DC/DC Converter

SHO1-P(N)xxxxH-xxB/C/D/F Series

Non-isolated DC-DC converter

Fixed input voltage and regulated adjustable single output

CE Patent Protection RoHS

FEATURES

- No-load input current as low as 8mA
- Continuous output voltage with linear adjustable function
- Six-sided metal shielding package, output ripple as low as 10mV
- Output voltage with high stability, low time coefficient and temperature coefficient
- Operating ambient temperature range: -25℃ to +71℃
- Input reverse polarity protection, control voltage over-voltage protection
- Output short-circuit protection, over-current protection
- EMI meet CISPR32/EN55032 CLASS B
- EN62368 approved

SHO1-P(N)xxxxH-xxB/C/D/F series offer 0.625W-1.25W of output, with operating ambient temperature range -25℃ to +71℃, input reverse polarity protection, control voltage over-voltage protection, output short circuit protection, over-current protection, six-sided metal shielding package, low ripple, low time coefficient and temperature coefficient, which are specifically designed for applications in board power systems where high voltages are required and output ripple requirements are high and output voltage stability is critical. They are widely used in fields such as photomultiplier tubes, mass spectrum, light spectrum, electron beam, ion beam, avalanche diodes.

Selection Guide

Certification	Part No.	Input Voltage (VDC) Nominal (Range)	Input Current ① (mA) Full load/No-load Typ.	Input Current ① (mA) Full load/No-load Max.	Output Voltage (VDC) Nominal ②	Output Voltage (VDC) Range	Output Voltage (VDC) Guaranteed range	Current (mA) Max./Min.
--	SHO1-P1251H-1B	5 (4.75-5.25)	390/15	410/20	1250	0~+1250	+200~+1250	1/0
	SHO1-N1251H-1B		390/15	410/20	-1250	0~-1250	-200~-1250	
CE	SHO1-P1251H-0.5C	12 (10.8-13.2)	80/8	90/12	1250	0~+1250	+200~+1250	0.5/0
	SHO1-N1251H-0.5C		80/8	90/12	-1250	0~-1250	-200~-1250	
	SHO1-P1501H-0.5C		90/10	100/15	1500	0~+1500	+200~+1500	
	SHO1-N1501H-0.5C		90/10	100/15	-1500	0~-1500	-200~-1500	
	SHO1-P1251H-0.5D	15 (13.5-16.5)	65/8	75/12	1250	0~+1250	+200~+1250	
	SHO1-N1251H-0.5D		65/8	75/12	-1250	0~-1250	-200~-1250	
	SHO1-P1501H-0.5D		75/10	85/15	1500	0~+1500	+200~+1500	
	SHO1-N1501H-0.5D		75/10	85/15	-1500	0~-1500	-200~-1500	
	SHO1-P1251H-0.5F	24 (21.6-26.4)	40/8	50/12	1250	0~+1250	+200~+1250	
	SHO1-N1251H-0.5F		40/8	50/12	-1250	0~-1250	-200~-1250	

Note:

① At the nominal input voltage and nominal output voltage .

② For SHO1-P(N)xxxxH-1B series when the Vadj control voltage is equal to 2.5VDC (Typ.), the output voltage can be nominal output voltage, and for SHO1-P(N)xxxxH-0.5C/D/F series the Vadj control voltage is equal to 5VDC (Typ.). The relationship curve between output voltage and control voltage is shown in Fig.3.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Reflected Ripple Current ①		--	30	--	mA
Surge Voltage (1sec. max.)	SHO1-P(N)xxxxH-1B series	--	--	10	VDC
	SHO1-P(N)xxxxH-0.5C/D series			18	
	SHO1-P(N)xxxxH-0.5F series			30	
Input Filter Type		PI filter			
Hot Plug		Unavailable			

Note:

① Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.

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Output Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Adjust-point Tolerance	Output voltage guaranteed range, see fig.3		--	±1	±2	%
Reference Voltage Accuracy	0%-100% load, reference 2.56VDC output (for SHO1-P(N)xxxxH-1B series)		--	±1	±2	%
	0%-100% load, reference 5.15VDC output (other series)		--	±1	±2	
Linear Regulation	Input voltage range, nominal output voltage, full load		--	±0.01	±0.03	%
Load Regulation	Nominal input voltage, nominal output voltage, 10%-100% load		--	±0.01	±0.03	
Time Coefficient	Nominal input voltage, nominal output voltage, full load, after warming up for 30 minutes		--	±0.001	±0.003	%/Hr
Temperature Coefficient	Nominal input voltage, nominal output voltage, full load		--	±0.01	±0.02	%/℃
Ripple & Noise①	20MHz bandwidth, nominal input voltage, 0%-100% load	SHO1-P(N)1251H-0.5C/D/F series	--	10	--	mV p-p
		SHO1-P(N)xxxxH-1B series & SHO1-P(N)1501H-0.5C/D series	--	15	--	
Over-current Protection	Input voltage range	SHO1-P(N)xxxxH-1B series	105	110	140	%Io
		Other series	110	140	180	
Short-circuit Protection	Input voltage range		Constant current mode, continuous			
Over-voltage Protection of Vadj②	Input voltage range	SHO1-P(N)xxxxH-1B series	2.5	2.6	2.7	VDC
		Other series	5.1	5.2	5.3	
Maximum allowable voltage of Vadj③	Input voltage range		--	--	10	

