

SPECIFICATION FOR APPROVAL

Client Name:

Product Name: 3300W energy storage power supply

Product Model:

Customer Model:

Version: A1

Date: 2022-8-10

Customer acknowledgement sign-off		
Fully recognized	Not recognized	Conditionally recognized

* Please send back a issue of this acknowledgement after the customer has confirmed the signature and seal.

Sample making	Test	Audit	Approvals

Number of times	Versions	Summary of reasons for amendment	Revisionist	Amendment Date
1	A0	First Edition Release		May 12
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1. Product description

This product is a portable energy storage power supply, suitable for home emergency power backup, outdoor expedition, emergency disaster relief, field work and other applications. The product has a built-in lithium battery, the battery is 15 series design, the voltage is 48Vdc (15*3.2V), there is an inverter AC output, the output 110V (50/60Hz) pure sine wave, with multiple DC output port input port and USB-A and USB-C interfaces.

2. Basic parameters of portable energy storage power supply

2.1. Whole machine and built-in battery pack BMS parameters

2.1.1. Battery pack BMS hardware design parameters


Projects	Minimum value	Standard	Maximum value	Remarks
Battery Type	---	20Ah	---	LiFePO4 40135, capacity of single cell
Rated voltage	---	48V	---	15S 4P
Battery Capacity	---	3840WH	---	Depends on single cell capacity
Protection board control mode	--	--	\-	Charge and discharge the same port negative control
Output short circuit protection and time	---	Support	---	The output will be turned off when there is a short circuit at the protection board, and will be activated by pressing the button or charging after the fault is removed
Overcurrent protection 1 time	1.8S	2S	2.2S	
Overcurrent protection 2 time	0.8S	1S	1.2S	
Short circuit protection time	300us	320us	340us	
Overcurrent protection 1 current	180A	200A	220A	
Overcurrent protection 2 current	220A	240A	260A	
Short circuit current	320A	340A	360A	
Equalization current	50mA	70mA	80mA	Single cell equalization current
Balanced turn-on voltage	/	3.200V	/	Single cell balanced opening action voltage
Pre-charge time		2S	3S	
Pre-charge current			2A	
Device over-temperature protection	95°C	100°C	105°C	Temperature at BMS MOS tube temperature probe
Cell charging overcharge protection	3.625V	3.650V	3.675V	Single cell overcharge protection voltage

Under-voltage protection for battery cell discharge	/	2.640V	/	Single cell over discharge protection voltage
Charging high temperature protection	55℃	58℃	61℃	The BMS detects the temperature, above which the battery stops discharging.
Charging low temperature protection	-6℃	-3℃	-0℃	Battery temperature is too low to stop charging, low temperature charging will lessen battery capacity and life
Discharge high temperature protection	60℃	63℃	66℃	The BMS detects the temperature, above which the battery stops discharging.
Discharge low temperature protection	-20℃	-17℃	-14℃	BMS detects the temperature, the temperature is too low, the battery stops discharging
Communication Interface		RS485		
Protection board standby leakage current	---	---	200uA	



2.1.2. System software design parameters





Projects	Minimum value	Standard	Maximum value	Remarks
Power on mode and response time	2.5S	3S	3.5S	Long press POWER key to wake up the system to boot up (light up the screen)
Charging high temperature protection	52℃	55℃	58℃	This temperature is the battery temperature
Charging low temperature protection	-3℃	0℃	3℃	This temperature is the battery temperature
Discharge high temperature protection	57℃	60℃	63℃	This temperature is the battery temperature
Discharge low temperature protection	-16℃	-14℃	-12℃	This temperature is the battery temperature
Storage temperature	0℃	23℃	25℃	Long-term battery storage, ambient humidity 65±20% RH environment
Single discharge cut-off voltage	--	2.800V	--	Turn off output
Overall leakage current	---	---	200uA	The product is in shutdown status, and the shutdown current of the whole machine
Standby power consumption (without AC)	---	8W	12W	
Standby power consumption (on AC)	---	15W	25W	

