

URF_P- 6WR2 Series

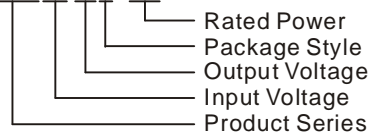
**6W,WIDE INPUT,ISOLATED & REGULATED
SINGLE OUTPUT, DIP PACKAGING, DC-DC CONVERTER**



RoHS

PART NUMBER SYSTEM

URF2405P-6WR2



FEATURES

- 4:1 wide input voltage range
- Efficiency up to 88%
- Operating Temperature range: -40°C ~ +85°C
- 3KVDC isolation
- Low ripple & noise
- Short circuit protection, over voltage protection
- Industry standard pinout
- Meet CISPR22/EN55022 CLASS A

APPLICATION

URF_P-6WR2 series models provide 6 Watt output power, with 4:1 wide input voltage of 9-36VDC, 18-75 VDC,output over-voltage and short-circuit protection. And all of them can meet CISPR22/EN55022 CLASS A without external circuit. Typical applications for these converters are industrial, electric power, instrumentation, telecommunication.

SELECTION GUIDE

Model	Input Voltage(VDC)		Output Voltage (VDC)	Output Current (mA)		Input Current (mA)(typ.)		Reflected Ripple Current (mA,typ.)	Max. Capacitive Load(µF)	Efficiency (% , typ.) @Max. Load
	Nominal (Range)	Max. ①		Max.	Min.	@Max. Load	@No Load			
URF2405P-6WR2	24 (9-36)	40	5	1200	60	301	12	20	2200	83
URF2412P-6WR2			12	500	25	287			680	87
URF2415P-6WR2			15	400	20	284			680	88
URF2424P-6WR2			24	250	12	287			680	87
URF4805P-6WR2	48 (18-75)	80	5	1200	60	151	3	20	2200	83
URF4812P-6WR2			12	500	25	143			680	87
URF4815P-6WR2			15	400	20	142			680	88
URF4824P-6WR2			24	250	12	143			680	87

Note: ① Absolute maximum rating without damage on the converter, but it isn't recommended.

INPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Surge Voltage (1Sec. max.)	24V input	-0.7	--	50	VDC
	48V input	-0.7	--	100	
Start-up Voltage	24V input	--	--	9	
	48V input	--	--	18	
No-load Input Power		--	0.2	0.5	W
Input Filter		Pi Filter			

OUTPUT SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit	
Output Voltage Accuracy	5% to 100% load	--	±1	±2	%	
Line Regulation	Full load, Input voltage from low to high	--	±0.2	±0.5		
Load Regulation	5% to 100% load	--	±0.5	±1		
Transient Recovery Time		--	300	500	us	
Transient Response Deviation	25% load step change	--	±3	±5	%	
Temperature coefficient	100% load	--	--	±0.03	%/°C	
Ripple*	20MHz Bandwidth	--	15	30	mVp-p	
Noise*	20MHz Bandwidth	24V input	--	65		100
	48V input	--	--	85		150
Output Over Voltage Protection	Input voltage range	110	120	140	%Vo	
Output Short Circuit Protection		Hiccup, Continuous, automatic recovery				

Note:* Ripple and noise tested with "parallel cable" method. See detailed operation instructions at *DC-DC Application Notes* .

COMMON SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Isolation Voltage	Input-Output, Tested for 1 minute, leakage current less than 1 mA	3000	--	--	VDC
Isolation Resistance	Input-Output, Test at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-Output, 100KHz/0.1V	--	120	--	pF
Switching Frequency	PWM mode	--	330	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours
Case Material		Plastic (UL94-V0)			
Weight		--	13	--	g

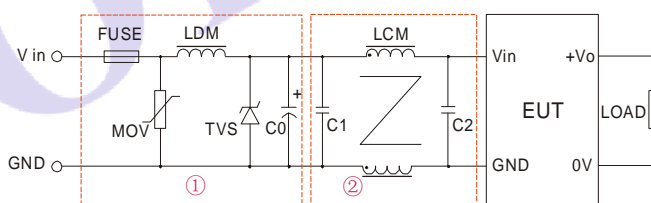
ENVIRONMENTAL SPECIFICATIONS

Item	Test Conditions	Min.	Typ.	Max.	Unit
Storage Humidity	Non condensing	5	--	95	%
Operating Temperature	Power derating (above 71℃, see Figure 5)	-40	--	85	℃
Storage Temperature		-55	--	125	
Max. Case Temperature	Operating Temperature curve range	--	--	105	
Lead Temperature	1.5mm from case for 10 seconds	--	--	300	
Cooling		Free air convection			

