10W,Ultra wide input isolated & regulated DC-DC converter



cULus CB CE Patent Protection RoHS

FEATURES

- Wide range of input voltage (4:1)
- Efficiency up to 87%
- No-load power consumption as low as 0.12W
- Isolation voltage :3K VDC
- Input under-voltage protection, output over-voltage protection, short circuit protection, output over-current protection
- Operating temperature range: -40℃ to +85℃
- Meet CISPR22/EN55022 CLASS A
- A2S (wring mounting) and A4S (TS35 rail mounting) products featuring anti-reverse connection for input
- IEC60950, UL60950, EN60950 Approval
- International standard pin-out

URF_LP-10WR3 series are isolated 10W DC-DC products with 4:1 input voltage. They feature efficiency up to 87%, 1500VDC isolation, operating temperature of -40 ℃ ~+85 ℃ , Input under-voltage protection, output short circuit protection, over-voltage protection, over-current protection and EMI meets CISPR22/EN55022 CLASS A, which make them widely applied in industrial control, electric power, instruments and communication fields. And extension package A2S and A4S also enable them with reverse voltage protection.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency ③(%,Typ.) @ Full Load	Max. Capacitive Load(μF)
		Nominal (Range)	Max.②	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
UL/CE/CB	URF2403LP-10WR3	24 (9-36)	40	3.3	2400/0	77/79	5400
	URF2405LP-10WR3			5	2000/0	80/82	5400
	URF2409LP-10WR3			9	1111/0	83/85	680
	URF2412LP-10WR3			12	833/0	84/86	470
	URF2415LP-10WR3			15	667/0	85/87	330
	URF2424LP-10WR3			24	416/0	85/87	100
	URF4803LP-10WR3	48 (18-75)	80	3.3	2400/0	77/79	5400
	URF4805LP-10WR3			5	2000/0	80/82	5400
	URF4812LP-10WR3			12	833/0	84/86	470
	URF4815LP-10WR3			15	667/0	85/87	330
	URF4824LP-10WR3			24	416/0	85/87	100

Notes:
①Part No. with suffix of "A2S" means chassis mounting and suffix of "A4S" means DIN-Rail mounting (e.g. URF2405LP-10WR3A2S means chassis mounting; URF2405LP-10WR3A4S means DIN-Rail mounting);
②Absolute maximum rating without damage on the converter, but it isn't recommended;
③Efficiency is measured In nominal input voltage and rated output load;A2S (wiring) and A4S (rail) Model due to input reverse polarity protection, minimum efficiency greater than Min.-2 is qualified.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Input Current (full load / no-load)	24VDC input	--	508/5	521/12	mA
	48VDC input	--	254/4	261/12	
Reflected Ripple Current	24VDC input	--	40	--	
	48VDC input	--	30	--	
Input impulse Voltage (1sec. max.)	24VDC input	-0.7	--	50	VDC
	48VDC input	-0.7	--	100	
Starting Voltage	24VDC input	--	--	9	
	48VDC input	--	--	18	

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Input under-voltage Protection	24VDC input	5.5	6.5	--	VDC
	48VDC input	14.0	15.5	--	
Starting Time	Nominal input& constant resistance load	--	10	--	ms
Input Filter		Pi filter			
Hot Plug		Unavailable			
Ctrl*	Module switch on	Ctrl suspended or connected to TTL high level (3.5-12VDC)			
	Module switch off	Ctrl pin connected to GND or low level (0-1.2VDC)			
	Input current when switched off	--	5	8	mA

Note: * the voltage of Ctrl pin is relative to input pin GND.

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Output Voltage Accuracy		--	±1	±3	%
Line Regulation	Full load, the input voltage is from low voltage to high voltage	--	±0.2	±0.5	
Load Regulation	0%-100% load	--	±0.5	±1	
Transient Recovery Time	25% load step change	--	300	500	μs
Transient Response Deviation		--	±3	±5	%
Temperature Drift Coefficient	Full load	--	--	±0.03	%/°C
Ripple&Noise*	20MHz bandwidth, 5%-100% load	--	50	120	mV p-p
Over-voltage Protection	Input voltage range	110	130	160	%Vo
Over-current Protection		110	140	190	%Io
Short circuit Protection		Continuous, self-recovery			

Note: *Ripple and noise are measured by "parallel cable" method, please see DC-DC Converter Application Notes for specific operation.
0%-5% load ripple&Noise is no more than 5%Vo.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Insulation Voltage	Input-output, with the test time of 1 minute and the leak current lower than 1mA	3000	--	--	VDC
Insulation Resistance	Input-output, insulation voltage 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output, 100KHz/0.1V	--	500	--	pF
Operating Temperature	Derating if the temperature is ≥71°C (see Fig. 1)	-40	--	+85	°C
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Lead Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	+300	°C
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency*	PWM mode	--	350	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Note: * This series of products using reduced frequency technology, the switching frequency is test value of full load,When the load is reduced to below 50%, the switching frequency decreases with decreasing load.

