



中国认可
国际互认
检测
TESTING
CNAS L10100

Report No./报告编号:
LP24020141C01-01

UN38.3 Test Report

UN38.3 检测报告

Product Name: Lithium ion Battery 18650
产品名称: 锂离子电池 18650

Applicant: JVCKENWOOD USA Corporation
委托单位:

Applicant Address: 4001 Worsham Ave, Long Beach, California, United States
委托单位地址:

Date of issue: 2024-06-14
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Dongguan Lepont Testing Service Co., Ltd.

东莞市力邦检测服务有限公司

Address: Room 202, Building 1, No. 65, Jiulong Road,
Dongcheng Subdistrict, Dongguan, Guangdong, China
地址: 广东省东莞市东城街道九龙路 65 号 1 栋 202 室

Tel.电话: +86-(0769)-8308 9988 Website 网址: <http://www.lepont.com.cn>

General Information 基本信息			
Manufacturer 制造商	Huizhou Dinggao Battery Co.,LTD 惠州市鼎高电池有限公司		
Manufacturer Address 制造商地址	No. 16, 6 SOUTH Road Laohuling Group, BaiGang Village, Xiaojingkou District, Huicheng Area, Huizhou, Guangdong Province, China 广东省惠州市惠城区小金口街道柏岗村老虎岭南 6 路 16 号		
Factory 生产工厂	Huizhou Dinggao Battery Co.,LTD 惠州市鼎高电池有限公司		
Factory Address 生产工厂地址	No. 16, 6 SOUTH Road Laohuling Group, BaiGang Village, Xiaojingkou District, Huicheng Area, Huizhou, Guangdong Province, China 广东省惠州市惠城区小金口街道柏岗村老虎岭南 6 路 16 号		
Product Name 产品名称	Lithium ion Battery 锂离子电池		
Model 型号	18650	Rating Parameter 额定参数	3.7V, 2000mAh, 7.4Wh
Manufacturer Telephone 制造商电话	+86-13823358834	E-mail 邮箱	574163753@qq.com
Accepted date 接样日期	2024-03-07	Test Date 测试日期	2024-03-07 ~ 2024-03-18
Testing Laboratory 测试实验室	Dongguan Lepont Testing Service Co., Ltd. 东莞市力邦检测服务有限公司		
Testing Address 测试地址	Room 202, Building 1, No.65, Jiulong Road, Dongcheng Subdistrict, Dongguan, Guangdong, China 广东省东莞市东城街道九龙路 65 号 1 栋 202 室		
Test method and criterion 测试方法和判定标准	UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/Subsection 38.3 联合国《试验和标准手册》(第 8 版) 38.3 节		
Test Items 测试项目:			
<input checked="" type="checkbox"/> T.1: Altitude simulation 高度模拟	PASS/通过	<input checked="" type="checkbox"/> T.5: External short circuit 外部短路	PASS/通过
<input checked="" type="checkbox"/> T.2: Thermal Test 温度试验	PASS/通过	<input type="checkbox"/> T.6: Crush 挤压/ <input checked="" type="checkbox"/> Impact 撞击	PASS/通过
<input checked="" type="checkbox"/> T.3: Vibration 振动	PASS/通过	<input checked="" type="checkbox"/> T.7: Overcharge 过充	PASS/通过
<input checked="" type="checkbox"/> T.4: Shock 冲击	PASS/通过	<input checked="" type="checkbox"/> T.8: Forced discharge 强制放电	PASS/通过
Test Conclusion 测试结论: The sample has passed the test items of UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.8/ Subsection 38.3 经测试, 该产品符合联合国《试验和标准手册》(第 8 版) 38.3 节。			
Remark: P-Pass, F-Fail, N/A-Not Applicable 注: P-通过, F-失败, N/A-不适用			
Tested by: 检测:	叶深威		Dongguan Lepont Testing Service Co., Ltd. (Stamp 签章)
Reviewed by: 审核人:	福春辉		
Approved by: 批准人:	陈列光		

General product information 产品信息:			
Nominal Voltage 标称电压	3.7V	Rated Capacity 额定容量	2000mAh
Total Energy 总能量	7.4Wh	Limited Charge Voltage 充电上限电压	4.25V
Standard Charging Current 标准充电电流	400mA	Standard Discharge Current 标准放电电流	400mA
Max. Continuous Charging Current 最大持续充电电流	2000mA	Max. Continuous Discharge Current 最大持续放电电流	2000mA
Cut-off Voltage 放电截止电压	2.75V	Model number of the cell 内部电芯型号	IMR18650-2000mAh
Cell Designation 电芯连接方式	1S1P 1串1并	Rated Capacity of Cell 电芯额定容量	2000mAh
Max. Continuous Discharge Current of Cell 电芯最大持续放电电流	2000mA	Cell Size 电芯尺寸	(Φ18.3×65.5)mm
Battery Size 电池尺寸	(Φ18.5×67.5)mm	Battery Appearance 电池外观	Approximate Green Cylinder 绿色近圆柱体

