

6W, ultra wide input isolated & regulated dual / single output DC-DC converter



### FEATURES

- Ultra wide input voltage range (4:1)
- High efficiency up to 86%
- Isolation voltage: 2.25K VDC
- Operating temperature range: -40°C to +85°C
- Input Under-voltage Protection, Output short circuit, over-current, over-voltage protection
- Low ripple & noise
- Reverse voltage protection available with A2S(Chassis mounting) or A4S(35mm DIN-Rail mounting)
- EN62368 approval (URA1D\_YMD-6WR3)
- EN60950 approval (URB1D\_YMD-6WR3)
- Meets requirements of railway standard EN50155 (URB1D\_YMD-6WR3)
- International standard pin-out

URA1D\_YMD-6WR3 & URB1D\_YMD-6WR3 series are isolated 6W DC-DC products with 40-160VDC input voltage. They feature efficiency up to 86%, 2250VDC isolation, operating temperature of -40 °C to +85 °C, Input Under-voltage Protection, Output short circuit, over-current, over-voltage protection. Railway vehicle electronic equipment widely used in 72V, 96V and 110V.

### Selection Guide

certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency <sup>③</sup> (%Min./Typ.) @ Full Load	Max. Capacitive Load(μF)
		Nominal (Range)	Max. <sup>②</sup>	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
CE	URA1D05YMD-6WR3	110 (40-160)	170	±5	±600/0	78/80	470
	URA1D12YMD-6WR3			±12	±250/0	82/84	100
	URA1D15YMD-6WR3			±15	±200/0	83/85	100
CE	URB1D05YMD-6WR3			5	1200/0	78/80	1000
	URB1D12YMD-6WR3			12	500/0	82/84	470
	URB1D15YMD-6WR3			15	400/0	83/85	220
	URB1D24YMD-6WR3	24	250/0	84/86	100		

Note:  
 ①Series with suffix "H" are heat sink mounting; series with suffix "A2S" are chassis mounting, with suffix "A4S" are DIN-Rail mounting, for example URB1D05YMD-6WHR3A2S is chassis mounting of with heat sink, URB1D05YMD-6WR3A4S 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;  
 ②Absolute maximum rating without damage on the converter, but it isn't recommended;  
 ③Efficiency 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.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	Nominal input voltage	--	68/3	70/8	mA
Reflected Ripple Current	Nominal input voltage	--	25	--	
Surge Voltage (1sec. max.)		-0.7	--	180	VDC
Starting Voltage		--	--	40	
Shutdown Voltage		28	33	--	
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	--	3	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 <sup>①</sup>			--	±1	±3			
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 <sup>②</sup>	0%-100% load	URB1D_YMD-6WR3	--	±0.5	±1			
	5%-100% load	URA1D_YMD-6WR3 Positive output		±0.5	±1			
		URA1D_YMD-6WR3 Negative output		±0.5	±1.5			
Cross Regulation	Dual output, main circuit with 50% load, auxiliary circuit with 25% -100% load		--	--	±10			
Transient Recovery Time	25% load step change, nominal input voltage		--	300	500	μs		
Transient Response Deviation	25% load step change, nominal input voltage		5V /±5 output		--	±3	±8	%
			Others		--	±3	±5	
Temperature Coefficient	Full load		--	±0.02	±0.03	%/°C		
Ripple & Noise <sup>③</sup>	20MHz bandwidth , 5%-100% load		--	50	100	mV p-p		
Over-voltage Protection	Input voltage range		110	--	160	%Vo		
Over-current Protection			120	--	210	%Io		
Short circuit Protection			Continuous, self-recovery					

Note: ①At 0%-5% load, the Max. output voltage accuracy of ±5VDC output converter negative output is ±5%;  
 ②When testing from 0% to 100% load working conditions, load regulation of URA1D\_YMD-6WR3 series index of ±5%;  
 ③Ripple and noise tested with "parallel cable" method, please see DC-DC Converter Application Notes for specific operation methods. 0%-5% load ripple&Noise is no more than 5%Vo.

