

6W isolated DC-DC converter wide input and regulated single output SIP package



Patent Protection  
 CE Report EN62368-1  
 UKCA Report BS EN62368-1  
 RoHS



### FEATURES

- Wide 4:1 input voltage range
- High efficiency up to 87%
- No-load power consumption bottom 0.12W
- I/O isolation test voltage 1.6k VDC
- Input under-voltage protection, output short-circuit, over-current protection
- Operating ambient temperature range: -40°C to +105°C
- Small SIP packaging
- International Standard Pin out

URB\_S-6WR3 series are Isolated 6W DC-DC converter products with a 4:1 input voltage range. They feature efficiencies of up to 87%, 1600VDC input to output isolation, operating ambient temperature of -40°C to +105°C, input under-voltage protection, output over-current, short-circuit protection, which is widely used in medical, industrial controls, electricity, instrumentation, communications and other fields.

### Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency <sup>②</sup> (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max. <sup>①</sup>	Voltage (VDC)	Current(mA) Max./Min.		
EN/BS EN	URB2403S-6WR3	24 (9-36)	40	3.3	1350/0	76/78	1800
	URB2405S-6WR3			5	1200/0	80/82	1000
	URB2409S-6WR3			9	667/0	82/84	470
	URB2412S-6WR3			12	500/0	83/85	470
	URB2415S-6WR3			15	400/0	83/85	220
	URB2424S-6WR3			24	250/0	83/85	100
	URB4803S-6WR3	48 (18-75)	80	3.3	1600/0	76/79	1200
	URB4805S-6WR3			5	1200/0	80/83	680
	URB4809S-6WR3			9	667/0	82/84	330
	URB4812S-6WR3			12	500/0	84/86	330
	URB4815S-6WR3			15	400/0	85/87	150
	URB4824S-6WR3			24	250/0	85/87	68

Notes:

① Exceeding the maximum input voltage may cause permanent damage;

② The above efficiency values are measured within 10 seconds of starting the product under the nominal input voltage and output rated load.

### Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load /no load)	24VDC nominal input series nominal input voltage	3.3V Ouput	--	238/5	245/12	mA
		5V Ouput	--	305/5	313/12	
		Others	--	298/10	305/16	
	48VDC nominal input series nominal input voltage	3.3V, 5V Ouput	--	158/5	165/12	
Others		--	143/10	156/16		
Reflected Ripple Current		--	50	--		
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	13	14.5	--		

Input Filter		Capacitive filter			
Hot Plug		Unavailable			
Ctrl *	Module on	Ctrl pin open or pulled high (TTL 3.5-12VDC)			
	Module off	Ctrl pin pulled low to GND (0-1.2VDC)			
	Input current when off	--	6	10	mA

Note: \*The Ctrl pin voltage is referenced to input GND.

## Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	24VDC nominal input series	--	±1	±2	%	
	48VDC nominal input series					--
Linear Regulation	Input voltage variation from low to high at full load	--	±0.5	±1		
Load Regulation <sup>①</sup>	5%-100% load	--	±0.5	±1.5		
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	μs	
Transient Response Deviation		3.3V/5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Ripple & Noise <sup>②</sup>	20MHz bandwidth, 5%-100% load	--	50	100	mV p-p	
Over-current Protection	Input voltage range	110	160	230	%Io	
Short-circuit Protection		Continuous, self-recovery				

Note:  
 ① Under 0%-5% load, the maximum output voltage accuracy is ±3%;  
 ② Load regulation for 0%-100% load is ±3%;  
 ③ Under 0%-5% load conditions, ripple & noise does not exceed 150mV. 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 voltage	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1600	--	--	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	--	+105	°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		10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency *	PWM mode	--	500	--	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.

