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TESTING
CNAS L2065



检测报告

TEST REPORT

样品信息: 锂离子电池组, 型号 QA50, 3.91V, 4850mAh, 18.97Wh
SAMPLE INFORMATION: RECHARGEABLE LITHIUM ION BATTERY, Model QA50, 3.91V, 4850mAh, 18.97Wh

申请单位: 珠海市嘉德电能科技有限公司
APPLICANT: Jiade Energy Technology (Zhuhai) Co., Ltd.

检测类别: 商业委托检测
TYPE OF TEST: Commercial Inspection and Testing Services

苏州UL美华认证有限公司广州分公司
UL-CCIC Company Limited Guangzhou Branch

Test Summary 测试总览	
样品名称 Name of Samples	锂离子电池组 RECHARGEABLE LITHIUM ION BATTERY
型号规格 Type/ Model	电池型号 QA50, 3.91V, 4850mAh, 18.97Wh Battery Model QA50, 3.91V, 4850mAh, 18.97Wh
商标 Trade Mark	不适用 N/A
申请单位 Applicant	珠海市嘉德电能科技有限公司 Jiade Energy Technology (Zhuhai) Co., Ltd.
申请单位地址 Applicant Address	珠海市金湾区三灶镇定湾七路9号1#厂房 #1 Building, No.9 The 7th Dingwan Road, Sanzao Town, Jinwan, District, Zhuhai, China
生产单位 Manufacturer	珠海市嘉德电能科技有限公司 Jiade Energy Technology (Zhuhai) Co., Ltd.
生产单位地址 Manufacturer Address	珠海市金湾区三灶镇定湾七路9号1#厂房 #1 Building, No.9 The 7th Dingwan Road, Sanzao Town, Jinwan, District, Zhuhai, China
联系电话 Telephone: 电子邮箱 Email: 公司网址 Website:	郑菊, 0756-8287186 Zhengju@blbattery.com www.blbattery.com
样品外观颜色 Appearance	黑色 Black
样品数量 Quantity of Sample	电池组 Battery Pack: 18 pcs 电池 Battery Cell: 30 pcs
样品标识序号 Sample Identification	电池组 Battery Pack: 6335780-S1~6335780-S18 电池 Battery Cell: 6335789-S1~6335789-S30
测试标准 Testing Standard	联合国《试验和标准手册》第七修订版修正 1 (2021), 第38.3节: 锂电池 United Nations: Manual of Tests and Criteria, Amendment 1 to Seventh Revised Edition, 2021 (ST/SG/AC.10/11/Rev.7/Amend.1), Section 38.3: Lithium Batteries
接样日期 Samples Received Date	2023-08-08
测试开始日期 Test Start Date	2023-08-14
测试完成日期 Test Completed Date	2023-08-29
备注 Remark:	N/A

Test Conclusion 测试结论				
Clause 章节	Name of test 测试项目名称	Sample Condition 样品状态	Conclusion 结论	Remarks 备注
38.3.4.1	试验T.1 Altitude Simulation 高度模拟	First cycle in fully charged state/ 第一个交替充电放电周期完全充电	Pass 通过	--
		25th cycle ending in fully charged state/ 第二十五个交替充电放电周期完全充电		
38.3.4.2	试验T.2 Thermal Test 温度试验	First cycle in fully charged state/ 第一个交替充电放电周期完全充电	Pass 通过	--
		25th cycle ending in fully charged state/ 第二十五个交替充电放电周期完全充电		
38.3.4.3	试验T.3 Vibration 振动	First cycle in fully charged state/ 第一个交替充电放电周期完全充电	Pass 通过	--
		25th cycle ending in fully charged state/ 第二十五个交替充电放电周期完全充电		
38.3.4.4	试验T.4 Shock 冲击	First cycle in fully charged state/ 第一个交替充电放电周期完全充电	Pass 通过	--
		25th cycle ending in fully charged state/ 第二十五个交替充电放电周期完全充电		
38.3.4.5	试验T.5 External Short-Circuit 外部短路	First cycle in fully charged state/ 第一个交替充电放电周期完全充电	Pass 通过	--
		25th cycle ending in fully charged state/ 第二十五个交替充电放电周期完全充电		
38.3.4.6	试验T.6 Impact/Crush 撞击/挤压	First cycle in 50% charged state / 第一个交替充电放电周期半充电	Pass 通过	Prismatic Pouch Cell 方形软包电芯
		25th cycle ending in 50% charged state/ 第二十五个交替充电放电周期半充电		
38.3.4.7	试验T.7 Overcharge 过度充电	First cycle in fully charged state/ 第一个交替充电放电周期完全充电	Pass 通过	--
		25th cycle ending in fully charged state/ 第二十五个交替充电放电周期完全充电		
38.3.4.8	试验T.8 Forced Discharge 强制放电	First cycle in fully discharged state/ 第一个交替充电放电周期完全放电	Pass 通过	--
		25th cycle ending in fully discharged state/ 第二十五个交替充电放电周期完全放电		
<p>Test Conclusion/检验结论：</p> <p>由珠海市嘉德电能科技有限公司送检的锂离子电池组，型号 QA50, 3.91V, 4850mAh, 18.97Wh，依据联合国《试验和标准手册》第七修订版修正 1(2021)，第38.3节：锂电池进行全项目测试。</p> <p>当采用简单接受判定规则时，被测样品符合规范的要求。</p> <p>The RECHARGEABLE LITHIUM ION BATTERY, Model QA50, 3.91V, 4850mAh, 18.97Wh submitted by Jiade Energy Technology (Zhuhai) Co., Ltd. is tested according to United Nations: Manual of Tests and Criteria, Amendment 1 to Seventh revised edition, 2021 (ST/SG/AC.10/11/Rev.7/Amend.1), Section 38.3: Lithium Batteries. The test items are full items.</p>				

The sample received complies with Specification when Simple Acceptance decision rule is applied.

