

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



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 8mV
- Output voltage with high stability, low time coefficient and temperature coefficient
- Ultra wide 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
- EMI meet CISPR32/EN55032 CLASS B
- Meet EN62368 standards

HO1-P(N)xxxV-xxB/C/F series offer 0.625W-3W of output, with ultra wide 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 photo-multiplier tubes, mass spectrum, light spectrum, electron beam, ion beam, ultrasonic flaw detector, avalanche diodes.

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	
--	HO1-P601V-3C	12	280/8	300/15	600	0~+600	+60~+600	3/0
	HO1-N601V-3C	(10.8-13.2)	280/8	300/15	-600	0~-600	-60~-600	
	HO1-P1251V-0.5C	12	85/8	95/15	1250	0~+1250	+200~+1250	0.5/0
	HO1-N1251V-0.5C	(10.8-13.2)	85/8	95/15	-1250	0~-1250	-200~-1250	
	HO1-P1251V-0.5F	24	48/8	54/15	1250	0~+1250	+200~+1250	
	HO1-N1251V-0.5F	(21.6-26.4)	48/8	54/15	-1250	0~-1250	-200~-1250	
	HO1-N1501V-1.2F	24 (21.6-26.4)	115/12	140/18	-1500	-1500 ~ 0	-1500 ~ -150	1.2/0
	HO1-N1801V-1F	24 (21.6-26.4)	115/12	140/18	-1800	-1800 ~ 0	-1800 ~ -180	1.0/0
	HO1-N102V-3F	24 (21.6-26.4)	210/12	230/18	-1000	0~-1000	-100~-1000	3/0
	HO1-P202V-0.5B	5	405/35	410/50	2000	0~+2000	+200~+2000	0.5/0
	HO1-N202V-0.5B	(4.75-5.25)	405/35	410/50	-2000	0~-2000	-200~-2000	
	HO1-P202V-1C	12	280/25	300/35	2000	0~+2000	+200~+2000	1/0
	HO1-N202V-1C	(10.8-13.2)	280/25	300/35	-2000	0~-2000	-200~-2000	

Note:
① At the nominal input voltage and nominal output voltage.
② For HO1-P(N)1251V-0.5C(F) series, HO1-P(N)202V-1C series and HO1-N102V-3F when the V_{adj} control voltage is equal to 5.0VDC (Typ.), the output voltage can be nominal output voltage, and for HO1-P(N)601V-3C series and HO1-P(N)202V-0.5B series the V_{adj} control voltage is equal to 2.5VDC (Typ.). HO1-N1501V-1.2F series and HO1-N1801V-1F series, when the V_{adj} control voltage is equal to 4.0VDC (Typ.), The relationship curve between output voltage and control voltage is shown in Fig.7;
③ Within this range, the product meets the adjust-point tolerance.

Input Specifications

Item	Operating Conditions	Min.	Typ.	Max.	Unit
Reflected Ripple Current ^①		--	30	--	mA
Surge Voltage (1sec. max.)	HO1-P(N)xxxV-xxB series	--	--	10	VDC

