

DC/DC Converter

SU/SVRH_P-3WR3 Series



3W isolated DC-DC converter in DIP package
Wide input and regulated single output



FEATURES

- Wide input voltage range
- High efficiency up to 80%
- No-load power consumption as low as 0.1W
- Operating ambient temperature range: -40°C to +105°C
- Reinforced insulation, I/O isolation test voltage 4.4k VAC/6.2k VDC, 2MOPP high isolation
- Transformer creepage 8mm, Transformer clearance 8mm
- Low leakage current < 5 μA
- Input under-voltage protection, output short-circuit, over-current, over-voltage protection
- Industry standard pin-out
- Meets 2xMOPP EN60601-1 third edition medical certification standard
- Meets UL/EN62368 standard

SU/SVRH_P-3WR3 series of isolated 3W DC-DC products with a wide input voltage range. They feature efficiencies of up to 80%, 4400VAC/6200VDC input to output isolation, input under-voltage, output over-voltage, over-current, short-circuit protection. The products meet CLASS B of CISPR32/EN55032 EMI standards by adding the recommended external components, meets EN60601-1 third edition medical certification standard. They are widely used in high isolation required area such as medical application.

Selection Guide

Certification	Part No.	Input Voltage (VDC)		Output		Full Load Efficiency (%) Min./Typ.	Capacitive Load (μF) Max.
		Nominal (Range)	Max. ^①	Voltage (VDC)	Current (mA) Max./Min.		
--	SVRH0505P-3WR3	5 (4.5-9)	12	5	600/0	68/70	330
	SVRH0512P-3WR3			12	250/0	72/74	220
	SVRH0515P-3WR3			15	200/0	73/75	100
	SVRH0524P-3WR3			24	125/0	72/74	47
	SURH2405P-3WR3	24 (9-36)	40	5	600/0	73/75	470
	SURH2412P-3WR3			12	250/0	77/79	330
	SURH2415P-3WR3			15	200/0	78/80	220
	SURH2424P-3WR3			24	125/0	77/79	100

Note: ① Exceeding the maximum input voltage may cause permanent damage.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Input Current (full load / no-load)	Nominal input voltage	SVRH05xxP-3WR3 series	--	858/20	883/40	mA
		SURH24xxP-3WR3 series	--	167/4	172/10	
Reflected Ripple Current	Nominal input voltage	--	200	--		
Surge Voltage (1sec. max.)	SVRH05xxP-3WR3 series	-0.7	--	16	VDC	
	SURH24xxP-3WR3 series	-0.7	--	50		
Start-up Voltage	SVRH05xxP-3WR3 series	--	--	4.5	VDC	
	SURH24xxP-3WR3 series	--	--	9		
Under-voltage Protection	SVRH05xxP-3WR3 series	2.5	--	--	VDC	
	SURH24xxP-3WR3 series	5.5	--	--		
Input Filter		C filter				
Hot Plug		Unavailable				

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Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit	
Voltage Accuracy		--	±1	±3	%	
Linear Regulation	Input voltage variation from low to high at full load	--	±0.2	±0.5		
Load Regulation	Nominal input voltage, 0%-100% load	--	±0.5	±1		
Transient Recovery Time	25% load step change, nominal input voltage	--	300	500	μs	
Transient Response Deviation	25% load step change, nominal input voltage	5V output	--	±5	±8	%
		Others	--	±3	±5	
Temperature Coefficient	Full load	--	--	±0.03	%/°C	
Ripple & Noise ^②	20MHz bandwidth, 5%-100% load	--	100	200	mVp-p	
Over-voltage Protection		110	--	160	%Vo	
Over-current Protection		110	160	260	%Io	
Short-circuit Protection		Continuous, self-recovery				