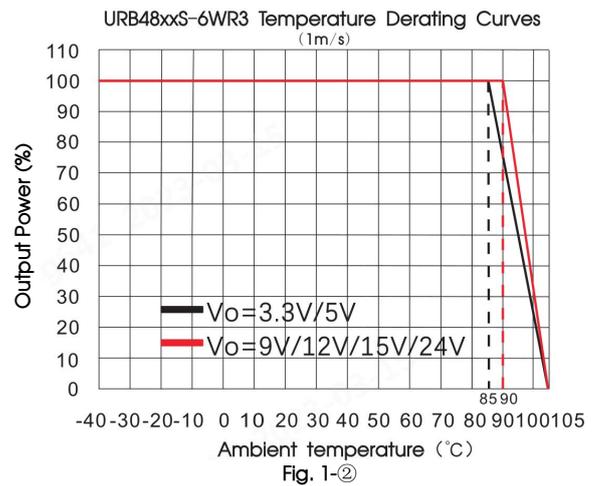
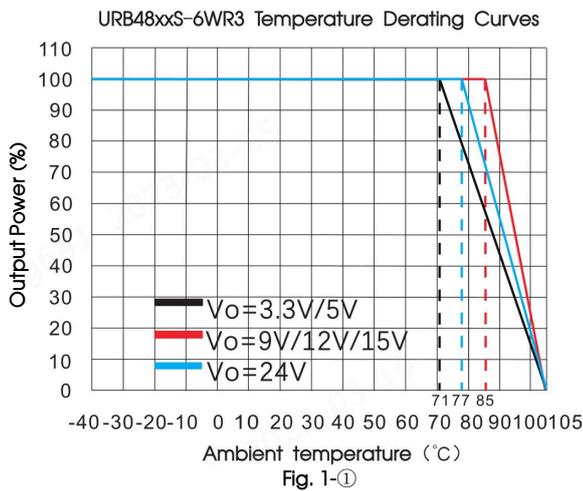
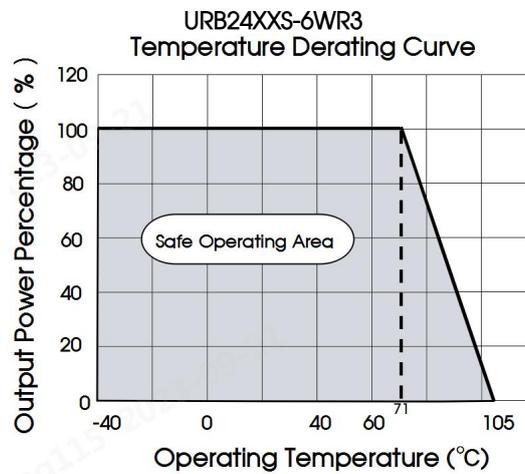
## Mechanical Specifications

Case Material	Black flame-retardant and heat-resistant plastic branch (UL94 V-0)
Dimensions	22 x 9.50 x 12.00 mm
Weight	4.7g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (24VDC nominal input series: See Figure 4-② for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit; )
	RE	CISPR32/EN55032 CLASS B (24VDC nominal input series: See Figure 4-② for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit; )
Immunity	ESD	IEC/EN61000-4-2 Contact $\pm 4\text{kV}$ perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m perf. Criteria A
	EFT	IEC/EN61000-4-4 $\pm 2\text{kV}$ (24VDC nominal input series: See Figure 4-① for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit; ) perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line $\pm 2\text{kV}$ (24VDC nominal input series: See Figure 4-① for the recommended circuit; 48VDC nominal input series: See Figure 5-① for the recommended circuit; ) perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s perf. Criteria A

Typical Characteristic Curves



Design Reference

1. Ripple & noise

The general performance of all DC/DC converters of this series is tested in accordance with the test circuit recommended in Figure 2 before leaving the factory. Figure 3 is used for ripple noise test.

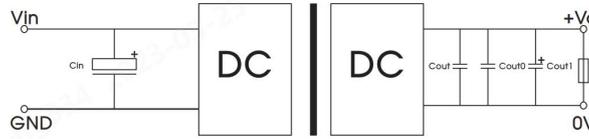


Fig. 2

	Cin	Vo(VDC)	Cout	Cout0	Cout1	
Vin:24VDC	100μF/100V	3.3/5/9	22μF/16V	1μF/50V	10μF/50V	Tantalum Capacitors
		12/15	22μF/25V	1μF/50V	10μF/50V	Tantalum Capacitors
		24	22μF/50V	1μF/50V	10μF/50V	Tantalum Capacitors
Vin:48VDC	100μF/100V	3.3/5	22μF/16V	1μF/50V	10μF/50V	Tantalum Capacitors
		9/12/15/24	10μF/50V	1μF/50V	10μF/50V	Tantalum Capacitors

2. Typical application

Input and/or output ripple can be further reduced by appropriately increasing the input & output capacitor values Cin and Cout 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. 3

	Cin	Vo(VDC)	Cout
Vin:24VDC	100μF/100V	3.3/5/9	22μF/16V
		12/15	22μF/25V
		24	22μF/50V
Vin:48VDC	100μF/100V	3.3/5	22μF/16V
		9/12/15/24	10μF/50V