Note:
① Please refer to fig.4 for the test method of ripple and noise, the product is working by the linear power source;
② When the Vadj voltage is greater than or equal to the over-voltage protection voltage point of Vadj, the product without output;
③ Vadj voltage can not exceed its maximum allowable voltage of 10V, otherwise the product will be permanently damaged.

General Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Operating Temperature	See Fig. 1	-25	--	+71	℃
Storage Temperature		-40	--	+85	
Storage Humidity	Non-condensing	5	--	85	%RH
Pin Soldering Resistance Temperature	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	Nominal input voltage, full load	--	200	--	KHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	K hours

Mechanical Specifications

Case Material	Aluminum alloy
Dimensions	45.50 x 23.00 x 12.50 mm
Weight	20g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (For SHO1-P(N)xxxxH-xxB/C/D series, with external 10uF/25V X5R MLCC capacitor at the input) (For SHO1-P(N)xxxxH-0.5F series, with external 22uF/50V X5R MLCC capacitor at the input)	
	RE	CISPR32/EN55032 CLASS B (without extra components)	
Immunity	ESD	IEC/EN61000-4-2 Contact ±4KV	perf. Criteria B
	RS	IEC/EN61000-4-3 10V/m	perf. Criteria B
	EFT	IEC/EN61000-4-4 100KHz ±2KV (see Fig.5 for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2KV (see Fig.5 for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s	perf. Criteria B

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Product Characteristic Curve

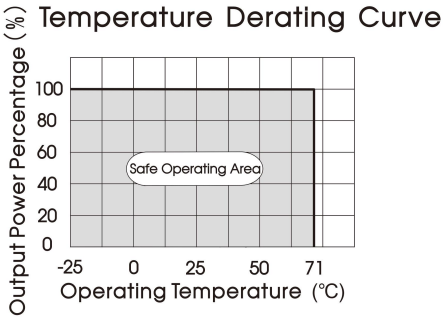


Fig. 1

Design Reference

1. Typical application

The output voltage of the product can be adjusted by an external circuit. There are two adjustment methods, as shown in Fig.2. The relationship curve between output voltage of the product and control voltage is shown in Fig.3.
Output ripple can be further reduced by connect the RC filter on the output end of the product.

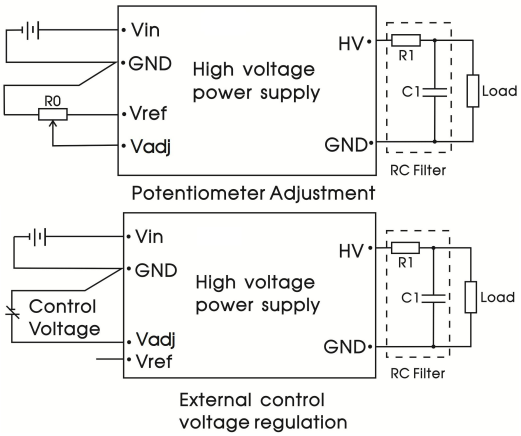
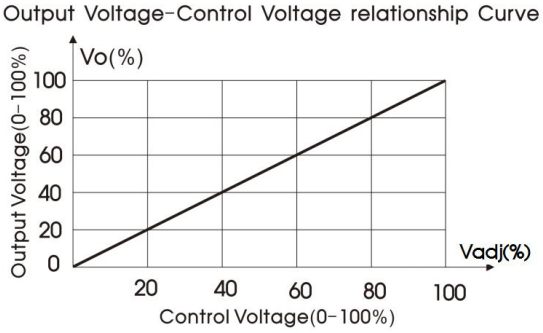


Fig. 2 External adjustment method of output voltage

Parameter description:

R0	Adjustable resistance≥10KΩ
R1	2KΩ
C1	4.7nF/2000V
Vref	SHO1-P(N)xxxxH-1B series: 2.56VC
	SHO1-P(N)xxxxH-0.5C/D/F series: 5.15VDC
Control Voltage	SHO1-P(N)xxxxH-1B series: 0-2.5VDC
	SHO1-P(N)xxxxH-0.5C/D/F series: 0-5VDC



(Note: For SHO1-P(N)xxxxH-1B series 100% Vadj is equal to 2.5VDC (Typ.);
For SHO1-P(N)xxxxH-0.5C/D/F series 100% Vadj is equal to 5.0VDC (Typ.))

