

锂离子电芯规格书

型号: Cell__K2770145P__20Ah__LFP

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发布日期	2018.3.13		
发布版本	A0		

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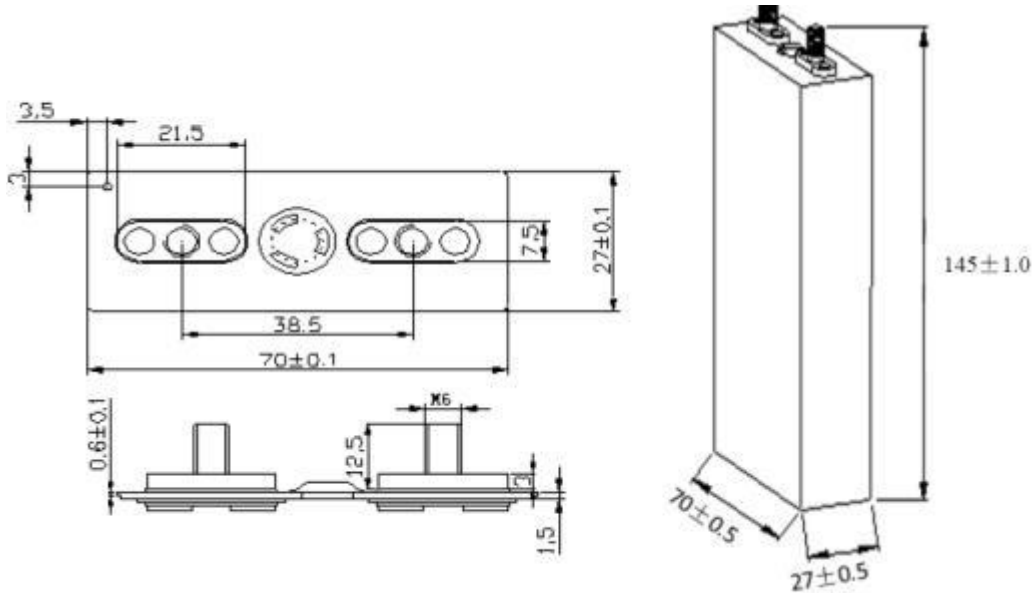
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1. 概述

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



单位: mm

3. 主要技术参数 (RT: 25±2°C)

No	ITEM	STANDARD	REMARK
3.1	Nominal capacity	20.0Ah	RT, 1C
3.2	Minimum capacity	19.5Ah	
3.3	AC internal resistance	≤4mΩ	RT, AC frequency 1000HZ
3.4	Voltage	3.2V	
3.5	weight	520±20g	
3.6	voltage range	3.65~2.00V	
3.7	Recommended charging current	≤1C	
3.8	Recommended discharge 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 time capacity retention≥80%	RT, 1C, 100% DOD
3.13	Charging temperature Tightening torque Exterior	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	Appearance	No cracks, scratches, deformations, stains, electrolyte leakage, etc.	

4. Test Conditions

4.1 Standard Test Conditions

4.1.1 The product test conditions in this specification are temperature: $25\pm 2^{\circ}\text{C}$, relative humidity 15%~90% RH, atmospheric pressure 86~106 kPa.

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 Standard charging mode

When the ambient temperature is $25\pm 2^{\circ}\text{C}$, the cell is discharged to 2.0V with a current of 1C, left for 1h, and then at $25\pm 2^{\circ}\text{C}$

