Ultracompact, Adjustable Output High-Voltage Power Supply
1.5Watt Medium-High Voltage DC-DC Converter

Volgen 1000V, 1500V, 2000V VHV Series

The VHV series is our new line of medium-high voltage DC-DC converters featuring an ultracompact size with the footprint reduced by about 60% as compared to conventional models.

With a pentahedron metal shield case, ripple noise has been reduced to as low as 10mVp-p. Output voltage can be adjusted by external voltage or external variable resistor. The built-in short circuit and overcurrent protection provide high reliability and a long life.

■ Features

- Ultralow ripple noise 10mVp-p
- World's smallest size (about a 60% reduction from comparable conventional models)
- Adjustable output voltage from 0 to 100%
- Control voltage 0 to +6V
- Built-in over current protection circuit
- Output capacity 1.5W
- ON/OFF Control
- Adjustable voltage by variable resistor or external voltage
- Use of pentahedron metal shield case
- PCB mount type
- High reliability and long life
- Supports 24V input with an external DC-DC converter

■ Model/Standard

Models OHV Series	Input V (Vdc)	Output V (Vdc) *1	Output I (mA)	Load Resistance (KΩ) min	Input I (A) typ	Ripple Noise (mVp-p) typ
VHV12-1.0K1500P	11.0-13.0	0 to +1000	0-1.5	666.7	0.28	5
VHV12-1.0K1500N	11.0-13.0	0 to -1000	0-1.5	666.7	0.28	5
VHV12-1.5K1000P	11.0-13.0	0 to +1500	0-1.0	1500	0.28	7
VHV12-1.5K1000N	11.0-13.0	0 to -1500	0-1.0	1500	0.28	7
VHV12-2.0K700P	11.0-13.0	0 to +2000	0-0.7	2857	0.28	10
VHV12-2.0K700N	11.0-13.0	0 to -2000	0-0.7	2857	0.28	10

Note 1: See P5 on how to use with a 24V input voltage.

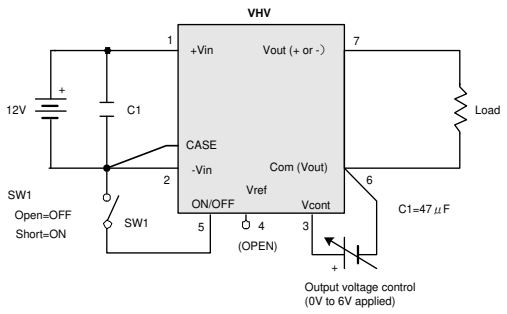
■ Specifications

Line regulation	0.01% typ. (for a line regulation of 11.0 to 13.0V)
Load regulation	0.02% typ. (for a load current regulation of 0 to 100%)
Temperature regulation	70ppm/°C typ. (for temperature regulation of -10°C to +50°C)
Over current protection	Drooping characteristic, built-in automatic return circuit, activated at 105% or more
Output voltage setting accuracy	±2% or less (when controlling a 6.0V external voltage)
Output voltage control	Either with 0V to +6V external voltage or a 5KΩ external variable resistor
ON/OFF control	Between 2pin and 5pin, OFF when opened and ON when short-circuited
Operating temp range	-10°C to +50°C (no temperature derating needed
Storage temp range	-25°C to +85°C
Operating humidity range	20% to 95% RH (no condensation)
Isolation between input and output	Non-isolated type (2pin through 6pin are connected inside)
MTBF expectation	Min. 390,000 to 400,000H (calculated from Bellnix MTBF calculation table)

Note 2 Output voltage is controlled by applying Vcont voltage. Apply voltage to the Vcont terminal by either variable resistor or external voltage to control output voltage. When Vcont voltage is zero, output voltage (output residual voltage) will be within 0.5% of maximum output voltage (input/output rating).

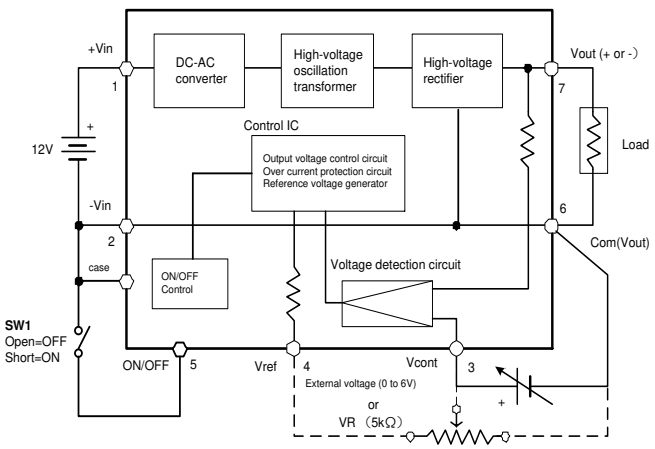
Note 3 Details are subject to change for improvement, etc., without prior notice.

