锂离子电芯规格书

型号：TB_2770180E_30Ah_LFP

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修订历史

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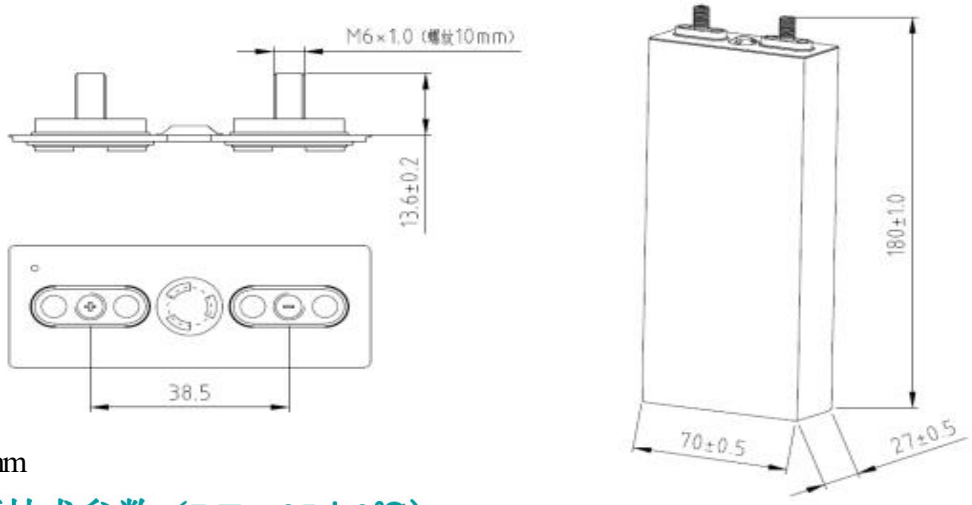
1. 概述

本规格书规定了本公司生产的方形磷酸铁锂电芯的技术标准、测试方法和注意事项。

2. 电芯尺寸



单位： mm

3. 主要技术参数（RT：25±2℃）

NO	Project	Standard	Remark
3.1	Nominal capacity	30Ah	RT， 0.5C
3.2	Minimum capacity	29.5Ah	
3.3	AC internal resistance	≤2mΩ	RT，AC frequency 1000HZ
3.4	Q	3.2V	
3.5	Cell weight	690±10g	
3.6	voltage range	3.65～2.00V	
3.7	Recommended charging current	≤1C	
3.8	Recommended discharge current	≤1C	
3.9	Maximum continuous charging current	1C	RT
3.10	Maximum Continuous Discharge Current	2C	RT
3.11	Maximum pulse discharge current	3C	RT，10s，SOC≥20%
3.12	cycle life	2000 周容量保持率≥80%	RT，1C，100% DOD
3.13	charging temperature	0～45℃	
3.14	discharge temperature	-20～55℃	
3.15	storage temperature	- 10～30℃	
3.16	Tightening torque	≤5.5N.m	
3.17	Exterior	No cracks, scratches, deformation, stains, electrolyte leakage, etc.	

4. 测试条件 Test Conditions

4.1 标准测试条件 Standard Test Conditions

4.1.1 The product test conditions in this specification are temperature: 25±2°C, relative humidity 15%~90% RH, atmospheric pressure 86~106kPa.

4.1.2 Unless otherwise specified, all product performance specifications are tested on products that have not been used within 1 month of the date of manufacture.

