

## Specification confirmation

<b>Product name</b>	<b>Ternary lithium battery pack</b>
<b>Product model</b>	<b>LFP-GP48100</b>
<b>Customer code</b>	
<b>Document number</b>	
<b>Version number</b>	A/0
<b>Issue date</b>	2021-12-20

<b>Approved by</b>	<b>Reviewed by</b>	<b>Prepared by</b>
Song Guo Song	Hai Yang	Kui Yuan

<b>Customer confirmation</b>	<b>Autograph</b>	<b>Date</b>
	<b>Company Name:</b>	
	<b>Company Seal:</b>	

# Content

<b>1. Scope</b> .....	2
<b>2. Product Pict</b> .....	2
<b>3. Basic parameters of battery</b> .....	2
<b>4. BMS Configuration</b> .....	3
<b>5. BMS Protection Parameters</b> .....	3
<b>6. Cell technical parameters</b> .....	5
<b>7. 2D diagram of the cell</b> .....	5
<b>8. Electrical performance</b> .....	6
<b>9. Use warning</b> .....	7
<b>10. Battery operation instruction</b> .....	8
<b>11. Other The Chemical Reaction</b> .....	9
<b>Note:</b> .....	9

## 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

## 2. Product Pict



## 3. Basic parameters of battery

Battery Model	48100
Size (L*W*H)mm	480*360*175
Weight (kg)	≤34kg
Battery Rated Capacity (0.2C)	100Ah
Battery Rated Voltage	51.8V
Operating Voltage Range	38.5-58.8V
Battery Type	Ternary lithium
Standard charging current	20A
Continuous Charging Current (Max.)	200A
Continuous Discharge Current (Max.)	200A

Peak Discharge Current	400A(3S)
Internal Resistance (mΩ)	50 mΩ
Storage Temperature	10°C~35°C
Storage Humidity	10%~90% RH
Shipping Voltage	51V~52V
Charging Temperature	0~55°C
Discharge Temperature	-20~55°C
Cooling Mode	Natural Cooling
Waterproof Level	IP65
Communication method	Bluetooth
Display	LCD
Battery Cycle Life	3000 times (standard charge and discharge)
Standard Environmental Condition	Temperature : 23±5°C
	Humidity : 45-75%RH
	Atmospheric Pressure : 86-106 KPA

#### 4. BMS Configuration

Function	Configuration	Function	Configuration
Number of batteries in series and parallel	14S2P	Battery packs in parallel	NO
Continuous current	200A	Battery packs in series	NO
Number of NTCs	1 built-in, 2 external	Module of Bluetooth	YES
Balance Function	Passive balance	LCD display	YES
Interface Type	Optional	Heating function	Optional

#### 5. BMS Protection Parameters

Function	Project	Specification			Unit
		MIN	TYP	MAX	
Cell Overvoltage Protection	Overvoltage protection voltage	4.22	4.25	4.28	V