Notes: ①The "Tip and barrel" method is used for ripple and noise test, please refer to DC-DC Converter Application Notes for specific information.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Isolation	Input-output Electric Strength test for 1 minute with a leakage current of 1mA max.	4400	--	--	VAC
		6200	--	--	VDC
Insulation Resistance	Input-output resistance at 500VDC	1000	--	--	MΩ
Isolation Capacitance	Input-output capacitance at 100KHz/0.1V	--	15	--	pF
Patient Leakage Current	240VAC/60Hz	--	3.6	5	uA
Reinforced Insulation	Transformer creepage	8.0	--	--	mm
	Transformer clearance	8.0	--	--	
Operating Temperature	See Fig. 1	-40	--	+105	°C
Storage Temperature		-55	--	+125	
Storage Humidity	Non-condensing	5	--	95	%RH
Pin Soldering Resistance Temperature	Wave-soldering (Soldering time: 10s)	--	--	260	°C
	Soldering spot is 1.5mm away from case for 10 seconds	--	--	300	
Vibration		10-150Hz, 5G, 0.75mm, along X, Y and Z			
Switching Frequency	PWM mode	--	330	--	KHz
Isolation Protection Class	240VAC/60Hz	2xMOPP			
MTBF	MIL-HDBK-217F@25°C	1000	--	--	K hours

Mechanical Specifications

Case Material	Black plastic; flame-retardant and heat-resistant (UL94-V0)
Dimensions	31.60 x 20.30 x 10.20 mm
Weight	13.0g(Typ.)
Cooling Method	Free air convection(20LFM)

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig.3 for recommended circuit)		
	RE	CISPR32/EN55032 CLASS B (see Fig.3 for recommended circuit)		
Immunity	ESD	IEC/EN61000-4-2	Contact ±6kV	perf. Criteria B
	RS	IEC/EN61000-4-3	10V/m	perf. Criteria A
	EFT	IEC/EN61000-4-4	±2KV, 5KHz/100KHz (see Fig.3 for recommended circuit)	perf. Criteria A
	Surge	IEC/EN61000-4-5	line to line ±2KV (see Fig.3 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6	10 Vr.m.s	perf. Criteria A

Typical Characteristic Curves

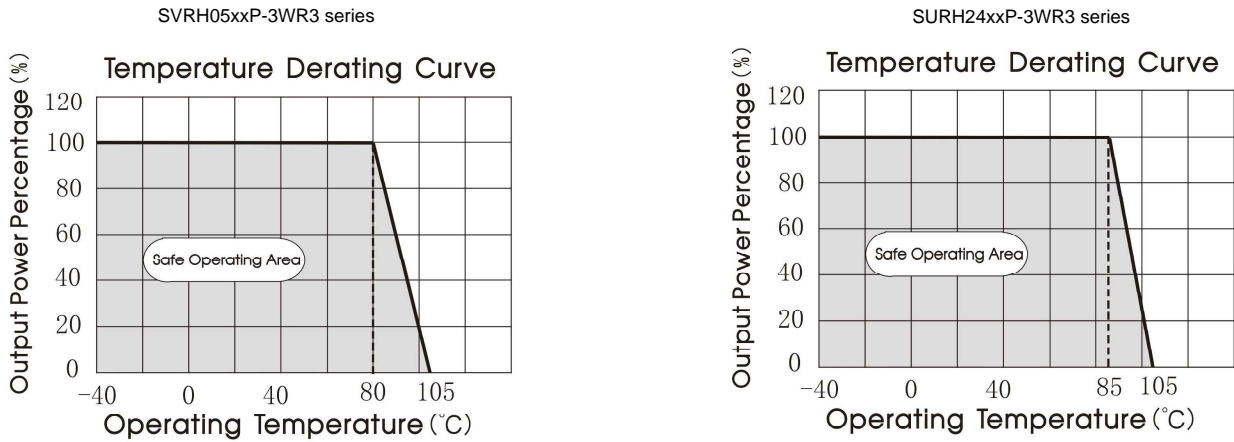


Fig. 1

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 C_{in} and C_{out} 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.



