

FHAG15 Series High-temperature AC-DC Converter

Features:

- : High operating temperature: ambient temperature: $-55^{\circ}\text{C} \sim +175^{\circ}\text{C}$ and max. shell temperature: $+204^{\circ}\text{C}$
- : High output power: 15
- : Small size: $L84 \times W33.0 \times H15.0$ mm
- : Multi-output channels and separated with each other (single-channel, dual-channel and three-channel 3.3V, 5V, 9V, 12V, 15V, 24V, 36V, 48V)
- : Small output ripple: max. 50mV, typical 20mV
- : High conversion efficiency: typical 75%-80%
- : Wide input range: AC: $70 \sim 150\text{V}$, $85 \sim 247\text{V}$, $120 \sim 247\text{V}$
- : Sealed metal casting: impact and moist resistance and electromagnetic radiation protection
- : High operating frequency: 66.6 KHz
- : Integrated LC EMI filter
- : Provide rated power without deduction at 175°C (shell), provide 80% rated power at 185°C (shell) and 50% at 204°C
- : Over-voltage and over-current failure switch-off delay restart
- : Input under-voltage and overvoltage turn-off protection
- : Over-heat protection at 210°C

Description:

The FHAG15series 15W high-temperature AC-DC power converter, designed for the electronic equipments working in the harsh environment, can work for 1,000 hours at shell temperature 150°C , for 400 hours at shell temperature 175°C and for 48 hours at shell temperature 204°C . With features of being resistant to high temperature, impact and humidity, it is a power supply system especially applicable to petroleum survey logging tool, petroleum drilling instrument, geophysical detecting instrument, vehicles, telecommunication, network infrastructures, enterprise and high-performance calculation.. It has three optional input ranges for choose: AC: $70 \sim 150\text{V}$ (Frequency $0\text{Hz} \sim 400\text{Hz}$), $85 \sim 247\text{V}$ ($0\text{Hz} \sim 400\text{Hz}$), $120 \sim 247\text{V}$ ($0\text{Hz} \sim 400\text{Hz}$) and can provide fixed-voltage output in the mode of single-channel, double-channel and three-channel. The output is isolated with each other. These three output modes 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%.

The output voltage types designed for FHAG15 series 15W high-temperature AC-DC power converter include 3.3V, 5V, 9V, 12V, 24V, 36V and 48V. The output can be either type of them and combinations of any two or three types. MOUT represents the main output terminal, OUT1 and OUT2 represents the auxiliary output terminals. During the use, the voltage output by MOUT is the most stable and its output voltage and ripple do not vary with the variation of itself and auxiliary output. With the precondition that MOUT outputs constant power, the voltage of auxiliary output terminals OUT1 and OUT2 drops at 2% max. with the rise of their output power. If auxiliary output terminals OUT1 and OUT2 output constant power, their output voltage will rise with the rise of power output by MOUT. For this feature, the output should be specified in using and selecting types. If the model is FHAG150-220S5-S5-S15-S36, it will output three channels 5V, 15V and 36V isolated from each other. Of which, 5V is from MOUT, 15V from OUT1 and 36V from OUT2. That is our model is FHAG15-ACINSMOUT-SOUT1-SOUT2.

In the course of using multi-output module, if the output (main or auxiliary) of a channel 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. 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 module and add secondary DC/DC module 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 using, when an output power (main or auxiliary) of a channel varies between the rated power of above 10% and below 70%, its voltage fluctuation generally is less than 50mV. This fluctuation is free of consideration in general.

Our design concept is that if the required output voltage is above three channels, then FHAG15 chooses OUT2 to output 24V, 36V and 48V. Following OUT2, connect our DC/DC module with input voltage of 28V (16~48V) or 48V (24~72V) to conduct secondary conversion.

As for the module with wide range of input voltage (85V~247V), when input voltage is less than 120V, it is only able to input power of 10W; when input voltage is greater than 120V, it output rated power of 15W.

