

# Product Manual

## TP-P36



## I. Overview

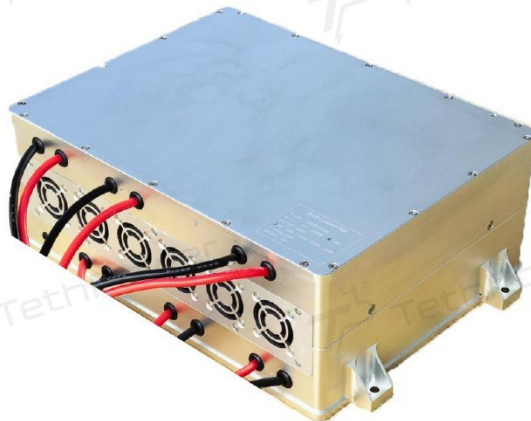
### 1、 application

This high-voltage DC power supply is a specialized custom solution featuring a compact size, lightweight construction, high efficiency, and integrated fan cooling; its maximum operating efficiency is  $\geq 97\%$ . The power module employs an aluminum housing design that is both lightweight and aesthetically pleasing, incorporates a waterproof design, and can serve as a viable alternative to imported high-voltage DC modular power supplies.

### 2、 Product Features

- DC-DC isolated power converter: Isolates the 1200–1450 VDC input and converts it to 58.5 VDC. The recommended design output is 32 kW; 36 kW is an extreme-test value, not a continuous rating.
- Characterized by high power density, compact size, and light weight.
- The design meets power supply reliability requirements: the input features overvoltage and undervoltage protection; the output features overvoltage protection, current limiting, short-circuit protection, and overtemperature protection.

### 3、 product photograph



### 4、 Main Product Specifications

| input voltage range | Rated output voltage | Recommended design power | productiveness | Voltage regulation accuracy | Output ripple and noise |
|---------------------|----------------------|--------------------------|----------------|-----------------------------|-------------------------|
| 1200 ~ 1450Vdc      | 58.5Vdc              | 32KW                     | $\geq 96\%$    | $\leq \pm 1\%$              | $\leq \pm 2\%V_o$       |

## II. Environmental Conditions

| order number | project                 | qualification                      | unit | remarks                            |
|--------------|-------------------------|------------------------------------|------|------------------------------------|
| 1            | working temperature     | -20°C ~ +40°C                      | °C   | 32 kW recommended design operation |
| 2            | storage temperature     | -40°C ~ +80°C                      | °C   | /                                  |
| 3            | relative humidity       | ≤95                                | %    | No condensation (40°C ± 2°C)       |
| 4            | above sea level         | 0-3000                             | m    |                                    |
| 5            | atmospheric pressure    | 76 ~ 106                           | Kpa  | /                                  |
| 6            | Heat dissipation method | Equipped with built-in air cooling | /    | /                                  |

## III. Electrical Characteristics

| 1            | input characteristics       |                       |       |                                                      |
|--------------|-----------------------------|-----------------------|-------|------------------------------------------------------|
| order number | project                     | technical requirement | unit  | remarks                                              |
| 1.1          | Nominal input voltage       | 1400                  | Vdc   |                                                      |
| 1.2          | input voltage range         | 1200 ~ 1450           | Vdc   |                                                      |
| 1.3          | Maximum input current       | 30                    | A     | Vin=1200Vdc, Po=32KW                                 |
| 2            | output characteristic       |                       |       |                                                      |
| order number | project                     | technical requirement | unit  | remarks                                              |
| 2.1          | Output rated voltage        | 58.5                  | Vdc   | /                                                    |
| 2.2          | Output voltage range        | 54 ~ 59               | Vdc   |                                                      |
| 2.3          | Output current              | Not published         |       | /                                                    |
| 2.4          | Recommended design power    | 32000                 | W     | /                                                    |
| 2.5          | Extreme-test output power   | 36000                 | W     | Extreme test only                                    |
| 2.6          | delivery efficiency         | ≥96                   | %     | Vin=1400Vdc, > 50%                                   |
| 2.7          | Voltage regulation accuracy | ±1                    | %     | /                                                    |
| 2.8          | Source adjustment rate      | ±1                    | %     | /                                                    |
| 2.9          | load regulation             | ±1                    | %     | /                                                    |
| 2.10         | Output ripple and noise     | ≤1000                 | mVp-p | Bandwidth limit: 20 MHz; test setup includes a 10 μF |

