

FHB 0.5AM10 Series High Temperature Step-down DC-DC Power Converters

Features:

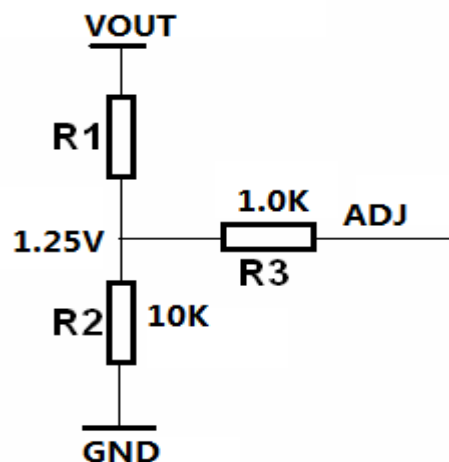
- : Working temperature: Ambient temperature: $-55^{\circ}\text{C} \sim +175^{\circ}\text{C}$, max. shell temperature up to $+185^{\circ}\text{C}$
- : Dimension: L: $22.0 \times$ W: $16.5 \times$ H: 9.2MM.
- : Input range: 4.0-16.0V
- : Output voltage: 1.2V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V, 6.0V, 7.0V, 8.0V, 9.0V, 10.0V, 12.0V, 15.0V
- : Output current: 0.5A
- : 1.8mA static working current
- : $7\mu\text{A}$ cutoff holding current
- : Equipped with output cutoff and voltage regulation terminal
- : Conversion efficiency: 85-96%
- : Working frequency: 150KHZ
- : Sealed metal casting: Impact and moist resistance and electromagnetic radiation protection
- : Provide rated power without deduction at 185°C (shell); provide 80% rated power at 185°C (shell)
- : Over-current, soft-start and undervoltage protection

Description:

FHB0.5AM10 series are high-temperature step-down DC-DC power converters with output current of 0.5A. They are specially designed for electronic equipment working in the harsh environment, can work for 1200 hours at shell temperature 150°C and for 500 hours at shell temperature 175°C , for 240 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. Its input ranges from 4.0V to 16.0V, providing non-isolated step-down 1-ch fixed voltage or adjustable output ranging from 1.25V to 15.0V. Within the entire range of working temperature and conversion between full load and no-load, the output voltage fluctuation is within 0.1V. FHB0.3AM7 series power converters' working frequency is up to 150KHZ, which provides ideal filtering condition. Under the condition without adding any filtering, its output voltage ripple is typically less than 50MV. Within the entire temperature range, the temperature stability of frequency maintains at $\pm 25\%$ and temperature drift of output voltage is 50 PPM/ $^{\circ}\text{C}$.

FHB0.5AM10 is a Buck step-down converter adopting DC-DC-BUCK circuit. It starts to work when input is greater than the range 3.75V-4.0V. After working, if input voltage is lower than output set voltage, it becomes a series resistor with internal resistance being 1.0Ω at most. When working steadily, smaller the voltage difference between input and output is, the higher the converting efficiency will be. The minimum voltage difference between input and output is $1.0 \times I_{\text{OUT}}$ (output current)

FHB0.5AM10 provides output adjustment terminal ADJ for regulating output voltage. Figure 1 shows the internal adjustment circuit. The voltage at joints R1 and R2 should be always guaranteed to be 1.25V during regulation. Before delivery, we have adjusted R1 making converter output rated voltage when ADJ is suspended. Given ADJ is suspended during use, it outputs rated



图一

voltage. When ADJ is directly connected to GND, the output will reach maximum value; while when ADJ is directly connected to VOUT, the output will reach minimum value. In actual adjustment, a proper resistor should be connected to R3 in serial before it is connected to VOUT or GND. If user needs converter with different output voltages, it is only necessary to order the converter that needs the most rated value in order to reduce the ordering types. The others can be adjusted and output using this converter.