Test Item 测试项目	Sample No.编号	Sample State 样品状态
T.1-T.5	LP24020141C01-B001~ LP24020141C01-B005	At first cycle, in fully charged states 第1个充放电循环满电状态
	LP24020141C01-B006~ LP24020141C01-B010	After 25 cycles ending in fully charged states 第25个充放电循环后满电状态
T.6	LP24020141C01-B011 ~ LP24020141C01-B015	At first cycle at 50% of the design rated capacity. 第1个充放电循环 50%的设计额定容量状态
	LP24020141C01-B016 ~ LP24020141C01-B020	After 25 cycles ending at 50% of the design rated capacity. 第25个充放电循环后 50%的设计额定容量状态
T.7	LP24020141C01-B021 ~ LP24020141C01-B024	At first cycle, in fully charged states 第1个充放电循环满电状态
	LP24020141C01-B025~ LP24020141C01-B028	After 25 cycles ending in fully charged states 第25个充放电循环后满电状态
T.8	LP24020141C01-B029~ LP24020141C01-B038	At first cycle, in fully discharged states 第1个充放电循环完全放电状态
	LP24020141C01-B039 ~ LP24020141C01-B048	After 25 cycles ending in fully discharged states 第25个充放电循环后完全放电状态
Test environment condition: Ambient temperature: 20 ± 5°C, humidity: 30% - 80% 环境温度: 20 ± 5°C, 湿度: 30% - 80%		

Test Procedure: 测试程序:

Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.8 shall be conducted using not otherwise tested cells and batteries. Test T.7 may be conducted using undamaged batteries previously used in Tests T.1 to T.5 for purposes of testing on cycled batteries.

试验T.1至T.5应在同一电芯或电池上按顺序进行。试验T.6和T.8应使用未经其他试验的电芯和电池进行。试验T.7可以使用试验T.1至测试T.5中使用过的且未损坏电池进行。

In order to quantify the mass loss, the following procedure is provided:

$$\text{Mass loss(\%)}=(M_1-M_2)/M_1\times 100$$

为了量化质量损失, 可用以下公式计算:

$$\text{质量损失(\%)}=(M_1-M_2)/M_1\times 100$$

Where M_1 is the mass before the test and M_2 is the mass after the test. When mass loss does not exceed the values in Table below, it is considered as "no mass loss".

式中: M_1 是试验前的质量, M_2 是试验后的质量。如果质量损失不超过下表所列的数值, 应视为“无质量损失”。

Mass M of cell or battery 电芯或电池的质量	Mass loss limit 质量损失限值
$M < 1\text{g}$	0.5%
$1\text{g} \leq M \leq 75\text{g}$	0.2%
$M > 75\text{g}$	0.1%

In tests T.1 to T.4, cells or batteries meet mass loss limit requirement and there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.

在 T.1 至 T.4 的试验中, 电芯或电池须满足质量损失限值要求还需无渗漏、无泄气、无解体、无破裂和无起火, 并且每个试验电芯或电池在试验后的开路电压不小于其在进行这一试验前电压的 90%。

Clause 章节	Requirement 标准要求	Result 结果	Vedict 判定
38.3.4	Procedure 程序		P
38.3.4.1	Test T.1: Altitude simulation 试验 1: 高度模拟		P
38.3.4.1.1	Purpose: This test simulates air transport under low-pressure conditions. 目的: 本试验模拟了低气压条件下的航空运输		P
38.3.4.1.2	Test procedure: Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20 ± 5°C). 试验程序: 试验电芯和电池被放置在压力等于或低于 11.6 kPa 和环境温度(20±5°C)下存放至少 6 小时。	11.6 kPa, 6 hours	P
38.3.4.1.3	Requirement: Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states. 要求: 电芯和电池须无渗漏、无泄气、无解体、无破裂和无起火, 并且每个试验电芯在试验后的开路电压不小于其在进行这一试验前电压的 90%。有关电压的要求不适用于完全放电状态下的试验电芯和电池。	See Table 1 见表 1	P
38.3.4.2	Test T.2: Thermal test 试验 T.2: 温度试验		P
38.3.4.2.1	Purpose: This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes. 目的: 本试验评估电芯和电池的密封完整性和内部电气连接, 试验是利用快速和极端的温度变化进行的。		P
38.3.4.2.2	Test procedure: Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72 ± 2°C, followed by storage for at least six hours at a test temperature equal to -40 ± 2°C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells are to be stored for 24 hours at ambient temperature (20 ± 5°C). 试验程序: 试验电芯和电池放置在试验温度等于 72 ± 2°C 的条件下存放至少 6 小时, 接着在试验温度等于 -40 ± 2°C 的条件下存放至少 6 小时。两个极端试验温度之间的最大时间间隔为 30 分钟。此程序重复进行, 共完成 10 次, 接着将所有试验电池在环境温度(20 ± 5°C)下存放 24 小时。		P
	For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours. 对于大型电芯和电池, 暴露在极端试验温度下的时间应至少 12 小时。		N/A

Clause 章节	Requirement 标准要求	Result 结果	Vedict 判定
38.3.4.2.3	<p>Requirement: Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell and battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states.</p> <p>要求: 电芯和电池须无渗漏、无泄气、无解体、无破裂和无起火, 并且每个试验电芯或电池在试验后的开路电压不小于其在进行这一试验前电压的 90%。有关电压的要求不适用于完全放电状态下的试验电芯和电池。</p>	See Table 2 见表 2	P
38.3.4.3	<p>Test T.3: Vibration 试验 T.3: 振动</p>		P
38.3.4.3.1	<p>Purpose: This test simulates vibration during transport. 目的: 本试验模拟运输过程中的振动</p>		P
38.3.4.3.2	<p>Test procedure: Cell and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face.</p> <p>试验程序: 电芯和电池紧固于振动台台面, 但不得造成电芯变形, 并能准确可靠地传播振动。振动应是一个正弦波形, 对数扫描频率在 7 Hz 和 200 Hz 之间进行对数扫描, 并在 15 分钟内回到 7 Hz。这一振动过程须对三个互相垂直的电芯安装方位的每一方向重复进行 12 次, 总共为时 3 小时。其中一个振动方向必须与端面垂直。</p>		P
	<p>The logarithmic frequency sweep shall differ for cells and batteries with a gross mass of not more than 12kg (cells and small batteries), and for batteries with a gross mass of more than 12 kg (large batteries).</p> <p>做对数频率扫描, 对总质量不超过 12kg 的电芯和电池(电芯和小型电池)和总质量大于 12kg 的电池(大型电池)有所不同。</p>		P
	<p>For cells and small batteries: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 g_n occurs (approximately 50 Hz). A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200 Hz.</p> <p>对电芯和小型电池: 从 7 Hz 开始, 保持 1 g_n 的最大加速度, 直到频率达到 18 Hz。然后将振幅保持在 0.8mm (总位移 1.6mm), 并增加频率直到峰值加速度达到 8 g_n (频率约为 50 Hz)。将峰值加速度保持在 8 g_n 直到频率增加到 200 Hz。</p>		P