Physical Specifications

Casing Material		Plastic (UL94-V0)
Package Dimensions	Horizontal package	51.50*26.50*12.00 mm
	A2S wiring package	76.00*31.50*21.20 mm
	A4S rail package	76.00*31.50*25.80 mm
Weight	Horizontal package/A2S wiring package/A4S rail package	24.00g/46.00g/66.00g (Typ.)
Cooling method	Free air convection	

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EMC Specifications

EMI	CE	CISPR22/EN55022	CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
	RE	CISPR22/EN55022	CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
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 (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5	±2KV (see Fig.3-①for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s	perf. Criteria A
	Voltage dips, short interruptions and voltage variations immunity	IEC/EN61000-4-29	0-70%	perf. Criteria B

Product Characteristic Curve

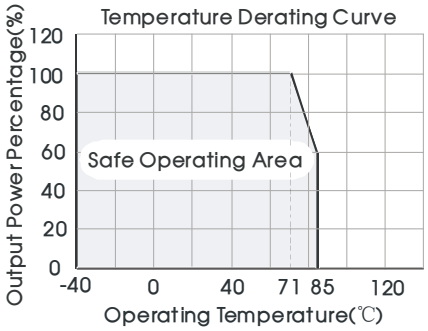
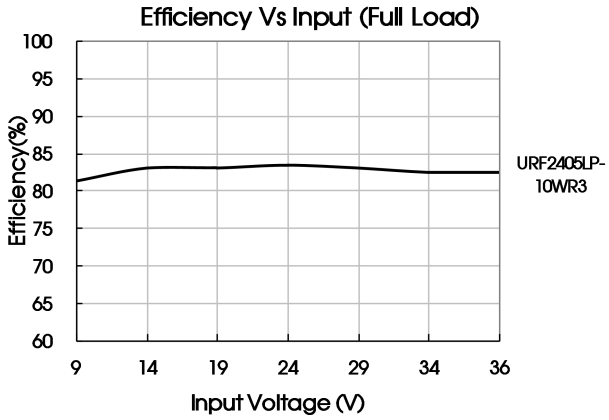
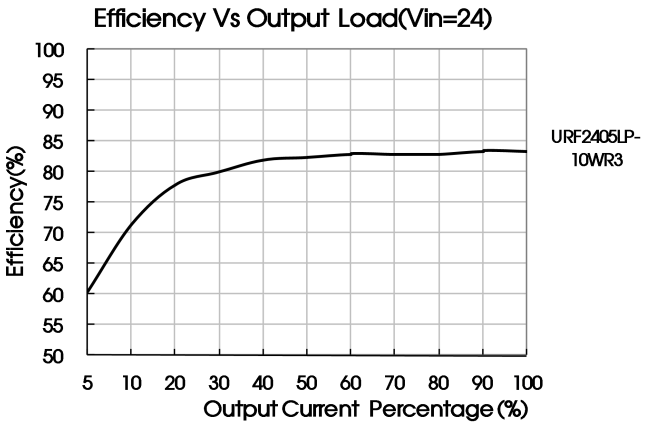
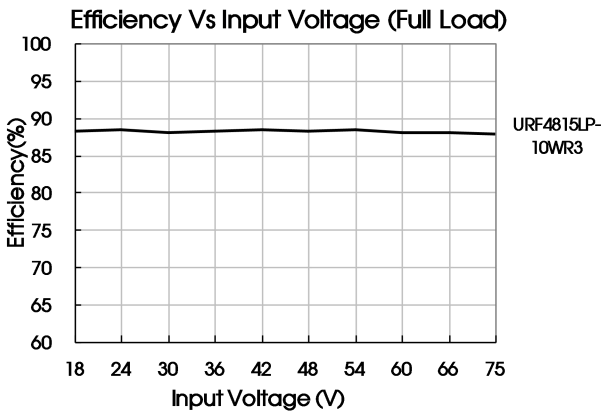
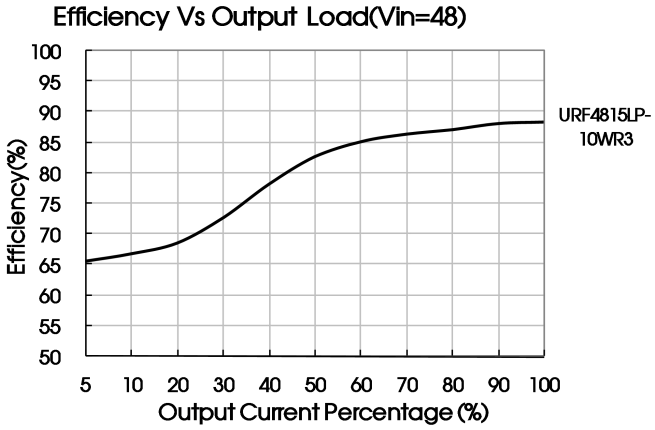


