



中国认可  
检测  
TESTING  
CNAS L2065



# 检测报告

## TEST REPORT

样品信息: 锂离子聚合物电池, 型号 ND50, 3.87V, 4700mAh, 18.2Wh  
SAMPLE INFORMATION: RECHARGEABLE LITHIUM ION POLYMER BATTERY, Model ND50, 3.87V, 4700mAh, 18.2Wh

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

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

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

<b>Test Summary</b> <b>测试总览</b>	
样品名称 Name of samples	锂离子聚合物电池 RECHARGEABLE LITHIUM ION POLYMER BATTERY
型号规格 Type/ Model	电池型号 ND50, 3.87V, 4700mAh, 18.2Wh Battery Model ND50, 3.87V, 4700mAh, 18.2Wh
商标 Trade mark	
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, P.R. China
制造商 Manufacturer	珠海市嘉德电能科技有限公司 Jiade Energy Technology (Zhuhai) Co., Ltd.
制造商地址 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, P.R. China
联系电话 Telephone: 电子邮箱 Email: 公司网址 Website:	郑菊, 0756-8287186 <a href="mailto:Zhengju@blbattery.com">Zhengju@blbattery.com</a> <a href="http://www.blbattery.com">www.blbattery.com</a>
样品外观颜色 Appearance	银色 Sliver
样品数量 Quantity of sample	电池组 Battery Pack: 18 pcs; 电池芯 Battery Cell: 30 pcs
样品标识序号 Sample identification	电池组 Battery Pack: 4052671-S1~4052671-S18 电池 Battery Cell: 4052675-S1~4052675-S30
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	2021-07-17
完成日期 Completion date	2021-07-23
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项测试记录页。

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	Pouch Cell 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聚合物电池, 型号 ND50, 3.87V, 4700mAh, 18.2Wh, 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。</p> <p>当采用准确度方法判定规则时, 被测样品符合规范的要求。</p> <p>The RECHARGEABLE LITHIUM ION POLYMER BATTERY, Model ND50, 3.87V, 4700mAh, 18.2Wh submitted by Jiade Energy Technology (Zhuhai) 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.</p> <p>The sample received complies with Specification when Accuracy Method decision rule is applied.</p> <p>测试结果: 通过。 The test results: Pass.</p> <p style="text-align: right;">签发日期/Date of issue: 2021-08-04</p>				

Approved by: Simon Chen  
批准: 陈世明  
Title: Operations Leader  
职衔: 运营主管



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Reviewed by: Simon Chen  
审核: 陈世明  
Title: Operations Leader  
职衔: 运营主管



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Tested by: Ade Su  
检测: 苏祥德  
Title: Engineer Project Associate  
职衔: 助理项目工程师



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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  $20 \pm 5^\circ\text{C}$  ( $68 \pm 9^\circ\text{F}$ ). 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
4052671-S1	(C)	64.017	64.021	0.000	4.398	4.391	99.841	(6), (7)
4052671-S2	(C)	64.507	64.511	0.000	4.397	4.390	99.841	(6), (7)
4052671-S3	(C)	63.920	63.928	0.000	4.396	4.389	99.841	(6), (7)
4052671-S4	(C)	63.798	63.800	0.003	4.398	4.390	99.818	(6), (7)
4052671-S5	(C)	64.079	64.077	0.000	4.396	4.388	99.818	(6), (7)
4052671-S6	(D)	63.880	63.888	0.000	4.395	4.388	99.841	(6), (7)
4052671-S7	(D)	64.091	64.097	0.000	4.395	4.388	99.841	(6), (7)
4052671-S8	(D)	63.790	63.797	0.000	4.395	4.388	99.841	(6), (7)
4052671-S9	(D)	64.146	64.152	0.000	4.396	4.389	99.841	(6), (7)
4052671-S10	(D)	64.056	64.063	0.000	4.394	4.386	99.818	(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.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：

