

20W, Ultra wide input isolated & regulated dual / single output DC/DC converter



FEATURES

- Wide range of input voltage (4:1)
- Efficiency up to 90%
- No-load power consumption as low as 0.15W
- Isolation voltage : 1500VDC
- Operating temperature range: -40°C to +85°C
- Input under-voltage protection, output short circuit protection, over-voltage protection, Over-current protection
- Meet CISPR22/EN55022 CLASS A
- Six-sided metal shielding package
- A2S (wring mounting) and A4S (35mm rail mounting) products featuring reverse polarity protection for input
- Meet UL60950 , EN60950 and IEC60950



URA_LD-20WR3 & URB_LD-20WR3 series are applied to wide voltage range input situation such as data transmission device, battery power supply device, tele-communication device, distributed power supply system, remote control system, industrial robot system etc.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency ③ (%Min./Typ.) @ Full Load	Max. Capacitive Load ④ (μF)
		Nominal (Range)	Max. ②	Output Voltage (VDC)	Output Current (mA)(Max./Min.)		
UL/CE/CB	URA2405LD-20WR3	24 (9-36)	40	±5	±2000/±100	84/86	4800
	URA2409LD-20WR3			±9	±1111/±56	86/88	1000
	URA2412LD-20WR3			±12	±834/±42	86/88	800
	URA2415LD-20WR3			±15	±667/±33	86/88	625
	URB2403LD-20WR3			3.3	5000/250	84/86	10000
	URB2405LD-20WR3			5	4000/200	88/90	10000
	URB2409LD-20WR3			9	2222/111	87/89	4700
	URB2412LD-20WR3			12	1667/84	87/89	1600
	URB2415LD-20WR3			15	1333/67	88/90	1000
	URB2424LD-20WR3			24	834/42	88/90	500
	--			URA4805LD-20WR3	48 (18-75)	80	±5
URA4812LD-20WR3		±12	±834/±42	86/88			800
URA4815LD-20WR3		±15	±667/±33	87/89			625
URB4803LD-20WR3		3.3	5000/250	84/86			10000
URB4805LD-20WR3		5	4000/200	88/90			10000
UL/CE/CB	URB4809LD-20WR3			9	2222/111	87/89	4700
	URB4812LD-20WR3			12	1667/84	87/89	1600
	URB4815LD-20WR3			15	1333/67	88/90	1000
	URB4824LD-20WR3			24	834/42	88/90	500

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-20WHR3A2S is chassis mounting of with heat sink, URB2405LD-20WR3A4S 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 Absolute maximum rating without damage on the converter, but it isn't recommended;
 ③ 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;
 ④ 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	3.3V output	--	799/40	818/45	mA
		5V output	--	926/40	947/45	
		Others	--	926/6	941/10	
	48VDC input	3.3V output	--	400/20	409/25	
		5V output	--	463/20	473/25	
		Others	--	463/5	463/9	
Reflected Ripple Current	24VDC input		--	30	--	
	48VDC input		--	30	--	
Input impulse Voltage (1sec. max.)	24VDC input		-0.7	--	50	
	48VDC input		-0.7	--	100	
Starting Voltage	24VDC input		--	--	9	VDC
	48VDC input		--	--	18	
Under Voltage Shutdown	24VDC input		5.5	6.5	--	
	48VDC input		14.0	15.5	--	
Starting Time	Nominal input& constant resistance load		--	10	--	ms
Input Filter	Pi filter					
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		--	4	7	Ma
Hot Plug	Unavailable					

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

Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy	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	10%-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% to 100% load		--	--	±5	
Transient Recovery Time			--	300	500	μs
Transient Response Deviation	25% load step change	3.3V/5V/±5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Drift Coefficient	Full load		--	--	±0.03	%/°C
Ripple & Noise	20MHz bandwidth		--	50	100	Mv p-p
Trim			--	±10	--	%Vo
Over-voltage Protection	Input voltage range		110	--	160	
Over-current Protection			110	--	190	
Short circuit Protection			Hiccup, Continuous, self-recovery			

