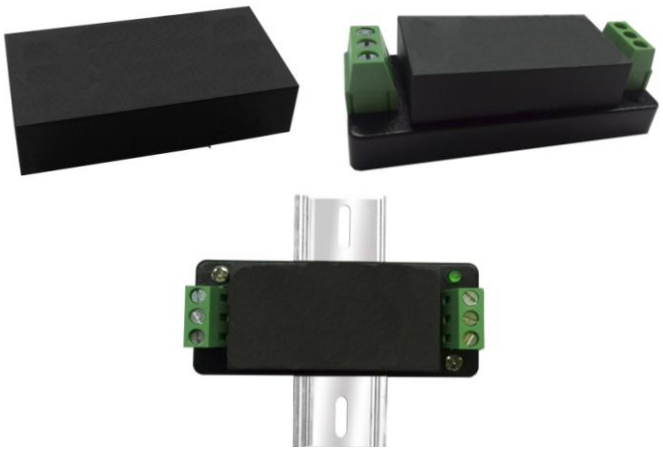
DC/DC Converter
SURF_LP-10WR3 Series

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



FEATURES

- **Wide range of input voltage (4:1)**
- **Efficiency up to 87%**
- No-load power consumption as low as 0.2W
- **Isolation voltage :3K VDC**
- **Operating temperature range: -40℃ to +85℃**
- **Input under-voltage protection, output over-voltage protection, short circuit protection, output over-current protection**
- **Meet CISPR22/EN55022 CLASS A**
- **International standard pin-out**
- **A2S (wring mounting) and A4S (TS35 rail mounting) products featuring anti-reverse connection for input**

SURF_LP-10WR3 series products are of 10W output power, extremely wide range of voltage input of 9-36VDC, 18-75VDC, isolation voltage of 3000VDC, Input under-voltage protection, output over-voltage protection、output short circuit protection and output over-current protection with the bare component in compliance with CISPR22/EN55022 CLASS A; these products are widely used in fields such as industrial control, electric power, instruments and communication.

Selection Guide

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.)		
SURF2403LP-10WR3	24 (9-36)	40	3.3	2400/120	77/79	5400
SURF2405LP-10WR3			5	2000/100	80/82	5400
SURF2409LP-10WR3			9	1111/56	83/85	680
SURF2412LP-10WR3			12	833/42	84/86	470
SURF2415LP-10WR3			15	667/33	85/87	330
SURF2424LP-10WR3			24	416/21	85/87	100
SURF4803LP-10WR3	48 (18-75)	80	3.3	2400/120	77/79	5400
SURF4805LP-10WR3			5	2000/100	80/82	5400
SURF4812LP-10WR3			12	833/42	84/86	470
SURF4815LP-10WR3			15	667/33	85/87	330
SURF4824LP-10WR3			24	416/21	85/87	100

Notes:
①Part No. with suffix of "A2S" means chassis mounting and suffix of "A4S" means DIN-Rail mounting (e.g. SURF2405LP-10WR3A2S means chassis mounting; SURF2405LP-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	--	mA
	48VDC input	--	254/4	--	
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	
Input under-voltage Protection	24VDC input	5.5	6.5	--	
	48VDC input	14.0	15.5	--	
Starting Time	Nominal input& constant resistance load	--	10	--	ms

Input Filter		Pi filter			
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	5%-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	%/℃
Ripple&Noise*	20MHz bandwidth	--	50	120	mV p-p
Output Over-voltage Protection	Input voltage range	110	130	160	%Vo
Output Over-current Protection		110	140	190	%Io
Output Short circuit Protection		Continuous, self-recovery			
Note: * Ripple and noise tested with "parallel cable" method, please see *DC-DC Converter Application Notes* for specific operation methods.					

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	℃
Storage Temperature		-55	--	125	℃
Storage Humidity	Non-condensing	5	--	95	%RH
Max. Operating Temperature for casing	Within the operating temperature curve	--	--	105	℃
Lead 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	--	350	--	KHz
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

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	Conducted disturbance	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
	Radiated emission	CISPR22/EN55022 CLASS A (Bare component)/ CLASS B (see Fig.3-② for recommended circuit)	
EMS	Electrostatic discharge	IEC/EN61000-4-2 Contact ±4KV	perf. Criteria B
	Radiation immunity	IEC/EN61000-4-3 10V/m	perf. Criteria A
EMS	EFT	IEC/EN61000-4-4 ±2KV (see Fig.3-① for recommended circuit)	perf. Criteria B
	Surge immunity	IEC/EN61000-4-5 ±2KV (see Fig.3-①for recommended circuit)	perf. Criteria B
	Conducted disturbance immunity	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