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
4052671-S1	(C)	64.021	64.016	0.008	4.391	4.324	98.474	(6), (7)
4052671-S2	(C)	64.511	64.508	0.005	4.390	4.323	98.474	(6), (7)
4052671-S3	(C)	63.928	63.920	0.013	4.389	4.325	98.542	(6), (7)
4052671-S4	(C)	63.800	63.798	0.003	4.390	4.322	98.451	(6), (7)
4052671-S5	(C)	64.077	64.076	0.002	4.388	4.323	98.519	(6), (7)
4052671-S6	(D)	63.888	63.882	0.009	4.388	4.320	98.450	(6), (7)
4052671-S7	(D)	64.097	64.091	0.009	4.388	4.322	98.496	(6), (7)
4052671-S8	(D)	63.797	63.783	0.022	4.388	4.320	98.450	(6), (7)
4052671-S9	(D)	64.152	64.144	0.012	4.389	4.322	98.473	(6), (7)
4052671-S10	(D)	64.063	64.058	0.008	4.386	4.320	98.495	(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:

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 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
4052671-S1	(C)	64.016	64.017	0.000	4.324	4.323	99.977	(6), (7)
4052671-S2	(C)	64.508	64.508	0.000	4.323	4.322	99.977	(6), (7)
4052671-S3	(C)	63.920	63.928	0.000	4.325	4.324	99.977	(6), (7)
4052671-S4	(C)	63.798	63.798	0.000	4.322	4.321	99.977	(6), (7)
4052671-S5	(C)	64.076	64.081	0.000	4.323	4.322	99.977	(6), (7)
4052671-S6	(D)	63.882	63.884	0.000	4.320	4.320	100.000	(6), (7)
4052671-S7	(D)	64.091	64.095	0.000	4.322	4.321	99.977	(6), (7)
4052671-S8	(D)	63.783	63.798	0.000	4.322	4.322	100.000	(6), (7)
4052671-S9	(D)	64.144	64.154	0.000	4.322	4.321	99.977	(6), (7)
4052671-S10	(D)	64.058	64.060	0.000	4.320	4.319	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%.

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

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
4052671-S1	(C)	64.017	64.021	0.000	4.323	4.323	100.000	(6), (7)
4052671-S2	(C)	64.508	64.509	0.000	4.322	4.322	100.000	(6), (7)
4052671-S3	(C)	63.928	63.927	0.002	4.324	4.324	100.000	(6), (7)
4052671-S4	(C)	63.798	63.803	0.000	4.321	4.321	100.000	(6), (7)
4052671-S5	(C)	64.081	64.076	0.008	4.322	4.322	100.000	(6), (7)
4052671-S6	(D)	63.884	63.883	0.002	4.320	4.320	100.000	(6), (7)
4052671-S7	(D)	64.095	64.093	0.003	4.321	4.321	100.000	(6), (7)
4052671-S8	(D)	63.798	63.780	0.028	4.322	4.322	100.000	(6), (7)
4052671-S9	(D)	64.154	64.156	0.000	4.321	4.321	100.000	(6), (7)
4052671-S10	(D)	64.060	64.058	0.003	4.319	4.319	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%.



### 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  $57 \pm 4$  °C, measured on the external case: 为使样品达到均匀稳定的初始温度:  $57 \pm 4$  °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  $57 \pm 4$  °C.  
小电芯, 小电池和大电芯: 样品外表温度恢复到 $57 \pm 4$  °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
4052671-S1	(C)	4.323	93.5	57.8	(4), (5)
4052671-S2	(C)	4.322	88.7	57.8	(4), (5)
4052671-S3	(C)	4.324	90.3	57.6	(4), (5)
4052671-S4	(C)	4.321	84.2	57.8	(4), (5)
4052671-S5	(C)	4.322	79.5	57.4	(4), (5)
4052671-S6	(D)	4.320	89.8	58.0	(4), (5)
4052671-S7	(D)	4.321	96.7	57.7	(4), (5)
4052671-S8	(D)	4.322	82.1	57.7	(4), (5)
4052671-S9	(D)	4.321	94.5	57.6	(4), (5)
4052671-S10	(D)	4.319	88.5	57.7	(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.

