CKAA60140B

Fast charge

Item 项目		Specification 标准	Explain 备注
1	Capacitance 额定容量	20000mAh	@25±3℃
2	Minimum capacity 最低容量	19000mAh	@25±3℃
3	Nominal voltage 标称电压	3.4V	
4	Maximum working voltage 最大工作电压	4.2V	
5	Minimum operating voltage 最小工作电压	2.5V	
6	Direct Current Resistance 直流内阻	≤0.6mΩ	(10ms), 4.2V@25±3℃
7	Alternating Current Resistance 交流内阻	≤0.4mΩ	1kHz, 4.2V@25±3℃
8	Standard charge current 标准充电电流	20A	25±3℃
9	Maximum charging current 最大充电电流	180A	25±3℃
10	Rated current 额定放电电流	20A	25±3℃
11	Max Continuous Discharge Current 最大持续放电电流	540A	@25±3℃, 强制散热
12	Maximum pulse discharge current 最大脉冲放电电流	1000A/1s	@25℃@4.2V
13	Operating temperature* 使用工作温度*	-40~65℃	充放电电流值≤20A

14	Storage Temperature Range (At Shipping SOC) 存储温度范围 (出货电压 SOC)	-20~45℃	-20~25℃，1 年； -20~45℃，3 个月
15	Fast charging cycle life 快充循环寿命（5C 充 3C 放）	≥30000次	@25±3℃， 强制散热
16	Standard cycle life 标准循环寿命（1C 充 1C 放）	≥12000 次	@25±3℃
17	Cell Weight 电池重量	≤865.0g	
18	Cell Dimensions 电池尺寸	Φ60.10×145.00	直径×高度 ±0.5mm

注：工作温度是指单体外壳的最高温度。

Product structure and size 产品结构、尺寸

产品直径 D	产品总体高度 L
60.10±0.5mm	145.00±0.5mm
带套管状态 Casing included	

6. Testing Methods 产品测试方法

6.1 Testing Conditions 测试条件

The standard testing conditions of this product specification are: under standard atmospheric pressure, temperature 25±3℃, relative humidity less than 65%.

本产品规格书标准测试条件为：标准大气压下，温度 25±3℃，相对湿度小于 65%。

6.2 Test equipment 测试设备

(1) Vernier Scale 游标卡尺

The slide caliper should have 0.01mm scale.

游标卡尺的测试精度应为 0.01mm。

(2) Ammeters and Voltmeters 电流表和电压表

The ammeters and voltmeters should have an accuracy of the grade 0.5mA and 0.5mV or higher

