CHVM1R5 Series
Instruction Manual

BEFORE USING THE POWER SUPPLY UNIT

Be sure to read this instruction manual thoroughly before using this product. Pay attention to all cautions and warnings before using this product. Incorrect usage could lead to an electrical shock, damage to the unit or a fire hazard.

⚠ DANGER

Never use this product in locations where flammable gas or ignitable substances are present.

⚠ INSTALLATION WARNING

- When installing, ensure that work is done in accordance with the instruction manual. When installation is improper, there is risk of electric shock and fire.
- Installation shall be done by Service personnel with necessary and appropriate technical training and experience. There is a risk of electric shock and fire.
- Do not cover the product with cloth or paper etc. Do not place anything flammable around. This might cause damage, electric shock or fire.

⚠ WARNING ON USE

- Do not touch this product or its internal components while circuit in operation, or shortly after shutdown. You may receive a burn.
- While this product is operating, keep your hands and face away from it as you may be injured by an unexpected situation.
- There are cases where high voltage charge remains inside the product. Therefore, do not touch even if they are not in operation as you might get injured due to high voltage and high temperature. You might also get electric shock or burn.
- Do not make unauthorized changes to this product nor remove the cover as you might get an electric shock or might damage the product. We will not be held responsible after the product has been modified, changed or dis-assembled.
- Do not use this product under unusual condition such as emission of smoke or abnormal smell and sound etc. Please stop using it immediately and shut off the product.
  It might lead to fire and electric shock. In such cases, please contact us. Do not attempt repair by yourself, as it is dangerous for the user.
- Do not operate and store these products in environments where condensation occurs due to moisture and humidity. It might lead fire and electric shock.
- Do not drop or apply shock to this product. It might cause failure. Do not operate these products mechanical stress is applied.

⚠ CAUTION ON MOUNTING

- Confirm connections to input/output terminals are correct as indicated in the instruction manual before switching on.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged.
- Input line, please use the wires as short and thick as possible.
- Do not use this product in special environment with strong electromagnetic field, corrosive gas or conductive substances and direct sunlight, or places where product is exposed to water or rain.
- Please shut down the input when connecting input and output of the product.
- When installing in environment where conductive foreign, dust and liquid may be present, please consider penetration of above foreign material in the power supply by installing filter, to prevent trouble or malfunction.

⚠ CAUTION ON USE

- Product individual notes are shown in the instruction manual. If there is any difference with common notes individual notes shall have priority.
- Before using this product, be sure to read the catalog and instruction manual. There is risk of electric shock or damage to the product or fire due to improper use.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged, or cause electric shock or fire.
- Insert fuse at the input to prevent smoke, fire during abnormal operation.
- For externally mounted fuse do not use other fuses aside from our specified and recommended fuse.
- This product was made for general purpose electronic equipment use and is not designed for applications requiring high safety (such as extremely high reliability and safety requirements. Even though high reliability and safety are not required, this product should not be used directly for applications that have serious risk for life and physical safety. Take sufficient consideration in fail-safe design (such as providing protective circuit or protective device inside the system, providing redundant circuit to ensure no instability when single device failure occurs).
- When used in environments with strong electromagnetic field, there is possibility of product damage due to malfunction.
- When used in environment with corrosive gas (hydrogen sulfide, sulfur dioxide, etc.) , there is possibility that they might penetrate the product and lead to failure.
- When used in environments where there is conductive foreign matter or dust, there is possibility of product failure or malfunction.
- Provide countermeasure for prevention of lightning surge voltage as there is risk of damage due to abnormal voltage.
- Take care not to apply external abnormal voltage to the output. Especially, applying reverse voltage or overvoltage more than the rated voltage to the output might cause failure, electric shock or fire.

⚠ NOTE

- Take note that traces of sheet metal processing be left in our power supplies.
- When disposing product, follow disposal laws of each municipality.
- When exporting our products, apply for necessary permissions as required by rules and regulations of Foreign Exchange and Foreign Trade Control Act.
- Catalogue, contents of the instruction manual may be changed without a prior notice. Refer to latest catalogue or instruction manual.
- Reproduction or reprinting the instruction manual or its portion is forbidden without our permission.

