

6W Isolated DC-DC converter in YMD package  
Ultra-wide input and regulated dual/single output



Patent Protection

UL60950-1    EN62368-1    BS EN62368-1    IEC60950-1

URA\_YMD-6WR3 & URB\_YMD-6WR3 series are isolated 6W DC-DC converter products with 4:1 input voltage range. They feature efficiencies up to 88%, 1500VDC input to output isolation and the converter safely operate ambient temperature of -40°C to +85°C, input under-voltage protection, output short-circuit, over-current, over-voltage 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, which make them widely applied in medical care, industrial control, electric power, instruments and communication and railway fields.

### FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 88%
- No-load power consumption as low as 0.12W
- I/O test isolation voltage: 1.5k VDC
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Operating ambient temperature range: -40°C to +85°C
- Meet CISPR32/EN55032 CLASS A, without extra components
- Input reverse polarity protection available with chassis(A2S ) or Din-Rail mounting (A4S) version
- Industry standard pin-out

### Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Full Load Efficiency <sup>④</sup> (%) Min./Typ.	Capacitive Load <sup>⑤</sup> (μF)Max.
		Nominal <sup>②</sup> (Range)	Max. <sup>③</sup>	Voltage (VDC)	Current (mA) Max./Min.		
UL/EN/BS EN/IEC	URA2405YMD-6WR3	24 (9-36)	40	±5	±600/0	81/83	470
	URA2412YMD-6WR3			±12	±250/0	84/87	100
	URA2415YMD-6WR3			±15	±200/0	83/85	100
	URA2424YMD-6WR3			±24	±125/0	85/87	100
	URB2403YMD-6WR3			3.3	1500/0	75/77	1800
	URB2405YMD-6WR3			5	1200/0	79/82	1000
	URB2409YMD-6WR3			9	667/0	82/84	680
	URB2412YMD-6WR3			12	500/0	83/85	470
	URB2415YMD-6WR3			15	400/0	84/86	220
	URB2424YMD-6WR3			24	250/0	84/86	100
	URA4805YMD-6WR3	48 (18-75)	80	±5	±600/0	81/83	470
	URA4812YMD-6WR3			±12	±250/0	85/87	100
	URA4815YMD-6WR3			±15	±200/0	86/88	100
	URB4803YMD-6WR3			3.3	1500/0	77/79	1800
	URB4805YMD-6WR3			5	1200/0	81/83	1000
	URB4812YMD-6WR3			12	500/0	85/87	470
	URB4815YMD-6WR3			15	400/0	86/88	220
	URB4824YMD-6WR3			24	250/0	86/88	100

Notes:  
 ① Use "A2S" suffix for chassis mounting and "A4S" suffix for Din-Rail mounting;  
 ② The A2S and A4S Model's start-up and minimum input voltages are increased by 1VDC due to the input reverse polarity protection circuit;  
 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 Vo1 and Vo2 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	--	268/5	275/12	mA
		Others	--	301/5	312/12	
	48VDC nominal input series, nominal input voltage	3.3V output	--	130/4	134/8	
		Others	--	150/4	155/8	
Reflected Ripple Current	Nominal input voltage	--	20	--		
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		
Input Under-voltage Protection	24VDC nominal input series	5.5	6.5	--		
	48VDC nominal input series	12	15.5	--		
Input Filter		Pi filter				
Hot Plug		Unavailable				

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy	0% - 100% load	Vo1	--	±1	±3	%
		Vo2	--	±3	±5	
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2	±0.5	
		Vo2	--	±0.5	±1	
Load Regulation <sup>①</sup>	5% - 100% load	Vo1	--	±0.5	±1	
		Vo2	--	±0.5	±1.5	
Cross Regulation	Dual outputs, 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 <sup>②</sup>	20MHz bandwidth, 5% - 100% load	--	60	85	mV p-p	
Over-voltage Protection		110	--	160	%Vo	
Over-current Protection	Input voltage range	110	140	190	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note: ①Load regulation for 0%-100% load is ±5%;  
②Under 0% -5% load conditions, ripple & noise does not exceed 5%Vo. The "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	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100kHz/0.1V	--	1000	--	pF
Operating Temperature	See Fig. 1	-40	--	+85	°C
Storage Humidity	Non-condensing	5	--	95	%RH
Storage Temperature		-55	--	+125	°C
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	+300	
Vibration		IEC/EN61373 - Category 1, Grade B			
Switching Frequency *	PWM mode	--	300	--	kHz
MTBF	MIL-HDBK-217F@25°C	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	25.40 x 25.40 x 11.70 mm
	A2S chassis mounting	76.00 x 31.50 x 21.20 mm
	A4S DIN-rail mounting	76.00 x 31.50 x 25.80 mm
Weight	Horizontal package/A2S wiring package/A4S rail package 12.5g /36.0g /56.0g(Typ.)	
Cooling method	Free air convection	

