

CHVM3 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°C~30°C
 - 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 an adjustable output voltage type mid-high voltage DC-DC converter. Output voltage can be controlled using an external voltage or external adjustable resistor. The CHVM series has adopted a 5 sided metallic shield, with lower ripple and lower noise.

■ Features

- PCB mounting type
- Output capacity 2.5W to 3W
- Over current protection
- Smallest size
- Low price
- UL / cUL 60950-1 certified product
- Adopted a 5 sided metallic shield case
- 100% Burn in test
- Adjustable voltage using an external voltage
- Low ripple noise of 30mVp-p
- High reliability, long life

■ Model name/Rating

Models CHVM series	Input Voltage (Vdc)	Output Voltage (Vdc)	Output Current (mA)	Load Resistance (K Ω) min	Output capacity (W)	Input Current (mA) typ	Ripple Noise (mVp-p) typ
CHVM2R7-12-0180PW	10.8 ~ 13.2	0 ~ +180	0 ~ 15	12	2.7	350	30
CHVM2R7-12-0180NW	10.8 ~ 13.2	0 ~ -180	0 ~ 15	12	2.7	350	30
CHVM3-12-0300PW	10.8 ~ 13.2	0 ~ +300	0 ~ 10	30	3.0	395	30
CHVM3-12-0300NW	10.8 ~ 13.2	0 ~ -300	0 ~ 10	30	3.0	395	30
CHVM2R5-12-0350PW	10.8 ~ 13.2	0 ~ +350	0 ~ 7	50	2.5	330	30
CHVM2R5-12-0350NW	10.8 ~ 13.2	0 ~ -350	0 ~ 7	50	2.5	330	30

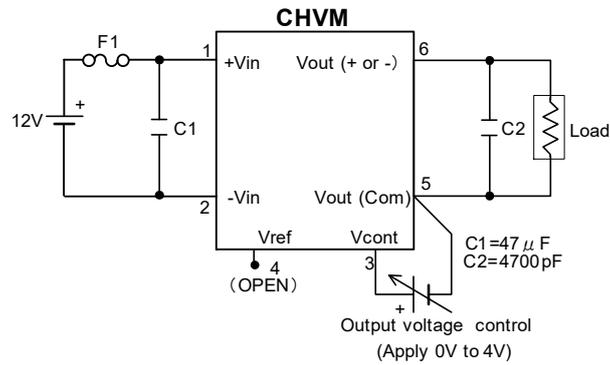
■ Specifications

Line regulation	0.02% typ.(Input current varying from +10.8V to +13.2V)
Load regulation	180V type : 0.5% typ. 300V, 350V type : 0.2% typ.(Load current varying from 0% to 100%)
Temp regulation	$\pm 0.01\%/^{\circ}\text{C}$ typ.(Temp varying from -10°C to $+50^{\circ}\text{C}$)
Over current protection	Foldback recovers, auto restart circuit at 105% or more
Output voltage accuracy	Below $\pm 5\%$ (Rated output, rated load, and $V_{\text{cont}}=4.0\text{V}$)
Output voltage control	External voltage 0V to +4V or an external resistor 5K Ω to adjust
Usage temp range	-10°C to $+60^{\circ}\text{C}$ (Derating required for temp higher than $+50^{\circ}\text{C}$)
Storage temp range	-25°C to $+85^{\circ}\text{C}$
Usage humidity range	20% to 95%RH(no dewing)
Isolation between input/output	Non isolated type (2pin-5pin and the case are connected internally)
MTBF expected value	480,000Hours(min)

Note1: The output voltage will be controlled by applying the V_{cont} voltage. Using an adjustable resistor or an external voltage, voltage should be applied on the V_{cont} pin in order to control the output voltage. When V_{cont} voltage=0V the output voltage (output residual voltage) should be less than 0.5% of the max output voltage(I/O rated).

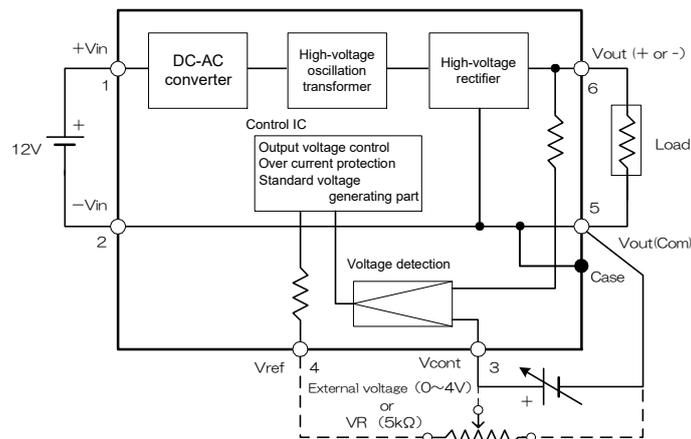
Note2: Details are subject to change for improvement, etc., without prior notice.