测试结果：通过。

The test results: Pass.

签发日期/Date of issue: 2023-09-07

Approved by: Simon Chen

批准：陈世明

Title: Operations Leader

职衔：工程主管



Reviewed by: Simon Chen

审核：陈世明

Title: Operations Leader

职衔：工程主管



Test Report Prepared by: Ade Su

检测：苏祥德

Title: Project Engineer

职衔：项目工程师



T.1 Altitude Simulation**高度模拟****Test Method 测试方法**

The samples were stored for at least 6 hours at a pressure of 11.6 kPa (1.68 psi) or less and a temperature of $20 \pm 5^\circ\text{C}$ ($68 \pm 9^\circ\text{F}$). The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 将测试样品放在温度为 $20\pm 5^\circ\text{C}$ ，大气压力为不大于11.6kpa的环境中贮存不少于6个小时。对样品在测试前后进行称重，并记录电压。

Test Results/测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test(g) 测试前质量(克)	Weight After Test(g) 测试后质量(克)	Percentage of Weight Loss 质量损失%	Voltage Before Test(V) 测试前电压(伏)	Voltage After Test(V) 测试后电压(伏)	Percentage of residual Voltage 残余电压%	Results 结果
6335780-S1	(C)	63.739	63.745	0.000	4.4442	4.4371	99.840	(6), (7)
6335780-S2	(C)	63.520	63.521	0.000	4.4450	4.4381	99.845	(6), (7)
6335780-S3	(C)	63.318	63.323	0.000	4.4440	4.4366	99.833	(6), (7)
6335780-S4	(C)	63.989	63.996	0.000	4.4398	4.4301	99.782	(6), (7)
6335780-S5	(C)	63.662	63.668	0.000	4.4413	4.4341	99.838	(6), (7)
6335780-S6	(D)	63.780	63.790	0.000	4.4434	4.4361	99.836	(6), (7)
6335780-S7	(D)	63.439	63.449	0.000	4.4444	4.4371	99.836	(6), (7)
6335780-S8	(D)	63.211	63.217	0.000	4.4444	4.4369	99.831	(6), (7)
6335780-S9	(D)	63.549	63.556	0.000	4.4417	4.4338	99.822	(6), (7)
6335780-S10	(D)	63.689	63.697	0.000	4.4422	4.4344	99.824	(6), (7)

Results/结果:

- (1) Leakage/漏液.
- (2) Venting/排气.
- (3) Disassembly/解体.
- (4) Rupture/破裂.
- (5) Fire/着火.
- (6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.
- (7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.

Samples Condition note for T1 to T8 / 试验T1至T8的样品状态备注：

- (A) Fully discharged state (for Primary Cells and Batteries) / 完全放电状态（针对原电池和原电池组）。
- (B) Undischarged state (for Primary Cells and Batteries) / 未放电状态（针对原电池和原电池组）。
- (C) At First cycle in fully charged state / 第一个充放电周期完全充电状态。
- (D) After 25 cycles ending in fully charged state / 25个充放电周期后完全充电状态。
- (E) At First cycle at 50% of the design rated capacity / 第一个充放电周期50%设计额定容量状态。
- (F) After 25 cycles ending at 50% of the design rated capacity / 25个充放电周期后50%设计额定容量状态。
- (G) At First cycle in fully discharged state / 第一个充放电周期完全放电状态。
- (H) After 25 cycles ending in fully discharged state / 25个充放电周期后完全放电状态。

T.2 Thermal Test 温度试验

Test Method 测试方法

The samples were subjected to temperature cycling consisting of the following.

The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 测试样品将进行如下温度循环测试。样品测试前后进行称重，并记录电压。

Samples In/ 样品进箱	The chamber temperature was raised to $72 \pm 2^{\circ}\text{C}$ ($162 \pm 4^{\circ}\text{F}$) within 30 minutes and maintained at this temperature for X* hours. 烤箱温度在30分钟内上升到 $72 \pm 2^{\circ}\text{C}$ ，并维持此温度X*小时。
	The chamber temperature was reduced to $-40 \pm 2^{\circ}\text{C}$ ($-40 \pm 4^{\circ}\text{F}$) within 30 minutes and maintained at this temperature for X* hours. 烤箱温度在30分钟内降低到 $-40 \pm 2^{\circ}\text{C}$ ，并维持此温度X*小时。
	Repeat the sequence for 9 additional cycles (total of 10 cycles). 重复此顺序测试额外9个循环（总共10个循环）。
Samples Out/ 样品出箱	After the 10th cycle, store the batteries at ambient temperature $20 \pm 5^{\circ}\text{C}$ ($68 \pm 9^{\circ}\text{F}$) for 24 hours prior to examination. 在第10个循环后，于 $20 \pm 5^{\circ}\text{C}$ 环境下储存24小时，然后检查其状态。