Clause 章节	Requirement 标准要求	Result 结果	Vedict 判定
	<p>For large batteries: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 g_n occurs (approximately 25 Hz). A peak acceleration of 2 g_n is then maintained until the frequency is increased to 200 Hz.</p> <p>对大型电池: 从7 Hz开始, 保持1 g_n的最大加速度, 直到频率达到18 Hz。然后将振幅保持在0.8mm (总位移1.6mm), 并增加频率直到峰值加速度达到2 g_n (频率约为25 Hz)。将峰值加速度保持在2 g_n直到频率增加到200 Hz。</p>		N/A
38.3.4.3.3	<p>Requirement: Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states.</p> <p>要求: 电芯和电池实验中和试验后无渗漏、无泄气、无解体、无破裂和无起火, 并且每个试验电芯或电池在第三个垂直安装方位上的试验后立即测得得开路电压不小于其在进行这一试验前电压的 90%。有关电压的要求不适用于完全放电状态下的试验电芯和电池。</p>	See Table 3 见表 3	P
38.3.4.4	<p>Test T.4: Shock 试验 T.4: 冲击</p>		P
38.3.4.4.1	<p>Purpose: This test assesses the robustness of cells and batteries against cumulative shocks.</p> <p>目的: 本试验评估电芯和电池抵抗累积冲击的耐受强度</p>		P
38.3.4.4.2	<p>Test procedure: Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery.</p> <p>试验程序: 试验电芯和电池用刚性支架紧固在试验装置上, 支架支撑着每个试验电池的所有安装面。</p>		P
	<p>Each cell shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds.</p> <p>每个电芯须经受峰值加速度 150g_n 和脉冲持续时间 6ms 的半正弦波冲击</p>		N/A
	<p>Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds.</p> <p>或者, 大型电芯须经受峰值加速度 50g_n 和脉冲持续时间 11ms 的半正弦波冲击</p>		N/A
	<p>Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for</p>	150g _n , 6ms	P

Clause 章节	Requirement 标准要求	Result 结果	Verdict 判定																		
	<p>large batteries. The formulas below are provided to calculate the appropriate minimum peak accelerations.</p> <table border="1" data-bbox="336 392 1066 770"> <thead> <tr> <th>Battery</th> <th>Minimum peak acceleration</th> <th>Pulse duration</th> </tr> </thead> <tbody> <tr> <td>Small batteries</td> <td> 150 g_n or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{100850}{\text{mass}^a}\right)}$ whichever is smaller </td> <td>6 ms</td> </tr> <tr> <td>Large batteries</td> <td> 50 g_n or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{30000}{\text{mass}^a}\right)}$ whichever is smaller </td> <td>11 ms</td> </tr> </tbody> </table> <p>^a Mass is expressed in kilograms</p> <p>每个电池因根据电池的质量而收到峰值加速度的正半弦波冲击。对于小型电池的脉冲持续时间为 6ms，对于大型电池的脉冲持续时间应为 11ms，下面的公式用于计算适当的最小峰值加速度。</p> <table border="1" data-bbox="336 952 1075 1330"> <thead> <tr> <th>电池</th> <th>最小峰值加速度</th> <th>脉冲持续时间</th> </tr> </thead> <tbody> <tr> <td>小型电池</td> <td> 150 g_n或公式结果中的较小值 $\text{Acceleration}(g_n) = \sqrt{\left(\frac{100850}{\text{mass}^*}\right)}$ </td> <td>6 ms</td> </tr> <tr> <td>大型电池</td> <td> 50 g_n或公式结果中的较小值 $\text{Acceleration}(g_n) = \sqrt{\left(\frac{30000}{\text{mass}^a}\right)}$ </td> <td>11 ms</td> </tr> </tbody> </table> <p>^a 质量单位用 kg 计算</p>	Battery	Minimum peak acceleration	Pulse duration	Small batteries	150 g _n or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{100850}{\text{mass}^a}\right)}$ whichever is smaller	6 ms	Large batteries	50 g _n or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{30000}{\text{mass}^a}\right)}$ whichever is smaller	11 ms	电池	最小峰值加速度	脉冲持续时间	小型电池	150 g _n 或公式结果中的较小值 $\text{Acceleration}(g_n) = \sqrt{\left(\frac{100850}{\text{mass}^*}\right)}$	6 ms	大型电池	50 g _n 或公式结果中的较小值 $\text{Acceleration}(g_n) = \sqrt{\left(\frac{30000}{\text{mass}^a}\right)}$	11 ms		
Battery	Minimum peak acceleration	Pulse duration																			
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小型电池	150 g _n 或公式结果中的较小值 $\text{Acceleration}(g_n) = \sqrt{\left(\frac{100850}{\text{mass}^*}\right)}$	6 ms																			
大型电池	50 g _n 或公式结果中的较小值 $\text{Acceleration}(g_n) = \sqrt{\left(\frac{30000}{\text{mass}^a}\right)}$	11 ms																			
	<p>Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the cell or battery for total of 18 shocks.</p> <p>每个电芯或电池需在三个互相垂直的安装方位的正方向经受三次冲击，接着在反方向经受三次冲击，总共经受 18 次冲击。</p>		P																		
38.3.4.4.3	<p>Requirement: Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell and battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states.</p> <p>要求：电芯和电池须无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电芯或电池在试验后的开路电压不小于其在进行这一试验前电压的 90%。有关电压的要求不适用于完全放电状态下的试验电芯和电池。</p>	See Table 4 见表 4	P																		

