# **MORNSUN**<sup>®</sup>

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



#### 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 µÅ, 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							
		Input Volta	ge (VDC)	Outp	out	Full Load	Max.
Certification	Part No.	Nominal (Range)	Max.*	Voltage (VDC)	Current (mA) Max./Min.	Efficiency (%) Min./Typ.	Capacitive Load(µF)
	URH2405P-6WR3		40	5	1200/0	78/80	2700
	URH2406P-6WR3			6	1000/0	79/81	2200
EN	URH2409P-6WR3			9	667/0	81/83	1800
	URH2412P-6WR3	24 (9-36)		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
	URH4805P-6WR3		80	5	1200/0	79/81	2700
ENI	URH4809P-6WR3	48 (18-75)		9	667/0	81/83	1800
EIN	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						
ltem	Operating Conditions	Min.	Тур.	Max.	Unit	
	24VDC input		309/5	317/8		
	48VDC input		154/4	159/7	m۸	
Reflected Dipple Current	24VDC input		20		ΜA	
Reliected Ripple Cultern	48VDC input		20			
	24VDC input	-0.7		50		
Surge vonage (Tsec. max.)	48VDC input	-0.7		100		
Start up Voltago	24VDC input			9	VDC	
sidii-up voliage	48VDC input			18		
Input Under-voltage Protection	24VDC input	5.5	6.5			
	48VDC input	12	15.5			
Input Filter			Pi f	ilter		
Hot Plug			Unavo	ailable		

**MORNSUN®** 

MORNSUN Guangzhou Science & Technology Co., Ltd.

MORNSUN Guangzhou Science & Technology Co., Ltd. reserves the copyright and right of final interpretation

<sup>2025.03.28-</sup>B/0 Page 1 of 6

# DC/DC Converter

## URH\_P-6WR3 Series

# **MORNSUN**<sup>®</sup>

Output Specifications					
Item	Operating Conditions	Min.	Тур.	Max.	Unit
Voltage Accuracy			±l	±3	
Linear Regulation	Input voltage variation from low to high at full load		±0.2	±0.5	%
Load Regulation <sup>®</sup>	5%-100% load		±0.5	±1	
Transient Recovery Time	25% load stop obgogo		300	500	μs
Transient Response Deviation	23 % load slep change		±3	±5	%
Temperature Coefficient	Full load			±0.03	<b>%/</b> ℃
Ripple & Noise <sup>®</sup>	20MHz bandwidth		100	180	mVp-p
Over-current Protection		110	150	260	%lo
Over-voltage Protection	Input voltage range	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.</p>

General Specifications						
Item	Operating Conditions	Min.	Тур.	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			MΩ	
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V		13	20	pF	
Leakage Current	240VAC/60Hz		3.6	5	uA	
Application Part			CF 1	ype		
	Transformer creepage	8.0				
	Transformer clearance	5.0				
Reinforced Isolation	PCB creepage & clearance	8.0			mm	
	Optocoupler creepage	8.0				
Operating Temperature	Derating if the temperature is $\ge$ 71 °C (see Fig. 1)	-40		85	°C	
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	Ĉ	
Vibration		10-5	5Hz, 2G, 30 M	in. along X, Y	and Z	
Switching Frequency*	PWM mode(nominal, full load)		300		KHz	
Safety Standard		E	EN60601-1: 2	006+A1: 2013	3	
Insulation Protection Grade	240VAC/60Hz		2xM	OPP		
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 (UL94 V-0)	
Dimensions	31.60 x 20.30 x 10.20 mm	
Weight	13.0g (Typ.)	
Cooling method	Free air convection	

**MORNSUN**<sup>®</sup>

MORNSUN Guangzhou Science & Technology Co., Ltd.



Electrom	Electromagnetic Compatibility (EMC)				
	<u></u>	Others	CISPR32/EN55032	CLASS A (without extra components)	
ETTISSIOUS	CE	URH2418P-6WR3	CISPR32/EN55032	32 CLASS B (see Fig.3-2) for recommended circuit)	
	ESD		IEC/EN61000-4-2	Contact ±6KV	perf. Criteria B
	EFT		IEC/EN61000-4-4	$\pm 2$ KV (see Fig.3-(1) for recommended circuit)	perf. Criteria B
Immunity	Surge		IEC/EN61000-4-5	$\pm 2$ KV (see Fig.3-(1) for recommended circuit)	perf. Criteria B
	CS		IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	lmmun drop a	ities of voltage dip, nd short interruption	IEC/EN61000-4-29	0-70%	perf. Criteria B

#### Typical Characteristic Curves



Operating <u>Femperature</u> (°C)



Efficiency Vs Input Voltage (Full Load) 100 95 90



Efficiency Vs Output Load(Vin=Vin-nominal) 100 90 URH2405P-80 6WR3 Efficiency(%) 70 60 50 40 30 20 10 20 30 40 50 60 70 80 90 100 Output Current Percentage (%)

Efficiency Vs Output Load(Vin=Vin-nominal)



**MORNSUN®** 

MORNSUN Guangzhou Science & Technology Co., Ltd.



### 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 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.



Vin	Cin	Cout
24VDC	100uF	10µF
48VDC	10µF -47µF	10µF

#### 2. EMC solution-recommended circuit



Notes: For EMC tests we use part  ${\rm (I)}$  in Fig. 3 for immunity and part  ${\rm (2)}$  for emissions test. Selecting based on needs.

|--|

Vin:24V	Vin:48V	
Choose according to	actual input current	
S20K30	S14K60	
330µF/50V	330µF/100V	
10µF/50V		
Refer to the	Cout in Fig.2	
10µH		
1nF/6KV		
-	Vin:24V Choose according to S20K30 330µF/50V 10µF/50V Refer to the 10µH 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 <u>www.mornsun-power.com</u>

**MORNSUN®** 

MORNSUN Guangzhou Science & Technology Co., Ltd.



#### **Dimensions and Recommended Layout**





Note:Grid 2.54\*2.54mm

Pin-Out		
Pin	Function	
1	Vin	
11	No Pin	
12	0V	
13	+Vo	
15	No Pin	
23	GND	
24	GND	
NC: No Connection		

Note:

Unit :mm[inch] Pin diameter tolerances :±0.10[± 0.004] General tolerances:±0.50[±0.020]

#### Note:

- 1. For additional information on Product Packaging please refer to <u>www.mornsun-power.com</u>. The Packaging bag number of Horizontal package: 58210008;
- 2. The maximum capacitive load offered were tested at nominal input voltage range and full load;
- 3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25°C, humidity<75%RH with nominal input voltage and rated output load;
- 4. 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;
- 7. Products are related to laws and regulations: see "Features" and "EMC";
- 8. 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. 8, Nanyun 4th Road, Huangpu District, Guangzhou, China Tel: 86-20-38601850 Fax: 86-20-38601272

E-mail: info@mornsun.cn

www.mornsun-power.com

**MORNSUN®** 

MORNSUN Guangzhou Science & Technology Co., Ltd.

2025.03.28-B/0 Page 5 of 6



MORNSUN Guangzhou Science & Technology Co., Ltd.

**MORNSUN**<sup>®</sup>

2025.03.28-B/0 Page 6 of 6 MORNSUN Guangzhou Science & Technology Co., Ltd. reserves the copyright and right of final interpretation