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深圳欧陆通电子股份有限公司  
SHENZHEN HONOR ELECTRONIC CO., LTD

ASPOWER

Electrical Specification

Model Name

U1A-D10550-DRB-Z

Version

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# Electrical Specification

(with 12V&12Vsb output(SGCC) HVDC CRPS Module for QD01))

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## 1.0 SCOPE

This specification defines the key characteristics for the 550W power supply, which is intended for worldwide use in IT equipment such as server application. This unit contains +12V and +12Vsb output ports. All the specifications are applicable under all operating conditions when installed in the end used system unless other noted.

## 2.0 INPUT PARAMETER

### 2.1 Input Voltage/Input Current/Frequency

The power supply shall operate within input limited voltage range as defined as below table, which includes the limited value of input current, input voltage, working frequency. The power supply shall be capable of start up from min load to max load at line input as low as 90VAC.

Table1.

|                  | Min                                   | Rated   | Max | Units |
|------------------|---------------------------------------|---------|-----|-------|
| AC input voltage | 90                                    | 100~240 | 264 | VAC   |
| Frequency        | 47                                    | 50-60   | 63  | Hz    |
| DC input voltage | 160                                   | 160~400 | 400 | VDC   |
| Input current    | <10A@100-240Vac/160-400Vdc @full load |         |     |       |

Note: Any long period of time for 265Vac~300Vac input at rated frequency range shall not cause damage to or shut down the power supply.

### 2.2 Inrush Current

AC line inrush current shall not exceed 25A peak, after which, the input current should be no more than the specified maximum input current. Ignore the instantaneous charge current for X, Y caps, but the peak current during time should <0.2ms. The power supply must meet the inrush requirements at 220Vac input, during cold start at any phase of AC voltage and under 25℃ ambient temperature.

### 2.3 AC Line Fuse

The power supply has a fuse in the live line wire of the input. The input fuse shall be a fast blow type. The input inrush current shall not cause the AC line fuse to blow under any conditions. All protection circuits in the power supply shall not cause the AC fuse to blow unless a component in the power supply has failed.



## 2.4 Efficiency

The power supply achieves the 80 plus platinum level testing at the 230Vac//50-60Hz 25°C ambient temperature and the loading condition show in below table.

**Table2.**

| Load | +12V  | +12Vsb | Efficiency requirement |
|------|-------|--------|------------------------|
| 10%  | 4.5A  | 0.21A  | >85%                   |
| 20%  | 9.0A  | 0.42A  | >90%                   |
| 50%  | 22.5A | 1.05A  | >94%                   |
| 100% | 45.0A | 2.1A   | >91%                   |

Note: Add external +12V power for fan and the fan power is not included in efficiency calculation.

## 2.5 AC Line Dropout

An AC line dropout is defined to be when the AC input drops to 0VAC at any phase of the AC line for any length of time. During an AC dropout the power supply must meet dynamic voltage regulation requirements. An AC line dropout of any duration shall not cause tripping of control signals or protection circuits. If the AC dropout lasts longer than 10ms time, the power supply should recover and meet all turn on requirements. The power supply shall meet the AC dropout requirement over rated AC voltages and frequencies. A dropout of the AC line for any duration shall not cause damage to the power supply.

## 2.6 Power Factor and iTHD

The power supply must meet the power factor requirements stated in the Energy Star Program Requirement for Computer Servers V2.0. The power factor and iTHD shall meet the requirements shown as below table at 230Vac/50Hz input condition.

**Table3.**

| Load        | 10% Load  | 20% Load | 50% Load | 100% Load    |
|-------------|-----------|----------|----------|--------------|
| PF          | >0.82     | >0.92    | >0.96    | > 0.98       |
| Load        | >10% Load | 20% Load | 40% Load | 50-100% Load |
| Current THD | 20%       | <15%     | <10%     | <8%          |

## 2.7 Surge and Sag

AC line transient conditions are defined as “sag” and “surge”. “Sag” is defined as the AC line voltage drops below nominal voltage. “Surge” is defined as the AC line voltage rises above nominal voltage. The power supply should meet below AC line sag and surge conditions.

**Table4. AC Line Sag Transient Performance**

| Duration      | Sag  | Input Voltage            | Frequency | Performance Criteria                             |
|---------------|------|--------------------------|-----------|--|
| =1/2 AC cycle | 95%  | 100~127VAC<br>200~240VAC | 50/60Hz   | Full load and no loss of function or performance |
| >1.0 AC cycle | >30% | 100~127VAC<br>200~240VAC | 50/60Hz   | Loss of function acceptable, self-recoverable    |

**Table5. AC Line Surge Transient Performance**

| Duration          | Surge | Input Voltage            | Frequency | Performance Criteria               |
|-------------------|-------|--------------------------|-----------|------------------------------------|
| Continuous        | 10%   | 100~127VAC<br>200~240VAC | 50/60Hz   | No loss of function or performance |
| 0 to 1/2 AC cycle | 30%   | 115VAC/230VAC            | 50/60Hz   | No loss of function or performance |

## 2.8 Input Power Loss

The input power should be lower than 5W when no load at PS off mode or at cold standby mode and lower than 8W PS ON at no load when 230Vac/50Hz input.

## 3.0 OUTPUT PARAMETER

### 3.1 Output Current

The following table defines the output current ratings. The combined output power of all outputs shall not exceed the rated output power (550W). The power supply shall meet both static, dynamic voltage regulation and timing requirements for all loading conditions defined in specification.

**Table6.**

| Input      | Output Voltage | Min Current | Max current |
|------------|----------------|-------------|-------------|
| 90~264Vac  | +12V           | 1.0A        | 45.0A       |
| 160~400Vdc | +12Vsb         | 0.1A        | 2.1A        |

Note: 1. The total max continuous output power is 550W for 90~264Vac /160~400Vdc input.

2. The power supply can support no load working.

### 3.2 Voltage Regulation

The power supply output voltages must stay within the following voltage limits shown in below table when operating at steady state, dynamic loading conditions. All outputs are measured with reference to the return remote sense (ReturnS) signal.

**Table7.**

| Output Voltage          | Min   | Rated | Max   | Tolerance |
|-------------------------|-------|-------|-------|-----------|
| +12V (at static state)  | 11.8V | 12.2V | 12.6V | /         |
| +12V (at dynamic state) | 11.6V | 12.2V | 12.8V | ±5%       |
| +12Vsb                  | 11.4V | 12.0V | 12.8V | /         |

### 3.3 Ripple & Noise

**Table8.**

| Output voltage | Ripple & noise |
|----------------|----------------|
| +12V           | <120mV         |
| +12Vsb         | <120mV         |

Note: The ripple & noise is measured over a bandwidth of 20MHz at the power supply output connectors. A 10μF low ESR electrolytic capacitor in parallel with a 0.1μF ceramic capacitor is placed at the point of measurement.

### 3.4 Timing

These timing requirements for power supply operation include alone module's output and multi modules' outputs. All outputs shall rise and fall monotonically. In additional, PSU timing must meet the requirement of mother board. The timing characteristics must be evaluated and verified when in design stage and system test stage.

**Table9. Turn On/Off Timing**

| Item         | Description  | Min | Max  | Units |
|--------------|--|-----|------|-------|
| Tsb_on_delay | Delay from AC being applied to +12Vsb within regulation. |     | 1500 | ms    |
| Tac_on_delay | Delay from AC being applied to +12V within regulation.   |     | 2500 | ms    |
| Tvout_rise   | Output voltage rise from 10% to 90% time for +12V.       | 5   | 70   | ms    |
| Tvout_rise   | Output voltage rise from 10% to 95% time for +12Vsb.     | 1   | 25   | ms    |





|                |   |     |      |    |
|----------------|---|-----|------|----|
| Tsb_vout       | Delay from +12Vsb being in regulation to +12V being in regulation at AC turn on.                    |     | 1500 | ms |
| Tpson_on_delay | Delay from PSON active to output voltages being within regulation limits.                           | 5   | 400  | ms |
| Tpwok_on       | Delay from output voltages within regulation limits to PWOK asserted at turn on.                    | 100 | 500  | ms |
| Tvout_holdup   | Time 12V output voltage dropping to 11.4V after loss of AC.   | 13  |      | ms |
| Tpwok_holdup   | Delay from loss of AC to de-assertion of PWOK.  | 12  |      | ms |
| T12Vsb_hold up | Time the +12Vsb output voltage stays within regulation after loss of AC.                            | 70  |      | ms |
| Tpwok_off      | Delay from PWOK de-asserted to output voltages dropping out of regulation limits.                   | 1   |      | ms |
| Tpwok_low      | Duration of PWOK being in the de-asserted state during an OFF/ON cycle using AC or the PSON signal. | 100 |      | ms |
| Tpson_pwok     | PWOK being de-asserted delay from PSON deactivate.  |     | 5    | ms |