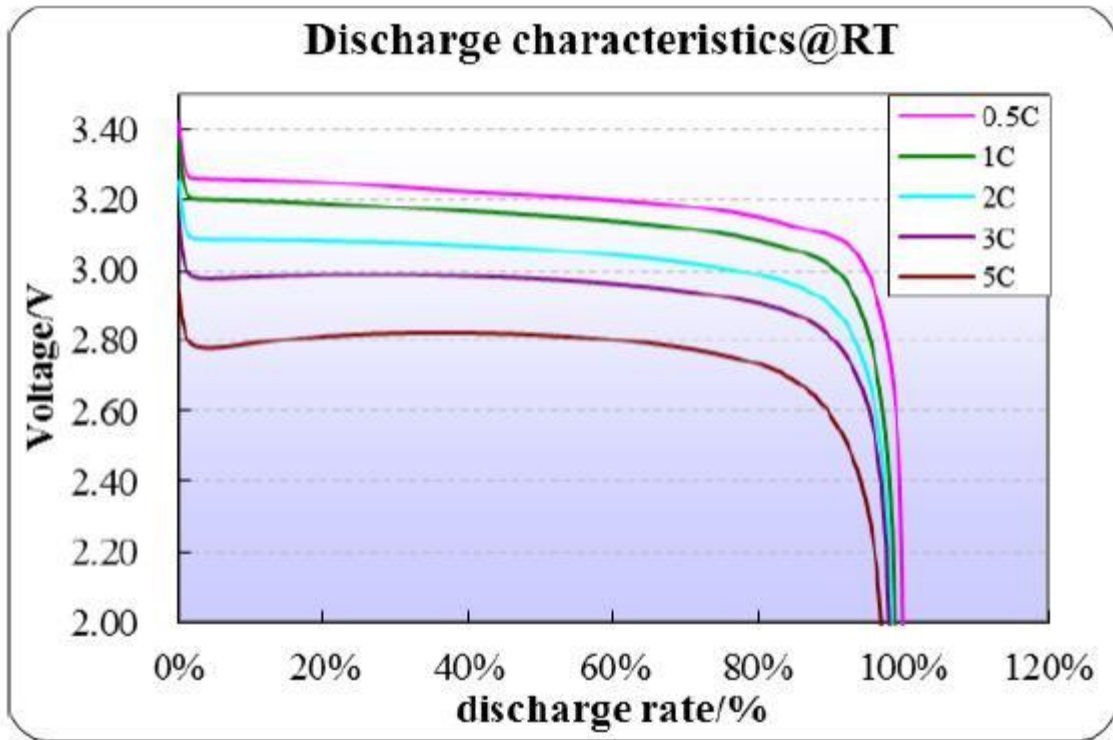
When charging with 1C constant current to 3.65V, transfer to constant voltage charging, stop charging when the charging current drops to 0.05C, and let it stand for 1h.

