HDC30 Series High-temperature DC-DC Power Converters

Features

- Working temperature: ambient temperature:-55℃～+175℃ and shell temperature: +185℃
- Wide input range: DC: 24V～72V, 36～108V, 70V～210V, 120V～360V, 200V～600V
- Output power: 30W
- Small size: L: 80.0×W: 23.0×H:16.0MM
- Output channels up to three. The following voltages are freely combined and the outputs are isolated from each other by 500V. (5V,7V,9V,12V,15V,18V,24V,36V,48V,72V）
- Output ripple: max. 100mV, typical 50mV
- Conversion efficiency: typical 77%-87%
- Sealed metal casting: impact and moist resistance and electromagnetic radiation protection
- Integrated EMI filter
- Overvoltage and overcurrent fault cutoff delay restart
- Output short-circuited or overload cut-cut protection
- 100ms soft start
- Provide rated power without deduction at 175℃ (shell), provide 80% rated power at 185℃
- Over-heat protection at 210℃

Description

The HDC30 series 30W high-temperature DC-DC power converters, specially designed for electronic equipment working in the harsh environment, can continuously work for 4,000 hours at shell temperature 150℃, 1,500 hours at shell temperature 175℃ and 700 hours at shell temperature 185℃. With features of being resistant to high temperature, impact and humidity, it is particularly suitable for being used as power supply system for petroleum prospecting logging tool, petroleum drilling instrument, geophysical detecting instrument, vehicles, telecommunication, network infrastructures, enterprise and high-performance calculation, etc.

The HDC30 series 30W high-temperature DC-DC power converters use the latest thermal design and new semiconductor technology, with its output power density increasing by three times than that of the FH series and the size reduces by three times, and what's more, the most important is that its service life doubles. The designed output voltage includes 5V, 7V, 9V, 12V, 15V, 18V, 24V, 36V, 48V, and 72V. The output can be either of them and combination of any three voltages. MOUT is main output terminal and OUT1 and OUT2 are auxiliary output terminals. During the use, the voltage outputted from main output terminal MOUT is most stable. The main output is isolated from the auxiliary output. The output power of the main output is required to be the largest output of the two.

The temperature resistance of all components adopted by the HDC30 is above +200℃. With the currently best thermal design, the temperature of elements and casing only rises by 9℃ in the condition with good heat radiation, thus it is able to steadily work at ambient temperature +175℃ for a long time. But when temperature of chip exceeds +204℃, overheat protection circuit of chip will be activated and it begins to reduce output power until zero at +210℃. When temperature lagged to +195℃, overheat protection circuit will rest and converter begins to output power again.

HDC30 is able to work with full load when casing temperature is less than +175℃ and work with 80% of load at casing temperature +185℃. At ambient temperature +175℃, casing temperature will still reach 180℃ even if good

heat radiation is adopted. For this reason, it is suggested to avoid working with full load at ambient temperature above +170℃. Up to 80% of load.

The voltage and ripple wave outputted from main output terminal do not vary with the variation of itself and power of auxiliary output voltage. In the condition that power outputted from main output terminal is constant, the voltage of auxiliary output terminals OUT1 and OUT2 decrease by 2% at most with the rise of its output power. If power outputted from auxiliary output terminals OUT1 and OUT2 is constant, their output voltage increases with the increase of power outputted from main output terminal. For this feature, the main and auxiliary output should be specified in using and selecting types. Here we take HDC30-220S12-S24 as an example, it will output dual-way mutually isolated voltages 12V and 24V, of which 12V is from MOUT, 24V from OUT1. That is our model HDC30-ACINSMOUT-SOUT1-Sout2.

Since the outputs are isolated from each other, each channel can be connected to a positive output and connected to a negative output, that is, two output terminals of each channel can be used as ground, and the two channels can be connected in series, and in parallel and can be common grounded.

When using multi-way output, 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%. In the course of operation, when an output power (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. If the output power varies between the range of rated power of less than 10% and above 70%, the higher the proportion of high and low output power, the greater the fluctuation. And the fluctuation frequency is equal to the frequency of power change. Then, the secondary filtering is thus considered to be done. If the fluctuation frequency of power is greater than 10KHz, the simple filtering is able to remove the fluctuation. 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 ways of main converter and add secondary DC/DC converter to re-convert additional voltage.