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS A (without extra components)/ CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	CLASS A (without extra components)/ CLASS B (see Fig.3-② 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	IEC/EN61000-4-4	±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.3-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0%, 70%	perf. Criteria B

Electromagnetic Compatibility (EMC) (EN50155)

Emissions	CE	EN50121-3-2 150kHz-500kHz	99dBuV (see Fig.3-② for recommended circuit)
	RE	EN5016-2-1 500kHz-30MHz	93dBuV (see Fig.3-② for recommended circuit)
Immunity	ESD	EN50121-3-2	Contact ±6kV/Air ±8kV perf. Criteria A
	RS	EN50121-3-2	20V/m perf. Criteria A
	EFT	EN50121-3-2	±2kV 5/50ns 5kHz (see Fig.3-① for recommended circuit) perf. Criteria A
	Surge	EN50121-3-2	line to line ±1kV (42Ω, 0.5μF) (see Fig.3-① for recommended circuit) perf. Criteria A
	CS	EN50121-3-2	0.15MHz-80MHz 10V r.m.s perf. Criteria A

Typical Characteristic Curve

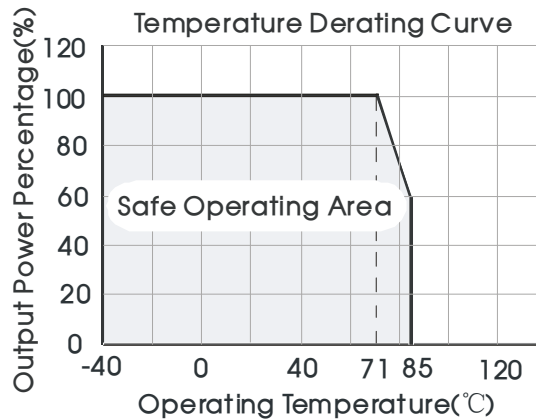
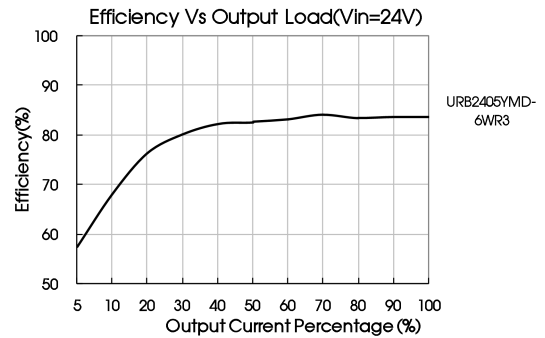
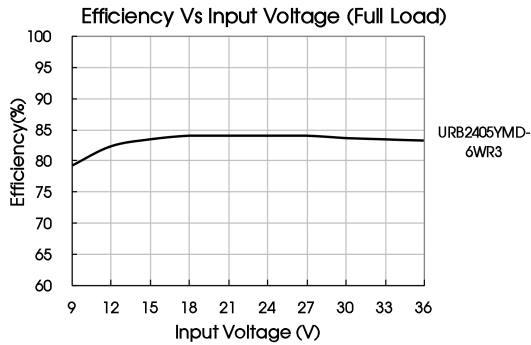
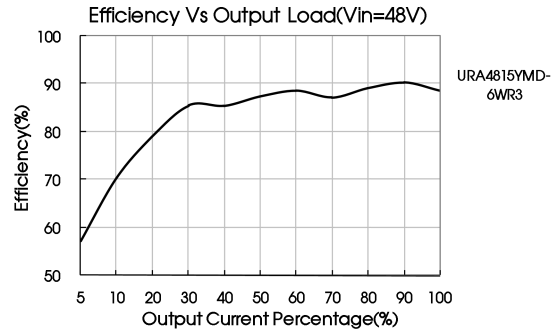
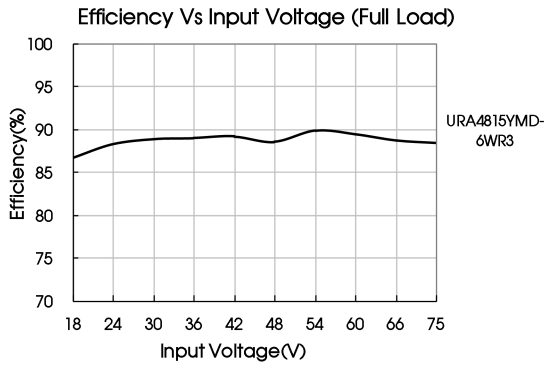