	HO1-P(N)xxxV-xxC series			18	
	HO1-P(N)xxxV-xxF series			30	
Input Filter Type		PI filter			
Hot Plug		Unavailable			
Input Reverse Polarity protection	The voltage between Vin and GND	-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.7		--	±1	±2	
Reference Voltage Accuracy	0%-100% load, reference 5.15VDC output	HO1-P(N)1251V-0.5C(F) HO1-P(N)202V-1C HO1-N102V-3F	--	±1	±2	%
	0%-100% load, reference 2.56VDC output	HO1-P(N)601V-3C HO1-P(N)202V-0.5B	--	±1	±2	
	0% -100% load, reference 4.12VDC output	HO1-N1501V-1.2F HO1-N1801V-1F	--	±1	±2	
Linear Regulation	Input voltage range, nominal output voltage, full load	HO1-P(N)1251V-0.5C(F) HO1-P(N)202V-1C HO1-P(N)601V-3C HO1-P(N)202V-0.5B	--	±0.01	±0.03	
		HO1-N1501V-1.2F HO1-N1801V-1F	--	±0.02	±0.05	
		HO1-N102V-3F	--	±0.03	±0.05	
		HO1-P(N)1251V-0.5C(F)	--	±0.01	±0.03	
Load Regulation	Nominal input voltage, nominal output voltage, 10%-100% load	HO1-P(N)601V-3C HO1-P(N)202V-1C HO1-P(N)202V-0.5B	--	±0.01	±0.05	
		HO1-N1501V-1.2F HO1-N1801V-1F	--	±0.02	±0.05	
		HO1-N102V-3F	--	±0.03	±0.05	
		HO1-P(N)1251V-0.5C(F)	--	±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	HO1-P(N)1251V-0.5C(F) HO1-P(N)202V-1C HO1-P(N)601V-3C HO1-P(N)202V-0.5B HO1-N1501V-1.2F HO1-N102V-3F HO1-N1801V-1F	--	±100	--	PPM/°C
Ripple & Noise ^①	20MHz bandwidth, nominal input voltage, 0%-100% load, output voltage 0~+1000/-1000VDC		--	8	--	mV p-p
	20MHz bandwidth, nominal input voltage, 0%-100% load	HO1-P(N)1251V-0.5C(F)	--	10	--	
		HO1-P(N)202V-1C HO1-P(N)202V-0.5B HO1-P(N)601V-3C	--	15	--	
		HO1-N1501V-1.2F	--	25	35	
		HO1-N1801V-1F HO1-N102V-3F	--	35	50	
Over-current Protection / Short-circuit Protection	Input voltage range		105	140	180	%Io
			Constant current mode, continuous, self-recovery			
Over-voltage Protection of Vadj ^②	Input voltage range	HO1-P(N)1251V-0.5C(F) HO1-P(N)202V-1C HO1-N102V-3F	5.1	5.2	5.3	VDC
		HO1-P(N)601V-3C HO1-P(N)202V-0.5B	2.5	2.6	2.7	
		HO1-N1501V-1.2F HO1-N1801V-1F	4.08	4.15	4.30	
Maximum allowable voltage of Vadj ^③	Input voltage range		--	--	10	

Note:

- Please refer to fig.8 for the test method of ripple and noise, the product is working by the linear power source, oscilloscope probe uses x1 gear to test;
- When the Vadj voltage is higher than or equal to the over-voltage protection voltage point of Vadj, the product without output;
- 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	HO1-P(N)1251V-0.5C(F)	See Fig. 1	-40	--	+105	°C
	HO1-P(N)202V-1C HO1-P(N)202V-0.5B	See Fig. 2	-40	--	+105	
	HO1-P(N)601V-3C	See Fig. 3	-40	--	+105	
	HO1-N1501V-1.2F	See Fig. 4	-40	--	+85	
	HO1-N1801V-1F	See Fig. 5	-40	--	+85	
	HO1-N102V-3F	See Fig. 6	-40	--	+85	
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	°C
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 °C		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 (see Fig.10-② 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 B
	EFT	IEC/EN61000-4-4	100KHz ±2kV (see Fig.10-① for recommended circuit) perf. Criteria B
	Surge	IEC/EN61000-4-5	line to line ±2kV (see Fig.10-① for recommended circuit) perf. Criteria B
	CS	IEC/EN61000-4-6	3 Vr.m.s perf. Criteria B

Product Characteristic Curve

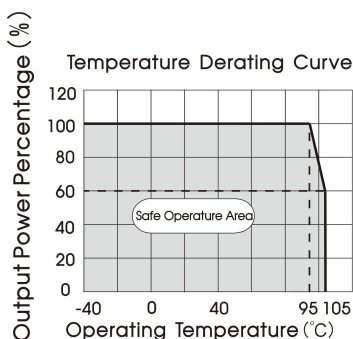


Fig. 1 HO1-P(N)1251V-0.5C(F)