Note: The duration of exposure to the test temperature extremes(X*) was determined as below:

注：样品承受极端温度的持续时间（X*）按如下确定：

[X] Small cells and small batteries: 6 hours; 小电芯和小电池为6小时;

[] Large cells and large batteries: 12 hours. 大电芯和大电池为12小时。

Tst Results/测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test(g) 测试前质量(克)	Weight After Test(g) 测试后质量(克)	Percentage of Weight Loss 质量损失%	Voltage Before Test(V) 测试前电压(伏)	Voltage After Test(V) 测试后电压(伏)	Percentage of residual Voltage 残余电压%	Results 结果
6335780-S1	(C)	63.745	63.731	0.022	4.4371	4.3683	98.449	(6), (7)
6335780-S2	(C)	63.521	63.513	0.013	4.4381	4.3567	98.166	(6), (7)
6335780-S3	(C)	63.323	63.312	0.017	4.4366	4.3549	98.158	(6), (7)
6335780-S4	(C)	63.996	63.981	0.023	4.4301	4.3612	98.445	(6), (7)
6335780-S5	(C)	63.668	63.654	0.022	4.4341	4.3658	98.460	(6), (7)
6335780-S6	(D)	63.790	63.778	0.019	4.4361	4.3550	98.172	(6), (7)
6335780-S7	(D)	63.449	63.433	0.025	4.4371	4.3553	98.156	(6), (7)
6335780-S8	(D)	63.217	63.204	0.021	4.4369	4.3546	98.145	(6), (7)
6335780-S9	(D)	63.556	63.540	0.025	4.4338	4.3662	98.475	(6), (7)
6335780-S10	(D)	63.697	63.688	0.014	4.4344	4.3660	98.458	(6), (7)

Results/结果:

(1) Leakage/漏液.

(2) Venting/排气.

(3) Disassembly/解体.

(4) Rupture/破裂.

(5) Fire/着火.

(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.

T.3 Vibration 振动

Test Method 测试方法

The samples were subjected to vibration tests consisting of the following. The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. 测试样品将进行如下振动测试。样品测试前后进行称重，并记录电压。

The samples were 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 was a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle was 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 was perpendicular to the terminal face. 电芯和电池牢固地安装在振动台上。振动以正弦波形式，以7Hz增加至200Hz，然后在减少回到7Hz为一个循环，一个循环持续15分钟的对数前移传送。以振动的其中一个方向必须是垂直样品极性，对每个电芯从三个互相垂直的方向上循环12次，每个方向3个小时。

The logarithmic frequency sweep was as follows/对数扫频如下:

[X] For cells and small batteries: From 7 Hz a peak acceleration of 1 gn was maintained until 18 Hz is reached. The amplitude was then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurred (approximately 50 Hz). A peak acceleration of 8 gn was then maintained until the frequency was increase to 200 Hz. 对于电芯和小电池：7赫兹开始保持1 gn的最大加速度直到频率为18赫兹，然后将振幅保持在0.8毫米（总偏移1.6毫米）并增加频率直到最大加速度达到8 gn（频率约为50赫兹），将最大加速度保持在8 gn直到频率增加到200赫兹。

[] For large batteries: From 7 Hz a peak acceleration of 1 gn was maintained until 18 Hz is reached. The amplitude was then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 gn occurred (approximately 25 Hz). A peak acceleration of 2 gn was then maintained until the frequency was increase to 200 Hz. 对于大电池：7赫兹开始保持1 gn的最大加速度直到频率为18赫兹，然后将振幅保持在0.8毫米（总偏移1.6毫米）并增加频率直到最大加速度达到2 gn（频率约为25赫兹），将最大加速度保持在2 gn直到频率增加到200赫兹。

Test Results/测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test(g) 测试前质量 (克)	Weight After Test(g) 测试后质量 (克)	Percentage of Weight Loss 质量损失 %	Voltage Before Test(V) 测试前电压 (伏)	Voltage After Test(V) 测试后电压 (伏)	Percentage of residual Voltage 残余电压 %	Results 结果
6335780-S1	(C)	63.731	63.727	0.006	4.3683	4.3676	99.984	(6), (7)
6335780-S2	(C)	63.513	63.507	0.009	4.3567	4.3558	99.979	(6), (7)
6335780-S3	(C)	63.312	63.313	0.000	4.3549	4.3540	99.979	(6), (7)
6335780-S4	(C)	63.981	63.973	0.013	4.3612	4.3605	99.984	(6), (7)
6335780-S5	(C)	63.654	63.649	0.008	4.3658	4.3652	99.986	(6), (7)
6335780-S6	(D)	63.778	63.774	0.006	4.3550	4.3541	99.979	(6), (7)
6335780-S7	(D)	63.433	63.430	0.005	4.3553	4.3543	99.977	(6), (7)
6335780-S8	(D)	63.204	63.199	0.008	4.3546	4.3536	99.977	(6), (7)
6335780-S9	(D)	63.540	63.539	0.002	4.3662	4.3656	99.986	(6), (7)
6335780-S10	(D)	63.688	63.693	0.000	4.3660	4.3654	99.986	(6), (7)

Results/结果:

(1) Leakage/漏液.

(2) Venting/排气.

(3) Disassembly/解体.

(4) Rupture/破裂.

(5) Fire/着火.

(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.