2.2. Anderson charging input port parameters

Projects	Minimum value	Standard	Maximum value	Remarks
Charging input voltage	11.5V	100V	160V	Support car charging, PV panel and other charging methods
Charging current	--	20A	25A	
Charging power		--	1500W	
Charging overvoltage protection	157V	161V	163V	DC port charging over voltage "  " icon flashes, buzzer prompt, charging resumes after voltage is normal.
Charge cut-off current	---	---	1A	Battery pack judged full current
Charging conversion efficiency	88%			The board-end efficiency is tested at 100V input and 51.2V battery voltage.
Reverse input polarity protection	---	Support	---	Can't charge when input is reversed, no prompt
Input short circuit protection	---	Support	---	Unable to charge when input short-circuited, no indication
car charger		Support		The charging current is 8A below 15V and 10A below 30V.
MPPT charging		Support		Supports charging of multiple PV panels up to 1500W

2.3. USB-A QC3.0 *2 output port parameters

Projects	Minimum value	Standard	Maximum value	Remarks
5V no-load output voltage	4.9V	5.15V	5.30V	Output no-load conditions, measuring the product USB output port voltage (discharge wire length 30cm, 20 copper cores, a single copper core wire diameter 0.14mm)
5V full load output voltage	4.70V	5.00V	5.30V	Output full load conditions, measurement of the product USB output port voltage (discharge wire length 30cm, 20 copper core, single copper core wire diameter 0.14mm)
5V rated output current	---	3.0A	---	Electronic load side
5V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
5V short circuit protection		Support		When the output is short-circuited, the output is automatically turned off, the screen "  " icon flashes, the buzzer prompts, the fault is lifted by pressing the USB button to resume.
5V output over-current protection	3.2A	3.7A	4.2A	When the port overcurrent protection screen "  " icon blinks, the buzzer prompt, the fault release needs to press the USB button to restore.

9V no-load output voltage	8.50V	9.00V	9.50V	Output no-load conditions, measuring the product USB output port voltage (discharge wire length 30cm, 20 copper cores, a single copper core wire diameter 0.14mm)
9V full load output voltage	8.50V	9.00V	9.50V	Output full load conditions, measurement of the product USB output port voltage (discharge wire length 30cm, 20 copper core, single copper core wire diameter 0.14mm)
9V rated output current	---	2.00A	---	Electronic load side
9V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
9V over-current protection	2.2A	2.5A	2.7A	When the port over-current protection screen "  " icon blinks, the buzzer prompts, the fault release needs to press the USB button to restore.
9V output short-circuit protection		Support		When the output is short-circuited, the output is automatically turned off, the screen "  " icon flashes, the buzzer prompts, the fault is lifted by pressing the USB button to resume.
12V no-load output voltage	11.50V	12.00V	12.50V	Output no-load conditions, measuring the product USB output port voltage (discharge wire length 30cm, 20 copper cores, a single copper core wire diameter 0.14mm)
12V full load output voltage	11.50V	12.00V	12.50V	Output full load conditions, measurement of the product USB output port voltage (discharge wire length 30cm, 20 copper core, single copper core wire diameter 0.14mm)
12V rated output current	---	1.5A	---	Electronic load side
12V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
12V over-current protection	1.8A	2A	2.2A	When the port over-current protection screen "  " icon blinks, the buzzer prompts, the fault release needs to press the USB button to restore.
12V output short-circuit protection	---	Support	---	When the output is short-circuited, the output is automatically turned off, the screen "  " icon flashes, the buzzer prompts, the fault is lifted by pressing the USB button to resume.