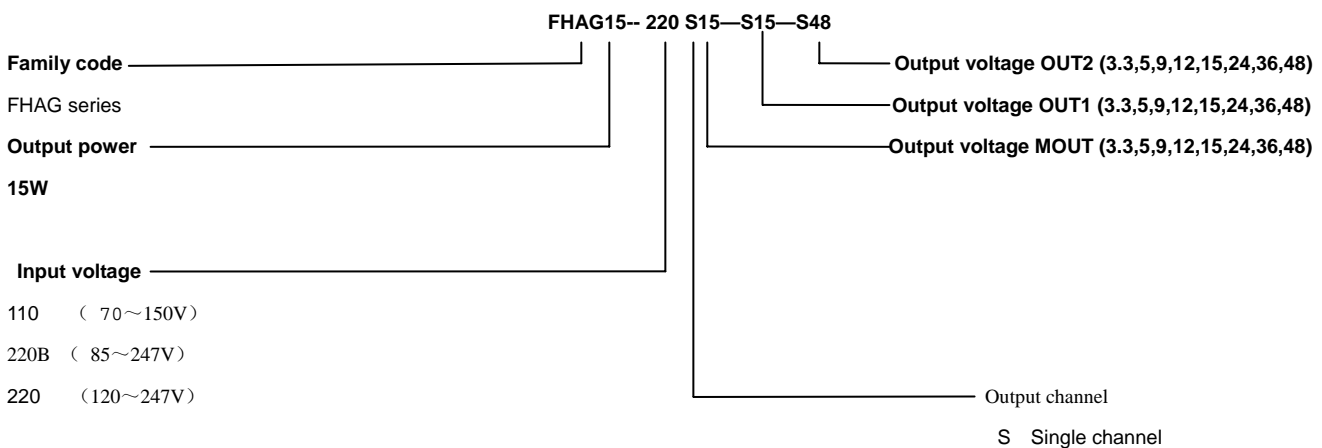
The operating frequency of FHAG15 series takes universal 66.6KHz, which can pass various EMI standard test. Under the circumstance without any filtering, its output voltage ripple is less than 50mV. Within the entire range of temperature, the temperature stability of frequency is ±8%.

FHAG15 series contains an in-built LC network, which can effectively reduce the fluctuations of the input current and the output voltage.

FHAG15 includes the output short circuit and overload automatic turn-off circuit. When the output lasts 0.1s and exceeds 120% of the rated output power, the module cuts off all outputs. After the over-current fault is eliminated, it automatically enters soft-start mode and restores the output voltage. If the overload duration of output is less than 01s, the module will not act.

FHAG15 components completely pass the in-factory test in strict accordance with the enterprise standards and GJB, which includes 24 ~ 72-hour live aging and screening under the temperature of +175°C. All finished products have experienced 8-hour full-load operation under the temperature of +175 °C before delivery so as to fully expose the damage to the components during the production process and hence ensure the reliability of products.

Type selection:



Remark: “—” in model means the isolation. If it is single channel output, there is no SOUT1—SOUT2; if it is dual-channel output, there is no

SOUT2.

Technical data:

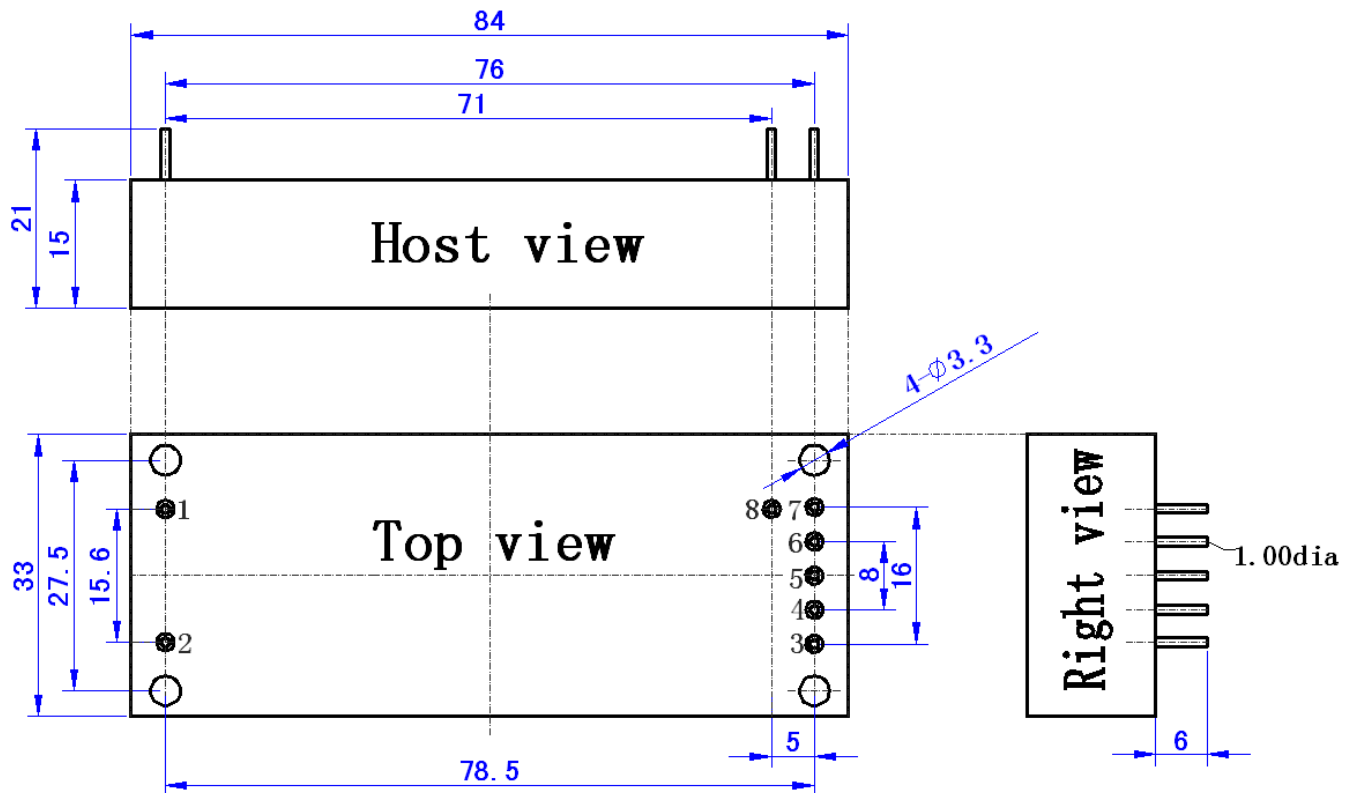
- (1) Operating temperature: -55 °C ~ +175 °C Max. shell temperature: +204 °C.
- (2) Input voltage: AC70~150V, AC85~247V, AC120~247V
- (3) Input AC frequency: 0Hz~400Hz
- (4) Output voltage: single channel, dual-channel or free combination of three channels (3.3V, 5V, 9V, 12V, 15V, 24V, 36V and 48V)
- (5) Output ripple: <50mV (typical 20mV)
- (6) Output power: 15W
- (7) Temperature stability: less than $\pm 2.5\%$ (typical $\pm 1\%$)
- (8) Shock resistance: 25G, 0 ~ 300Hz
- (9) Conversion efficiency: 75% ~ 80%
- (10) Static power consumption: 0.8W max.
- (11) Dimension: L84.0×W33.0×H15.0 mm
- (12) Isolation voltage between input and output or between the outputs: 1000V

Service requirements:

As the module has nearly 3W power consumption under full-load operation and its size is small, a good medium needed to be added between the shell of the power supply 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, it is directly installed on radiator. If the ripple cannot be filtered with capacitance or LC network, then this ripple is electro magnetic interference (EMI). Thus, an EMI filtering module is necessary to be added to input and output terminals of FHAG15. To function properly, the shell of filtering module should be suspended not to connect with radiator, input GND and output GND. If it is connected to either of them, EMI filtering module will not function properly. As we have added EMI network to input and output terminals inside module, 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 ordinarily put heat-conducting pad, ceramics backing or silicon rubber pad between the shell and radiator.

Outline diagram:



Definition of pins:

Pin No.	Definition of single output	Definition of dual-output	Definition of three-output
1	AC input1	AC input 1	AC input 1
2	AC input 2	AC input 2	AC input 2
3	MOUT	OUT1	OUT2
4	MOUT	GND1	GND2
5	MGND	MOUT	OUT1
6	MGND	MGND	GND1
7	Null NC	Null NC	MOUT
8	Null NC	Null NC	MGND

Product performance, reliability and information are subject to change without prior notice.

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