

Recipient company name: _____

Specification number:LFP6228082

document number :

Version: 2.0

Release date: 2021-3-1

Lithium Iron Phosphate Ion Battery

Specification

Product Specifications

Model LFP6228082-161Ah

Lay down	Examine and verify	Ratify

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Revision History

Revision Count	Date of Issue	Revision
0	2021.3.1	First Issue-----

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1 Scope

This product specification applies to LFP6228082 lithium iron phosphate (LFP) lithium-ion batteries.

Testing must strictly adhere to the methods specified in this specification. Should any objections arise regarding test items or testing methods, please coordinate with our company for resolution.

2 Product Types and Models

2.1 Product Type: Lithium Iron Phosphate (LFP) Lithium-ion Battery

2.2 Product model: LFP6228082

3 Key Technical Parameters

Project		Rating	Remarks
3.1	nominal capacity	161Ah	0.2CA discharge $\geq 161\text{Ah}$
3.2	rated voltage	3.2V	
3.3	internal resistance	$\leq 0.4\text{m}\Omega$	
3.4	Discharge cutoff voltage	2.5V	
3.5	Standard charging current	32.2A	0.2CA (32.2A charging to 3.65V)
3.6	charging voltage	3.65V	
3.7	Maximum charging voltage	3.70V	
3.8	Fast charging current	161A	Charge at constant current and constant voltage to 3.65V
3.9	Maximum continuous charging current	161A	Charge at constant current and constant voltage to 3.65V
3.10	Maximum continuous discharge current	161A	1C constant current discharge to 2.50V
3.11	weight	Approximately 3.1 kg	
3.12	working temperature	Charge	0~+50℃
		Discharge	-20~+55℃
3.13	storage temperature	Less than 1 month	-20~+45℃
		More than 1 month	-20~+35℃

The recommended storage temperature during transportation is 20℃.

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4 Battery Dimensions and Appearance

4.1 Outline Dimension

Refer to '6 LFP6228082 Product Structural Characteristics' for the battery's external dimensions.

Thickness: 62mm (measured under a pressure of 300gf applied by the measuring instrument to the battery at a temperature of $25\pm 2^{\circ}\text{C}$)

Width: 280mm (measured under a pressure of 300gf applied by the measuring instrument to the battery at a temperature of $25\pm 2^{\circ}\text{C}$)

Length: 82mm (excluding tabs, with a measurement pressure of 300gf applied to the battery and a temperature of $25\pm 2^{\circ}\text{C}$)

Note: The battery may expand in thickness when stored or used at high temperatures.

4.2 Surface

The external surface of the battery is clean, with no electrolyte leakage, no obvious scratches or mechanical damage, minor spot welding allowed, no deformation, and no other visual defects that may affect the battery's value.

5 Function

5.1 Standard Test Conditions

The test batteries must be newly manufactured by our company within one month and have not undergone more than five charge-discharge cycles. Unless otherwise specified, the test conditions specified in this product specification are: temperature $25\pm 2^{\circ}\text{C}$ and relative humidity 45%–85%. If test results have been confirmed to remain unaffected by these conditions, experiments may also be conducted under temperature 15–30°C and relative humidity 25%–85%.

5.2 Test equipment requirements

- (1) The precision of measuring instrument should be greater than or equal to 0.01 mm.
- (2) The accuracy of a multimeter for voltage and current measurement must be at least Class 0.5, and its internal resistance for voltage measurement should not be less than 10 k Ω /V.
- (3) The internal resistance tester should be based on the AC impedance method (1kHz LCR).
- (4) The current accuracy of the battery testing system should be above $\pm 0.1\%$, the constant voltage accuracy should be $\pm 0.5\%$, and the timing accuracy should not be lower than $\pm 0.1\%$.
- (5) The accuracy of the measuring instrument should not be lower than $\pm 0.5^{\circ}\text{C}$.

5.3 Standard Charging

0.2C=32.2A

Charge at a constant current and voltage of 0.2C (32.2A) until reaching 3.65V or when the charging current drops below 0.05C, with the total charging time not exceeding 5 hours.

5.4 Pause Time

Unless otherwise specified, the battery charging and discharging interval is 10 minutes.