**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
4052675-S21	(C)	3.861	25.2	(3), (4)
4052675-S22	(C)	3.882	25.1	(3), (4)
4052675-S23	(C)	3.868	25.8	(3), (4)
4052675-S24	(C)	3.876	25.4	(3), (4)
4052675-S25	(C)	3.874	25.2	(3), (4)
4052675-S26	(D)	3.874	25.3	(3), (4)
4052675-S27	(D)	3.876	25.4	(3), (4)
4052675-S28	(D)	3.874	25.4	(3), (4)
4052675-S29	(D)	3.866	25.6	(3), (4)
4052675-S30	(D)	3.874	24.3	(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.

**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.

### 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	$2*4000\text{mA}=8000\text{mA}$
Overcharge Voltage/过充电压	$2*4.45\text{V}=8.9\text{V}$

#### 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
4052671-S11	(A)	4.383	0	(3)
4052671-S12	(A)	4.392	0	(3)
4052671-S13	(A)	4.391	0	(3)
4052671-S14	(A)	4.390	0	(3)
4052671-S15	(B)	4.392	0	(3)
4052671-S16	(B)	4.372	0	(3)
4052671-S17	(B)	4.393	0	(3)
4052671-S18	(B)	4.389	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.

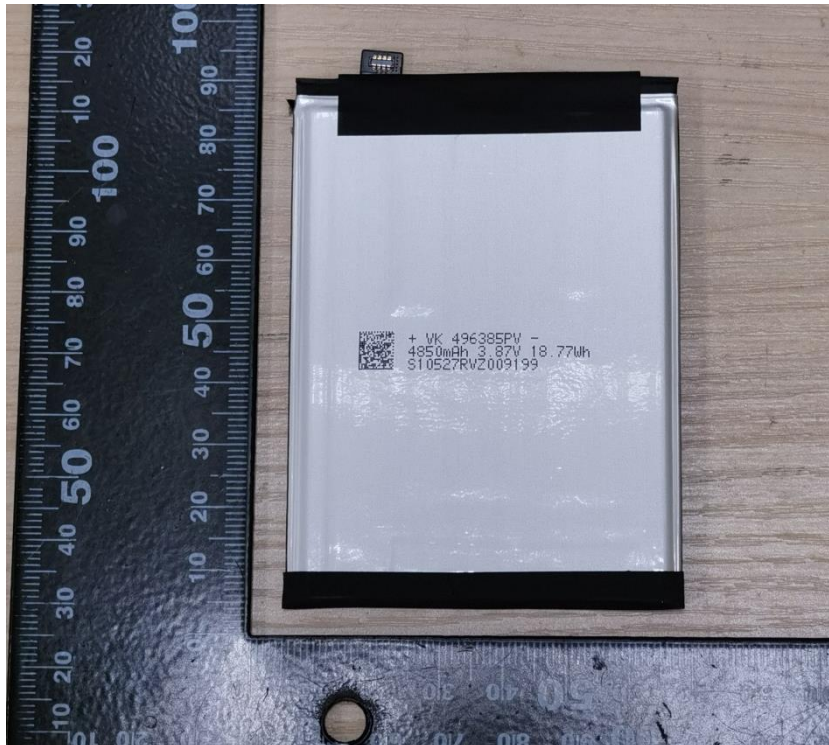
#### Samples Condition note/样品状态备注

- (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 charged state/第二十五个交替充电放电周期完全充电.

