

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



Patent Protection RoHS



FEATURES

- Wide 4:1 input voltage range
- High efficiency up to 85%
- No-load power consumption bottom 0.12W
- I/O isolation test voltage 1.5k VDC
- Input under-voltage protection, output short-circuit, over-current protection
- Operating ambient temperature range: -40°C to +105°C
- 0.5*0.5-inch Small packaging

URB24_N-1W/3W/6WR3 series are isolated 6W DC-DC converter products with a 4:1 input voltage range. They feature efficiencies of up to 85%, 1500VDC 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 ^② (%) Min./Typ.	Capacitive Load (μF)Max.
		Nominal (Range)	Max. ^①	Voltage (VDC)	Current(mA) Max./Min.		
--	URB2403N-1WR3G	24 (9-40)	50	3.3	303/0	71/73	470
	URB2405N-1WR3G			5	200/0	72/74	470
	URB2406N-1WR3G			6	167/0	72/74	470
	URB2409N-1WR3G			9	111/0	76/78	220
	URB2412N-1WR3G			12	83/0	77/79	100
	URB2415N-1WR3G			15	67/0	77/79	100
	URB2424N-1WR3G			24	42/0	78/80	47
	URB2428N-1WR3G			28	36/0	78/80	47
--	URB2403N-3WR3G	24 (9-40)	50	3.3	909/0	73/75	1800
	URB2405N-3WR3G			5	600/0	78/80	1000
	URB2406N-3WR3G			6	500/0	80/82	1000
	URB2409N-3WR3G			9	333/0	80/82	470
	URB2412N-3WR3G			12	250/0	81/83	470
	URB2415N-3WR3G			15	200/0	81/83	220
	URB2424N-3WR3G			24	125/0	82/84	100
	URB2428N-3WR3G			28	107/0	82/84	100
--	URB2403N-6WR3G	24 (9-40)	50	3.3	1350/0	74/76	1800
	URB2405N-6WR3G			5	1200/0	79/81	1000
	URB2406N-6WR3G			6	1000/0	79/81	1000
	URB2409N-6WR3G			9	667/0	81/83	470
	URB2412N-6WR3G			12	500/0	83/85	470
	URB2415N-6WR3G			15	400/0	83/85	220
	URB2424N-6WR3G			24	250/0	82/84	100
	URB2428N-6WR3G ^③			28	215/0	82/84	100

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;

③ At 9-20VDC input, URB2428N-6WR3G output current derates to 85%.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load /no load)	1W series, nominal input voltage	3.3V/5V/6V Ouput	--	59/5	60/12	mA
		Others	--	57/5	58/12	
	3W series, nominal input voltage	3.3V Ouput	--	167/5	172/12	
		5V/6V Ouput	--	157/5	161/12	
		Others	--	151/5	155/12	
	6W series, nominal input voltage	3.3V Ouput	--	241/5	248/12	
		5V/6V Ouput	--	309/5	317/12	
		Others	--	298/5	305/12	
Surge Voltage (1sec. max.)			-0.7	--	50	VDC
Start-up Voltage			--	--	9	
Input Under-voltage Protection			5.5	6.5	--	
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.						

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Output Specifications^①

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Output Voltage Accuracy ^②	5%-100% load		--	±1	±2	%
Linear Regulation	Input voltage variation from low to high at full load		--	±0.5	±1	
Load Regulation ^③	5%-100% load		--	±0.5	±1.5	
Transient Recovery Time	25% load step change, nominal input voltage		--	450	500	μs
Transient Response Deviation		3.3V/5V/6V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise ^④	20MHz bandwidth, 5%-100% load	24V/28V output	--	150	250	mVp-p
		Others		60	120	
Over-current Protection	Input voltage range		110	160	250	%Io
Short-circuit Protection			Continuous, self-recovery			

Note:

①All output characteristics are tested according to the test circuit recommended in Fig.2 10uF capacitor should be connected to the back end, otherwise the output performance will be different from the specifications;

②Under 0%-5% load, the maximum output voltage accuracy is ±3%;

③Load regulation for 0%-100% load is ±5%;

④Under 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 voltage	Input-output Electric Strength Test for 1 minute with a leakage current of 1mA max.	1500	--	--	VDC
	Input/output-case Electric Strength Test for 1 minute with a leakage current of 1mA max.	1000	--	--	
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	-55	--	+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 (1W/3W)	--	320	--	kHz
	PWM mode (6W)	--	480	--	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	12.70 x 12.70 x 10.80 mm
Weight	4.0g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032	CLASS B	
	RE	CISPR32/EN55032	CLASS B	
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	perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A

