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检测
TESTING
CNAS L2065

检 测 报 告
TEST REPORT

样品信息： SAMPLE INFORMATION:	二次锂离子电池组, 型号 APP00317, 3.8V, 4000mAh, 15.2Wh Rechargeable Li-ion battery, Model APP00317, 3.8V, 4000mAh, 15.2Wh
申请单位： APPLICANT:	典晖科技股份有限公司 APack Technology Co., Ltd.
检测类别： TYPE OF TEST:	商业委托检测 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

Date Issued: 2019-11-01
Date Revised: 2019-11-25

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Test Summary 测试总览	
样品名称 Name of samples	二次锂离子电池组 Rechargeable Li-ion battery
型号规格 Type/ Model	型号 APP00317, 3.8V, 4000mAh, 15.2Wh Model APP00317, 3.8V, 4000mAh, 15.2Wh
商标 Trade mark	N/A
申请单位 Applicant	典暉科技股份有限公司 APack Technology Co., Ltd.
申请单位地址 Applicant address	242新北市新莊區中正路649-2號3樓 3F, No. 649-2, Jhongjheng Rd., Sinjhuang Dist, New Taipei City 242, Taiwan (R.O.C)
制造商 Manufacturer	典暉科技股份有限公司 APack Technology Co., Ltd.
制造商地址 Manufacturer Address	242新北市新莊區中正路649-2號3樓 3F, No. 649-2, Jhongjheng Rd., Sinjhuang Dist, New Taipei City 242, Taiwan (R.O.C)
联系电话 Telephone： 电子邮箱 Email: 公司网址 Website:	葉子祿：+886-2-2903-1303 #601 Luke@apack.com.tw; ce@apack.com.tw N/A
样品外观颜色 Appearance	黑色 Black
样品数量 Quantity of sample	电池组 Battery Pack: 18pcs 电池 Battery Cell: 30pcs
样品标识序号 Sample identification	电池组 Battery Pack: 2877699-1~2877699-18 电池 Battery Cell: 2877700-1~2877700-30
测试标准 Testing standard	联合国《关于危险品货物运输的建议书》试验和标准手册第六修订版修正 1 (2017)，第38.3节：锂电池 United Nations: Recommendations on the Transport of Dangerous Goods - Manual of Tests and Criteria, Amendment 1 to Sixth revised edition, 2017 (ST/SG/AC.10/11/Rev.6/Amend.1), Section 38.3: Lithium Batteries
接样日期 Received date	2020-02-11
完成日期 Completion date	2020-03-03
备注 Remark: According to the Standard, a single-cell battery (Battery Pack) is considered a “Cell” (Battery Cell) and shall be tested according to the testing requirements for “Cell”. This testing included the samples of Battery Pack and Battery Cell as aforementioned. For testing details, please refer to Table of Test Conclusion and individual test record page. 按照标准要求，单电芯电池（电池包）被视作“电芯”（电池芯），以“电芯”的要求进行测试，本测试项目样品包含如前所述电池包和电池芯。有关测试详情，请查阅测试结论表格及各单项测试记录页。	

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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 discharged state/第一个交替充电放电周期完全放电 After twenty-five cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电	Pass 通过	--
38.3.4.2	试验T.2 Thermal test 温度试验	First cycle in fully discharged state/第一个交替充电放电周期完全放电 After twenty-five cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电	Pass 通过	--
38.3.4.3	试验T.3 Vibration 振动	First cycle in fully discharged state/第一个交替充电放电周期完全放电 After twenty-five cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电	Pass 通过	--
38.3.4.4	试验T.4 Shock 冲击	First cycle in fully discharged state/第一个交替充电放电周期完全放电 After twenty-five cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电	Pass 通过	--
38.3.4.5	试验T.5 External Short-circuit 外部短路	First cycle in fully discharged state/第一个交替充电放电周期完全放电 After twenty-five cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电	Pass 通过	--
38.3.4.6	试验T.6 ~~Impact~~/Crush ~~撞击~~/挤压	First cycle in 50% charged state/第一个循环周期半满电 After twenty-five cycles ending at 50% charged state/第二十五个交替充电放电周期半满电	Pass 通过	Pouch Cell. 软包电芯.
38.3.4.7	试验T.7 Overcharge 过度充电	First cycle in fully discharged state/第一个交替充电放电周期完全放电 After twenty-five cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电	Pass 通过	-- --

