



UN38.3 检测报告

TEST REPORT

报告编号:

BCTC2101707971B

Report No:

委托单位:

深圳市元明电源有限公司

Applicant

Shenzhen Soshine Battery Co., Ltd

产品名称:

锂离子电池

Product Name:

Lithium-ion battery

产品型号:

18650

Product Type:

检测日期:

2021-01-05 至 2021-01-18

Tested Date:

签发日期:

2021-01-20

Issued Date:

深圳市倍测检测有限公司

Shenzhen BCTC Testing Co., Ltd.





Test Summary 测试总览	
样品名称 Name of samples	锂离子电池 Lithium-ion battery
型号规格 Model/ Type	型号/ Model: 18650 规格/ Type: 3.7V, 3400mAh, 12.58Wh
商标 Trade mark	
申请单位 Applicant	深圳市元明电源有限公司 Shenzhen Soshine Battery Co., Ltd
申请单位地址 Applicant address	广东省深圳市龙华区观澜五和大道 310 号金科工业园 A 座 703 #703, Building A, JinKe Industrail Park, Guanlan Town, Longhua District, Shenzhen 518110, P.R. China
制造商 Manufacturer	深圳市元明电源有限公司 Shenzhen Soshine Battery Co., Ltd
制造商地址 Manufacturer Address	广东省深圳市龙华区观澜五和大道 310 号金科工业园 A 座 703 #703, Building A, JinKe Industrail Park, Guanlan Town, Longhua District, Shenzhen 518110, P.R. China
联系电话 Telephone 电子邮箱 Email 公司网址 Website	+86-755-23779962 summer@soshine.com.cn --
外观颜色 Appearance	黑色 Black
样品尺寸 Size	直径 D*高度 H 18.5mm*65.2mm
样品标识序号 Sample identification	电池组/Battery: 18pcs, 电芯/Cell: 30pcs 210116484-01~210116484-48
测试标准 Testing standard	联合国《关于危险货物运输的建议书 试验和标准手册》第六修订版修正 1, 38.3 标准要求 Recommendations on the TRANSPORT OF DANGEROUS GOODS" Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.6, 38.3/Amendment 1)
接样日期 Received date	2021-01-05
完成日期 Completion date	2021-01-18
<p>备注 Remark:</p> <p>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。</p> <p>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.</p>	



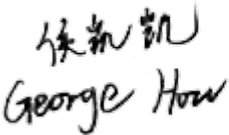
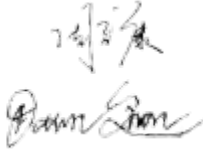
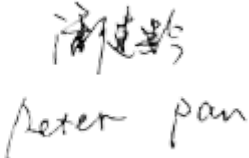
Test Conclusion 测试结论				
Clause 章节	Name of test 测试项目名称	Sample Condition 样品状态	Conclusion 结论	Remarks 备注
38.3.4.1	试验 T.1 Altitude simulation 高度模拟	First cycle in fully charged state 第一个交替充电放电周期完全充电	Pass 通过	--
		25th cycle ending in fully charged state 第二十五个交替充电放电周期完全充电		
38.3.4.2	试验 T.2 Thermal test 温度试验	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 <input checked="" type="checkbox"/> Impact 撞击 <input type="checkbox"/> Crush 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	18650 Cell 18650 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	--
		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		