|              |                                            |                                                                                                  |                 | electrolytic capacitor and a 0.1 $\mu$ F film capacitor; rated load. |
|--------------|--------------------------------------------|--------------------------------------------------------------------------------------------------|-----------------|----------------------------------------------------------------------|
| 2.11         | temperature coefficient                    | $\pm 0.02$                                                                                       | %/ $^{\circ}$ C | /                                                                    |
| 2.12         | Output rise time                           | $\leq 1$                                                                                         | S               | /                                                                    |
| 2.13         | Power-on output delay                      | $\leq 5$                                                                                         | S               | Nominal Input                                                        |
| 2.14         | Power-on and power-off overshoot magnitude | $\Delta V: \leq \pm 5$                                                                           | %               | /                                                                    |
| 2.15         | Dynamic response overshoot                 | $\Delta V: \leq \pm 5$                                                                           | %               | /                                                                    |
| 2.16         | Dynamic response recovery time             | $\leq 2$                                                                                         | ms              | Load variations of 25%–50%–25% or 50%–75%–50%, at 25 $^{\circ}$ C    |
| <b>3</b>     | <b>protection feature</b>                  |                                                                                                  |                 |                                                                      |
| order number | project                                    | technical requirement                                                                            | unit            | remarks                                                              |
| 3.1          | Under-voltage protection input             | 1140 ~ 1170                                                                                      | Vdc             | Hysteresis greater than 10 V                                         |
| 3.2          | Under-voltage recovery input               | $\leq 1200$                                                                                      | Vdc             |                                                                      |
| 3.3          | Overvoltage Protection                     | 1470 ~ 1490                                                                                      | Vdc             | Hysteresis greater than 15 V                                         |
| 3.4          | Overvoltage recovery                       | $\geq 1450$                                                                                      | Vdc             |                                                                      |
| 3.5          | Overvoltage protection output              | 60 ~ 62                                                                                          | Vdc             | Self-recoverable                                                     |
| 3.7          | Overcurrent Protection Output              | 685 ~ 720                                                                                        | A               | Self-recoverable                                                     |
| 3.8          | Short-circuit protection output            | Long-term short circuits will not cause damage.                                                  |                 | Self-recoverable                                                     |
| 3.9          | Overtemperature protection                 | If the enclosure temperature exceeds 65 $^{\circ}$ C, the current output will begin to decrease. | $^{\circ}$ C    | Enclosure temperature                                                |

## IV. Safety Characteristics

| order number | project               |                     | test condition                          | remarks                                       |
|--------------|-----------------------|---------------------|-----------------------------------------|-----------------------------------------------|
| 1            | dielectric strength   | Input to Output     | 3000Vdc/10mA/1min                       | No arc flash, no breakdown                    |
|              |                       | Input to the shell  | 3000Vdc/10mA/1min                       |                                               |
|              |                       | Output to the shell | 1000Vdc/10mA/1min                       |                                               |
| 2            | insulation resistance | Input to Output     | $\geq 10\text{M}\Omega @ 500\text{Vdc}$ | At normal atmospheric pressure and a relative |

|  |  |                     |                                         |                                                  |
|--|--|---------------------|-----------------------------------------|--------------------------------------------------|
|  |  | Input and Housing   | $\geq 10\text{M}\Omega @ 500\text{Vdc}$ | humidity of 90%, with a test DC voltage of 500 V |
|  |  | Output to the shell | $\geq 10\text{M}\Omega @ 500\text{Vdc}$ |                                                  |

## V. Other Characteristics

### 1. Flame retardancy requirements:

The flame retardancy rating of the PCBs used in the system shall meet the V-0 requirement specified in GB 4943.1-2011; the flame retardancy rating of the insulated cables shall meet the requirements specified in GB/T 18380.12-2008; and the flame retardancy rating of other insulating materials shall meet the V-1 requirement specified in GB 4943.1-2011.

