

DC/DC Converter

URH_P-6WR3 Series

MORNSUN®

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



Patent Protection



Report

RoHS

EN60601-1



FEATURES

- Ultra wide 4:1 input voltage range
- High efficiency up to 85%
- No-load power consumption as low as 0.12W
- Reinforced isolation, I/O isolation test voltage: 6KVDC and 2MOPP high isolation
- Leakage current < 5 μ A, under 240VAC/60Hz operating conditions
- Transformer creepage distance is 8mm, transformer clearance is 5mm
- Operating ambient temperature range: -40°C to +85°C
- Input under-voltage protection, output short circuit, over-current, over-voltage protection
- Meet EN60601-1(3rd edition medical grade) standards, EN60601-1: 2006+A1: 2013
- Industry standard pin-out

URH_P-6WR3 series of isolated 6W DC-DC converter products with an ultra wide input voltage range of 9-36VDC, 18-75VDC, input to output isolation is tested with 6000VDC, output over-voltage protection and output short circuit protection, EN60601-1 approval; they are widely used in applications that requiring high isolation, such as medical, electricity, also for energy storage systems that requiring an low no-load power consumption.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Max. Capacitive Load(μ F)
		Nominal (Range)	Max.*	Voltage (VDC)	Current (mA) Max./Min.		
EN	URH2405P-6WR3	24 (9-36)	40	5	1200/0	78/80	2700
	URH2406P-6WR3			6	1000/0	79/81	2200
	URH2409P-6WR3			9	667/0	81/83	1800
	URH2412P-6WR3			12	500/0	82/84	1000
	URH2415P-6WR3			15	400/0	83/85	680
--	URH2418P-6WR3			18	333/0	83/85	1200
	URH2424P-6WR3			24	250/0	82/84	470
EN	URH4805P-6WR3	48 (18-75)	80	5	1200/0	79/81	2700
	URH4809P-6WR3			9	667/0	81/83	1800
	URH4812P-6WR3			12	500/0	82/84	1000
	URH4815P-6WR3			15	400/0	83/85	680
	URH4824P-6WR3			24	250/0	82/84	470

Note:*Exceeding the maximum input voltage may cause permanent damage.

Input Specifications

Input Specifications					
Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	--	309/5	317/8	mA
	48VDC input	--	154/4	159/7	
Reflected Ripple Current	24VDC input	--	20	--	
	48VDC input	--	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			

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Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Voltage Accuracy		--	±1	±3	%
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5	
Load Regulation ^①	5%-100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Coefficient	Full load	--	--	±0.03	%/°C
Ripple & Noise ^②	20MHz bandwidth	--	100	180	mVp-p
Over-current Protection	Input voltage range	110	150	260	%Io
Over-voltage Protection		110	--	160	%Vo
Short-circuit Protection		Continuous, self-recovery			

Note:

① Load regulation for 0%-100% load is ±5%;

② Ripple & Noise at <5% load is 5%Vo max. The "parallel cable" method is used for Ripple and Noise test, oscilloscope using the 1X probe, 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.	6000	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	10000	--	--	M Ω
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	13	20	pF
Leakage Current	240VAC/60Hz	--	3.6	5	uA
Application Part		CF Type			
Reinforced Isolation	Transformer creepage	8.0	--	--	mm
	Transformer clearance	5.0	--	--	
	PCB creepage & clearance	8.0	--	--	
	Optocoupler creepage	8.0	--	--	
Operating Temperature	Derating if the temperature is ≥71℃ (see Fig. 1)	-40	--	85	℃
Storage Humidity	Without condensation	5	--	95	%RH
Storage Temperature		-55	--	125	℃
Pin Soldering Resistance Temperature	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Vibration		10-55Hz, 2G, 30 Min. along X, Y and Z			
Switching Frequency*	PWM mode(nominal, full load)	--	300	--	KHz
Safety Standard		EN60601-1: 2006+A1: 2013			
Insulation Protection Grade	240VAC/60Hz	2xMOPP			
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

Note:* Switching frequency is measured at full load. The module reduces the switching frequency for light load (below 50%) efficiency improvement.