电流表和电压表的精度应分别为 0.5mA 和 0.5mV 或以上。

(3) Impedance Meter 电压内阻测试仪

AC Impedance 1000 Hz

交流阻抗测量频率：1000 Hz

(4) Other information 其他信息

- Temperature meter：Precision ≤ 0.5℃

温度仪表要求：精度为≤0.5℃

- Time measurement tolerance：±0.1%

时间测试公差：±0.1%

- The size measurement tolerance；±0.1%

尺寸测量公差：±0.1%

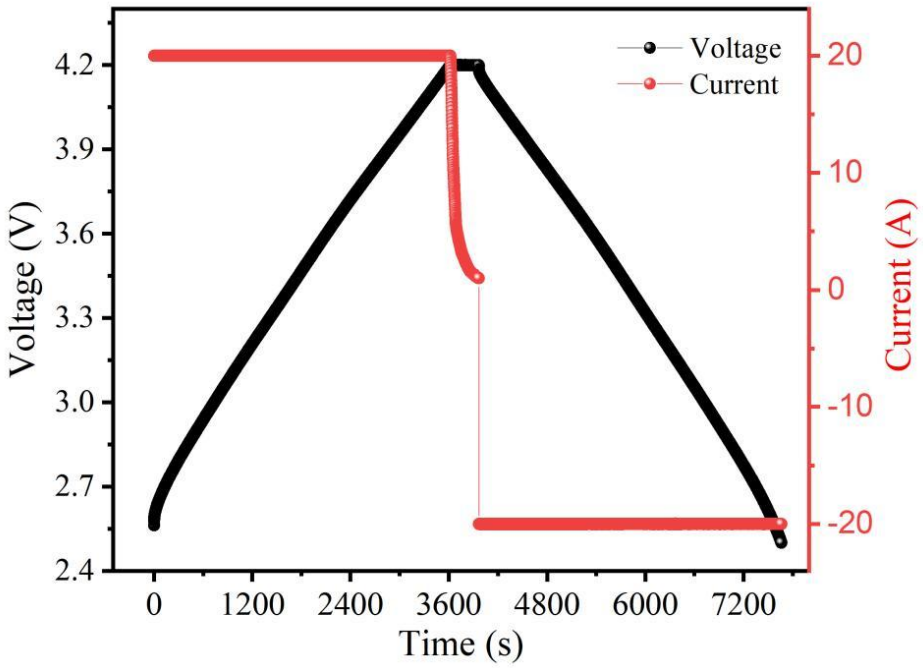
- The quality measurement tolerance 0.1%

质量测量公差：±0.1%

6.3 Test for Capacitance 容量测试

At 25±3℃, discharge the battery with a constant current I to U_{min} before testing. Charge the product at 1C to the set voltage of 4.2V, then charge it at constant voltage to 0.05C and cut off the current. Then, discharge the product at 1C to 2.5V. After standing for 30 seconds, repeat the above process again, and take the capacity value (mAh) after the second discharge as the capacity value of the product.

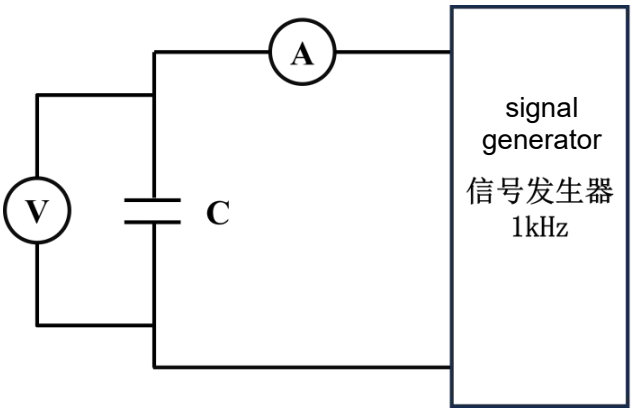
在 25±3℃条件下，在测试前，先将电池用恒定电流 I 放电至 U_{min}。将产品以 1C 充电至设定电压 4.2V 后恒压充电至 0.05C 电流截止，紧接着，以 1C 电流将产品放电至 2.5V。静置 30s 后，再次重复上述过程，取第 2 次放电后的容量值(mAh)为产品的容量值。。



Alternating Current Resistance(ACR) 交流内阻

Charge the cell to 3.2V and keep this voltage for 30min, then using the AC Internal resistance to test its AC Resistance at 1kHz.