T.4 Shock 冲击

Test Method 测试方法

The samples were subjected to shock. The samples were weighed before and after the exposure. The cell/battery voltage was also determined before and after the test. The sample cell was secured to the testing machine by means of a rigid mount, which supports all mounting surfaces of the sample. Each sample was subjected to a half-sine shock as below: 样品将进行如下冲击测试。对样品在测试前后进行称重，并记录电压。以稳固的托架固定住每个电芯和电池样品的全部配件表面。每个样品将进行如下半正弦冲击测试：

For cells: Peak acceleration of 150 gn and pulse duration of 6 milliseconds. 小电芯：峰值为 150 gn，脉冲持续6毫秒。

For large cells: Peak acceleration of 50 gn and pulse duration of 11 milliseconds. 大电芯：峰值为50 gn，脉冲持续11毫秒。

For small batteries: Peak acceleration of the smaller of the following, and pulse duration of 6 milliseconds: 小电池：取如下较小值为峰值，脉冲持续6毫秒。

- 150 gn.
- $\sqrt{(100850 / \text{mass of the battery in kg})}$

For large batteries: Peak acceleration of the smaller of the following, and pulse duration of 11 milliseconds: 大电池：取如下较小值为峰值，脉冲持续11毫秒。

- 50 gn.
- $\sqrt{(30000 / \text{mass of the battery in kg})}$

Each sample was subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell for a total of 18 shocks. 每个测试样品须在三个互相垂直的电池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。

Test Results/测试结果

Sample No. 样品编号	Sample Condition 样品状态	Weight Before Test(g) 测试前质量 (克)	Weight After Test(g) 测试后质量 (克)	Percentage of Weight Loss 质量损失 %	Voltage Before Test(V) 测试前电压 (伏)	Voltage After Test(V) 测试后电压 (伏)	Percentage of residual Voltage 残余电压 %	Results 结果
6335780-S1	(C)	63.727	63.730	0.000	4.3676	4.3670	99.986	(6), (7)
6335780-S2	(C)	63.507	63.504	0.005	4.3558	4.3553	99.989	(6), (7)
6335780-S3	(C)	63.313	63.301	0.019	4.3540	4.3534	99.986	(6), (7)
6335780-S4	(C)	63.973	63.974	0.000	4.3605	4.3600	99.989	(6), (7)
6335780-S5	(C)	63.649	63.645	0.006	4.3652	4.3645	99.984	(6), (7)
6335780-S6	(D)	63.774	63.769	0.008	4.3541	4.3537	99.991	(6), (7)
6335780-S7	(D)	63.430	63.424	0.009	4.3543	4.3537	99.986	(6), (7)
6335780-S8	(D)	63.199	63.195	0.006	4.3536	4.3532	99.991	(6), (7)
6335780-S9	(D)	63.539	63.535	0.006	4.3656	4.3649	99.984	(6), (7)
6335780-S10	(D)	63.693	63.682	0.017	4.3654	4.3647	99.984	(6), (7)

Results/结果:

(1) Leakage/漏液.

(2) Venting/排气.

(3) Disassembly/解体.

(4) Rupture/破裂.

(5) Fire/着火.

(6) No leakage, no venting, no disassembly, no rupture, no fire/无漏液，无排气，无解体，无破裂，无着火.

(7) The open circuit voltage of each cell after testing was greater than 90%/开路电压不低于试验前开路电压的90%.

T.5 External Short-Circuit 外部短路

Test Method 测试方法

The samples shall be heated for a period of time noted below, to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case: 为使样品达到均匀稳定的初始温度： 57 ± 4 °C，样品需在此环境下暴露一段时间。

- Small cells and small batteries: 6 hours. 小电芯和小电池至少暴露6小时。
- Large cells and large batteries: 12 hours. 大电芯和大电池至少暴露12小时。
- **[X]** 1 hours, assessed depended on the size and design of the sample. 1 小时，根据样品尺寸设计评估所得。

The samples were then subjected to a short circuit condition with a total external resistance of less than 0.1 ohm, until: 然后将样品正负极用小于0.1欧姆的总电阻回路进行短路，直到：

- Small cells, small batteries and large cells: 1 hour after the external case temperature of sample has returned to 57 ± 4 °C.
小电芯，小电池和大电芯：样品外表温度恢复到 57 ± 4 °C之后保持短路状态1小时以上。
- Large batteries: After the external case temperature of sample has decreased by half of the maximum temperature increase observed during the test and remains below that value.
大电池：样品表面温度下降所测最大温升的一半，并保持低于该数值。

Test Results/测试结果

Sample No. 样品编号	Sample Condition 样品状态	Voltage Before Test(V) 测试前电压 (伏)	External resistance (mohm) 总外部电阻 (毫欧)	Maximum Temperature, °C 最高温度 (°C)	Results 结果
6335780-S1	(C)	4.3670	84.21	57.7	(4), (5)
6335780-S2	(C)	4.3553	85.12	57.8	(4), (5)
6335780-S3	(C)	4.3534	91.32	57.7	(4), (5)
6335780-S4	(C)	4.3600	88.54	57.5	(4), (5)
6335780-S5	(C)	4.3645	90.12	57.3	(4), (5)
6335780-S6	(D)	4.3537	89.98	57.5	(4), (5)
6335780-S7	(D)	4.3537	92.31	57.6	(4), (5)
6335780-S8	(D)	4.3532	82.42	57.7	(4), (5)
6335780-S9	(D)	4.3649	80.05	57.7	(4), (5)
6335780-S10	(D)	4.3647	87.32	57.6	(4), (5)

Results/结果:

- (1) Disassembly/解体.
- (2) Rupture/破裂.
- (3) Fire/着火.
- (4) No disassembly, no rupture, no fire within 6 hours after the test/测试后6小时内无解体，无破裂，无着火.
- (5) The maximum temperature did not exceed 170°C/最高温度不超过170摄氏度.