### 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.		2250	--	--	VDC
	Input and output respectively on the shell, with the test time of 1 minute and the leak current lower than 1mA.		1600	--	--	
Insulation Resistance	Input-output, isolation voltage 500VDC		1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V		--	1000	--	pF
Operating Temperature	see Fig.1		-40	--	+85	°C
Storage Temperature			-55	--	+125	
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds.		--	--	+300	
Storage Humidity	Non-condensing		5	--	95	%RH
Vibration			IEC61373 car body 1 B mold			
Switching Frequency *	PWM Mode		--	300	--	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				
Dimensions	Horizontal package( without heat sink)			25.40*25.40*11.70 mm	
	Horizontal package( with heat sink)			25.40*25.40*16.20 mm	
	A2S wiring package ( without heat sink)			76.00*31.50*21.20 mm	
	A2S wiring package( with heat sink)			76.00*31.50*25.20 mm	
	A4S rail package( without heat sink)			76.00*31.50*25.80 mm	
	A4S rail package( with heat sink)			76.00*31.50*29.80 mm	
Weight	without heat sink	Horizontal package/A2S wiring package/A4S rail package			15g/35g/54g(Typ.)
	with heat sink	Horizontal package/A2S wiring package/A4S rail package			20g/40g/59g(Typ.)
Cooling Methods	Free air convection				

EMC Specifications

EMI	CE	CISPR32/EN55032	CLASS B (see Fig.3 or Fig.4-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS B (see Fig.3 or Fig.4-② for recommended circuit)	
EMS	ESD	IEC/EN61000-4-2	Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	IEC/EN61000-4-3	20V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±4KV(see Fig.3 or Fig.4-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2KV (2Ω 18uF see Fig.3 for recommended circuit) line to ground ±4KV (12Ω 9uF see Fig.3 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

EMC Specifications (EN50155)

EMI	CE	EN50121-3-2	150kHz-500kHz 99dBuV 500kHz-30MHz 93dBuV	
	RE	EN50121-3-2	30MHz-230MHz 40dBuV/m at 10m 230MHz-1GHz 47dBuV/m at 10m	
EMS	ESD	EN50121-3-2	Contact ±6KV/Air ±8KV	perf. Criteria B
	RS	EN50121-3-2	20V/m	perf. Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz	perf. Criteria A
	Surge	EN50121-3-2	line to line ±1KV (42Ω, 0.5 μ F) line to ground ±2KV (42Ω, 0.5 μ F)	perf. Criteria B
	CS	EN50121-3-2	0.15MHz-80MHz 10Vr.m.s	perf. Criteria A

Note:All the tests are testing under the conditions of inputs capacitor 100uF/200V or FC-C01D.