Clause 章节	Requirement 标准要求	Result 结果	Vedict 判定
38.3.4.5	Test T.5: External short circuit 试验 T.5: 外部短路		P
38.3.4.5.1	Purpose: This test simulates an external short circuit 目的: 本试验模拟外部短路		P
38.3.4.5.2	Test procedure: The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case. This period of time depends on the size and design of the cell or battery and should be assessed and documented. 试验程序: 待测电芯或电池应加热一段时间, 使其外表面温度达到均匀稳定在 57 ± 4 °C的温度, 加热时间取决于电芯或电池的大小和设计, 并应进行评估和记录。		P
	If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries 如果这种评估是不可行的, 对于小型电芯和小型电池至少存放6小时,		P
	12 hours for large cells and large batteries. 对于大型电芯和大型电池存放12小时。		N/A
	Then the battery at 57 ± 4 °C is subjected to one short circuit condition with a total external resistance of less than 0.1 ohm. 然后电池在 57 ± 4 °C的环境中, 接受一个外部总阻值小于0.1Ω的短路条件。		P
	This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57 ± 4 °C. 这个短路条件应在电芯或电池的外壳温度回到 57 ± 4 °C后继续短路1小时		P
	or in the case if the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value. 或对于大型电池其外壳温度已下降了一半的最大升温, 并保持低于该值。		N/A
	The short circuit and cooling down phases shall be conducted at least at ambient temperature. 短路和冷却过程至少在环境温度中进行。		P
38.3.4.5.3	Requirement: Cells and batteries meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire during the test and within six hours after the test. 要求: 电芯和电池外壳温度不超过170°C, 并且在试验过程中及试验6小时内无解体, 无破裂和无起火。	See Table 5 见表 5	P
38.3.4.6	Test T.6: Impact/Crush 试验 T.6: 撞击/挤压		P

Clause 章节	Requirement 标准要求	Result 结果	Verdict 判定
38.3.4.6.1	<p>Purpose: These tests simulate mechanical abuse from an impact or crush that may result in an internal short circuit.</p> <p>目的: 本试验模拟撞击或挤压等可能造成内部短路的机械破坏</p>		P
38.3.4.6.2	<p>Test procedure-Impact (applicable to cylindrical cells not less than 18.0 mm in diameter)</p> <p>测试程序-撞击 (适用于直径不小于18.0mm的圆柱形电芯)</p>		P
	<p>The test sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm \pm 0.1 mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the centre of the sample. A 9.1 kg \pm 0.1 kg mass is to be dropped from a height of 61 \pm 2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.</p> <p>试验电芯或元件电芯放置在平坦光滑的表面上, 一个316型的不锈钢棒横放在样品中心, 钢棒直径15.8 mm \pm 0.1 mm, 长度至少6cm, 或电芯最长段的尺度, 取二者之长。将一块质量9.1 kg \pm 0.1 kg的重锤从61 \pm 2.5 cm高处跌落到钢棒和样品交叉点处, 使用一个几乎没有摩擦的, 对落体重锤阻力最小的垂直轨道或者管道加以控制。垂直轨道或管道用于引导落锤沿与水平支撑表面呈90度落下。</p>		P
	<p>The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm \pm 0.1mm diameter curved surface lying across the centre of the centre of the test sample. Each sample is to be subjected to only a single impact.</p> <p>试验样品被撞击时, 其纵轴应与平坦表面平行并与横放在样品中心直径15.8 mm \pm 0.1 mm弯曲表面的纵轴垂直。每一次试验样品只受一次撞击。</p>		P
38.3.4.6.3	<p>Test procedure-Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter)</p> <p>测试程序-挤压 (适用于棱柱形, 袋装, 硬币/纽扣电芯和直径小于18.0mm 圆柱形电芯)</p>		N/A
	<p>A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.</p> <p>(a) The applied force reaches 13 kN \pm 0.78 kN;</p> <p>(b) The voltage of the cell drops by at least 100 mV; or</p> <p>(c) The cell is deformed by 50% or more of its original thickness.</p> <p>Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50% of its</p>		N/A