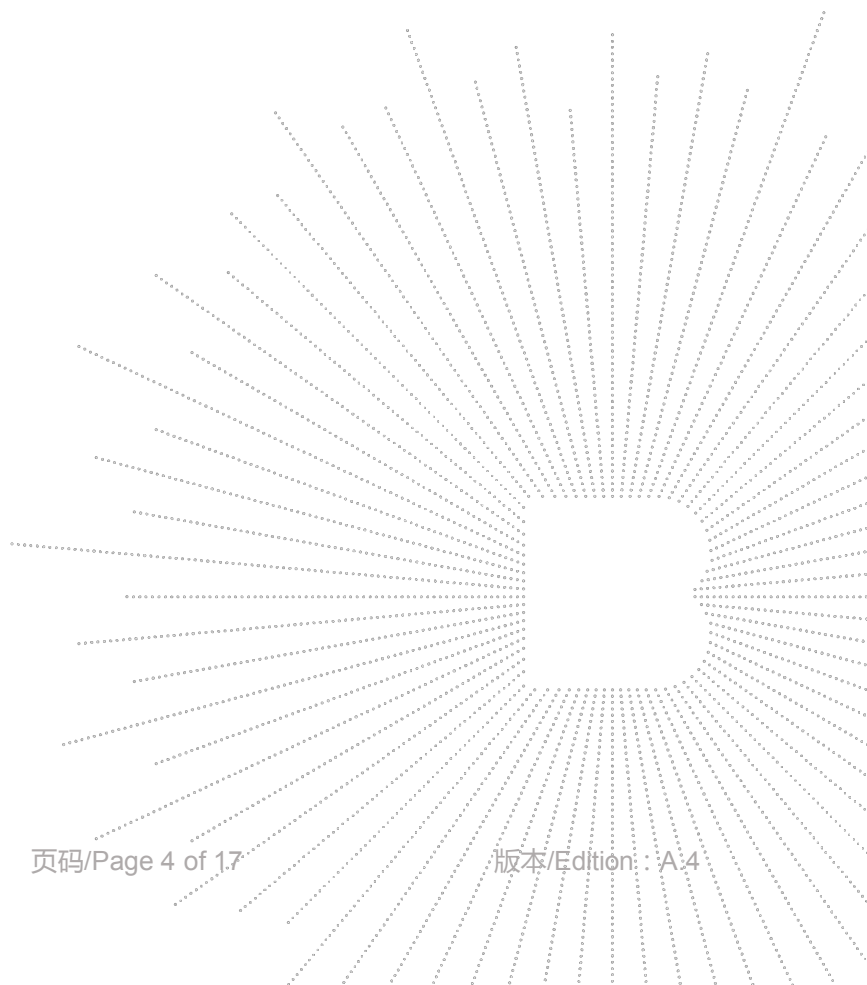


Test Conclusion 检验结论:

经测试, 该样品符合联合国《关于危险货物运输的建议书 试验和标准手册》第六修订版修正 1, 第 38.3 节标准要求。

The sample has passed the test items of UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6, 38.3/Amendment 1.

<p>Tester: George Hou 检测: 侯凯凯 Title: Test engineer 职衔: 测试工程师</p>		<p>Reviewer: Dawn Zhou 审核: 周主康 Title: Project handler 职衔: 项目工程师</p>		<p>Approver: Peter Pan 批准: 潘健黔 Title: Manager 职衔: 经理</p>	
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T.1 Altitude simulation 高度模拟								
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 Result 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
210116484-01	First cycle in	46.003	46.001	0.004	4.182	4.181	99.976	(F), (G)
210116484-02	fully charged state 第一个交替充电放电周期完全充电	46.810	46.810	0.000	4.183	4.182	99.976	(F), (G)
210116484-03		46.223	46.222	0.002	4.187	4.185	99.952	(F), (G)
210116484-04	25th cycle ending in fully charged state 第二十五个交替充电放电周期完全充电	46.029	46.029	0.000	4.182	4.181	99.976	(F), (G)
210116484-05		46.461	46.461	0.000	4.183	4.181	99.952	(F), (G)
210116484-06	25th cycle ending in fully charged state 第二十五个交替充电放电周期完全充电	46.582	46.580	0.004	4.185	4.184	99.976	(F), (G)
210116484-07		46.347	46.347	0.000	4.186	4.184	99.952	(F), (G)
210116484-08	25th cycle ending in fully charged state 第二十五个交替充电放电周期完全充电	46.528	46.528	0.000	4.182	4.181	99.976	(F), (G)
210116484-09		46.366	46.364	0.004	4.187	4.185	99.952	(F), (G)
210116484-10	25th cycle ending in fully charged state 第二十五个交替充电放电周期完全充电	46.475	46.475	0.000	4.182	4.181	99.976	(F), (G)
Results/ 结果: (A) Leakage/ 漏液. (B) Venting/ 排气. (C) Disassembly/ 解体. (D) Rupture/ 破裂. (E) Fire/ 着火. (F) 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. (G) 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