⚠ LONG-TERM STORAGE METHOD AND LONG-TERM STORAGE PERIOD

- Please keep the product in carton box.
- Please do not apply excessive vibration, shock or mechanical stress applied directly to the product.
- Please keep away from direct sunlight.
- For long-term storage temperature and humidity, the following conditions shall be used as a guideline :
  Temperature range : 5℃～30℃
  Humidity range : 40%～60%RH
  Please keep away from the places where temperature and humidity can change drastically.
  It can cause condensation on the product or deterioration.
- For long-term storage period, we recommend to use within 1 years after receiving the product.
  < Soldering and PCB mounted products : On Board, Power Module and etc >
  For products that have been received for more than 1 year, please check lead oxidation and solderability.

The CHVM series is medium-high voltage DC-DC converters featuring an ultracompact size.
With a pentahedron metal shield case, ripple noise has been reduced to as low as 5mVp-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 5mVp-p
- •Smallest size
- •Adjustable output voltage from 0 to 100%
- •Control voltage 0 to +6V
- •Output capacity 1.5W
- •UL / cUL 60950-1 certified product
- •CE marking
- •Built-in over current protection circuit
- •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

■ Model name/Rating

Models CHVM series	Input Voltage (Vdc)	Output Voltage (Vdc)	Output Current (mA)	Load Resistance (KΩ) min	Input Current (A) typ	Ripple Noise (mVp-p) typ
CHVM1R5-12-1000P	11.0~13.0	0~+1000	0 ~ 1.5	666.7	0.22	5
CHVM1R5-12-1000N	11.0~13.0	0~-1000	0 ~ 1.5	666.7	0.22	5
CHVM1R5-12-1500P	11.0~13.0	0~+1500	0 ~ 1.0	1500	0.23	7
CHVM1R5-12-1500N	11.0~13.0	0~-1500	0 ~ 1.0	1500	0.25	7
CHVM1R5-12-2000P	11.0~13.0	0~+2000	0 ~ 0.7	2857	0.28	10
CHVM1R5-12-2000N	11.0~13.0	0~-2000	0 ~ 0.7	2857	0.28	10

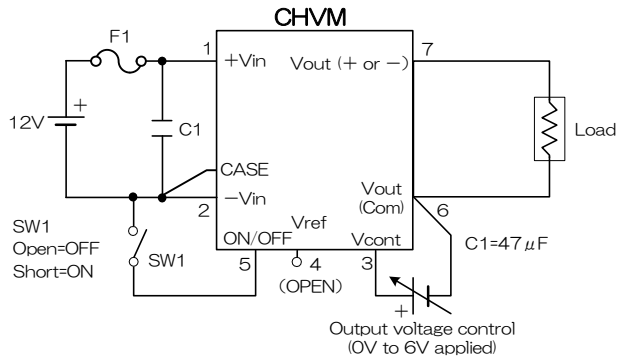
■ Specifications

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)
MTTF expectation	600,000Hours(min)

Note 1 : 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).

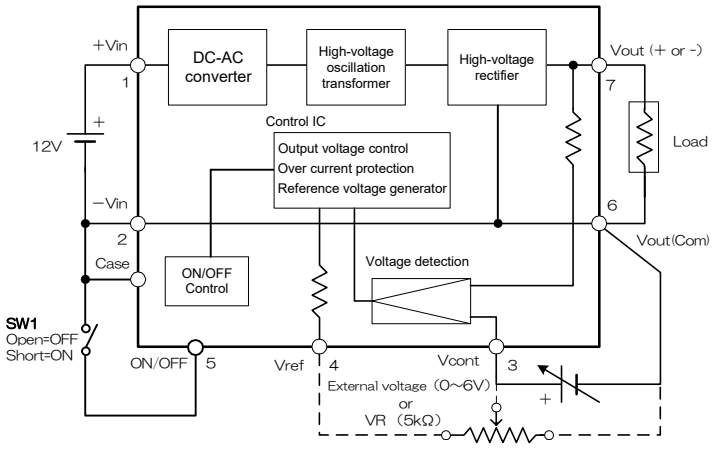
Note 2 : Details are subject to change for improvement, etc., without prior notice.

