

锂离子电芯规格书

型号: Cell_K2770180P_25Ah_LFP

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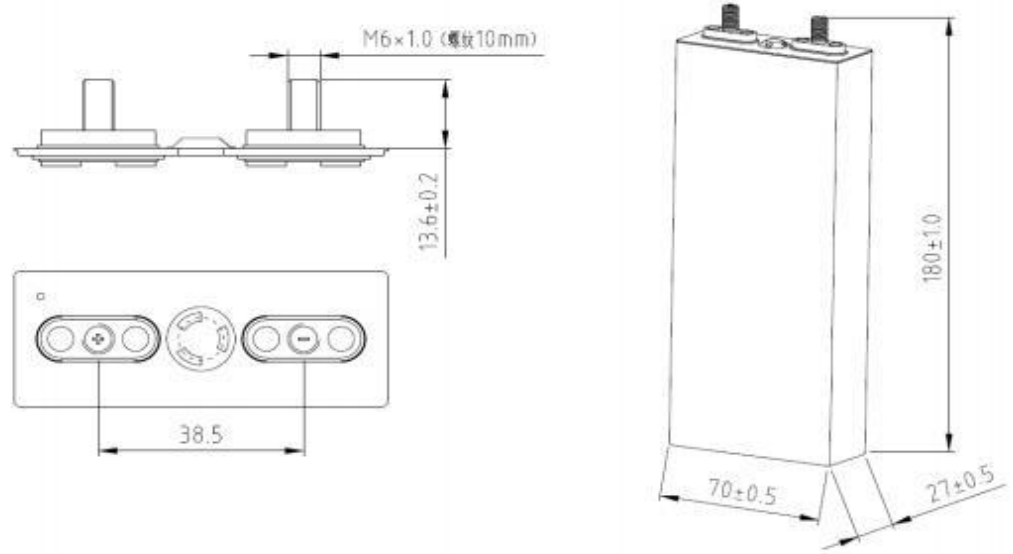
修订历史

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A0	-	首次发行	2017.5.2	陈星
A1	All	重新修订	2018.6.29	陈星

1. 概述

本规格书规定了深圳市拓邦锂电池有限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



3. 主要技术参数 (RT: 25±2°C) Main technical parameters

NO	Item	Standard	Remark
3.1	Nominal capacity	25.0Ah	RT, 1C
3.2	Minimum capacity	24.5Ah	
3.3	AC internal resistance	≤4mΩ	RT, AC frequency 1000HZ
3.4	Standard voltage	3.2V	
3.5	Cell weight	660±10g	
3.6	voltage range	3.65~2.00V	
3.7	Standard charging current	≤1C	
3.8	Standard discharging current	≤1C	
3.9	Max continuous charge current	2C	RT
3.10	Max continuous discharge current	3C	RT
3.11	Max pulse discharge current	5C	RT, 10s, SOC≥20%
3.12	Cycle life	2000 times capacity retention rate ≥ 80%	RT, 1C, 100% DOD
3.13	Charge temperature	0~45°C	
3.14	Discharge temperature	-20~55°C	
3.15	Storage temperature	-10~30°C	
3.16	Tightening torque	≤5.5N.m	
3.17	Exterior	No cracks, scratches, deformations, 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 all temperature: $25\pm 2^{\circ}\text{C}$, 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 from the date of manufacture.

4.2 标准充电模式 Standard charging mode

When the ambient temperature is $25\pm 2^{\circ}\text{C}$, discharge the battery cell to 2.0V with 1C current, let it stand for 1h, and then charge it with 1C constant current to 3.65V under the condition of $25\pm 2^{\circ}\text{C}$, then transfer to constant voltage charging until the charging current drops. Stop charging when it reaches 0.05C and let it stand for 1h.