T.6 Impact / Crush 撞击 / 挤压

Test Method 测试方法

[] Impact (for cylindrical cells not less than 18 mm in diameter)/ 撞击 (适用于直径不小于18毫米的圆柱形电池)

A test sample was placed on a flat 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 was placed across the center of the sample. A 9.1 kg \pm 0.1 kg mass was 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 was oriented 90 degrees from the horizontal supporting surface. 将试验样品放在一个平坦光滑的平面上。将一条316型不锈钢棒，其直径为15.8 mm \pm 0.1 mm，长度为至少6 cm，或电芯的最长边长度（两者中较大者），放置在样品中心。将一质量为9.1 kg \pm 0.1 kg的物体于61 \pm 2.5 cm的高度，无摩擦地从垂直滑轨落向样品。垂直滑轨与横向支承面互相垂直，保持90度。

The test sample was impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of a 15.8 mm \pm 0.1 mm diameter curved surface lying across the center of the test sample. Separate samples were used for each test. 接受撞击的试样，纵轴应与平坦的表面平行并与横放在试样中心的直径15.8 mm \pm 0.1 mm弯曲表面的纵轴垂直。每一个试样只经受一次撞击。

[X] Crush (for prismatic, pouch, coin/button cells and cylindrical cells less than 18 mm in diameter)/挤压 (适用于棱柱形、袋装、硬币/纽扣电池和直径小于18毫米的圆柱形电池)

A sample was crushed between two flat surfaces. The crushing was gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing was continued until the first of the three options below has reached/将样品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厘米/秒。挤压持续进行，直到出现以下三种情况之一：

- The applied force reaches 13 kN \pm 0.78 kN/施加的力达到13 kN \pm 0.78 kN;
- The voltage of the cell drops by at least 100 mV; or/电池的电压下降至少100毫伏，或者
- The cell is deformed by 50% or more of its original thickness/电池变形达原始厚度的50%以上。

A prismatic or pouch cell was crushed by applying the force to the widest side. A button/coin cell was crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force was applied perpendicular to the longitudinal axis/棱柱形或袋装电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形应从与纵轴垂直的方向施压。

The test sample was observed for a further 6 hours. Separate samples that have not previously been subjected to other tests were used for each test/测试样品进一步观察6小时。未进行过其他测试的样品用于此测试。

Test Results/测试结果

Sample No. 样品编号	Sample Condition 样品状态	Voltage Before Test(V) 测试前电压 (伏)	Maximum Temperature, °C 最高温度 (°C)	Results 结果
6335789-S16	(E)	3.8877	23.4	(3), (4)
6335789-S17	(E)	3.8887	23.1	(3), (4)
6335789-S18	(E)	3.8906	23.8	(3), (4)
6335789-S19	(E)	3.8890	22.6	(3), (4)
6335789-S20	(E)	3.8876	23.1	(3), (4)
6335789-S26	(F)	3.8890	24.0	(3), (4)
6335789-S27	(F)	3.8889	24.2	(3), (4)
6335789-S28	(F)	3.8892	23.9	(3), (4)
6335789-S29	(F)	3.8878	23.6	(3), (4)
6335789-S30	(F)	3.8883	23.4	(3), (4)

Results/结果:

(1) Disassembly/解体.

(2) Fire/着火.

(3) No disassembly, no fire within 6 hours after the test/测试后6小时内无解体, 无着火.

(4) The maximum temperature did not exceed 170°C/最高温度不超过170摄氏度.

T.7 Overcharge 过度充电

Test Method 测试方法

Batteries were subjected to a charge current of twice the manufacturer's recommended maximum continuous charge current. 2倍制造厂推荐的最大持续充电电流对样品充电。

The minimum voltage of the test was as follows/最小的测试电压由按如下决定：

- When the manufacturer's recommended charge voltage is not more than 18 V, the minimum voltage of the test was the lesser of 2 times the maximum charge voltage of the battery or 22 V. 如果厂家推荐的充电电压不超过18V，本测试的最小充电电压应是厂家标定最大充电电压的两倍或者是22V之中的较小者。
- When the manufacturer's recommended charge voltage is more than 18 V, the minimum voltage of the test was 1.2 times the maximum charge voltage. 如果厂家推荐的充电电压超过18V，本测试的最小充电电压应是厂家标定最大充电电压的1.2倍。

Tests were conducted at ambient temperature $20 \pm 5^\circ\text{C}$. The duration of the test was 24 hours. 测试在 $20 \pm 5^\circ\text{C}$ 的环境温度下进行，试验持续24小时。

Overcharge Current/过充电流	12000mA
Overcharge Voltage/过充电压	9.27V

Test Results/测试结果

Sample No. 样品编号	Sample Condition 样品状态	Voltage Before Test, V 测试前电压 (伏)	Measured Overcharge Current, mA 测量的过充电流 (毫安)	Results 结果
6335780-S11	(C)	4.4406	0	(3)
6335780-S12	(C)	4.4401	0	(3)
6335780-S13	(C)	4.4406	0	(3)
6335780-S14	(C)	4.4405	0	(3)
6335780-S15	(D)	4.4313	0	(3)
6335780-S16	(D)	4.4367	0	(3)
6335780-S17	(D)	4.4379	0	(3)
6335780-S18	(D)	4.4321	0	(3)

Results/结果:

(1) Disassembly/解体.