4.2 标准充电模式

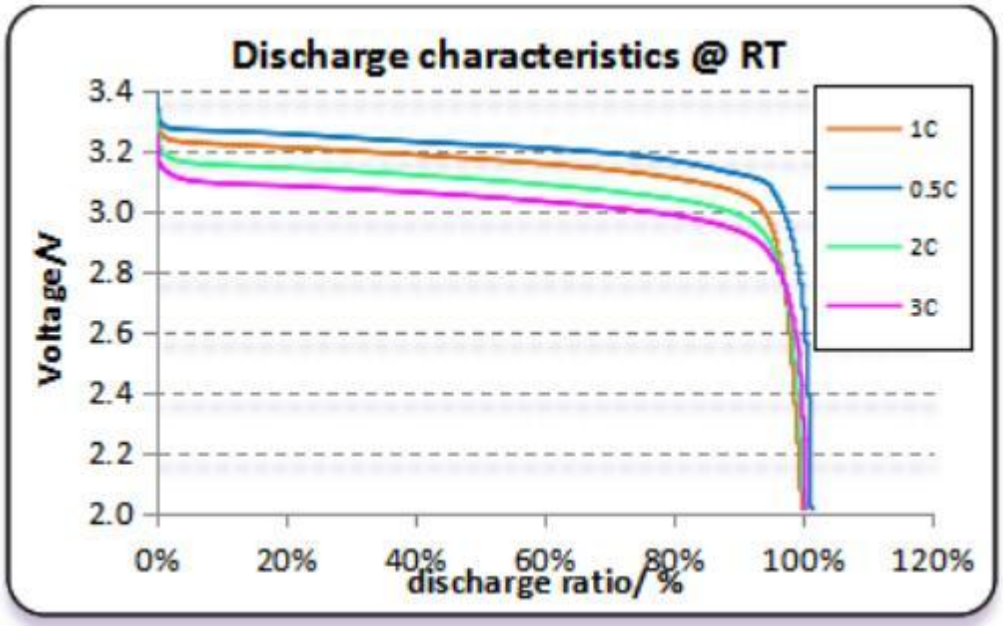
At an ambient temperature of 25±2°C, discharge the cell to 2.0V with a current of 0.5C, let it stand for 1h, and then charge it at a constant current of 0.5C to 3.65V at 25±2°C, then switch to constant voltage charging until the time of charging Stop charging when the current drops to 0.05C, and let it stand for 1h.

5. 电性能

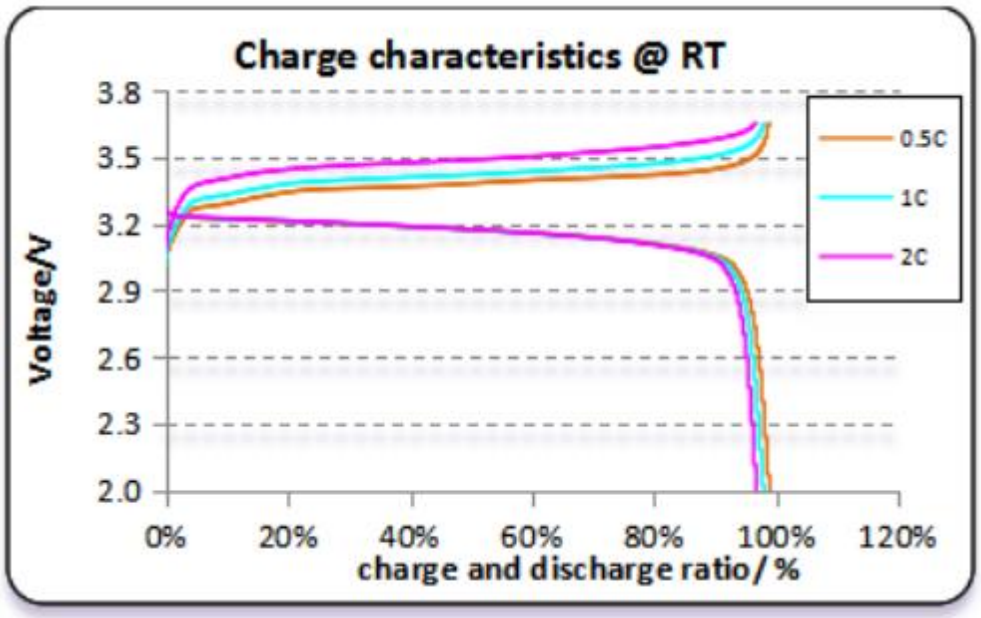
NO	Project	Test method	Standard
5.1	high temperature performance	After the battery is charged according to the regulations in 4.2, put the battery in a high-temperature box at 55±2°C for 5 hours, and then discharge it to 2.0V with a current of 1C. Stand for 4 hours under certain conditions, and then check the appearance of the cell.	1.Capacity retention≥95%; 2.The appearance of the battery cell has no deformation and no cracks.
5.2	low temperature performance	After the battery is charged according to the regulations in 4.2, put the battery in a low-temperature box at -20±2°C for 24 hours, and then discharge it to 1.8V with a current of 1C. After the experiment, take the battery out at an ambient temperature of 25±2 Under the condition of °C, let it stand for 4 hours, and then visually inspect the appearance of the cell.	1. Capacity retention rate ≥ 60%; 2. The appearance of the battery cell has no deformation and no cracks.
5.3	1C charging performance	Under the condition of ambient temperature of 25±2°C, a. Discharge to 2.0V with a constant current of 1C, and let it stand for 1h. b. Charge it to 3.65V with a constant current of 1C, and let it stand for 1h. c. Discharge to 2.0V with a constant current of 1C.	Capacity retention≥90%
5.4	2C discharge performance	After the battery cell is charged according to the regulations in 4.2, it is then discharged to 2.0V at a constant current of 2C at an ambient temperature of 25±2°C.	Capacity retention≥90%
5.5	Charge retention and recovery	After the battery cell is charged according to the regulations in 4.2, the battery cell should be placed on hold for 28 days at an ambient temperature of 25±2°C, and then discharged to 2.0V at a constant current of 1C.	Capacity retention≥85% Capacity recovery rate≥90%
5.6	Cycle life（25±2°C)	Charge the cell at 1C CC/CV 3.65V with a cut-off current of 0.05C and set it aside for 30 minutes, then discharge it at a constant current of 1C to 2.0V, and then set it aside for 30 minutes after discharge, and then perform the next charge-discharge cycle. When the capacity retention rate is <80% , the loop stops.	Cycle times≥2000

