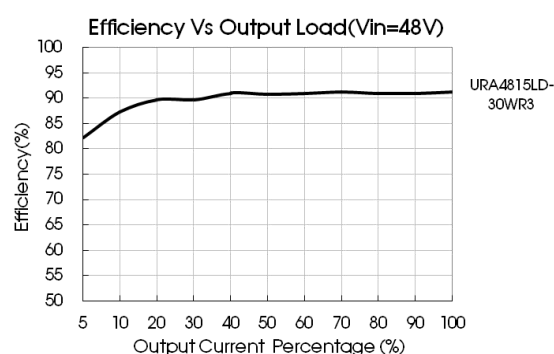
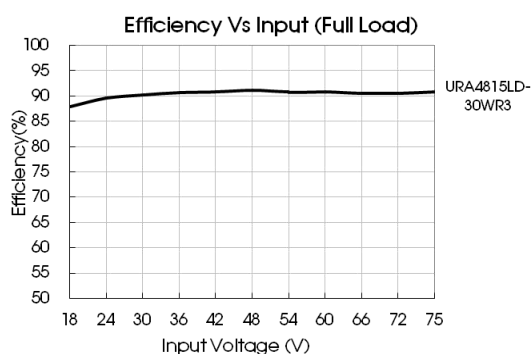
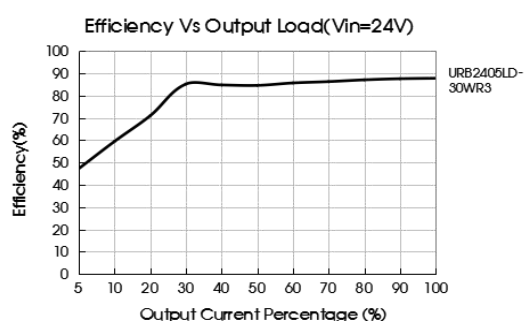
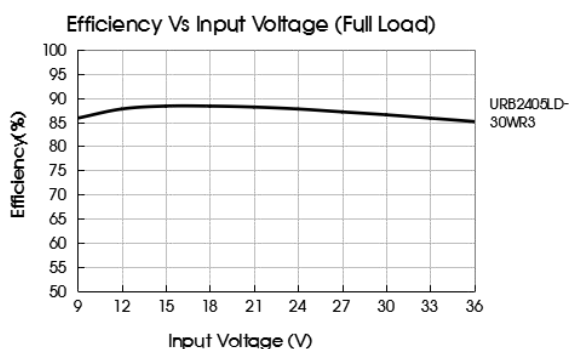


Fig. 4

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.

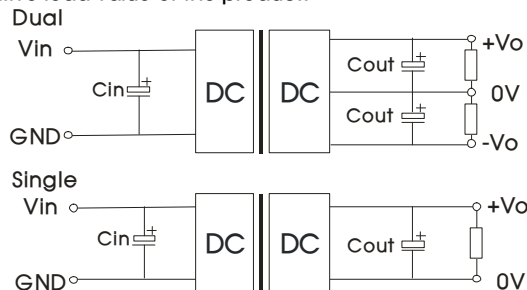


Fig. 5

Single output voltage (VDC)	C_{out} (μF)	C_{in} (μF)	Dual output voltage (VDC)	C_{out} (μF)	C_{in} (μF)
3.3/5/9	220	100	$\pm 5/\pm 12/\pm 15$	220	100
12/15/24	100		± 24	100	

2. EMC compliance circuit

Single output

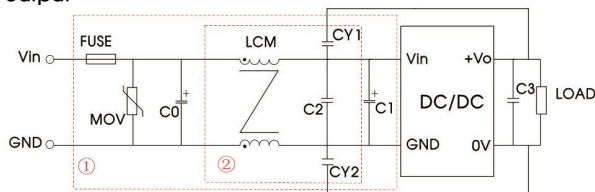


Fig. 6

Notes: Part ① in the Fig. 6 is used for EMC test and part ② for EMI 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 C_{out} in Fig.5	
LCM	1mH, recommended to use MORNSUN's FL2D-30-102	
CY1、CY2	1nF/2KV	

Dual output

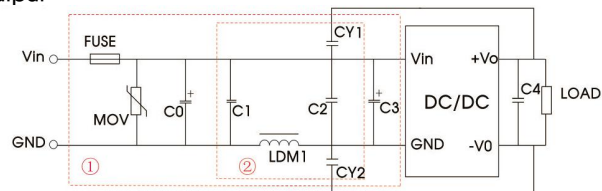
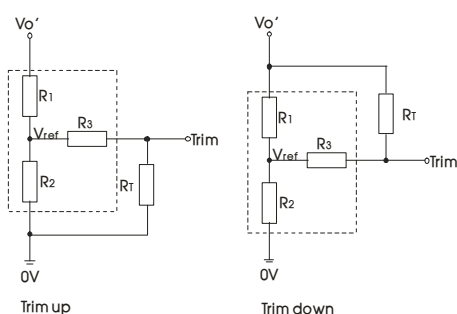