Note: *Ripple 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	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	URB2424LD-20WR3	--	2050	--
		Others	--	1050	--
Operating Temperature	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	°C
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	270	--	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	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 26.00g/48.00g/68.00g(Typ.)
	with heat sink	Horizontal package/A2S wiring package/A4S rail package 34.00g/56.00g/76.00g(Typ.)
Cooling Method	Free air convection	

EMC Specifications

EMI	CE	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)
	RE	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② 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	IEC/EN61000-4-4 ±2KV (see Fig.3-① for recommended circuit) perf. Criteria B
	Surge	IEC/EN61000-4-5 ±2KV (see Fig.3-① for recommended circuit) perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s perf. Criteria A
	Immunities of voltage dip, drop and short interruption	IEC/EN61000-4-29 0-70% perf. Criteria B

Product Characteristic Curve

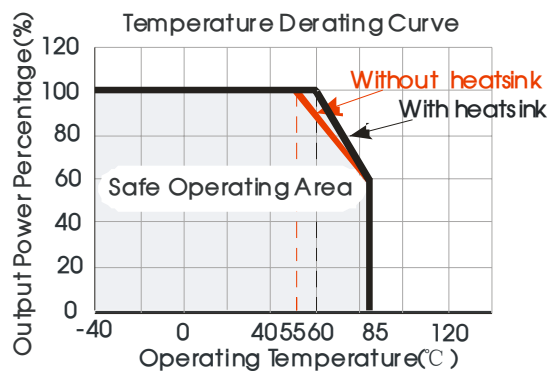
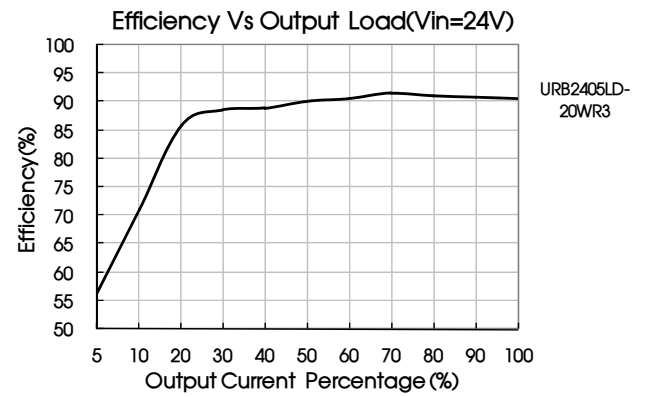
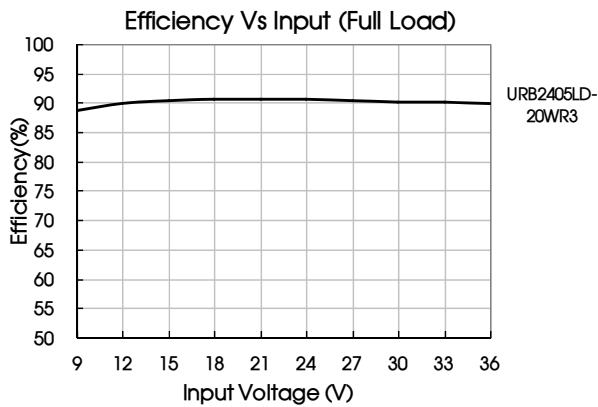
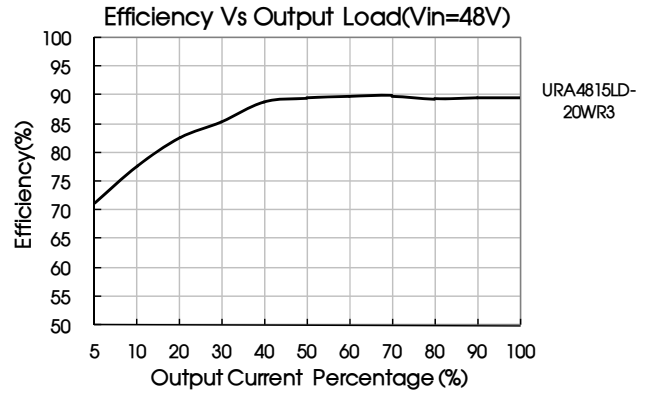
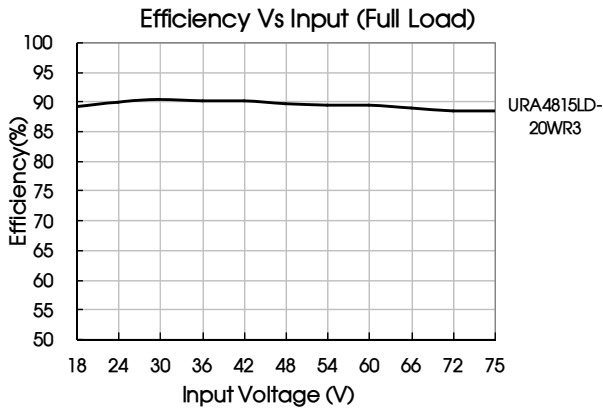


