

Non-isolated DC-DC converter
Fixed input voltage and regulated adjustable single high-voltage output



Patent Protection



HO1-P(N)302-0.5C/F Series offer 1.5W of output, with operating ambient temperature range -40°C to +105°C, 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.

FEATURES

- No-load input current as low as 15mA
- Continuous output voltage with linear adjustable function
- Six-sided metal shielding package, output ripple as low as 30mV
- Output voltage with high stability, low time coefficient and temperature coefficient
- Operating ambient temperature range: -40°C to +105°C
- Vadj control terminal input impedance is greater than 1MΩ
- Input reverse polarity protection, control voltage over-voltage protection
- Output short-circuit protection, over-current protection

Selection Guide

Certification	Part No.	Input Voltage (VDC)	Input Current ^① (mA) Full load/No-load		Output Voltage (VDC)			Current (mA) Max./Min.
		Nominal (Range)	Typ.	Max.	Nominal ^②	Range	Guaranteed range ^③	
--	HO1-P302-0.5C	12 (10.8-13.2)	220/30	230/40	3000	0~+3000	+300~+3000	0.5/0
	HO1-N302-0.5C		220/30	230/40	-3000	-3000~0	-3000~-300	0.5/0
	HO1-P302-0.5F	24 (21.6-26.4)	100/15	110/25	3000	0~+3000	+300~+3000	0.5/0
	HO1-N302-0.5F		100/15	110/25	-3000	-3000~0	-3000~-300	0.5/0

Note:

① At the nominal input voltage and nominal output voltage.

② HO1-P(N)302-0.5C/F series when the Vadj control voltage is equal to 2.5VDC (Typ.). The relationship curve between output voltage and control voltage is shown in Fig.3.

③ Within this range, the product meets the adjust-point tolerance.

Input Specifications

Item	Operating Conditions		Min.	Typ.	Max.	Unit
Input Current (full load / no load)	Normal temperature,Nominal input voltage	HO1-P(N)302-0.5C	--	220/30	230/40	mA
		HO1-P(N)302-0.5F	--	100/15	110/25	
Reflected Ripple Current ^①			--	30	--	
Surge Voltage (1sec. max.)	HO1-P(N)302-0.5C		--	--	18	VDC
	HO1-P(N)302-0.5F				30	
Input Filter Type			PI filter			
Hot Plug			Unavailable			
The reverse voltage protection	Voltage between input VIN and GND terminals		-36	--	0	VDC

Note:

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

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	--	±1	±2	

Linear Regulation	Input voltage range, nominal output voltage, full load	--	±0.01	±0.05	%
Load Regulation	Nominal input voltage, nominal output voltage, 10%-100% load	--	±0.01	±0.05	
Time Coefficient	Nominal input voltage, nominal output voltage, full load, after warming up for 30 minutes	--	±0.001	±0.003	%/H
Temperature Coefficient	Nominal input voltage, nominal output voltage, full load	--	±0.01	±0.02	%/°C
Ripple & Noise ^①	20MHz bandwidth, nominal input voltage, 0%-100% load	--	30	50	mVp-p
Over-current Protection	Input voltage range	110	140	180	%Io
Short-circuit Protection	Input voltage range	Constant current mode, continuous, self-recovery			
Vadj function(output voltage regulation)	Nominal input voltage	0-2.5V linear adjustment, set the Vadj pin voltage to set the out put voltage			
Over-voltage Protection of Vadj ^②	Input voltage range	2.5	2.6	2.7	VDC
Maximum allowable voltage of Vadj ^③		--	--	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		-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	℃
Class of pollution			Grade 2. For applications where no contamination conduction occurs but temporary contamination conduction may occur due to accidental condensation, such as office environments			
Vibration			10-150Hz, 5G, 0.75mm. along X, Y and Z			
Switching Frequency	Nominal input voltage, full load	HO1-P(N)302-0.5C	--	80	--	kHz
		HO1-P(N)302-0.5F	--	150	--	kHz
Altitude			Altitude≤2000m			
MTBF	MIL-HDBK-217F@25℃		1000	--	--	k hours