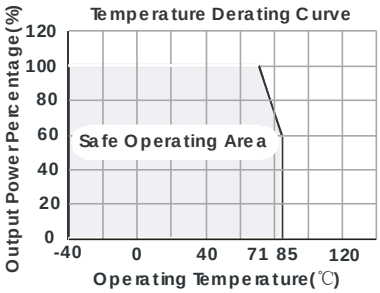
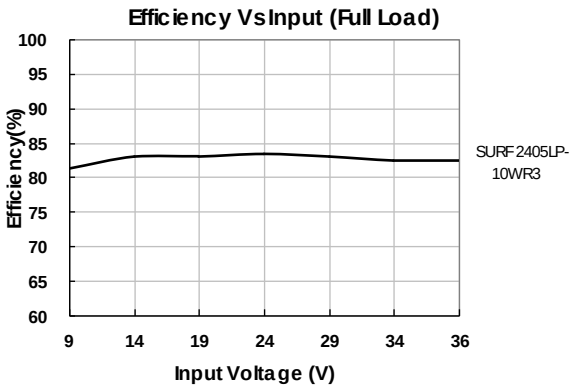
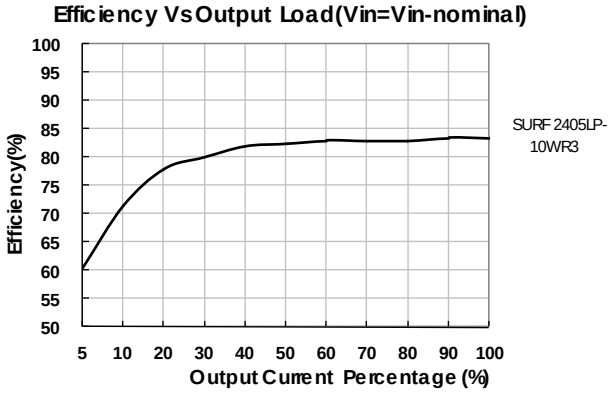
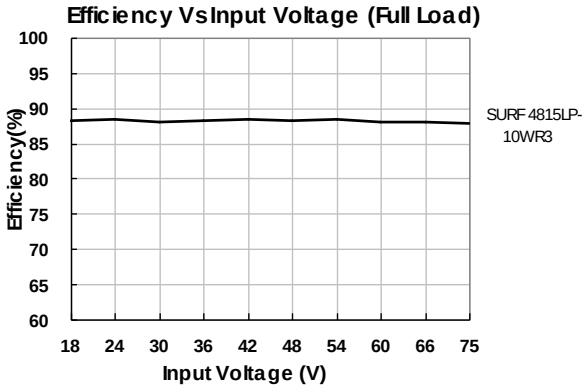
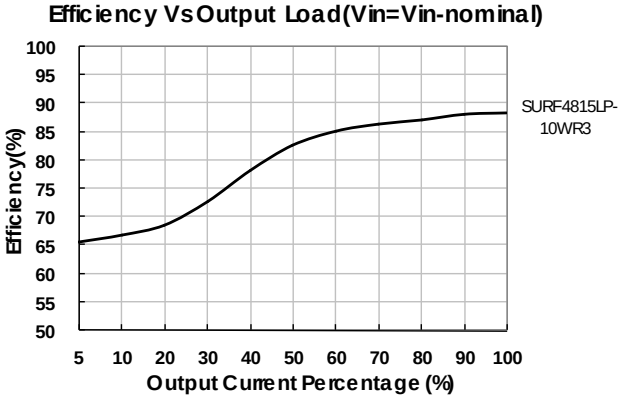


Fig. 1









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.

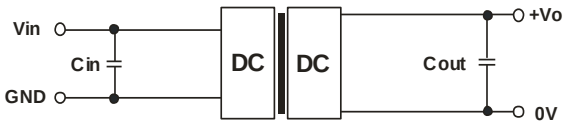


Fig. 2

Cin	Cout
10μF ~ 47μF	10μF

2. EMC solution-recommended circuit

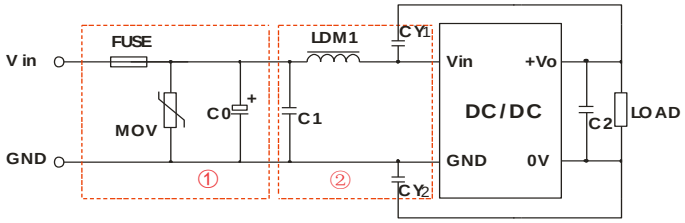


Fig. 3

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	S14K35	S14K60
C0	330μF/50V	330μF/100V
C1	1μF/50V	1μF/100V
C2	Refer to the Cout in Fig.2	
LDM1	4.7μH	
CY1	1nF/3KV	
CY2	1nF/3KV	