5.5 Initial Performance Test

Project	Test method	Ask
(1) open circuit voltage	The open-circuit voltage is measured within 24 hours after standard charging.	$\geq 3.2\text{V}$
(2) AC internal resistance	After standard charging, the internal resistance was measured by the AC method at $25\pm 2^{\circ}\text{C}$.	$\leq 0.4\text{m}\Omega$
(3) Nominal capacity test	After standard charging, leave it for 10 minutes, then discharge at 0.2C (32.2A) to 2.5V to test the battery capacity (defined as C5)	$C_5 \geq 161\text{Ah}$ Min $\geq 98\% C_5$
(4) 0.5C discharge capacity	Charge at 0.5C for 10 minutes, then discharge at 0.5C (80A) to 2.5V to measure the discharge capacity.	Discharge capacity $\geq 161\text{Ah}$, Min $\geq 98\%$, C5
(6) 1.0C discharge capacity	After fast charging, leave it for 10 minutes. Then discharge 1.0CA (161A) to 2.5V to test the discharge capacity.	Discharge capacity $\geq 161\text{Ah}$, Min $\geq 97\%$, C5

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5.6 Electrical Property Test

5.6.1 discharge temperature characteristic

The battery was charged under standard conditions at $25\pm 2^{\circ}\text{C}$, followed by cooling or heating to the test temperature within 30 minutes. Prior to discharge, the battery was maintained at this temperature for 1 hour with a discharge current of 0.2 A. After completing one temperature cycle, the battery was left at room temperature for 2 hours before charging again at $25\pm 2^{\circ}\text{C}$. The requirements are as follows:

Discharge temperature	-20°C	25°C	60°C
Discharge capacity	60%	100%	90%

5.6.2 cycling performance

After standard charging, leave the battery idle for 10 minutes, then discharge at 0.2C current to 2.5V and maintain this state for another 10 minutes. Repeat the above cycle until the battery is fully discharged.

The capacitance should be $\leq 75\%$ C5 for three consecutive cycles at a test temperature of $25\pm 2^{\circ}\text{C}$ (an important parameter affecting battery cycle performance). The requirements are as follows: Cycle count ≥ 3500 cycles

5.6.3 charge retention capability

Project		Test method	Ask
Storage at room temperature	1	After charging, the battery was stored at $25\pm 2^{\circ}\text{C}$ for 30 days, and the 0.2CA discharge capacity (retention capacity) was tested.	Capacity maintained at $\geq 85\%$ C5
	2	0.2CA cycle 3 times, test recovery capacity (maximum discharge capacity after 3 cycles)	Capacity recovery $\geq 85\%$ C5
High-temperature storage	1	After standard charging, the battery was stored at $60\pm 2^{\circ}\text{C}$ for 7 days, and the 0.2CA discharge capacity (retention capacity) was tested.	Capacity maintained at $\geq 60\%$ C5
	2	0.2CA cycle 3 times, test recovery capacity (maximum discharge capacity after 3 cycles)	Capacity recovery $\geq 80\%$ C5

5.6.4 Long-term storage performance

For this experiment, batteries should be selected with a production date within 3 months prior to the test date. Before storage, charge the batteries to 50% capacity, then leave them open-circuit for 365 days. Under ambient conditions of $25\pm 2^{\circ}\text{C}$, perform 3 cycles at 0.2C current rate, and measure the recovery capacity (maximum discharge capacity after 3 cycles). The requirements are as follows:

Capacity recovery $\geq 85\%$ C5

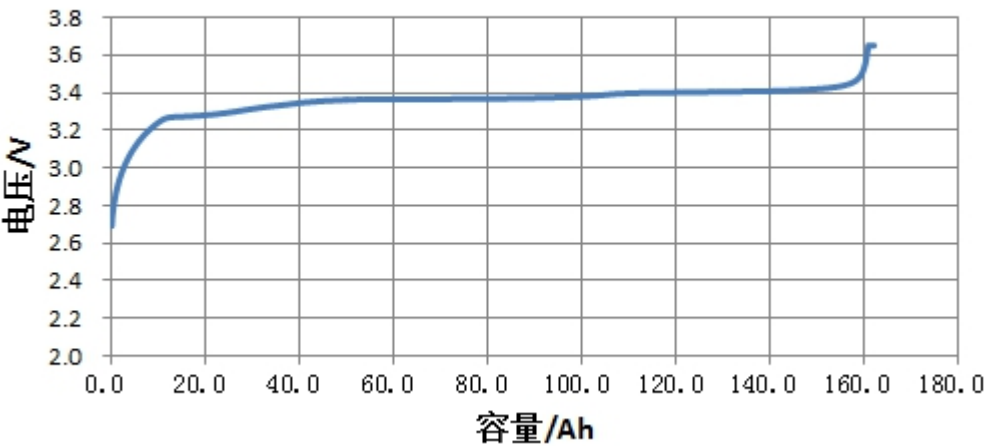
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5.7 Feature Curve

5.7.1 charging voltage-capacity characteristic curve

Under ambient conditions of $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, constant current charging was performed at 0.5C until reaching 3.65V, with the curve shown in the figure:

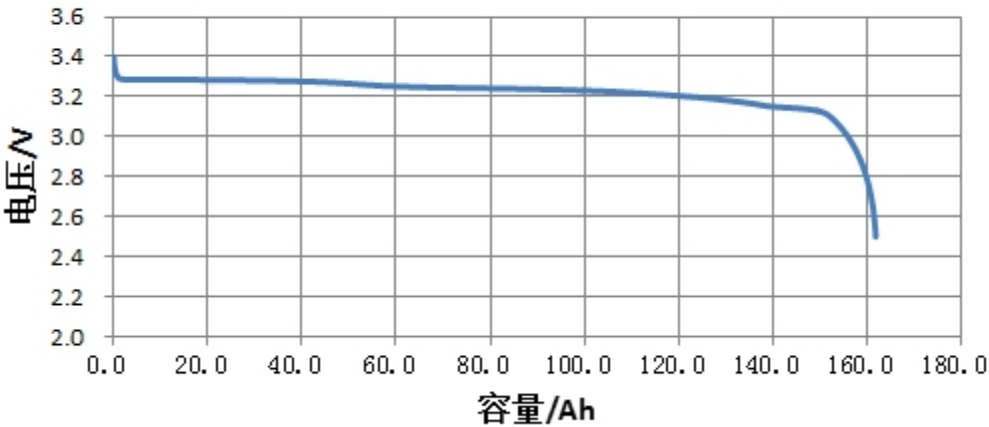
0.5C充电电压-容量特征曲线



5.7.2 Discharge Voltage-Capacity Characteristic Curve Diagram

Under ambient conditions of $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$, a constant current of 0.5C was applied to 2.5V, with the curve shown in the figure:

0.5C放电电压-容量特征曲线



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5.8 Mechanical Properties

Project	Test method	Ask
Constant wet heat property	After standard charging, the battery was placed in a constant temperature and humidity chamber ($40 \pm 2^{\circ}\text{C}$, 90%~95% relative humidity) for 48 hours. The battery was then removed and placed at ambient temperature ($25 \pm 2^{\circ}\text{C}$) for 2 hours. If no significant changes were observed in appearance, the battery was discharged to 2.50 V at a current rate of 1.0 C.	Discharge capacity $\geq 80\%$ C5
Vibrate	After standard charging, the battery was mounted on a vibration platform and subjected to experiments in three vertical directions (X, Y, Z). The vibration frequency ranged from 10 to 55 Hz with a rate of change of 1 Hz/min, and the displacement amplitude was 0.8 mm. The reciprocating vibration was maintained for 90 minutes.	The battery shows no visible damage, leakage, smoke, or explosion, and its voltage is $\geq 3.20\text{V}$.
Free fall	After the battery vibration test, the free-fall test shall be conducted under the following conditions: drop height: 1.0 m. The object of the experiment was a 18~20 mm thick hardwood board. Drop direction: Drop once along the horizontal surface, both front and back.	The battery exhibits no obvious damage, leakage, smoking, or explosion.

