

FHHZ40 Series Multi-output High-temperature DC-DC Power Converters

Features:

- : Working temperature: Ambient temperature: $-55^{\circ}\text{C} \sim +175^{\circ}\text{C}$, max. shell temperature up to $+185^{\circ}\text{C}$
- : Output power: 40W
- : Input range: DC: 9V-36V, 16V-48V, 24V-72V, 36-108V; 70-210V, 120V-360V and 200V-400V
- : Multiple outputs up to 9 and max. 6 isolated output ground circuits
1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5V
7V, 9V, 12V, 15V, 18V, 24V, 36V, 48V
- : Small size: L:84.0×W:50.0×H:25.0MM
- : Small output ripple: Maximum 10mV, typical 7mV
- : High conversion efficiency: Typical 70-80%
- : Sealed metal casting: Impact and moist resistance and electromagnetic radiation protection
- : Remote cutoff function
- : Integrated LC EMI filter
- : Provide rated power without deduction at 175°C (shell); provide 80% rated power at 185°C (shell)
- : Over-heat protection at 210°C



Description:

FHHZ40 series 40W multi-output high-temperature DC-DC power converters, specially designed for electronic equipment working in the harsh environment, can work for 2,000 hours at shell temperature 150°C , for 750 hours at shell temperature 175°C and for 400 hours at shell temperature 185°C . With features of being resistant to high temperature, impact and humidity, it is particularly suitable for being used as power supply for petroleum prospecting logging tool, petroleum drilling instrument, geophysical detecting instrument, vehicles, telecommunication, network infrastructures, enterprise and high-performance calculation, etc.

FHHZ40 has five alternative input ranges including 9V~36V, 16~48V, 24~72V, 36~108V, 70~210V, 120~360V and 200V-400V. It is able to provide at most 9 outputs and 6 isolated ground circuits. They are allowed to be connected to form output combinations of different types as per requirement. Within the entire temperature range and conversion between full load and no-load, the output voltage fluctuation is within 2%.

FHHZ40 series 40W multi-output high-temperature DC-DC power converter was specially designed and developed for a complicated system requiring the total power less than 40W, more than 4 outputs or 3 isolated ground circuits, high voltage accuracy and ripple wave less than 10MV. This power converter makes it possible to meet clients' all requirements on power supply without assembling our power converters any more.

FHHZ40 series 40W multi-output high-temperature DC-DC power converter is a combined power converter. The front stage consists of two 20W three isolated ground circuits and three-output DC/DC FHV20 series power converter and the back stage consists of three FHB1.5A series power converters, plus 2 input EMI and at most 8 output EMI. This combination ensures that there are at least 5 output voltages with accuracy greater than 1.5% within one module. If output is symmetric between the positive and negative, the number of channel of output voltage with accuracy greater than 1.5% will be 7. The minimum output voltage can reach +1.2V to meet low-voltage and high-current requirements like high-speed DSP and CPLD. The minimum value of each channel of 9 output currents is zero and 1.5A maximum, but the total output power should not be greater than 40W and input power not greater than 47W. As sufficient EMI filtering is added to input and output, it ensures

that the system's static ripple wave is not greater than 10mV.

Three FHB1.5A power converters in back stage can connect a common auxiliary output or separately connect an auxiliary output with input voltage equal to or greater than 5V.

Output voltage of entire module is the any combination from 1-9 channels of 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5V, 7V, 9V, 12V, 15V, 18V, 24V, 36V, 48V, but the total channels of 1.2V, 1.5V, 1.8V, 2.5V should not exceed three channels, because they shall only be provided by FHB1.5A. FHHZ40 power converter can only combine three FHB1.5A power converters at most.

When output channels are equal to or less than 5, output voltage of each channel is main output which is stable in any condition and the accuracy is higher than 1.5%; when output channels are more than 5, for additional channel, if voltage is greater than 3.3V and maintains positive and negative symmetry with one of five channels, it is main output and stable too. The accuracy is higher than 1.5%. If additional channel cannot form positive and negative symmetric output with the previous 5 channels, it is then auxiliary output and its output voltage and ripple wave will vary with its output power.