### 2. System noise

System noise shall not exceed 60 dB(A).

### 3. System Reliability

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

Test conditions: 25°C, rated input, full-load output (as per MIL-HDBK-217F Note 2 stress method);

### 4. Protection Rating

The protection rating shall meet the IP65 requirements. No water accumulation is permitted on the top surface of the power supply enclosure.

### 5. Three Protection Features (moisture resistance, mold prevention, and salt spray resistance)

Internal printed circuit boards, plug-in connectors, and other circuit components of the product shall undergo moisture-proofing, mold-proofing, and salt spray resistance treatments; specifically, the salt spray resistance shall comply with the requirements specified in Table 9 of GB/T 4797.6, ensuring that the product can operate normally under outdoor humid or salt spray conditions.

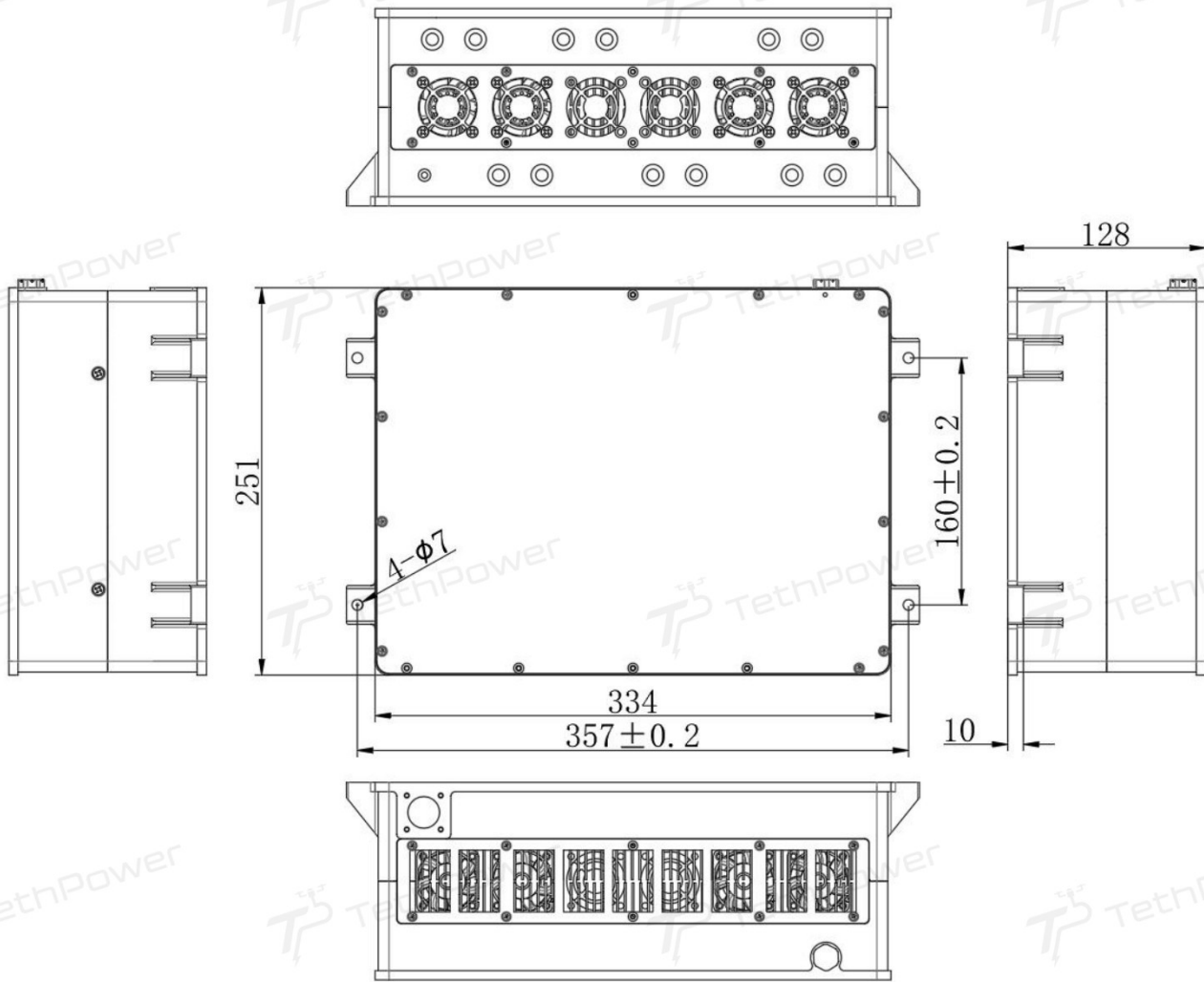
## VI. Product Labels

Made in-house or printed according to customer specifications.

## VII. Mechanical Dimensions and Connector Definitions

### 1、Product Installation Dimension Diagram

| parameter                   | metric              |
|-----------------------------|---------------------|
| Maximum external dimensions | 334mm*251mm*128±1mm |



## 2、Plug-in Definition

Power Section Definition

definition table :

| Function Name | definition | explanatory note            |
|---------------|------------|-----------------------------|
| DC Input      | VIN+       | High-voltage input positive |
|               | VIN-       | High-voltage input negative |
| DC Output     | OUT+       | 58V positive output         |
|               | OUT-       | 58V output negative         |

## 3、Weight (net weight):

**Approximately 12.5 kg**

## VIII. Packaging, Transportation, and Storage

### 1. Packaging

The packaging box shall display the product name, model number, manufacturer's identification mark, inspection certificate from the manufacturer's quality department, and manufacturing date; the interior of the packaging box shall contain a list of accessories.