EMC SPECIFICATIONS

EMI	CE	CISPR22/EN55022 CLASS A(Recommended External Circuit)/ CLASS B(External Circuit Refer to Figure1-② or Figure 3)			
	RE	CISPR22/EN55022 CLASS A(Recommended External Circuit)/ CLASS B(External Circuit Refer to Figure1-② or Figure 3)			
EMS	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	(Recommended Circuit Refer to Figure1-①)	perf. Criteria B
		IEC/EN61000-4-4	±4KV	(Recommended Circuit Refer to Figure 3)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±2KV	(Recommended Circuit Refer to Figure1-① or Figure 3)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s		perf. Criteria A
	Voltage dips, short and interruptions immunity	IEC/EN61000-4-29	0%-70%		perf. Criteria B

EMC RECOMMENDED CIRCUIT



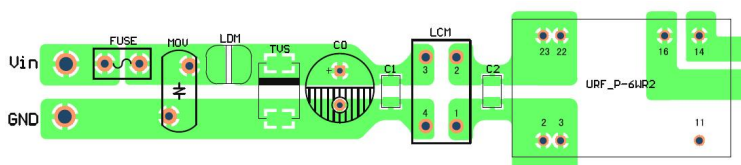
(Figure1)

Recommended external circuit parameters:

Model	Vin: 24V	Vin: 48V
FUSE	Choose according to actual input current	
MOV	S14K35	S14K60
LDM	56μH	
TVS	SMCJ48A	SMCJ90A
C0	330μF/50V	330μF/100V
C1, C2	2.2μF/50V	2.2μF /100V
LCM	2.2 mH, recommended to use MORNSUN's FL2D-30-222	

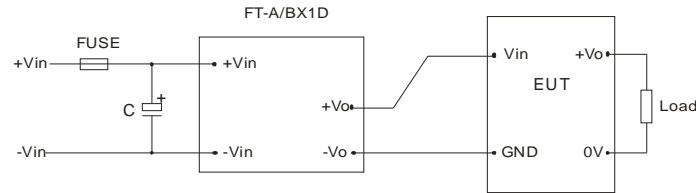
Note: In Figure 1, part①is EMS Recommended external circuit, part②is EMI recommended external circuit. Choose according to requirements.

EMC RECOMMENDED CIRCUIT PCB LAYOUT



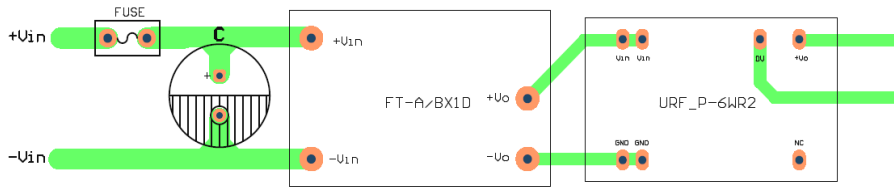
(Figure 2)

EMC MODULE APPLICATION CIRCUIT



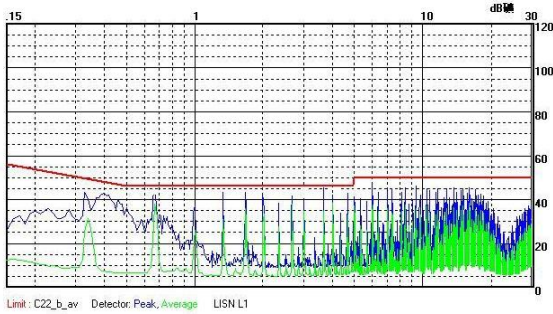
For nominal input voltage of 24V, $C \geq 330 \mu\text{F}/50\text{V}$
 For nominal input voltage of 48V, $C \geq 330 \mu\text{F}/100\text{V}$
 FT-A/BX1D is MORNSUN's EFT suppresser
 (Figure 3)

EMC MODULE RECOMMENDED CIRCUIT PCB LAYOUT

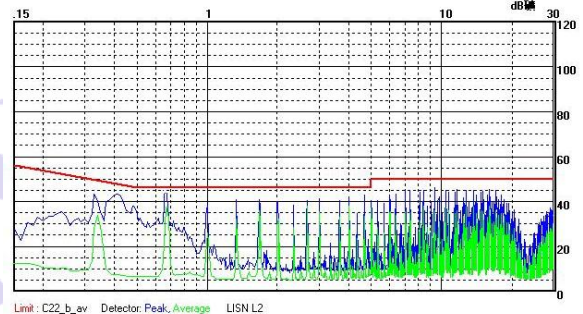


(Figure 4)