During the use, the voltage outputted from main output terminal is most stable and it does not vary with the variation of itself and auxiliary output power. In the condition that power outputted from main output terminal is constant, the voltage of auxiliary output terminal decreases with the rise of its output power, reaching 2% at most. If power outputted from auxiliary output terminal is constant, their output voltage increases with the increase of power outputted from main output terminal.

In the course of using multi-output converter, if the power of an output (main or auxiliary) dynamically changes, it will cause the auxiliary output voltage to fluctuate accordingly. If the fluctuation is greater than 50mA, measures must be taken. The voltage fluctuation above 50mA appears when output power varies between the rated power of above 10% and below 70%. The fluctuation increases along with the rise of proportion of high and low output power. The fluctuation frequency is equal to the frequency of power variation. At this time, the secondary filtering is thus considered to be done. If the fluctuation frequency of power is less than 10KHz, there will be trouble in filtering. Then it is necessary to reduce the number of output channels of main converter and add secondary DC/DC converter to re-convert additional voltage. If the fluctuation frequency of power is greater than 10KHz, the simple filtering is able to remove the fluctuation.

In the course of operation, when the power of an output (main or auxiliary) varies between the rated power of above 10% and below 70%, its voltage fluctuation generally is less than 50mV. This fluctuation is free from consideration in general.

FHV20 series included in FHHZ40 power converter contains the output short circuit and overload automatic turn-off circuit. When the output lasts for 0.1s and exceeds 120% of the rated output power, the converter cuts off all outputs. After the over-current fault is eliminated, it automatically resumes the output voltage. If the overload duration of output is less than 0.1s, the converter will not act. As for the entire converter, output short-circuit and overload are not uniform action. If only one piece of FHV20 is overloaded in front stage, it and its back stage will cut off. The other FHV20 and its back stage will output normally. In this case, power should be rationally distributed in selecting type. For any question, please contact our engineer.

FHHZ40 is able to work with full load when shell temperature is less than +175°C and work with 70% of load at shell temperature +185°C. At ambient temperature +175°C, shell temperature will still reach 180°C even if good heat radiation is adopted. For this reason, it is suggested to avoid working with full load at ambient temperature above +170°C. 70% of load at most is ok.

FHHZ40 series power converter contains over-voltage and under-voltage cut-off functions, which enables the converter to stop working beyond the range of the input voltage to protect the converter. The under-voltage and over-voltage cut-off voltage is within 5V of extension of rated voltage. If the input range is rated at 36-108V, its

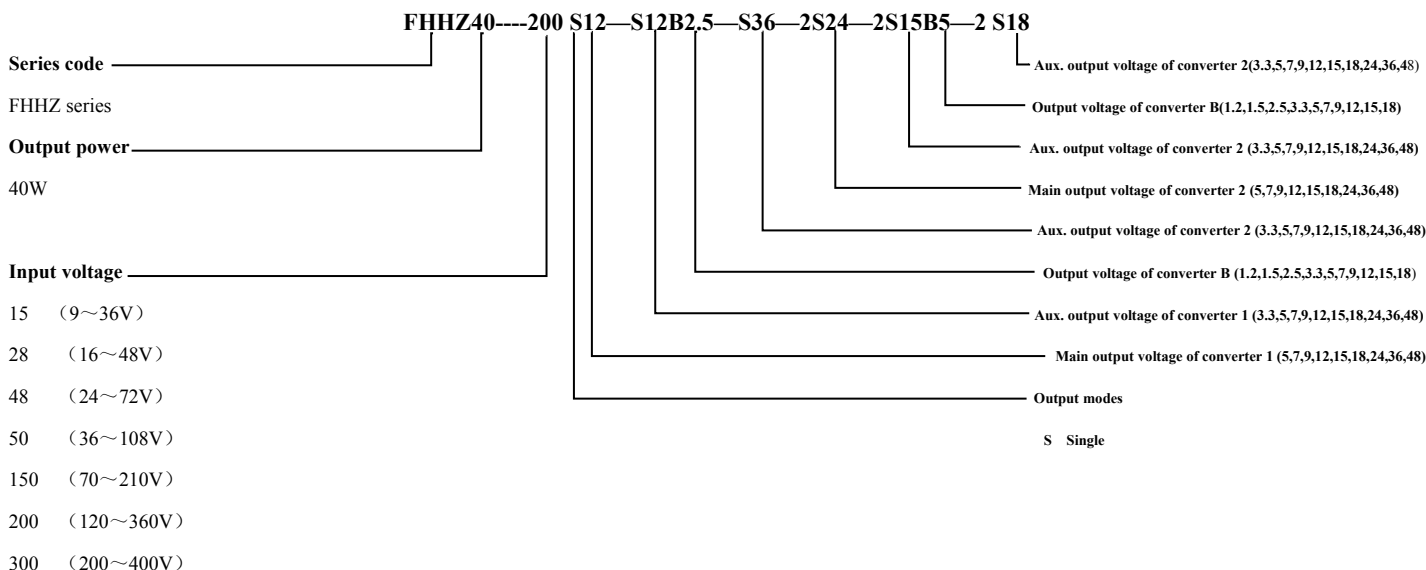
under-voltage cut-off voltage will be 31-35.9V and over-voltage cut-off voltage will be 110~115V.