Clause 章节	Requirement 标准要求	Result 结果	Verdict 判定
	<p>original thickness, the pressure is released. 将电芯或元件电芯放在两个平面之间挤压, 挤压力度逐渐加大, 在第一个接触点上的速度大约为 1.5 cm/s。挤压持续进行, 直到出现以下三种情况之一:</p> <p>(a) 施加的力量达到 13 kN ± 0.78 kN; (b) 电芯的电压下降至少 100mV; 或 (c) 电芯形变达原始厚度的 50%或更多。 一旦达到最大压力、电压下降 100mV 或更多, 或电芯形变至少达原厚度的 50%, 即可解除压力。</p>		
	<p>A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis. 棱柱形或袋装电芯须从最宽的面施压。扣式或币式电芯, 须施加挤压力在它的扁平面之间。圆柱形电芯, 挤压力须施加于垂直于电芯纵轴的方向上。</p>		N/A
	<p>Each test cell or component cell is to be subjected to one crush only. 每个试验电芯或元件电芯只做一次挤压试验。</p>		N/A
	<p>The test sample shall be observed for a further 6 h. The test is conducted using test cell or component cells that have not previously been subjected to other tests. 试验后须继续观察 6 小时。试验须使用之前未做过其他试验的电芯或元件电芯进行。</p>		P
38.3.4.5.4	<p>Requirement: Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test. 要求: 电芯和元件电芯外部温度不超过170°C, 并且在试验过充中及试验后6小时内无解体和无起火。</p>	See Table 6 见表 6	P
38.3.4.7	<p>Test T.7: Overcharge 试验T.7: 过度充电</p>		P
38.3.4.7.1	<p>Purpose: This test evaluates the ability of a rechargeable battery or a single cell rechargeable battery to withstand an overcharge condition. 目的: 本试验评估可充电电池或单电芯可充电电池承受过度充电状况的能力。</p>		P
38.3.4.7.2	<p>Test procedure: The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows: 试验程序: 充电电流为制造商建议的最大持续充电电流的两倍。试验的最小电压如下:</p>		P

Clause 章节	Requirement 标准要求	Result 结果	Vedict 判定
	(a) when the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (a) 制造商建议的充电电压不大于18V时, 试验的最小电压应是电池最大充电电压的两倍或22伏两者中的较小者。		P
	(b) when the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. (b) 制造商建议的充电电压大于18V时, 试验的最小电压应是电池最大充电电压的1.2倍。		N/A
	Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours. 试验在环境温度下进行。试验时间为24小时。		P
38.3.4.7.3	Requirement:Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test. 要求: 可充电电池在试验过程中和试验后7天内无解体和无起火。	See Table 7 见表 7	P
38.3.4.8	Test T.8: Forced discharge 试验T.8: 强制放电		P
38.3.4.8.1	Purpose:This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition. 目的: 本试验评估原电池或可充电电池承受强制放电条件的能力。		P
38.3.4.8.2	Test procedure: Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V DC power supply at an initial current equal to the maximum discharge current specified by the manufacturer. 试验程序: 每个电芯在环境温度下与12V直流电电源串联在起始电流等于制造商给定的最大放电电流的条件下强制放电。		P
38.3.4.8.2	The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell is forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere). 电芯与一个适当大小的电阻负载串联以调节到规定大小的放电电流。每块电芯的放电时间(单位为h)等于电芯的额定容量除以试验初始放电电流(单位A)。		P
38.3.4.8.3	Requirement:Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test. 要求: 原电芯或可充电电芯在试验过程中和试验后7天内无解体和无起火。	See Table 8 见表 8	P

Table 1 表 1	Altitude simulation 高度模拟						
	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Results 结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
LP24020141 C01-B001	47.418	4.217	47.418	4.216	0.000	99.98	O
LP24020141 C01-B002	47.442	4.220	47.442	4.219	0.000	99.98	O
LP24020141 C01-B003	47.453	4.221	47.452	4.221	0.002	100.00	O
LP24020141 C01-B004	47.465	4.219	47.465	4.218	0.000	99.98	O
LP24020141 C01-B005	47.437	4.219	47.437	4.219	0.000	100.00	O
LP24020141 C01-B006	47.469	4.218	47.466	4.218	0.006	100.00	O
LP24020141 C01-B007	47.466	4.218	47.465	4.217	0.002	99.98	O
LP24020141 C01-B008	47.455	4.220	47.454	4.220	0.002	100.00	O
LP24020141 C01-B009	47.424	4.219	47.424	4.219	0.000	100.00	O
LP24020141 C01-B010	47.436	4.221	47.436	4.220	0.000	99.98	O
Note: L –Leakage, V –Venting, D –Disassembly, R –Rupture, F –Fire, O –No leakage, no venting, no disassembly, no rupture and no fire 注: L –漏液; V –泄气; D –解体; R –破裂; F –起火; O –无漏液、无泄气、无解体、无破裂、无起火。							

Table 2 表 2		Thermal test 温度试验					
Sample No. 样品编号	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Results 结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
LP24020141 C01-B001	47.418	4.216	47.417	4.201	0.002	99.64	O
LP24020141 C01-B002	47.442	4.219	47.440	4.203	0.004	99.62	O
LP24020141 C01-B003	47.452	4.221	47.451	4.202	0.002	99.55	O
LP24020141 C01-B004	47.465	4.218	47.462	4.204	0.006	99.67	O
LP24020141 C01-B005	47.437	4.219	47.435	4.203	0.004	99.62	O
LP24020141 C01-B006	47.466	4.218	47.463	4.201	0.006	99.60	O
LP24020141 C01-B007	47.465	4.217	47.464	4.204	0.002	99.69	O
LP24020141 C01-B008	47.454	4.220	47.452	4.202	0.004	99.57	O
LP24020141 C01-B009	47.424	4.219	47.423	4.201	0.002	99.57	O
LP24020141 C01-B010	47.436	4.220	47.433	4.200	0.006	99.53	O

