DC/DC Converter

HO1-P(N)502LD-0.4C Series

MORNSUN®

Non-isolated DC-DC converter

Fixed input voltage and regulated adjustable single high-voltage output

CE UKCA Patent Protection RoHS

EN62368-1 BS EN62368-1

FEATURES

- Six-sided metal shielding package, output ripple as low as 50mV
- Continuous output voltage with linear adjustable function
- Output voltage with high stability, low time coefficient and temperature coefficient
- Ultra wide operating ambient temperature range: -40℃ to +105℃
- Voltage and current display
- Input reverse polarity protection, control voltage over-voltage protection
- Output short-circuit protection, over-current protection
- EMI meet CISPR32/EN55032 CLASS B

HO1-P(N)502LD-0.4C series offer 2W of output, with ultra wide operating ambient temperature range -40℃ to +105℃, 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 electrophoresis, mass spectrum, light spectrum, electron beam, ion beam, nuclear radiation detection

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Input Current ① (mA) Full load/No-load		Output Voltage (VDC)			Output Current (mA) Max./Min.
		Nominal (Range)	Typ.	Max.	Nominal ②	Range	Guaranteed range ③	
EN/BS EN	HO1-P502LD-0.4C	12 (10.8-13.2)	320/40	350/60	5000	0~+5000	200~+5000	0.4/0
	HO1-N502LD-0.4C		320/40	350/60	-5000	0~-5000	-200~-5000	

Note:
① At the nominal input / output voltage.
② The nominal output voltage corresponds to the Vadj control voltage of 5.00VDC (Typ), refer to Figure 3 for the relationship curve between output voltage and control voltage.
③ Product meets the adjust-point tolerance in this range.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Reflected Ripple Current ①		--	50	--	mA
Surge Voltage (1sec. max.)		--	--	16	VDC
Input Filter Type		PI filter			
Hot Plug		Unavailable			
Input Reverse Polarity protection	The voltage between Vin and GND	-36	--	0	VDC
Remote control (Ctrl) ②	Power on	Ctrl open or low level (0-1.2VDC)			
	Power off	Ctrl connect with high level (3.5-12VDC)			
	Input current when off	--	5	10	mA

Note:
① Refer to DC-DC Converter Application Notes for detailed description of reflected ripple current test method.
② The voltage of Ctrl pin is relative to the input pin GND.

Output Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Adjust-point Tolerance	Output voltage guaranteed range, see fig.3	--	±0.5	±1.5	%
Reference Voltage Accuracy	Input voltage range, 0%-100% load	--	±1.5	±2	
Linear Regulation	Input voltage range, nominal output voltage, full load	--	±0.05	±0.15	
Load Regulation	Nominal input voltage, nominal output voltage, 10%-100% load	--	±0.05	±0.15	
Time Coefficient	Nominal input voltage, nominal output voltage, full load, after	--	±0.005	±0.01	%/Hr

	warming up for 30 minutes				
Temperature Coefficient	Nominal input voltage, nominal output voltage, full load	--	±100	--	PPM/℃
Ripple & Noise	20MHz bandwidth, Input voltage range, 0%-100% load,	--	50	100	mV p-p
Over-current Protection / Short-circuit Protection	Input voltage range	105	110	180	%Io
		Constant current mode, continuous, self-recovery			
Over-voltage Protection of Vadj①	Input voltage range	5.1	5.2	5.3	VDC
Maximum allowable voltage of Vadj②		--	--	10	

Note:
① When the Vadj voltage is higher than or equal to the over-voltage protection voltage point of Vadj, the product without output;
② 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	-40	--	+105	℃
Storage Temperature		-55	--	+125	
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	--	100	--	kHz
MTBF	MIL-HDBK-217F@25℃	1000	--	--	k hours
Vmon pin function①	Nominal input voltage	0-5V output voltage detection			
Imon pin function②		0-5V output current detection			

Note:
① The voltage value of Vmon pin reflects the output voltage value of the product in real time ;
② The voltage value of Imon pin reflects the output current value of the product in real time.