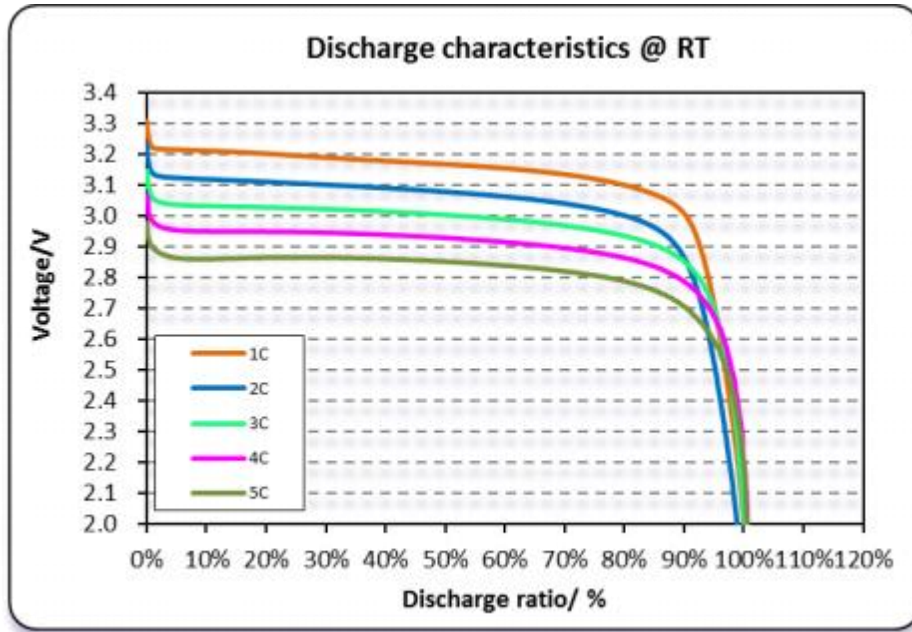
5. 电性能 Electrical properties

NO	Item	testing method	standard
5.1	High temperature performance	After the battery is charged as specified in 4.2, put the battery in a high temperature box of $55\pm 2^{\circ}\text{C}$ for 5 hours, and then discharge it to 2.0V with a current of 1C. After the experiment, take the battery out and place it at an ambient temperature of $25\pm 2^{\circ}\text{C}$. Leave it for 4 hours under the same conditions, and then check the appearance of the cell.	1. The capacity retention rate is $\geq 95\%$; 2. The appearance of the 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 into a low temperature box of $-20\pm 2^{\circ}\text{C}$ for 24h, and then discharge it to 1.8V with 1C current. Leave it for 4 hours under the condition of $^{\circ}\text{C}$, and then visually inspect the appearance of the cell.	1. Capacity retention rate $\geq 70\%$; 2. The appearance of the cell has no deformation and no cracks.
5.3	2C rate charging performance	At an ambient temperature of $25\pm 2^{\circ}\text{C}$, 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 2C and let it stand for 1h. c. Discharge to 2.0V with a constant current of 1C.	Capacity retention rate $\geq 80\%$
5.4	3C rate discharge	After the battery is charged as specified in 4.2, under the condition of an ambient temperature of $25\pm 2^{\circ}\text{C}$,	Capacity retention

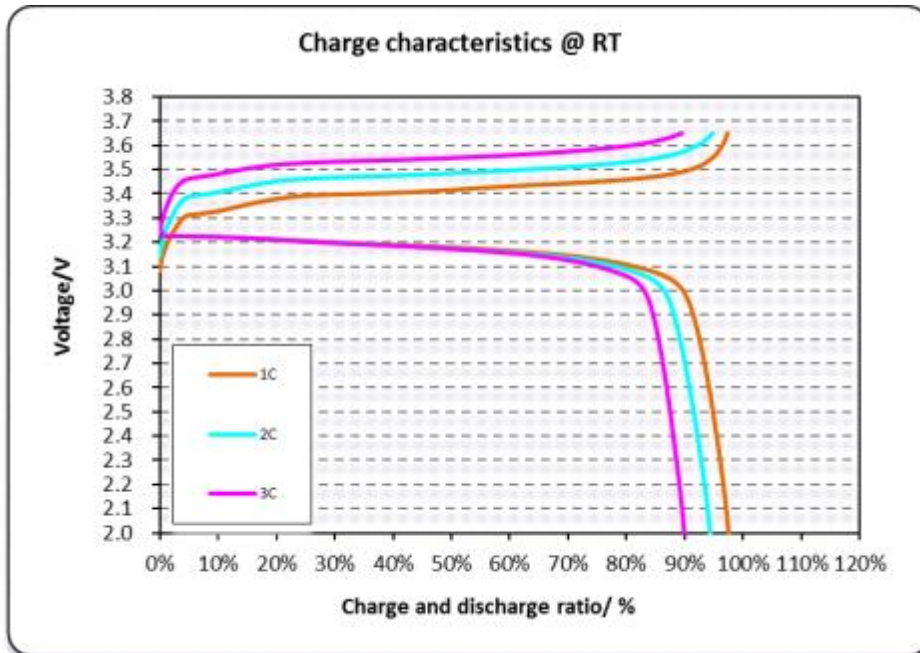
	performance	discharge it to 2.0V with a constant current of 3C.	rate≥90%
5.5	Charge retention and recovery	After the battery is charged according to 4.2, under the condition of ambient temperature of $25\pm 2^{\circ}\text{C}$, put the battery on hold for 28 days, and then discharge it to 2.0V with a constant current of 1C.	Capacity retention rate≥85% Capacity recovery rate≥90%
5.6	cycle life ($25\pm 2^{\circ}\text{C}$)	The cells are charged according to 1C CC/CV 3.65V cut-off current of 0.05C and then put on hold for 30 minutes, then discharged to 2.0V with a constant current of 1C, and put on hold for 30 minutes after discharge, and then proceed to the next charge-discharge cycle, when the capacity retention rate is less than 80% , stop the loop.	Cycle times ≥ 2000