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. 环境箱温度在 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. 环境箱温度在 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
210116484-01	First cycle in	46.001	45.982	0.041	4.181	4.137	98.948	(F), (G)
210116484-02	fully charged	46.810	46.789	0.045	4.182	4.138	98.948	(F), (G)
210116484-03	state	46.222	46.204	0.039	4.185	4.140	98.925	(F), (G)
210116484-04	第一个交替充	46.029	46.010	0.041	4.181	4.138	98.972	(F), (G)
210116484-05	电放电周期完	46.461	46.441	0.043	4.181	4.137	98.948	(F), (G)
210116484-06	全充电	46.580	46.563	0.036	4.184	4.138	98.901	(F), (G)
210116484-07	25th cycle	46.347	46.329	0.039	4.184	4.142	98.996	(F), (G)
210116484-08	ending in fully	46.528	46.509	0.041	4.181	4.138	98.972	(F), (G)
210116484-09	charged state	46.364	46.342	0.047	4.185	4.142	98.973	(F), (G)
210116484-10	第二十五个交	46.475	46.458	0.037	4.181	4.137	98.948	(F), (G)
	替充电放电周							
	期完全充电							

Results/ 结果:

- (A) Leakage/ 漏液.
(B) Venting/ 排气.
(C) Disassembly/ 解体.
(D) Rupture/ 破裂.
(E) Fire/ 着火.
(F) 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。
(G) 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

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 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
210116484-01	First cycle in fully charged state 第一个交替充电放电周期完全充电 25th cycle ending in fully charged state 第二十五个交替充电放电周期完全充电	45.982	45.980	0.004	4.137	4.136	99.976	(F), (G)
210116484-02		46.789	46.789	0.000	4.138	4.135	99.928	(F), (G)
210116484-03		46.204	46.203	0.002	4.140	4.139	99.976	(F), (G)
210116484-04		46.010	46.010	0.000	4.138	4.135	99.928	(F), (G)
210116484-05		46.441	46.439	0.004	4.137	4.135	99.952	(F), (G)
210116484-06		46.563	46.563	0.000	4.138	4.138	100.000	(F), (G)
210116484-07		46.329	46.328	0.002	4.142	4.141	99.976	(F), (G)
210116484-08		46.509	46.509	0.000	4.138	4.138	100.000	(F), (G)
210116484-09		46.342	46.342	0.000	4.142	4.140	99.952	(F), (G)
210116484-10		46.458	46.457	0.002	4.137	4.135	99.952	(F), (G)

Results/ 结果:

(A) Leakage/ 漏液.

(B) Venting/ 排气.

(C) Disassembly/ 解体.

(D) Rupture/ 破裂.

(E) Fire/ 着火.

(F) 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.

(G) 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

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 6 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
210116484-01	First cycle in	45.980	45.978	0.004	4.136	4.134	99.952	(F), (G)
210116484-02	fully charged	46.789	46.789	0.000	4.135	4.134	99.976	(F), (G)
210116484-03	state	46.203	46.201	0.004	4.139	4.137	99.952	(F), (G)
210116484-04	第一个交替充	46.010	46.010	0.000	4.135	4.133	99.952	(F), (G)
210116484-05	电放电周期完	46.439	46.438	0.002	4.135	4.133	99.952	(F), (G)
210116484-06	全充电	46.563	46.563	0.000	4.138	4.137	99.976	(F), (G)
210116484-07	25th cycle	46.328	46.327	0.002	4.141	4.137	99.903	(F), (G)
210116484-08	ending in fully	46.509	46.508	0.002	4.138	4.135	99.928	(F), (G)
210116484-09	charged state	46.342	46.342	0.000	4.140	4.138	99.952	(F), (G)
210116484-10	第二十五个交	46.457	46.456	0.002	4.135	4.134	99.976	(F), (G)
	替充电放电周							
	期完全充电							

Results/ 结果:

(A) Leakage/ 漏液.