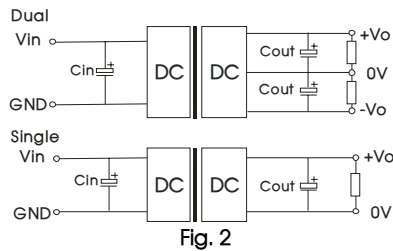
Fig. 1



Design Reference

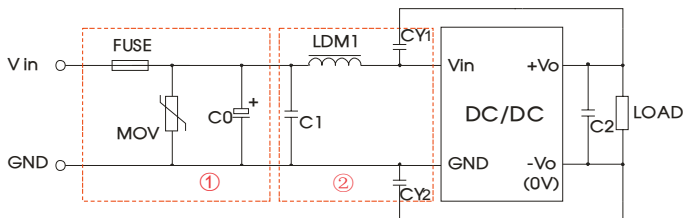
1. Typical application

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.



Single Vout (VDC)	Cout (μ F)	Cin (μ F)	Dual Vout (VDC)	Cout (μ F)	Cin (μ F)
3.3/5	470	100	± 5	220	100
9/12/15	220		$\pm 9/\pm 12/\pm 15$	100	
24	100		--	--	

2. EMC solution-recommended circuit



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	
MOV	S14K35	S14K60
C0	330 μ F/50V	330 μ F/100V
C1	1 μ F/50V	1 μ F/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7 μ H	
CY1/ CY2	1nF/2KV	

EMC solution-recommended circuit PCB layout

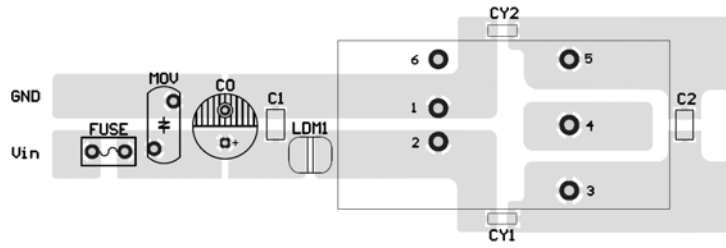
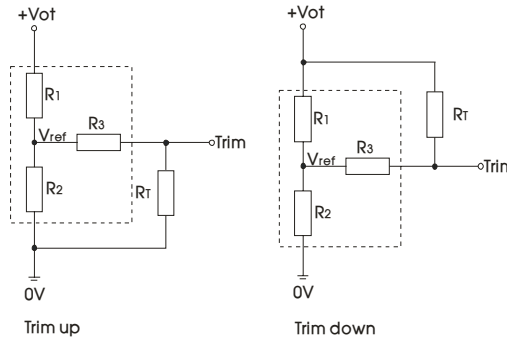


Fig. 4

Note: the min. distance of the bonding pads between input & output isolation capacitors (CY1/CY2) shall be ≥ 2mm.