If the auxiliary output voltage accuracy requires high, the voltage requires very stable, or the voltage is less than 12V, it is better to choose our switching regulator FHB series for voltage regulation and conversion.

If the required output voltage is more than three channels, of non-isolated channels between the outputs, one channel is output by the HDC30, and the other channels are to be converted by FHB series. If the isolated channels of output voltage is greater than three, then the HDC30 selects OUT1 to output 24V , 36V, 48V or 72V, and DC/DC with input of 28V (16~48V), 48V (24~72V) or 50V (36~108V) and switching regulator FHB module are connected following OUT1 for secondary conversion.

The shutdown terminal SLEEP of the HDC30 series is active high. When the voltage is 3.2~5.3V, the module enters the sleep state, cuts off all outputs, and the input current is less than 1MA. When the SLEEP voltage is 0 ~ 2.5V or floating, the module works normally. The input voltage of the SLEEP terminal should not exceed 6.0V.

HDC30 series converter contains the LC network, which can effectively reduce input current and output voltage fluctuation.

HDC30 series 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

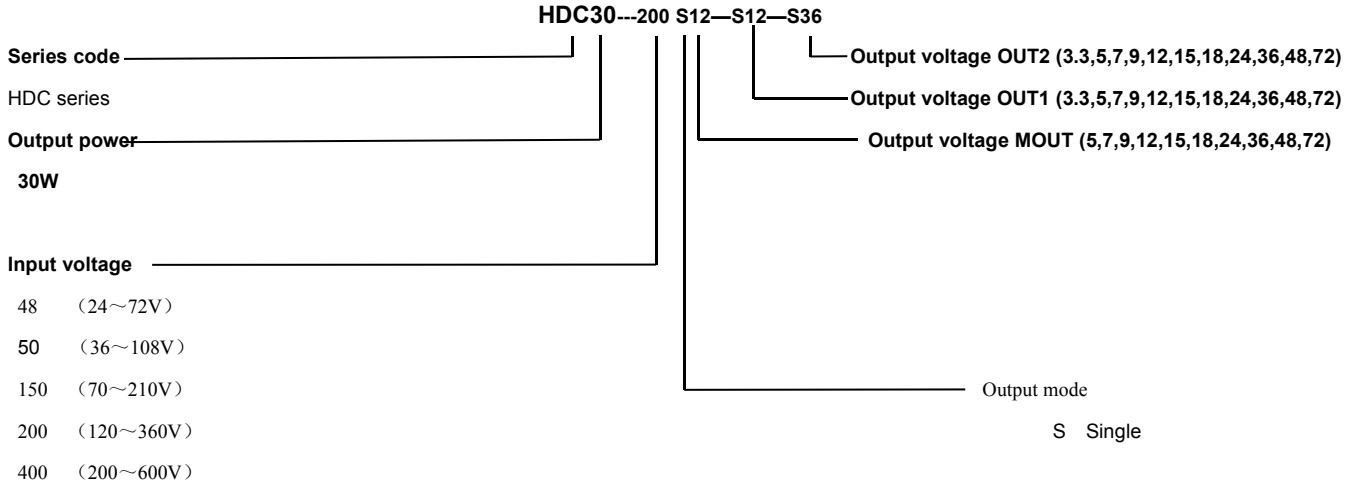
is eliminated, it automatically resumes the output voltage. If the overload duration of output is less than 01s, the converter will not act.

The HDC30 contains a soft start circuit of 100MS, which can slowly increase the input current after module starts and fault is removed, so as to connect the external large-capacity output filter capacitor and reduce the startup impact.

The HDC30 contains an undervoltage and overvoltage shutdown, which allows the module to stop operating beyond the input voltage range so as to protect the module. The undervoltage and overvoltage shutdown voltage is within 5V of the nominal voltage. For the input range of 36~108V, its undervoltage shutdown voltage is 31~35.9V, and the overvoltage shutdown voltage is 110~115V.

Key elements used for HDC30 completely passed the factory test in 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 +175 ℃ before delivery so as to fully check the damage to the elements during the production process and hence ensure the reliability of products.

Type selection



Note: — means isolation. If it is single output, there is no—SOUT1—SOUT2. If it is two-way output, there is no —SOUT2.