5. 电性能

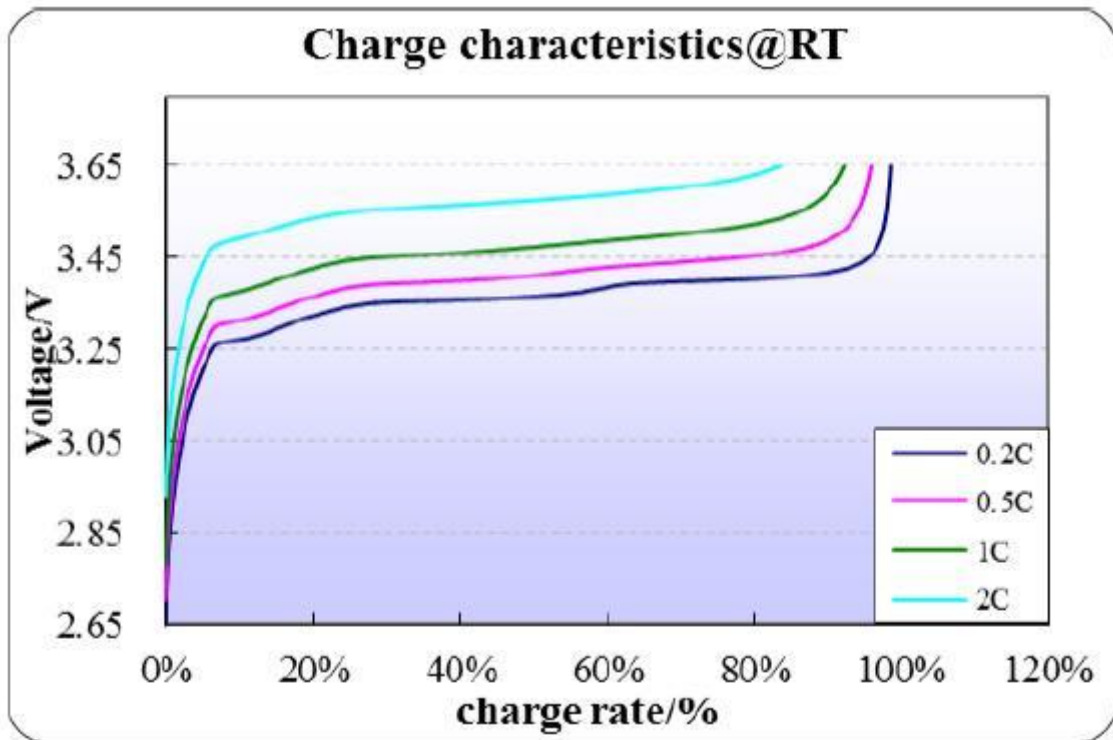
序号	项目	testing method	标准
5.1	High temperature performance	After the battery is charged as specified in 4.2, put the battery in a high temperature box of $55\pm 2^{\circ}\text{C}$ for 5 hours, and then discharge it to 2.0V with a current of 1C. After the experiment, take the battery out and place it at 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.Capacity retention $\geq 95\%$; 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 $\geq 70\%$ 1. 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 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 performance	After the battery is charged as specified in 4.2, under the condition of an ambient temperature of $25\pm 2^{\circ}\text{C}$, discharge it to 2.0V with a constant current of 3C.	Capacity retention rate $\geq 90\%$
5.5	Charge retention and recovery	After the battery is charged according to the provisions of 4.2, under the condition of an 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 $\geq 85\%$ Capacity recovery rate $\geq 90\%$
5.6	Cycle life ($25\pm 2^{\circ}\text{C}$)	The battery cell is charged at 1C CC/CV 3.65V cut-off current 0.05C, then put on hold for 30min, and then discharged to 1C constant current. 2.0V, put it on hold for 30min after discharge, and then perform the next charge-discharge cycle. When the capacity retention rate is less than 80%, the cycle is stopped.	Cycle life ≥ 2000

6. 电性能曲线 (参考)