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:

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

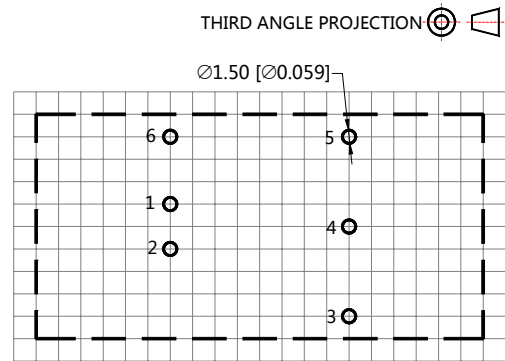
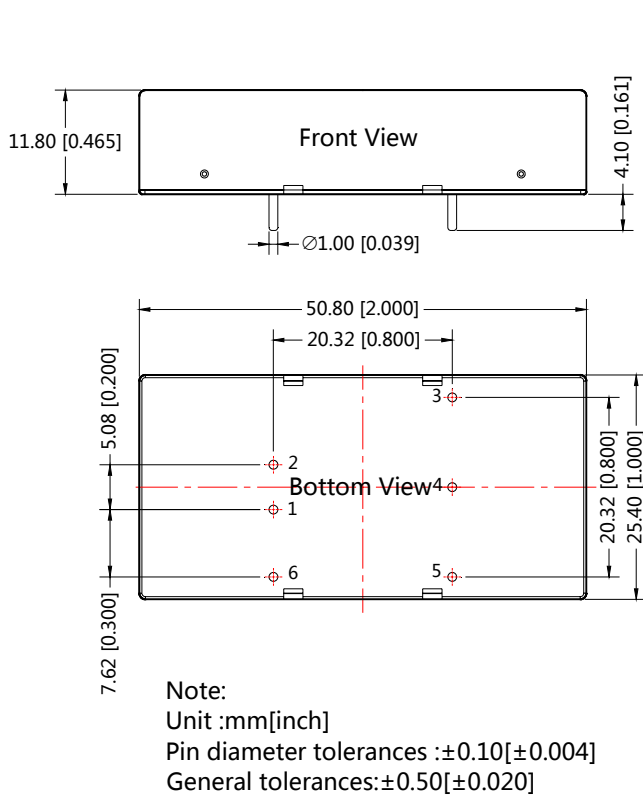
R_T is Trim resistance
 α is a self-defined parameter, with no real meaning.

Vout(V)	R1(K Ω)	R2(K Ω)	R3(K Ω)	Vref(V)
3.3	4.801	2.87	12.4	1.25
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

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

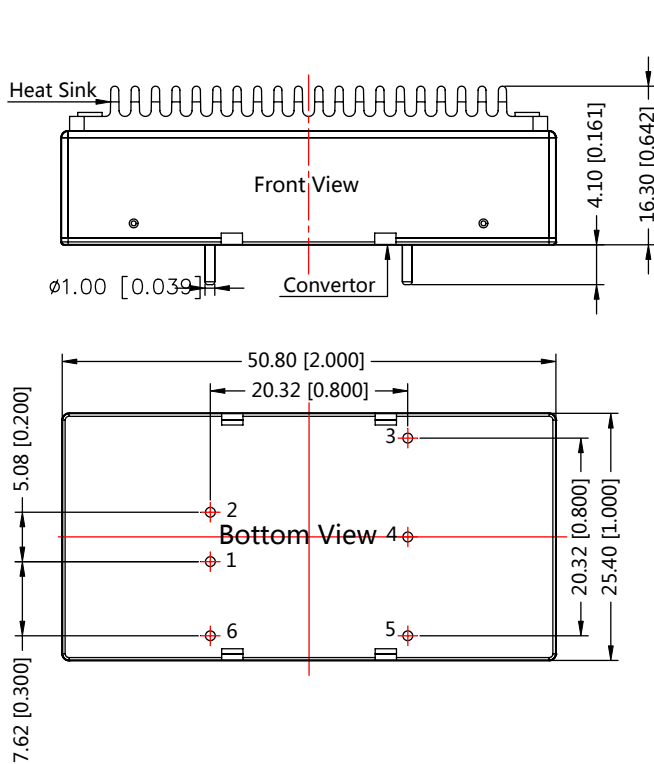
5. For more information please find DC-DC converter application notes on www.mornsun-power.com