FHHZ40 power converter's cut-off terminal SLEEP is high-level effective. When the voltage is 3.2~5.3V, the converter enters the resting state, all outputs are cut off, and the input current is less than 2mA. When the voltage is 0~ 2.5V, or suspended, the converter operates properly. The input voltage of SLEEP terminal shall not exceed 6.0V. for any special requirement, please inform us and we will close some channels to let it work normally.

FHHZ40 contains 100MS soft start circuit, able to slowly increase input current after converter is started and fault is removed for externally connecting large capacity output filtering capacitance and reducing start impact.

Key components used for FHHZ40 series power-supply converter are purchased in military level and completely pass the in-factory test in strict accordance with the national military product quality standard. The factory test includes 24~72-hour live aging and screening under the temperature of +175℃. All finished products have experienced 8-hour full-load operation under the temperature of +185℃ before delivery so as to fully check the damage to the components during the production process and hence ensure the reliability of products.

Type Selection:



Notes: “—” in model refers to isolation. There are 6 “—” at most. The first “—” refers to input and output isolation and the following “—” refers to isolation between output. There are at least one and at most five isolation symbols between outputs. There are at least one and at most three SXXs. It is output voltage from converter 1 in front stage. It has at least one output and at most three outputs. The first SXX is main output of module in front stage. There are at least one and at most three 2SXXs. It is output voltage from module 2 in front stage. It has at least one output and at most three outputs. The first 2SXX is main output of converter2. BXX refers to output of FHB1.5A converter. For output it connects in front stage, model B will be close to its output. If the output connected to FHB1.5A is not led out, it is represented with --B. There are at most three Bs.

For example, if you want to input 200-400V. There are three groups of output and they are mutually isolated. The first group ±12v,+2.5v,+3.3v,+5v, the second group ±15v,+3.3v and the third group +5V. You can choose FHHZ40-300S12B2.5B3.3-S12-S5-2S15 B3.3-2S15-2S5, where if S12 and 2S15 are inversely connected to previous output, it forms common ground negative output. If you cannot give detailed model, please provide us with your desired input and output voltage and current, we will recommend proper model for your application.

Technical Parameters:

- (1) Operating temperature: -55℃ ~ +175℃, Max. shell temperature: +204℃.