EMC solution-recommended circuit PCB layout

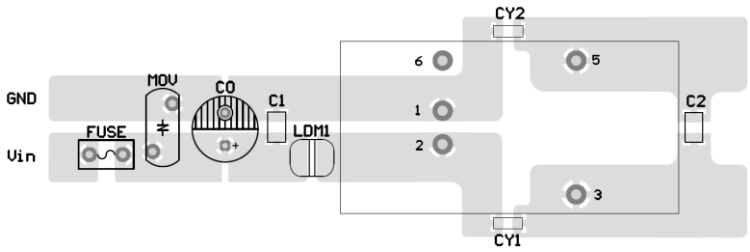
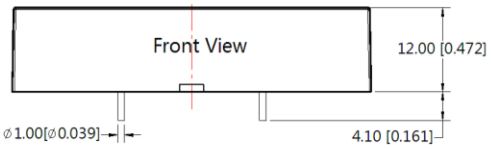


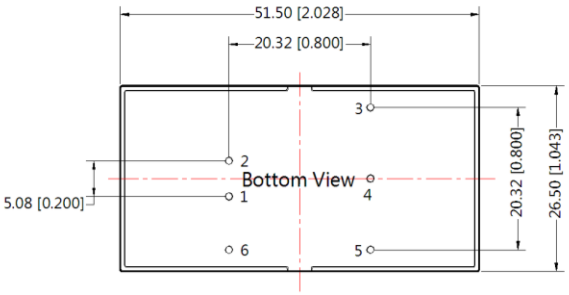
Fig. 4

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

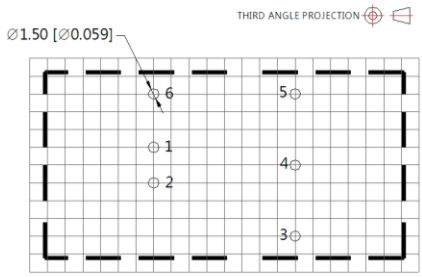
3. The product does not support output in parallel with power per liter or hot-plug use

Dimensions and Recommended Layout





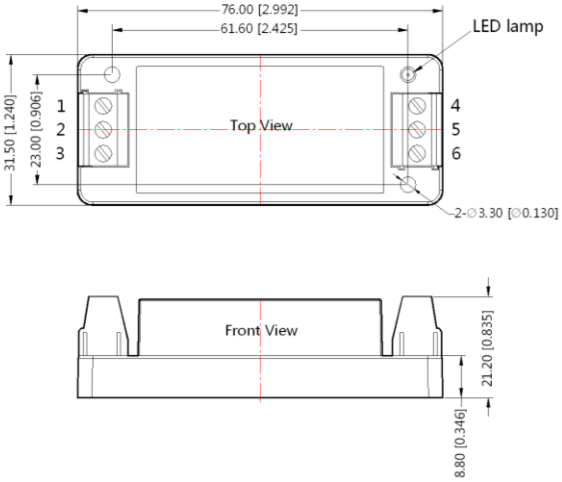
Note:
Unit :mm[inch]
Pin diameter tolerances :±0.10[±0.004]
General tolerances:±0.50[±0.020]



Note : Grid 2.54*2.54mm

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

SURF_LP -10WR3A2S Dimensions

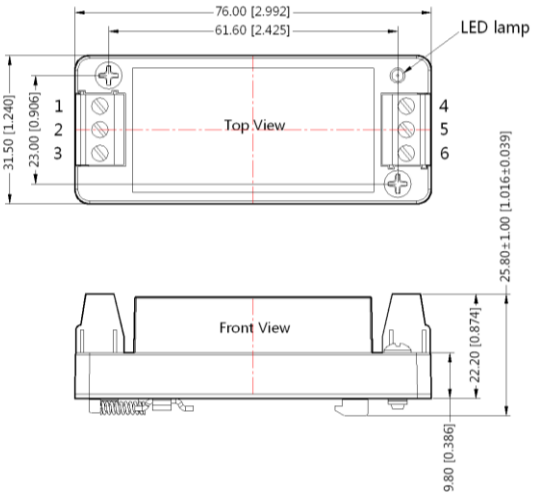


Pin-Out						
Pin	1	2	3	4	5	6
Function	Ctrl	GND	Vin	0V	NC	+Vo

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

SURF_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]

Note:

1. Recommended used in more than 5% load, if the load is lower than 5%, then the ripple index of the product may exceed the specification, but does not affect the reliability of the product.
2. The max. capacitive load should be tested within the input voltage range and under full load conditions;
3. Unless otherwise specified, data in this datasheet should be tested under the conditions of Ta=25℃, humidity<75% when inputting nominal voltage and outputting rated load;
4. All index testing methods in this datasheet are based on our Company's corporate standards;
5. 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 directly contact our technicians for specific information;
6. We can provide product customization service;
7. Specifications of this product are subject to changes without prior notice.