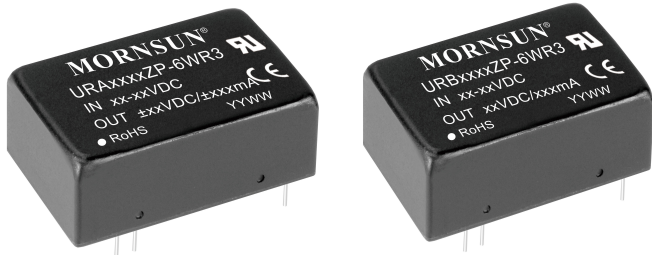


6W isolated DC-DC converter in DIP package  
Ultra-wide input and regulated dual/single output



FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 88%
- No-load power consumption as low as 0.12W
- I/O isolation test voltage 1.5K VDC
- Operating ambient temperature range: -40°C to +85°C
- Input under-voltage, output over-voltage, short-circuit, over-current protection
- Meets CISPR32/EN55032 CLASS A, without extra components
- Industry standard pin-out
- UL60950, EN60950, IEC60950 approved
- Meets EN50155 railway standard
- Meets EN62368 standard

URA\_ZP-6WR3 & URB\_ZP-6WR3 series of isolated 6W DC-DC converter products with an ultra-wide range of voltage input of 9-36VDC(24VDC input), 18-75VDC(48VDC input), input to output isolation is tested with 1500VDC, output over-voltage protection and output short-circuit protection. They meet CLASS A of CISPR32/EN55032 EMI standards without external components and they are widely used in fields such as industrial control, electric power, instruments, communication, and railway applications.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency <sup>②</sup> (%) Min./Typ.	Capacitive Load <sup>③</sup> (μF)Max.			
		Nominal (Range)	Max. <sup>①</sup>	Voltage (VDC)	Current (mA) Max./Min.					
UL/CE/CB	URA2405ZP-6WR3	24 (9-36)	40	±5	±600/0	81/83	680			
	URA2409ZP-6WR3			±9	±333/0	84/86	220			
	URA2412ZP-6WR3			±12	±250/0	85/87	330			
	URA2415ZP-6WR3			±15	±200/0	86/88	220			
	URA2424ZP-6WR3			±24	±125/0	85/87	100			
	URB2403ZP-6WR3			3.3	1500/0	77/79	1800			
	URB2405ZP-6WR3			5	1200/0	81/83	1000			
	URB2409ZP-6WR3			9	667/0	82/84	1000			
	URB2412ZP-6WR3			12	500/0	85/87	470			
	URB2415ZP-6WR3			15	400/0	86/88	220			
	URB2424ZP-6WR3			24	250/0	85/87	100			
	--			URA4805ZP-6WR3	48 (18-75)	80	±5	±600/0	81/83	680
URA4812ZP-6WR3		±12	±250/0	85/87			330			
URA4815ZP-6WR3		±15	±200/0	86/88			220			
URB4803ZP-6WR3		3.3	1500/0	78/80			1800			
URB4805ZP-6WR3		5	1200/0	82/84			1000			
URB4809ZP-6WR3		9	667/0	83/85			680			
UL/CE/CB		URB4812ZP-6WR3					12	500/0	85/87	470
		URB4815ZP-6WR3					15	400/0	86/88	220
		URB4824ZP-6WR3					24	250/0	85/87	100

Notes:  
 ① Exceeding the maximum input voltage may cause permanent damage;  
 ② Efficiency is measured at nominal input voltage and rated output load;  
 ③ The specified maximum capacitive load for positive and negative output is identical.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	--	316/5	325/12	mA
	48VDC input	--	156/4	160/8	
Reflected Ripple Current		--	20	--	
Surge Voltage (1sec. max.)	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	
Start-up Voltage	24VDC input	--	--	9	
	48VDC input	--	--	18	
Input Under-voltage Protection	24VDC input	5.5	6.5	--	
	48VDC input	12	15.5	--	
Input Filter		Pi filter			
Hot Plug		Unavailable			

### Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy <sup>①</sup>	Vo1	--	±1	±3	%	
	Vo2					
Balance Of Output Voltage	Dual output, balanced load	--	±0.5	±1.5		
Linear Regulation	Input voltage variation from low to high at full load	Vo1	--	±0.2		±0.5
		Vo2	--	±0.5		±1
Load Regulation <sup>②</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	3.3V, 5V, ±5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Ripple&Noise <sup>③</sup>	20MHz bandwidth	--	--	85	mV p-p	
Over-voltage Protection	Input voltage range	110	--	160	%Vo	
Over-current Protection		110	140	190	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note: ① Output voltage accuracy of ±5VDC/±9VDC output converter for 0%-5% load is ±5% max;  
 ② Load regulation for 0%-100% load is ±5%;  
 ③ 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	Derating when operating temperature up to 71°C (see Fig. 1)	-40	--	85	°C
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	°C
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	32.00 x 20.00 x 10.80mm
Weight	12.0g(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	±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	99dBµV (see Fig.3-② for recommended circuit)
	RE	EN55016-2-1	500kHz-30MHz	93dBµV (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 Curves**

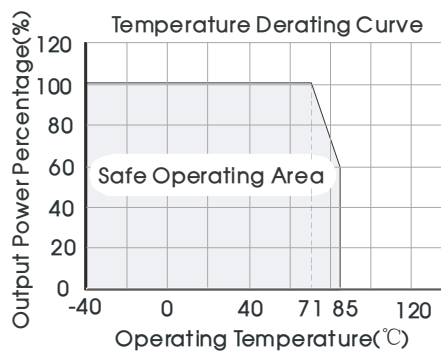
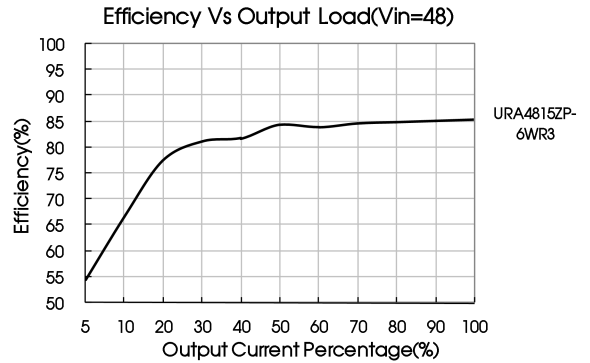
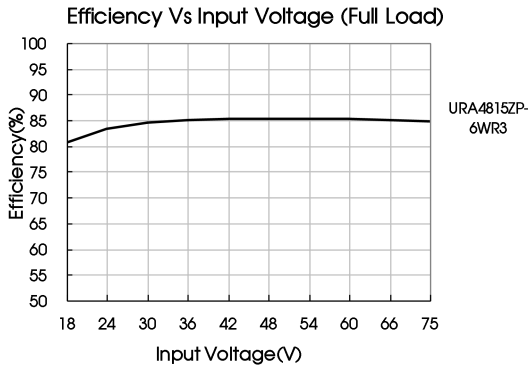
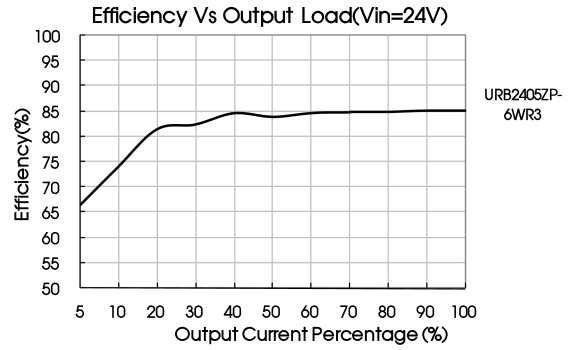
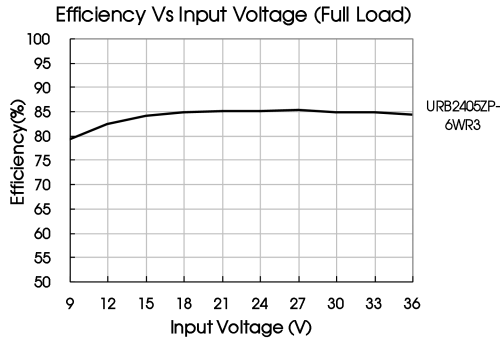