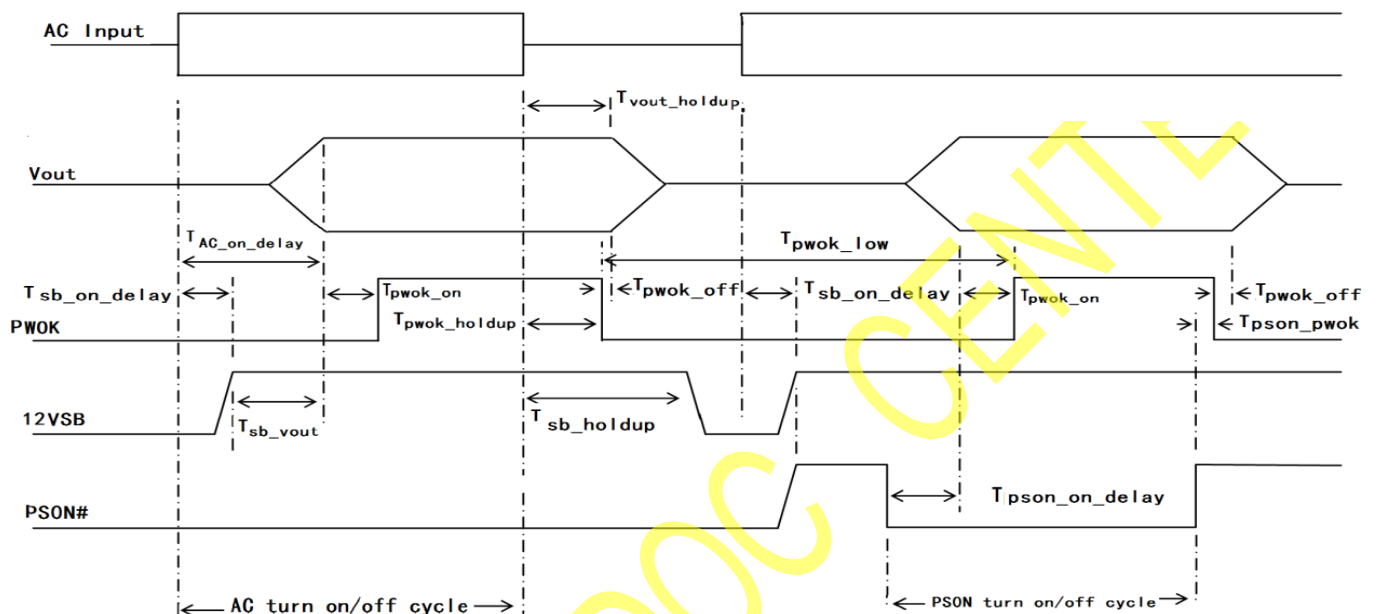
Note:

1. Tsb-on & Tac-on Delay Time: The Tsb-on delay time for +12Vsb should be  $\leq 1500\text{ms}$  at rated input when full load. The Tac-on delay time for +12V should be  $\leq 2500\text{ms}$  at rated input when full load.
2. Rise Time (Tvout\_rise): The +12V must rise from 10% to 95% within regulation limits within 5 to 70ms. For +12Vsb, it is allowed to rise within 1.0 to 25ms. All outputs must rise monotonically.
3. Main Output Delay Time (Tsb\_vout): The +12V main output being in regulation delay from +12Vsb being in regulation should be  $\leq 1500\text{ms}$  when at AC turn on.
4. Tpson\_on\_delay: The +12V output must be within regulation after PSON active for 5 to 400ms.
5. Power Work OK Delay (Tpwok\_on): PWOK should delay from +12V output within regulation for 100 to 500ms.
6. Hold Up Time(Tvout\_holdup): The hold up time for +12V  $\geq 13\text{ms}$  & PWOK  $\geq 12\text{ms}$  at any phase of rated voltage input when  $\leq$  full load. The hold up time for +12Vsb should  $\geq 70\text{ms}$ .
7. Power Fail Delay Time (Tpwok\_off): +12V dropping out of regulation delay from PWOK should  $\geq 1\text{ms}$  when power off  $\leq$  full load.



8. Duration Time for PWOK ( $T_{pwok\_low}$ ): The duration time of PWOK when OFF/ON cycle using AC or the PSON signal should  $\geq 100ms$ .

9. PWOK Delay PSON Deactivate ( $T_{pson\_pwok}$ ): PWOK being de-asserted should delay from PSON deactivate  $\leq 5ms$ .



### 3.5 Overshoot

The turn-on overshoot due to application of AC input or remote enable shall be  $< 5\%$  of the nominal output voltage for any application of input voltage within the specified range.

Overshoot/undershoot on turn on or restart must meet under all loading conditions, including minimum output capacitance on all output voltages.

### 3.6 Dynamic

The output voltage shall remain within limits specified for the step loading, slew rate, and capacitive loading in below table.

The load transient repetition rate shall be tested between 50Hz to 5KHz at 50% duty cycles. And +12V's, +12Vsb's min load is 1.0A, 0.1A when do dynamic loading test. The test shall be at least in 50 Hz/1KHz/5KHz condition. The output current transient repetition rate is only a test specification.

**Table10.**

| Output Voltage | Transient Step (A)<br>Percent of Rated Current | Slew rate (A/us) | Frequency (Hz) | Cap (uF) |
|----------------|--|------------------|----------------|----------|
| +12V           | 60% of max load                                | 0.5              | 50-5K          | 1000uF   |
| +12Vsb         | 1.0  | 0.5              | 50-5K          | 1000uF   |

### 3.7 Capacitive Loading

The power supply shall be stable and meet all requirements with the following capacitive loading range, including start up with full load. The PSU is not damaged include normal turn on timing, running under all load conditions.

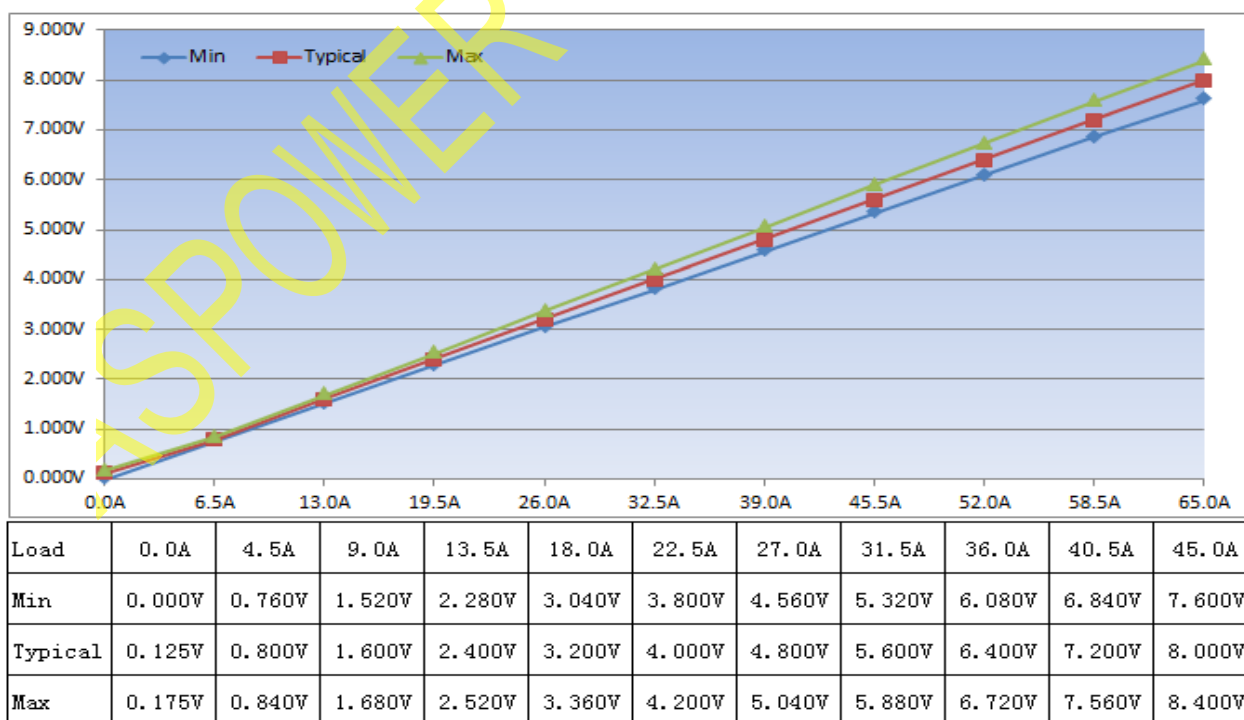
**Table11.**

| Output Voltage          | +12V       | +12Vsb  |
|-------------------------|------------|---------|
| Capacitive loading (uF) | 2000~50000 | 10~3100 |

### 3.8 Current Sharing

All outputs shall be capable of operating in a redundant current share mode. A maximum (eight) of power supplies may be operated in parallel. All outputs shall incorporate an isolation diode or mosfet for fault isolation. The +12Vsb current sharing shall be a drop type. The +12V current sharing shall be an active type. Connecting the load share bus pins of each power supply together shall enable the current share feature. With the current share pins tied together, the +12V output load current shall be balanced to within 5% when 12V output at  $\geq 30\%$  full load and no load for +12Vsb.

