

Product Manual

TP-P4



1. Overview

1、 Application Scenarios

This high-voltage DC power supply is a specially customized power source, featuring advantages such as small size, light weight, high efficiency, and self-contained fan for heat dissipation. Its maximum operating efficiency is $\geq 97\%$. The power module adopts an aluminum shell design, which is lightweight, aesthetically pleasing, and has a waterproof design. It can serve as a substitute for imported high-voltage DC module power supplies.

2、 Product Features

- DC-DC isolated power converter: It isolates and converts the input 800V direct current (DC) into 60V DC, with a total output power of 4000W.
- It has the characteristics of high power density, small size, light weight, etc.
- The design meets the reliability requirements of the power supply: There is over-voltage/under-voltage protection for the input, and over-voltage protection, current limiting, short-circuit protection and over-temperature protection functions for the output.

3、 Product Photos



4、 Main Specifications of the Product

Input voltage range	Rated output voltage	Maximum output power	Working efficiency	Voltage regulation accuracy	Output ripple and noise
680~800Vdc	50 $\pm$ 0.5Vdc	4000W	$\geq 97\%$	$\leq \pm 1\%$	$\leq \pm 2\%V_o$

2.Environmental conditions

NO.	Program	Technical indicators	Unit	Remark
1	Operating temperature	-40℃~+50℃	℃	
2	Storage temperature	-40℃~+80℃	℃	/
3	Relative humidity	≤95	%	No condensation (40℃±2℃)
4	Altitude	0-2000	m	
5	Atmospheric pressure	76~106	K pa	/
6	Heat dissipation method	Self-contained air cooling	/	/

三、Electrical characteristics

1	Input characteristics			
NO.	Program	Technical requirements	Unit	Remarks
1.1	Rated input voltage	750	Vdc	
1.2	Input voltage range	680~800	Vdc	
1.3	Maximum input current	7	A	In=680Vdc, Po=4000W
2	Output characteristics			
NO.	Program	Technical requirements	Unit	Remarks
2.1	Output rated voltage	50	Vdc	/
2.2	Output voltage range	47~50.5	Vdc	
2.3	Rated output current	80	A	/
2.4	Maximum output current	88	A	/

2.5	Rated output power	4000	W	/
2.6	Output efficiency	≥97	%	In=750Vdc, half load
2.7	Voltage regulation accuracy	±1	%	/
2.8	Source regulation rate	±1	%	/
2.9	Load regulation rate	±1	%	/
2.10	Output ripple and noise	±2	%/Vo	Bandwidth limit: 20MHz. A 10μF electrolytic capacitor and a 0.1μF film capacitor are connected in parallel at the test end; rated load
2.11	Temperature coefficient	±0.02	%/°C	/
2.12	Output rise time	≤200	ms	/
2.13	Output delay at startup	≤5	S	Rated input
2.14	Over - shoot amplitude during startup and shutdown	ΔV: ≤±5	%	/
2.15	Dynamic response over - shoot	ΔV: ≤±5	%	/
2.16	Dynamic response recovery time	≤2	ms	25%~50%~25% or 50%~75%~50% load change, 25°C

3 Protection Characteristics				
NO.	Program	Technical requirements	Unit	Remarks
3.1	Input under - voltage protection	620~640	Vdc	The hysteresis is greater than 10V
3.2	Input under - voltage recovery	≤650	Vdc	
3.3	Input over -	810~830	Vdc	The hysteresis is greater

	voltage protection			than 10V
3.4	Input over - voltage recovery	≥ 800	Vdc	
3.5	Input reverse connection protection	Reverse connection of the 800V DC input		Reverse connection of the 800V DC input
3.6	Output over - voltage protection	55~59	Vdc	it can self-recover
3.7	Output over - current protection	86~95	A	it can self-recover
3.8	Output short - circuit protection	Available		it can self-recover
3.9	Over-temperature protection	Available	°C	it can self-recover
4	Parallel operation current sharing			
NO.	Program	Technical requirements	Unit	Remarks
4.1	Current sharing unbalance degree	≤ 5	%	The output is greater than 50% of the load
4.2	Parallel operation method	Connect the current sharing bus signals in parallel, and connect the load outputs in parallel		
4.3	Number of units in parallel	≤ 8	PCS	

四、Safety Characteristics

NO.	Program		Test conditions	Remarks
1	Withstand voltage strength	Input to output	2500Vdc/2mA/1min	There is no arcing and no breakdown.
		Input to enclosure	2000Vdc/2mA/1min	
		Output to enclosure	500Vdc/2mA/1min	
2	Insulation resistance	Input to output	$\geq 10M\Omega @ 500Vdc$	At normal atmospheric pressure, when the relative humidity is 90% and the test direct current
		Input and enclosure	$\geq 10M\Omega @ 500Vdc$	

		Output to enclosure	$\geq 10\text{M}\Omega @ 500\text{Vdc}$	voltage is 500V
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五、Other Characteristics

1、Flammability requirements:

The flame retardancy rating of the PCBs used in the system shall meet the V-0 requirements specified in GB4943.1 - 2011. The flame retardancy rating of the insulated cables shall meet the requirements specified in GB/T 18380.12 - 2008. The flame retardancy rating of other insulating materials shall meet the V-1 requirements specified in GB4943.1 - 2011.