(2) Fire/着火.

(3) No disassembly, no fire within seven days after the test/测试后7天内无解体，无着火.

T.8 Forced Discharge 强制放电

Test Method 测试方法

Each cell was forced discharged at ambient temperature by connecting it in series with a 12 V DC power supply at an initial current equal to the maximum discharge current specified by the manufacturer. 在常温环境下，将单个电芯连接在12V的直流电源上进行强制放电，此直流电源提供给每个电芯初始电流为制造厂指定的最大放电电流。

The specified discharge current was obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell was forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in amperes). 指定的放电电流通过串联在测试电芯上的合适大小和功率的负载来获得，每个电芯的强制放电时间（小时）为额定容量除以初始电流（安培）。

Test Results/测试结果

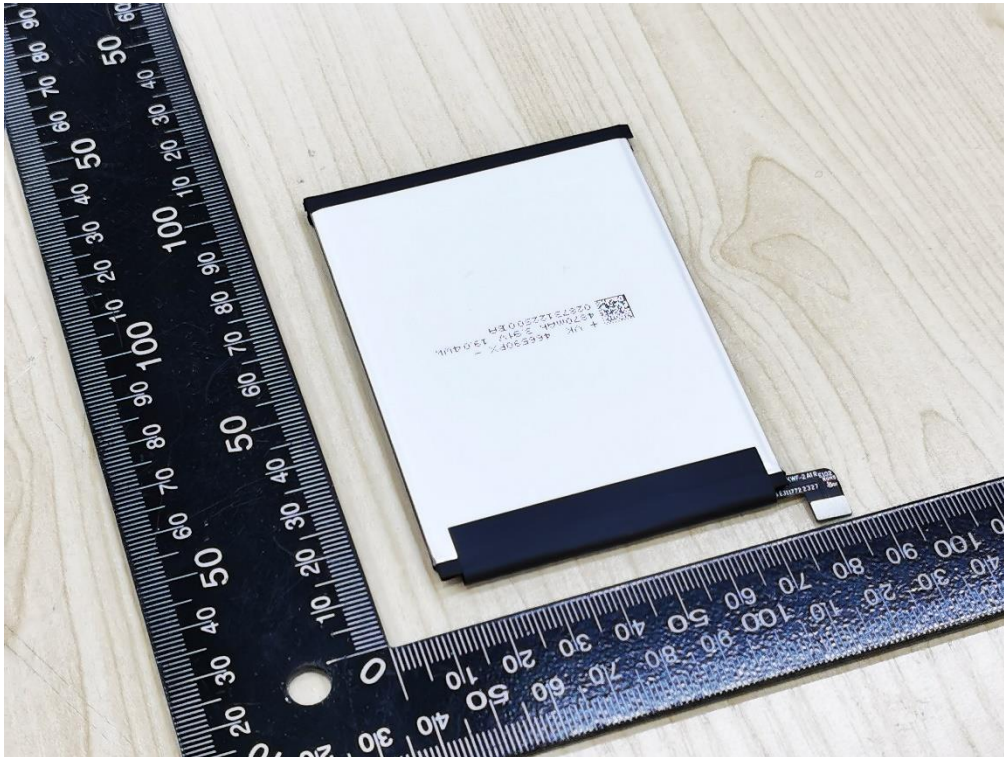
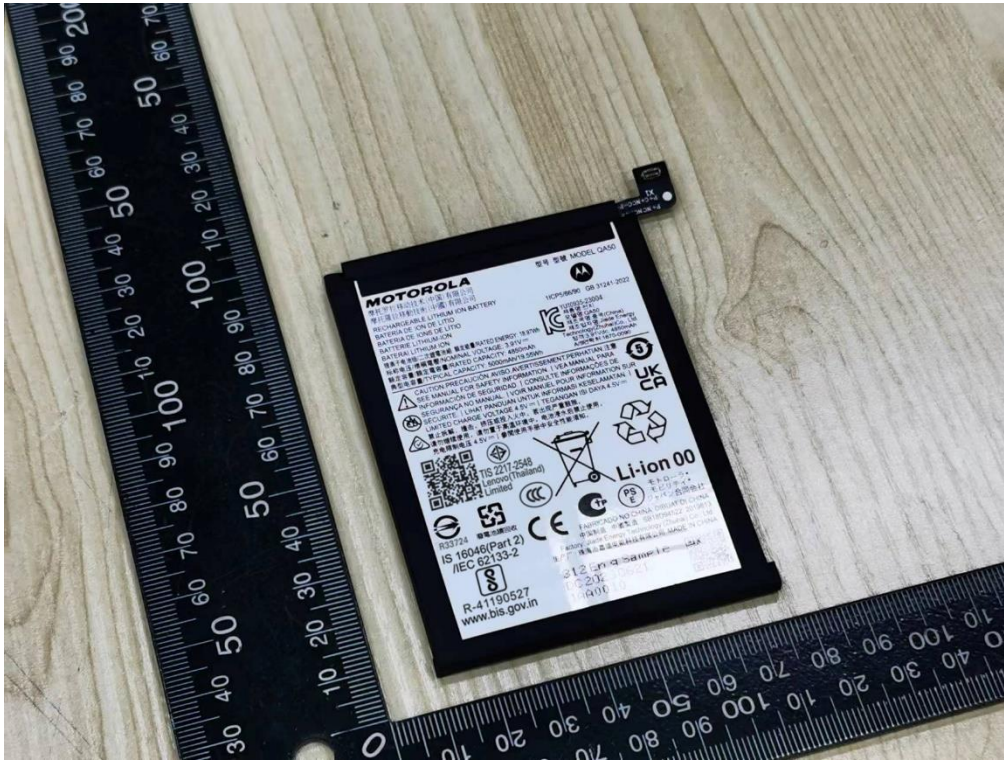
Sample No. 样品编号	Condition 样品状态	Initial Discharge Current, mA 初始放电电流 (毫安)	Voltage of Discharged Cell Before Test(V) 测试前电压（伏）	Voltage After Test(V) 测试后电压 (伏)	Results 结果
6335789-S1	(G)	4870	3.0292	0.0003	(3)
6335789-S2	(G)	4870	3.0351	0.0004	(3)
6335789-S3	(G)	4870	3.0322	0.0002	(3)
6335789-S4	(G)	4870	3.0303	0.0005	(3)
6335789-S5	(G)	4870	3.0303	0.0004	(3)
6335789-S11	(G)	4870	3.0311	0.0002	(3)
6335789-S12	(G)	4870	3.0339	0.0004	(3)
6335789-S13	(G)	4870	3.0372	0.0003	(3)
6335789-S14	(G)	4870	3.0321	0.0006	(3)
6335789-S15	(G)	4870	3.0211	0.0003	(3)
6335789-S6	(H)	4870	3.0423	0.0005	(3)
6335789-S7	(H)	4870	3.0674	0.0005	(3)
6335789-S8	(H)	4870	3.0563	0.0002	(3)
6335789-S9	(H)	4870	3.0572	0.0005	(3)
6335789-S10	(H)	4870	3.0677	0.0006	(3)
6335789-S16	(H)	4870	3.0663	0.0008	(3)
6335789-S17	(H)	4870	3.0552	0.0003	(3)
6335789-S18	(H)	4870	3.0753	0.0006	(3)
6335789-S19	(H)	4870	3.0552	0.0005	(3)
6335789-S20	(H)	4870	3.0896	0.0004	(3)