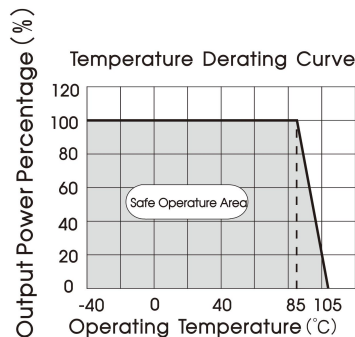


Fig. 2 HO1-P(N)202V-1C
HO1-P(N)202V-0.5B

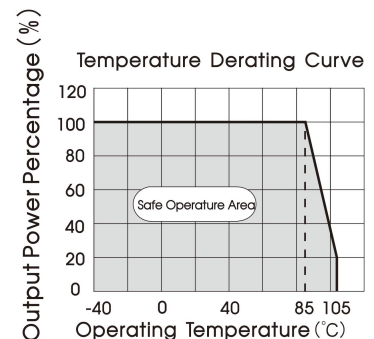
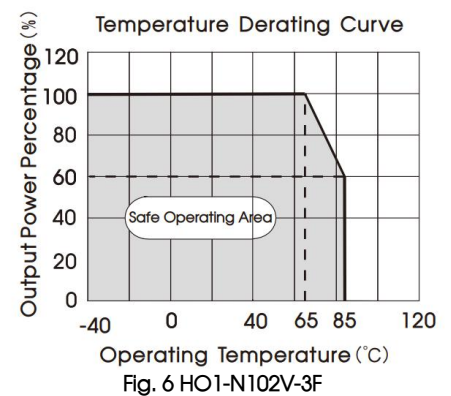
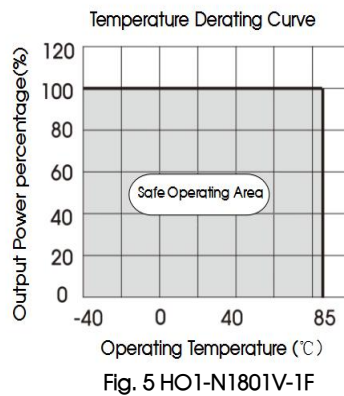
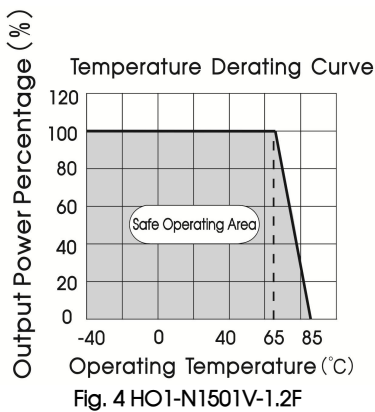


Fig. 3 HO1-P(N)601V-3C



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.7. The relationship curve between output voltage of the product and control voltage is shown in Fig.8. Output ripple can be further reduced by connect the RC filter on the output end of the product.

Parameter description:

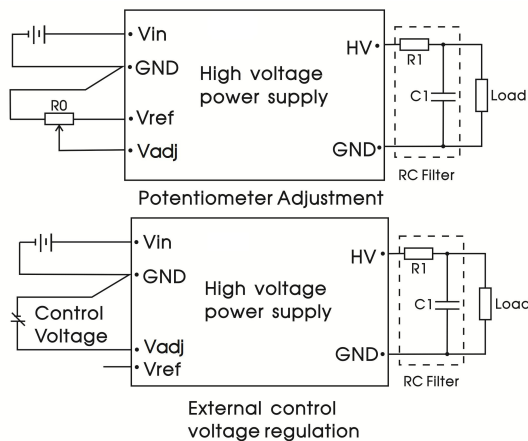
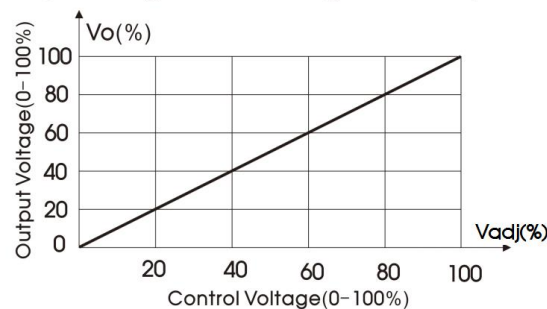