Typical Characteristic Curves

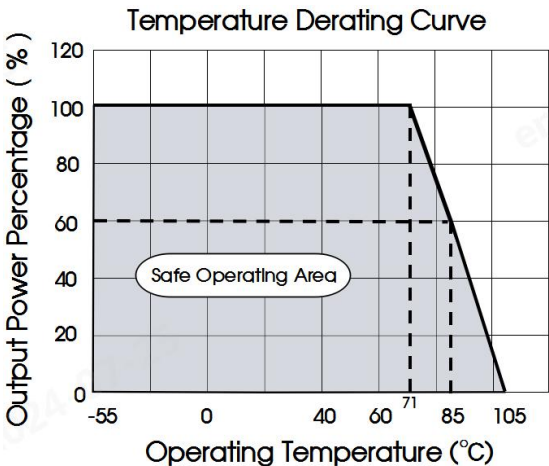


Fig. 1-①

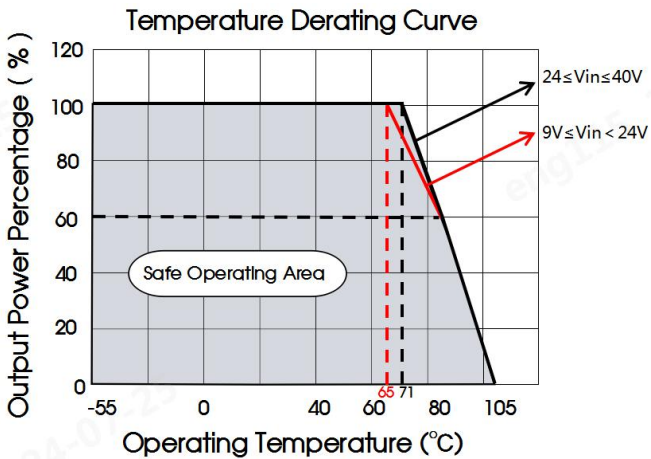


Fig. 1-②

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		Cout	Cout0	Cout1	
Vin:24VDC	100μF/100V	10μF/50V	1uF/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
100μF/100V	3.3/5/6/9	10μF/16V
	12/15	10μF/25V
	24/28	10μF/50V

3. EMC compliance circuit

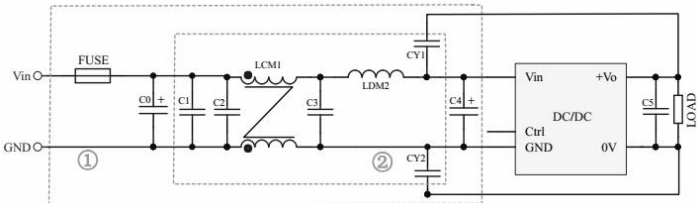


Fig. 4

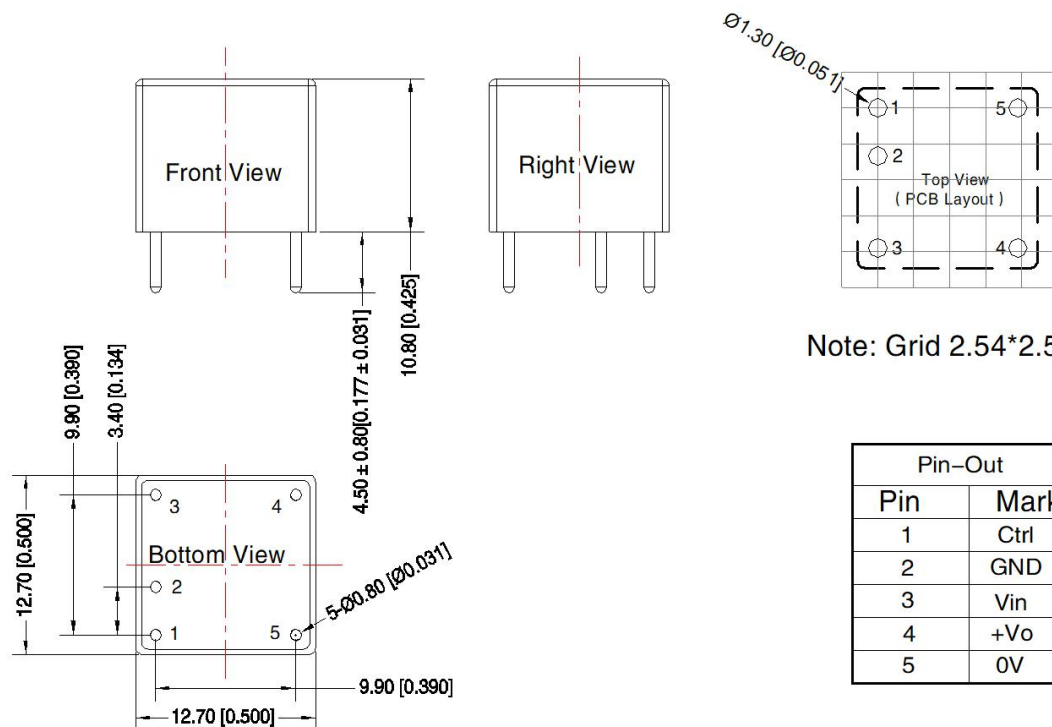
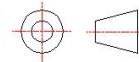
Notes: We use Part ① in Fig. 4 for Immunity test and part ② for Emissions test. Selecting based on needs.

Parameter description:

Model	Vin: 24VDC
FUSE	Choose according to actual input current
C0/C4	330μF/100V
C1/C2/C3	10μF/50V
C5	10μF/50V
LCM1	470μH, recommended to use MORNSUN's FL2D-13-471R3
LDM1	4.7μH/3.1A
CY1/CY2	2.2nF/400VAC

Dimensions and Recommended Layout

THIRD ANGLE PROJECTION



Note: Grid 2.54*2.54mm

Pin-Out	
Pin	Mark
1	Ctrl
2	GND
3	Vin
4	+Vo
5	0V

Note:

Unit: mm[inch]

Pin section tolerances: $\pm 0.10[\pm 0.004]$

Pin spacing tolerance: $\pm 0.25[\pm 0.010]$

General tolerances: $\pm 0.50[\pm 0.020]$

Note:

1. For additional information on Product Packaging please refer to www.mornsun-power.com. Packaging bag number: 58200159;
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. The products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified companies.

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 www.mornsun-power.com