Product Characteristic Curve

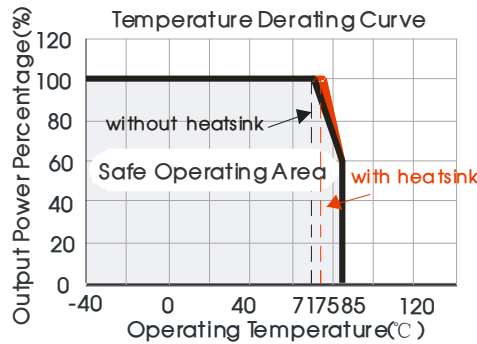
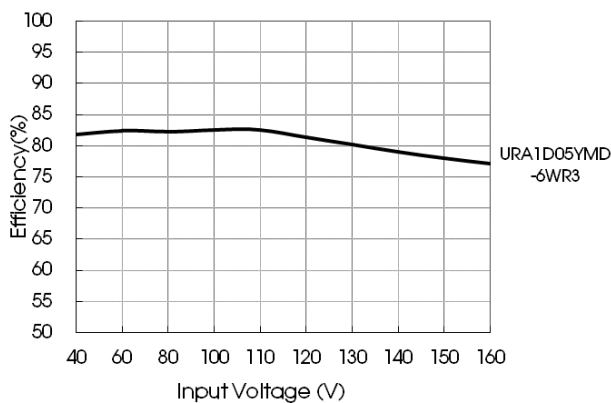
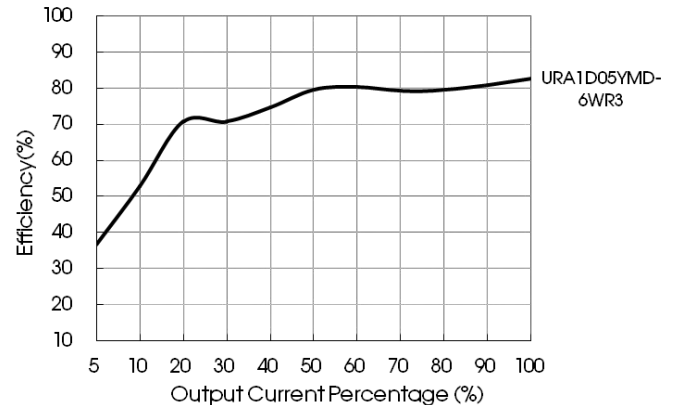


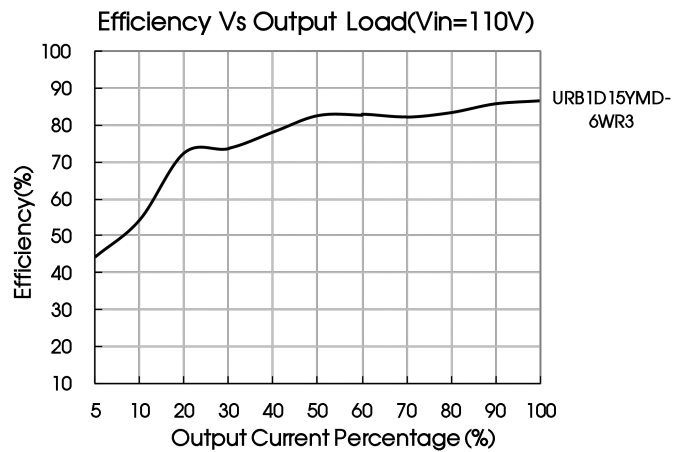
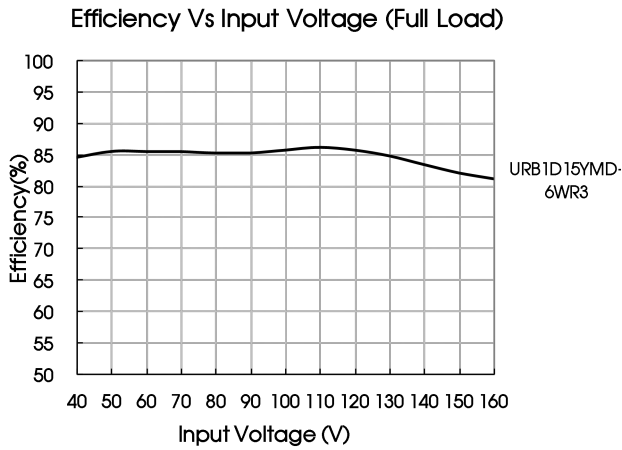
Fig. 1

Efficiency Vs Input Voltage (Full Load)



Efficiency Vs Output Load (Vin=110V)





## 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 a further decrease of the input and output ripple is required, properly increase the input & output of additional capacitors  $C_{in}$  and  $C_{out}$  or select capacitors of low equivalent impedance, and ensure the capacitance should be lower than the max. capacitive load of the product.