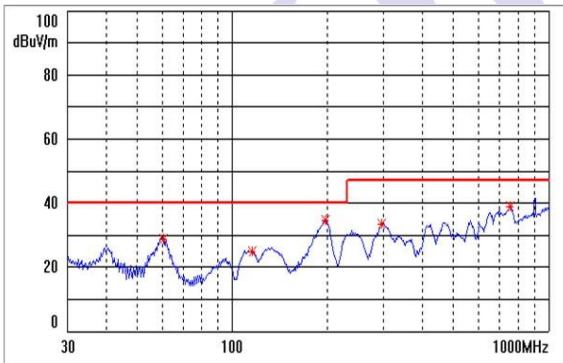
EMI TEST WAVEFORM (RECOMMENDED CIRCUIT FIGURE 1-②)



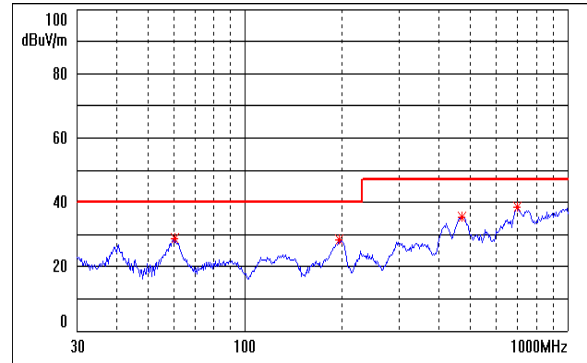
URF4812P-6WR2 CE (Class B, Positive line)



URF4812P-6WR2 CE (Class B, Negative line)

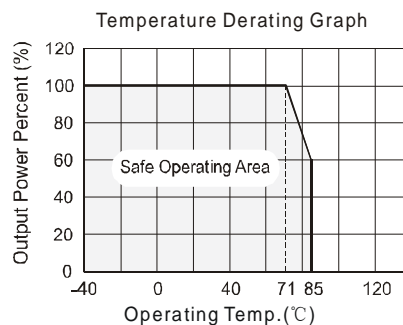


URF4812P-6WR2 CE (Class B, Positive line)



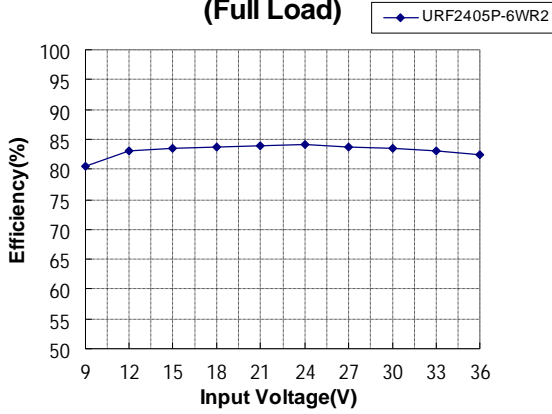
URF4812P-6WR2 CE (Class B, Negative line)

PRODUCT TYPICAL PERFORMANCE CURVE

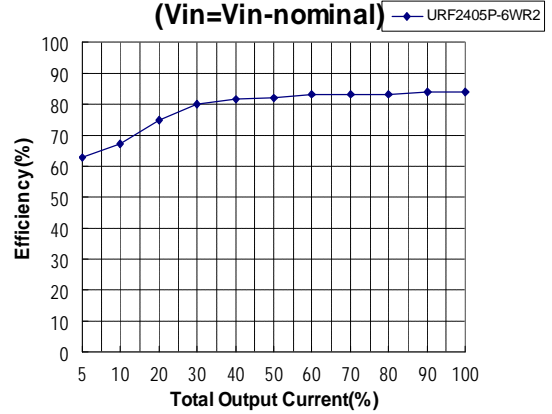


(Figure 5)

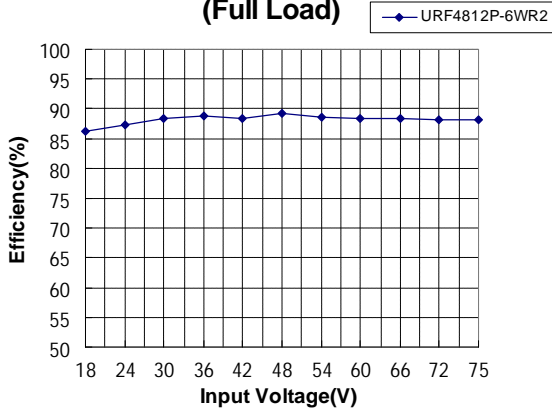
**Efficiency VS Input Voltage curve
(Full Load)**



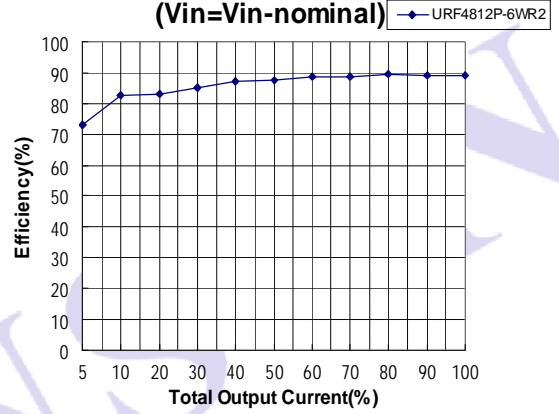
**Efficiency VS Output Load curve
(Vin=Vin-nominal)**