Fig.7

Notes: Part ① in the Fig. 7 is used for EMC test and part ② for EMI 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 C_{out} 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:

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

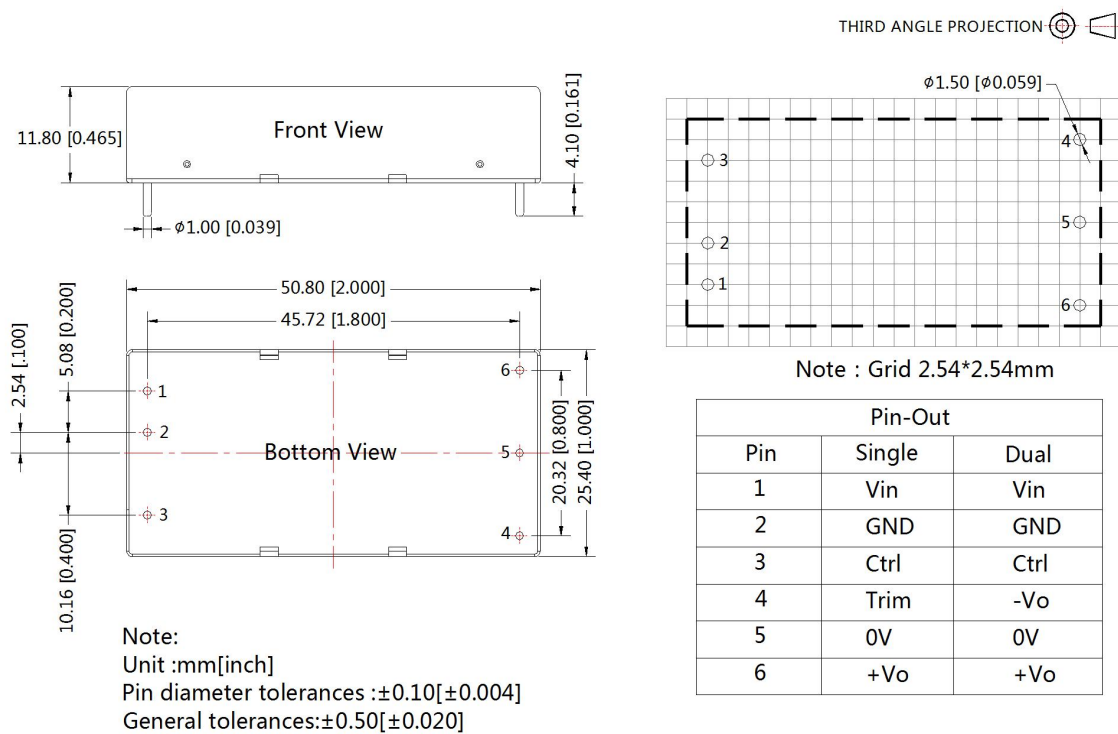
R_T = Trim Resistor value;
 a = self-defined parameter;
 V_o' = desired output voltage.

TRIM resistor connection (dashed line shows internal resistor network)

Vout(VDC)	R1(K Ω)	R2(K Ω)	R3(K Ω)	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

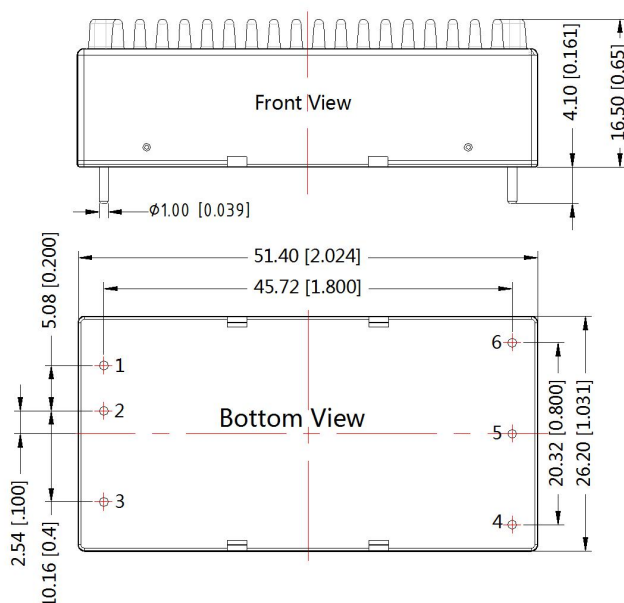
- The products do not support parallel connection of their output
- For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Horizontal Package (without heat sink) Dimensions and Recommended Layout