常温下，将单体充电至 3.2V 并恒压充电 30min 后，在 1kHz 条件下，采用交流阻抗仪进行交流内阻测试。



Direct Current Resistance(DCR) 直流内阻

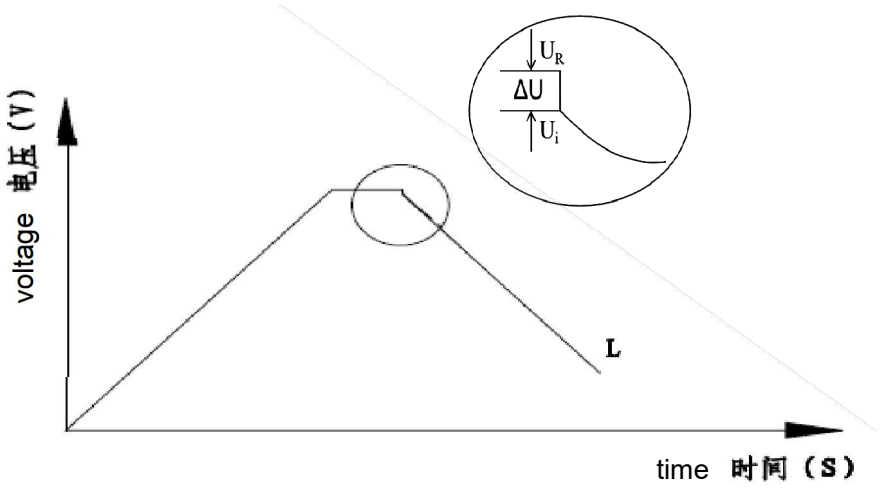
At 25±3℃, discharge the battery with a constant current I to U_{min} before testing. Charge the product at 1C to the set voltage U_R, and then charge it at a constant voltage until the current stops at 0.05C. Record the end time as t_0.

在 25±3℃条件下，在测试前，先将电池用恒定电流 I 放电至 U_{min}。再将产品以 1C 充电至设定电压 U_R 后恒压充电至 0.05C 电流截止，记录结束时刻为 t_0。

Afterwards, discharge the product to 2.5V with a 1C current and record the voltage U_i at t_0+10ms. After standing for 30 seconds, repeat the above process again and calculate the DC internal resistance of the second cycle according to formula (1) as the DC internal resistance of the battery.

后以 1C 电流将产品放电至 2.5V，记录 t_0+10ms 时的电压 U_i。静置 30s 后，再次重复上述过程，按公式(1)计算第 2 次循环的直流内阻，作为电池的直流内阻。

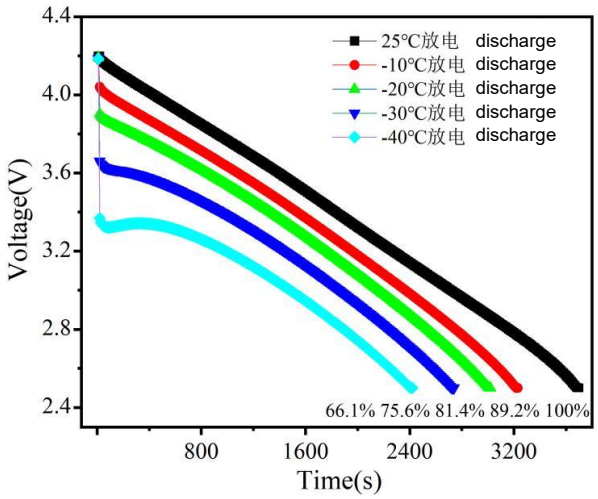
$$R=\Delta U/I=(U_R-U_i).$$



6.6 Test for Low Temperature 低温性能测试

Under the ordered temperature, constant charge the cell to 4.2V and then end it at 0.05C by constant voltage. After this, remove the cell to different temperature condition (keep 2h) and discharge it to 2.5V at 1C current, record its discharge capacitance.

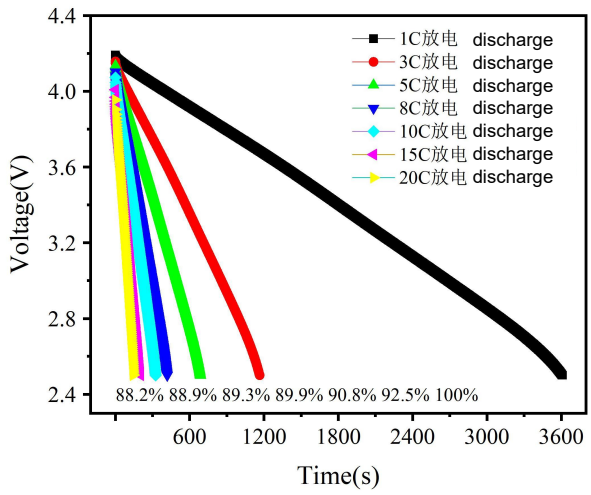
在设定温度条件下，将单体充电至 4.2V 后恒压充电至 0.05C 截止，放入不同温度并保持 2h 后，以 1C 电流将单体放电至 2.5V，记录单体放电过程的容量。