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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	--
		After twenty-five cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电		--

Test Conclusion / 检验结论：

由典暉科技股份有限公司送检的二次锂离子电池组, 型号APP00317, 3.8V, 4000mAh, 15.2Wh，依据《关于危险品货物运输的建议书》试验和标准手册第六修订版修订1第38.3节进行全项目测试。

当采用准确度方法判定规则时,被测样品符合规范的要求。

The Rechargeable Li-ion battery, Model APP00317, 3.8V, 4000mAh, 15.2Wh submitted by APack Technology Co., Ltd. is tested according to Section 38.3 of Amendment 1 to the Sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.6 Amend.1 Section 38.3). The test items are full items.

The sample received complies with Specification when Accuracy Method decision rule is applied.

测试结果：通过。

The test results: Pass.

签发日期/Date of issue: 2020-03-09

Approved by:	Reviewed by:	Tested by:
批准： 彭军	审核： 彭军	检测： 潘意嫦
Title:	Title:	Title:
职衔：	职衔：	职衔：

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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 ± 5°C (68 ± 9°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±5°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
2877699-1	(C)	62.859	62.852	0.011	4.355	4.354	99.977	(6) (7)
2877699-2	(C)	62.642	62.634	0.013	4.349	4.347	99.954	(6) (7)
2877699-3	(C)	62.395	62.388	0.011	4.348	4.347	99.977	(6) (7)
2877699-4	(C)	62.690	62.684	0.010	4.347	4.346	99.977	(6) (7)
2877699-5	(C)	62.372	62.365	0.011	4.348	4.347	99.977	(6) (7)
2877699-6	(D)	62.570	62.564	0.010	4.348	4.347	99.977	(6) (7)
2877699-7	(D)	62.591	62.585	0.010	4.357	4.350	99.839	(6) (7)
2877699-8	(D)	62.744	62.738	0.010	4.349	4.348	99.977	(6) (7)
2877699-9	(D)	63.014	63.007	0.011	4.349	4.348	99.977	(6) (7)
2877699-10	(D)	62.763	62.758	0.008	4.349	4.349	100.000	(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％.

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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 ± 2°C (162 ± 4°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 ± 2°C，并维持此温度X*小时
	The chamber temperature was reduced to -40 ± 2°C (-40 ± 4°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 ± 2°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 ± 5°C (68 ± 9°F) for 24 hours prior to examination. 在第10个循环后，于20 ± 5°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。

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
2877699-1	(C)	62.852	62.846	0.010	4.354	4.277	98.232	(6) (7)
2877699-2	(C)	62.634	62.630	0.006	4.347	4.274	98.321	(6) (7)
2877699-3	(C)	62.388	62.383	0.008	4.347	4.274	98.321	(6) (7)
2877699-4	(C)	62.684	62.678	0.010	4.346	4.272	98.297	(6) (7)
2877699-5	(C)	62.365	62.361	0.006	4.347	4.272	98.275	(6) (7)
2877699-6	(D)	62.564	62.555	0.014	4.347	4.272	98.275	(6) (7)
2877699-7	(D)	62.585	62.576	0.014	4.350	4.274	98.253	(6) (7)
2877699-8	(D)	62.738	62.731	0.011	4.348	4.274	98.298	(6) (7)
2877699-9	(D)	63.007	63.000	0.011	4.348	4.277	98.367	(6) (7)
2877699-10	(D)	62.758	62.750	0.013	4.349	4.276	98.321	(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％.

