FH15 Series High-temperature DC-DC Modules

Features:

- ：High operating temperature (ambient temperature:-55℃～+175℃ and max. shell temperature: +204℃)
- ：Small size （L：53.8×W：28.4×H：11.0MM.）
- ： High conversion efficiency (typically 78％～87％)
- ：Synchronization and turnoff functions
- ： Sealed metal casting (impact and moist resistance and electromagnetic radiation protection)
- ： Wide input range（16V ～48V, 24V～72V, 36～72V，70~210V, 120～ 350V）
- ： Multi-output route（single-route, dual-route, or triple-route 3.3V，5V，9V， 12V， 15V，24V）
- ： High operating frequency（300KHZ）
- ： Integrated LC EMI filter
- ： Providing rated power without deduction at 175℃ (shell)； providing 80% rated power at 185℃ (shell)
- ： Over-temperature protection under the temperature of 210℃
- ：Over-voltage and over-current failure switch-off delay restart
- ：Input under-voltage and overvoltage turnoff protection
- ： 100MS soft-start function

Description：

The FH15 series 5W high-temperature DC-DC power module is designed for the electronic equipments working in the harsh environment and can work for 1000 hours at 150 ℃ shell temperature, for 400 hours at 175 ℃ shell temperature and for 48 hours at 204 ℃ shell temperature. 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 five optional input ranges: 10～30V, 16～48V，24～72V, 36～72V ,70～210V and can provide fixed-voltage output in the mode of single-way, double-way, or three-way, and within the entire operating temperature range and under the condition change of full-load and no-load, the output voltage fluctuation is less than 0.3V. However, the output precision of 3.3V voltage is even less than 0.15V. The operating frequency of the FH15 series is up to 300KHZ, which provides good wave filtration. Its output voltage ripple is less than 100MV in the conditions of no wave filtering conditions. Within the entire temperature range, the temperature stability of frequency should be ±8%.

FH15 series provides the synchronization features, allowing that a multiple of modules in a same series can operate at the same frequency. As a result, switch interference can be effectively reduced. When the power of one module is inadequate or the routes of output are insufficient, it is possible to realize the synchronous operation of several modules. In other word, the synchronous terminals of all modules are bond together to enable the synchronous operation. The modules can automatically distribute the main and auxiliary modules. The modules which are the first to reach steady operation obtain the main control power, and the remaining modules are auxiliary modules which operate by following the frequency of main modules. It is also possible to arrange an external clock at SYNC pin to link up SYNC pins of several modules to realize synchronization. If an external master clock signal is applied, it recommended that the frequency of oscillator should be 250KHZ~350KHZ. If it is not within this range, the in-service condition may not be the optimal, even if the module can still operate within the wide range of 200KHZ ~ 450KHZ. The impulse width (Larger than 29ns) of external master clock signal should be made available. At this time, all modules can operate by following the external sync frequency. The level received by SYNC pin should be TTL5V. At the time of application, if the external sync clock signal is not TTL level, it is necessary to convert by adding the level.

FH5 Series contains an in-built LC network, which can effectively reduce the fluctuations of the input current and the output voltage.

FH15 Series contains a 100MS soft-start circuit, which can slowly increase the input current when the module is activated and after the failure is removed so as to facilitate external connection of a large-capacity output filtering capacitor and reduce the impact from starting.

FH5 series has over-voltage and under-voltage turnoff functions, which can enable the module to stop working beyond the range of the input voltage to protect the module. The under-voltage and over-voltage turn-off voltage is within 5V of extension of VAC. If the input range is rated at 36-72V, its under-voltage turn-off voltage will be 19-23.9V and over-voltage turn-off voltage will be 72.1-77V.

SLEEP, the turn-off terminal of FH15 series, is high-level effective. When the voltage is 3.2~5.3V, the module enters the resting state, all outputs are cut off, and the input current is less than 1MA. If several modules operate in synchronous manner, the auxiliary module shall generate a main module after the main modules is turned off. At this moment, the original auxiliary modules will operate by following the frequency of new main modules. If the auxiliary module is turned off, the unturned-off modules shall not be affected, and shall still operate by following the frequency of main modules. When the voltage is 0~ .5V, or hangs in the air, the module operates properly. The input voltage of SLEEP terminal shall not exceed 5.5V.

FH15 series 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 into soft-start mode and restores the output voltage. If the overload duration of output is less than 01s, the module will not take action.

The operating frequency of FH15 series is up to 300KHZ, which provides a good filtering condition. Its output voltage ripple is less than 100MV without any additional filtering conditions.

FH5 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 at +175℃. All finished products have experienced 8-hour full-load operation at +175 ℃ before delivery so as to fully expose the damage to the components during the production process and hence ensure the reliability of products.