■ Test circuit



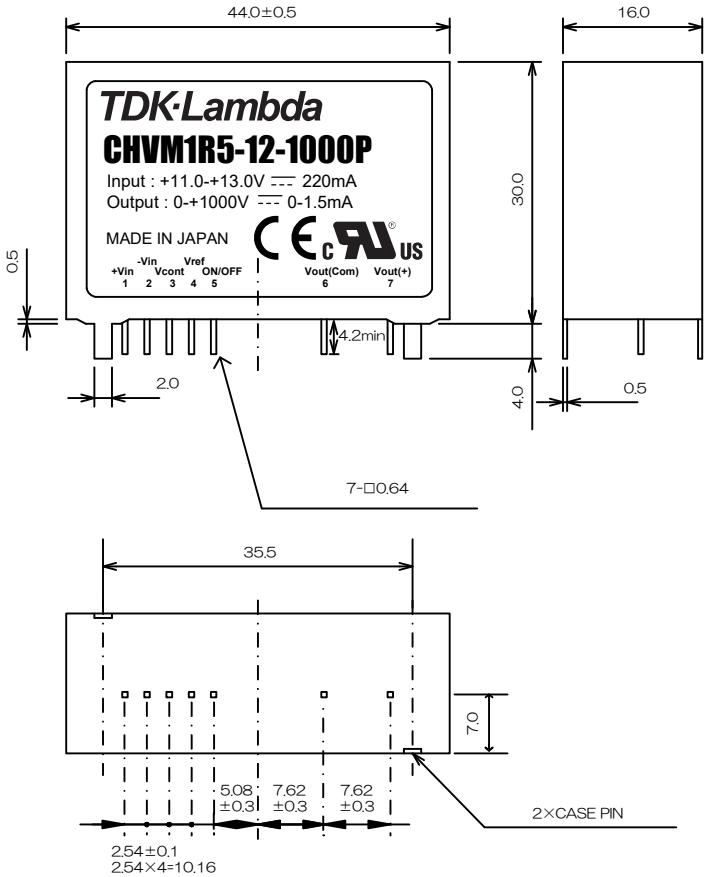
(1) The input-output ground lines and the case are connected inside.
(2) Vref is 6V (when external VR is 5KΩ)
(3) ON/OFF can be controlled by a transistor.

■ Block diagram



● Switching frequency (fixed) : 200kHz

■ Shape, dimensions and terminal composition



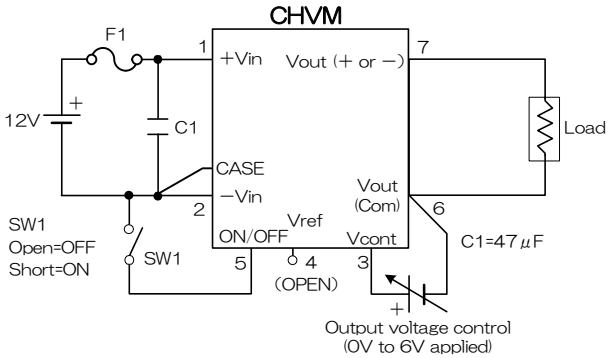
(Bottom view)

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

1) Terminal
Material: Phosphor bronze
Treatment: Ni base Au plating
2) Case
Material: Brass
Treatment: Nickel plating

Weight: 50g typ.
Unit: mm
Unspecified dimensional tolerance ±0.5

■ Standard usage instructions



The CHVM 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, an 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.

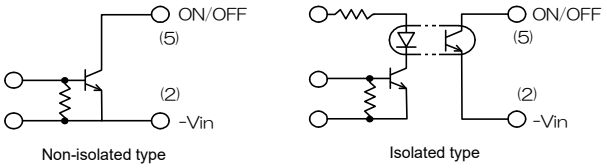
Between ON/OFF terminal (5) and -Vin terminal (2)

(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.