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

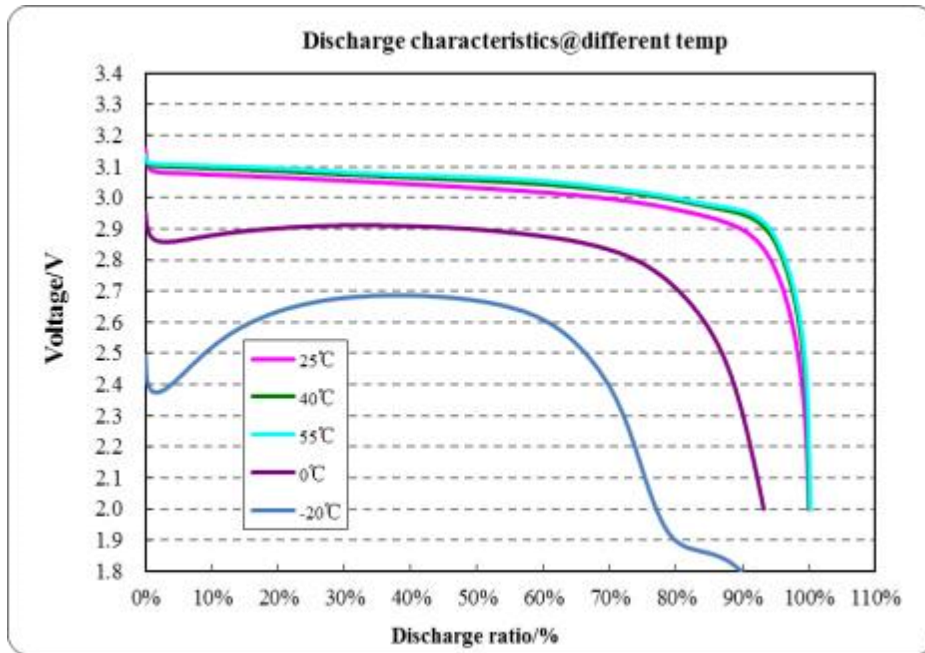
倍率放电曲线 Rate discharge curve



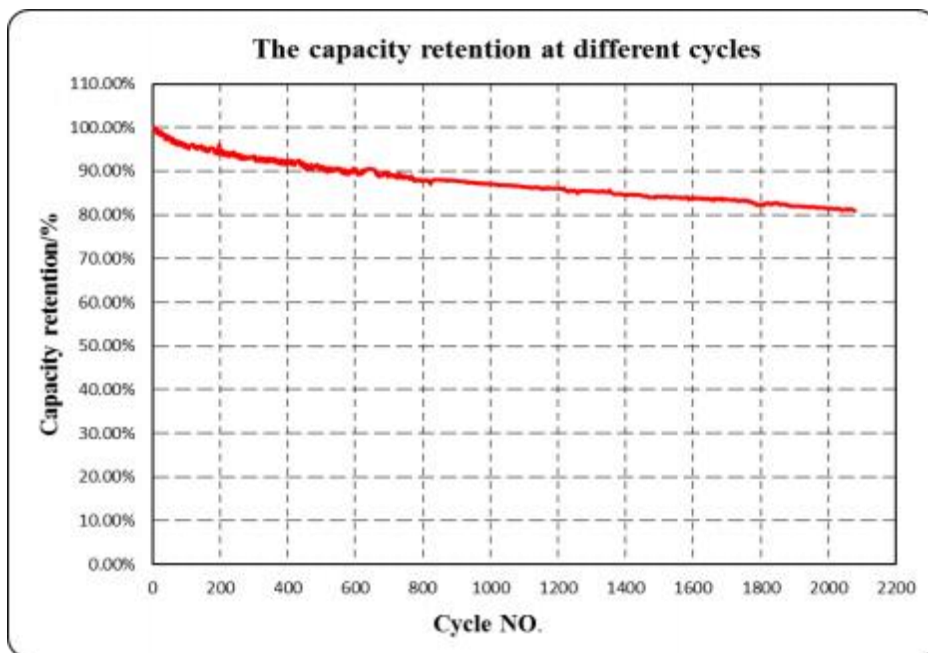
倍率充电曲线 Rate charging curve



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



循环曲线 Circular curve



7. 环境性能 Environmental performance

序号	项目	测试方法	标准																																
7.1	temperature cycle	<p>After the battery is charged according to 4.2, put the battery into the temperature box, adjust the temperature of the temperature box according to the table, cycle 5 times, and observe for 1 hour.</p> <table border="1"> <thead> <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> </thead> <tbody> <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> </tbody> </table>	温度 C°	时间增量 min	累计时间 min	温度变化率 C°/min	25	0	0	0	-40	60	60	13/12	-40	90	150	0	25	60	210	13/12	85	90	300	2/3	85	110	410	0	25	70	480	6/7	The cell should not leak, catch fire, explode or crack
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7.2	low pressure test	<p>After the battery is charged according to the provisions of 4.2, put the battery in a vacuum of -90KPa and let it stand for 6 hours. Take out the battery and let it stand for 6 hours at room temperature to check the appearance of the battery.</p>	The cells should not leak, catch fire, explode or crack																																
7.3	Vibration test	<p>After the cell is charged according to the provisions of 4.2, install the cell fixture on the table top of the vibration table, and adjust the experimental equipment according to the following vibration frequency and corresponding amplitude. In each direction of X, Y and Z, the vibration is cyclically swept from 10~55Hz for 30min, and the 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.</p>	1. The appearance of the cell should have no obvious damage, no leakage, no fire, no explosion, and no cracking; 2. The cell voltage should not be lower than 3.2V.																																