■ Test circuit



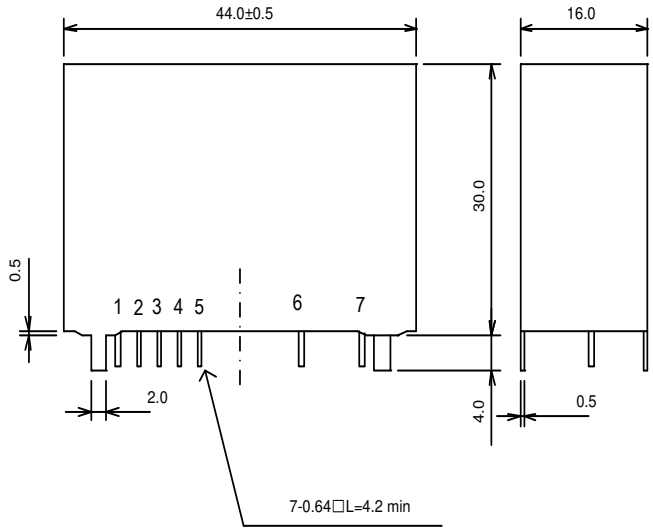
(1) The input-output ground lines and the case are connected internally.
(2) Vref is 6V (when external VR is 5KΩ)
(3) ON/OFF can be controlled by a transistor.

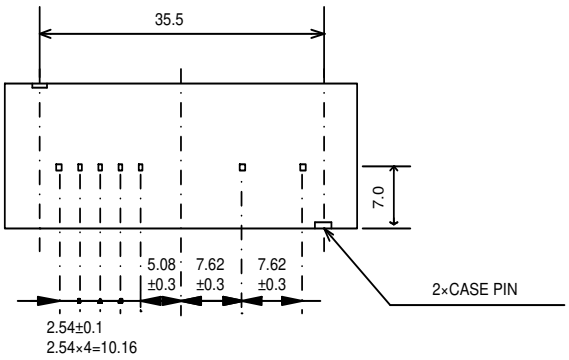
■ Block diagram



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■ Shape, dimensions and terminal composition





Pin-NO.	Pin name
1	+Vin
2	-Vin
3	Vcont
4	Vref
5	ON/OFF
6	Com (Vout)
7	Vout (+ or -)

Weight: TBD

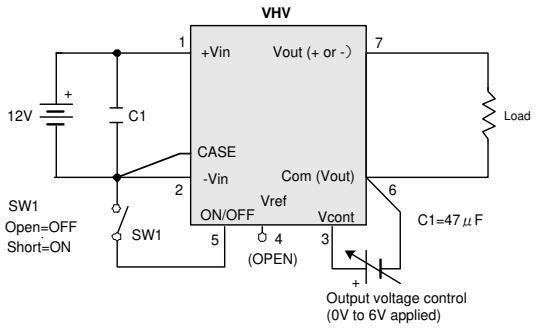
Unit: mm

Unspecified dimensional tolerance ±0.5

1) Terminal
Material: Phosphor bronze
Treatment: Ni base Au plating

2) Case
Material: Brass
Treatment: Nickel plating

■ Standard method of use



The VHV series does not basically require additional parts, but add capacitor C1 to the input terminal if input impedance is high due to a long distance between the power supply and converter, the input line is thin, a filter is inserted on the input side, etc. When fitting a capacitor, try to add on the converter terminal side so as to reduce lead inductance.

■ ON/OFF Control

Output voltage can be turned ON/OFF by closing/opening between the ON/OFF terminal and -Vin terminal.

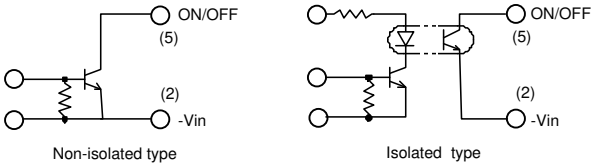
Between ON/OFF terminal (5) and -Vin terminal (2)

(1) Output OFF when opened

(2) Output ON when short-circuited (0 - 0.4V, 1mA max.)

As the ON/OFF terminal is pulled up to +Vin inside the power supply, pay attention to the voltage of elements (photocoupler, transistor, etc.) to switch the ON/OFF terminal.

Short-circuit when ON/OFF is not controlled.