2.4. USB-C 20W*3 port parameters

Projects	Minimum value	Standard	Maximum value	Remarks
Port Protocol	--	---	---	PD3.0,Apple2.4A,DCP-1.5A,SAMSUNG-AFC,HW-FCP,QC2.0,QC3.0

,HW-SCP.				
5V no-load output voltage	4.70V	5.00V	5.30V	Measurement of the product USB output port voltage under output no-load conditions
5V full load output voltage	4.70V	5.00V	5.30V	Measurement of product USB output port voltage under full output load conditions
5V rated output current	---	3.0A	---	Electronic load side
5V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
5V short circuit protection		Support		Automatic output shutdown when the output is short-circuited
5V output overcurrent protection	3.1A	3.30A	4.40A	Automatic output shutdown in case of output overcurrent
5V output conversion efficiency		85%	---	Load greater than 500mA
9V no-load output voltage	8.50V	9.00V	9.50V	Measure the product USB output port voltage under output no-load condition
9V full load output voltage	8.50V	9.00V	9.50V	Measurement of product USB output port voltage under full output load conditions
9V rated output current	---	2.22A	---	Electronic load side
9V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
9V overcurrent protection	2.3A	2.5A	3A	Automatic output shutdown in case of output overcurrent
9V output short-circuit protection		Support		Automatic output shutdown when the output is short-circuited
12V no-load output voltage	11.5V	12.00V	12.50V	Measurement of the product USB output port voltage under output no-load conditions
12V full load output	11.5V	12.00V	12.50V	Measurement of product USB output port voltage under full output load conditions

voltage				
12V rated output current	---	1.67A	---	Electronic load side
12V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
12V overcurrent protection	1.8A	2.0A	2.50A	Automatic output shutdown in case of output overcurrent
12V output short-circuit protection	---	Support	---	Automatic output shutdown when the output is short-circuited



2.5. USB-C 100W*1 port parameters

Projects	Minimum value	Standard	Maximum value	Remarks
Port Protocol	--	---	---	PD3.0,Apple2.4A,DCP-1.5A,SAMSUNG-AFC,HW-FCP,QC2.0,QC3.0,HW-SCP.
5V no-load output voltage	4.70V	5.00V	5.30V	Measurement of the product USB output port voltage under output no-load conditions
5V full load output voltage	4.70V	5.00V	5.30V	Measurement of product USB output port voltage under full output load conditions
5V rated output current	---	3.0A	---	Electronic load side
5V port output ripple	---	---	150mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
5V short circuit protection		Support		Automatic output shutdown when the output is short-circuited
5V output overcurrent protection	3.0A	3.20A	4.40A	Automatic output shutdown in case of output overcurrent
5V output conversion efficiency		85%	---	Load greater than 500mA
9V no-load output voltage	8.50V	9.00V	9.50V	Measurement of the product USB output port voltage under output no-load conditions
9V full load output voltage	8.50V	9.00V	9.50V	Measurement of product USB output port voltage under full output load conditions

9V rated output current	---	3.00 A	---	Electronic load side
9V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
9V overcurrent protection	3.0A	3.20 A	4.40A	Automatic output shutdown in case of output overcurrent
9V output short-circuit protection		Support		Automatic output shutdown when the output is short-circuited
12V no-load output voltage	11.5V	12.0 0V	12.50V	Measurement of the product USB output port voltage under output no-load conditions
12V full load output voltage	11.5V	12.0 0V	12.50V	Measurement of product USB output port voltage under full output load conditions
12V rated output current	---	3.0A	---	Electronic load side
12V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
12V overcurrent protection	3.0A	3.20 A	4.40A	Automatic output shutdown in case of output overcurrent
12V output short-circuit protection	---	Support	---	Automatic output shutdown when the output is short-circuited
15V no-load output voltage	14.5V	15.0 0V	15.50V	Measurement of the product USB output port voltage under output no-load conditions
15V full load output voltage	14.5V	15.0 0V	15.50V	Measurement of product USB output port voltage under full output load conditions
15V rated output current	---	3.0A	---	Electronic load side
15V port output ripple	---	---	200mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
15V overcurrent protection	3.0A	3.20 A	4.40A	Automatic output shutdown in case of output overcurrent
15V output short circuit protection	---	Support	---	Automatic output shutdown when the output is short-circuited
20V no-load output voltage	19.5V	20.0 0V	20.50V	Measure the product USB output port voltage under output no-load condition
20V full load output voltage	19.5V	20.0 0V	20.50V	Measurement of product USB output port voltage under full output load conditions
20V rated	---	5.0A	---	Electronic load side