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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 g 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 g occurred (approximately 50 Hz). A peak acceleration of 8 g was then maintained until the frequency was increase to 200 Hz. 对于小电芯和小电池：7赫兹开始保持1gn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8gn（频率约为50赫兹），将最大加速度保持在8gn直到频率增加到200赫兹。

[ ] For large batteries: From 7 Hz a peak acceleration of 1 g 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 g occurred (approximately 25 Hz). A peak acceleration of 2 g was then maintained until the frequency was increase to 200 Hz. 对大电芯和大电池： 7赫兹开始保持1gn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2gn（频率约为25赫兹），将最大加速度保持在2gn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
2877699-1	(C)	62.846	62.846	0.000	4.277	4.276	99.977	(6) (7)
2877699-2	(C)	62.630	62.629	0.002	4.274	4.273	99.977	(6) (7)
2877699-3	(C)	62.383	62.381	0.003	4.274	4.274	100.000	(6) (7)
2877699-4	(C)	62.678	62.678	0.000	4.272	4.271	99.977	(6) (7)
2877699-5	(C)	62.361	62.361	0.000	4.272	4.271	99.977	(6) (7)
2877699-6	(D)	62.555	62.556	0.000	4.272	4.271	99.977	(6) (7)
2877699-7	(D)	62.576	62.576	0.000	4.274	4.273	99.977	(6) (7)
2877699-8	(D)	62.731	62.731	0.000	4.274	4.273	99.977	(6) (7)
2877699-9	(D)	63.000	63.000	0.000	4.277	4.276	99.977	(6) (7)
2877699-10	(D)	62.750	62.750	0.000	4.276	4.275	99.977	(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％.

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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：

[x] For cells: Peak acceleration of 150 gn and pulse duration of 6 milliseconds. 小电芯：峰值为150gn，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50gn，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.
- √(100850 / 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6毫秒。

- 50 gn.
- √(30000 / 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
2877699-1	(C)	62.846	62.846	0.000	4.276	4.276	100.000	(6) (7)
2877699-2	(C)	62.629	62.629	0.000	4.273	4.273	100.000	(6) (7)
2877699-3	(C)	62.381	62.382	0.000	4.274	4.273	99.977	(6) (7)
2877699-4	(C)	62.678	62.678	0.000	4.271	4.271	100.000	(6) (7)
2877699-5	(C)	62.361	62.359	0.003	4.271	4.271	100.000	(6) (7)
2877699-6	(D)	62.556	62.556	0.000	4.271	4.271	100.000	(6) (7)
2877699-7	(D)	62.576	62.577	0.000	4.273	4.273	100.000	(6) (7)
2877699-8	(D)	62.731	62.731	0.000	4.273	4.273	100.000	(6) (7)
2877699-9	(D)	63.000	63.000	0.000	4.276	4.275	99.977	(6) (7)
2877699-10	(D)	62.750	62.750	0.000	4.275	4.275	100.000	(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％

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T.5 External short circuit
外部短路

Test Method 测试方法

The samples were 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。
- **[ ]** ____hours, assessed depended on the size and design of the sample. _____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）	Maximum Temperature, °C 最高温度（°C）	Results 结果
2877699-1	(C)	4.276	57.7	(4) (5)
2877699-2	(C)	4.273	57.7	(4) (5)
2877699-3	(C)	4.273	57.7	(4) (5)
2877699-4	(C)	4.271	57.8	(4) (5)
2877699-5	(C)	4.271	57.6	(4) (5)
2877699-6	(D)	4.271	57.7	(4) (5)
2877699-7	(D)	4.273	58.0	(4) (5)
2877699-8	(D)	4.273	57.8	(4) (5)
2877699-9	(D)	4.275	57.7	(4) (5)
2877699-10	(D)	4.275	57.9	(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.

Samples Condition note for T1 to T5 /试验T1至T5的样品状态备注 :
(A) Fully discharged state/完全放电.
(B) Undischarged state/未放电.
(C) First cycle in fully charged state/第一个交替充电放电周期完全充电.
(D) After 25 cycles ending in fully charged state/第二十五个交替充电放电周期完全充电.