#### Dual Output



#### Single Output



Fig. 2

$C_{in}$	$C_{out}$
10 $\mu$ F -47 $\mu$ F	10 $\mu$ F

### 2. EMC solution-recommended circuit

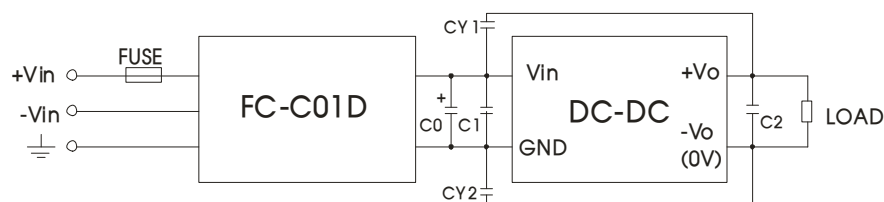


Fig. 3

Fig.3 Parameter description:

FUSE	Choose according to actual input current
FC-C01D	FC-CX1D is the EMC auxiliary component of our company. Input voltage range: 40V-160V
C0	100 $\mu$ F/200V
C1	Refer to the $C_{in}$ in Fig.2
C2	Refer to the $C_{out}$ in Fig.2
CY1、CY2	1nF /3KV

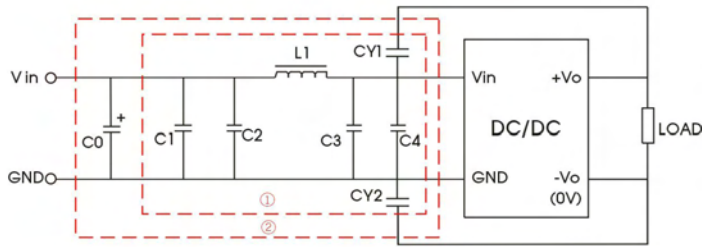


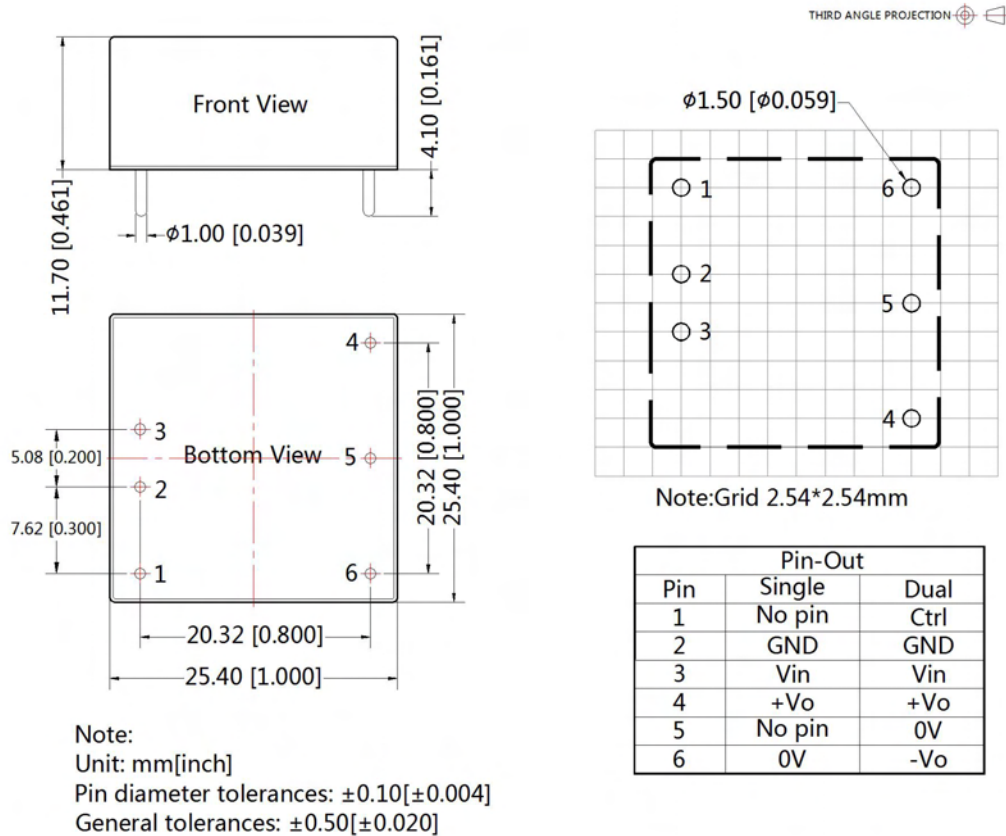
Fig. 4

Fig. 4 Parameter description:

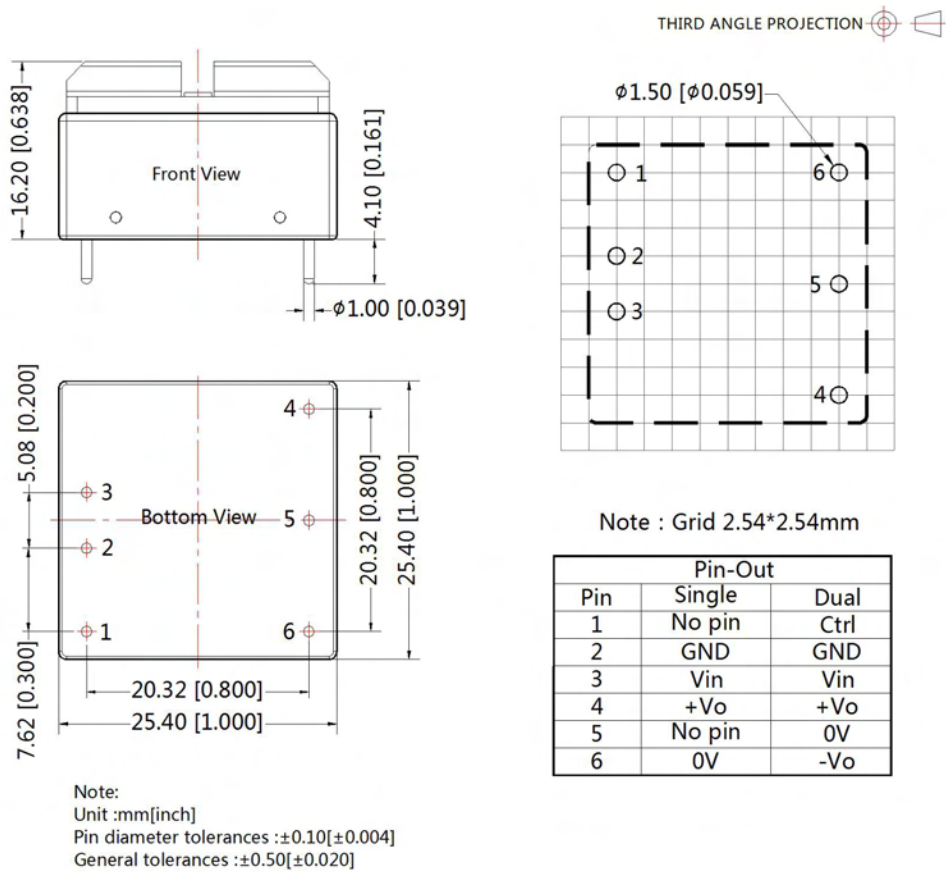
C0	100uF/200V
C1、C2、C3、C4	0.22uF/250V
L1	68 μ H
CY1、CY2	1nF/3KV

- It is not allowed to connect modules output in parallel to enlarge the power
- For more information about Mornsun EMC Filter products, please visit [www.mornsun-power.com](http://www.mornsun-power.com) to download the Selection Guide of EMC Filter