output current				
20V port output ripple	---	---	300mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
20V overcurrent protection	5.10A	5.30 A	5.50A	Automatic output shutdown in case of output overcurrent
20V output short circuit protection	---	Support	---	Automatic output shutdown when the output is short-circuited
PPS output voltage range	3.30V		20.0V	

2.6. DC5521 12V/3A *2 output port parameters





Projects	Minimum value	Standard	Maximum value	Remarks
DC no-load output voltage	13.0V	13.5	14.0V	Port voltage at no-load stable output of the product
Full load output voltage	13.0V	13.5	14.0V	Port voltage when the product is stable output with rated load
Rated output current		3A		The product can work stably for a long time
Port Output Ripple	---	---	300mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10 μ F electrolytic capacitor and 0.1 μ F ceramic capacitor
Output overcurrent protection	7A	8A	9A	If the current is exceeded, the output of the port will be turned off automatically, the screen "  " icon will flash at the same time, and the buzzer will indicate that the fault will be removed by pressing the DC button to resume.
Short circuit protection	---	Support	---	When the DC output is short-circuited, the output will be turned off automatically, the screen "  " icon flashes at the same time, the buzzer prompts, the fault is lifted and needs to be restored by pressing the DC button.

2.7. Cigarette lighter output parameters

Projects	Minimum value	Standard	Maximum value	Remarks
----------	---------------	----------	---------------	---------

DC no-load output voltage	13.0V	13.6V	14.0V	Port voltage at no-load stable output of the product
Full load output voltage	12.9V	13.6V	14.0V	Port voltage when the product is stable output with rated load
Rated output current		10A		The product can work stably for a long time
Port Output Ripple	---	---	500mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10μF electrolytic capacitor and 0.1μF ceramic capacitor
Output overcurrent protection	11A	12A	13.5A	Exceeding this current will automatically turn off the output of this port, the screen "  " and "  " icons flash at the same time, the buzzer indicates that the fault is removed and needs to be restored by pressing the DC button.
Short circuit protection	---	Support	---	When the DC output is short-circuited, the output will be turned off automatically, the screen "  " and "  " icons flashes at the same time, the buzzer prompts, and the fault release needs to be restored by pressing the DC button.

2.8. XT60 output parameters


Projects	Minimum value	Standard	Maximum value	Remarks
XT60 no-load output voltage	13.0V	13.6V	14.0V	Port voltage at no-load stable output of the product
Full load output voltage	12.9V	13.6V	14.0V	Port voltage when the product is stable output with rated load
Rated output current		25A		The product can work stably for a long time
Port Output Ripple	---	---	500mV	Rated conditions, set the oscilloscope bandwidth 20MHz, test terminal parallel to 10μF electrolytic capacitor and 0.1μF ceramic capacitor
Output overcurrent protection	26A	27A	29A	Exceeding this current will automatically turn off the output of this port, the screen "  " and "  " icons flash at the same time, the buzzer indicates that the fault is removed and needs to be restored by pressing the DC button.
Short circuit protection	---	Support	---	When DC output is short-circuited, the output will be turned off automatically, the screen "  " and "  " icons flashes at the same time, the buzzer prompts, and the fault release needs to be



restored by pressing DC key.