Model example: for model **HDC30-150S15-S5-S36, 15V is output from MOUT, 5V from OUT1 and 36V from OUT2. For model HDC30-50S5-S5-S12, +5V is output from MOUT, 5V from OUT1 and 12V from OUT2.**

Technical data

(1) Operating temperature: -55℃ ~ +175 ℃, Max. shell temperature: +185 ℃.
(2) Input voltage: 24V～72V, 36～108V, 70~210V, 120～360V, 200～600V
(3) Output voltage: Output channels up to three, and two isolated output ground circuits: 5V, 7V, 9V, 12V, 15V,18V,24V,36V, 48V, 72V (free combination of any three voltages)
(4) Output ripple: Less than 100mV, typical 50mV
(5) Input AC frequency: 0Hz～400Hz
(6) Output power: 30W

(7) Temperature stability: Less than ±2.5% , typical ±1%
(8) Shock resistance: 25G, 0 ~ 300Hz
(9) Conversion efficiency: 77-87%
(10) Static power consumption: 0.8 Max.
(11) Dimension: L:80.0×W:23.0×H:16.0mm
(12) Isolation voltage between input and output: 1000V; isolated voltage between ouputs:500V
(13) Output form of voltage: High-temperature lead wire

Service requirement

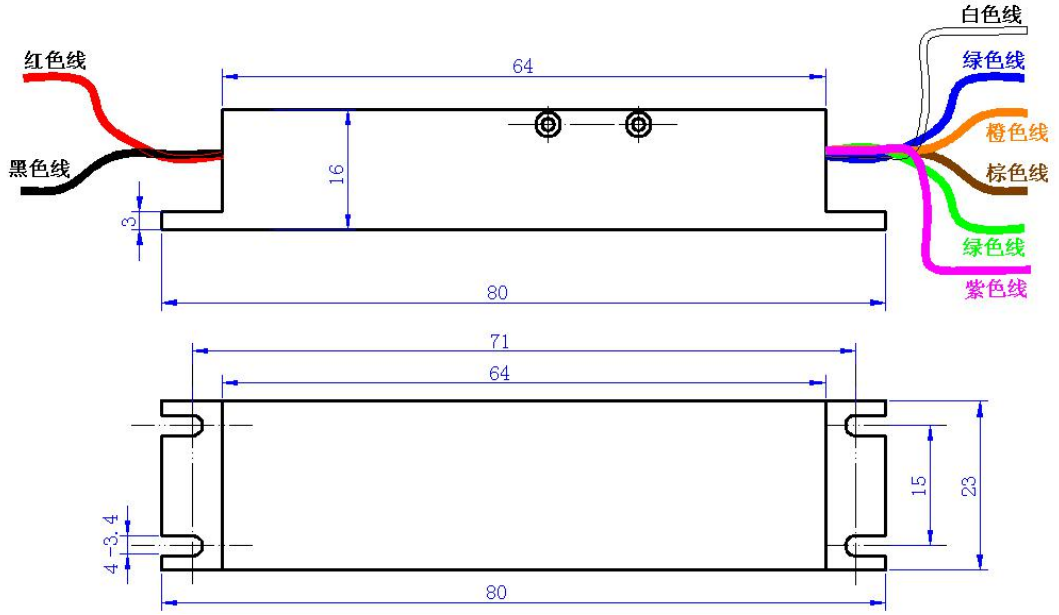
As the power converter has nearly 5W power consumption under the condition of full-load operation and its size are small, good medium is necessary to be added between the shell of the power converter and the radiator so as to ensure the temperature of the converter shell to be less than 185℃.

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 HDC30. 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. If the ripple is still large after the internal EMI functions, it is necessary to connect input or output EMI filtering outside the converter.

The input and output of the module have a maximum of four grounds, and if there is any need to connect them together, they must be connected to each other where the exit lead is smaller than the 1cm. The shorter the line off module at the access point, the less interference!

Outline diagram

HDC30外形示意图



Definition of lead wires

Red wire: Input +	Black wire: Input –	Yellow wire: Cutoff wire	White wire: MOUT
Blue wire: MGND	Orange wire: +OUT1	Brown wire: -OUT1	Green wire: +OUT2
Purple wire: -OUT2			

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

February 21, 2019