■ Test circuit

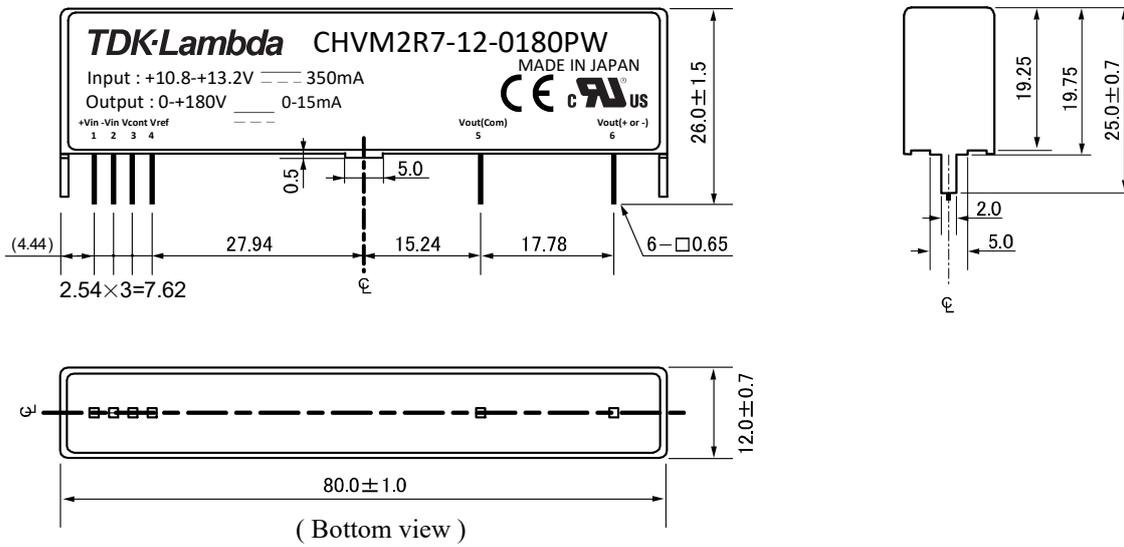


Warning 1: The ground line (2pin, 5pin) between the input/output, and the case are internally connected.
Warning 2: Vref is 4V ±0.3V (When external VR=5kΩ)

■ Block diagram



■ Shape, dimensions and terminal composition

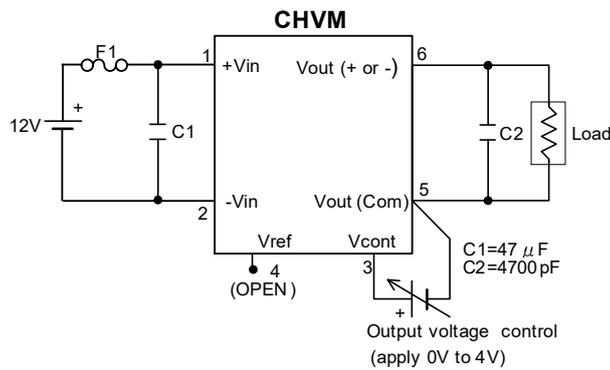


Pin-No.	Pin name
1	+Vin
2	-Vin
3	Vcont
4	Vref
5	Vout (com)
6	Vout (+ or -)

- 1) Pins
 Material : Phosphorous bronze
 Treatment : Ni base Au coating
- 2) Case
 Material : Brass
 Treatment : Nickel coating

Weight : 46g typ. Units : mm Tolerance unless otherwise specified ±0.5

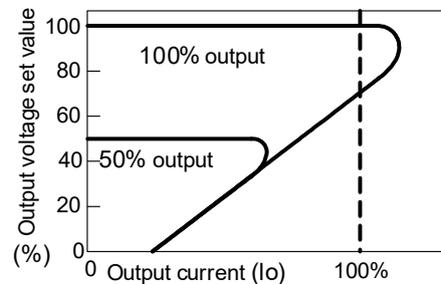
■ Standard usage instructions



The CHVM series does not require any external parts, however when the impedance is high, for example: the distance between the power supply and converter is long, the input line is thin, or the input side has a filter then connecting a capacitor C1 to the input side is recommended. Place the capacitor as close as possible to the converter pin side, to lower the lead inductance.