2.9. LED lamp parameters

Projects	Minimum value	Standard	Maximum value	Remarks
LED light power	2W	3W	4W	
Working mode	---	Always on / SOS / flashing	---	1. Short press or long press once to turn on the LED, short press the LED LIGHT button in turn, the LED light sequence: full bright - SOS - flashing - LED off. 2. SOS distress signal: 3 short 3 long 3 short: light 200ms, extinguish 200ms, light 200ms, extinguish 200ms, light 200ms, extinguish 800ms, light 600ms, extinguish 400ms, light 600ms, extinguish 400ms, light 600ms, extinguish 800ms, light 200ms, extinguish 200ms, light 200ms, extinguish 200ms, light 200ms, extinguish 2000ms, cycle. 3. LED open state, long presses the LED LIGHT button (≥ 1 second) directly off the LED
Color temperature		4000K		




2.10. AC input port parameters

Projects	Minimum value	Standard	Maximum value	Remarks
Input Voltage Range	85Vac	110Vac	135Vac	
Input Frequency Range	47Hz	--	63Hz	Over-under frequency,  blinking
Input inrush current			40A	
Constant charging power	150W	1.5KW	1.6KW	5 gears: 300W,600W,900W,1200W,1500W
Total input power		1.6KW		
Charge cut-off power			80W	
Input Power Factor	0.95	---	1	Charging power 1.5KW at 110VAC input voltage
Charging conversion efficiency	88%	--	--	
Total input current	---	--	10%	

harmonics				
Input overvoltage protection	132Vac	135Vac	138Vac	 Blinking
Input overvoltage recovery	129Vac	132Vac	135Vac	
Input undervoltage protection	82Vac	85Vac	88Vac	 Blinking
Input undervoltage recovery	85Vac	88Vac	91Vac	
UPS mode	Load <1575W Long-term operation $1575W \leq \text{load} < 2250W @ 30s;$ $2250W \leq \text{load} < 3000W @ 5s;$ $3000W \leq \text{load} @ 1s;$		In charge-and-discharge mode, the input power is limited and priority is given to ensuring the discharge power. Therefore, as the load power increases, the charging power decreases. The total input power is always guaranteed to be less than 1650 w. When the load power reaches 1500 w, the charging power is limited to 150 w.	

2.11. AC output port parameters

Projects	Minimum value	Standard	Maximum value	Remarks
Rated output voltage	100Vac	110Vac	120Vac	
Output waveform	---	Sine wave	---	Rated resistive load
Output frequency switching	49Hz	50/60Hz	61Hz	1. Enter the switching mode: long press the AC button for 3 seconds, AC output state to turn off the AC output, while entering the switching mode 2. Screen 50hz and 60hz flashing, short press AC button to select 50Hz or 60Hz 3. Release the button and save automatically after 3 seconds
Average no-load loss	---	15W	25W	AC gears maximum no-load loss
Rated output power	---	3300W	---	Rated resistive load
Output Power Factor	0.95	---	1	Constant resistance load
Efficiency	88%	92%	---	Loaded current 50%, 75%, and
Soft start time	---	--	50mS	Time from power-on to output stabilization at full output
Dynamic response to voltage changes	---	---	3%	Output voltage change <3% when output resistive load jumps from 10% to 100%
Dynamic response adjustment time	---	---	20ms	Output regulation time <20ms when output resistive load jumps from 10% to 100%
Linear adjustment rate	---	---	3%	
Load Adjustment Rate	---	---	3%	
Voltage Harmonics (THD)	---	---	5%	Testing THD value of rated resistive load (<5%)
AC charging and		Support		

discharging				
Bypass transition time			10mS	Rated resistive load test.
Short circuit protection	---	Support	---	When short circuit, the output is off, the screen "  " icon flashes, the buzzer alarm, press AC to restore the output.
Overload protection	Constant power mode 3300W, voltage drop after overload.			When the output is overloaded, the screen "  " icon flashes and the buzzer alerts, press AC to restore the output.
Over temperature protection	95°C	100°C	105°C	Detects the temperature of the power device and shuts down the output after over-temperature protection, the high temperature icon flashes and the buzzer alerts.
Overtemperature recovery	65°C	70°C	75°C	After the over-temperature protection is released, press AC Out to restore the output.
Fan opening temperature	55°C	60°C	65°C	Once the heatsink temperature reaches within that range, turn on the fan and light up the "  " icon.
Fan off temperature	45°C	50°C	55°C	After the heatsink temperature reaches within the range, turn off the fan

