20W,Ultra wide input, isolated & regulated single output , DIP package, DC-DC converter

3 years Warranty

FEATURES

- Ultra wide input voltage range (4:1)
- High efficiency up to 89%
- No-load power consumption as low as 0.12W
- Isolation voltage :3K VDC
- Input under-voltage protection, output short circuit, over-voltage, Over-current protection
- Operating temperature range: -40℃ to +85℃
- Meet CISPR22/EN55022 CLASS A
- Reverse voltage protection available with A2S(Chassis mounting) or A4S(DIN-Rail mounting)
- IEC60950, UL60950, EN60950 approval
- International standard pin-out

c UL us CB CE Patent Protection RoHS

URF_LP-20WR3 series are isolated 20W DC-DC products with 4:1 input voltage. They feature efficiency up to 89%, 3000VDC 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 power industry, data transmission device, battery power supply device, tele-comunication device, distributed power supply system, remote control system, industrial robot system etc. And extension package A2S and A4S also enable them with reverse voltage protection.

Selection Guide

Certification	Part No. ①	Input Voltage (VDC)		Output		Efficiency③ (%,Min./Typ.) @ Full Load	Max. Capacitive Load(μF)
		Nominal (Range)	Max.②	Output Voltage (VDC)	Output Current (mA) (Max./Min.)		
UL/CE/CB	URF2403LP-20WR3	24 (9-36)	40	3.3	5000/0	84/86	10000
	URF2405LP-20WR3			5	4000/0	87/89	10000
	URF2409LP-20WR3			9	2222/0	86/88	4700
	URF2412LP-20WR3			12	1667/0	86/88	1600
	URF2415LP-20WR3			15	1334/0	87/89	1000
	URF2424LP-20WR3			24	833/0	87/89	500
	URF4803LP-20WR3	48 (18-75)	80	3.3	5000/0	84/86	10000
	URF4805LP-20WR3			5	4000/0	86/88	10000
	URF4812LP-20WR3			12	1667/0	86/88	1600
	URF4815LP-20WR3			15	1334/0	87/89	1000
	URF4824LP-20WR3			24	833/0	87/89	500

Notes:
① product model with a suffix of "A2S" means chassis mounting and that with a suffix of "A4S" indicates DIN-Rail mounting (e.g. URF2405LP-20WR3A2S means chassis mounting; URF2405LP-20WR3A4S 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	3.3V output	--	799/40	819/45	mA
		5V output	--	936/40	958/45	
		Other output	--	947/9	969/12	
	48VDC input	3.3V output	--	400/20	410/25	
		5V output	--	473/20	485/25	
		Other output	--	473/5	485/8	
Reflected Ripple Current	24VDC input		--	30	--	
	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	
under-voltage turn-off	24VDC input	5.5	6.5	--	
	48VDC input①	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	--	4	7	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	0%-100% load		--	±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		3.3V,5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Drift Coefficient	Full load		--	--	±0.03	%/℃
Ripple & Noise*	20MHz bandwidth,5%-100% load		--	50	100	mV p-p
Over-voltage Protection	Input voltage range		110	--	160	%Vo
Output Voltage Regulation Trim			--	±10	--	%Vo
Over-current Protection			110	--	190	%Io
Short circuit Protection			Hiccup, 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 ≥55℃ (see Fig. 1)	-40	--	+85	℃
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Welding Resistance Temperature	Welding spot is 1.5mm away from the casing, 10 seconds	--	--	+300	℃
Vibration		10-55Hz, 10G, 30 Min. along X, Y and Z			
Switching Frequency *	PWM mode	--	270	--	KHz
MTBF	MIL-HDBK-217F@25℃	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

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
	Immunities of voltage dip, drop and short interruption	IEC/EN61000-4-29 0-70%	perf. Criteria B

