

Specification confirmation

Product name	LiFePO4 battery pack
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Approved by	Reviewed by	Prepared by
Song Guo Song	Yang Hai	Yuan Kun

Customer confirmation	Autograph	Date
	Company Name:	
	Company Seal:	

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1. Scope

This specification describes the basic performance, technical requirement, testing method, warning and caution of Li-ion rechargeable battery. The specification only applies to Shenzhen All Technology Co., Ltd

1.1 Application Scope

“General specification of lithium-ion battery for cellular phone” GB/T 18287-2013.

“Lithium ion cells and batteries used in portable electronic equipments — Safety requirements” GB 31241-2014

Electrotechnical terminology - Primary and secondary cells and batteries ” GB/T 2900.41-2008

2. Product Pict



3. Basic parameters of battery

Battery Model	IFP28148115
Battery PACK	4S1P
Size (L*W*H)mm	229*138*208
Weight (kg)	≤5.5Kg
Battery Rated Capacity (0.2C)	50Ah
Battery Rated Voltage	12.8V
Rated Power	640Wh
Operating Voltage Range	10-14.6V
Battery Type	LiFePO4
Charger voltage (CC/CV)	DC15V

Standard charging current	10A (0.2C)
Continuous Charging Current (Max.)	50A (1C)
Standard discharge current	10A(0.2C)
Continuous Discharge Current (Max.)	50A (1C)
Peak Discharge Current	150A(3S)
Internal Resistance (mΩ)	≤45 mΩ
Storage Temperature	Within 2 months: -20°C~40°C
	Within 6 months: -10-35°C
Storage Humidity	10%~90% RH
Shipping Voltage	12V~13V
Charging Temperature	-20~70°C
Discharge Temperature	-20~75°C
Power consumption	≤120uA
Discharge cut-off voltage	10V
Charging cut-off voltage	14.6V
Cooling Mode	Natural Cooling
Waterproof Level	IP65
Battery Cycle Life	6000 times (0.2C standard charge and discharge)
Standard Environmental Condition	Temperature : 23±5°C
	Humidity : 45-75%RH
	Atmospheric Pressure : 86-106 KPA

4. Battery pack Materials BOM (Main material)

Part Name	QTY	Description	Remarks
Cell	1	IFP28148115	
PCM	1	JBD-HP04S024-L4S-50A-50A-B-S	
Shell	1	Case size: 229*138*208mm	

5. BMS Protection Parameters

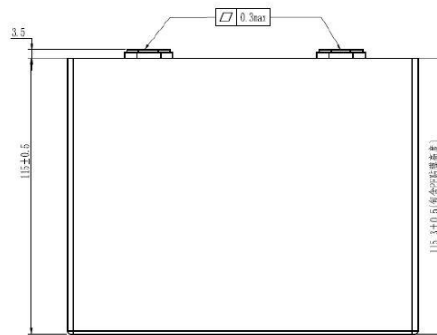
Function	Project	Specification			Unit
		MIN	TYP	MAX	
Cell Overvoltage Protection	Overvoltage protection voltage	3.70	3.75	3.80	V
	Overcharge protection delay time	500	1000	1500	mS
	Overcharge protection restores voltage	3.50	3.55	3.60	V
Cell Over-discharge protection	Over-discharge protection voltage	2.10	2.20	2.30	V
	Over-discharge protection delay time	500	1000	1500	mS
	Over-discharge protection recovery voltage	2.2	2.3	2.4	V
	Over-discharge protects recovery conditions	The voltage recovers or the charge resumes			
Charging overcurrent protection	Charge overcurrent protection value	50	55	60	A
	Charging overcurrent delay	500	1000	1500	mS
	Charging overcurrent discharge conditions	Automatic recover after a delay of 32S			
Overcurrent Discharge	1st Overcurrent Discharge	60	80	100	A
	1st Overcurrent Discharge delay	500	1000	1500	mS
	2nd Overcurrent Discharge	200	240	280	A
	2nd Overcurrent Discharge delay	50	100	200	mS
	Overcurrent Discharge Release	Automatic recovery after a delay of 32S			
Short Circuit Discharge	Short protect protection current	600	700	800	A
	Short circuit protection delay time	100	200	400	uS
	Short circuit protection recovery	Recover after 5S delay after disconnecting the Load/ Charging			
	Short circuit description: short circuit current less than the minimum or higher than the maximum value may cause short circuit protection failure, short circuit current more than 1000A, there is no guarantee of short circuit protection, and it is not recommended to do short circuit protection test.				
Discharge high temperature protection	Temperature protection value	70	75	80	°C