Shorting or opening of a current share pin shall not cause the output voltage to go out of steady state regulation. For 45.0A load the +12Vbus voltage shall be 8 V for a single power supply. The +12Vbus pin's voltage VS load requirements are as below table and curve when single power supply.



Note: The voltage at +12Vbus should meet the V-I curve requirement when  $\geq 50\%$  full load.



### 3.9 Hot Swap Requirement

Hot swapping is the process of inserting and extracting a power supply from an operating power system. During this process the output voltage shall remain within the limits. The hot swap test must be conducted when the system is operating under static, dynamic and no loading conditions. The power supply shall use a latching mechanism to prevent insertion and extraction of the power supply when the AC power cord is inserted into the power supply. The power supplies must be able to operate in a hot-swap/redundant configuration.

### 3.10 No Load Condition

The power supply shall not be damaged nor cause abnormal operation at any load conditions including no load. The power supply shall be able to turn on and off under no load condition. The on and off waveforms shall be monotonic.

### 3.11 Output Regulation

All outputs shall remain within the tolerances in section 3.2's table under all allowable load and temperature conditions during load variations on the other output voltage, any combination of the following conditions. The outputs will be measured at the output terminals.

1. Input operating rated range.
2. Specified load range.
3. Cross regulation on dual or multiple outputs.
4. Specified environmental conditions.

### 3.12 Grounding

The output ground of the pins of the power supply provides the output power return path. The output connector ground pins shall not be connected to the safety ground (power supply enclosure).

### 3.13 Control Signal

#### 3.13.1 Control and Status Signals

All control signals shall be TTL compatible with respect to the output return and shall be isolated from the primary circuit and be SELV (safety extra-low voltage circuit) rated.

### 3.13.2 Vin\_Good Signal

Vin\_Good signal is an input voltage OK signal and will be asserted high to indicate the power supply's input voltage are within range. If the input voltage is out of range, the Vin\_Good signal will be pulled to a low state. This signal accepts an open collector/drain input from the system and a 5.1K ohm resistor pull up to +3.3Vs located in power supply.

**Table12. Vin\_Good Signal Characteristic**

| Signal Type          | Power State        | Logic Level (Min) | Logic Level (Max) |
|----------------------|--------------------|-------------------|-------------------|
| Vin_Good Signal=Low  | Input Out Of Range | 0V                | 0.4V              |
| Vin_Good Signal=High | Input Normally     | 2.4V              | 3.46V             |

### 3.13.3 PSON Input Signal

The PSON signal is required to remotely turn on/off the power supply. PSON is an active low signal that turn on the +12V power rail. When this signal is not pulled low by the system, or left open, the outputs (except the +12Vsb) turn off. This signal is pulled to a standby voltage by a pull-up resistor internal to the power supply. Refer to section 3.4 for the timing diagram. This signal accepts an open collector/drain input from the system and a 5.1K ohm resistor pull up to +3.3Vs located in power supply.

**Table13. PSON Signal Characteristic**

| Signal Type          | Power State | Logic Level (Min) | Logic Level (Max) |
|----------------------|-------------|-------------------|-------------------|
| PSON=Low             | ON          | 0V                | 1.0V              |
| PSON=High or Open    | OFF         | 2.0V              | 3.46V             |
| Source Current (Low) | ON          |                   | 4mA               |

### 3.13.4 PWOK (Power OK) Output Signal

PWOK is a power OK signal and will be pulled high when the power supply to indicate that all the outputs are within the regulation limits of the power supply. When any output voltage falls out of regulation limits or when AC power has been removed for a time sufficiently long so that power supply operation is no longer guaranteed, PWOK will be de-asserted to a low state. The start of the PWOK delay time shall inhibited as long as any power supply output is in current limit. This signal is open collector/drain output and a 0.27K ohm resistor pull-up to +3.3Vs in power supply.

**Table14. PWOK Signal Characteristic**

| Signal Type             | Power State  | Logic Level (Min) | Logic Level (Max) |
|-------------------------|--------------|-------------------|-------------------|
| PWOK=Low                | Power Not OK | 0V                | 0.4V              |
| PWOK=High               | Power OK     | 2.4V              | 3.46V             |
| Sink Current (Low)      |              |                   | 0.4mA             |
| Source Current (High)   |              |                   | 2mA               |
| PWOK Rise and Fall Time |              |                   | 0.1ms             |

### 3.13.5 Alert Signal

This signal is low active indicating that the power supply is experiencing a problem, warning or fault that the user should investigate. The signal shall activate in the case of critical component temperature reached a warning threshold, over temperature protection, over current warning, over current protection, input over voltage protection.

This signal is open collector output and a 2K ohm resistor pull-up to +3.3Vs in power supply.

**Table15. Alert Signal Characteristic**

| Signal Type              | Power State     | Logic Level (Min) | Logic Level (Max) |
|--------------------------|-----------------|-------------------|-------------------|
| Alert=Low                | Alert to system | 0V                | 0.4V              |
| Alert=High               | Power OK        | 2.4V              | 3.46V             |
| Sink Current, Alert=Low  |                 |                   | 4mA               |
| Alert Rise and Fall Time |                 |                   | 0.1ms             |

### 3.13.6 SDA and SCL Signal

SDA and SCL pins (for I2C bus) is designed to operate at +3.3V volts. The pull-up resistors are 20K ohm to +3.3Vs in power supply.

### 3.13.7 A0, A1 Signal

PSU module address line 0 and line 1. This signal line is provided for determining the address for the specific PSU FRU and SMBus address. A 10K ohm resistor pull-up to +3.3Vs located in the PSU for each. The address line should be either float or pull low with equal to or less than 100ohm in the motherboard design.

### 3.13.8 Power Cold Redundancy Requirement

#### 3.13.8.1 Power MCU Address Settings

Power should support N+1 cold redundant ( $N \leq 3$ ). Power address settings is refers to the below table.

**Table16. Power MCU address settings**

| A1 (B20 PIN) | A0 (B19 PIN) | Power Internal MCU Address | Power slot position |
|--------------|--------------|----------------------------|---------------------|
| 0            | 0            | B0                         | 1                   |
| 0            | 1            | B2                         | 2                   |
| 1            | 0            | B4                         | 3                   |
| 1            | 1            | B6                         | 4                   |

#### 3.13.8.2 Cold Redundancy Configuration

There is a Cold\_Redundancy\_CONFIG (FCh) command in power supply, the system can read or write access. The format of the command for example: the command S B0 w FC 55 PEC P is to set the register of power supply B0 to 55h. According to the requirements, the value of the register can be set to 00h / 55h / 0Eh. The different value represents the diffident meaning that can refer to the descriptions from the below table.

**Table17. Cold Redundant Configuration Description**

| Cold Redundant Configuration (FCh)  |                        |   |
|---|------------------------|---|
| Value   | State                  | Description   |
| 00h   | Standard Redundancy    | Power loading in average cold redundant.                |
| 55h   | Cold Redundant Active  | Normal operating output power from cold redundant.      |
| 0Eh   | Cold Redundant Standby | Standby power without output power from cold redundant. |
| Remarks: The power supply which is in cold standby mode will not involve the output loading by slightly decreases its output voltage. |                        |   |

The default factory setting state is standard redundant, its value is 00h.

When power supply occurs any abnormal conditions (including AC cord plugging in/out, power off reset, over-temperature warning, ambient temperature out of range; 12V short protection, UVP, OVP, OCP, Fan alert and abnormal internal circuit) will make the register value reset to default 00h, and also set the CRB (B22 PIN) to low level, force the other paralleled operating power supplies into standard redundancy state.



### 3.13.8.3 Cold Standby Signal Require

The essential condition for power supply access into cold standby state: PSON is low level, the register value should be 0Eh. At the same time the requirements for the power supply which is access into cold standby state as below:

When CRB is low level, the power of cold redundant active and cold standby should be awaked immediately and the FCh value recovers to 00h, moving into standard redundancy state.

Keep PWOK (A25 PIN) as high level.

Every power status should keep normal, could not report any fault or abnormal condition, unless it is indeed existed.

Indicator light should flicker as the specification requirements.

### 3.13.8.4 Access Cold Redundancy Status

For example (at most 4 units power), the cold redundancy operating mode of power supply should follow the below descriptions.

Cold Redundancy BUS (B22 PIN) abbreviate CRB, power Supply Unite abbreviate PSU.

**Table18. Power Access Cold Redundancy example sheet**

| PSU | FCh Register Value (hex) |            |            |
|-----|--------------------------|------------|------------|
|     | Step1                    | Step2      | Step3      |
| 1#  | 00                       | 55         | 55         |
| 2#  | 00                       | 55         | 0E         |
| CRB | Low Level                | High Level | High Level |

### 3.13.8.5 Exit Cold Redundancy State

PSU could exit cold redundant mode by system command or load over threshold.