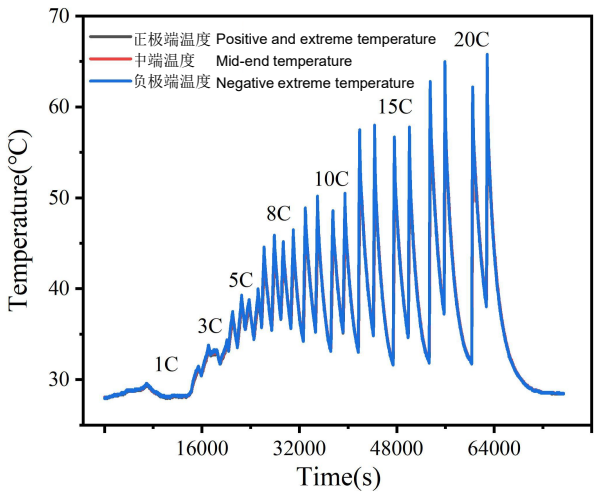


Rate discharge 倍率放电

Under 25±3℃, test the cell's original performance by "Capacitance/resistance method", After charging according to the standard charging method， followed by constant current (N C) discharge to 2.5V at specified discharge rates at 25±3℃.

在 25±3℃条件下，按照“容量/内阻测试”方法测完初始性能后，按标准充电方式充电后，在 25±3℃下以给定放电倍率 N C 恒流放电至 2.5V。





Charging Method 充电方法

Standard Charge 标准充电

Standard Charge refers to charging at a constant current of 20A (1C) to 4.2V at an ambient temperature of 25±3℃, and then charging at a constant voltage until the current is less than 0.05C.

标准充电即在环境温度为 25±3℃的条件下，先以恒定电流 20A(1C)充电至 4.2V，然后恒压充电至电流小于 0.05C。

Rapid Charge 快速充电

Rapid Charge refers to charging at a constant current of 60A (3C) to 4.2V at an ambient temperature of 25±3℃, and then charging at a constant voltage until the current is less than 0.05C.

快速充电即在环境温度为 25±3℃的条件下，先以恒定电流 60A(3C)充电至 4.2V，然后恒压充电至电流小于 0.05C。

8. Electrochemical Characteristics 电化学性能

Item 项目		Test Condition 测试条件	Criteria 检验标准
1	Standard discharge capacity 标准放电容量	At 25±3℃, fully charge the product with standard charging method, and then discharge it at1C to a capacity of 2.50V. 在 25±3℃条件下，将产品以标准充电方式充满电，然后以 1C 放电至 2.50V 截止的容量。	Standard discharge capacity ≥19000mAh 标准放电容量≥19000mAh
2	DCR 直流内阻	Charge the product at 1C to the set voltage U_R, then charge it at a constant voltage until the current cutoff is 0.05C, and record the end time as t_0. Afterwards, discharge the product to 2.5V with a 1C current and record the voltage U_i at t_0+10ms. After standing for 30 seconds, repeat the above process again and calculate the DC internal resistance of the second cycle using the formula $R=\Delta U/I$ as the DC internal resistance of the battery.	≤0.6mΩ