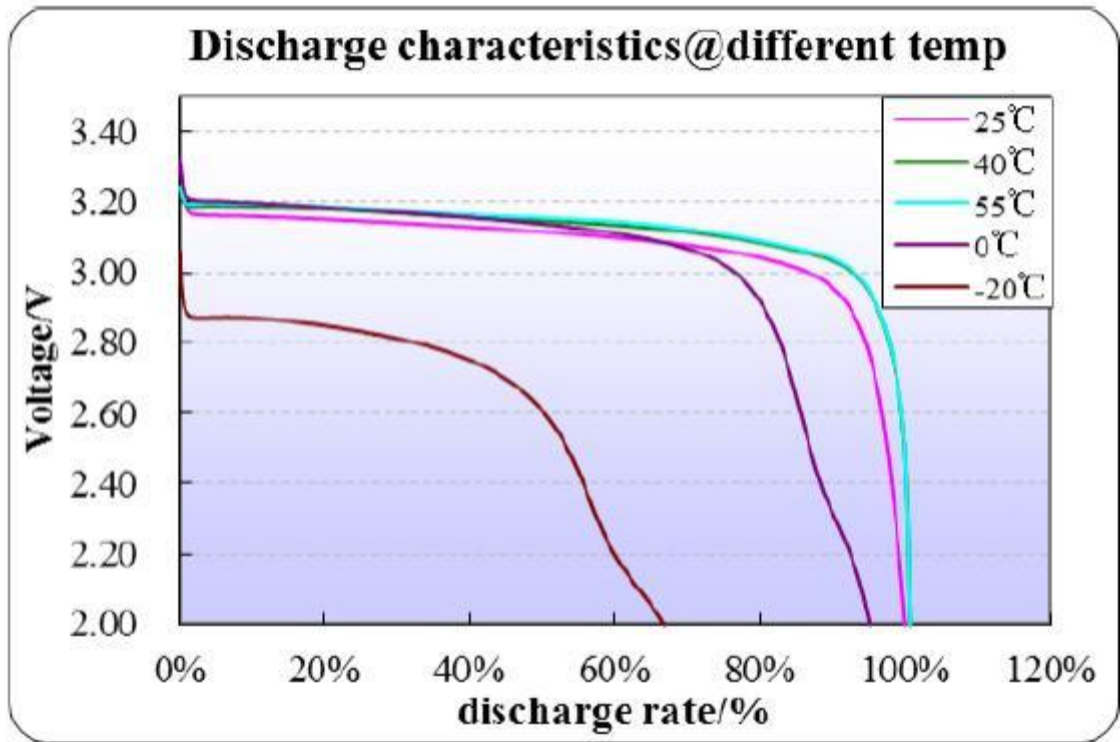
Rate discharge curve



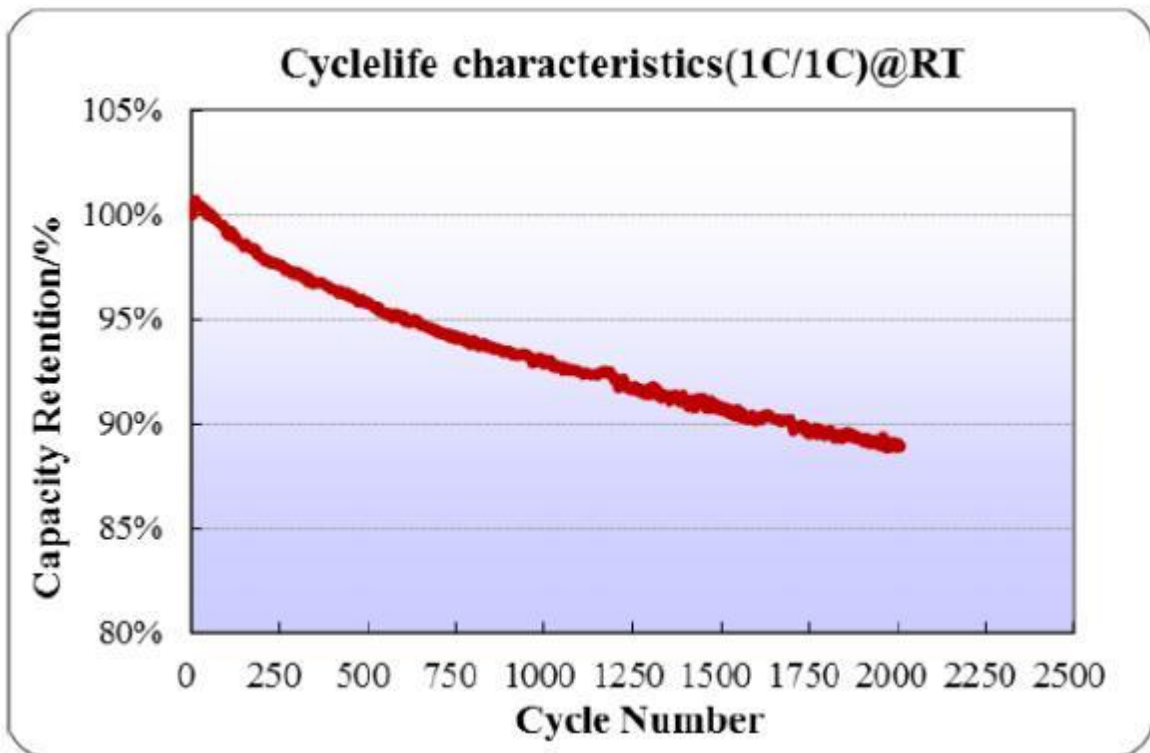
Rate charging curve



High and low temperature discharge curve



cycle curve



7. 环境性能

序号	项目	测试方法	标准																																
7.1	temperature cycle	<p>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.</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 battery 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 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.</p>	The battery cell should not leak, catch fire, explode or crack																																
7.3	Vibration test	<p>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 of the three directions of X, Y, and Z, vibrate cyclically from 10 to 55Hz for 30 minutes, and the frequency sweep rate is 1oct/min:</p> <p>(a) Vibration frequency: 10Hz~30Hz Displacement amplitude (single amplitude): 0.38mm;</p> <p>(b) Vibration frequency: 30Hz~55Hz Displacement amplitude (single amplitude): 0.19mm.</p>	<p>1. The appearance of the battery cell should have no obvious damage, no leakage, no fire, no explosion, no cracking;</p> <p>2. The battery voltage is not lower than 3.2V.</p>																																

7.4	crash test	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 through the fixture, and the collision test is carried out according to the following acceleration and pulse duration: pulse peak acceleration: 100m /s ² , collision frequency: 40~80 times/min, pulse duration: 16min, collision times: 1000±10 times.	1. The appearance of the battery cell has no obvious damage, no leakage, no fire, no explosion, no cracking; 2. The voltage of the single cell is not lower than 3.2V.
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8. Safety test

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

序号	项目	测试方法	标准
8.1	short circuit test	Short-circuit the positive and negative electrodes of the battery 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
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 weight of 9.1kg 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 high-temperature-resistant steel needle of φ5mm~φ8mm 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°C)	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. Delivery