(B) Venting/ 排气.

(C) Disassembly/ 解体.

(D) Rupture/ 破裂.

(E) Fire/ 着火.

(F) 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.

(G) 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

The samples were shall be heated for a period of time noted below, to reach a homogeneous stabilized temperature of $57 \pm 4^{\circ}\text{C}$, measured on the external case:

为使样品达到均匀稳定的初始温度: $57 \pm 4^{\circ}\text{C}$, 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 $57 \pm 4^{\circ}\text{C}$.
小电芯, 小电池和大电芯: 样品外表温度恢复到 $57 \pm 4^{\circ}\text{C}$ 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
210116484-01	First cycle in fully charged state 第一个交替充电放电周期完全充电	4.134	58.1	(D), (E)
210116484-02		4.134	57.8	(D), (E)
210116484-03		4.137	57.9	(D), (E)
210116484-04		4.133	58.1	(D), (E)
210116484-05		4.133	58.3	(D), (E)
210116484-06	25th cycle ending in fully charged state 第二十五个交替充电放电周期完全充电	4.137	58.0	(D), (E)
210116484-07		4.137	57.5	(D), (E)
210116484-08		4.135	57.9	(D), (E)
210116484-09		4.138	58.0	(D), (E)
210116484-10		4.134	58.1	(D), (E)

Results/ 结果:

(A) Disassembly/ 解体.

(B) Rupture/ 破裂.

(C) Fire/ 着火.

(D) 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.

(E) 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

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。

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
210116484-11	First cycle in 50% charged state 第一个交替充电放电周期半充电	3.784	141.4	(C); (D)
210116484-12		3.786	135.0	(C); (D)
210116484-13		3.784	138.2	(C); (D)
210116484-14		3.765	119.0	(C); (D)
210116484-15		3.759	112.2	(C); (D)
210116484-16	25th cycle ending in 50% charged state 第二十五个交替充电放电周期半充电	3.760	140.7	(C); (D)
210116484-17		3.786	138.1	(C); (D)
210116484-18		3.777	143.5	(C); (D)
210116484-19		3.779	139.1	(C); (D)
210116484-20		3.784	138.5	(C); (D)

Results/ 结果:

(A) Disassembly/ 解体.

(B) Fire/ 着火.

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

(D) 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**

Batteries were subjected to a charge current of twice the manufacturer's recommended maximum continuous charge current/ 2 倍制造商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。

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)	Overcharge Current, mA 过充电流 (毫安)	Overcharge Voltage, V 过充电压 (伏)	Results 结果
210116484-21	First cycle in fully charged state 第一个交替充电放电周期完全充电	4.191	6800	8.4	(C)
210116484-22		4.189			(C)
210116484-23		4.189			(C)
210116484-24		4.189			(C)
210116484-25	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	4.190			(C)
210116484-26		4.189			(C)
210116484-27		4.188			(C)
210116484-28		4.190			(C)

Results/ 结果:

(A) Disassembly/ 解体.

(B) Fire/ 着火.

(C) 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

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）	Results 结果
210116484-29	First cycle in fully discharged state 第一个交替充电放电周期完全放电	3400	3.180	(C)
210116484-30			3.169	(C)
210116484-31			3.158	(C)
210116484-32			3.157	(C)
210116484-33			3.150	(C)
210116484-34			3.149	(C)
210116484-35			3.154	(C)
210116484-36			3.160	(C)
210116484-37			3.158	(C)
210116484-38			3.161	(C)
210116484-39	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		3.158	(C)
210116484-40			3.159	(C)
210116484-41			3.179	(C)
210116484-42			3.180	(C)
210116484-43			3.194	(C)
210116484-44			3.157	(C)
210116484-45			3.194	(C)
210116484-46			3.158	(C)
210116484-47			3.158	(C)
210116484-48			3.163	(C)

Results/ 结果:

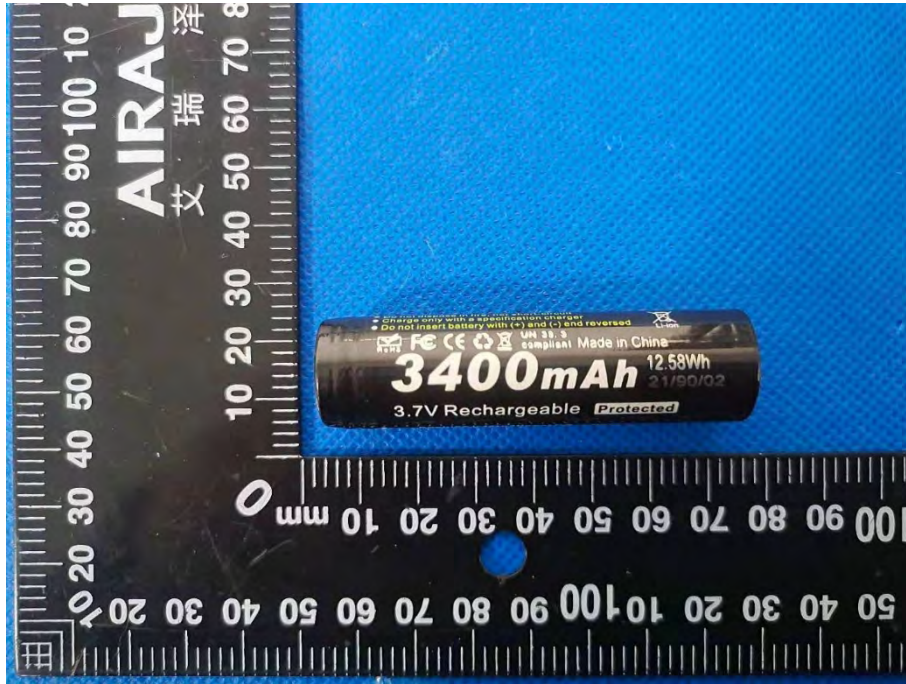
(A) Disassembly/ 解体.

(B) Fire/ 着火.