Note: **L**-Leakage, **V**-Venting, **D**-Disassembly, **R**-Rupture, **F**-Fire, **O**-No leakage, no venting, no disassembly, no rupture and no fire
 注: **L**-漏液; **V**-泄气; **D**-解体; **R**-破裂; **F**-起火; **O**-无漏液、无泄气、无解体、无破裂、无起火。

Table 3 表 3		Vibration 振动					
Sample No. 样品编号	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Results 结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
LP24020141 C01-B001	47.417	4.201	47.417	4.200	0.000	99.98	O
LP24020141 C01-B002	47.440	4.203	47.440	4.202	0.000	99.98	O
LP24020141 C01-B003	47.451	4.202	47.451	4.202	0.000	100.00	O
LP24020141 C01-B004	47.462	4.204	47.462	4.204	0.000	100.00	O
LP24020141 C01-B005	47.435	4.203	47.435	4.203	0.000	100.00	O
LP24020141 C01-B006	47.463	4.201	47.463	4.201	0.000	100.00	O
LP24020141 C01-B007	47.464	4.204	47.464	4.203	0.000	99.98	O
LP24020141 C01-B008	47.452	4.202	47.452	4.202	0.000	100.00	O
LP24020141 C01-B009	47.423	4.201	47.423	4.201	0.000	100.00	O
LP24020141 C01-B010	47.433	4.200	47.433	4.199	0.000	99.98	O

Note: **L**-Leakage, **V**-Venting, **D**-Disassembly, **R**-Rupture, **F**-Fire, **O**-No leakage, no venting, no disassembly, no rupture and no fire
注: **L**-漏液; **V**-泄气; **D**-解体; **R**-破裂; **F**-起火; **O**-无漏液、无泄气、无解体、无破裂、无起火。

Table 4 表 4		Shock 冲击					
Sample No. 样品编号	Prior to test 试验前		After test 试验后		Mass loss 质量损失 (%)	Residual OCV 剩余电压 (%)	Results 结果
	Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
LP24020141 C01-B001	47.417	4.200	47.417	4.200	0.000	100.00	O
LP24020141 C01-B002	47.440	4.202	47.440	4.202	0.000	100.00	O
LP24020141 C01-B003	47.451	4.202	47.451	4.201	0.000	99.98	O
LP24020141 C01-B004	47.462	4.204	47.462	4.204	0.000	100.00	O
LP24020141 C01-B005	47.435	4.203	47.435	4.202	0.000	99.98	O
LP24020141 C01-B006	47.463	4.201	47.463	4.201	0.000	100.00	O
LP24020141 C01-B007	47.464	4.203	47.464	4.203	0.000	100.00	O
LP24020141 C01-B008	47.452	4.202	47.452	4.202	0.000	100.00	O
LP24020141 C01-B009	47.423	4.201	47.423	4.200	0.000	99.98	O
LP24020141 C01-B010	47.433	4.199	47.433	4.199	0.000	100.00	O

Note: **L**-Leakage, **V**-Venting, **D**-Disassembly, **R**-Rupture, **F**-Fire, **O**-No leakage, no venting, no disassembly, no rupture and no fire
注: **L**-漏液; **V**-泄气; **D**-解体; **R**-破裂; **F**-起火; **O**-无漏液、无泄气、无解体、无破裂、无起火。

Table 5 表 5	External short circuit 外部短路	
Sample No. 样品编号	Maximum outer casing temperature 电池表面最高温度(°C)	Results 结果
LP24020141C01-B001	58.1	O
LP24020141C01-B002	57.9	O
LP24020141C01-B003	58.0	O
LP24020141C01-B004	57.8	O
LP24020141C01-B005	58.2	O
LP24020141C01-B006	58.1	O
LP24020141C01-B007	57.9	O
LP24020141C01-B008	58.0	O
LP24020141C01-B009	58.1	O
LP24020141C01-B010	57.8	O

Note: L–Leakage, V–Venting, D–Disassembly, R–Rupture, F–Fire, O–No disassembly, no rupture and no fire
注: L–漏液; V–泄气; D–解体; R–破裂; F–起火; O–无解体、无破裂、无起火。

Table 6 表 6	Impact 撞击	
Sample No. 样品编号	Maximum outer casing temperature 电池表面最高温度(°C)	Results 结果
LP24020141C01-B011	68.2	O
LP24020141C01-B012	71.3	O
LP24020141C01-B013	72.6	O
LP24020141C01-B014	69.5	O
LP24020141C01-B015	70.3	O
LP24020141C01-B016	73.7	O
LP24020141C01-B017	67.9	O
LP24020141C01-B018	72.2	O
LP24020141C01-B019	74.5	O
LP24020141C01-B020	70.8	O

Note: D–Disassembly, F– Fire, O–No disassembly and no fire
注: D–解体; F–起火; O–无解体、无起火。