Horizontal Package (with heat sink) Dimensions

THIRD ANGLE PROJECTION

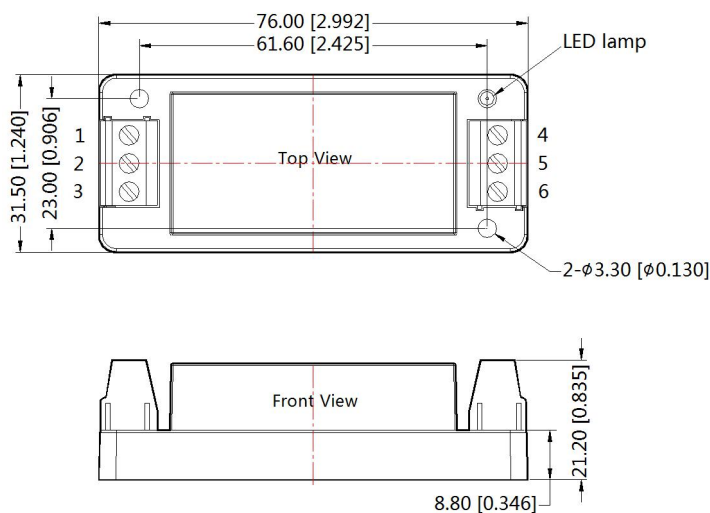


Pin-Out		
Pin	Single	Dual
1	Vin	Vin
2	GND	GND
3	Ctrl	Ctrl
4	Trim	-Vo
5	0V	0V
6	+Vo	+Vo

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

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

THIRD ANGLE PROJECTION

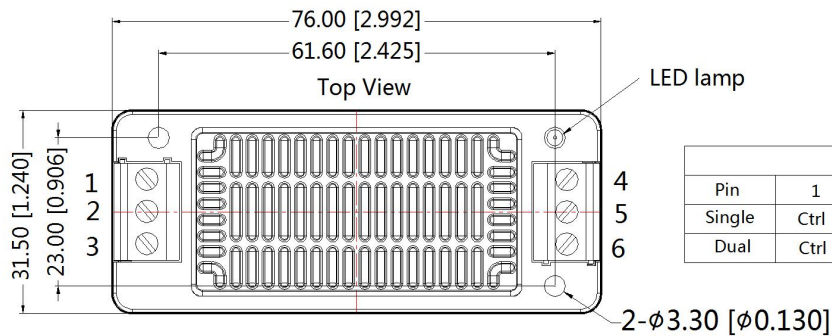


Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	Trim	0V	+Vo
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo

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

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

THIRD ANGLE PROJECTION

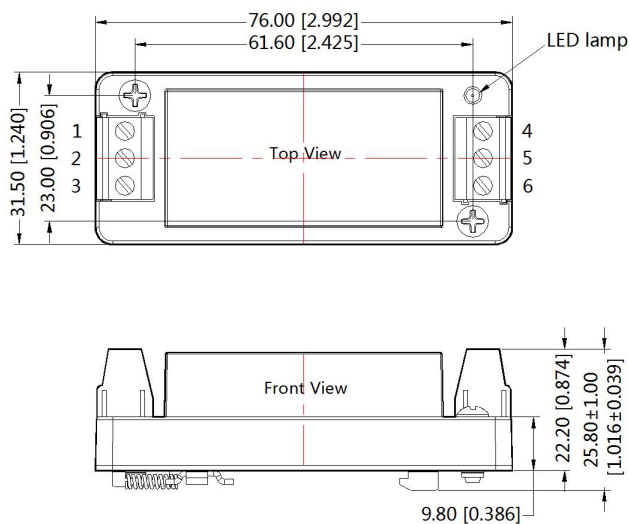


Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	Trim	0V	+Vo
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo

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

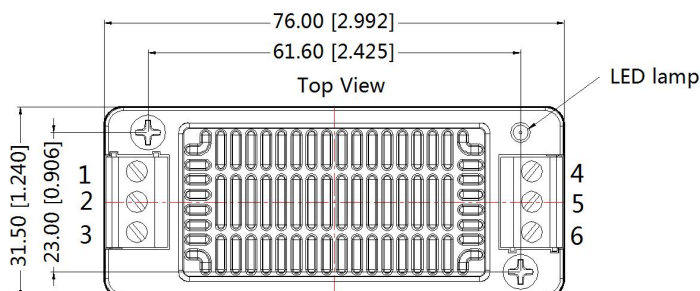


Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	Trim	0V	+Vo
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo

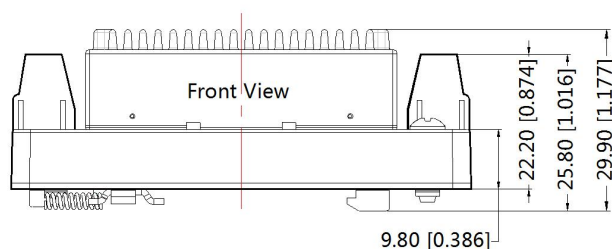
Note:
Unit: mm[inch]
Wire range: 24-12 AWG
Tightening torque: Max 0.4 N·m
General tolerances: ± 0.50 [± 0.020]

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: $\pm 1.00[\pm 0.039]$

Notes:

- 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;
- 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's 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.

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 Fax: 86-20-38601272 E-mail: sales@mornsun.cn www.mornsun-power.com