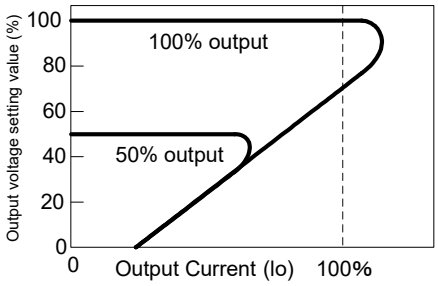
Short-circuit when ON/OFF is not controlled.



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).

■ Over current protection

The CHVM 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.

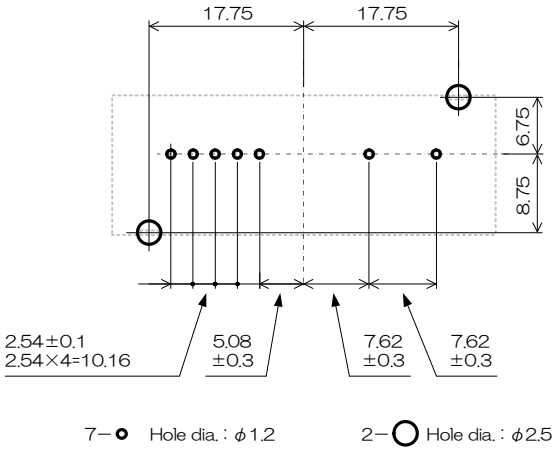


CHVM series
over current protection circuit
characteristic

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)

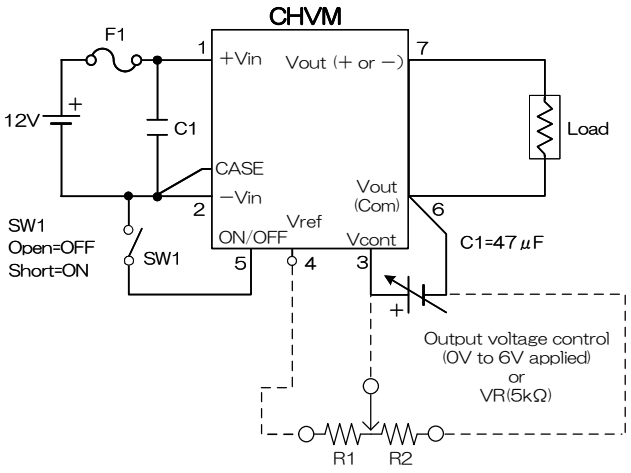


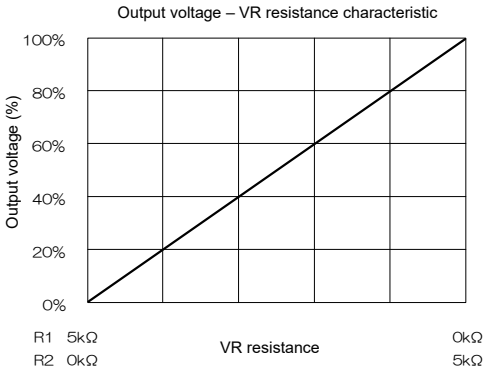
[mm]

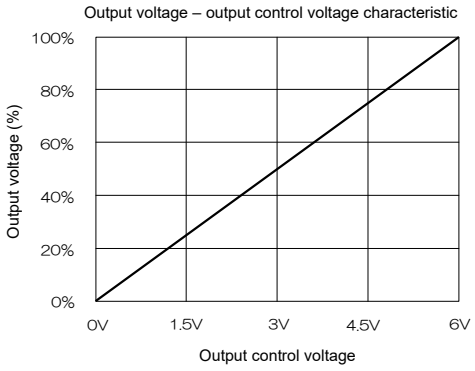
(1) The CHVM series uses a metal case. When mounting onto a double-sided board, wiring to this converter should be on a soldered surface. When wiring, pay enough attention to creepage distance because of the high voltage of this converter.
(2) When mounting onto a double-sided board, make the round on the parts surface of the high voltage output terminal as small as possible.
(3) Connect the case of the CHVM 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 CHVM series can be set and adjusted by external voltage and external variable resistor.