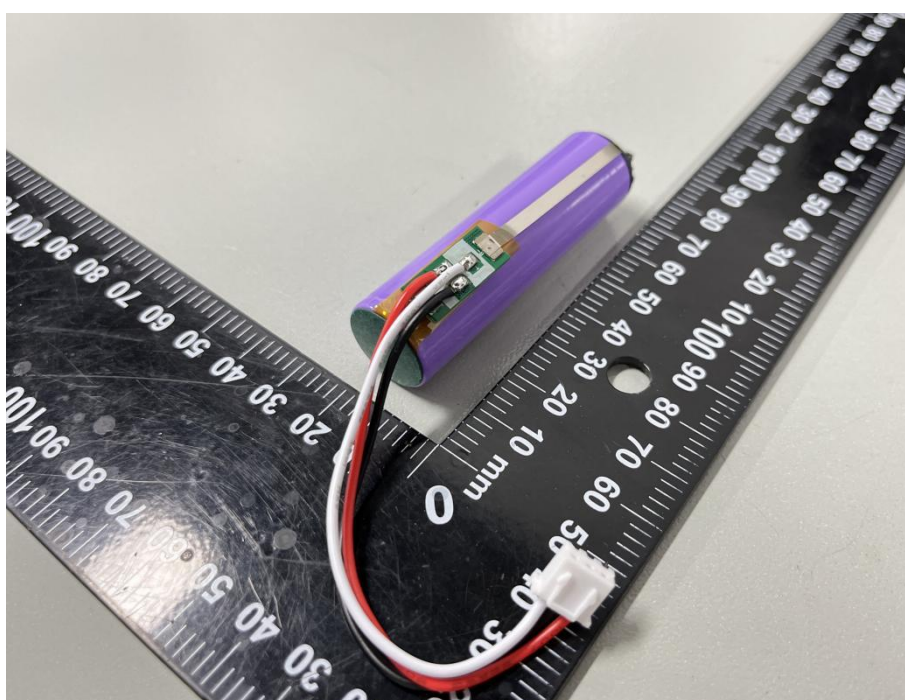
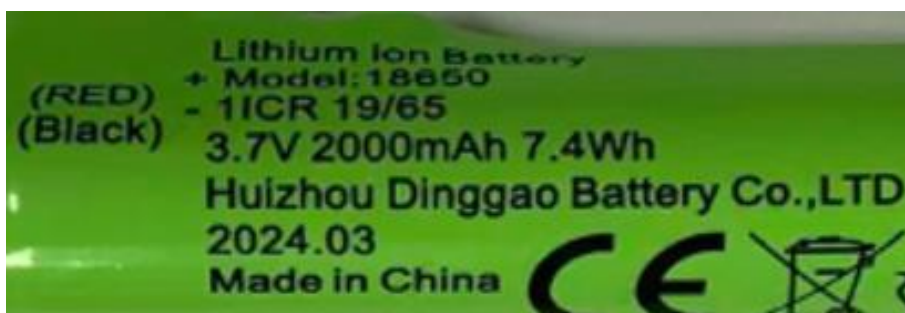
Table 7 表 7	Overcharge 过充
Overcharge current 过充电电流(mA)	2×2000mA=4000mA
Overcharge voltage 过充电电压(Vdc)	2×4.25V=8.5V
Sample No. 样品编号	Results 结果
LP24020141C01-B021	O
LP24020141C01-B022	O
LP24020141C01-B023	O
LP24020141C01-B024	O
LP24020141C01-B025	O
LP24020141C01-B026	O
LP24020141C01-B027	O
LP24020141C01-B028	O
Note: D –Disassembly, F – Fire, O –No disassembly and no fire 注: D –解体; F –起火; O –无解体、无起火。	

Table 8 表 8	Forced discharge 强制放电
Initial current 初始电流(mA)	2000mA
Supply voltage 试验电压(Vdc)	12Vdc
Time interval 试验时间(Minutes) :	60 Minutes
Sample No. 样品编号	Results 结果
LP24020141C01-B029	O
LP24020141C01-B030	O
LP24020141C01-B031	O
LP24020141C01-B032	O
LP24020141C01-B033	O
LP24020141C01-B034	O
LP24020141C01-B035	O
LP24020141C01-B036	O
LP24020141C01-B037	O
LP24020141C01-B038	O
LP24020141C01-B039	O
LP24020141C01-B040	O
LP24020141C01-B041	O
LP24020141C01-B042	O
LP24020141C01-B043	O
LP24020141C01-B044	O
LP24020141C01-B045	O
LP24020141C01-B046	O
LP24020141C01-B047	O
LP24020141C01-B048	O
Note: D –Disassembly, F – Fire, O –No disassembly and no fire 注: D –解体; F –起火; O –无解体、无起火。	