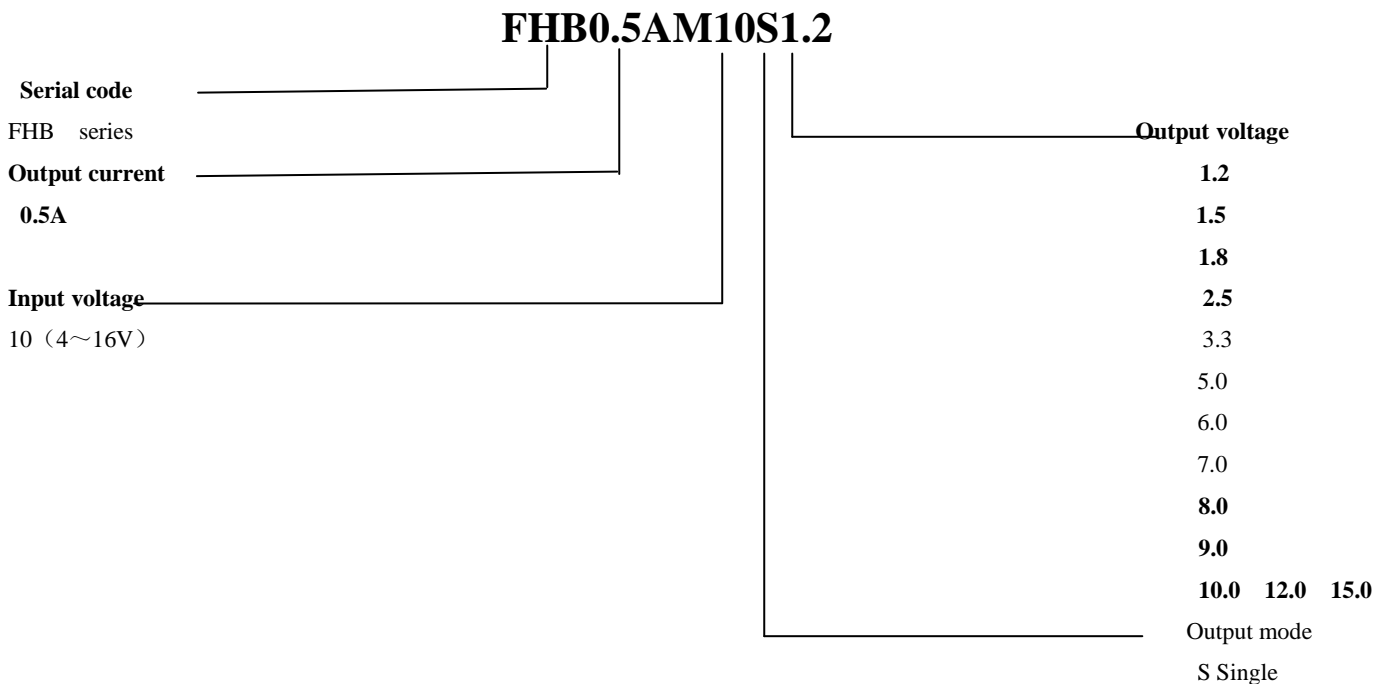
FHB0.5AM10 comes with a cutoff enabling terminal which has high level enabling output and low level cutoff output. This facilitates low-power consumption system to shut off the system that does not need to work so as to save input power. The typical consumption after cutoff is only 7μA. If it does not need to be cut off, short-circuit EN terminal and input terminal for leading wire.

FHB0.5AM10 series power converter contains under-voltage cut-off functions, which enables the converter to stop working when the input voltage is less than 3.75V for the purpose of protecting the converter.

FHB0.5AM10 contains output short-circuit and overload auto-cutoff circuit. When output continues to exceed 1.5A for 0.1 second, converter will cut off output; after overcurrent fault is removed, converter will automatically continue to output voltage.

Key components used for FHB0.5AM10series power converters 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°C. All finished products have experienced 8-hour full-load operation under the temperature of +175 °C 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:



Technical Parameters:

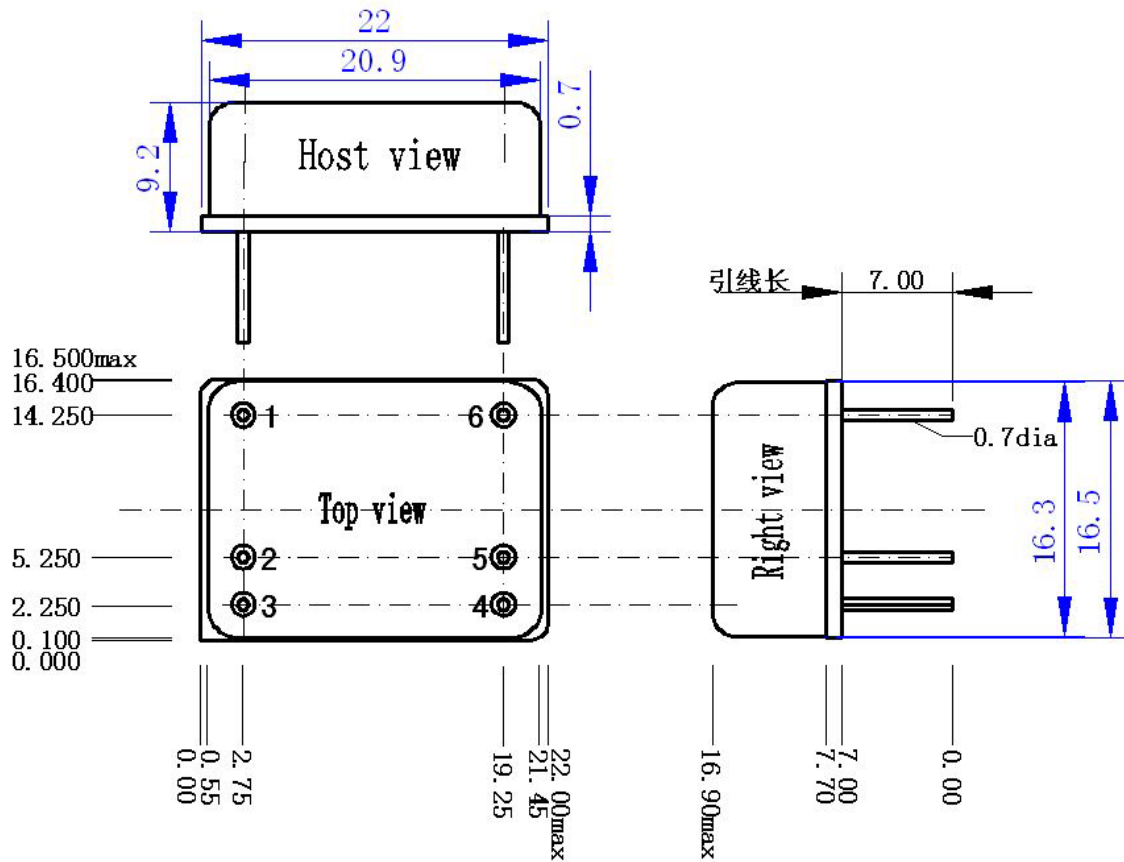
Item	Description	Value			Unit
		Min	Typical	Max	
Working temperature	Shell temperature of converter	-55		+185	°C
Input voltage		4.0		16.0	V
Output voltage	Able to output the following voltages: 1.25V, 1.5V, 1.8V, 2.5V, 3.3V, 5.0V, 6.0V, 7.0V, 8.0V, 9.0V, 10.0V, 12.0V, 15.0V	1.25V		15.0V	V
Size	Error: ±0.5mm	L:W:H: 22.0*16.5*9.2			mm
Input current	V _{in} = 9.0V, I _{LOAD} = 0mA, v _{out} = 5.0V	1.8		3.0	mA
Output current		0		500	mA
Output ripple			50	100	mVp-p
Output internal resistance		0.5		1.0	Ω
Output temperature drift			50		ppm/°C
Precision of output voltage		-0.25		+0.25	V
Output efficiency	V _{in} = 9.0V, I _{LOAD} = 300mA, v _{out} = 5.0V		92		%/
Undervoltage lock			3.75	4.0	V
On/off frequency		130	150	210	kHz
Shutdown current	EN=0V, V _{in} =9.0V, TC=175°C		7.0	100	uA
Linear adjust rate	V _{in} =4.0V to 11.0V		0.15		%/V
Load adjust rate	I _{LOAD} = 300mA		0.0005		%/mA
EN terminal voltage	High level Enable	2.0		V _{IN} +0.3	V
	Low level Shutdown	-0.3		0.25	V
EN terminal input current	TC=25°C			1.0	uA
Output short-circuit current	TC=25°C		1.5A		V
Vibration	MIL-STD-810D Method 514.3	Each axis circulates for 10 times Frequency: 20-50Hz/50Hz-2KHz, Amplitude/rate: 0.5mm/10g			OK
Shock	MIL-STD-810D Method 516.3	Shock three times for each Spike rate: 100g Holding time: 6ms			OK

Service Requirement:

The shell of the converter is isolated from the input and output. During the use, it is directly mounted on printed circuit board and the top of converter is connected to cooler. As converter's efficiency is rather higher and its output power is low, it is unnecessary to take cooling into account if the condition is inadmissible. The shell can be suspended or connected to GND. It can prevent radiation if it is connected to GND. If it is required to be suspended and prevent radiation, a 1000PF capacitor should be connected between GND and shell.

During use, if ripple is a little bit bigger for circuit, it is possible to use capacitor or LC network to filter it.

Outline Diagram



Definition of Pins

Pin No.	Output Definition
1	Input +
2	Input GND
3	EN
4	ADJ
5	Output GND
6	Output +

**Product performance, reliability and information are subject to change without prior notice.
September 24th, 2014**