Mechanical Specifications

Case Material	Aluminum alloy
Dimensions	45.50 x 35.00 x 12.50 mm
Weight	32g (Typ.)
Cooling Method	Free air convection

Electromagnetic Compatibility (EMC)

Emissions	CE	CISPR32/EN55032 CLASS B (see Fig.5-② for recommended circuit) (with external 10uF/50V 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.5-① 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 B

Product Characteristic Curve

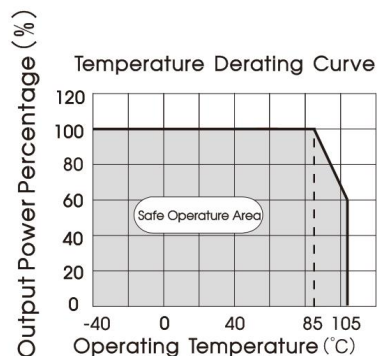
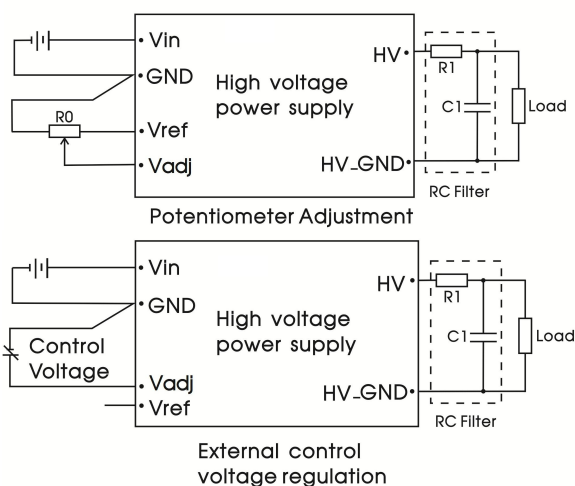


Fig. 1

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.4. The relationship curve between output voltage of the product and control voltage is shown in Fig.5. Output ripple can be further reduced by connect the RC filter on the output end of the product.

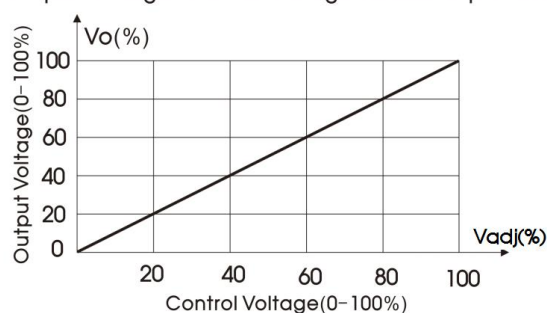


Parameter description:

R0	Adjustable resistance $\geq 10K\Omega$
R1	2k Ω
C1	4.7nF/4000V
Vref	2.56VC
Control Voltage	0-2.5VDC

Fig. 2 External adjustment method of output voltage

Output Voltage-Control Voltage relationship Curve



(Note: 100% Vadj is equal to 2.5VDC (Typ.))

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

2. Ripple & Noise testing compliance circuit

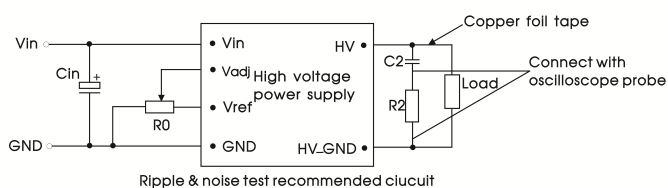


Fig.4 Ripple and noise test recommended circuit

Parameter description:

Cin	100μF/50V
R0	Adjustable resistance $\geq 10k\Omega$
R2	1kΩ/2W
C2	4.7nF/4000V

3. EMC compliance circuit

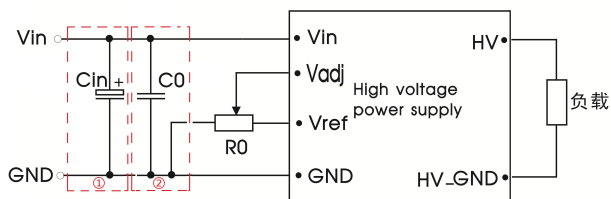


Fig. 5 EMC compliance circuit

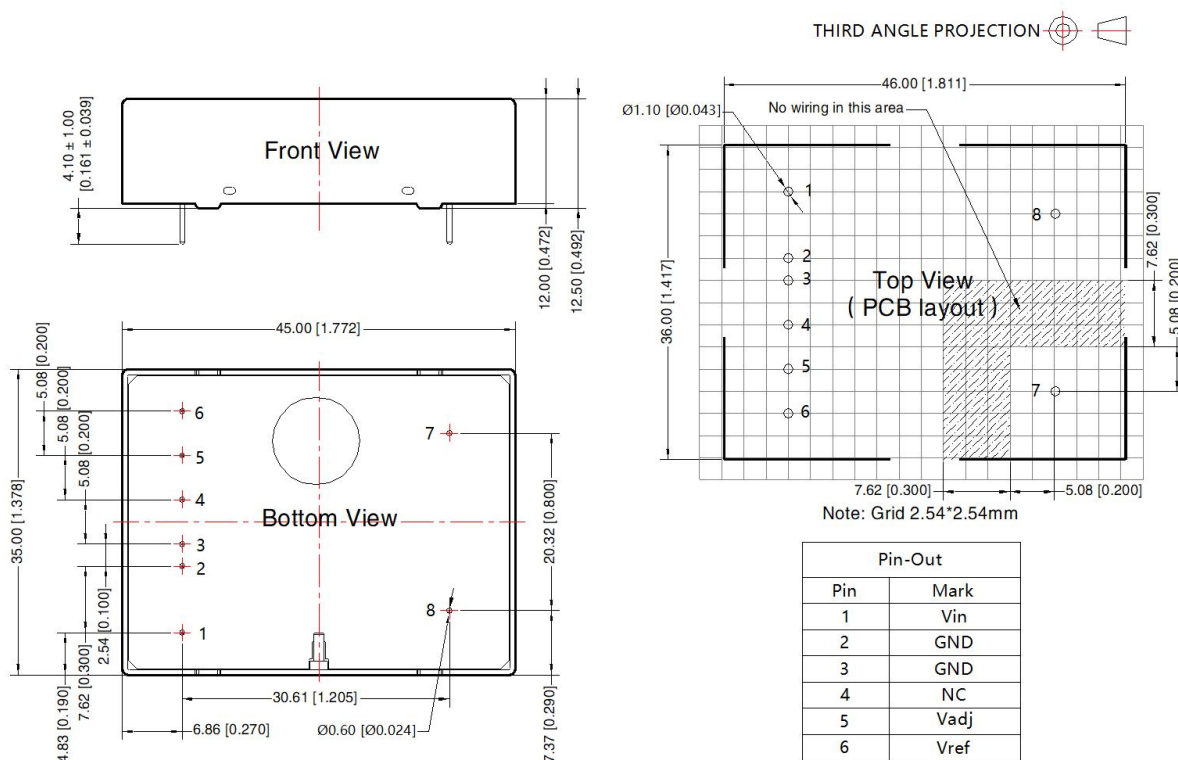
Notes: For EMC tests we use Part ① in Fig. 5 for immunity and part ② for emissions test. Selecting based on needs.

Parameter description:

Cin	680uF/50V Aluminum electrolytic capacitor
C0	10uF/50V MLCC Capacitors
R0	Adjustable resistance $\geq 10k\Omega$

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

Dimensions and Recommended Layout



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

Pin-Out	
Pin	Mark
1	Vin
2	GND
3	GND
4	NC
5	Vadj
6	Vref
7	HV
8	HV_GND

NC: Pin to be isolated from circuit
HV_GND and GND are connected internally

Notes:

1. For additional information please refer to Product Packaging Information. Packaging bag number: 58210122;
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 $T_a=25^{\circ}\text{C}$, 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.

Mornsun Guangzhou Science & Technology Co., Ltd.

Address: No. 5, Kehui St. 1, Kehui Development Center, Science Ave., Guangzhou Science City, Huangpu District, Guangzhou, P. R. China

Tel: 86-20-38601850

Fax: 86-20-38601272

E-mail: info@mornsun.cn

www.mornsun-power.com