2、System noise

The system noise shall not be greater than 55 dB(A).

3、System reliability

MTBF $\geq 100\text{K}$ hour ;

Test conditions: 25°C, rated input, full - load output, predicted by the stress method in MIL - HDBK - 217F Notice 2;

4、Protection Level

The protection level shall meet the requirements of IP54. Water accumulation on the top of the power supply enclosure is not allowed;

5、Three Protections (Moisture-proof, Mildew-proof, Salt Fog-proof)

The circuits such as printed circuit boards and connectors inside the product shall be treated against moisture, mildew and salt spray. The salt - spray resistance shall meet the requirements in Table 9 of GB/T 4797.6, enabling the product to operate normally in outdoor humid and salt - spray environments.

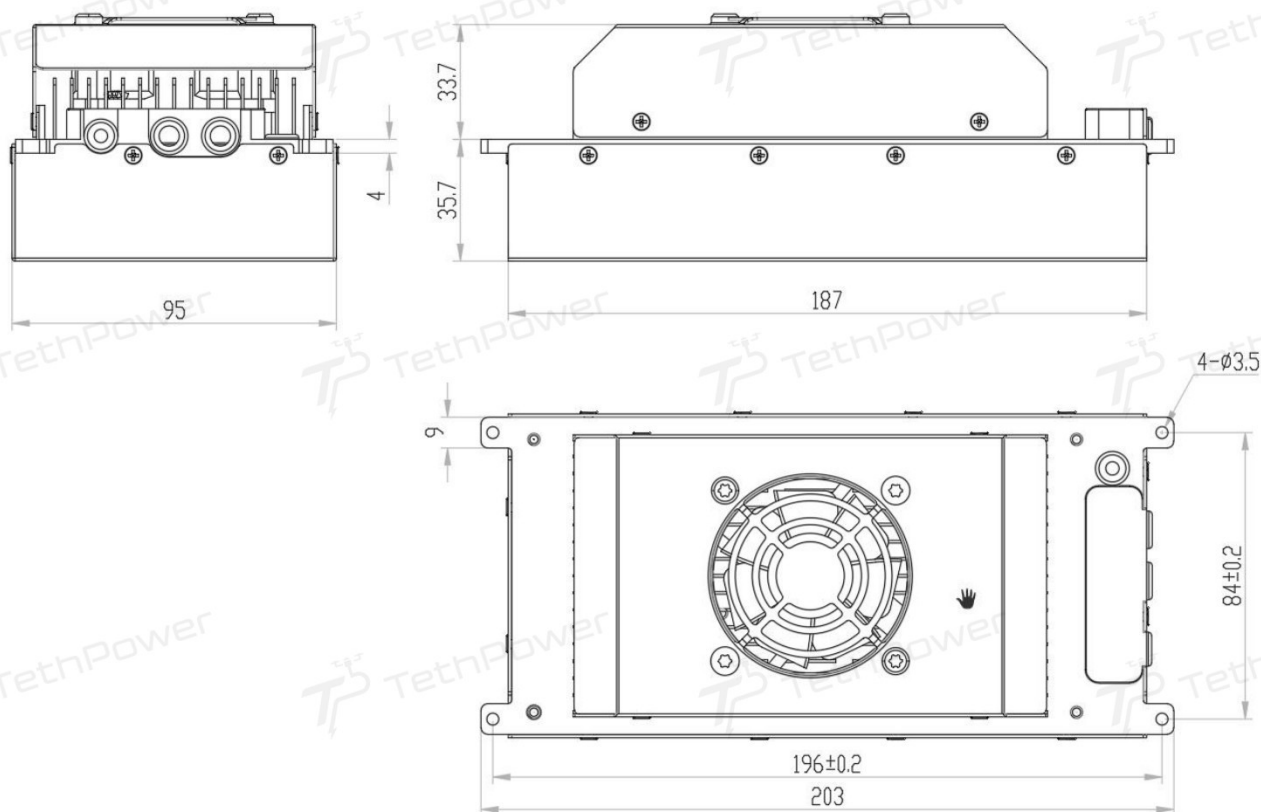
六、Product Label

DC/DC ADAPTER
MODEL :
INPUT: DC 800V ☐ 1000V ☐
OUTPUT: 60V ☒ 67A
IP Rating: IP54
Weight: 1000g

七、Mechanical dimensions and definitions of connectors

1、Schematic diagram of the product installation dimensions

Parameters	Indicator
Heat Sink Size	187mm*95mm*70mm±1mm



八、Packaging, Transportation, and Storage

1、Packaging

The packaging box shall have the product name, model, manufacturer's logo, the inspection certificate issued by the manufacturer's quality department, the manufacturing date, etc.; and there shall be an accessory list inside the packaging box.