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T.6 Impact / Crush
撞击 / 挤压

Test Method 测试方法

[ ] Impact (for cylindrical cells greater 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 ± 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 ± 0.1 kg mass was dropped from a height of 61 ± 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 ± 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 ± 0.1 kg的物体于61 ± 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 ± 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 ± 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 ± 0.78 kN/施加的力达到13 kN ± 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
2877700-1	(C)	3.842	23.3	(3) (4)
2877700-2	(C)	3.842	23.3	(3) (4)
2877700-3	(C)	3.848	23.5	(3) (4)
2877700-4	(C)	3.847	23.2	(3) (4)
2877700-5	(C)	3.844	23.2	(3) (4)
2877700-6	(D)	3.827	23.2	(3) (4)
2877700-7	(D)	3.836	23.2	(3) (4)
2877700-8	(D)	3.825	23.5	(3) (4)
2877700-9	(D)	3.820	23.5	(3) (4)
2877700-10	(D)	3.824	23.4	(3) (4)

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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.

Samples Condition note /样品状态备注

(A) Undischarged/未放电.

(B) Fully discharged/完全放电.

(C) First cycle in 50% charged state/第一个循环周期半满电.

(D) 25 cycles ending at 50% charged state/第二十五个交替充电放电周期半满电.

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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 ± 5°C. The duration of the test was 24 hours. 测试在20 ± 5°C的环境温度下进行，试验持续24小时。

Overcharge Current/过充电流	3200mA*2=6400mA
Overcharge Voltage/过充电压	4.35V*2=8.7V

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
2877699-11	(A)	4.328	0	(3)
2877699-12	(A)	4.328	0	(3)
2877699-13	(A)	4.329	0	(3)
2877699-14	(A)	4.330	0	(3)
2877699-15	(B)	4.331	0	(3)
2877699-16	(B)	4.326	0	(3)
2877699-17	(B)	4.329	0	(3)
2877699-18	(B)	4.329	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.

Samples Condition note /样品状态备注

(A) First cycle in fully charged state/第一个交替充电放电周期完全充电.

(B) After 25 cycles ending in fully discharged state/第二十五个交替充电放电周期完全充电.

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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
2877700-11	(B)	4035	3.137	0	(3)
2877700-12	(B)	4040	3.131	0	(3)
2877700-13	(B)	4001	3.067	0	(3)
2877700-14	(B)	4008	3.135	0	(3)
2877700-15	(B)	4023	3.161	0	(3)
2877700-16	(B)	4025	3.023	0	(3)
2877700-17	(B)	4024	3.162	0	(3)
2877700-18	(B)	4030	3.106	0	(3)
2877700-19	(B)	4018	3.130	0	(3)
2877700-20	(B)	4035	3.158	0	(3)
2877700-21	(C)	4001	3.103	0	(3)
2877700-22	(C)	4008	3.122	0	(3)
2877700-23	(C)	4040	3.121	0	(3)
2877700-24	(C)	4037	3.128	0	(3)
2877700-25	(C)	4028	3.085	0	(3)
2877700-26	(C)	4036	3.087	0	(3)
2877700-27	(C)	4036	3.146	0	(3)
2877700-28	(C)	4010	3.128	0	(3)
2877700-29	(C)	4021	3.163	0	(3)
2877700-30	(C)	4035	3.161	0	(3)

Results/结果:

(1) Disassembly/解体.

(2) Fire/着火.

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

Samples Condition note /样品状态备注

(A) Fully discharged state/完全放电.

(B) First cycle in fully discharged state/第一个交替充电放电周期完全放电.