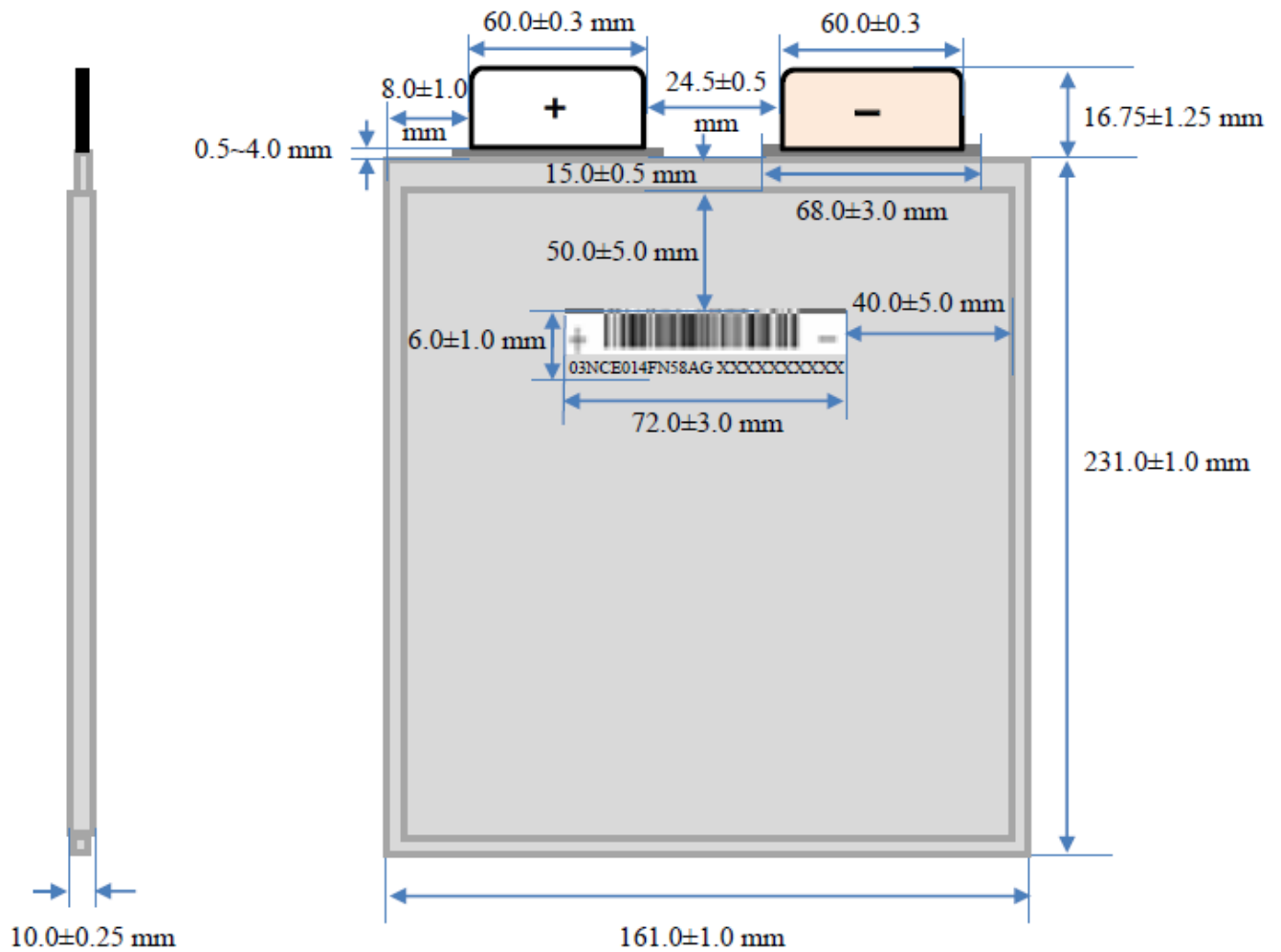
	Overcharge protection delay time	1000	2000	3000	mS
	Overcharge protection restores voltage	4.10	4.15	4.20	V
Cell Over-discharge protection	Over-discharge protection voltage	2.70	2.80	2.90	V
	Over-discharge protection delay time	1000	2000	3000	mS
	Over-discharge protection recovery voltage	2.90	3.00	3.10	V
	Over-discharge protects recovery conditions	The voltage recovers or the charge resumes			
Charging overcurrent protection	Charge overcurrent protection value	205	210	215	A
	Charging overcurrent delay	7	10	13	S
	Charging overcurrent discharge conditions	Automatic recover after a delay of 32S			
Overcurrent Discharge	1st Overcurrent Discharge	205	210	215	A
	1st Overcurrent Discharge delay	7	10	13	S
	2nd Overcurrent Discharge	420	460	500	A
	2nd Overcurrent Discharge delay	150	320	500	mS
	Overcurrent Discharge Release	Automatic recovery after a delay of 32S			
Short Circuit Discharge	Short circuit protection current	720	900	1080	A
	Short circuit protection delay time	200	400	800	uS
	Short circuit protection recovery	Recover after 5S delay after disconnecting the load			
	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 2000A, there is no guarantee of short circuit protection, and it is not recommended to do short circuit protection test.				
Discharge high temperature protection (external)	Temperature protection value	70	75	80	°C
	Temperature protection release value	60	65	70	°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	60	65	70	°C
	Temperature protection release value	50	55	60	°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	3.97	4.00	4.03	V
	Opening voltage difference		15		mV
	Balanced current	10		70	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	58.0Ah	(25±2)°C, Standard charge and discharge	
	Typical Voltage	3.7V		
	AC Impedance Resistance(1KHz)	≤1.0mΩ		
2	Dimension	Width	161.0 ±1.0mm	Refer to 6
		Thickness	10.0 ±0.25mm	
		High (total)	247.75 ±1.0mm	
3	Battery weight	833g±15g		

## 7. 2D diagram of the cell



## 8. Electrical performance

No.	Item	Requirements	Measuring Procedure
1	Rate Discharge Performance at 25°C	Discharge capacity/nominal capacity×100% A) 0.5CA ≥100% B) 1.0CA ≥98%	After standard charge and 1h rest, discharge to 38.5V 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 38.5V 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 32V 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 38.5V 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 38.5V cut-off at (25±2)°C.
4	Cycle Life at 25°C	≥3000 cycle @1.0C/1.0C	Under the 200kgf clamp, after standard charged and 30mins rest, discharge to 38.5V cutoff with the current of 1.0C (A) at (25±2) °C, 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°C	≥2400 cycle @1.0C/1.0C	Under the 200kgf clamp, after standard charged and 30mins rest, discharge to 38.5V cutoff with the current of 1.0 C (A) at (35±2) °C, 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°C	≥1600 cycle @1.0C/1.0C	Under the 200kgf clamp, after standard charged and 30mins rest, discharge to 38.5V cutoff with the current of 1.0 C (A) at (45±2) °C, 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.