2.12. LCD screen display parameters

Projects	Minimum value	Standard	Maximum value	Remarks
Power range	0%		100%	
Charging power error		2%	3%	
Discharge power error		2%	3%	
Backlight brightness adjustment		Support		
Display size		--		

3. Front panel function description

3.1. Control keys.

1) POWER button.

Press and hold 3S to turn on the power. After turning on the power, the display lights up, showing information such as power and remaining time, and the buzzer beeps 1 time. Press and hold 3S again to turn off Press and hold 3S again to turn off the phone. In the case of charging input, long press cannot turn off the power, first unplug the charging device to turn off the power normally.

2) AC Out button.

- ①. 1 short press to turn on the AC output, the AC LED lights up (white) and the display shows the AC icon.
- ②. 1 short press again to turn off the AC output, the AC LED goes out and the display AC icon is not shown.
- ③. Press and hold again for 3 seconds to enter frequency switching mode.

3) DC Out button.

- ①. Short press 1 time to turn on DC output, DC LED indicator lights up (white), display DC, CAR.XT60 icon shows
 - ②. Short press once to turn off the DC output, DC LED will be off and the DC icon on the display will not be shown
- 4) USB Out button.
- ①. Short press 1 time to turn on USB, USB LED light (white), display USB-A/USB-C icon shows
 - ②. Short press once to turn off USB, the USB LED goes off and the display USB icon turns off without display.
- 5) Light button.
- ①. Short press 1 time to turn on the LED, short press the LIGHT button in turn, the LED light sequence: full bright - SOS - flashing LED off.
 - ②. SOS distress signal: 3 short 3 long 3 short: light 200ms, extinguish 200ms, light 200ms, extinguish 200ms, light 200ms, 800ms, 600ms, 400ms, 600ms, 400ms, 600ms, 800ms, 200ms, 200ms. extinguish 200ms, light 200ms, extinguish 200ms, light 200ms, extinguish 2000ms, cycle.
 - ③. Burst flash signal: 200ms on, 200ms off.
 - ④. When the LED is on, long press the LIGHT button (≥ 1 second) to turn off the LED directly.

3.2. Charging display

During the charging process, the corresponding power display is incremented (e.g., the original 50% power, starting from the 5th cell, every 0.5s increment 1 cell, after 10 cells, the power returns to the display 5) display 5 The remaining charging time decreases until the end of charging, the power indicator is always on and shows 100%. Charging with AC

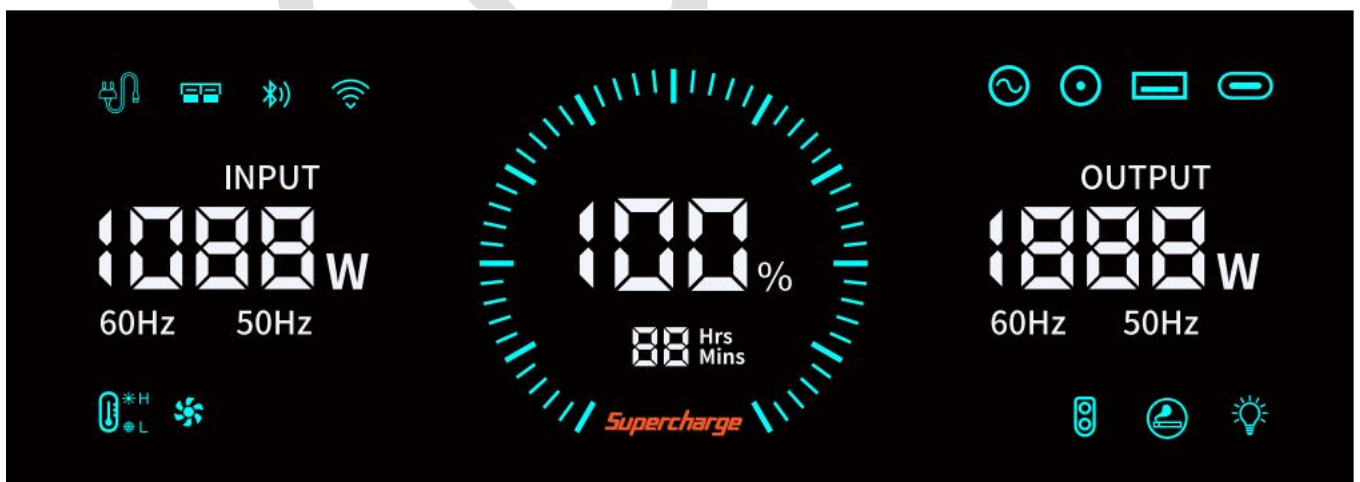
When charging with AC, the super fast charger icon "  " and the interface icon "  " will be displayed and the current charging power and the remaining charging time will be shown.