5.8 Safety Performance

Project	Test method	Ask
Heavy impact	The battery is placed on the impact test bench, and a 10 kg weight is dropped freely from a height of 1 m to impact the battery fixed on the fixture (the largest surface area of the battery should be perpendicular to the bench surface).	The battery does not catch fire or explode.
Thermal shock	The battery was placed in a thermal chamber, with the temperature rising at a rate of $(5 \pm 2^{\circ}\text{C})/\text{min}$ to $130 \pm 2^{\circ}\text{C}$ and maintained for 30 minutes.	The battery does not catch fire or explode.
Hot test	After standard charging, the battery was placed in a 90°C oven for 4 hours, followed by constant-current discharge at 0.2C current to 2.50V, and then subjected to 3 cycles.	Capacity recovery rate $\geq 75\%$ C5
Over-charging	After standard charging, place the battery equipped with a thermocouple in a fume hood. Connect the battery and sliding resistor in series with a constant current and voltage source, setting the voltage to 4.8V. Adjust the current to 5.0A using the sliding resistor, then charge the battery at 5.0A. Monitor the battery temperature throughout the experiment. Terminate the test when the temperature drops approximately 10°C below the peak value. It is not necessary to maintain a constant current of 5.0A during testing.	The battery does not catch fire or explode.
Short	Place the battery connected with a thermocouple in a fume hood and short-circuit its positive and negative terminals (total line resistance should not exceed 100 m Ω). Monitor the battery temperature changes during the test. Terminate the experiment when the battery temperature drops to approximately 10°C below the peak value.	The battery does not catch fire or explode.

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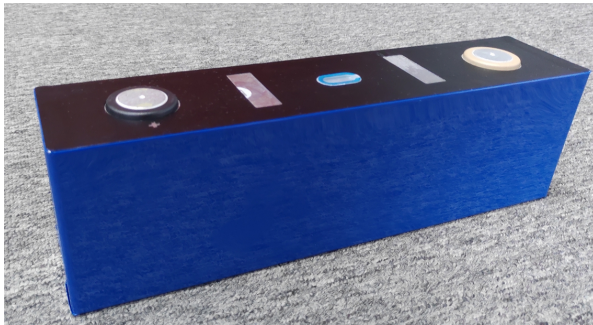
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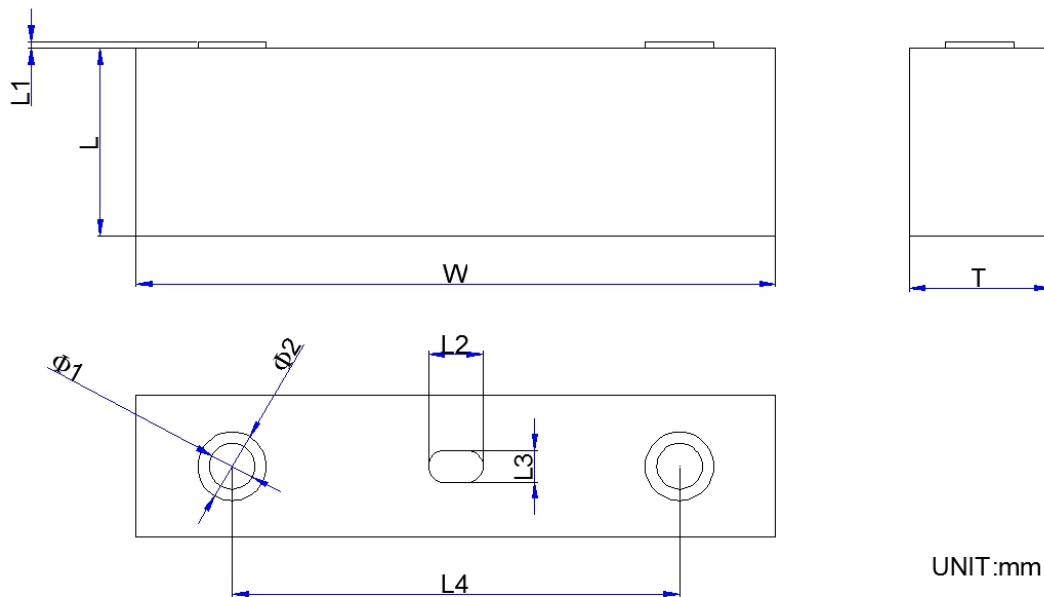
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6 Product structural characteristics