Product Characteristic Curve

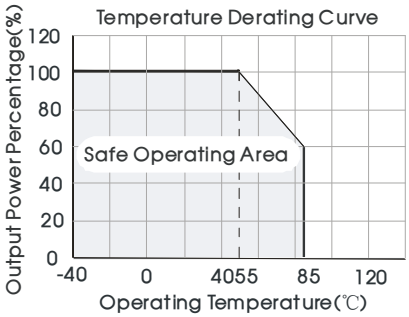
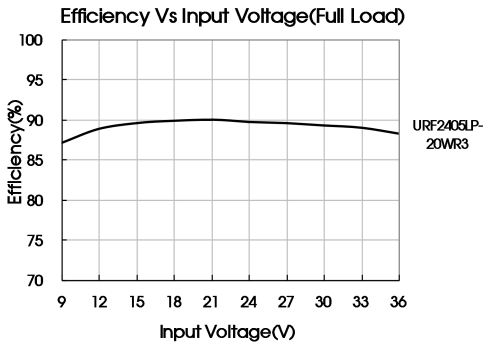
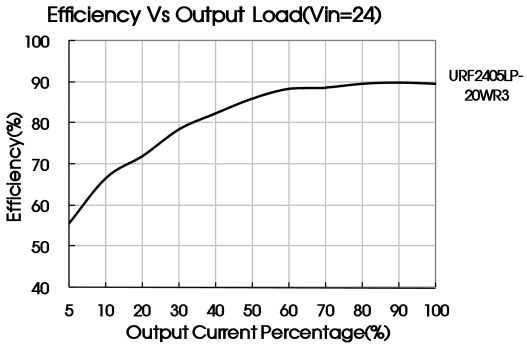
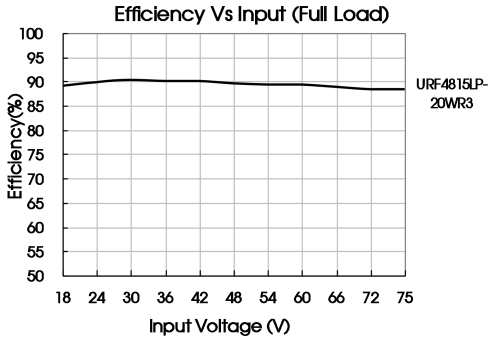
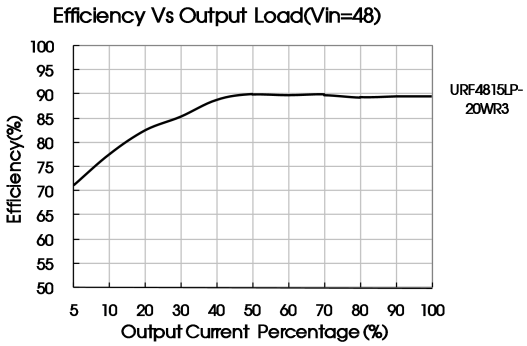


Fig. 1









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.

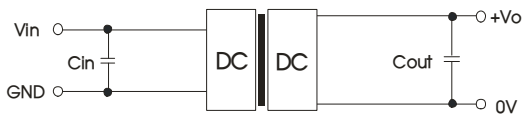


Fig. 2

Vin(VDC)	Cout(μF)	Cin(μF)
3.3/5	470	100
9/12/15	220	
24	100	

2. EMC solution-recommended circuit

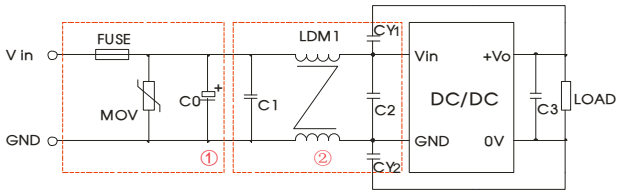


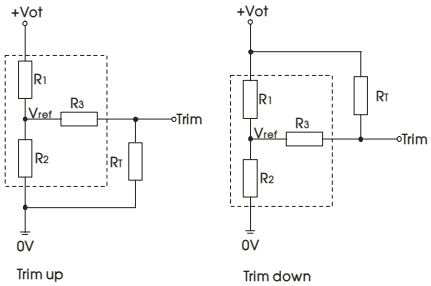
Fig. 3

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	S20K30	S14K60
C0	330μF/50V	330μF/100V
C1/C2	1μF/50V	1μF/100V
C3	Refer to the Cout in Fig.2	
LDM1	6.8mH	
CY1	1nF/3KV	
CY2	1nF/3KV	

3. Application of Trim and calculation of Trim resistance



Applied circuits of Trim (Part in broken line is the interior of models)

Calculation formula of Trim resistance:

$$\text{up:}\quad R_T=\frac{aR_2}{R_2-a}-R_3 \qquad a=\frac{V_{ref}}{V_o'-V_{ref}}\cdot R_1$$

$$\text{down:}\quad R_T=\frac{aR_1}{R_1-a}-R_3 \qquad a=\frac{V_o'-V_{ref}}{V_{ref}}\cdot R_2$$

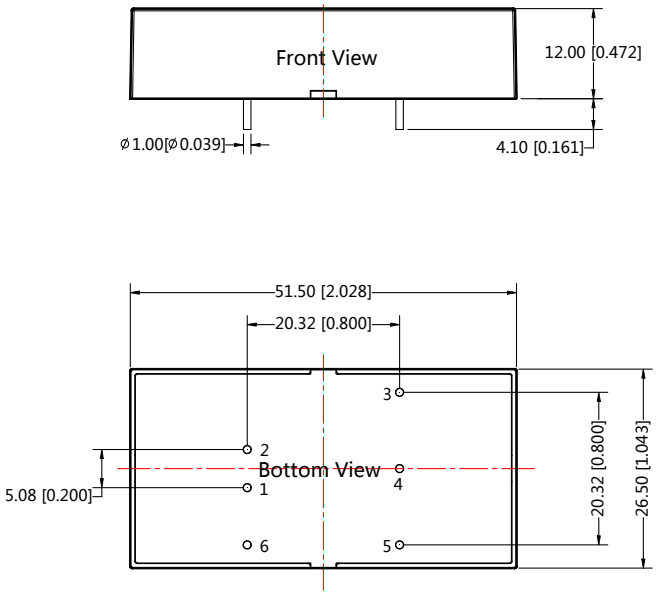
R_T is Trim resistance
a is a self-defined parameter, with no real meaning.