Fig. 1



## 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.

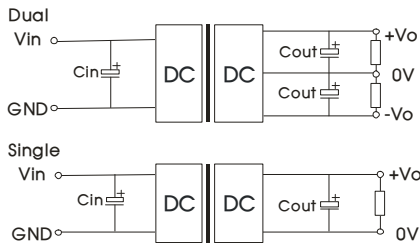


Fig. 2

Vin(VDC)	Cin	Cout
24	100 $\mu$ F/50V	10 $\mu$ F/50V
48	10 $\mu$ F- 47 $\mu$ F/100V	10 $\mu$ F/50V

### 2. EMC compliance circuit

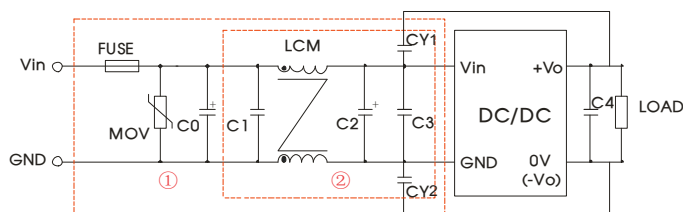


Fig. 3

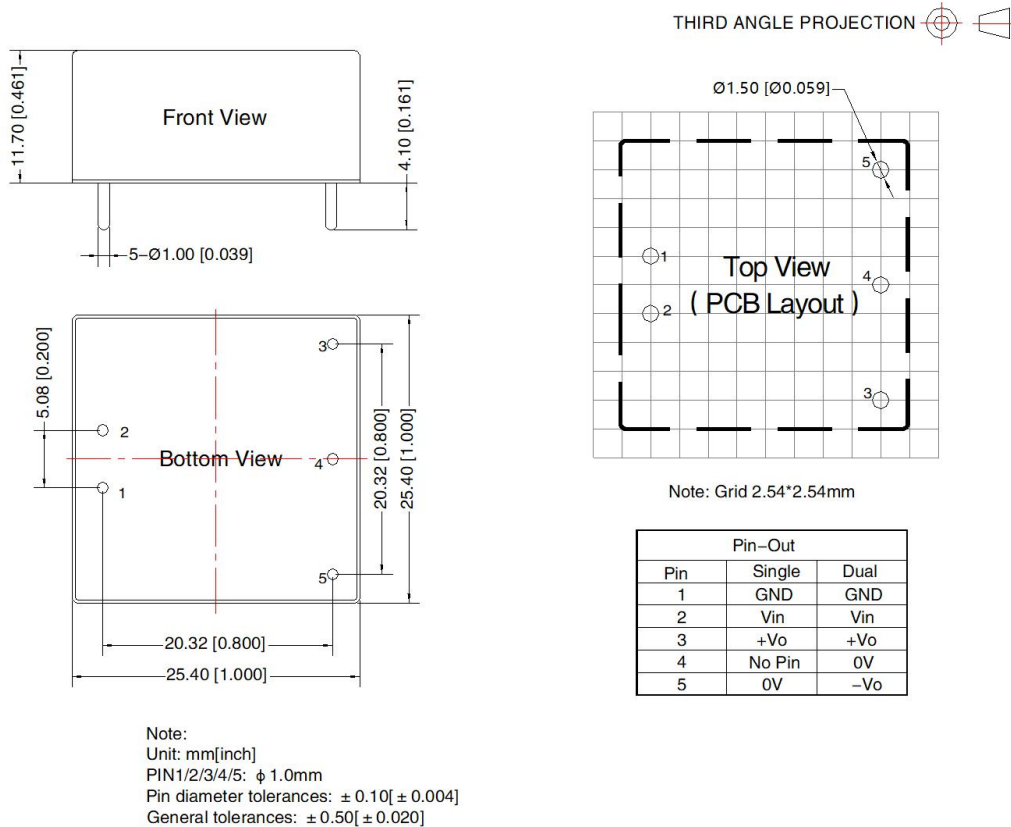
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