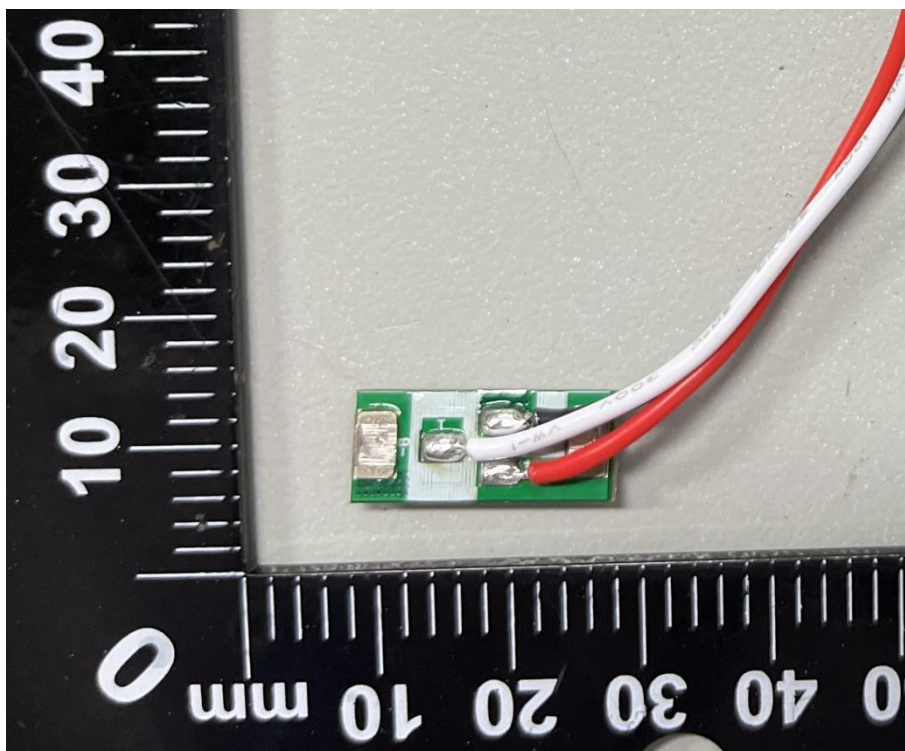
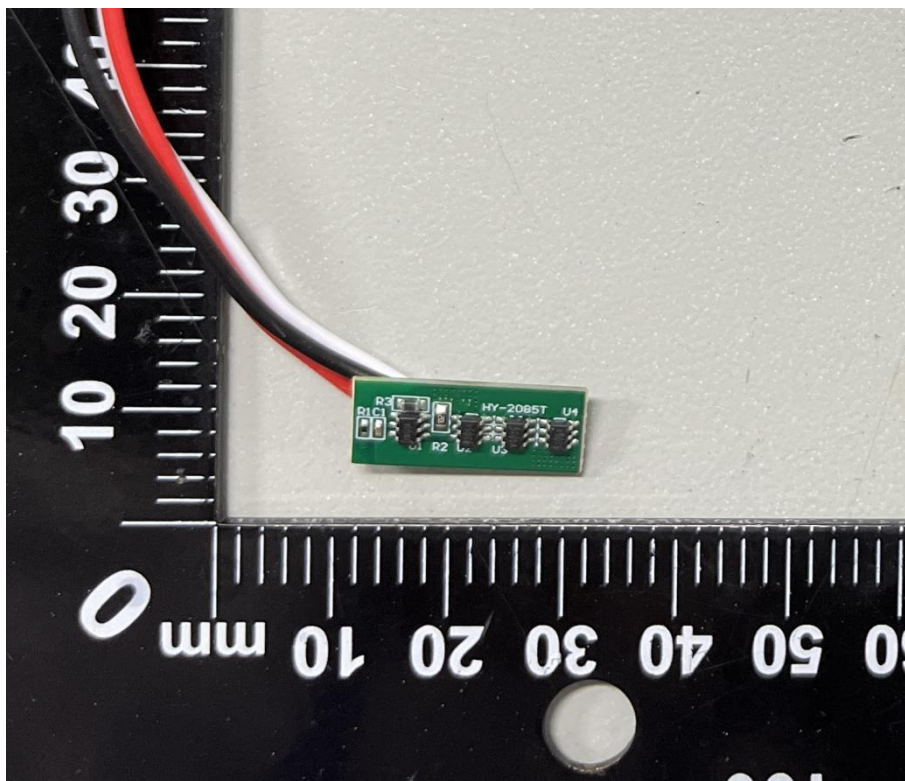
Photos of sample
样品照片



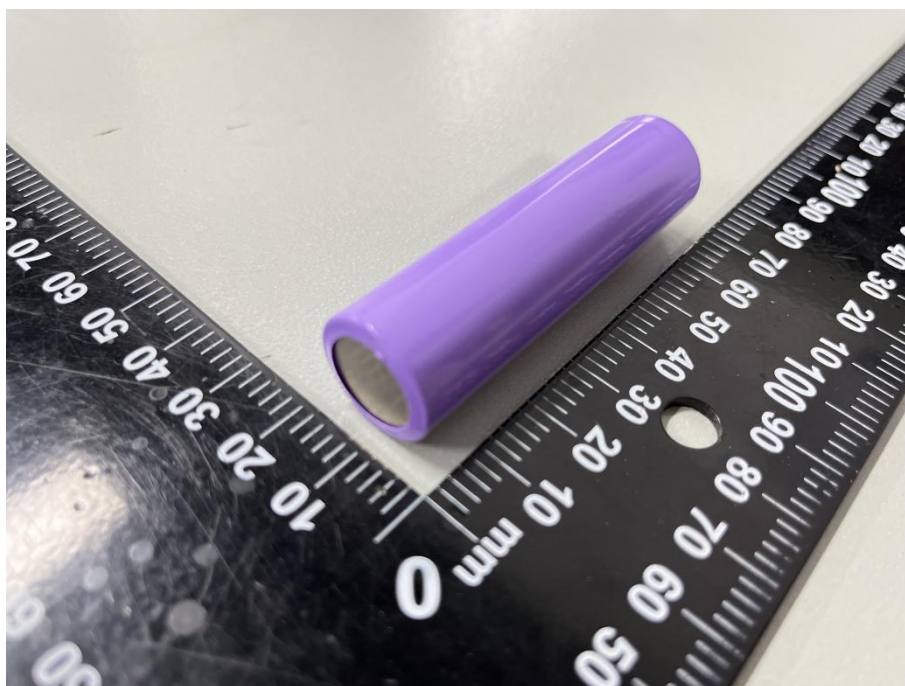
Photos of sample
样品照片



Photos of sample
样品照片



Photos of sample
样品照片



*****End of Test Report 检测报告结束*****

Important Notice

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5. Objections to the test report must be submitted to LEPONT within 15 days.
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6. The test report is valid for the tested samples only.
本报告仅对测试样品有效。
7. The Chinese contents in this report are only for reference.
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