T.8 Forced discharge 强制放电					
Test Method 测试方法					
<p>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。</p> <p>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）。</p>					
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
4052675-S1	(B)	4863	3.131	0	(3)
4052675-S2	(B)	4851	3.115	0	(3)
4052675-S3	(B)	4869	3.139	0	(3)
4052675-S4	(B)	4864	3.146	0	(3)
4052675-S5	(B)	4864	3.081	0	(3)
4052675-S6	(B)	4857	3.082	0	(3)
4052675-S7	(B)	4855	3.144	0	(3)
4052675-S8	(B)	4850	3.089	0	(3)
4052675-S9	(B)	4863	3.090	0	(3)
4052675-S10	(B)	4868	3.124	0	(3)
4052675-S11	(C)	4865	3.109	0	(3)
4052675-S12	(C)	4859	3.109	0	(3)
4052675-S13	(C)	4870	3.129	0	(3)
4052675-S14	(C)	4863	3.106	0	(3)
4052675-S15	(C)	4859	3.132	0	(3)
4052675-S16	(C)	4864	3.092	0	(3)
4052675-S17	(C)	4863	3.096	0	(3)
4052675-S18	(C)	4870	3.124	0	(3)
4052675-S19	(C)	4859	3.094	0	(3)
4052675-S20	(C)	4858	3.106	0	(3)
<p>Results/结果:</p> <p>(1) Disassembly/解体.</p> <p>(2) Fire/着火.</p> <p>(3) No disassembly, no fire within seven days after the test/测试后七天内无解体、无着火.</p> <p>Samples Condition note /样品状态备注</p> <p>(A) Fully discharged state/完全放电.</p> <p>(B) First cycle in fully discharged state/第一个交替充电放电周期完全放电.</p> <p>(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.</p>					

Test samples  
测试样品照片

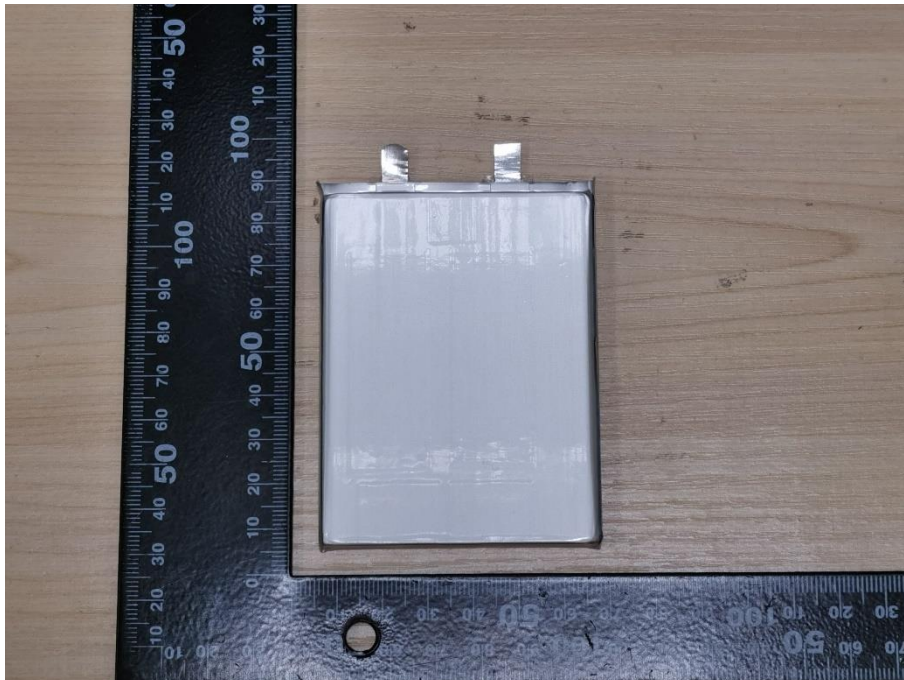
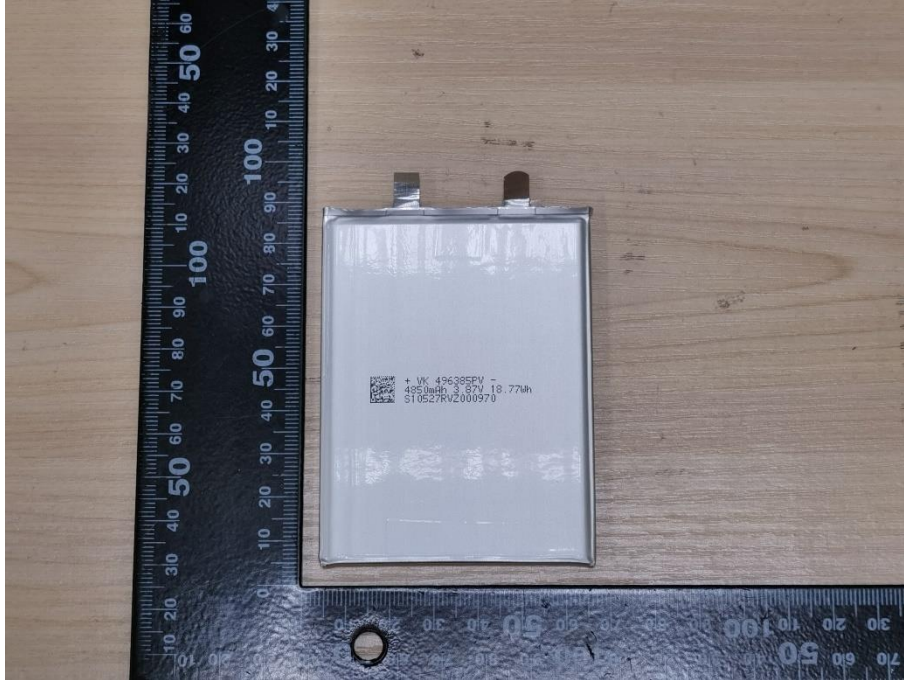
RECHARGEABLE LITHIUM ION POLYMER BATTERY, Model ND50, 3.87V, 4700mAh, 18.2Wh  
锂离子聚合物电池, 型号 ND50, 3.87V, 4700mAh, 18.2Wh