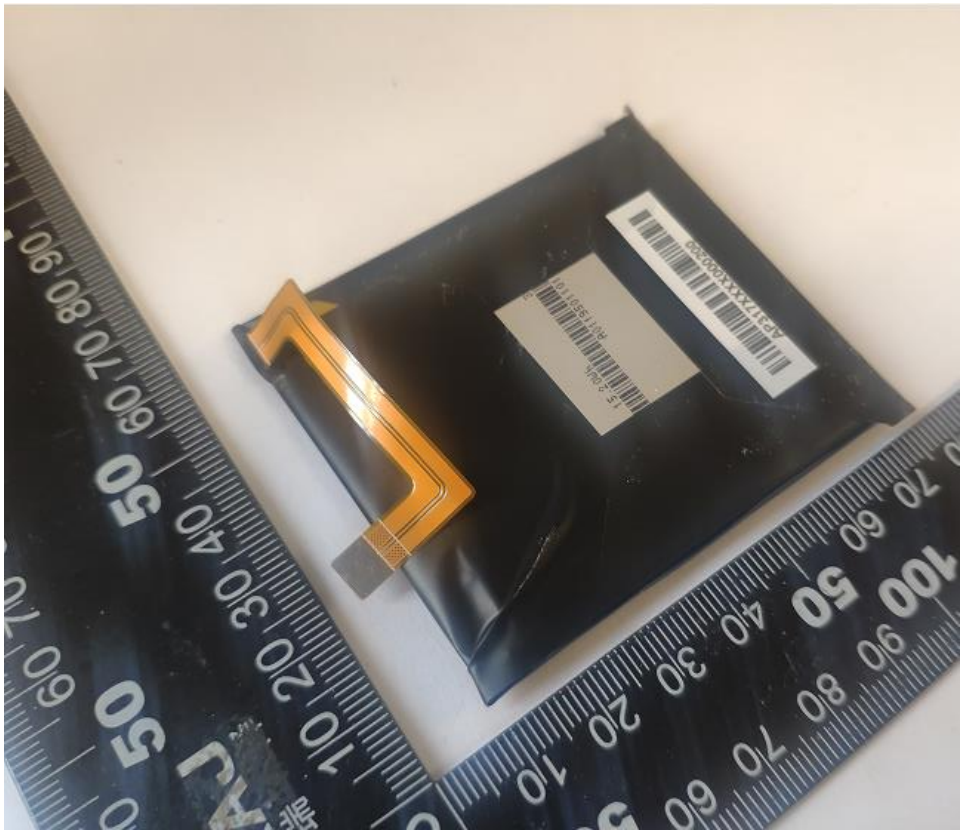
(C) After 25 cycles ending in fully discharged state/第二十五个交替充电放电周期完全放电.

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Test samples
测试样品照片

二次锂离子电池组, 型号APP00317, 3.8V, 4000mAh, 15.2Wh
Rechargeable Li-ion battery, Model APP00317, 3.8V, 4000mAh, 15.2Wh

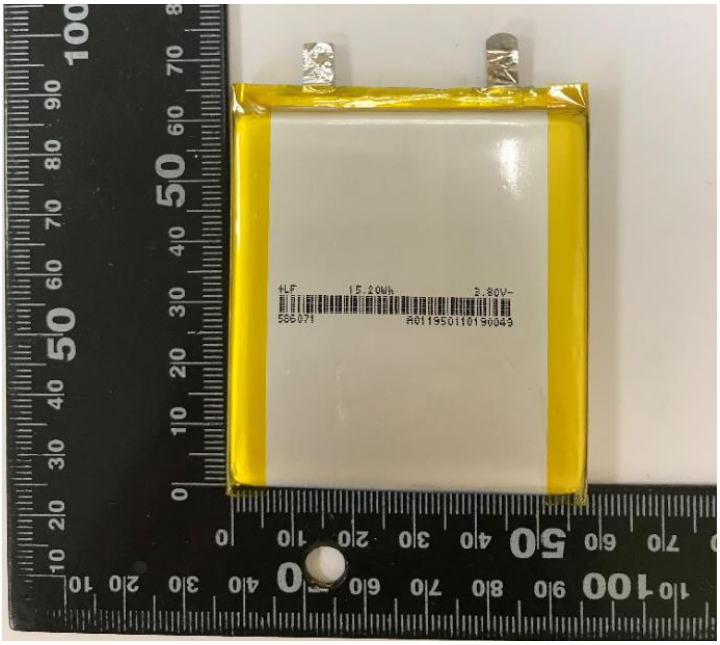




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Test samples
测试样品照片

Internal cell model 586071, 3.8V, 4000mAh, 15.2Wh, Manufacturer Hunan LI-FUN TECHNOLOGY CO.,LTD
内部电芯型号586071, 3.8V, 4000mAh, 15.2Wh, 制造商湖南立方新能源科技有限責任公司





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Battery Label **电池标签**
Battery Label/电池标签



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