3.3. Discharge display

1) When the product is not in charging state, the display indicates the current power; 10 cells of lights indicate that the power is 10%, 20%, 30%, 80%,...100%. The screen also shows the remaining time of discharge.

(2) product discharge power $\leq 10\%$ or power = 0% prompt: buzzer chirps (interval tone 3 times); display power icon interval flashing 7 seconds

3.4. The display screen is as follows.



The top left part is the remaining time of system charge/discharge, battery temperature status indication, and fan status. The middle part is the battery power, the upper right corner is the charge/discharge The bottom row is the open status detection of each port. After the device is maintained for 300s without operation, the screen will enter half-bright mode.

3.5. Direct access to the mains, the machine can adapt to set the frequency.

3.6. The machine is not charging and there is no port output, no operation, it will automatically shut down after 5 minutes.

3.7. Press ac button 10 times continuously and quickly to switch between 100V and 110V for ac.

4. Portable energy storage power supply reliability testing

4.1. Environmental Reliability Testing Requirements

Test Items	Test equipment + test methods	Test conditions	Judgment Criteria
High and low temperature cycle impact	High and low temperature test chamber Confirm the appearance and function and performance of the DUT before the test. Put the DUT into the corresponding test equipment, set the relevant parameters according to the test conditions, remove the DUT after completing the test, and carry out the appearance and function and performance verification.	The portable energy storage power supply is placed in a temperature-controlled chamber at a temperature of $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$ for the following steps. a) Place the sample in the experimental chamber at a temperature of $75^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and maintain it for 6 hours; b) Lower the temperature of the chamber to $-40^{\circ}\text{C} \pm 2^{\circ}\text{C}$ and maintain it for 6 hours. c) The temperature changeover time is not greater than 30 minutes. d) Repeat steps a) to b) for a total of 10 cycles.	PCBA function must be normal, no potential damage to the device
DC/AC inverter output for high temperature operation	High and low temperature test chamber before the test DUT appearance and function, performance confirmation. Put the DUT in working condition into the corresponding test equipment, set the relevant parameters according to the test conditions, and remove the DUT after completing the test, and carry out the appearance and function and performance verification.	Temperature: $40 \pm 2^{\circ}\text{C}$, test duration: 24h, rated output voltage, 100% load, set aside at least 4 hours in a room temperature environment after the product is removed	1.40 degrees high temperature environment, the product according to the system design allows the worst case of the combination of functions to be tested, repeat a complete cycle, PCBA to function properly, there can be no potential damage, the temperature of key devices can not exceed the range allowed by the device specifications
DC/AC inverter output working at low temperature	High and low temperature test chamber before the test DUT appearance and function, performance confirmation. Put the DUT in working condition into the corresponding test equipment, set the relevant parameters according to the	Temperature: $0 \pm 2^{\circ}\text{C}$, test duration: 24h, rated output voltage, 100% load, set aside at least 4 hours in a room temperature environment after the product is removed	Under low temperature environment, the product is tested by selecting the worst case scenario among the functional combinations allowed by the system design, and repeating a complete cycle, the PCBA should