6. 电性能曲线（参考）Electrical performance curve (reference)

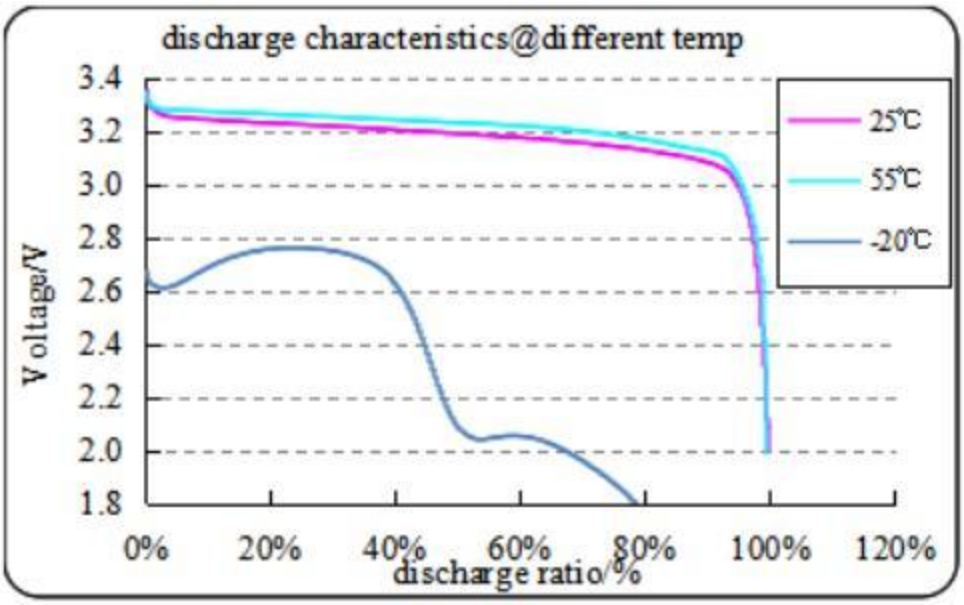
倍率放电曲线 Rate discharge curve



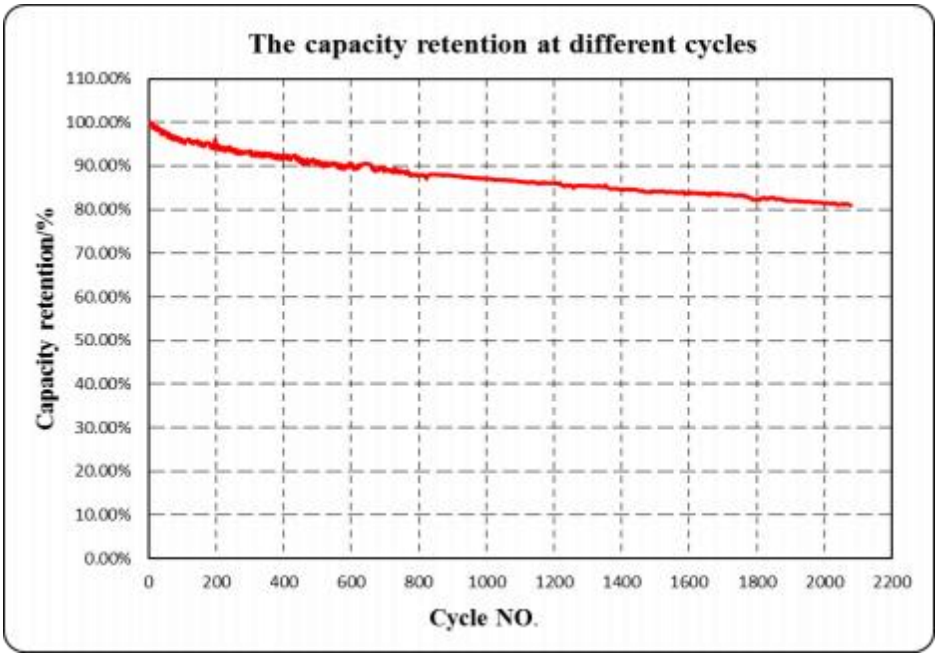
倍率充电曲线 Rate charging curve



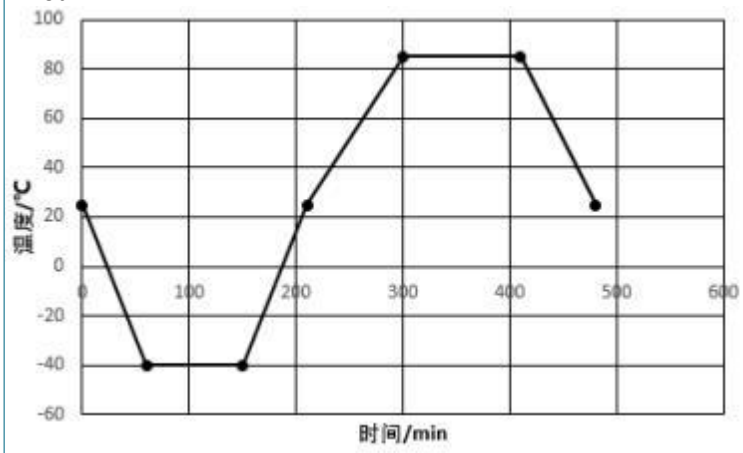
高低温放电曲线 High and low temperature discharge curve



循环曲线 cycle curve



7. 环境性能 Environmental performance

<table>
<tr><th>NO.</th><th>Items</th><th>Test method</th><th>Standard</th></tr>
<tr><td>7.1</td><td>temperature cycle</td><td>After the battery cell is charged according to the regulations in 4.2, put the battery cell into the temperature box, adjust the temperature of the temperature box according to the table, cycle 5 times, and observe for 1 hour.
<table>
<tr><th>温度
C°</th><th>时间增量
min</th><th>累计时间
min</th><th>温度变化率
C°/min</th></tr>
<tr><td>25</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td>-40</td><td>60</td><td>60</td><td>13/12</td></tr>
<tr><td>-40</td><td>90</td><td>150</td><td>0</td></tr>
<tr><td>25</td><td>60</td><td>210</td><td>13/12</td></tr>
<tr><td>85</td><td>90</td><td>300</td><td>2/3</td></tr>
<tr><td>85</td><td>110</td><td>410</td><td>0</td></tr>
<tr><td>25</td><td>70</td><td>480</td><td>6/7</td></tr>
</table>