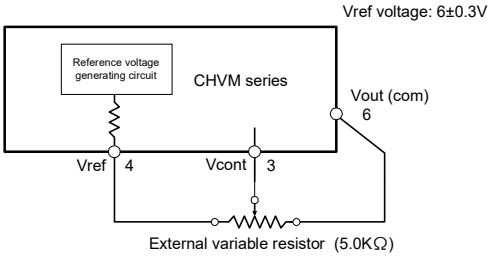




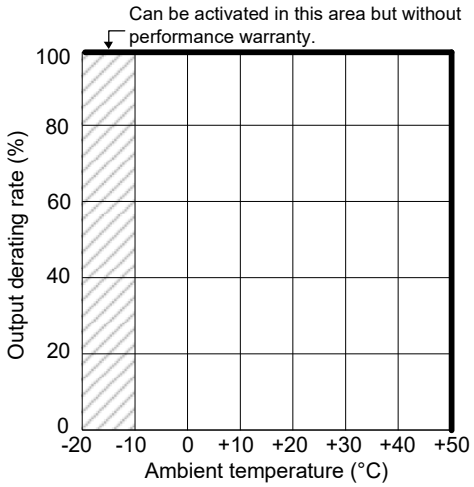
- In the above characteristic graph (output voltage - VR resistance characteristic), the resistance R1 and R2 are for a guideline. When setting output at a fixed voltage with a fixed resistor, do so after determining R1 and R2 using a variable resistor.
- Do not apply 6V+3% or more voltage to Vcont.
- 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.

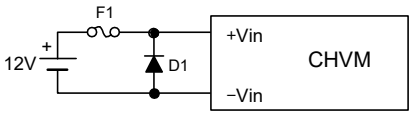


■ Temperature derating



■ 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 circuit as shown below.



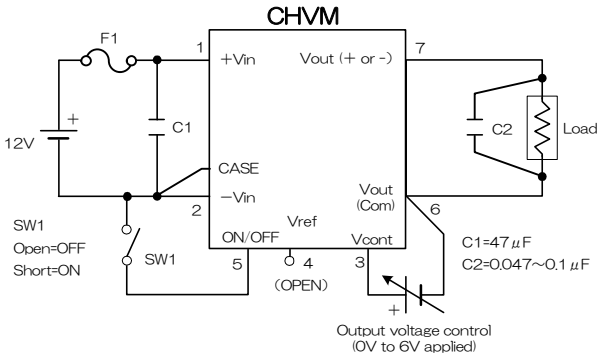
■ Recommended soldering conditions

Observe the following conditions for soldering each part.

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

■ To reduce output noise further

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



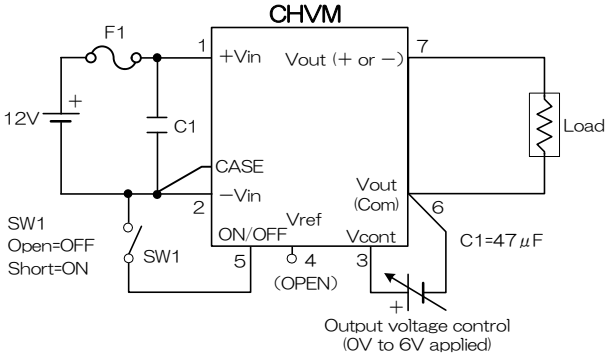
To reduce output noise even further, position C2 near the Load with the shortest input-output wiring while paying attention to creepage and spatial distances.

Point!

(1) Add a capacitor of a good high frequency characteristic to the input side.
(2) Design a pattern for the ground (common) line to be thick and short so as to reduce common impedance.
(3) 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 constant of the capacitor.

■ Safety standard

The CHVM series has attained the UL62368-1, CSA62368-1, UL60950-1, CSA60950-1 certification and CE marked.
When using the CHVM series as a Recognized certified product please mount an input fuse as shown below.



Choose a fuse(F1) from below:
- •UL Listed products
- •DC250V, Rated current 2A type