Fig. 3 The relationship curve of output voltage and control voltage

2. Ripple & Noise testing compliance circuit

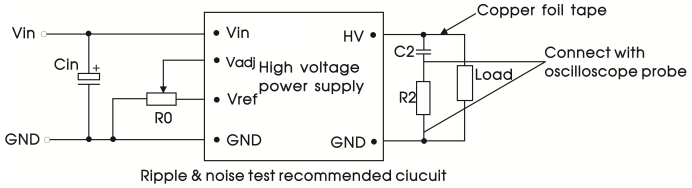
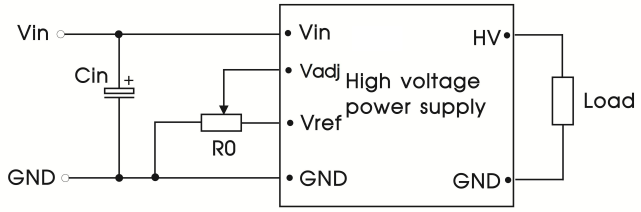


Fig.4 Ripple and noise test recommended circuit

Parameter description:

Cin	100μF/50V Aluminum electrolytic capacitor
R0	Adjustable resistance≥10KΩ
R2	1KΩ/2W Resistance
C2	472K/250VAC Y2 Capacitance

3. EMC compliance circuit



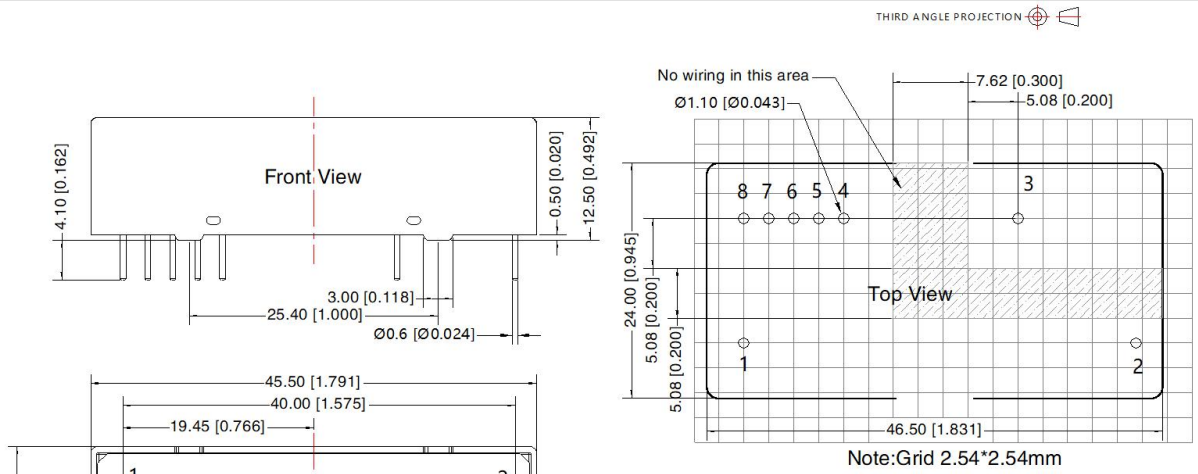
EMC recommended ciucuit

Fig. 5

Parameter description:

Cin	SHO1-P(N)xxxxH-1B series: 4700μF/35V Aluminum electrolytic capacitor
	SHO1-P(N)xxxxH-0.5C/D/F series: 680μF/50V Aluminum electrolytic capacitor
R0	Adjustable resistance≥10KΩ

Dimensions and Recommended Layout



Note:Grid 2.54*2.54mm

Pin-Out	
Pin	Funtion
1,2	NC
3	HV
4	Vref
5	Vadj
6	Case
7	GND
8	Vin

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

NC: Pin to be isolated from circuit
Case：Case is connected to the internal GND
GND： Vin's and HV's GND are connected internally

Notes:

1. For additional information please refer to Product Packaging Information. Packaging bag number: 58210097;
2. If the product is not operated within the required load range, the product performance cannot be guaranteed to comply with all parameters in the datasheet;
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 corporate standards;
5. We can provide product customization service;
6. Products are related to laws and regulations: see "Features" and "EMC";
7. Our products shall be classified according to ISO14001 and related environmental laws and regulations, and shall be handled by qualified units.