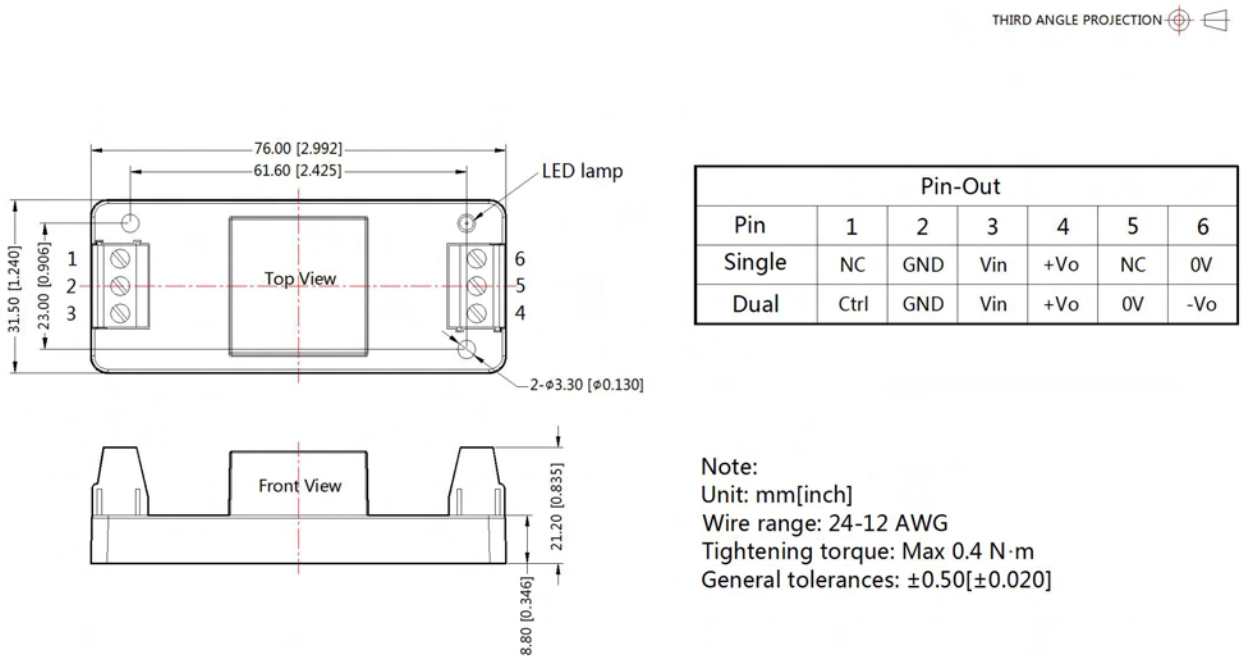
### Horizontal Package (without heat sink) Dimensions and Recommended Layout