#### 1. Exit Cold Redundancy command by system command

When PSU is working in cold redundant mode, system can send command to order the PSU in cold standby mode. By setting the FCh to 55h or 00h to exit cold redundant standby mode and move into cold redundant active or standard redundancy mode.

When setting the cold standby PSU to 00h, to let PSU move into standard redundancy state, at the same time pull low the CRB from high level to low level. Then drive all the paralleled PSU to move in standard redundancy state.

#### 2. Exiting Cold Redundancy by Output Load Over Threshold

When output loading over the threshold, CR Standby PSU will exit cold standby automatically and move into standard redundancy state.



### 3.13.9 EEPROM

The power supply shall have an ID EEPROM which contains power supply specific information:

Specially assemble part number, serial number, assembly deviation, special configurations, test history, field test history, and field trace-ability data. This data is stored in an EEPROM device located inside of the power supply. A 256bytes serial EEPROM is used in power supply. This device will be programmed by the unit vendor with detailed information on the unit. This device shall have its highest order address bit (A2 internally wired to ground). The A0 & A1 address bit are wired to the output connector and includes an internal 10K ohm resistor pull up to the +3.3Vs.

**Table19. Address Signals**

| A1 | A0 | EEPROM Address | MCU Address | PSU |
|----|----|----------------|-------------|-----|
| 0  | 0  | A0             | B0          | 1   |
| 0  | 1  | A2             | B2          | 2   |
| 1  | 0  | A4             | B4          | 3   |
| 1  | 1  | A6             | B6          | 4   |

### 3.13.10 LED Indicators

There will be a dual color LED lamp on the case's front panel, the color is green and amber to indicate the power supply status. There will be a (slow) blinking green to indicate that AC is applied to the PSU and the standby voltage is available. It shall go steady to indicate that all the power outputs are available. This same LED will (slowly) blinking or be solid ON amber to indicate that the power supply reached a warning status or has failed and therefore a replacement of the unit is/maybe necessary. The LED operation is defined as below table. The LED shall be visible on the power supply's exterior face. The LED locations shall meet ESD requirements. The LED shall be securely mounted in such a way that incidental pressure on the LED won't cause it to become displaced.

**Table20. LED State Requirement**

| Power Supply Status   | LED Status         |
|---|--------------------|
| +12V Output ON and OK.  | Green ON           |
| No AC power to all power supplies.  | OFF                |
| AC present/Only 12Vsb on (PS off).  | 1Hz Blinking Green |
| When the power in cold standby state.                                       | 2Hz Blinking Green |
| AC cord unplugged or DC power lost; with a second power supply in parallels | Amber ON           |



|  |                    |
|--|--------------------|
| still with AC input power.   |                    |
| Power supply warning events where the power supply continues to operate:<br>High temperature warning, Fan warning, Over current warning. | 2Hz Blinking amber |
| Power supply critical event causing a shutdown: UVP, OVP, OCP, OTP.  | Amber ON           |

### 3.13.11 Signal Ripple & Noise Requirement

Some significant signals should have a ripple and noise requirement as below table. The test condition should under no external capacitor but mating with customer's system.

**Table21.**

| Signal       | SCL<br>High | SDA<br>High | PSON<br>Low or High | Alert<br>Low or High | PWOK<br>Low or High | Vin_Good<br>Low or High | Present<br>Low |
|--------------|-------------|-------------|---------------------|----------------------|---------------------|-------------------------|----------------|
| Test @ 20MHz | 300mV       |             |                     |                      |                     |                         |                |

## 4.0 PROTECTION

When the input UVP/OVP, +12V or +12Vsb output's UVP/OCP, unit's OTP or high ambient temperature protection is triggered, the power supply will shut down and self-recovery when the fault condition removed. If +12V output's OVP is triggered, the power supply will shut down and latched off the +12V output. The latch state can be cleared by toggling the PSON signal or by an AC power interruption of 5 seconds nominal. If the auxiliary converter's OTP is triggered, the power supply will shut down and auto-restart immediately.

### 4.1 Input Under and Over Voltage Protection (Input UVP/OVP)

The input UVP and OVP should meet below table.

**Table22.**

| Input voltage | Under voltage protection | Self-recovery voltage |
|---------------|--------------------------|-----------------------|
| HVDC          | 145V±5V                  | 155V±5V               |
| AC            | 74V±5V                   | 84V±5V                |
| Input voltage | Over voltage protection  | Self-recovery voltage |
| HVDC          | 418V±8V                  | 408V±8V               |
| AC            | 316V±6V                  | 310V±6V               |

## 4.2 Output Under and Over Voltage Protection (Output UVP/OVP)

The power supply should have over and under voltage protection to prevent the outputs from exceeding limits or abnormal operation. If the +12V's UVP or +12Vsb's UVP/OVP occurred, the power supply should shut down and self-recovery after the fault condition removed. If the +12V's OVP occurred, the power supply will shut down and latched off. The latch state can be cleared by toggling the PSON signal or by an AC power interruption of 5 seconds nominal.

+12Vsb & +12V UVP range: 9.0~10.5Vdc; +12Vsb & +12V OVP range: 13.3~14.5Vdc.

The over and under voltage protection should tested at +12V/1.0A, +12Vsb/0.1A load condition.

## 4.3 Over Temperature Protection (OTP)

The power supply will be protected against over temperature conditions caused by loss of fan cooling or excessive ambient temperature. In over temperature protection (OTP) condition the PSU will shut down. When the power supply temperature drops to within specified limits, the power supply shall restore power automatically, while the +12Vsb remains always on.

There are four temp sensors in the power supply, The first is on the main board to sense the PFC MOSFET copper temperature, it will trigger primary OTP and self-recovery when the PFC MOSFET temperature return to a safe point. The second is on the main board to sense the auxiliary converter MOSFET's temperature, it will trigger auxiliary converter +12Vsb output's OTP and auto-restart immediately for single module. The third is on the transformer PCB board to sense the synchronous MOSFET's copper temperature. It will trigger secondary OTP when the sensor resistor's temperature reached limit and self-recovery. The last one is a temperature sense resistor on the main board and located at the air intake to sense the ambient temperature. The power supply will shut down if the ambient temperature reached the limit and self-recovery when the ambient temperature returns to normally. Before the fourth OTP triggered, there is warming first, and the trigger points are as below table.

Table23.

| The temp sensors | Over temperature warning | Over temperature protection | Self-recovery temperature |
|------------------|--------------------------|-----------------------------|---------------------------|
| Fourth ambient   | 65±5℃                    | 70±5℃                       | 60±5℃                     |

#### 4.4 Short Circuit Protection (SCP)

The power supply shall be protected from damage due to faults between output (+12V or +12Vsb) and GND. Short circuit of the power supply outputs shall not result in fire hazard, shock hazard, or damage to the power supply. Components shall not be damaged during the short circuit conditions. If the +12V shorted to GND, the power supply will shut down and self-recovery after the short circuit condition removed. All outputs shut down upon a short circuit of the +12Vsb and when the short is removed, the power supply shall self-recovery.

#### 4.5 Over Current Protection (OCP)

The power supply should have over current protection to prevent the outputs from exceeding limits. If the +12V's OCP or +12Vsb's OCP occurred, the power supply should shut down and self-recovery after the over current condition removed.

It also has 150% peak load function when start up for 10s.

+12Vsb OCP range: 3.5~7.0A; +12V OCP range: 51~57A.

The +12V main output can endure a peak load of 150% full load for 50ms min, after the occurrence of peak current maximum 8ms, the Alert signal will be low.

**Table24. OCP Limited Specification**

| +12V Main Output                 | Full Range Input  | LED                |
|----------------------------------|-------------------|--------------------|
| Over current warning             | $51 \pm 3A$       | 2Hz Blinking Amber |
| Over current protection          | $54 \pm 3A$       | Amber              |
| Over current recovery            | $48 \pm 3A$       | Green              |
| Peak load (50ms)                 | 60~72A            | Amber              |
| +12Vsb                           | Total Range Input | LED                |
| Over current warning (PS OFF)    | $3.8 \pm 0.3A$    | 1Hz Blinking Green |
| Over current warning(PS ON)      | $3.8 \pm 0.3A$    | 2Hz Blinking Amber |
| Over current protection (PS ON)  | $6.2 \pm 0.3A$    | Blinking Amber     |
| Over current protection (PS OFF) | $4.2 \pm 0.3A$    | Blinking Amber     |

#### 4.6 Fan Warning and Fault

If the fan speed control duty cycle was set greater than 10%, but the fan speed is between 500 and 1000 RPM, the PSU should send out fan alarm signal, when it less than 500RPM, the PSU should send out fan failure signal.