2、Transportation

The product should be packed in a sturdy packaging box during transportation. The outside of the box should comply with the relevant national standards and bear marks such as "Handle with Care" and "Keep Away from Moisture". The packaging box containing the product is allowed to be transported by any means of transportation. Direct exposure to rain and snow and mechanical impacts should be avoided during transportation.

3、Storage

When the product is not in use, it should be stored in the packaging box. The ambient temperature in the warehouse should be between -10°C and 40°C, and the relative humidity should not exceed 80%. Harmful gases, flammable and explosive products, and corrosive chemical substances are not allowed in the warehouse. Also, there should be no strong mechanical vibrations, impacts, or strong magnetic fields. The packaging box should be placed on a cushion at least 20 cm above the ground, and at least 50 cm away from walls, heat sources, windows, or air inlets. Under these specified conditions, the general storage period is 2 years. After exceeding 2 years, the product should be reinspected.

九、Safety Precautions

1. Once the safety protection of the equipment is damaged, the equipment must stop operating and be handled in accordance with the relevant maintenance regulations.
2. When the power supply equipment is moved from a cold environment to a warm one, condensation may pose a risk of electric leakage. Therefore, the grounding requirements must be strictly implemented; Only qualified personnel are allowed to connect the equipment to the power supply.
3. After cutting off the power supply, the equipment must be shut down for five minutes to ensure that the capacitors have sufficient time to discharge before any maintenance work on the power supply equipment can be carried out.
4. Pay attention to safety in use: Avoid touching the areas with safety warning signs and high-voltage signs by hand to prevent electric shock and scalding.

十、Referenced Standards and Specifications

GB/T 2423.1-2001 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test A: Low Temperature

GB/T 2423.2-2001 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test B: High Temperature

GB/T 2423.3-1993 Basic Environmental Test Procedures for Electrical and Electronic Products
- Test Ca: Test Method for Constant Damp Heat

GB/T 2423.4-1993 Basic Environmental Test Procedures for Electrical and Electronic Products
- Test Db: Test Method for Cyclic Damp Heat

GB/T 2423.5-1995 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Ea and Guidance: Shock

GB/T 2423.6-1995 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Ea and Guidance: Bump

GB/T 2423.8-1995 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Ed: Free Fall

GB/T 2423.10-1995 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Fc and Guidance: Vibration (Sine)

GB/T 2423.11-1997 Environmental Testing for Electrical and Electronic Products, Part 2: Test Methods/Test Fd: Broadband Random Vibration - General Requirements

GB/T 2423.22-2002 Environmental Testing for Electrical and Electronic Products, Part 2: Test N: Temperature Change

GB/T 14508-93 Mechanical Environmental Conditions for Freight Transportation on Classified Highways

EN55022: 1998 Information Technology Equipment - Radio Disturbance Characteristics - Limits and Methods of Measurement

EN55024: 1998 Information Technology Equipment - Immunity Characteristics - Limits and Methods of Measurement

CEI IEC 61000-4-2 2001 Electromagnetic Compatibility Testing and Measurement Techniques
- Electrostatic Discharge Immunity Test

CEI IEC 61000-4-3 2002 Electromagnetic Compatibility Testing and Measurement Techniques
- Radiated, Radio-Frequency, Electromagnetic Field Immunity Test

CEI IEC 61000-4-4 1998 Electromagnetic Compatibility Testing and Measurement Techniques

- Electrical Fast Transient/Burst Immunity Test

CEI IEC 61000-4-5 1999 Electromagnetic Compatibility Testing and Measurement Techniques

- Surge (Impact) Immunity Test

CEI IEC 61000-4-6 2001 Electromagnetic Compatibility Testing and Measurement Techniques

- Immunity to Conducted Disturbances, Induced by Radio-Frequency Fields

CEI IEC 61000-4-8 1993 Electromagnetic Compatibility Testing and Measurement Techniques

- Power Frequency Magnetic Field Immunity Test

CEI IEC 61000-4-11 1994 Electromagnetic Compatibility Testing and Measurement

Techniques - Voltage Dips, Short Interruptions and Voltage Variations Immunity Test

CEI IEC 61000-4-29 2000 Electromagnetic Compatibility Testing and Measurement

Techniques - Immunity to Voltage Dips, Short Interruptions and Voltage Variations on DC Input Ports

IEC 61000-3-2 2001 Electromagnetic Compatibility - Limits - Limits for Harmonic Current Emissions (Equipment Input Current $\leq 16A$ per Phase)

IEC 61000-3-3 1994 Electromagnetic Compatibility - Limits - Voltage Fluctuations and Flicker in Low-Voltage Supply Systems (Equipment Rated Current $\leq 16A$)

GB4943-2001 Safety of Information Technology Equipment

YD/T 282-2000 General Test Methods for the Reliability of Telecommunication Equipment

GB/T 13722-92 Technical Requirements and Test Methods for Mobile Communication Power Supplies

YD/T 732-95 Test Methods for DC-DC Converters for Telecommunications

YD/T 731-2002 High-Frequency Switching Rectifiers for Telecommunications

GB14287.1-2005 Electrical Fire Monitoring System - Part 1: Electrical Fire Monitoring Equipment