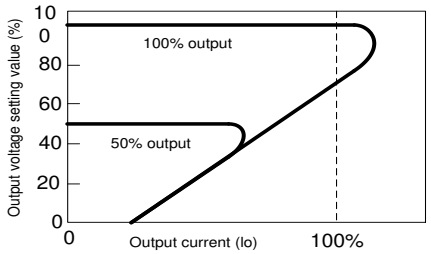


Ensure that there is no chattering to the ON/OFF terminal which affects output voltage. Output residual voltage is 0.5% or less when output is OFF under ON/OFF control (at the rated input-output).

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■ Overcurrent protection circuit

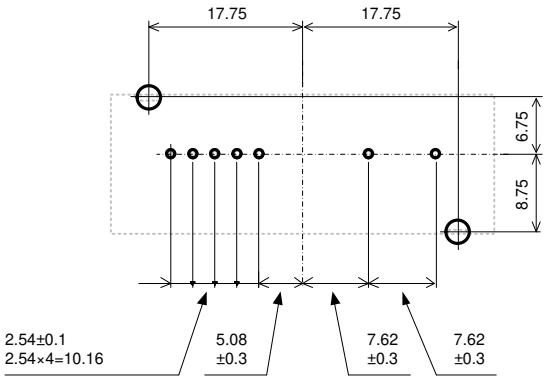
The VHV series has a built-in over current protection circuit against overload and load short-circuit. The circuit reduces output voltage in case of overload or load short-circuit and automatically returns the output to normal when the cause is eliminated.



The overcurrent protection circuit shows a drooping characteristic. Ensure that the load to be used is at least with the minimum resistance specified for each series.

■ Recommended pattern

[Top View]



7- ○ Hole dia. : ϕ1.2　　2- ◯ Hole dia. : ϕ2.5

[mm]

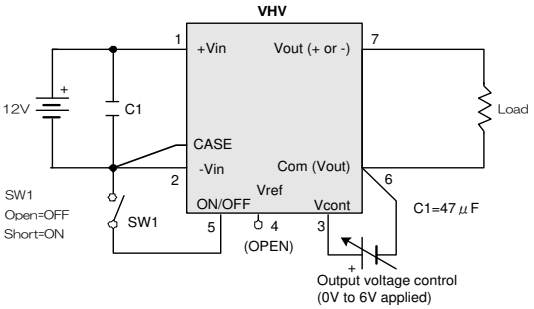
(i) The VHV series uses a metal case. When mounting onto a double-sided board, wiring to this converter should be on a soldered surface. When wiring, pay enough attention to creepage distance because of the high voltage of this converter.

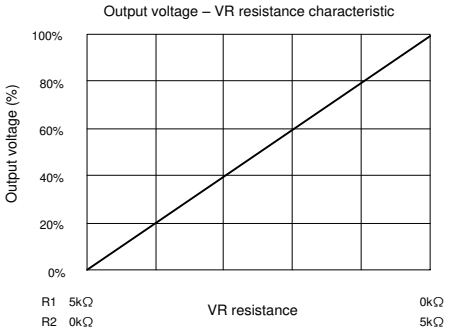
(ii) When mounting onto a double-sided board, make the land on the parts surface of the high voltage output terminal as small as possible.

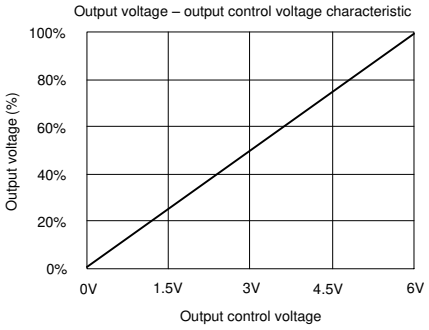
(iii) Connect the case of the VHV series to -Vin or Com. Try to reduce impedance to the ground as much as possible.

■ Setting and adjustment of output voltage

The output voltage of the VHV series can be set and adjusted by external voltage and external variable resistor.