</td><td>The battery cell should not leak, catch fire, explode or crack</td></tr>
<tr><td>7.2</td><td>low apressure test</td><td>After the battery is charged according to the regulations in 4.2, put the battery in a vacuum of -90KPa and let it stand for 6 hours, take it out and let it stand at room temperature for 6 hours, and check the appearance of the battery.</td><td>The battery cell should not leak, catch fire, explode or crack</td></tr>
<tr><td>7.3</td><td>vibration test</td><td>After the batteries are charged according to the regulations in 4.2, install the fixtures for the batteries on the table of the vibrating table, and adjust the experimental equipment according to the following vibration frequencies and corresponding amplitudes. In each direction of X, Y, and Z, cycle frequency sweep vibration from 10 to 55Hz for 30 minutes, and the frequency sweep rate is 1oct/min:
(a) Vibration frequency: 10Hz～30Hz Displacement amplitude (single amplitude): 0.38mm;
(b) Vibration frequency: 30Hz～55Hz Displacement amplitude (single amplitude): 0.19mm.</td><td>1. The appearance of the battery cell should have no obvious damage, no leakage, no fire, no explosion, and no cracking;
2. The battery voltage is not lower than 3.2V.</td></tr>
<tr><td>7.4</td><td>crash test</td><td>After the battery cell is tested according to the provisions of 4.2, the battery cell is respectively fixed on the vibrating table according to the three mutually perpendicular axes of X, Y, and Z, and the collision test is carried out according to the following acceleration and pulse duration: pulse peak acceleration: 100m /s2, collision frequency: 40~80 times/min, pulse duration: 16min, collision times: 1000±10 times.</td><td>1. The appearance of the battery cell has no obvious damage, no liquid leakage, no fire, no explosion, and no cracking;
2. The voltage of the single cell is not lower than 3.2V.</td></tr>
</table>

8. 安全测试 Safety test

The following tests should be carried out in a device with forced ventilation and explosion-proof measures. Before the test, all batteries should be charged according to 4.2 and left for 24 hours before the following test.

NO.	Items	Test method	Standard
8.1	short circuit test	Short-circuit the positive and negative electrodes of the cell externally for 10 minutes, and observe for 1 hour if the resistance of the external circuit is less than 5 mΩ.	no fire, no explosion
8.2	overcharge	Charge with a constant current of 1C until the voltage reaches 1.5 times of the end-of-charge voltage specified in the technical conditions of the enterprise or stop charging after the charging time reaches 1h. Observe for 1h.	no fire, no explosion
8.3	Overdischarge	Discharge at 1C for 90min. Observe for 1h.	No fire, no explosion, no leakage
8.4	squeeze test	Compression is performed between the two surfaces of the cell with the largest area. The compression force is applied by a hydraulic piston with a diameter of 32mm. The compression continues until the pressure reaches 17.2Mpa, and the applied pressure is 13kN. When the maximum pressure is reached, the pressure is released.	no fire, no explosion
8.5	heavy impact	Put the battery cell on the impact table, place a Φ15.8mm steel column in the center of the battery, the longitudinal axis of the steel column is parallel to the plane, let a 9.1kg weight fall freely from a height of 610mm, and impact the battery cell, the battery cell allows deformed.	no fire, no explosion
8.6	acupuncture	a) Use a φ5mm~φ8mm high-temperature-resistant steel needle to penetrate at a speed of 25±5mm/s from the direction perpendicular to the battery plate. The penetration position should be close to the geometric center of the punctured surface, and the steel needle stays in the battery core ; b) Observe for 1 hour.	no fire, no explosion
8.7	Thermal Shock (130℃)	Place the cell in an electric blast drying oven, and raise the temperature from room temperature to 130°C ± 3°C at a rate of 5°C/min and keep it for 30min.	no fire, no explosion

9. 出货 Shipment

The battery cell is shipped according to the voltage of 3.300±0.030V, 50%SOC or customer requirements. The remaining capacity of the battery cell after shipment and before charging depends on the storage time and conditions.

10. 质量保证 Quality assurance

10.1 本规格书中，质量保证如果与品质保证协议冲突，以品质保证协议为主。

10.2 若因客户的滥用或误用， 本公司不免费更换。

10.3 本公司对违反安全守则操作所产生的问题不承担任何责任。

10.4 本公司对与电路、电池组、充电器搭配使用所产生的问题不承担任何责任。

10.5 出货后客户在电芯组装过程中产生的不良电芯不在本公司质量保证的范围之列。

10.6 本规格书是经双方协商后制定的，规格书之外的项目本公司不承担质量保证。

10.1 In this specification, if the quality assurance conflicts with the quality assurance agreement, the quality assurance agreement shall prevail.

10.2 If the customer abuses or misuses, the company will not replace it free of charge.

10.3 The company does not assume any responsibility for problems arising from operations in violation of safety rules.

10.4 The company does not assume any responsibility for problems arising from the use of circuits, battery packs, and chargers.

10.5 Defective batteries produced by customers during the battery assembly process after shipment are not covered by our company's quality assurance.