Horizontal Package (without heat sink) Dimensions and Recommended Layout



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

Horizontal Package (with heat sink) Dimensions



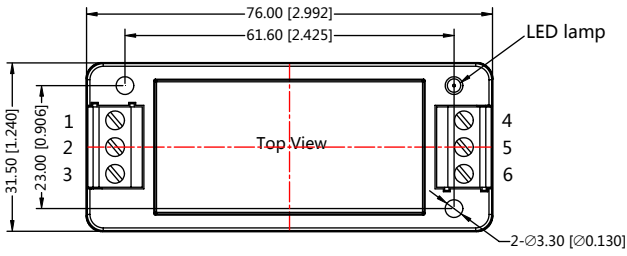
THIRD ANGLE PROJECTION

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

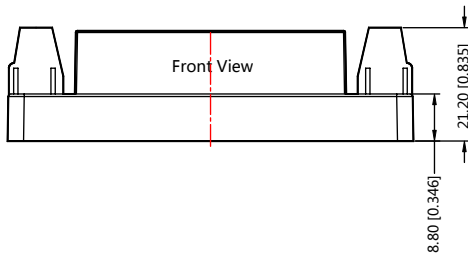
Note:
Unit :mm[inch]
General tolerances:±0.50[±0.020]
If use heatsinks,make sure there is enough space for a special size in ther above graph

URA_LD-20WR3A2S & URB_LD-20WR3A2S(without heat sink) Dimensions

THIRD ANGLE PROJECTION



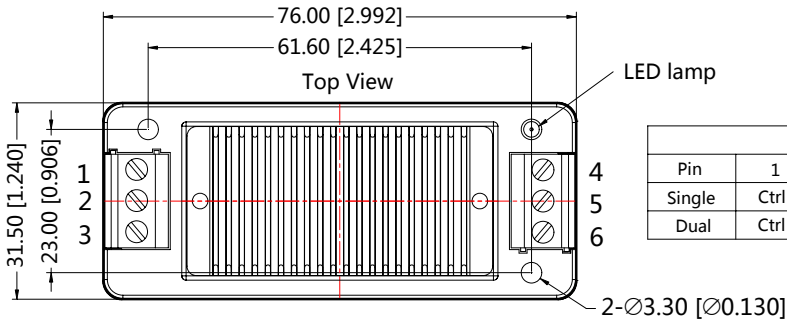
Pin-Out						
Pin	1	2	3	4	5	6
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo
Single	Ctrl	GND	Vin	0V	Trim	+Vo



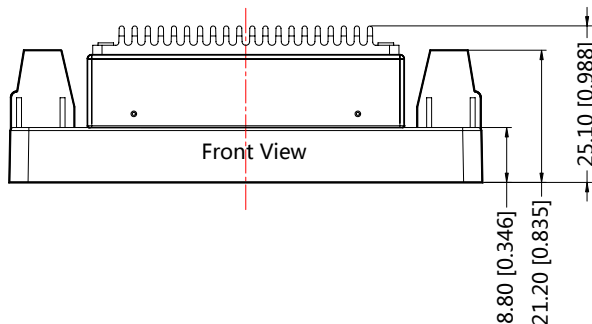
Note:
 Unit:mm[inch]
 Wire range : 24~12 AWG
 General tolerances:±0.50[±0.020]