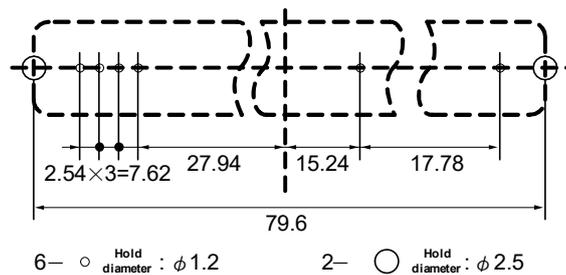
■ Over current protection

The CHVM series has a over load and load short protection installed, which is the over current protection. When the product status is in over load or load short mode, the output voltage will decrease, and once the problem has been removed, the voltage will increase again.



CHVM series
Over current protection characteristic

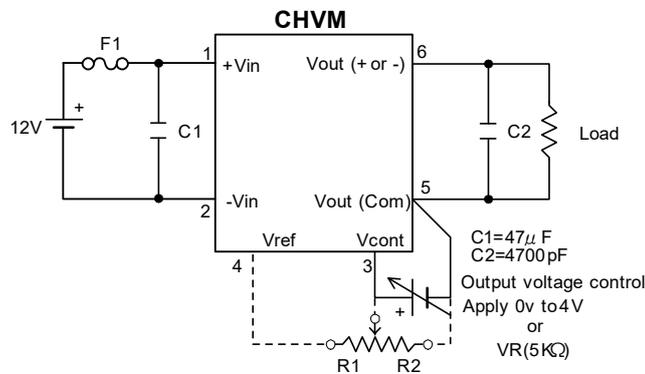
■ Recommended pattern



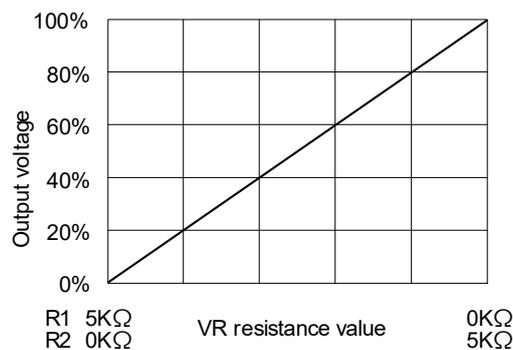
- (1) The CHVM series uses a metallic case. When soldering to a double-sided PCB, the wiring for the converter should be on the soldering side.
Also, this converter will generate high voltages so the creepage distance should also be taken into account when designing.
- (2) When mounting to a double-sided PCB, the high voltage output pin and land should be as small as possible.
- (3) The CHVM series case should be connected to the -Vin and Vout (Com).
- (4) The metallic case does not need to be touching anything.
However, when using and making contact with the metallic case, the anti land impedance should be lowered.

■ Setting and adjustment of output voltage

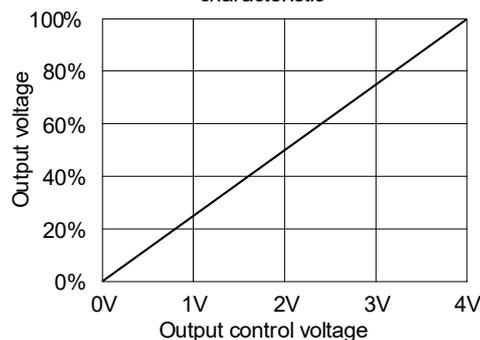
The CHVM series output voltage can be adjusted by using an external voltage or external adjustable resistor.



Output voltage—VR resistance value characteristic



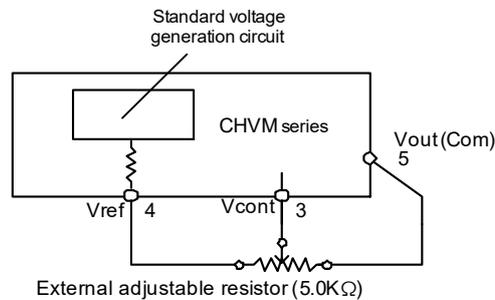
Output voltage—Output control voltage characteristic



- The above characteristics (Output voltage -VR resistance value characteristic) graph is an indication of the resistance value R1 and R2. When setting the voltage to a set rate using a stable resistor, first decide the adjustable resistor R1 and R2.
- Do not apply voltage higher than 4V+5% on the Vcont.
- Choose an adjustable resistor appliance with good temp characteristics.
- When the resistance value for the adjustable resistor is 5.0KΩ, the max output voltage of 4.0V which is 100%, should be applied to Vcont pin. Since the max output voltage largely affects the margin of error for the resistance value, set the resistance value at 5.0KΩ±5%.