		将产品以1C充电至设定电压U_R后恒压充电至0.05C电流截止，记录结束时刻为t_0。后以1C电流将产品放电至2.5V，记录t_0+10ms 时的电压U_i。静置30s后，再次重复上述过程，按公式 $R=\Delta U/I$ 计算第2次循环的直流内阻，作为电池的直流内阻。	
3	Rate discharge performance 倍率放电性能	Standard charge followed by constant current(N C) discharge to 2.5V at Specified discharge rates at 25±3℃ . 按标准充电方式充电后，在25±3℃下以给定放电倍率NC恒流放电至2.5V。	Capacity Retension $= \frac{\text{NC discharge capacity}}{\text{1C discharge capacity}} \times 100\%$ 容量保持率 $= \frac{\text{NC 放电容量}}{\text{1C 放电容量}} \times 100\%$
4	Fast charging cycle life 快充循环寿命	Under the condition of 25±3℃, charge the product at 5C to 4.0V, discharge at 3C constant current to 2.5V, and let it stand for 30 minutes. After 1000 cycles of testing, the above testing process is a cycle that needs to be repeated 30 times, ultimately achieving 30000 life tests. 在 25±3℃条件下，将产品以 5C 将其充电至4.0V，以3C恒流放电至2.5V并静置30min，循环测试1000周后。上述测试过程为一个周期，测试过程需重复上述30次上述周期，最终实现30000次寿命测试。	Capacity Retension $= \frac{\text{discharge capacity of 30000th cycel}}{\text{original discharge capacity}} \geq 80\%$ 容量保持率 $= \frac{\text{第 30000 次循环的放电容量}}{\text{初始放电容量}} \geq 80\%$
5	Standard cycle life 标准循环寿命	Under the condition of 25±3℃, charge the product at 1C to 4.2V, discharge at 1C constant current to 2.5V, and let it stand for 30 minutes. After 1000 cycles of testing, the above testing process is a cycle that needs to be repeated 12 times, ultimately achieving 12000 life tests. 在25±3℃条件下，将产品以1C将其充电至4.2V，以1C恒流放电至2.5V并静置30min，循环测试1000周后。上述测试过程为一个周期，测试过程需重复上述12次上述周期，最终实现12000次寿命测试。	Capacity Retension $= \frac{\text{discharge capacity of 12000th cycel}}{\text{original discharge capacity}} \geq 80\%$ 容量保持率 $= \frac{\text{第 12000 次循环的放电容量}}{\text{初始放电容量}} \geq 80\%$

6	Discharge temperature performance test 放电温度性能测试	Under the condition of 25±3℃, fully charge the product with standard charging method, and discharge it to 2.5V at a constant current of 1C (20A) at the specified temperature. 25±3℃条件下，将产品以标准充电方式充满电后，在指定温度下以1C（20A）恒流放电截至到2.5V。	-40℃: Capacity retention≥65% -20℃: Capacity retention≥80% 0℃: Capacity retention≥92% 60℃:Capacity retention≥100% -40℃：容量保持率≥65% -20℃：容量保持率≥80% 0℃：容量保持率≥92% 60℃：容量保持率>100%
7	25 ℃ storage performance 25 ℃存储性能	After charge at standard condition, and then stored at 25±3℃ for 30 days. After this, discharge to 2.5V by standard condition. 标准充电方式充满电后25±3℃下存储30天，以标准放电方式放电至2.5V。	Capacity Retension $=\frac{\text{Residual capacity after 30 days storage}}{\text{original discharge capacity}}$ ≥ 80% 容量保持率 $=\frac{\text{存储 30 天剩余容量}}{\text{初始容量}}$ ≥ 80% Capacity recovery rate $=\frac{\text{Recover capacity after 7 days storage}}{\text{original discharge capacity}}$ =95% 容量恢复率 $=\frac{\text{存储 30 天恢复容量}}{\text{初始容量}}$ ≥ 95%
8	High temperature storage performance 高温储存性能	Standard charge to 4.2V and stored at 55℃ for 7 days, and then rest at 25±3℃ for 5 hours, after this, discharge to 2.5V by 1C current. 55℃下以标准充电方式充电至4.2V并存储7天，后在25±3℃下搁置5h，并以标准放电方式放电至2.5V。	Capacity Retension $=\frac{\text{Residual capacity after 7days storage}}{\text{original discharge capacity}}$ ≥75% 容量保持率 $=\frac{\text{存储 7 天剩余容量}}{\text{初始容量}}$ ≥ 75% Capacity recovery rate $=\frac{\text{Recover capacity after 7 days storage}}{\text{original discharge capacity}}$ ≥90% 容量恢复率 $=\frac{\text{存储 7 天恢复容量}}{\text{初始容量}}$ ≥ 90%