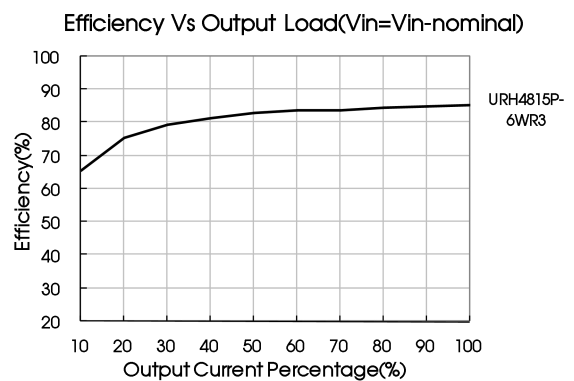
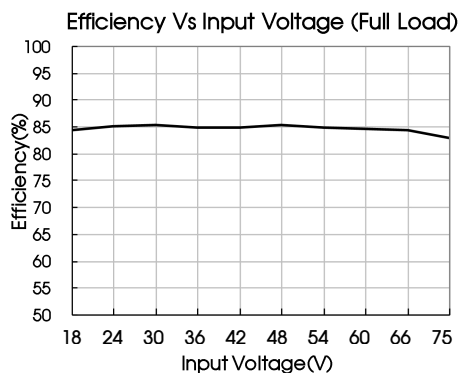
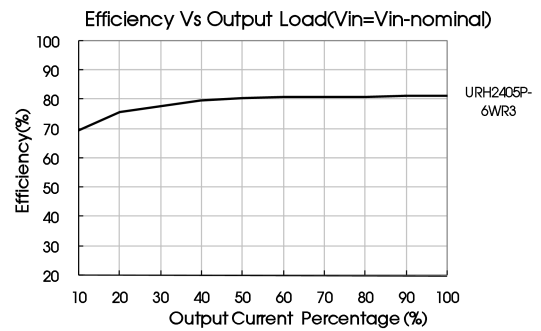
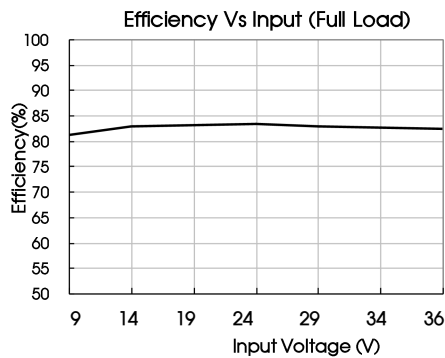
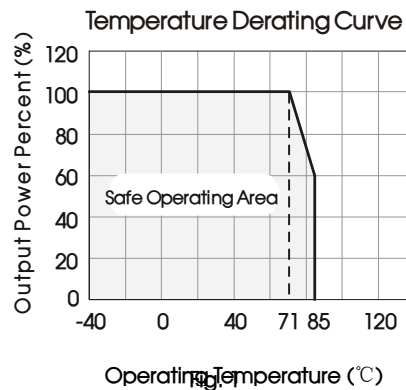
Mechanical Specifications

Case Material	Black flame-retardant and heat-resistant plastic (UL94 V-0)
Dimensions	31.60 x 20.30 x 10.20 mm
Weight	13.0g(Typ.)
Cooling method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	Others	CISPR32/EN55032	CLASS A (without extra components)
		URH2418P-6WR3	CISPR32/EN55032	CLASS B (see Fig.3-② for recommended circuit)
Immunity	ESD		IEC/EN61000-4-2	Contact $\pm 6\text{KV}$ perf. Criteria B
	EFT		IEC/EN61000-4-4	$\pm 2\text{KV}$ (see Fig.3-① for recommended circuit) perf. Criteria B
	Surge		IEC/EN61000-4-5	$\pm 2\text{KV}$ (see Fig.3-① for recommended circuit) perf. Criteria B
	CS		IEC/EN61000-4-6	3 V _{r.m.s} perf. Criteria A
	Immunities of voltage dip, drop and short interruption		IEC/EN61000-4-29	0-70% perf. Criteria B

Typical Characteristic Curves



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.