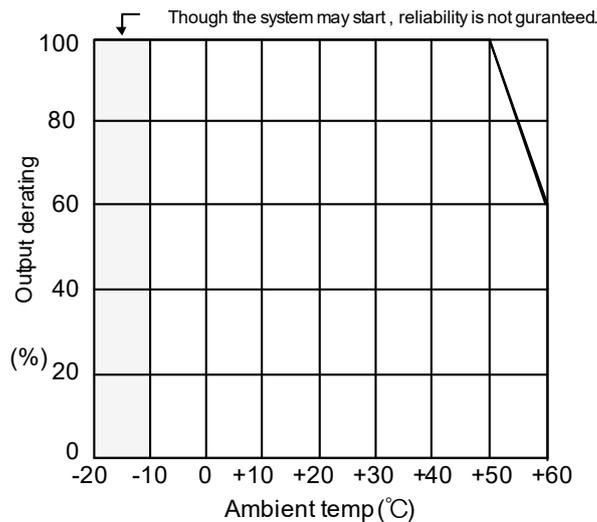
■ Vref pin (standard voltage output)

When controlling the output voltage with an adjustable resistor, this pin is used. Vref has a standard output voltage of 4V. In this case, the external adjustable resistor is 5KΩ. Since the resistance value from the external adjustable resistor will decide the output voltage with the effect of the specified value, use a resistance value with an accuracy of 5KΩ±5%. The type of resistor does not matter, as long as it is 5KΩ, however one with a good temp coefficient is recommended.



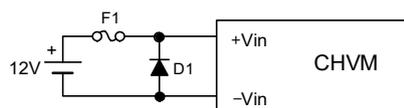
■ Temperature derating

When using the product where the ambient temp is higher than 50°C, follow the derating graph below, increasing the load resistance as the temp increases. The minimum load resistance value is specified for each series.



■ Preventing reverse connections

The converter may break if the polarities are reversed. If there is a possibility in which the connections maybe reversed, connect a diode and fuse like below.



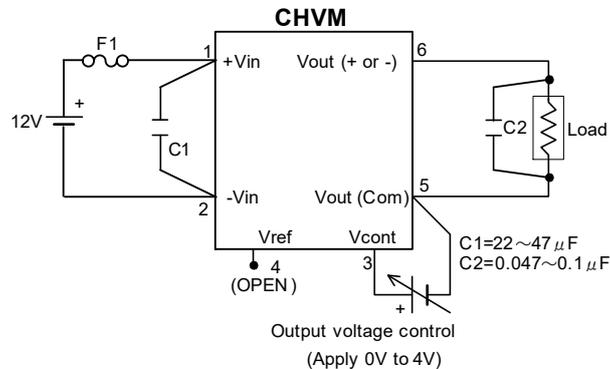
■ Recommended solder conditions

Soldering conditions for each part are as follows:

- | | | |
|---------------------|-------------|------------|
| (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 does not need any external parts, however to lower the output noise further, connect a capacitor C2 like the figure below.



When lowering the output noise, the wiring of the input and output should be as short as possible. Place C2 closest to the load, paying attention to creepage and clearance distances.

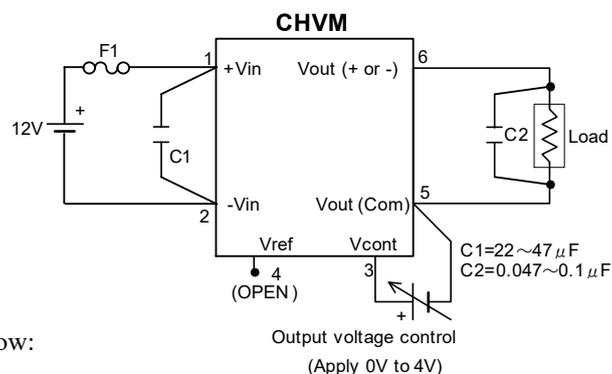
Point!

- (1) Choose a capacitor with a high-frequency when adding to the input.
- (2) Earth (COMMON) line should be thick and short in the pattern design to lower the common impedance.
- (3) The capacitor which is connected to the output side should be able to withstand the pressure, when connected to the loadside. At this time, the capacitor lead should be shortened. Also when the load response time is a problem, please be aware of the time constant.

■ Safety standard

The CHVM series has attained the UL60950-1, CSA60950-1 certification.

When using this product as a recognized (certified) product, an input fuse should be mounted like below.



Choose a fuse(F1) from below:

- UL Listed products
- DC250V, Rated current 2A type