(external)	Temperature protection release value	43	53	63	°C
Discharge Low Temperature protection (external)	Temperature protection value	-25	-20	-15	°C
	Temperature protection release value	-15	-10	-5	°C
High temperature charging protection (external)	Temperature protection value	70	75	80	°C
	Temperature protection release value	43	53	63	°C
Low temperature charging protection (external)	Temperature protection value	-15	-10	-5	°C
	Temperature protection release value	-10	-5	0	°C
FET discharge high temperature protection (built-in curing)	Temperature protection value	85	90	95	°C
	Temperature protection release value	50	65	80	°C
Balanced function	Balanced opening voltage	3.50	3.55	3.60	V
	Opening voltage difference	20	40	50	mV
	Balanced current	20	25	30	mA
	Balanced mode	Charge Balance /Static Balance			
	Balanced type	Time-sharing Balance/Pulse Balance			

6. Cell technical parameters

No.	Item	Parameter	Remark
1	Nominal Capacity	52Ah	(25±2)°C, Standard charge and discharge
	Typical Voltage	3.2V	
	AC Impedance Resistance(1KHz)	≤3mΩ	
2	Dimension	28.3±0.3mm	
		148.2±0.3mm	
		119±0.3mm	
3	Battery weight	966g±30g	

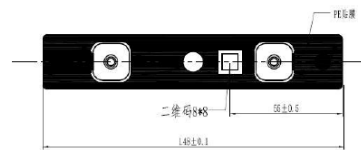
7. 2D diagram of the cell



Over Cell Dimension



Thickness of Cell



Dimension of Cover Plate

8. Electrical performance

No.	Item	Requirements	Measuring Procedure
1	Rate Discharge Performance at 25°C	Discharge capacity/nominal capacity×100% A) 0.5C ≥100% B) 1.0C ≥98%	After standard charge and 1h rest, discharge to 8.0V cutoff with the current of 0.5C(A), 1.0C(A), respectively. If the discharge capacity fails to meet the technical requirements, this test is allowed to be repeated three times
2	Discharge Performance at different temperature	Discharge capacity/nominal capacity×100% A)55°C 1.0C≥95% B)-20°C 1.0C≥70%	Measure the initial capacity and state of the battery: A) after standard charge and 5h rest at 55°C, discharge to 8.0V cutoff with the current of 1.0C(A); B) after standard charge at 25±2°C and 4h rest at -20°C±2°C, discharge to 8.0V cutoff with the current of 1.0C(A).
3	Capacity Retention and Capacity Recovery at 25°C	Capacity Retention≥95% Capacity Recovery≥97%	Measure the initial capacity and state of the battery, after standard charge and stored for 28 days, discharge to 8.0V cutoff with the current of 0.5C(A), calculate the remaining capacity, the retention can be expressed as a percentage of nominal capacity. After standard charged and 30mins rest, calculate the discharging capacity (Ah), the recovery can be expressed as a percentage of nominal capacity. The recovery is measured with discharge current 0.5CA with 8.0V cut-off at (25±2)°C.

4	Cycle Life at 25℃	≥6000 cycle @0.2C	Under the 200kgf clamp, after standard charged and 30mins rest, discharge to 8.0V cutoff with the current of 0.2C (A) at (25±2) ℃, and then start the next cycle, end with the capacity decreasing to 80% of the initial capacity. The number of cycles is defined as the cycle life of the battery.
5	Cycle Life at 35℃	≥4000 cycle @1.0C	Under the 200kgf clamp, after standard charged and 30mins rest, discharge to 8.0V cutoff with the current of 1.0 C (A) at (35±2) ℃, and then start the next cycle, end with the capacity decreasing to 80% of the initial capacity. The number of cycles is defined as the cycle life of the battery.
6	Cycle Life at 45℃	≥2000 cycle @1.0C	Under the 200kgf clamp, after standard charged and 30mins rest, discharge to 8.0V cutoff with the current of 1.0 C (A) at (45±2) ℃, and then start the next cycle, end with the capacity decreasing to 80% of the initial capacity. The number of cycles is defined as the cycle life of the battery.
7	End of life management	capacity/nominal capacity <70%	During the use of the battery, the battery shall be stopped when the end of life regulations is exceeded.