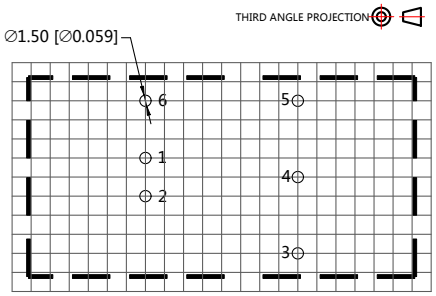
Vout(V)	R1(KΩ)	R2(KΩ)	R3(KΩ)	Vref(V)
3.3	4.801	2.87	12.4	1.25
5	2.883	2.87	10	2.5
9	7.500	2.87	15	2.5
12	11.000	2.87	15	2.5
15	14.494	2.87	15	2.5
24	24.872	2.87	17.8	2.5

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

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

Dimensions and Recommended Layout



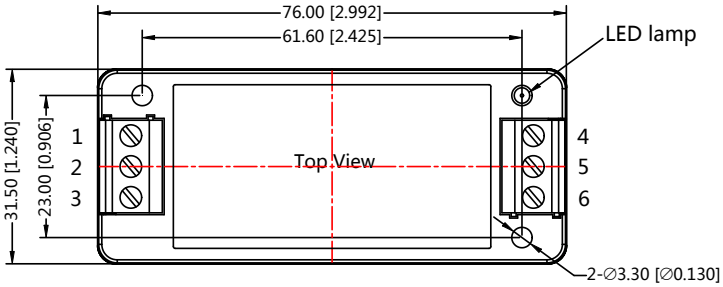


Note : Grid 2.54*2.54mm

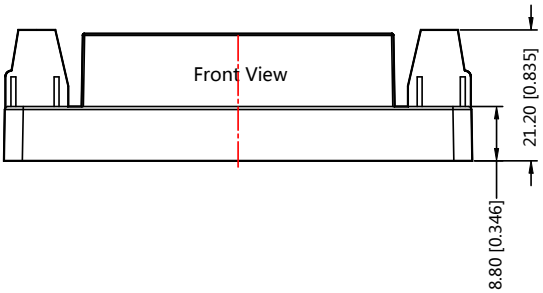
Pin-Out	
Pin	Function
1	GND
2	Vin
3	+Vo
4	Trim
5	0V
6	Ctrl

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

URF_LP-20WR3A2S Dimensions

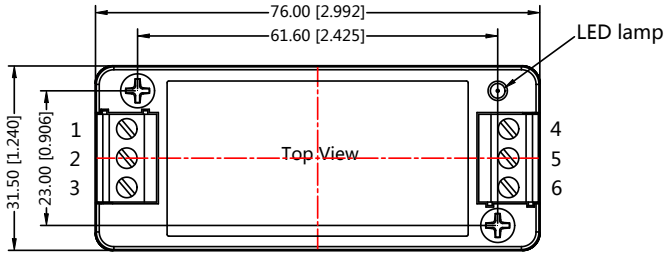


Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	Trim	+Vo

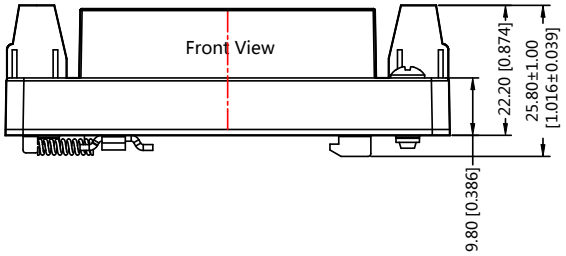


Note:
Unit:mm[inch]
Wire range : 24~12 AWG
General tolerances:±0.50[±0.020]

URF_LP-20WR3A4S Dimensions



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



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

Note:
1. Packing information please refer to Product Packing Information which can be downloaded from www.mornsun-power.com.The Packing bag number of Horizontal package : 58210039, the Packing bag number of A2S/ A4S package:58220022;
2. Recommend to use module with more than 5% load, if not, the ripple of the product may exceeds the specification, but does not 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%RH 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.

Mornsun Guangzhou Science & Technology Co., Ltd.
Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Luogang District, Guangzhou, P. R. China
Tel: 86-20-38601850-8801 Fax: 86-20-38601272 E-mail: info@mornsun.cn