### 2. Transportation

Products shall be transported in securely packaged boxes. The exterior of the box shall comply with relevant national standards and shall bear labels such as "Handle with Care" and "Moisture-proof." Packaging boxes containing products may be transported using any means of transport. During transportation, direct exposure to rain or snow, as well as mechanical impact, must be avoided.

### 3. Storage

When not in use, the product shall be stored within the packaging box under the following conditions: warehouse ambient temperature between -10°C and 40°C, relative humidity not exceeding 80%; the warehouse must be free of harmful gases, flammable or explosive substances, or corrosive chemicals; furthermore, the warehouse must be free from strong mechanical vibration, impact, or strong magnetic fields; the packaging box should be placed at least 20 cm above the ground, and at least 50 cm away from walls, heat sources, windows, or air inlets; the shelf life under these specified conditions is generally 2 years; after 2 years, the product shall undergo re-inspection.

## IX. Safety Precautions

1. Once the equipment's safety protection system is compromised, the equipment must be shut down immediately, and maintenance procedures specified in the relevant guidelines shall be followed.

2. When power equipment is moved from a cold environment to a warm environment, condensation may pose a risk of electric leakage; therefore, grounding requirements must be strictly adhered to;

Only qualified personnel may connect the equipment to the power supply.

3. When cutting off the power supply, the equipment must be shut down for at least five minutes to allow the capacitors sufficient time to discharge; only after this period can maintenance work be performed on the power supply equipment.

4. Pay close attention to safety precautions: Where safety warning signs or high-voltage warning signs are present, avoid touching these areas with your hands to prevent electric shock or burns.