Naming principle ：

FH15---28D12

Family code
FH series
Output power
15W

Input voltage(V)
28（16V ～48V）
48（24～72V）
50（36～72V）
150（70～210V）
200（120～350V）

Output voltage
3.3v
5
9
12
15
24

Output modes
S Single
D Dual

Main technical parameters：

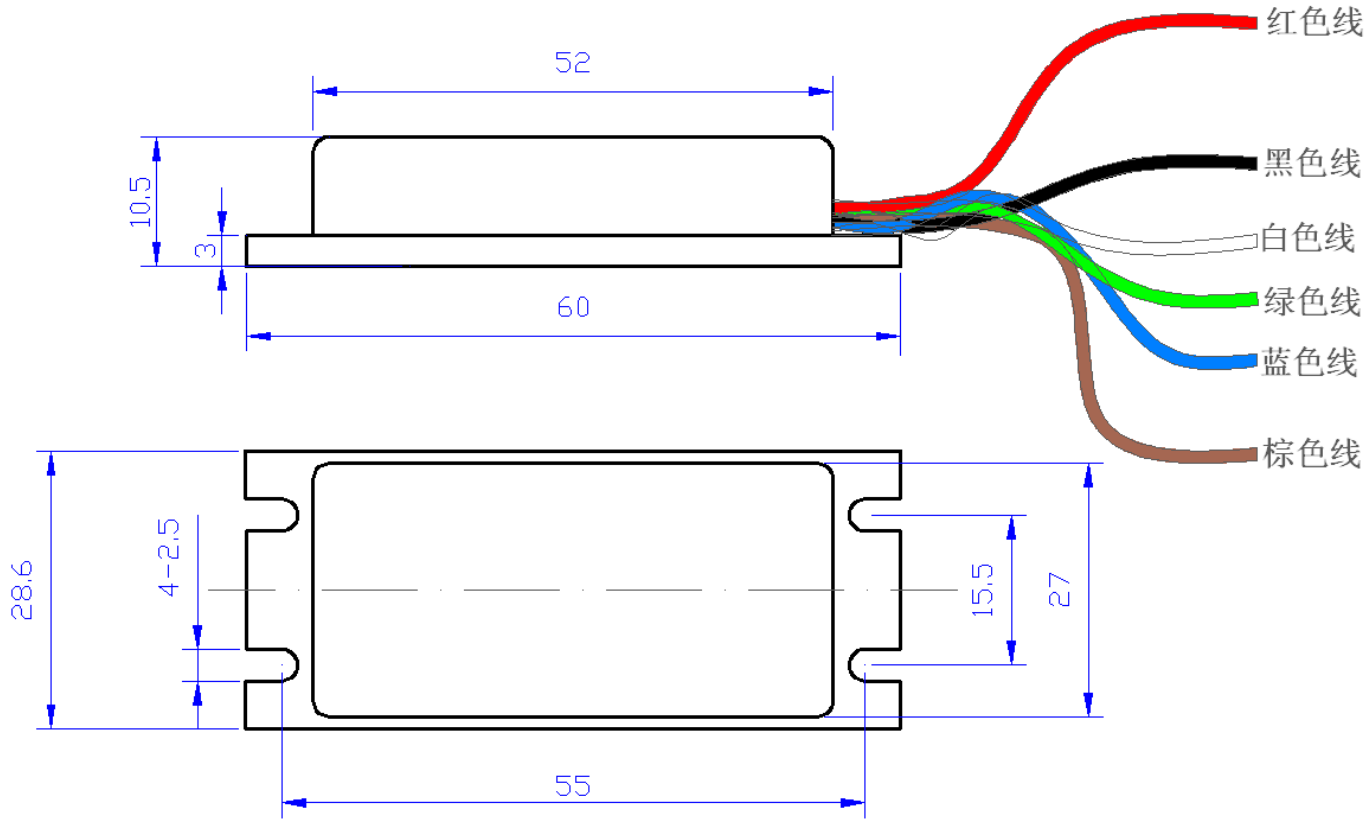
(1) Operating temperature: -55 ℃ ~ +175 ℃ Maximum shell temperature: +204 ℃.
(2) Input voltage: 16V ～48V, 24～72V，36～72V， 70 ~ 210V, 120～350V
(3) Output voltage: 3.3V，5V，9V， 12V， 15V，24V
(4) Output ripple: 100mVp-p (typical 30mVp-p)
(5) Output power: 15W
(6) Output accuracy: less than 4%
(7) Load regulation: less than 4%.
(8) Temperature stability: less than ±2.5% (typical ±1%)
(9) Line regulation: ±0.1% (10% linear change).
(10) Earthquake resistance: 25G, 0 ~ 300Hz
(11) Conversion efficiency: 78% ～ 87%
(12) Static power consumption: 0.5W Maximum
(13) Isolation voltage between input and output or between the outputs: 1000V
(14) 100MS soft-start function
(15) Over-heat turnoff at 210℃

Service Requirements:

As the modules have nearly 2W power consumption under the condition of full-load operation and their sizes are small, good medium need to be added between the shell of the power supply and the radiator so as to ensure the temperature of the module case to be less than 204 ℃. The shell of the module is isolated from the input and output. The shell is directly connected with the shortest outgoing line terminal between the input and output to FG or connected through a 1000V/1000PF capacitor, which ensures the contact resistance between the inner part of the module and the shell is minimum one so as to effectively reduce the switching spikes.

The no-load current of the module is 12MA. The current after turnoff is 2MA and the operating frequency at +25℃ is 300 ± 20 KHZ while it is 310 ± 20KHZ at +175℃.

Outline diagram：



Definition of the pinouts:

Red pin：positive input　Black pin：negative input　Yellow pin：turnoff line　Purple pin：synchronization line
Blue pin：output to FG　White pin：　9V / +12 V / +15 V /　Gray pin：　-9V/-12V/-15V
Green pin：+3.3 V / +5 V

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

March, 15. 2013