Horizontal Package (with heat sink) Dimensions

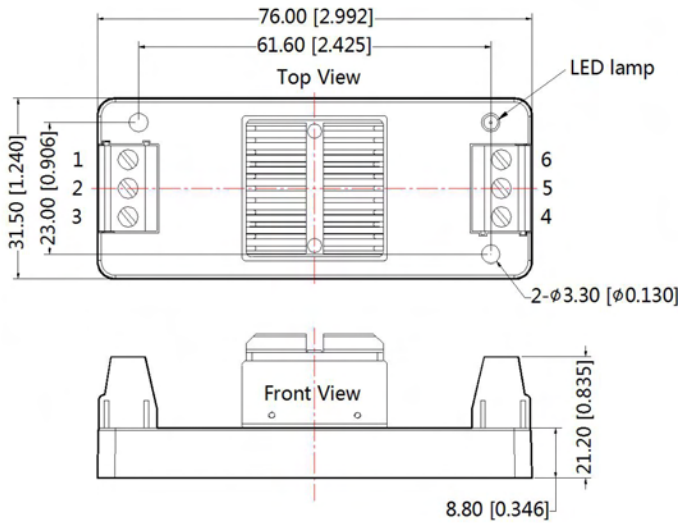


URA1D\_YMD-6WR3A2S & URB1D\_YMD-6WR3A2S (without heat sink) Dimensions



URA1D\_YMD-6WHR3A2S & URB1D\_YMD-6WHR3A2S (with heat sink) Dimensions

THIRD ANGLE PROJECTION

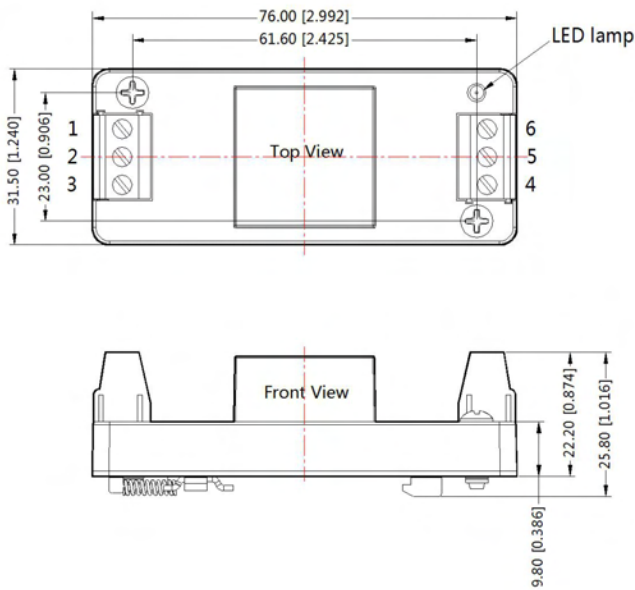


Pin-Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V
Dual	Ctrl	GND	Vin	+Vo	0V	-Vo

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

URA1D\_YMD-6WR3A4S & URB1D\_YMD-6WR3A4S (without heat sink) Dimensions

THIRD ANGLE PROJECTION

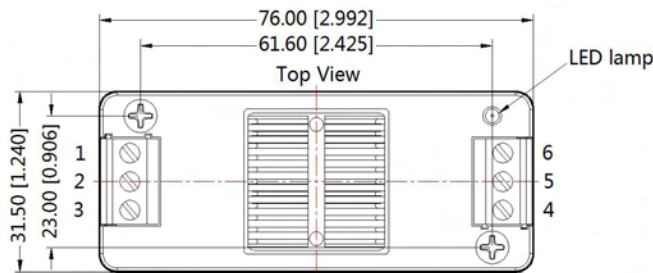


Pin-Out						
Pin	1	2	3	4	5	6
Single	NC	GND	Vin	+Vo	NC	0V
Dual	Ctrl	GND	Vin	+Vo	0V	-Vo

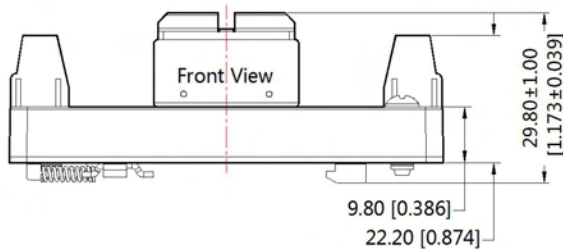
Note:  
 Unit: mm[inch]  
 Mounting rail: TS35  
 Wire range: 24-12 AWG  
 Tightening torque: Max 0.4 N·m  
 General tolerances: ±1.00[±0.039]

URA1D\_YMD-6WHR3A4S & URB1D\_YMD-6WHR3A4S(with heat sink) Dimensions

THIRD ANGLE PROJECTION 



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

Note:

1. Packing information please refer to Product Packing Information which can be downloaded from [www.mornsun-power.com](http://www.mornsun-power.com). The Packing bag number of Horizontal package :58210003(without heat sink), 58200048(with heat sink, A2S/ A4S package 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. Other product application information, please see DC-DC (railway power supply) Converter Application Notes for specific operation methods--2016 Edition.
5. All index testing methods in this datasheet are based on Company's corporate standards;
6. We can provide product customization service, please contact our technicians directly for specific information;
7. Products are related to laws and regulations: see "Features" and "EMC";
8. 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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