7.4	crash test	<p>After the battery cell is tested according to the provisions of 4.2, the battery cell is fixed on the vibration table according to the three mutually perpendicular axes of X, Y, and Z, respectively, 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.</p>	1. The appearance of the cell has no obvious damage, no leakage, no fire, no explosion, and no cracking; 2. The voltage of a single cell is not less than 3.2V																																

8. 安全测试 Safety test

The following tests should be carried out in a device with forced air exhaust conditions and explosion-proof measures. Before the test, all the cells should be charged according to the provisions of 4.2, and the following tests should be carried out after being put on hold for 24 hours.

序号	项目	Test method	Standard
8.1	Short circuit test	The positive and negative electrodes of the cell are externally short-circuited for 10 minutes, and the external circuit resistance is less than 5 mΩ, and observe for 1 hour.	No fire, no explosion
8.2	Overcharge	Charge with a constant current of 1C until the voltage reaches 1.5 times the charge termination 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	Over-discharge	Discharge at 1C for 90min. Observe for 1h.	No fire, no explosion, no leakage
8.4	crush test	Compression is performed between the surfaces of the two largest areas of the cell, and 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 the weight of 9.1kg fall freely from the height of 610mm, impact the battery core, the battery core Deformation is allowed.	No fire, no explosion
8.6	acupuncture	a) Use φ5mm~φ8mm high-temperature-resistant steel needles to penetrate at a speed of 25±5mm/s from the direction perpendicular to the electrode plate of the cell. The penetration position should be close to the geometric center of the punctured surface, and the steel needle stays in the cell. ; b) Observe for 1h.	No fire, no explosion
8.7	Thermal shock (130°C)	Put the cells in an electric blast drying oven, and the temperature rises from room temperature to 130°C ± 3°C at a rate of 5°C/min and maintains for 30min.	No fire, no explosion