6.1 Product appearance diagram



6.2 Product size illustration



No	Name	technical parameters	
1	T	$62.0 \pm 0.5\text{mm}$	
2	W	$280.0 \pm 0.5\text{mm}$	
3	L	$82.0 \pm 0.5\text{mm}$	
4	L1	$3.0 \pm 0.5\text{ mm}$	
5	L2	$24.0 \pm 1\text{mm}$	
6	L3	$14.0 \pm 0.5\text{mm}$	
7	L4	$196.0 \pm 0.5\text{mm}$	
8	$\Phi 1$	$20.0 \pm 0.5\text{mm}$	
9	$\Phi 2$	$30.0 \pm 0.5\text{mm}$	
10	Total height of bolt	$14.0 \pm 0.1\text{mm}$	
Design		Examine and verify	Ratify

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7 Battery Usage Guide

Read the following precautions carefully to ensure the correct use of lithium-ion batteries. Our company shall not be liable for any issues arising from violations of the following precautions.

Danger!Failure

to read the following carefully may result in battery leakage, explosion or fire.

- Do not put batteries in water or wet them;
- Do not use or store batteries near heat sources (e.g. fire or heater);
- Please use the original charger.
- Do not reverse the polarity of the electrodes;

Do not connect the battery directly to a wall outlet or a cigarette lighter socket in a vehicle.

- Do not put batteries in fire or heat batteries;
- Do not use wires or other metal objects to short-circuit the battery's positive and negative terminals, and do not transport or store batteries with necklaces, hairpins, or other metal objects.
- Impact, throwing, or mechanical vibration of the battery is prohibited;
- It is prohibited to puncture the battery casing with nails or other sharp objects, and hammering or stepping on the battery is strictly forbidden.
- Direct welding of battery terminals is prohibited;
- Do not disassemble batteries in any way;
- Charging batteries is prohibited near ignition sources or under extreme heat conditions.

Warning!Fail-

ure to read the following carefully may result in battery leakage, explosion or fire.

- Do not place batteries in microwave ovens or pressure vessels;
 - Do not use with primary batteries (e.g., dry batteries) or with batteries of different capacities, models, or types.
- Do not use the battery if it emits an odor, heats up, deforms, changes color, or exhibits any other abnormal phenomena; if the battery is in use or charging, immediately remove it from the electrical appliance or charger and stop using it;
- Batteries should be kept out of reach of children. If a child accidentally swallows a battery, seek immediate medical attention.

If the battery leaks or emits an odor, immediately remove it from any open flame.

The leaking electrolyte may cause fire or explosion;

If battery leakage causes electrolyte to enter the eyes, do not rub it out; instead, rinse with water and seek immediate medical assistance. Failure to address the situation promptly may result in ocular injury.

Pay attention to !

Do not use batteries in extremely hot environments, such as direct sunlight or inside vehicles during hot weather. Otherwise, the battery may overheat and potentially catch fire (ignite), which can impair battery performance and shorten its service life.

Batteries should only be used under the following conditions, otherwise the performance of the battery will be reduced or the battery life will be shortened.

Work environment :

Charging: 0°C to 50°C

Discharge: -20°C to 55°C

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When children use batteries, they need to be taught according to the user instructions and closely monitored to ensure correct use of batteries.

If the battery leaks and the electrolyte comes into contact with the skin or clothing, immediately rinse the affected area with running water to prevent potential skin inflammation. Refer to the device manual for battery usage and perform proper installation and removal of the battery.

If the device is not used for an extended period, remove the battery and store it in a cool, dry place to prevent rusting or performance degradation. If the battery terminals are contaminated, clean them with a dry cloth before use. Otherwise, poor contact may occur, leading to energy loss or failure to charge.

8 State of Battery at Factory

The battery is pre-charged to 30%-50% capacity at factory, with a voltage range of 3.20-3.40V.

9 Revision of Product Specification

Our company reserves the right to revise this product specification. No separate notice will be given to customers after the revision.

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