## 5.0 OPERATE ENVIRONMENT

**Table25. Environment Limits**

| Item                  | Unit  | Min | Nominal | Max   | Notes   |
|-----------------------|---|-----|---------|-------|---|
| Operating Temperature | ℃   | 0   | 35      | 50    | The power supply should start up at -25℃, But no electrical property requirement.   |
| Storage Temperature   | ℃   | -40 | 25      | 70    | Non-operating, maximum rate of change of 20℃/hour.  |
| Relative Humidity     | %   | 10  |         | 90    | Operating, non-condensing.  |
|                       |   | 5   |         | 95    | Non-operating, non-condensing.  |
| Operating Altitude    | m   | 0   |         | 5000  | The power supply max operating ambient temperature is defined at sea level. The max operating ambient temperature should drops at a slew of 0.33℃/100m altitude raised. |
| Storage Altitude      | m   | 0   |         | 15000 |   |
| Mechanical Shock      | 50G trapezoidal wave, velocity change =170in./sec |     |         |       | Non-operating. Three drops in each of six directions are applied to each of the samples.  |

## 6.0 SAFETY

### 6.1 Safety Certification

- 1、CCC      2. GB4943-2011

### 6.2 Hi-Pot

Primary to secondary, HI-POT Withstand voltage: 10mA max 3000Vac, 50/60Hz or 0.5mA max 4242Vdc for 60 seconds for power supply unit;

Primary to Earth, HI-POT Withstand voltage: 10mA max 1500Vac, 50/60Hz or 0.5mA max 2121Vdc for 60 seconds.

Secondary to Earth, HI-POT Withstand voltage: 10mA max 500Vac, 50/60Hz or 0.5mA max 707Vdc for 60 seconds.

### 6.3 Grounding Impedance Test

Grounding impedance test using grounding current 32A for 60s and the impedance is less than 100mohm.



## 6.4 Leakage Current

In order to ensure that the leakage current of the power supply case not cause leakage damage to the human body, after inserting the AC power, the leakage current of the power supply should meet the requirements of safety. Under 264Vac/60Hz conditions to be less than 1.75mA test with customer system.

## 6.5 Insulation Resistance

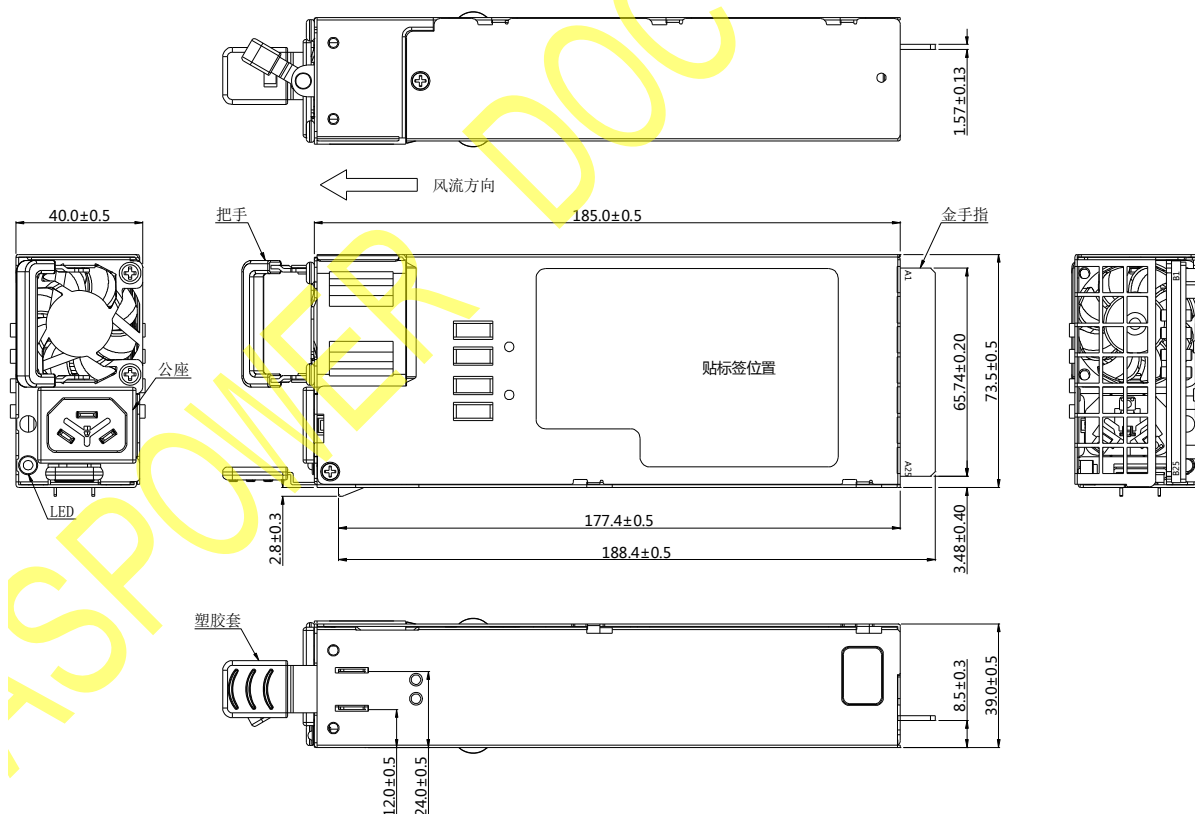
Primary to Secondary: 500Vdc for 60S, the insulation resistance shall not be less than 10Mohm.

Secondary to Earth: 500Vdc for 60S, the insulation resistance shall not be less than 2Mohm.

## 7.0 OUTLINE STRUCTURE

### 7.1 Outline Dimension

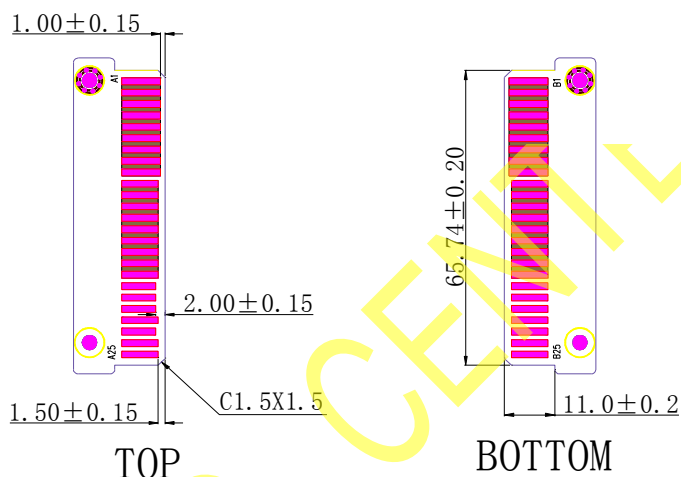
Outline dimension: 185mm (L)\*73.5mm (W)\* 39(40)mm (T)



Note: Labels in dimension figures for reference only, please refer to below labels for detail.

## 7.2 Output Connector

| Pin | Name       | Pin | Name     |
|-----|------------|-----|----------|
| A1  | GND        | B1  | GND      |
| A2  | GND        | B2  | GND      |
| A3  | GND        | B3  | GND      |
| A4  | GND        | B4  | GND      |
| A5  | GND        | B5  | GND      |
| A6  | GND        | B6  | GND      |
| A7  | GND        | B7  | GND      |
| A8  | GND        | B8  | GND      |
| A9  | GND        | B9  | GND      |
| A10 | +12V       | B10 | +12V     |
| A11 | +12V       | B11 | +12V     |
| A12 | +12V       | B12 | +12V     |
| A13 | +12V       | B13 | +12V     |
| A14 | +12V       | B14 | +12V     |
| A15 | +12V       | B15 | +12V     |
| A16 | +12V       | B16 | +12V     |
| A17 | +12V       | B17 | +12V     |
| A18 | +12V       | B18 | +12V     |
| A19 | SDA        | B19 | A0       |
| A20 | SCL        | B20 | A1       |
| A21 | PSON       | B21 | +12V SB  |
| A22 | Alert      | B22 | SM-Bus   |
| A23 | GND Sense  | B23 | LS       |
| A24 | +12V Sense | B24 | Present  |
| A25 | PWOK       | B25 | Input OK |



**Table26. Output Terminals**

| Signal            | Description   |
|-------------------|---|
| GND               | Outputs return and it's also connected with the case.   |
| +12V              | The main output voltage.  |
| PMBus*SDA         | I2C Data bus.   |
| PMBus*SCL         | I2C Clock bus, 100kHz max.  |
| A0(SMBus*address) | Address set Pin.  |
| A1(SMBus*address) | Address set Pin.  |
| PSON              | Remote ON/OFF control signal: When the PSON signal is low, the power supply will turn on the +12V main output, and turn off when it's high. |
| +12Vsb            | The auxiliary output voltage.   |
| Alert             | Power supply warning signal: When this pin get low signal will notice system the power supply has some fault occurred.                      |

|            |  |
|------------|--|
| SM-Bus     | Power supply cold redundancy control signal.                               |
| GND Sense  | +12V output GND return sense for feedback.                                 |
| +12V Sense | +12V output voltage sense for feedback.                                    |
| +12Vbus    | +12V output load sharing bus.  |
| PWOK       | Power supply work OK signal.   |
| Present    | The power online signal, connected to GND in the power supply.             |
| Input OK   | It also means Vin_Good signal, high level means input voltage is in range. |

## 8.0 EMI AND EMS REQUIREMENT

### WARNING

This product is Class A and may cause radio interference in the domestic environment. In this case, it may be necessary for the user to take practical measures against interference.