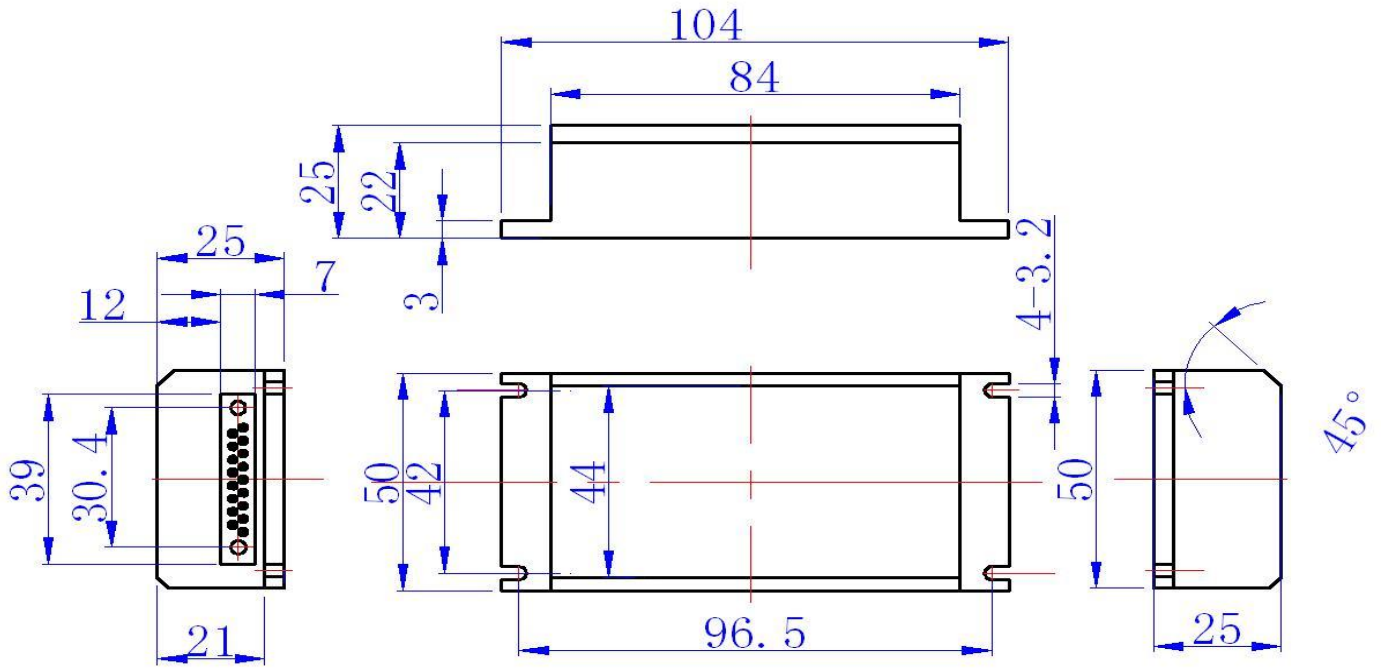
- (2) Input voltage: DC: 9V~36V, 16V~48V, 24V~72V, 36V~108V, 70V~210V, 120V~360V and 200V~400V
- (3) Multiple outputs up to 9 outputs and at most 6 mutually-isolated output ground circuits: 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5V, 7V, 9V, 12V, 15V, 18V, 24V, 36V and 48V
- (4) Output ripple: Less than 10mV, typical 7mV
- (5) Output power: 40W
- (6) Temperature stability: Less than $\pm 2.5\%$, typical $\pm 1\%$
- (7) Shock resistance: 25G, 0 ~ 300Hz
- (8) Conversion efficiency: 70-80%
- (9) Static power consumption: 0.8W Max.
- (10) Dimension: L84.0×W50.0×H25.0mm
- (11) Isolation voltage between input and output: 1000V
- (12) Isolation voltage between outputs: 500V
- (13) Output form of voltage: 27 pin socket

Service Requirement:

As the power converter has nearly 8W power consumption under the condition of full-load operation and its size are small, good medium is necessary to be added between the shell of the power converter and the radiator so as to ensure the temperature of the converter shell to be less than 204°C.

The shell of the converter is isolated from the input and output. During the use, the converter is usually mounted on instrument or its framework with the framework as a radiator. If the ripple cannot be filtered with capacitance or LC network, then this ripple is electro-magnetic interference (EMI). Thus, an EMI filtering converter is necessary to be added to input and output terminals of FHHZ40. To function properly, the shell of filtering converter should be suspended not to connect with radiator, input and output ground wires. If it is connected to either of them, EMI filtering converter will not function properly. As we have added EMI network to input and output terminals inside converter, so long as the shell is suspended, it will function. If the ripple is still large, it is needed to externally connect input or output EMI filter outside the shell. To suspend shell, it usually puts heat-conducting pad, ceramics backing or silicon rubber pad between the shell and radiator.

Outline Diagram:



Product performance, reliability and information are subject to change without prior notice.
May 28th, 2014