9. 出货

9. Shipping

The cells are shipped according to the voltage of $3.300\pm 0.030V$, 50% SOC or customer requirements, the remaining capacity of the cells before charging after shipment

Depends on storage time and conditions.

10. 质量保证

10. Quality Assurance

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

10.2 Shenzhen Topbond Lithium Battery Co., Ltd. will not replace it free of charge due to customer abuse or misuse.

10.3 Shenzhen Topbond Lithium Battery Co., Ltd. does not assume any responsibility for problems arising from operations that violate the safety rules.

10.4 Shenzhen Topbond Lithium Battery Co., Ltd. does not take any responsibility for problems arising from the use of circuits, battery packs and chargers.

10.5 Defective cells produced by the customer during the cell assembly process after delivery are not included in the scope of the quality assurance of Shenzhen Topbond Lithium Battery Co., Ltd.

10.6 This specification is formulated after negotiation between the two parties. Shenzhen Topbond Lithium Battery Co., Ltd. does not undertake the quality assurance for items outside the specification.

11. 安全守则

11. Safety Rules

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

11.1 Cell Precautions

- a. Do not expose the cells to extreme heat or flames.
- b. It is forbidden to short-circuit the cells, overcharge or overdischarge.
- c. It is forbidden to subject the cells to strong mechanical shocks.
- d. Do not immerse the cell in water or make it hygroscopic.
- e. It is forbidden to disassemble or trim the battery.
- f. It is forbidden to place it with metal objects such as necklaces, coins or hairpins.
- g. It is forbidden to cause obvious damage or deformation of the cell.
- h. Do not connect batteries to sockets.
- i. Direct contact with leaking cells is prohibited.
- j. It is forbidden to mix old and new batteries.
- k. It is forbidden to place the battery cells in the direct sunlight.

- l. Keep the battery away from children.
- m. Acupuncture, hammering or trampling on the cell is prohibited.
- n. Do not hit or throw the battery.
- o. It is forbidden to directly contact the positive and negative poles of the cell with the case.

11.2 电芯使用说明 Instructions for use of battery cells

11.2.1 充电 Charge

- a. The battery charging temperature range is 0°C~45°C.
- b. Charge the battery with a constant current of 1C to 3.65V, and then charge it with a constant voltage of 3.65V until the current is 0.05C. It is not recommended to charge the cell with a current exceeding 2C (C: nominal capacity).
- c. Use a constant current and constant voltage lithium-ion battery charger.

11.2.2 放电 discharge

- a. The recommended discharge termination voltage is 2.0V, and the recommended maximum continuous constant current discharge current is 3C.
- 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. If it is to be stored for a long time (more than 3 months), the cells should be stored in an environment with a temperature range of -10~30°C, low humidity and no corrosive gas.
- b. Do not put the cells under any pressure.
- c. It is recommended to charge and discharge once every 3 months, and must charge and discharge once every 6 months. The charging and discharging method is as follows: under the environment of 25±2°C, 1C constant current discharge to 2.0V, stand for 30min, 1C constant current and constant voltage Charge to 3.65V, cut-off current 0.05C, stand for 30min, discharge to 2.0V at 1C constant current, stand for 30min, charge at 1C constant current for 0.5h.
- d. Based on the protection of battery cells, a good storage environment is necessary.

Note 1. If the customer needs to operate or apply the battery under the conditions other than this document, please consult Shenzhen Topbond Lithium Battery Co., Ltd. for related matters.

Note 2. Shenzhen Topbond Lithium Battery Co., Ltd. is not responsible for any accidents caused by using the battery outside the conditions described in this document.
any liability.

12.安全保证 Security guarantee

For safety reasons, if there are lithium-ion battery system protection circuits, fast charging and other special applications, please consult Shenzhen Topbond Lithium Battery Co., Ltd. first.