Results/结果:

- (1) Disassembly/解体.
- (2) Fire/着火.
- (3) No disassembly, no fire within seven days after the test/测试后七天内无解体、无着火.

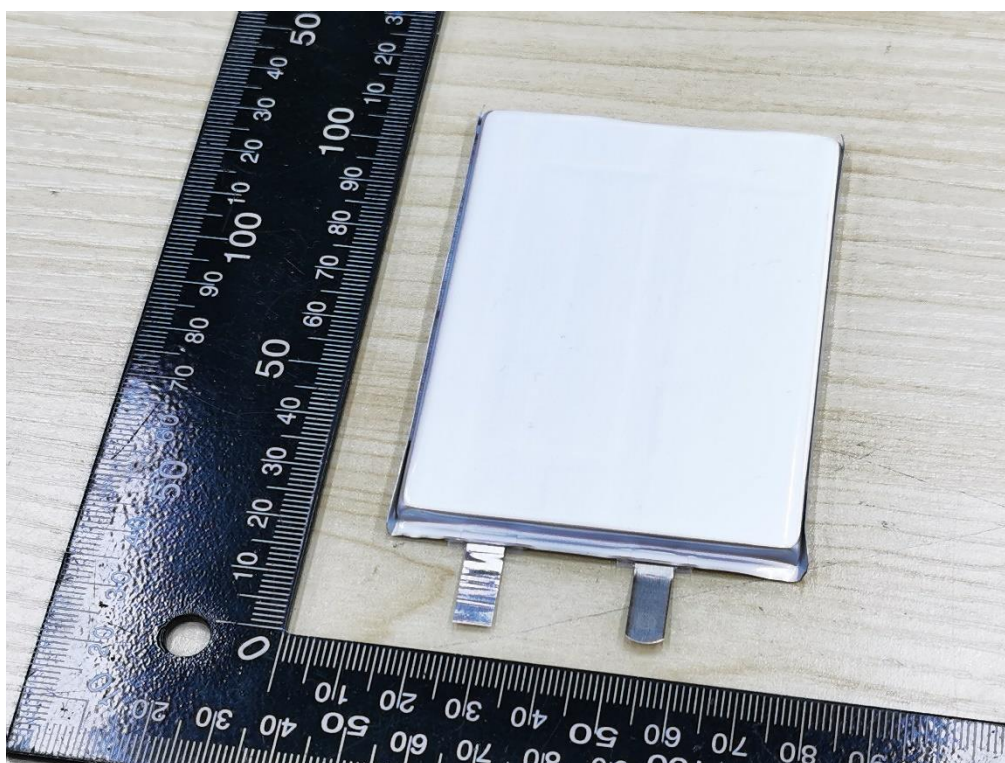
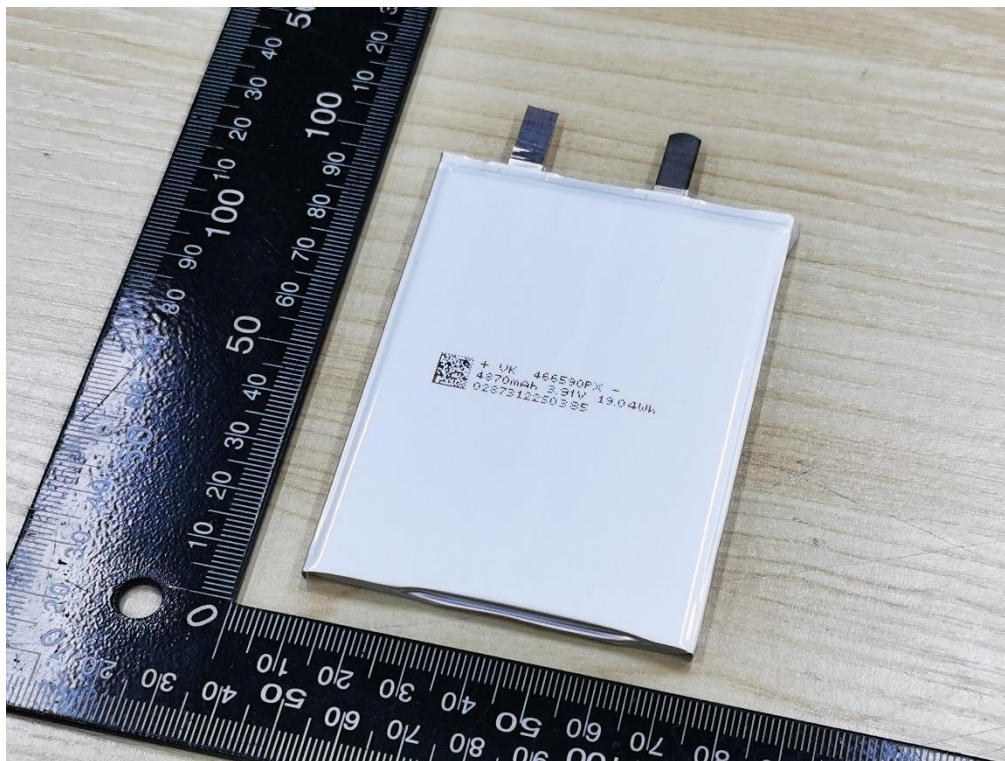
Photos of Test Samples
测试样品照片

RECHARGEABLE LITHIUM ION BATTERY, Model QA50, 3.91V, 4850mAh, 18.97Wh
锂离子电池组, 型号 QA50, 3.91V, 4850mAh, 18.97Wh



Photos of Test Samples
测试样品照片

Inner Cell, Model 466590PX, 3.91V, 4870mAh, 19.04Wh, manufactured by Dongguan Veken Battery Co. LTD
内部电芯, 型号 466590PX, 3.91V, 4870mAh, 19.04Wh, 由东莞维科电池有限公司制造。



Sample Label
样品标签

MOTOROLA 型号 型號 MODEL QA50

摩托罗拉移动技术(中国)有限公司
摩托羅拉移動技術(中國)有限公司

RECHARGEABLE LITHIUM ION BATTERY
BATERIA DE ION DE LITIO
BATERIA DE IONS DE LÍTIO
BATTERIE LITHIUM-ION
BATERAI LITHIUM ION

锂离子电池组/二次鋰電池組 额定能量/RATED ENERGY: 18.97Wh
标称电压/標稱電壓/NOMINAL VOLTAGE: 3.91V==
额定容量/額定電容量/RATED CAPACITY: 4850mAh
典型电容量/TYPICAL CAPACITY: 5000mAh/19.55Wh