Mechanical Properties 机械性能

Test Item 测试项目		Test Condition 测试条件	Criteria 检验标准
1	Drop Test 跌落测试	Under normal temperature conditions, fully charge the battery to 4.2V, and drop the battery cell from a height of 1.5m in the direction of positive and negative poles to the cement floor. After the experiment, place it for at least 1 hour and conduct a visual inspection. 常温条件下，将电池充满电至 4.2V状态，电芯从1.5m的高度以正负极柱的方向跌落至水泥地面，实验后放置至少1h后进行外观检查。	No explosion, no fire 不爆炸、不起火
2	Vibration Test 振动测试	At room temperature, fix the fully charged battery cell with standard charging method on the vibration table, increase the vibration frequency from 7Hz to 200Hz within 15 minutes, and then reduce it to 7Hz. Repeat the above steps for 3 hours. Maintain an acceleration of 1g during the process of increasing from 7Hz to 18Hz, and maintain an acceleration of 8g during the process of increasing from 18Hz to 200Hz. 在室温条件下，将以标准充电方式充满电的电芯固定在振动台上，在15分钟内将振动频率由7Hz增加到200Hz后再降低至7Hz，重复上述步骤实验3h。7Hz增加到18Hz的过程中保持1g的加速度，18Hz增加到200Hz的过程中保持8g的加速度。	No explosion, no fire, no leakage,Voltage drop less than 5% 不爆炸、不起火、不漏液、电压下降小于5%

Safety 安全性能

Test Item 测试项目		Test Condition 测试条件	Criteria 检验标准
1	Hot Test 高温测试	A cell is to be heated in a gravity convection or circulating air oven. The temperature of the oven is to be raised at a rate of 5°C±2°C per minute to a temperature of 130°C±2°C and remain for 30 min and observed 1h. 将电芯放在电热鼓风干燥箱中加热，温度以 5°C±2°C/min 的速率由室温升至 130°C±2°C 并保持 30min，观察 1h。	No explosion, no fire 不爆炸、不起火
2	Sea Water Immersion Test 海水浸泡	The cell was immersed in 3.5%Nacl solution (mass fraction, simulated seawater composition at normal temperature) for 2h. 将电芯完全浸入 3.5%NaCl 溶液（质量分数，模拟常温下的海水成分）中搁置 2h。	No explosion, no fire 不爆炸、不起火
3	Over-discharge Test 过放电	Constant discharge with 1C current for 90min ，then observed for 1h. 以 1C 电流恒流放电 90min，观察 1h。	No explosion, no fire,no leakage 不爆炸、不起火、不漏液
4	Over-charge Test 过充电	Charge the battery at 1C to 4.2V and cut off the current at 0.1C, then charge at 0.5C until the voltage reaches 4.75V or the charging time reaches 50min, and then stop charging. Observe the status of the battery for 60min. 电池以 1C 充满电至 4.2V 且截至电流 0.1C，然后以 0.5C 充电至电压达到 4.75V 或充电时间达 50min 后停止充电，观察 60min 电池的状态	No explosion, no fire 不爆炸、不起火

5	Short-circuit Test 短路测试	Short-circuit the standard charged cell by connecting positive and negative terminal by less 5 mΩ wire, until the cell case temperature has returned to be 20% less then peak temperature. 短接电芯的正负极，外部线路总电阻＜5mΩ，当电芯温度下降到比峰值低约20%，结束实验	No explosion, no fire 不爆炸、不起火
6	Thermal Shock Test 热冲击测试	After fully charged according to the standard charge method, the cell is put in an oven. Then set the oven temperature as follows: (1)Decrease the oven temperature from chamber temperature to -40℃ within 60 min and keep the cell under -40℃ for 90 min; (2)Raise the oven temperature from -40℃ to 25℃ within 60min; (3)Raise the oven temperature from 25℃ to 85℃ within 90 min and keep the cell under 85℃ for 110 min; (4)Decrease the oven temperature from 85℃ to 25℃ within 70 min; (5)Repeat the sequence for a further 4 cycles.Afterwards, the cell is observed for 1h. 电芯按标准充电方式充电后放入温度箱中，然后按以下步骤调节温度箱的温度： (1)在 60min 内由 25℃降温至-40℃，保持90min； (2)在 60min 内温度由-40℃升至 25℃； (3)在 90min 内温度由 25℃升至 85℃，保持110min； (4)在 70min 内温度由 85℃降至 25℃； (5)循环上述步骤 4 次。结束后观察 1h。	No explosion, no fire 不爆炸、不起火