10.6 This specification is formulated after negotiation between the two parties, and the company does not undertake quality assurance for items other than the specification.

11. 安全守则 Safety rules

滥用锂离子电芯可能会造成电芯的损害或人身的伤害， 在使用锂离子电芯以前， 请仔细阅读以下的安全守则：

Abuse of lithium-ion batteries may cause battery damage or personal injury. Before using lithium-ion batteries, please read the following safety rules carefully:

11.1 电芯防范措施 Cell Precautions

a. Do not expose the battery to extreme heat or flames.

b. Do not short circuit, overcharge or overdischarge the battery.

c. It is forbidden to subject the battery cell to severe mechanical shock.

d. Do not immerse the battery in water or make it absorb moisture.

e. It is forbidden to disassemble or modify the battery cell.

f. Do not place with metal objects such as necklaces, coins or barrettes.

g. Do not subject the cell to obvious damage or deformation.

h. It is forbidden to connect the battery core to the socket.

i. Prohibit direct contact with leaking cells.

j. Do not mix old and new batteries.

k. Do not place the batteries in direct sunlight.

l. Keep the batteries away from children.

m. It is forbidden to needle, hammer or trample on the battery cell.

n. It is forbidden to strike or throw batteries.

o. It is forbidden to directly contact the positive and negative poles of the battery with the shell.

11.2 电芯使用说明 Battery instructions

11.2.1 充电 Charge

a. 电芯充电温度范围为 0℃~45℃。

b. 以 0.5C 的电流恒流充电至 3.65V，然后以 3.65V 的电压恒压充电至电流为 0.05C，不建议使用超过 1C 电流对电芯进行充电（C：标称容量）。

c. 使用恒流恒压锂离子电芯充电器。

a. The battery charging temperature range is 0°C~45°C.
b. Charge the battery with a constant current of 0.5C to 3.65V, and then charge it with a constant voltage of 3.65V to a current of 0.05C. It is not recommended to charge the battery with a current exceeding 1C (C: nominal capacity).
c. Use a constant current and constant voltage lithium-ion battery charger.

11.2.2 放电 Discharge

a. 放电终止电压为 2.0V，最大持续恒流放电电流为 2C。

b. 为了达到较好的性能，电芯的放电温度范围为 0～35℃。

a. The end-of-discharge voltage is 2.0V, and the maximum continuous constant discharge current is 2C.

b. In order to achieve better performance, the discharge temperature range of the cell is 0-35°C.

11.2.3 存储建议 Storage advice

a. 如果要长时间存放(超过 3 个月)，电芯应存储在温度范围为– 10～30℃,低湿度和不含腐蚀性气体的环境中。
b. 建议每 3 个月要充放电一次，6 个月必须充放电一次，充放电方式如下： 在 25±2℃环境下，1C 恒流放电至 2.0V ，静置 30min ，0.5C 恒流恒压充电至 3.65V 截止电流 0.05C，静置 30min，1C 恒流放电至 2.0V，静置 30min ，0.5C 恒流充电 1h。
c. 基于对电芯的保护， 良好的存储环境是必需的。
注 1、如果客户需要将电芯在该文件之外的条件下操作或应用，请先咨询本公司相关事宜。
注 2、在该文件说明的条件之外使用该电芯而产生的事故， 本公司不承担任何责任。

a. If it is to be stored for a long time (more than 3 months), the battery should be stored at a temperature range of -10 ~ 30 ° C, low humidity and no corrosion
environment with aggressive gases.
b. It is recommended to charge and discharge once every 3 months, and must be charged and discharged once every 6 months. Voltage charge to 3.65V cut-off current 0.05C, rest for 30min, 1C constant current discharge to 2.0V, rest for 30min, 0.5C constant current charge for 1h.
c. Based on the protection of the batteries, a good storage environment is necessary.
Note 1. If the customer needs to operate or apply the battery under conditions other than this document, please consult our company for relevant matters.
Note 2. The company does not assume any responsibility for accidents caused by using the battery outside the conditions specified in this document.

12.安全保证 Security assurance

为了安全起见， 如有锂离子电芯系统保护电路、快速充电和其它方面的特殊应用， 请先咨询本公司。

For the sake of safety, if there are special applications for lithium-ion battery system protection circuit, fast charging and other aspects, please consult our company first.