

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



EN62368-1 BS EN62368-1

URB\_S-6WR3 series of 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 range of -40°C to +105°C, input under-voltage protection, output short-circuit, over-current protection and they are widely used in applications such as medical care, industrial control, electric power, instruments and communication fields.

## FEATURES

- Ultra-wide 4:1 input voltage range
- High efficiency up to 87%
- No-load power consumption as low as 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
- Compact SIP package
- Industry standard pin-out

## Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency <sup>®</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	84/86	470
	URB2415S-6WR3			15	400/0	85/87	220
	URB2424S-6WR3			24	250/0	83/85	100

Notes:

- ① Exceeding the maximum input voltage may cause permanent damage;
- ② Efficiency is measured at nominal input voltage and rated output load.

## Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	3.3V output	--	238/5	245/12	mA
	5V output	--	305/5	313/12	
	Others	--	298/10	305/16	
Reflected Ripple Current		--	50	--	
Surge Voltage (1sec. max.)		-0.7	--	50	VDC
Start-up Voltage		--	--	9	
Input Under-voltage Protection		5.5	6.5	--	
Input Filter		Capacitance Filter			
Hot Plug		Unavailable			
Ctrl*	Module on	Ctrl pin open or pulled high (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
Voltage Accuracy <sup>①</sup>	5% -100% load	--	±1	±2	%
Linear Regulation	Input voltage variation from low to high at full load	--	±0.5	±1	
Load Regulation <sup>②</sup>	5% -100% load	--	±0.5	±1.5	

Transient Recovery Time		--	300	500	μs
Transient Response Deviation	25% load step change, nominal input voltage	3.3V/5V output	--	±5	±8
		Others	--	±3	±5
Temperature Coefficient	Full load	--	--	±0.03	%/°C
Ripple & Noise <sup>③</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 conditions, 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 Specification

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	1600	--	--	VDC
Insulation Resistance	Input-output insulation 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 plastic; flame-retardant and heat-resistant (UL94-V0)
Dimensions	22.00 x 9.50 x 12.00 mm
Weight	4.6g (Typ.)
Cooling method	Free air convection

## Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR32/EN55032	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	

Typical Characteristic Curves

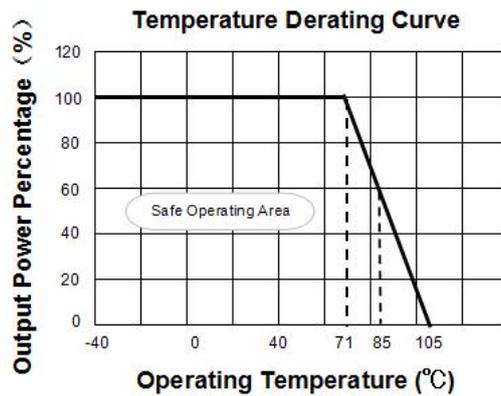
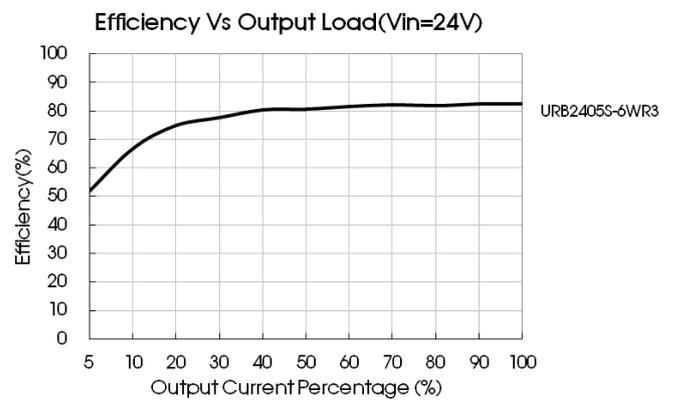
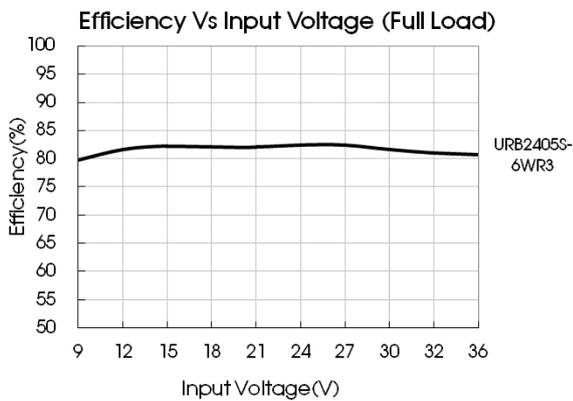


Fig. 1



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

$C_{in}$	$V_{out}(VDC)$	$C_{out}$
100 $\mu$ F/100V	3.3/5/9	22 $\mu$ F/16V
	12/15	22 $\mu$ F/25V
	24	22 $\mu$ F/50V

2. EMC compliance circuit

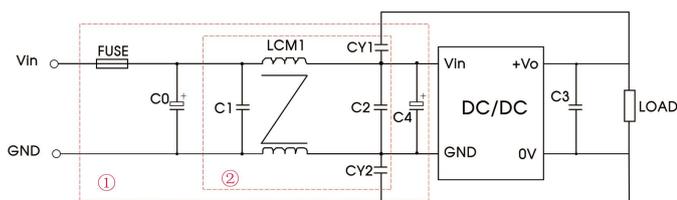


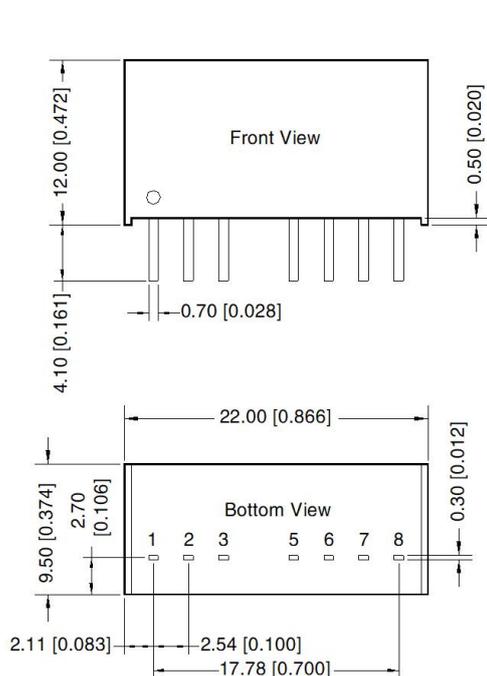
Fig. 3

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:

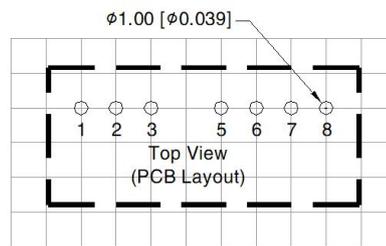
Model	$V_{in}$ : 24VDC
FUSE	Choose according to actual input current
C0/C4	330 $\mu$ F/50V
C1/C2	10 $\mu$ F/50V
C3	22 $\mu$ F/50V
LCM1	470 $\mu$ H, recommended to use MORNSUN's FL2D-13-471R3
CY1/CY2	1nF/400VAC

Dimensions and Recommended Layout



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

THIRD ANGLE PROJECTION



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:

1. For additional information on Product Packaging please refer to [www.mornsun-power.com](http://www.mornsun-power.com). Packaging number: 58210004;
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  $T_a=25^\circ\text{C}$ , humidity<75%RH with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on company corporate standards;
5. We can provide product customization service, please contact our technicians directly for specific information;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. 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)