Mechanical Specifications

Case Material	Aluminium alloy
Dimensions	74.60 x 38.10 x 26.00 mm
Weight	90g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig.5-② for recommended circuit)	
	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 A
	EFT	IEC/EN61000-4-4 100KHz ±2kV (see Fig.5-① for recommended circuit)	perf. Criteria B
	Surge	IEC/EN61000-4-5 line to line ±2kV (see Fig.5-① for recommended circuit)	perf. Criteria B
	CS	IEC/EN61000-4-6 3 Vr.m.s	perf. Criteria A

Product Characteristic Curve

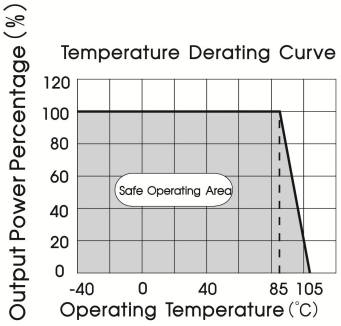


Fig. 1

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.

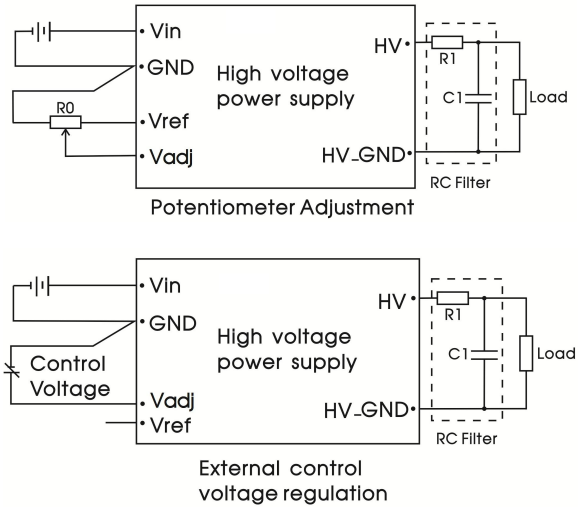
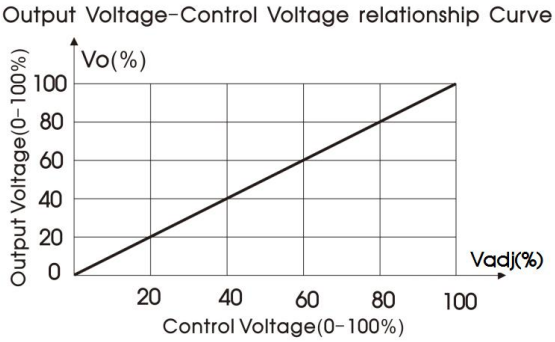


Fig. 2 External adjustment method of output voltage

Parameter description:

R0	Adjustable resistance≥10kΩ
R1	10kΩ
C1	472K/6000V
Vref	5.15VDC
Control Voltage	0-5VDC



(Note: For HO1-P(N)502LD-0.4C: 100% Vadj is equal to 5.00VDC (Typ.))

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

2. Ripple & Noise testing compliance circuit

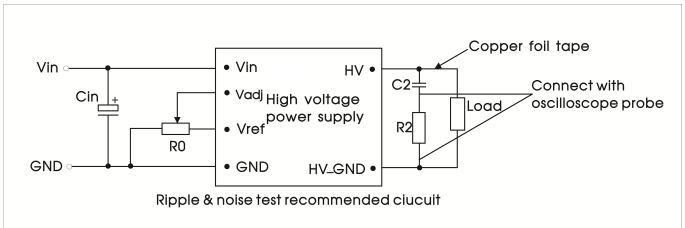


Fig.4 Ripple and noise test recommended circuit

Parameter description:

Cin	100 μF/50V Aluminum electrolytic capacitor
R0	Adjustable resistance≥10kΩ
R2	1kΩ/2W Resistance
C2	222K/6000V capacitor