**Table27. EMI (Electromagnetic Interference) Requirements Table**

| Item                | Description and Requirement  | Criterion    | Notes           |
|---------------------|--|--------------|-----------------|
| Radiated Emissions  | Frequency: 30MHz~1GHz  | EN 55032     | 230V/50Hz input |
|                     | Class A with 6dB Margin  | FCC Part 15  | 120V/60Hz input |
| Conducted Emissions | Frequency: 150KHz~30MHz  | EN 55032     | 230V/50Hz input |
|                     | Class A with 6dB Margin  | FCC Part 15  | 120V/60Hz input |
| Harmonic            | EN 61000-3-2 Class A   | EN 61000-3-2 | 230V/50Hz input |
| Voltage Flicker     | $P_{st} \leq 1.0$ and $P_{lt} \leq 0.65$<br>Voltage change $\leq 3.3\%$<br>Relative Voltage change $\leq 4\%$<br>The voltage changed over 3.3% duration time should $\leq 500ms$ | EN 61000-3-3 | 230V/50Hz input |

**Table28. EMS (Electromagnetic Susceptibility) Requirements Table**

| Item  | Description and Requirement   | Level | Criterion                               |
|-------|---|-------|---|
| Surge | Different Mode: $\pm 1KV$<br>Common Mode: $\pm 2KV$<br>With 10% margin. | B     | EN61000-4-5<br>EN 55035<br>GR-1089-CORE |



|                                       |  |             |  |
|---------------------------------------|--|-------------|--|
| Electrical Fast Transient Group (EFT) | ±2KV   | B           | EN61000-4-4<br>EN 55035<br>YD/T 1082                           |
| Electrical Static Discharge (ESD)     | Touch: ±6KV<br>Air: ±8KV                                     | B           | EN61000-4-2<br>EN 55035  |
| Radiated Susceptibility (RS)          | 3V/m   | A           | EN 61000-4-3<br>EN 55035                                       |
| Conducted Susceptibility (CS)         | 150KHz~80MHz 3V 80% AM                                       | A           | EN 61000-4-6/EN 55035  |
| Voltage Dips and Interruptions        | 0% Ut: 10ms<br>70% Ut: 500ms (220Vac input)<br>0% Ut: 5000ms | B<br>B<br>C | EN 61000-4-11<br>EN 61000-4-29<br>EN 55035 / 60601<br>GB 19286 |

Performance criterion of the voltage fluctuation immunity test:

A: The power supply should have no loss of function or degradation of performance according to its specification during the test.

B: Temporary loss of function or degradation of performance is acceptable, but all the outputs should be in an acceptable range and should recover to normal after the test. The power supply shouldn't loss any of outputs, reset or any abnormal warning when doing the test with system.

C: Temporary loss of function or shut down is acceptable, but the power supply should restart with an operator intervention or auto-restart normally after the test.

## 9.0 MECHANICAL PERFORMANCE

Non-operating:

Sine sweep: 5~500Hz @0.5gRMS at 0.5 octave/min; dwell 15 min at each of 3 resonant points;

Random profile: 5Hz @0.01g<sup>2</sup>/Hz (slope up); 20~500Hz @0.02g<sup>2</sup>/Hz (flat);

Input acceleration = 3.13gRMS; 10min.per axis for 3 axis on all samples.

## 10.0 MTBF

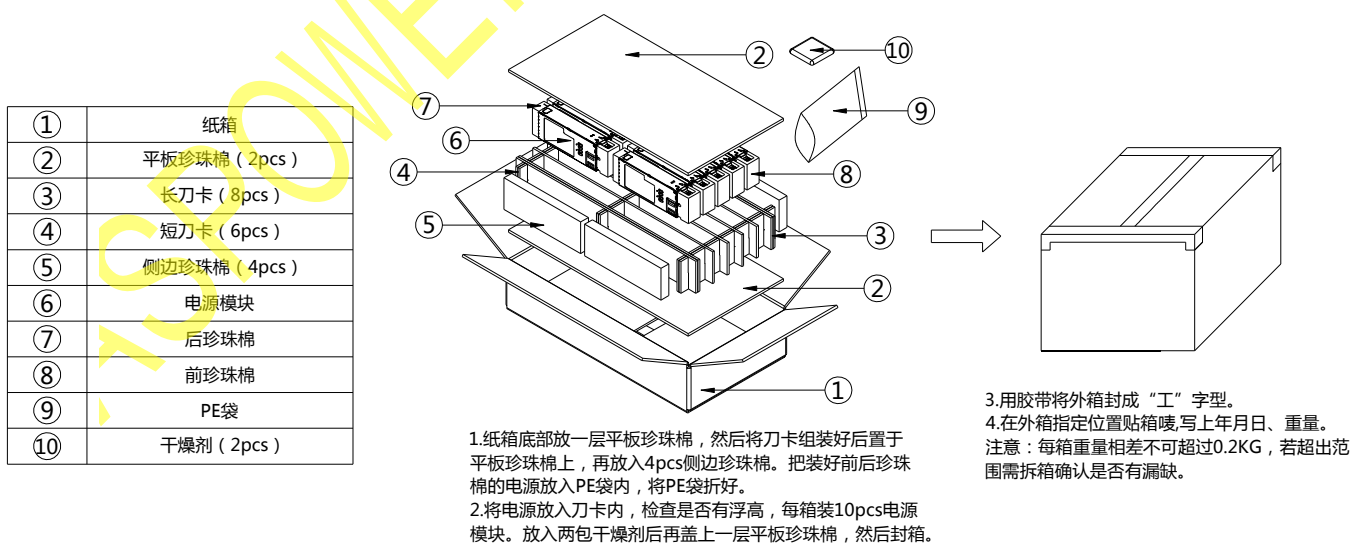
The power supply shall have a reliability requirement as below table when under full load and 110Vac/60Hz or 230Vac/50Hz or 336Vdc input.

**Table29.**

| Item                                      | Requirement  | Notes  |
|---|--|--|
| Life Time                                 | $\geq 10$ years at 35°C ambient                                  | Not including the fan, fan's life time should $\geq 7$ years.  |
| CMTBF<br>(Calculated MTBF)                | $\geq 250,000$ hours, at 35°C ambient temperature and full load. | Telcordia Technologies SR-332 (Method I Case 3).               |
| Electrolytic capacitor<br>calculated life | $\geq 10$ years  | 35°C ambient and full load using capacitors supplier equation. |
| Fan Noise                                 | 58dBA (220Vac input)   | 35 °C ambient and full load.                                   |
| Annual Return Rate                        | $\leq 0.1\%$   |  |
| Warranty                                  | $\geq 3$ years   |  |

## 11.0 PACKAGE

### 11.1 Outline Diagram of Carton





## 12.0 SOFTWARE

### 12.1 Data Precision Requirement

Some data read from power supply should have a precision requirement as below table:

**Table30. Required Accuracy (110Vac or 220Vac or 270Vdc)**

| Output Load Condition                 | 10%~20%      | 20%-50% | 50%-100% |
|---------------------------------------|--------------|---------|----------|
| Read_VIN(88h)                         | ±2%          | ±2%     | ±2%      |
| Read_IIN(89h)                         | ±3% or ±0.2A |         |          |
| Read_PIN(97h)/Read_Ein(86h)           | ±10W         | ±2%     | ±2%      |
| Read_Vout(8Bh)                        | ±2%          |         |          |
| Read_Iout(8Ch)                        | ±1A          | ±2%     | ±2%      |
| Read_Pout(96h)/Read_Eout(87h)         | ±10W         | ±2%     | ±2%      |
| Read_Ambient Temperature(0-70℃) (8Dh) | ±5℃          |         |          |

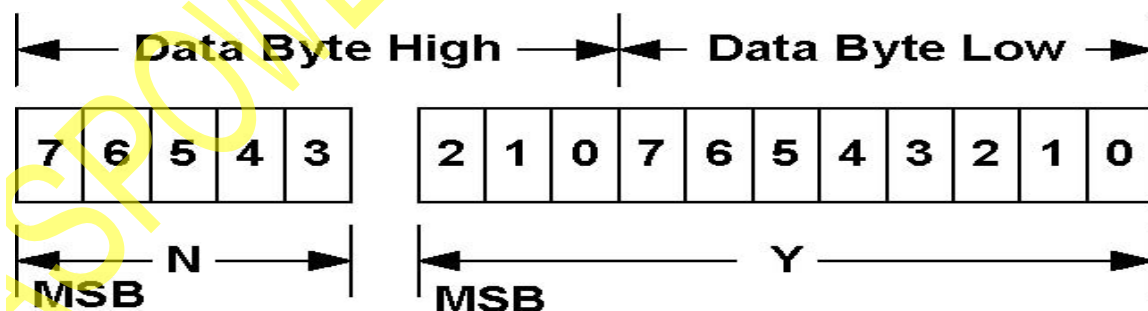
Note:

1. There is no accuracy requirement when PSU is in PS-OFF mode.

### 12.2 PMBus Specification

#### Linear Data Formats

The Linear Data Format is a two byte value with: An 11 bit, two's complement mantissa and A 5 bit, two's complement exponent (scaling factor). The format of the two data bytes is illustrated in below Figure.