**Test samples**  
**测试样品照片**

Inner Cell, Model 496385PV, 4850mAh, 3.87V, 18.77Wh, manufactured by NINGBO VEKEN BATTERY CO LTD

内部电芯，型号 496385PV, 4850mAh, 3.87V, 18.77Wh, 由宁波维科电池有限公司制造



Battery Label  
電池標籤

**MOTOROLA** 型号 型號 MODEL ND50

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 POLYMER BATTERY  
 BATERIA DE POLIMERO DE ION DE LITIO  
 BATERIA DE POLIMERO DE IONS DE LÍTIO  
 BATTERIE LITHIUM-ION POLYMER  
 BATERAI LITHIUM ION POLYMER

1ICP5/64/85 GB 31241-2014  
 锂离子聚合物电池/二次鋰電池組 額定容量/額定電容量/RATED CAPACITY: 4700mAh/18.2Wh  
 标称电压/標稱電壓/NOMINAL VOLTAGE: 3.87V 典型电容量/TYPICAL CAPACITY: 5000mAh/19.4Wh

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 4.45V 或 | TEGANGAN ISI DAYA 4.45V 或  
 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4.45V 或 | 參閱使用手冊中安全性能須知。  
 充電限制電壓4.45V 或

UK  
CA

Li-ion 00  
 PS E  
 モトローラ・  
 モビリティ・  
 ジャパン 合同会社

TIS 2217-2548  
 Lenovo(Thailand)Limited

FABRICADO NO CHINA DIBUAT DI CHINA  
 中国製造 中國製造 SB18D25053 2019813  
 MFR: Jiade Energy Technology (Zhuhai) Co., Ltd.  
 制造商: 珠海市嘉德电能科技有限公司 MADE IN CHINA

XXXXXXXX-XXXXX  
 제품명: 전지  
 모델명: ND50  
 제조국명: 중국 (China)  
 제조업자명: Jiade Energy  
 Technology (Zhuhai) Co., Ltd.  
 정격: 3.87Vdc, 4700mAh  
 AS연락처: 1670-0900

122 Eng Sample  
 DC20210626  
 1AA0164






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Laboratory: UL-CCIC Company Limited Guangzhou Branch

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