7	Low Pressure Test 低气压测试	After charging according to the standard charging method, the battery cell is stored for 6 hours at 25±3℃ and an absolute pressure of 11.6kPa. Low-pressure area test shall be carried out according to UN38.3 standard. 电芯按标准充电方式充电后，在 25±3℃、绝对压力为 11.6kPa 条件下存储 6 小时。低气压测试按照 UN38.3 标准执行。	No explosion, no fire, no leakage 不爆炸、不起火、不漏液

11. Satus of the Cell as of Ex-factory 电芯出厂状态

The battery cell should ensure transportation within the range of 3.10V to 3.50V (20-50% SOC)

电芯应保证在 3.30V 至 3.50V(20~35%SOC)范围内转运。

12. Instructions and precautions 使用指导和注意事项

12.1 Instructions 使用指导

- The operating temperature of ultra fast charging lithium-ion batteries should not exceed the upper or lower limit of rated temperature.
  超快充锂离子电池的使用温度不宜超过额定温度上限或下限。
- Ultra fast charging lithium-ion batteries should be used within the rated voltage range.
  超快充锂离子电池应在额定电压区间下使用。
- Please confirm the polarity of the ultra fast charging lithium-ion batteries before use, and reverse connection is prohibited.
  超快充锂离子电池在使用之前请确认极性，禁止反接。
- The external environmental temperature has a significant impact on the lifespan of ultra fast charging lithium-ion batteries. Please stay away from heat sources.
  外界环境温度对超快充锂离子电池的寿命具有重要影响，请远离热源。

- Do not come into direct contact with water, oil, acid, or alkali for ultra fast charging lithium-ion batteries.
  超快充锂离子电池请勿直接接触水、油、酸或碱。
- Do not squeeze, nail or disassemble ultra fast charging lithium-ion batteries.
  请勿挤压、钉刺或拆解超快锂离子电池。
- Do not squeeze, puncture, or disassemble ultra fast charging lithium-ion batteries.
  请勿随意丢弃超快充锂离子电池，废弃时请根据国家环保标准进行处理。
- This product has a certain voltage value before shipment. Do not short-circuit the positive and negative terminals during use.
  本产品发货前已具有一定电压值，使用过程切勿使正负极端短路。

Storage 储存

- Ultra fast charging lithium-ion batteries should not be placed in places with a relative humidity of over 85% or containing toxic gases. In such environments, the leads and casing are prone to moisture and corrosion, leading to circuit breakers in lithium-ion batteries.
  超快充锂离子电池不可处于相对湿度为 85%以上或含有有毒气体的场所，该种环境下引线及壳体易受潮及腐蚀，导致超快充锂离子电池断路。
- If batteries need to be stored for a long time, please store them in a well ventilated area with a temperature of25±3C, a relative humidity of below 60%, a voltage not exceeding 3.50V, and no exposure to sunlight.
  电池若需长期储存，请在温度 25±3℃，相对湿度 60%以下，电压不超过 3.50V，通风良好的场所存放，严禁暴晒。

Shipment 运输

- The capacity of delivery cell is approximately at 20-50% of charging. It is not specified more than 50% capacityremain at customer, because of self-discharge. During transportation, keep the cell from acutely vibration, impacting, solarization, drenching.
  出货电芯处 20-50%电量状态，由于电芯存在自耗，运送到客户端的电芯无法完全保证 50%荷电量。运输过程应防止剧烈振动、冲击、日晒雨淋。