Fig. 1



## 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.

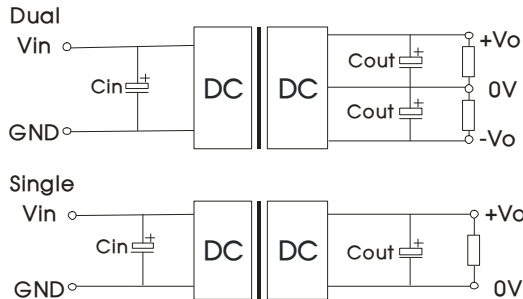
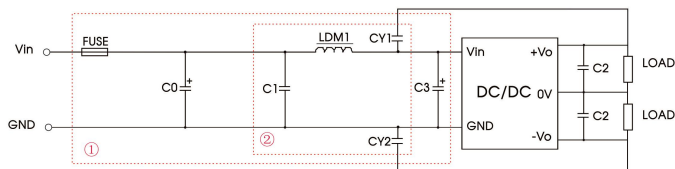


Fig. 2

Vin(VDC)	Cin	Vo(VDC)	Cout
24	100μF/50V	3.3/5/9/±5/±9	10μF/16V
		12/15/±12/±15	10μF/25V
		24/±24	10μF/50V
48	10μF/100V~47μF/100V	3.3/5/9/±5	10μF/16V
		12/15/±12/±15	10μF/25V
		24	10μF/50V

### 2. EMC compliance circuit

Dual output:



Single output:

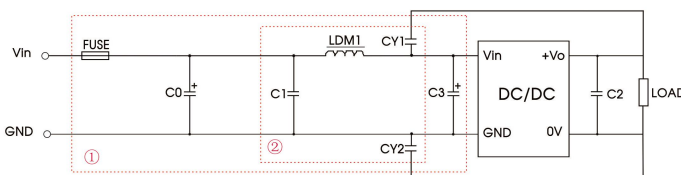


Fig. 3

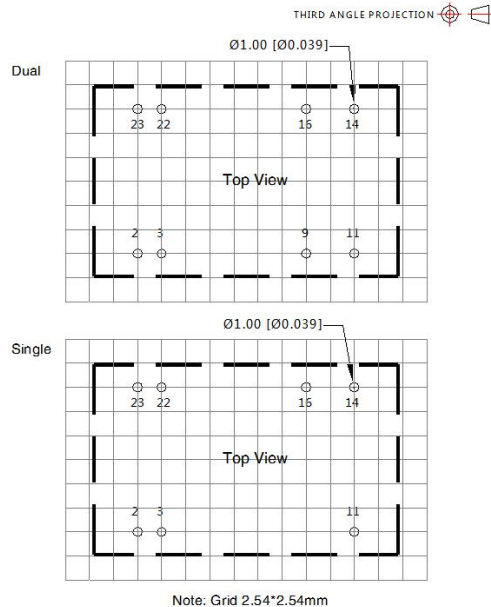
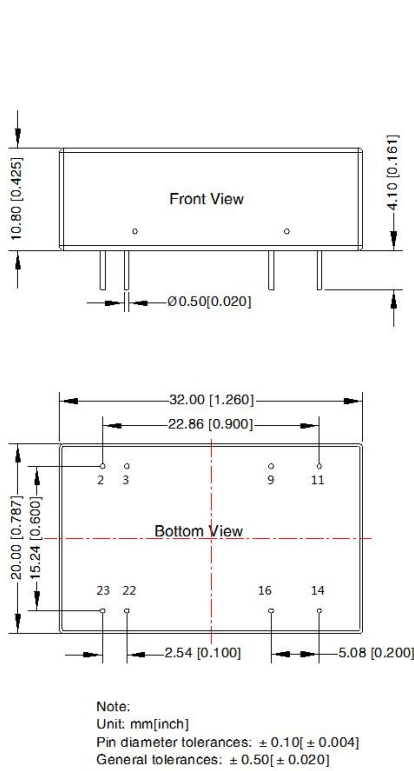
Notes: For EMC tests we use Part ① in Fig. 3 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

Model	Vin:24VDC	Vin:48VDC
FUSE	Choose according to actual input current	
C0/C3	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH	
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



Pin	Pin-Out	
	Single	Dual
2,3	GND	GND
9	No Pin	0V
11	NC	-Vo
14	+Vo	+Vo
16	0V	0V
22,23	Vin	Vin

NC: Pin to be isolated from circuit

Notes:

- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58210008;
- 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;
- 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;
- We can provide product customization service;
- 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.

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