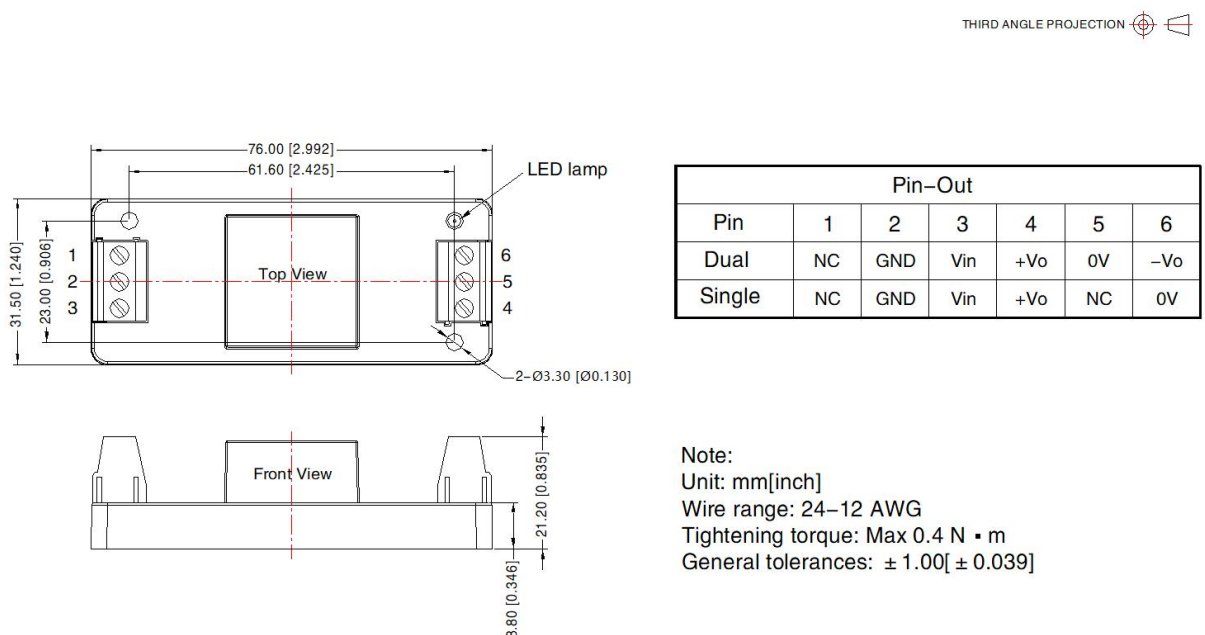
Model	Vin: 24VDC	Vin: 48VDC
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0	680 $\mu$ F/50V	680 $\mu$ F/100V
C1	1 $\mu$ F/50V	1 $\mu$ F/100V
C2	330 $\mu$ F/50V	330 $\mu$ F/100V
C3	4.7 $\mu$ F/50V	4.7 $\mu$ F/100V
C4	Refer to the Cout in Fig.2	
LCM	4.7mH	
CY1/CY2	1nF/2kV	

- 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](http://www.mornsun-power.com)

Dimensions and Recommended Layout

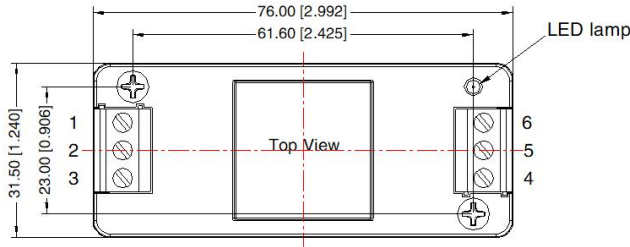


URA\_YMD-6WR3A2S & URB\_YMD-6WR3A2S Dimensions

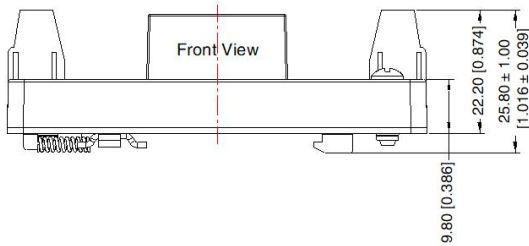


URA\_YMD-6WR3A4S & URB\_YMD-6WR3A4S Dimensions

THIRD ANGLE PROJECTION 



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



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:
- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58210003(DIP), 58220022(A2S/A4S package);
  - It is recommended that the load imbalance of the dual output is  $\leq \pm 5\%$ . If it exceeds  $\pm 5\%$ , the performance of the product cannot be guaranteed to meet as datasheet marked. For details, please contact our technical staff;
  - 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 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, Huangpu District, Guangzhou, P. R. China  
Tel: 86-20-38601850 Fax: 86-20-38601272 E-mail: [info@mornsun.cn](mailto:info@mornsun.cn) [www.mornsun-power.com](http://www.mornsun-power.com)