The relation between Y, N and the “real world” value is:  $X = Y \cdot 2^N$

Where, as described above:

X is the “real world” value being communicated

Y is an 11 bit, two's complement integer;

N is a 5 bit, two's complement integer.

Devices that use the linear format must accept and be able to process any value of N.

## 12.3 PMBUS Command Supported

**Table31. STATUS\_WORD Command**

| Byte | Bit No. | Status Bit Name   | Meaning  | Support |
|------|---------|-------------------|--|---------|
| Low  | 7       | BUSY              | A fault was declared because the device was busy and unable to respond.  | No      |
|      | 6       | OFF               | This bit is asserted if the unit is not providing power to the output, regardless of the reason, including simply not being enabled. | Yes     |
|      | 5       | VOUT_OV           | An output over voltage fault has occurred.   | Yes     |
|      | 4       | IOUT_OC           | An output over current fault has occurred.   | Yes     |
|      | 3       | VIN_UV            | An input under voltage fault has occurred.   | Yes     |
|      | 2       | TEMPERATURE       | A temperature fault or warning has occurred.   | Yes     |
|      | 1       | CML               | A communications, memory or logic fault has occurred.  | No      |
|      | 0       | NONE OF THE ABOVE | A fault or warning not listed in bits [7:1] of this byte has occurred.   | No      |
| High | 7       | VOUT              | An output voltage fault or warning has occurred.   | Yes     |
|      | 6       | IOUT/POUT         | An output current or output power fault or warning has occurred.   | Yes     |
|      | 5       | INPUT             | An input voltage, input current, or input power fault or warning has occurred.   | Yes     |
|      | 4       | MFR               | A manufacturer specific fault or warning has occurred.   | No      |
|      | 3       | POWER_GOOD#       | The POWER_GOOD signal, if present, is negated.   | Yes     |
|      | 2       | FANS              | A fan or airflow fault or warning has occurred.  | Yes     |
|      | 1       | OTHER             | A bit in STATUS_OTHER is set.  | No      |
|      | 0       | UNKNOWN           | A fault type not given in bits [15:1] of the STATUS_WORD has been detected.  | No      |

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**Table32. STATUS\_VOUT Command**

| Bit | Meaning  | Support |
|-----|--|---------|
| 7   | VOUT Over voltage Fault  | Yes     |
| 6   | VOUT Over voltage Warning  | No      |
| 5   | VOUT Under voltage Warning   | No      |
| 4   | VOUT Under voltage Fault   | Yes     |
| 3   | VOUT_MAX Warning (An attempt has been made to set the output voltage to value higher than allowed by the VOUT_MAX command) | No      |
| 2   | TON_MAX_FAULT  | No      |
| 1   | TOFF_MAX Warning   | No      |
| 0   | VOUT Tracking Error  | No      |

**Table33. STATUS\_IOUT Command**

| Bit | Meaning  | Support |
|-----|--|---------|
| 7   | IOUT Over current Fault                          | Yes     |
| 6   | IOUT Over current And Low Voltage Shutdown Fault | No      |
| 5   | IOUT Over current Warning                        | Yes     |
| 4   | IOUT Undercurrent Fault                          | No      |
| 3   | Current Share Fault                              | No      |
| 2   | Power Limiting                                   | No      |
| 1   | POUT Overpower Fault                             | No      |
| 0   | POUT Overpower Warning                           | No      |

**Table34. STATUS\_INPUT Command**

| Bit | Meaning                                 | Support |
|-----|---|---------|
| 7   | VIN Over voltage Fault                  | Yes     |
| 6   | VIN Over voltage Warning                | No      |
| 5   | VIN Under voltage Warning               | Yes     |
| 4   | VIN Under voltage Fault                 | Yes     |
| 3   | Unit Off For Insufficient Input Voltage | Yes     |
| 2   | IIN Over current Fault                  | No      |
| 1   | IIN Over current Warning                | No      |

|   |                       |    |
|---|-----------------------|----|
| 0 | PIN Overpower Warning | No |
|---|-----------------------|----|

**Table35. STATUS\_TEMPERATURE Command**

| Bit | Meaning                    | Support |
|-----|----------------------------|---------|
| 7   | Over temperature Fault     | Yes     |
| 6   | Over temperature Warning   | Yes     |
| 5   | Under temperature Warnings | No      |
| 4   | Under temperature Fault    | No      |
| 3   | Reserved                   | No      |
| 2   | Reserved                   | No      |
| 1   | Reserved                   | No      |
| 0   | Reserved                   | No      |

**Table36. STATUS\_FAN\_1\_2 Command**

| Bit | Meaning                | Support |
|-----|------------------------|---------|
| 7   | Fan 1 Fault            | Yes     |
| 6   | Fan 2 Fault            | No      |
| 5   | Fan 1 Warning          | Yes     |
| 4   | Fan 2 Warning          | No      |
| 3   | Fan 1 Speed Overridden | No      |
| 2   | Fan 2 Speed Overridden | No      |
| 1   | Airflow Fault          | No      |
| 0   | Airflow Warning        | No      |

**Table37. STATUS\_OTHER Command**

| Bit | Meaning                               | Support |
|-----|---------------------------------------|---------|
| 7   | Reserved                              | No      |
| 6   | Reserved                              | No      |
| 5   | Input A Fuse Or Circuit Breaker Fault | No      |
| 4   | Input B Fuse Or Circuit Breaker Fault | No      |
| 3   | Input A OR-ing Device Fault           | No      |
| 2   | Input B OR-ing Device Fault           | No      |
| 1   | Output OR-ing Device Fault            | No      |

|   |          |    |
|---|----------|----|
| 0 | Reserved | No |
|---|----------|----|

**Table38. Supported Command Summary**

| CMD Code | Name                | Type       | Bytes | Conditions                  |
|----------|---------------------|------------|-------|-----------------------------|
| 03h      | CLEAR_FAULTS        | Send Byte  | 0     |                             |
| 19h      | CAPABILITY          | Read Byte  | 1     |                             |
| 1Ah      | QUERY               | Block Read | 1     |                             |
| 20h      | VOUT_MODE           | Read Byte  | 1     |                             |
| 40h      | VOUT_OV_FAULT_LIMIT | Read Word  | 2     |                             |
| 44h      | VOUT_UV_FAULT_LIMIT | Read Word  | 2     |                             |
| 46h      | IOUT_OC_FAULT_LIMIT | Read Word  | 2     |                             |
| 4Ah      | IOUT_OC_WARN_LIMIT  | Read Word  | 2     |                             |
| 4Fh      | OT_FAULT_LIMIT      | Read Word  | 2     |                             |
| 51h      | OT_WARN_LIMIT       | Read Word  | 2     |                             |
| 55h      | VIN_OV_FAULT_LIMIT  | Read Word  | 2     |                             |
| 57h      | VIN_OV_WARN_LIMIT   | Read Word  | 2     |                             |
| 58h      | VIN_UV_WARN_LIMIT   | Read Word  | 2     |                             |
| 59h      | VIN_UV_FAULT_LIMIT  | Read Word  | 2     |                             |
| 78h      | STATUS_BYTE         | Read Byte  | 1     |                             |
| 79h      | STATUS_WORD         | Read Word  | 2     |                             |
| 7Ah      | STATUS_VOUT         | Read Byte  | 1     |                             |
| 7Bh      | STATUS_IOUT         | Read Byte  | 1     |                             |
| 7Ch      | STATUS_INPUT        | Read Byte  | 1     |                             |
| 7Dh      | STATUS_TEMPERATURE  | Read Byte  | 1     |                             |
| 80h      | READ_VIN_TYPE       | Read Byte  | 1     | 00:NO AC;<br>01:AC; 02:HVDC |
| 81h      | STATUS_FANS_1_2     | Read Byte  | 1     |                             |
| 86h      | READ_EIN            | Block Read | 6     |                             |
| 87h      | READ_EOUT           | Block Read | 6     |                             |
| 88h      | READ_VIN            | Read Word  | 2     |                             |
| 89h      | READ_IIN            | Read Word  | 2     |                             |
| 8Bh      | READ_VOUT           | Read Word  | 2     |                             |