The battery cell is shipped according to the voltage of $3.300\pm 0.030V$, 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. 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 Topband Lithium Battery Co., Ltd. will not replace it for free if it is abused or misused by the customer.

10.3 Shenzhen Topband Lithium Battery Co., Ltd. does not assume any responsibility for problems arising from violations of safety rules.

10.4 Shenzhen Topband Lithium Battery Co., Ltd. is not responsible for any problems arising from the use of circuits, battery packs and chargers.

10.5 After shipment, the bad batteries produced by customers during the battery assembly process are not included in the quality assurance scope of Shenzhen Topband Lithium Battery Co., Ltd.

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

11. safety rules

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

11.2 Battery instructions

11.2.1 Charge

- a. The battery charging temperature ranges from 0°C to 45°C.
- b. Charge it with a constant current of 1C 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 use Charge the cell with more than 2C current (C: nominal capacity).
- C. Use a constant current and constant voltage lithium-ion battery charger.

11.2.2 discharge

- a. The recommended end-of-discharge 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 Storage Recommendations

- a. If it is to be stored for a long time (more than 3 months), the battery cell should be stored in an environment with a temperature range of -10 to 30°C, low humidity and no corrosive gases.
- b. Do not subject the cells to any stress.
- c. It is recommended to charge and discharge once every 3 months, and once every 6 months. The charging and discharging method is as follows: 1C constant current discharge to 2.0V in an environment of 25±2°C, let stand for 30min, 1C constant current and constant voltage Charge to 3.65V cut-off current 0.05C, stand still for 30min, 1C constant current discharge to 2.0V, stand still for 30min, 1C constant current charge for 0.5h.
- d. 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 Shenzhen Topband Lithium Battery Co., Ltd. for relevant matters.

Note 2. Shenzhen Topband Lithium Battery Co., Ltd. will not bear any responsibility for accidents caused by using the battery outside the conditions specified in this document.

12.Security assurance

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