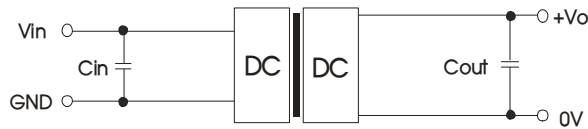


Fig. 2

V_{in}	C_{in}	C_{out}
24VDC	100 μ F	10 μ F
48VDC	10 μ F -47 μ F	10 μ F

2. EMC solution-recommended circuit

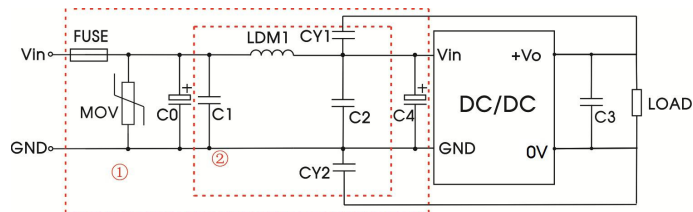


Fig. 3

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

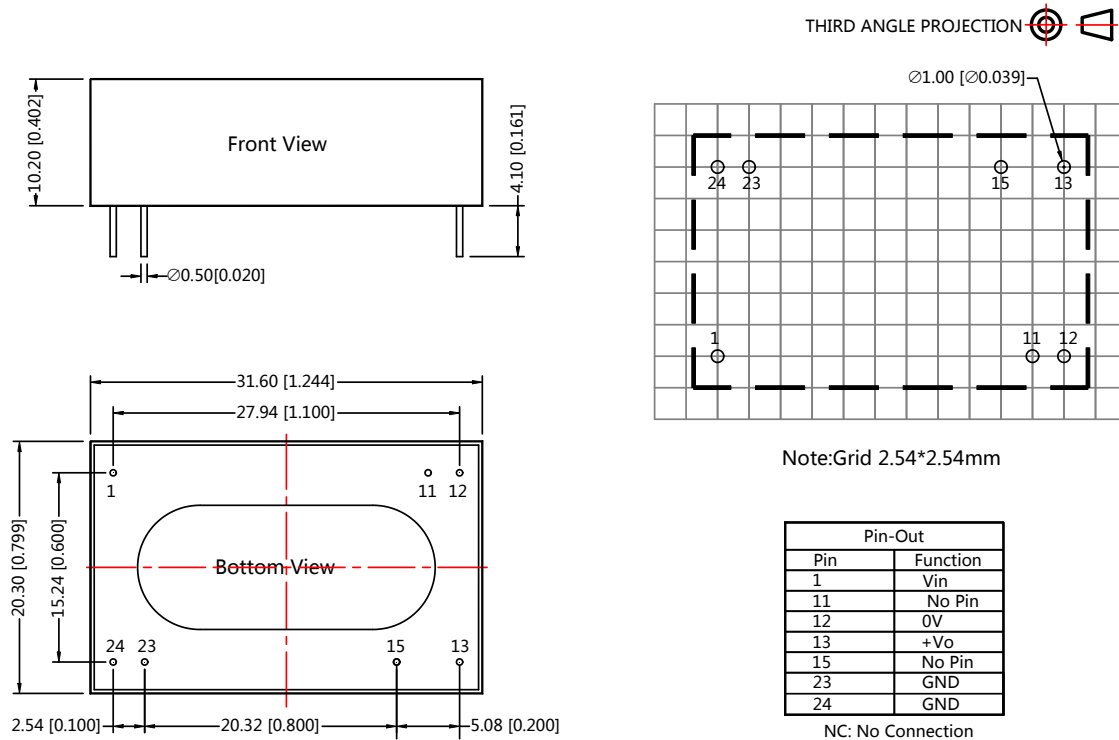
Parameter description:

Model	V_{in} :24V	V_{in} :48V
FUSE	Choose according to actual input current	
MOV	S20K30	S14K60
C0, C4	330 μ F/50V	330 μ F/100V
C1, C2	10 μ F/50V	--
C3	Refer to the C_{out} in Fig.2	
LDM1	10 μ H	--
CY1, CY2	1nF/6KV	--

3. The products do not support parallel connection of their output

4. For additional information please refer to DC-DC converter application notes on www.mornsun-power.com

Dimensions and Recommended Layout



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

- Note:
- For additional information on Product Packaging please refer to www.mornsun-power.com. The Packaging bag number of Horizontal package: 58210008;
 - The maximum capacitive load offered were tested at nominal 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 our 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 contact our technicians directly 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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