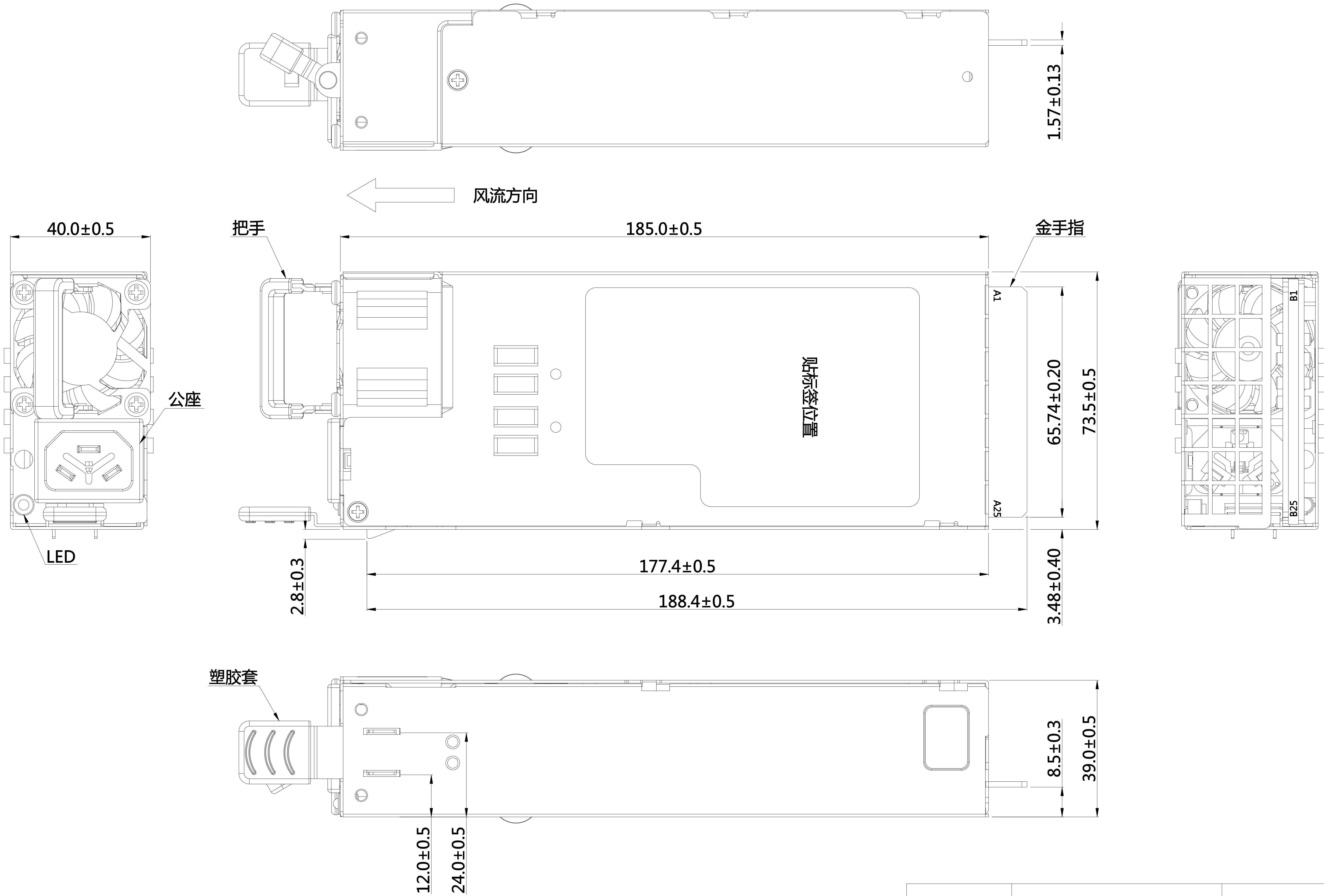
|     |                    |                         |    |  |
|-----|--------------------|-------------------------|----|--|
| 8Ch | READ_IOUT          | Read Word               | 2  |  |
| 8Dh | READ_TEMPERATURE_1 | Read Word               | 2  |  |
| 8Eh | READ_TEMPERATURE_2 | Read Word               | 2  |  |
| 8Fh | READ_TEMPERATURE_3 | Read Word               | 2  |  |
| 90h | READ_FAN_SPEED_1   | Read Word               | 2  | Rpm value  |
| 96h | READ_POUT          | Read Word               | 2  |  |
| 97h | READ_PIN           | Read Word               | 2  |  |
| 98h | PMBUS_REVISION     | Read Byte               | 1  | V1.2   |
| 99h | MFR_ID             | Read Block              | 14 | See MFR Data table   |
| 9Ah | MFR_MODEL          | Read Block              | 14 | See MFR Data table   |
| 9Bh | MFR_REVISION       | Read Block              | 6  | Updata   |
| 9Eh | MFR_SERIAL         | Read Block              | 14 |  |
| A0h | MFR_VIN_MIN        | Read Word               | 2  | See MFR Data table   |
| A1h | MFR_VIN_MAX        | Read Word               | 2  | See MFR Data table   |
| A4h | MFR_VOUT_MIN       | Read Word               | 2  | See MFR Data table   |
| A5h | MFR_VOUT_MAX       | Read Word               | 2  | See MFR Data table   |
| A6h | MFR_IOUT_MAX       | Read Word               | 2  | See MFR Data table   |
| A7h | MFR_POUT_MAX       | Read Word               | 2  | See MFR Data table   |
| A8h | MFR_TAMBIENT_MAX   | Read Word               | 2  | See MFR Data table   |
| A9h | MFR_TAMBIENT_MIN   | Read Word               | 2  | See MFR Data table   |
| FCh | SMART_ON_CONFIG    | Write Byte<br>Read Byte | 1  | 00h Standard<br>Redundancy<br>55h Smart On Active<br>0Eh Smart Standby |



Table39. MFR Data

| CMD Code | Name             | Content          |
|----------|------------------|------------------|
| 99h      | MFR_ID           | ASPOWER#####     |
| 9Ah      | MFR_MODEL        | U1A-D10550-DRB-Z |
| A0h      | MFR_VIN_MIN      | 90               |
| A1h      | MFR_VIN_MAX      | 264              |
| A4h      | MFR_VOUT_MIN     | 11.6             |
| A5h      | MFR_VOUT_MAX     | 12.8             |
| A6h      | MFR_IOUT_MAX     | 45               |
| A7h      | MFR_POUT_MAX     | 550              |
| A8h      | MFR_TAMBIENT_MAX | 55               |
| A9h      | MFR_TAMBIENT_MIN | 0                |

|     |      |     |            |
|-----|------|-----|------------|
| 版本  | 变更内容 | 修改人 | 日期         |
| 1.0 | 首次发行 | 黄奕崇 | 2021.01.28 |



| Pin | Name       | Pin | Name     |
|-----|------------|-----|----------|
| A1  | GND        | B1  | GND      |
| A2  | GND        | B2  | GND      |
| A3  | GND        | B3  | GND      |
| A4  | GND        | B4  | GND      |
| A5  | GND        | B5  | GND      |
| A6  | GND        | B6  | GND      |
| A7  | GND        | B7  | GND      |
| A8  | GND        | B8  | GND      |
| A9  | GND        | B9  | GND      |
| A10 | +12V       | B10 | +12V     |
| A11 | +12V       | B11 | +12V     |
| A12 | +12V       | B12 | +12V     |
| A13 | +12V       | B13 | +12V     |
| A14 | +12V       | B14 | +12V     |
| A15 | +12V       | B15 | +12V     |
| A16 | +12V       | B16 | +12V     |
| A17 | +12V       | B17 | +12V     |
| A18 | +12V       | B18 | +12V     |
| A19 | SDA        | B19 | A0       |
| A20 | SCL        | B20 | A1       |
| A21 | PS0N       | B21 | +12V SB  |
| A22 | Alert      | B22 | SM-Bus   |
| A23 | GND Sense  | B23 | LS       |
| A24 | +12V Sense | B24 | Present  |
| A25 | PWOK       | B25 | Input OK |

|    |                  |        |  |   |    |    |    |   |     |
|----|------------------|--------|--|---|----|----|----|---|-----|
| 机型 | U1A-D1XXXX-DRB-Z | 未注尺寸公差 |  | <div> 深圳欧陆通电子股份有限公司.<br/>ASPOWER</div> |    |    |    |   |     |
| 品名 | 外观图              | ** :   |  |   |    |    |    |   |     |
| 料号 |                  | *** :  |  |   |    |    |    |   |     |
|    |                  | **** : |  | 确认  | 审核 | 单位 | mm | 页码  | 1/1 |
| 规格 |                  | 角度 :   |  | 制图  |    | 比例 |    | 1 : 1   |     |
|    |                  |        |  | 黄奕崇   |    |    |    |  |     |