11CP5/66/90 GB 31241-2022

YU10935-23004
제품명: 전지
모델명: QA50
제조국명: 중국 (China)
제조업자명: Jiade Energy Technology (Zhuhai) Co., Ltd.
정격: 3.91Vdc, 4850mAh
A/S 연락처: 1670-0090

CAUTION, PRECAUCIÓN, AVISO, AVERTISSEMENT, PERHATIAN, 注意
SEE MANUAL FOR SAFETY INFORMATION. | VEA MANUAL PARA INFORMACIÓN DE SEGURIDAD. | CONSULTE INFORMAÇÕES DE SEGURANÇA NO MANUAL. | VOIR MANUEL POUR INFORMATION SUR SÉCURITE. | LIHAT PANDUAN UNTUK INFORMASI KESELAMATAN. | LIMITED CHARGE VOLTAGE 4.5V== | TEGANGAN ISI DAYA 4.5V==
禁止拆解、撞击、挤压或投入火中。若出现严重鼓胀，请勿继续使用。请勿置于高温环境中。电池浸水后禁止使用。充电限制电压 4.5V== | 參閱使用手册中安全性能須知。

TIS 2217-2548
Lenovo (Thailand) Limited

R33724 廢電池請回收
IS 16046 (Part 2) / IEC 62133-2

312 Eng Sample
DC 20230621
1AA0010

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Laboratory: UL-CCIC Company Limited Guangzhou Branch

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*** 报告结束 ***

*** Report End ***