9. Use warning

In order to use and handle the battery safely, please read the operating instructions carefully before use

- Do not expose the battery to the sun or throw it in a fire.
- When charging the battery, the positive and negative polarities cannot be reversed.
- Do not short-circuit the positive and negative poles of the battery pack with wires or other metal objects!
- Do not pierce the battery pack housing with nails or other sharp objects, and do not hammer or pedal the battery pack!
- Do not disassemble or deform the battery.
- Do not immerse the battery in water.
- Never place the battery pack in a microwave oven or pressure vessel!
- Do not use the battery pack in an extremely hot environment, such as in direct sunlight or in a car on a hot day. Otherwise, the battery pack will overheat, which will affect performance and shorten the life of the battery pack.
- Do not mix batteries of different manufacturers, types and models.
- Do not allow children to touch the battery.
- If the battery pack emits odor, heat, deformation, discoloration or any other abnormal phenomenon, do not use it. If the battery pack is in use or charging, immediately remove it from the car (electrical appliance) or charger and stop using it!
- If the electrolyte gets into the eyes after the battery leaks, do not wipe it, flush it with water immediately, and seek medical assistance immediately. If it is not handled in time, the eyes will be injured!

Charge and discharge

- The battery must be charged under suitable conditions.
- Never charge the battery with a faulty charger.
- The battery can't be charged continuously for more than 24H.
- Do not charge the battery pack in the presence of fire or extreme heat! Do not use or store battery packs near heat sources such as fire or heaters! If the battery leaks or emits peculiar smell, immediately move it away from the open flame. When using the battery for the first time, fully charge the battery before using it.
- During the charging and discharging process of the battery pack, if there is an odor or abnormal sound, please stop charging and discharging immediately.
- The ambient temperature will affect the discharge capacity. When the ambient temperature exceeds the standard environment ($25\pm 5^{\circ}\text{C}$), the discharge capacity will be reduced!

Storage

- The battery is stored in a ventilated and dry environment.

Disposal

- The laws and regulations of different countries are different, and the disposal should be based on the local laws and regulations.

10. Battery operation instruction

10.1 Charging

Charging current: The maximum charging current specified in the specification cannot be exceeded.

Charging voltage: cannot exceed the highest limit voltage specified in the specification.

Charging temperature: The charging temperature of the battery must be performed in accordance with the temperature ranges of the specification. Charge in constant current and then in constant voltage mode, and reverse charging is prohibited. It is dangerous to charge the battery with the polarity reversed.

10.2 Discharging current

The discharge current of the battery cannot exceed the maximum discharge current specified in the specification.

Excessive current discharge will cause the battery to heat up and reduce its capacity.

10.3 Discharge temperature

The battery discharge temperature must be performed within the temperature range of the specification.

10.4 Over-discharges

Short-term overcharge and over-discharge will not affect the use of the battery, but long-term over-discharge will affect the function of the battery, and the battery will be permanently unsuitable. Another reason why the battery may be

over-discharged is the disappearance of automatic energy. The way to prevent battery over-discharge is that the battery should maintain a certain amount of power.

10.5 Storage battery

The battery is stored within the temperature range specified in the specification. If the battery is stored for more than six months, it is recommended that you start charging the battery.

11. Other The Chemical Reaction

Since the battery uses the principle of chemical reaction, the performance of the battery will decrease with time, even if it is stored for a long time without use. If the conditions of use such as charging, discharging and ambient temperature are not within the specified range of use, the service life of the battery will also be shortened, or liquid leakage will result in equipment damage. If the battery cannot be charged for a long period of time, even if the charging method is correct, the battery needs to be replaced.

Note:

Matters not included in this manual shall be determined by mutual agreement.