Fig. 1









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Design Reference

1. Typical application

All the DC/DC converters of this series are tested according to the recommended circuit (see Fig. 2) before delivery.
If it is required to further reduce input and output ripple, properly increase the input & output of additional capacitors Cin and Cout or select capacitors of low equivalent impedance provided that the capacitance is no larger than the max. capacitive load of the product.

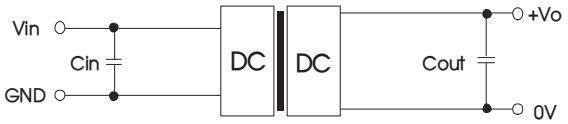
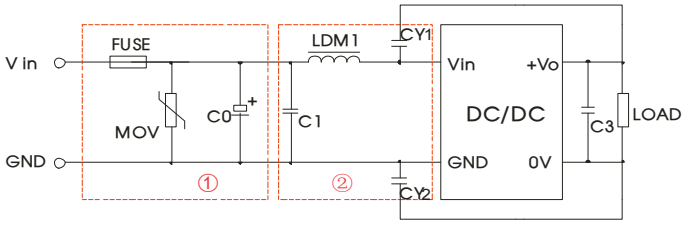


Fig. 2

Cin	Cout
10μF ~ 47μF	10μF

2. EMC solution-recommended circuit

24VDC input



48VDC input

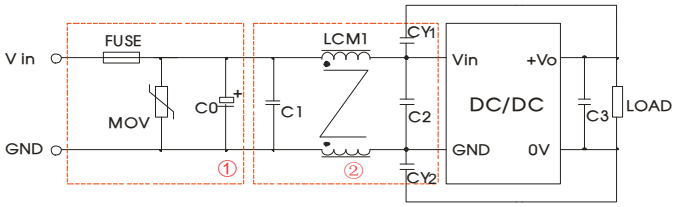


Fig. 3

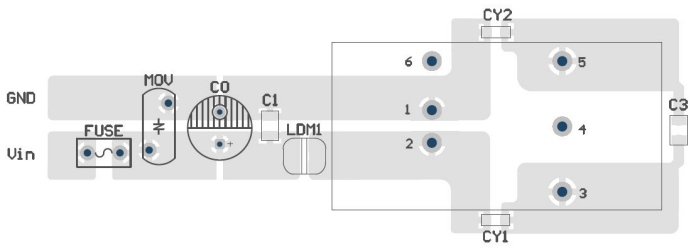
Notes: Part ① in the Fig. 3 is used for EMS test and part ② for EMI filtering; selected based on needs.

Parameter description:

Model	Vin:24V	Vin:48V
FUSE	Choose according to actual input current	
MOV	S14K35	S14K60
C0	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	--	1μF/100V
LDM1	4.7μH	--
LCM1	--	6.8mH
C3	Refer to the Cout in Fig.2	
CY1	1nF/3KV	
CY2	1nF/3KV	

EMC solution-recommended circuit PCB layout

24VDC 输入



48VDC 输入

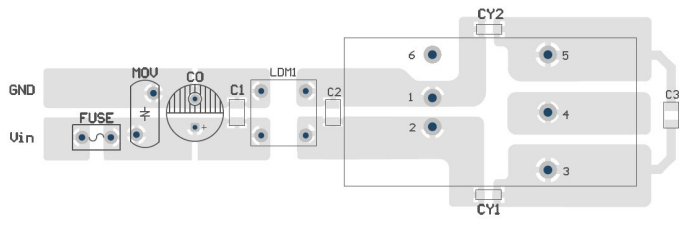


Fig. 4

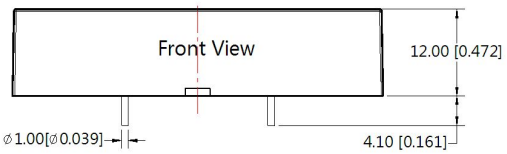
Note: the min. distance of the bonding pads between input & output isolation capacitors (CY1/CY2) shall be ≥ 2mm.