URA_LD-20WHR3A2S & URB_LD-20WHR3A2S(with heat sink) Dimensions

THIRD ANGLE PROJECTION



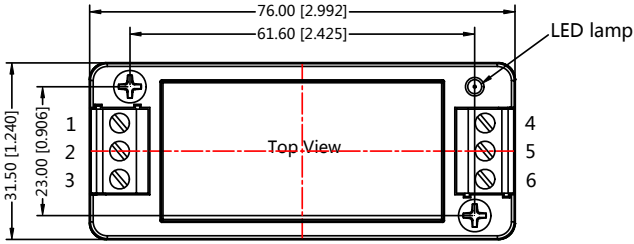
Pin-Out						
Pin	1	2	3	4	5	6
Single	Ctrl	GND	Vin	0V	Trim	+Vo
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo



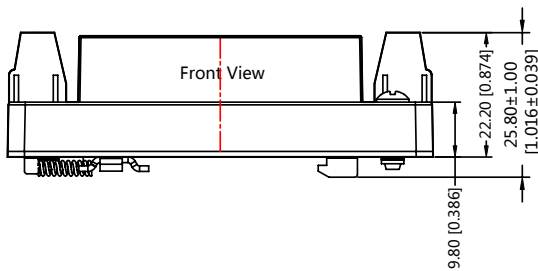
Note:
 Unit:mm[inch]
 Wire range:24~12 AWG
 General tolerances:±0.50[±0.020]

URA_LD-20WR3A4S & URB_LD-20WR3A4S(without heat sink) Dimensions

THIRD ANGLE PROJECTION 



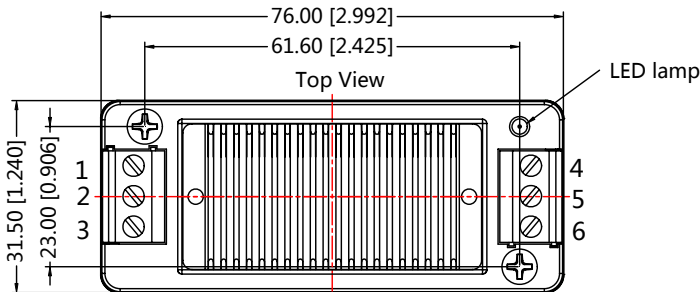
Pin-Out						
Pin	1	2	3	4	5	6
Dual	Ctrl	GND	Vin	-Vo	0V	+Vo
Single	Ctrl	GND	Vin	0V	Trim	+Vo



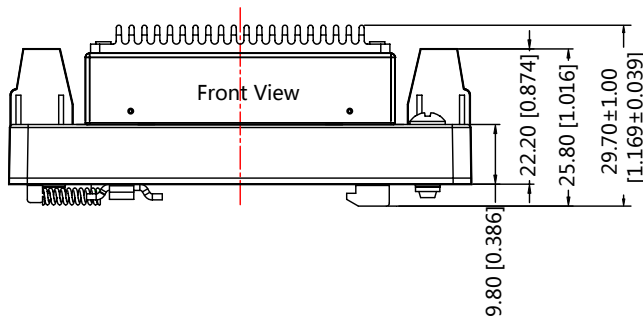
Note:
 Unit:mm[inch]
 Wire range : 24~12 AWG
 General tolerances:±0.50[±0.020]

URA_LD-20WHR3A4S & URB_LD-20WHR3A4S(with heat sink) Dimensions

THIRD ANGLE PROJECTION 



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



Note:
 Unit:mm[inch]
 Wire range:24~12 AWG
 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. The Packing bag number of Horizontal package :58200035(without heat sink), 58200051(with heat sink, A2S/ A4S package number: 58220022;
2. Recommended used in more than 5% load, if the load is lower than 5%, then the ripple index of the product may exceed the specification, but does not affect the reliability of the product;
3. The unbalance degree of the recommended dual output module load: $\leq 5\%$; if the degree exceeds $\pm 5\%$, 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;
4. The max. capacitive load should be tested within the input voltage range and under full load conditions;
5. Unless otherwise specified, data in this datasheet should be tested under the conditions of $T_a=25^\circ\text{C}$, humidity $<75\%$ when inputting nominal voltage and outputting rated load;
6. All index testing methods in this datasheet are based on our Company's corporate standards;
7. 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;
8. We can provide product customization service;
9. Specifications of this product are subject to changes without prior notice.

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