Fig. 2

Vout	Cout	Cin
5VDC	10 μ F/16V	100 μ F/50V
12VDC	10 μ F/25V	
15VDC	10 μ F/25V	
24VDC	10 μ F/50V	

2. EMC compliance circuit

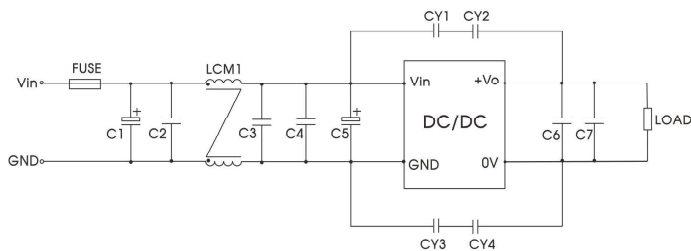


Fig. 3

Parameter description

Model	Vin: 5VDC	Vin: 24VDC
FUSE	Choose according to actual input current	
C1	2200 μ F/35V	1000 μ F/63V
C2/C3/C4	4.7 μ F/50V	
C5	100 μ F/50V	220 μ F/50V
C6/C7	10 μ F/50V	
LCM1	4.7mH, recommended to use SFL2D-30-472	
CY1/CY2/CY3/CY4	Y1: 471K/400VAC	

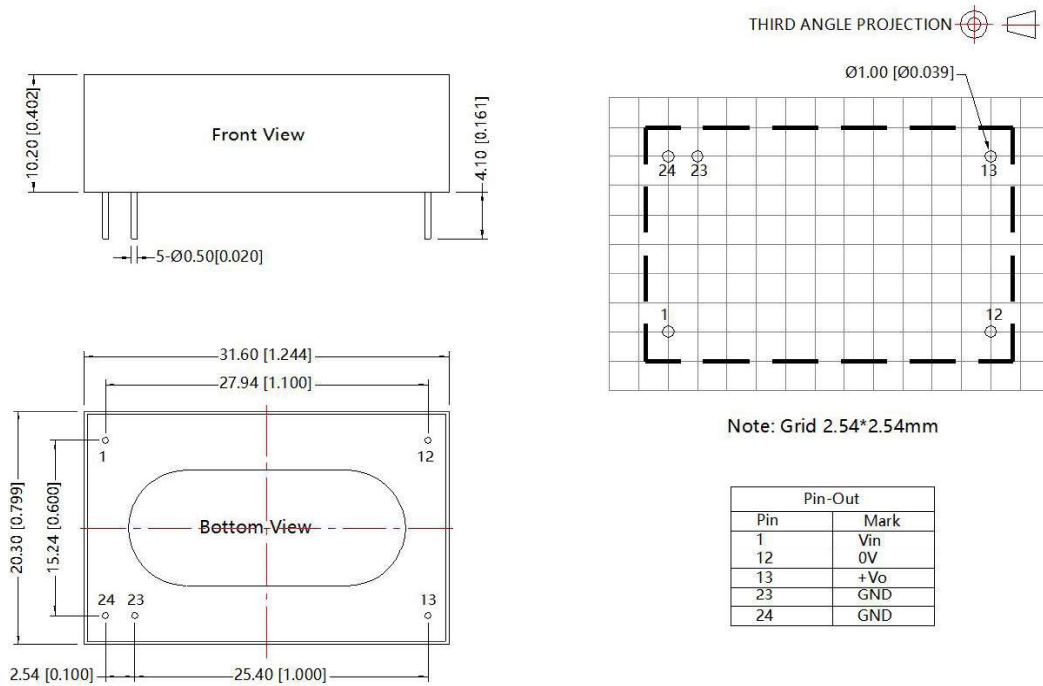
Notes: The patient leakage current is 50 μ A(Typ.) after adding EMC compliance circuit.

3. The products do not support parallel connection of their output

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SU/SVRH_P-3WR3 Dimensions and Recommended Layout



Note:
 Unit: mm[inch]
 Pin diameter tolerances: $\pm 0.10[\pm 0.004]$
 General tolerances: $\pm 0.50[\pm 0.020]$

Note:

1. The maximum capacitive load offered were tested at input voltage range and full load;
2. Unless otherwise specified, parameters in this datasheet were measured under the conditions of $T_a=25^\circ\text{C}$, humidity<75%RH with nominal input voltage and rated output load;
3. All index testing methods in this datasheet are based on company corporate standards;
4. We can provide product customization service, please contact our technicians directly for specific information;
5. Products are related to laws and regulations: see "Features" and "EMC";
6. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.