3. EMC compliance circuit

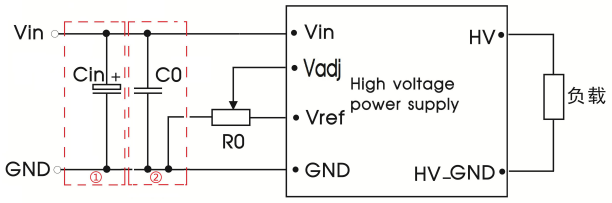


Fig. 5 EMC compliance circuit

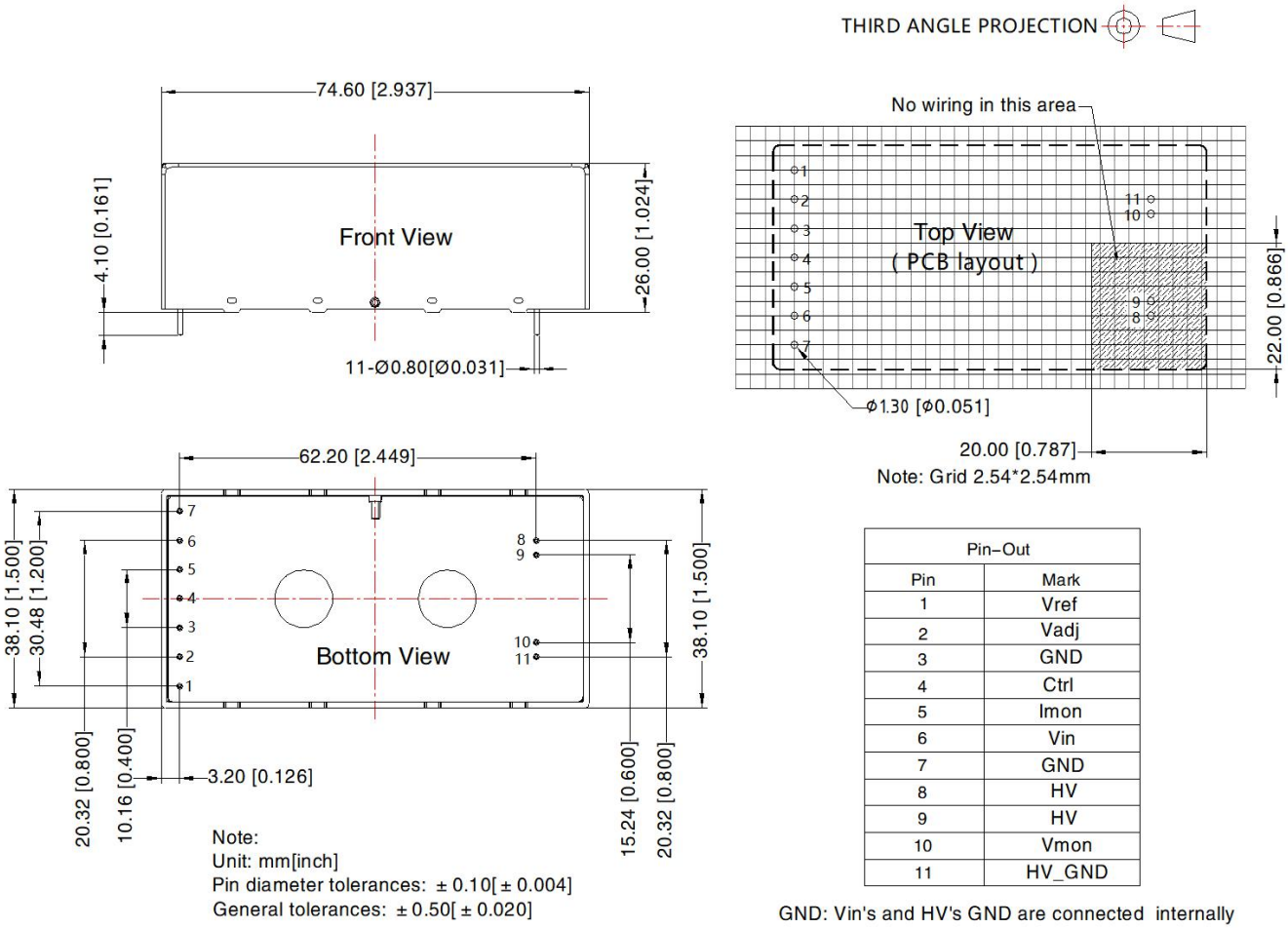
Notes: For EMC tests we use Part ① in Fig. 5 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

Cin	2200μF/50V Aluminum electrolytic capacitor
C0	22uF/25V MLCC capacitor
R0	Adjustable resistance≥10kΩ

4. For additional information please refer to DC-DC converter application notes on www.mornsun.cn

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	Mark
1	Vref
2	Vadj
3	GND
4	Ctrl
5	Imon
6	Vin
7	GND
8	HV
9	HV
10	Vmon
11	HV_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: 58210157;
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.

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