Fig. 7 External adjustment method of output voltage

R0	Adjustable resistance $\geq 10k\ \Omega$	
R1	2k Ω	
C1	HO1-P(N)1251V-0.5C(F) HO1-P(N)601V-3C HO1-N1501V-1.2F HO1-N102V-3F	472K/2000V
	HO1-P(N)202V-1C HO1-P(N)202V-0.5B HO1-N1801V-1F	472K/3000V
Vref	HO1-P(N)1251V-0.5C(F) HO1-P(N)202V-1C	5.15VDC
	HO1-P(N)601V-3C HO1-P(N)202V-0.5B	2.56VDC
	HO1-N1501V-1.2F HO1-N1801V-1F	4.12VDC
Control Voltage	HO1-P(N)1251V-0.5C(F) HO1-P(N)202V-1C	0-5VDC
	HO1-P(N)601V-3C HO1-P(N)202V-0.5B	0-2.5VDC
	HO1-N1501V-1.2F HO1-N1801V-1F	0-4VDC

Output Voltage-Control Voltage relationship Curve



(Notes: HO1-P(N)1251V-0.5C(F), HO1-P(N)202V-1C, HO1-N102V-3F: 100% Vadj equal 5.0VDC (Typ.)

HO1-P(N)601V-3C, HO1-P(N)202V-0.5B: 100% Vadj equal 2.5VDC (Typ.)

HO1-N1501V-1.2F, HO1-N1801V-1F: 100% Vadj equal 4.0VDC (Typ.)

Fig. 8 The relationship curve of output voltage and control voltage

2. Ripple & Noise testing compliance circuit

Parameter description:

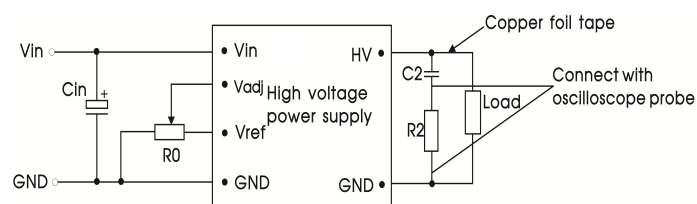


Fig.9 Ripple and noise test recommended circuit

Cin	100 μ F/50V Aluminum electrolytic capacitor
R0	Adjustable resistance $\geq 10k \Omega$
R2	1k Ω /2W Resistance
C2	HO1-P(N)1251V-0.5C(F) & HO1-P(N)601V-3C & HO1-N1501V-1.2F & HO1-N102V-3F series: 472K/2000V Capacitance HO1-P(N)202V-1C & HO1-P(N)202V-0.5B & HO1-N1801V-1F series: 472K/3000V Capacitance

3. EMC compliance circuit

Parameter description:

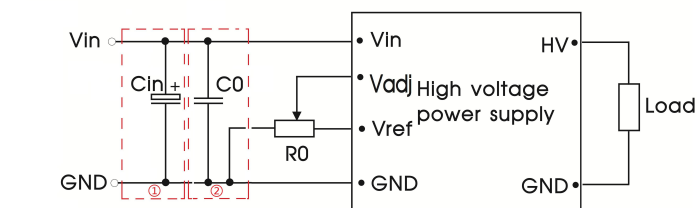


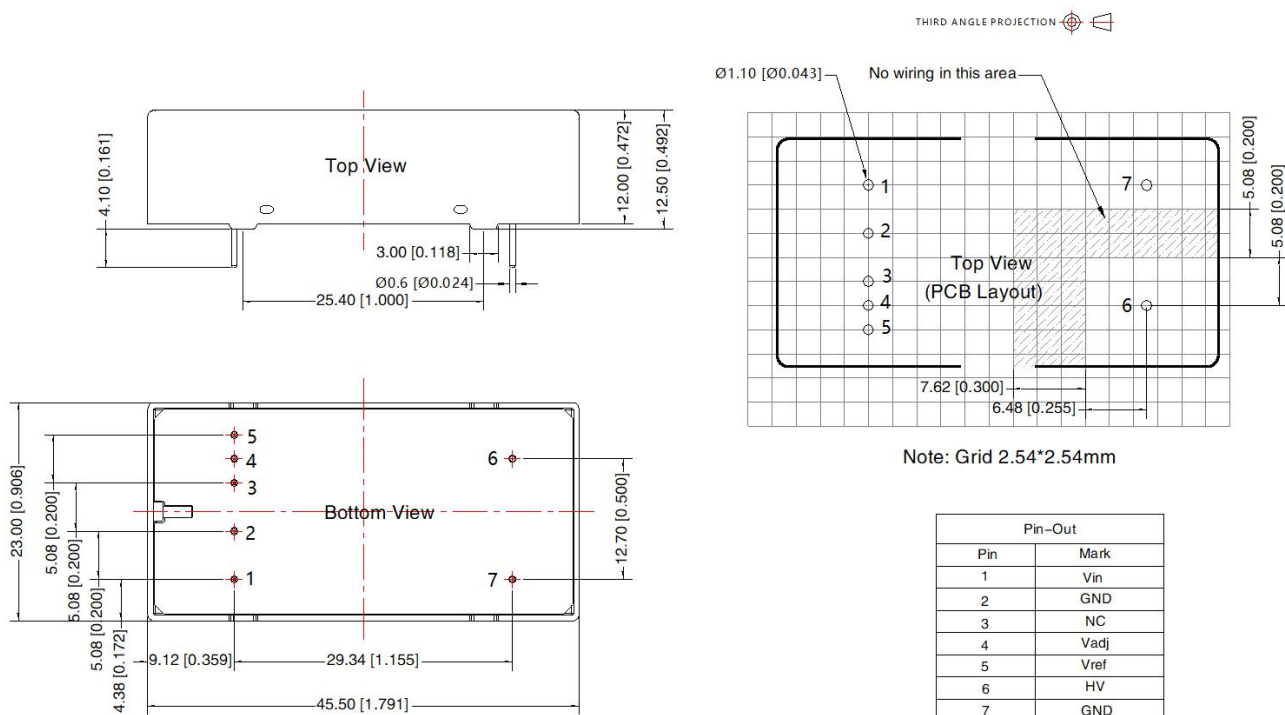
Fig.10 EMC compliance circuit

Notes: For EMC tests we use Part ① in Fig. 10 for immunity and part ② for emissions test. Selecting based on needs.

Cin	HO1-P(N)202V-0.5B series: 4700 μ F/50V Aluminum electrolytic capacitor HO1-N1501V-1.2F & HO1-N1801V-1F: 1000 μ F/50V Aluminum electrolytic capacitor Others: 680 μ F/50V Aluminum electrolytic capacitor
C0	For HO1-P(N)1251V-0.5C series: 10 μ F/25V MLCC capacitor HO1-P(N)202V-1C & HO1-P(N)202V-0.5B series: 47 μ F/25V MLCC capacitor HO1-P(N)1251V-0.5F & HO1-P(N)601V-3C & HO1-N1501V-1.2F & HO1-N1801V-1F series: 22 μ F/50V MLCC capacitor
R0	Adjustable resistance $\geq 10k \Omega$