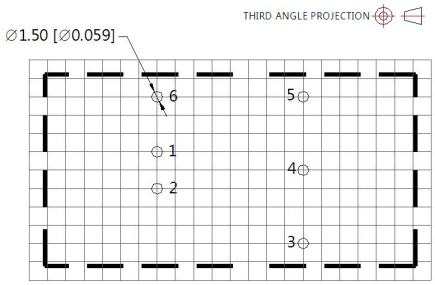
3. It is not allowed to connect modules output in parallel to enlarge the power

4. For more information please find DC-DC converter application notes on www.mornsun-power.com

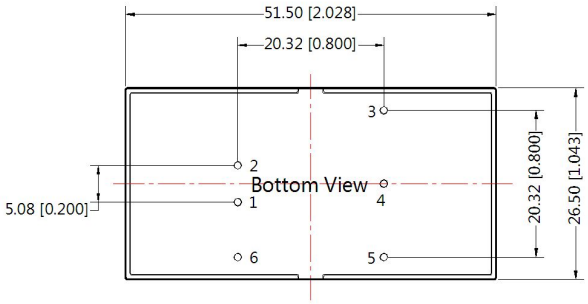
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Dimensions and Recommended Layout





Note : Grid 2.54*2.54mm

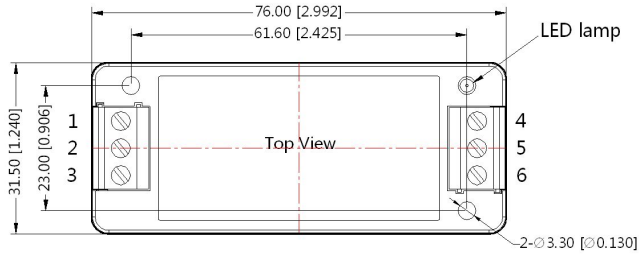


Note:
Unit :mm[inch]
Pin diameter tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]

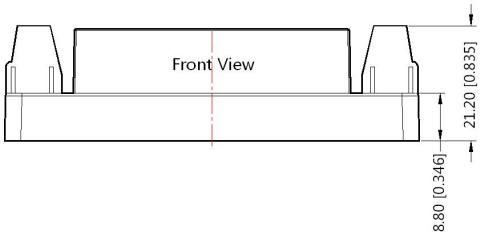
Pin-Out	
Pin	Function
1	GND
2	Vin
3	+Vo
4	No Pin
5	0V
6	Ctrl

URF_LP-10WR3A2S Dimensions





Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	NC	+Vo

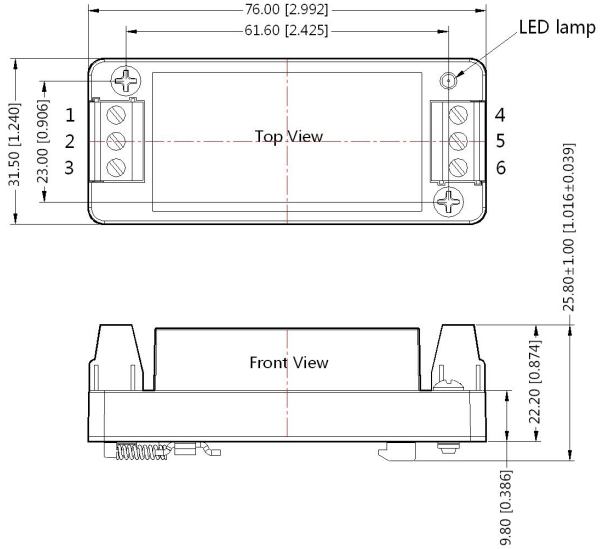


Note:
Unit:mm[inch]
Wire range : 24~12 AWG
General tolerances:±0.50[±0.020]

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URF_LP-10WR3A4S Dimensions

THIRD ANGLE PROJECTION



Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	NC	+Vo

Note:
Unit:mm[inch]
Wire range：24~12 AWG
General tolerances:±0.50[±0.020]

Notes:
1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com. Packing Bag Number: 58210039(DIP), 58220022(A2S/A4S package);
2. The maximum capacitive load offered were tested at nominal input voltage and full load;
3. Unless otherwise specified, parameters in this datasheet were measured under the conditions of Ta=25℃, humidity<75% with nominal input voltage and rated output load;
4. All index testing methods in this datasheet are based on our Company's corporate standards;
5. The performance parameters of the product models listed in this manual are as above, but some parameters of non-standard model products may exceed the requirements mentioned above. Please contact our technicians directly for specific information;
6. We can provide product customization service;
7. Specifications are subject to change without prior notice.

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