**Efficiency VS Input Voltage curve
(Full Load)**

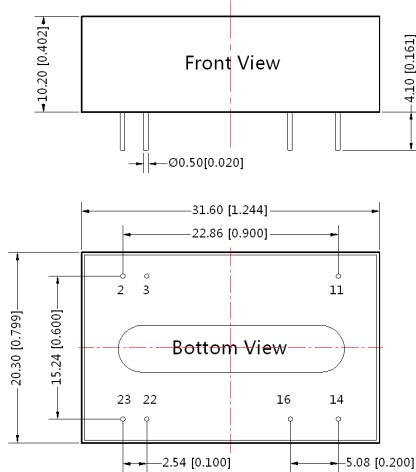


**Efficiency VS Output Load curve
(Vin=Vin-nominal)**



OUTLINE DIMENSIONS, RECOMMENDED FOOTPRINT & PACKAGING

MECHANICAL DIMENSIONS

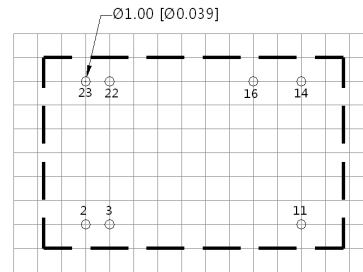


PIN CONNECTION	
Pin	Function
2,3	GND
11	NC
14	+Vo
16	0V
22,23	Vin

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

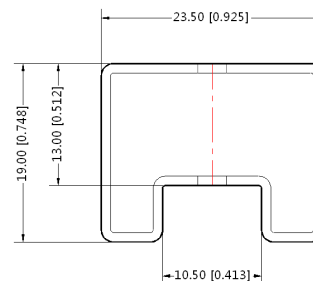


RECOMMENDED FOOTPRINT DETAILS



Note:Grid 2.54*2.54mm
Note:The actual footprint refer to PIN CONNECTION

TUBE PACKAGING DIMENSIONS

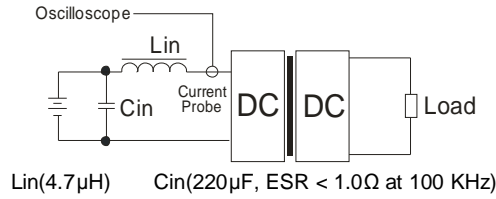


Note:
Unit :mm[inch]
General tolerances :±0.50[±0.020]
L=530[20.866] Tube Quantity:15PCS
L=220[8.661] Tube Quantity:6PCS
Inner carton(S): L*W*H=255*170*80
Outer carton(S): L*W*H=375*280*270, 6 inner cartons(S)
Inner carton(L): L*W*H=580*200*100
Outer carton(L): L*W*H=600*215*220, 2 inner cartons(L)
Outer carton(L): L*W*H=600*215*325, 3 inner cartons(L)

TEST CONFIGURATIONS

Input Reflected-Ripple Current Test Setup

Input reflected-ripple current is measured with an inductor L_{in} and Capacitor C_{in} to simulate the source impedance.



DESIGN CONSIDERATIONS

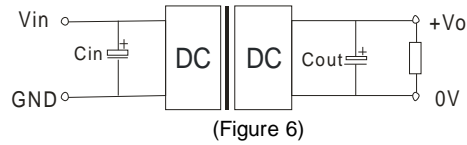
1) Recommended circuit

All the URF_P-6WR2 Series have been tested according to the following recommended test circuit before leaving the factory (see Figure 6).

If you want to further decrease the input/output ripple, you can increase a capacitance-values properly or choose capacitors with low ESR, but the total capacitance of the filter capacitor must not exceed the Max. Capacitive Load.

Cin: 10 μ F~47 μ F

Cout: 10 μ F



2) It is not recommended to increase the output power capability by connecting two or more converters in parallel. The product is not hot-swappable

Note:

1. Min. load shouldn't be less than 5%, otherwise ripple maybe increased dramatically, If the product operates under min. load, it may not be guaranteed to meet all specifications listed. Operation under minimum load will not damage the converter.
2. Max. Capacitive Load is tested at input voltage range and full load.
3. All specifications measured at $T_a=25^{\circ}\text{C}$, humidity<75%, nominal input voltage and rated output load unless otherwise specified.
4. In this datasheet, all test methods are based on our corporate standards.
5. All characteristics are for listed models, and non-standard models may perform differently. Please contact our technical support for more details.
6. Please contact our technical support for any specific requirement.
7. Specifications of this product are subject to changes without prior notice.

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