## X. Cited Standards and Specifications

GB/T 2423.1-2001 – Environmental testing of electrical and electronic products – Part 2: Test methods / Test A: Low temperature

GB/T 2423.2-2001 Electrical and electronic products – Environmental testing – Part 2: Test methods / Test B: High temperature

GB/T 2423.3-1993: Basic Environmental Test Methods for Electrical and Electronic Products – Test Ca:

Constant Humidity and Heat Test Method;  
GB/T 2423.4-1993: Basic Environmental Test Methods for Electrical and Electronic Products – Test Db:  
Alternating Humidity and Heat Test Method  
GB/T 2423.5-1995 – Environmental testing of electrical and electronic products – Part 2: Test methods / Test  
Ea and Guidelines: Shock  
GB/T 2423.6-1995 – Environmental testing of electrical and electronic products – Part 2: Test methods / Test  
Ea and Guidelines: Collision  
GB/T 2423.8-1995 – Environmental testing of electrical and electronic products – Part 2: Test methods / Test  
Ed: Free fall  
GB/T 2423.10-1995 – Environmental testing of electrical and electronic products – Part 2: Test methods / Tests  
Fc and guidelines: Vibration (sinusoidal)  
GB/T 2423.11-1997 – Environmental testing of electrical and electronic products – Part 2: Test methods / Test  
Fd: Wideband random vibration – General requirements  
GB/T 2423.22-2002 – Environmental testing of electrical and electronic products – Part 2: Test N: Temperature  
variation  
GB/T 14508-93: Environmental Conditions for Freight Transport Machinery on Class I Highways  
EN55022:1998 Information technology equipment – Wireless interference characteristics – Limits and  
measurement methods;  
EN55024:1998 Information technology equipment – Electromagnetic compatibility – Limits and measurement  
methods;  
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 – Radio  
Frequency Electromagnetic Field Radiation Immunity Test  
CEI IEC 61000-4-4:1998 – Electromagnetic Compatibility Testing and Measurement Techniques –  
Electrostatic fast transient pulse group immunity test  
CEI IEC 61000-4-5:1999 – Electromagnetic Compatibility Testing and Measurement Techniques – Surge  
(Impulse) Immunity Test  
CEI IEC 61000-4-6: 2001 – Electromagnetic Compatibility Testing and Measurement Techniques – Immunity  
to Conduction Disturbances Induced by Radio Frequency Fields  
CEI IEC 61000-4-8: 1993 – Electromagnetic Compatibility Testing and Measurement Techniques – Power  
Frequency Magnetic Field Disturbance Test  
CEI IEC 61000-4-11:1994 – Electromagnetic Compatibility Testing and Measurement Techniques:  
Susceptibility Test for Voltage Sags, Short-term Interruptions, and Voltage Transients  
CEI IEC 61000-4-29:2000 – Electromagnetic Compatibility Testing and Measurement Techniques – Immunity  
Test for DC Input Port Voltage Sags, Short-duration Interruptions, and  
Voltage Transients  
IEC 61000-3-2: 2001 – Electromagnetic Compatibility – Limits – Harmonic current emission limits (for  
equipment with a per-phase input current  $\leq 16$  A)  
IEC 61000-3-3:1994 – Electromagnetic Compatibility – Limits – Voltage fluctuations and flicker in low-voltage  
power supply systems (equipment rated current  $\leq 16$  A)  
GB4943-2001 – Safety of information technology equipment  
YD/T 282-2000: General Test Methods for Reliability of Communication Equipment  
GB/T 13722-92: Technical Requirements and Test Methods for Mobile Communication Power Supplies  
YD/T 732-95: Test Method for Communication DC–DC Converters  
YD/T 731-2002 – Telecommunications High-Frequency Switching Rectifiers  
GB14287.1-2005 Electrical Fire Monitoring System – Part 1: Electrical Fire Monitoring Equipment