	test conditions, and remove the DUT after completing the test, and carry out the appearance and function and performance verification.		function properly and there should be no potential damage
Constant Humidity and Heat	<p>High temperature and high humidity chamber</p> <p>Confirm the appearance and function and performance of the DUT before the test.</p> <p>Put the fully charged DUT into the corresponding test equipment, set the relevant parameters according to the test conditions, remove the DUT after completing the test, and carry out the appearance and function and performance verification</p>	<p>Temperature: $40\pm 2^{\circ}\text{C}$, relative humidity: 90%-95%, time: 48h, take out and set aside at room temperature $23\pm 2^{\circ}\text{C}$ for 2h, visually inspect the appearance, discharge the port with the lowest discharge capacity at room temperature corresponding to the nominal rated discharge current until the portable energy storage power supply automatically terminates the capacity provided by the output, and set aside in a room temperature environment for at least 4 hours after the product is taken out</p>	<ol style="list-style-type: none"> 1. No functional abnormality in the working process after constant humid heat experiment 2. No discoloration, cracking and other appearance abnormalities on the surface of the product, no abnormalities in function and performance 3. Discharge power is not less than 100% of the rated power

4.2. Structural Component Reliability Requirements

Test Items	Test equipment + test methods	Test conditions	Judgment Criteria
USB durability testing	Plugging Tester	5000 times, 200 times/h	<ol style="list-style-type: none"> 1. No obvious damage to the USB connector 2. USB plugging force in line with USB-IF v2.0 specification (plugging force $\leq 35\text{N}$, pulling force $\geq 8\text{N}$) 3. After the plugging and unplugging test is completed, it is necessary to check whether the contact terminals have copper leakage
DC output terminal durability test	Plugging Tester	3000 times, 200 times/h	<ol style="list-style-type: none"> 1. No obvious damage to the terminals 2. The pulling and inserting force is in accordance with 10N-50N 3. Check the contact terminals for copper leakage after the plugging test is completed
DC input terminal durability test	Plugging Tester	3000 times, 200 times/h	<ol style="list-style-type: none"> 1. No obvious damage to the DC input terminal 2. The pulling force is in accordance with 10N-35N 3. After the plugging and unplugging test is completed, it is necessary to check whether the contact terminals have copper leakage
AC output terminal durability test	Plugging Tester	2000 times, 200 times/h	<ol style="list-style-type: none"> 1. AC connector without obvious damage 2. After the test, the maximum pull-out force: three inserts should be less than 70N off, the minimum pull-out force of a single pole

			should be greater than 1.5N not off 3. Check the contact terminals for copper leakage after the plugging test is completed
Terminal mechanical strength test	Push-pull meter	50N, 1min	Terminals will not sink in, no mechanical and functional failure
Key Life	Plugging Tester	5000 times, 200 times/h	No function of the keys and mechanical defects
Key mechanical strength test	Push-pull meter	50N, 1min	Terminals will not sink in, no mechanical and functional failure

5. Safety and Certification

5.1. Safety testing

Production does not do safety testing, the prototype design needs to meet the test requirements to the following certification program corresponding to the specific requirements.

5.2. Certification requirements

PCBA boards are designed to meet the following certification requirements

UL2743	FCC	CE	RoHS	UN38.3	MSDS	VDE
	√	√	√	√	√	

6. Factory test

All incoming PCBAs need to undergo a complete functional test, with test data records, recording each batch of PCBAs tested in the SMT stage to

The defective phenomenon and the proportion of , factory with test report.

7. Product Dimensions

Weight	
Product Size	L*W*H = 584*320*464