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

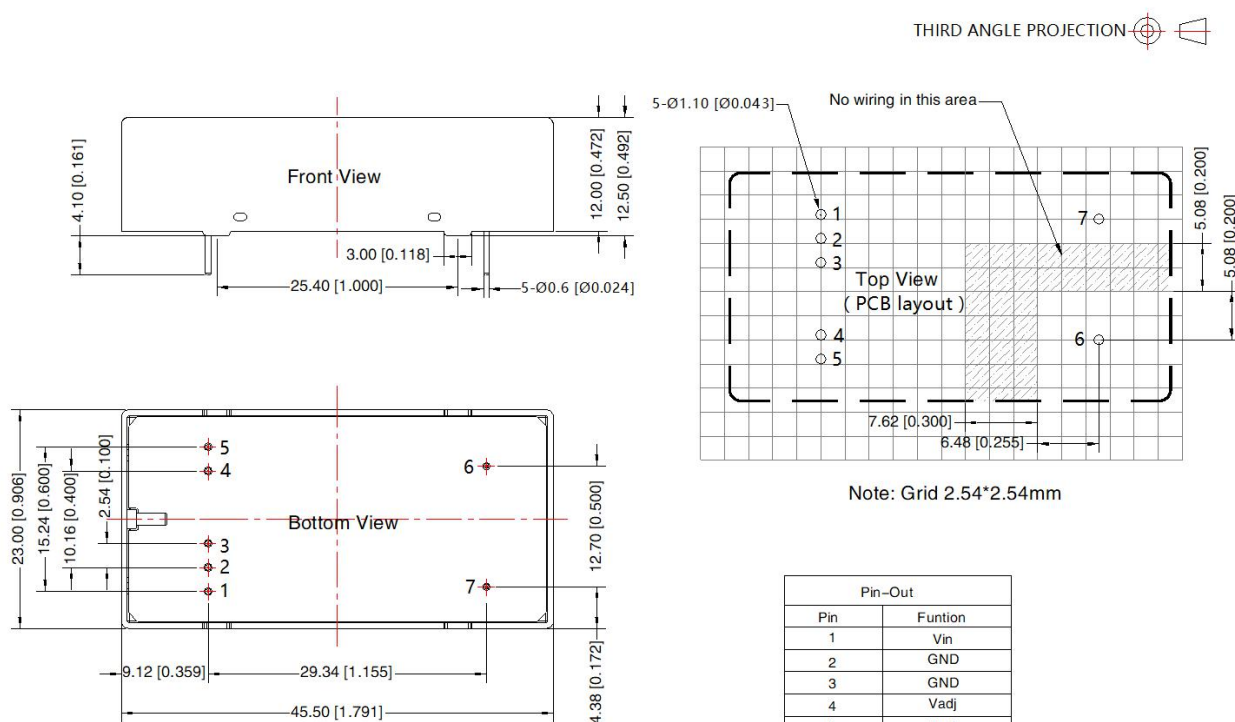
Dimensions and Recommended Layout



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

NC: Pin to be isolated from circuit
GUN: Vin's and HV's GND are connected internally

(HO1-P601V-3C、HO1-N601V-3C、HO1-P1251V-0.5C、HO1-N1251V-0.5C、HO1-P1251V-0.5F、HO1-N1251V-0.5F、HO1-N1501V-1.2F、HO1-N1801V-1F、HO1-P202V-0.5B、HO1-N202V-0.5B、HO1-P202V-1C、HO1-N202V-1C Appearance size diagram)



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

Note: GND and HV_GND are connected internally

HO1-N102V-3F Appearance size diagram

Notes:

- For additional information please refer to Product Packaging Information. Packaging bag number: 58210107;
- 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;
- 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;
- All index testing methods in this datasheet are based on our company corporate standards;
- We can provide product customization service;
- Products are related to laws and regulations: see "Features" and "EMC";
- 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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