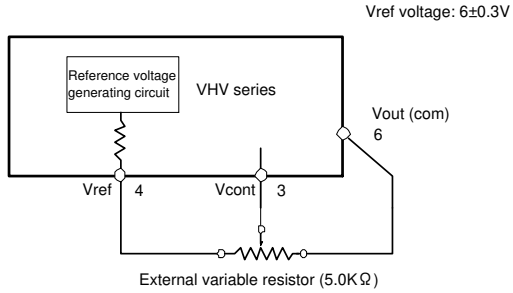




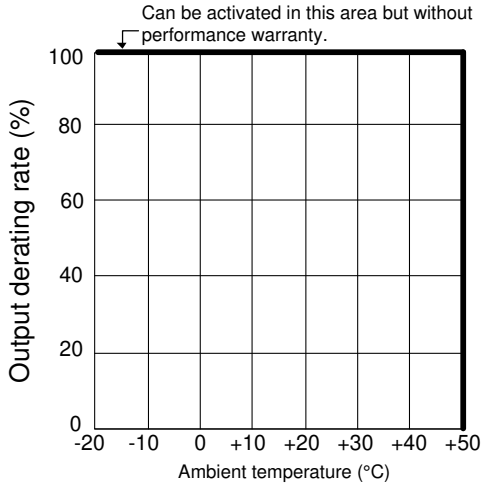
- In the above characteristic graph (output voltage - VR resistance characteristic), the resistance R1 and R2 are a guideline. When setting output at a fixed voltage with a fixed resistor, do so after determining R1 and R2 using a variable resistor.
- Do not apply 6V+3% or more voltage to Vcont.
- Use a variable resistor with a good temperature coefficient.
- It is preset that when the resistance of the variable resistor is 5.0KΩ, 6.0V is applied to the Vcont terminal to obtain 100% output voltage. Since the tolerance of the resistance value largely affects the maximum output voltage, set the resistance value at 5.0KΩ±5%.

■ Description of Vref terminal (reference voltage output)

This terminal is used for controlling output voltage with a variable resistor. Vref outputs a reference voltage of 6V. A 5KΩ external resistor is used in this case.
Since resistance value (tolerance) of an external resistor affects the Vref terminal voltage preset value and determines output voltage, ensure that the resistor has high accuracy of 5KΩ±5%. The type of the variable resistor (5KΩ) does not matter, but those of a good temperature coefficient are recommended.

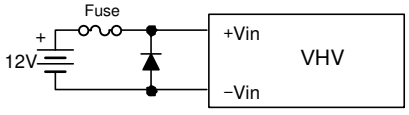


■ Temperature derating



■ Protection against reverse connection

Reverse connection of input voltage may result in the breakage of a converter. If there is any possibility for a reverse connection, add a diode and a fuse to the input terminal as shown below.



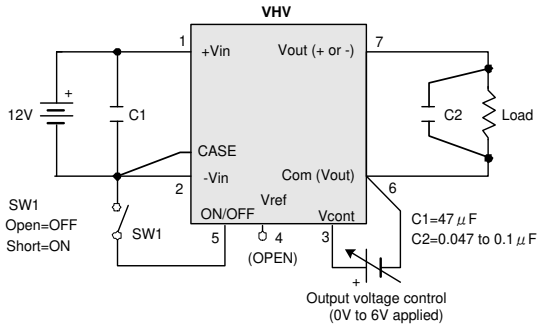
■ Recommended soldering conditions

Observe the following conditions for soldering each part.

(i) Soldering iron	340 - 360°C	5 seconds
(ii) Dip solder bath	230 - 260°C	10 seconds

■ To reduce output noise further

The VHV series basically does not require any additional parts, but to reduce output noise further, add Capacitor C2 as shown below.



To reduce output noise even further, position C2 near the Load with the shortest input-output wiring while paying attention to creepage and spatial distances .

Point!

(i) Add a capacitor of a good high frequency characteristic to the input side.

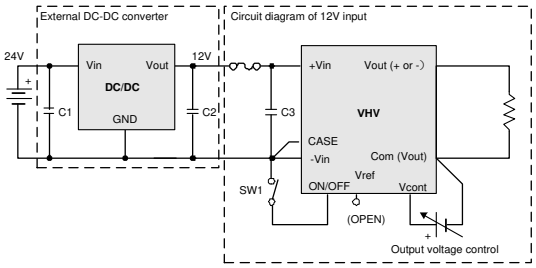
(ii) Design a pattern for the ground (common) line to be thick and short so as to reduce common impedance.

(iii) Ensure that a capacitor to add to the output side shall have a sufficient withstand voltage and shall be attached to the terminal end. Try to make the lead wires of the capacitor the shortest possible in this case as well. In addition, with a load requiring a certain response speed, pay attention to the time

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■ How to use for a 24V input voltage

By connecting a 24V-input 12V-output DC-DC converter to the front of the VHV series, the VHV series can be used for a 24V input voltage.



■ Warranty

The warranty term of the product is one year after shipment. Should the product become defective within the warranty period due to our design or workmanship, the product will be repaired free of charge or replaced. However, this warranty does not cover products which have been subjected to unauthorized inner modifications, etc.
The scope of our warranty is limited to that of the said product.

■ Contact

If you have any further technical questions for this product, please contact us.

E-mail: info@volgen.com
URL: www.volgen.com