3. EMC compliance circuit

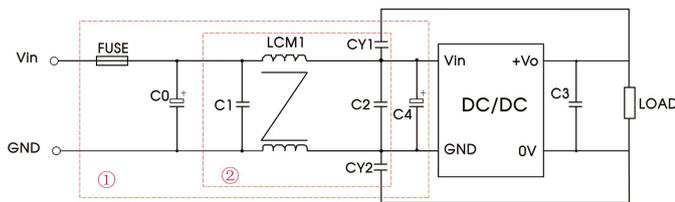


Fig. 4

Notes: We use Part ① in Fig. 4 for Immunity test and part ② for Emissions test. Selecting based on needs.

Parameter description:

Model	Vin: 24VDC
FUSE	Choose according to actual input current
C0/C4	330μF/50V
C1/C2	10μF/50V
C3	22μF/50V
LCM1	470μH, recommended to use MORNSUN's FL2D-13-471R3
CY1/CY2	1nF/400VAC

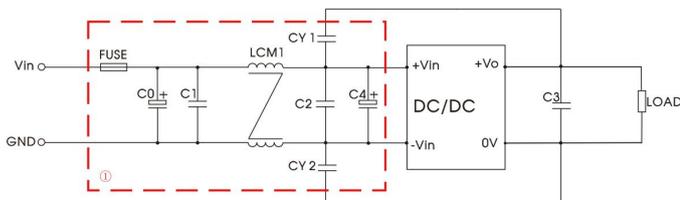


Fig. 5

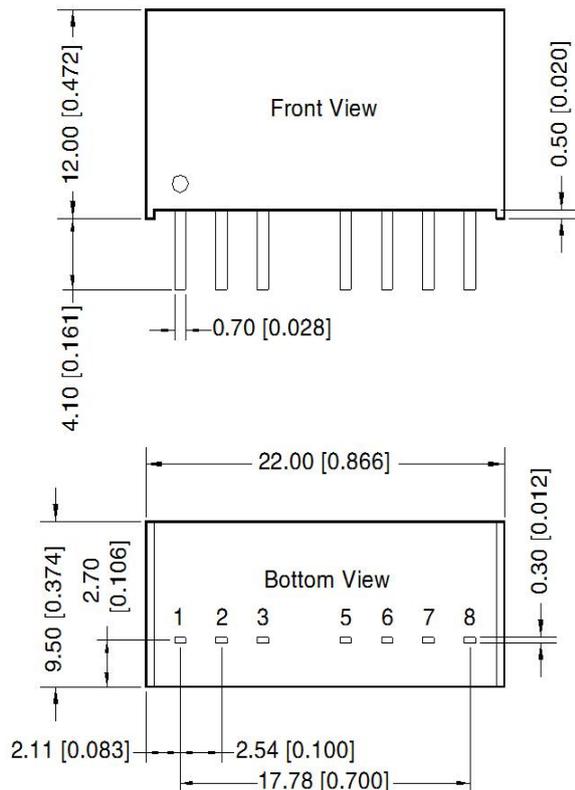
Notes: For EMC and EMI tests we use Part ① in Fig. 5.

Parameter description:

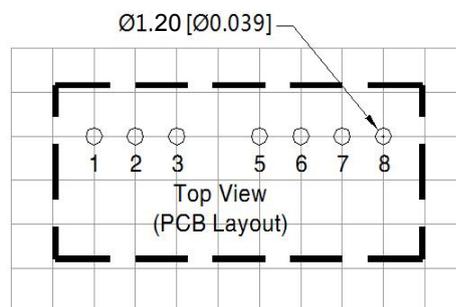
Model	Vin: 48VDC
FUSE	Choose according to actual input current
C0	200μF/100V
C1/C2	10μF/100V
C3	22μF/100V
LCM1	470μH, recommended to use MORNSUN's FL2D-13-471R3
C4	330μF/100V
CY1/CY2	1nF/400VAC

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION 



Note:  
Unit: mm[inch]  
Pin section tolerances:  $\pm 0.10$  [ $\pm 0.004$ ]  
General tolerances:  $\pm 0.50$  [ $\pm 0.020$ ]



Note: Grid 2.54\*2.54mm

Pin-Out	
Pin	Mark
1	GND
2	Vin
3	Ctrl
5	NC
6	+Vo
7	0V
8	NC

NC: Pin to be isolated from circuitry

- Note:
- For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging bag number: 58210004;
  - 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";
  - The products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified companies.

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