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

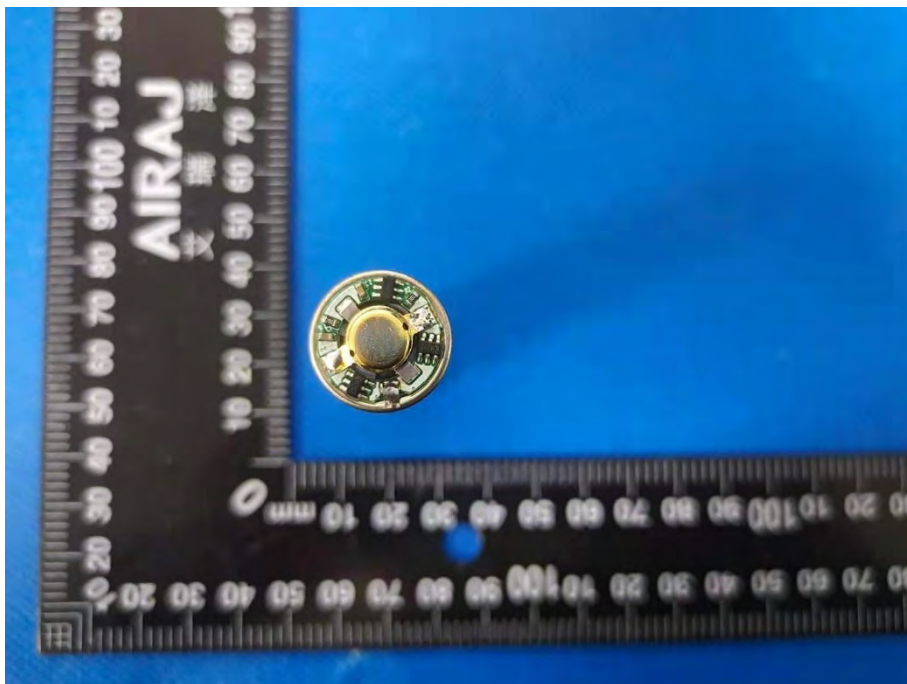
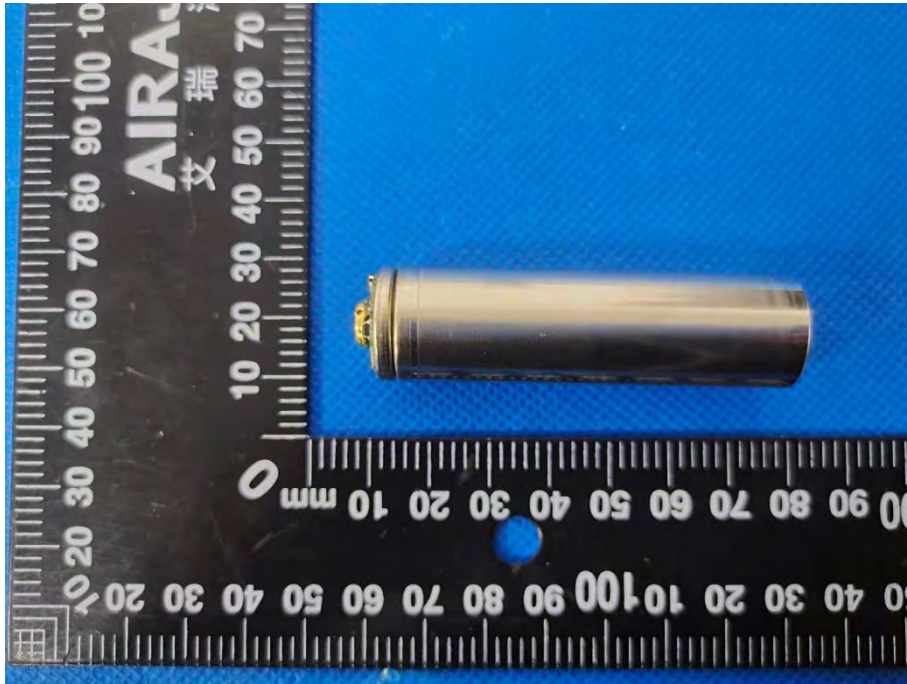


Test Sample
测试样品照片





Test Sample
测试样品照片





Battery Label
电池标签





试验仪器设备清单 Equipment List

序号 No.	编号 Code	名称 Equipment name	型号 Type
1.	BCTC-BAT-004	高精度电池性能测试系统 Battery Testing system	CT-4008-5V6A-S1/BTS -6V4A
2.	BCTC-BAT-003	瑞能充放电仪 Charging and Discharge Tester	CDS 60V10A CTS 20V5A
3.	BCTC-BAT-007	电池低压高空模拟试验机 Altitude Simulation Tester	GX-3020-Z70
4.	BCTC-BAT-009	可编程恒温恒湿试验箱 Temp & Humi. Chamber	BTKS5-150C
5.	BCTC-BAT-010	振动试验机 Vibration Tester	EV103
6.	BCTC-BAT-011	加速度冲击试验机 Shock Tester	HSKT10
7.	BCTC-BAT-015	温控型短路试验机 Thermal Control Short Tester	GX-6055-B5
8.	BCTC-BAT-020	电池冲击试验机 Battery Impact Tester	BE-5066
9.	BCTC-BAT-024	交流内阻测试仪 Ac internal resistance tester	AT526
10.	BCTC-BAT-034	电子天平 Electric Scale	JJ1523BC
11.	BCTC-BAT-036	多路温度测试仪 Multichannel temperature tester	AT4516
12.	BCTC-BAT-037	多路温度测试仪 Multichannel temperature tester	AT4516
13.	BCTC-BAT-039	电子负载 direct-current load	IT8512A+
14.	BCTC-BAT-040	电子负载 direct-current load	IT8512A+
15.	BCTC-BAT-042	DC直流电源 DC direct-current	IT6502D
16.	BCTC-BAT-043	DC直流电源 DC direct-current	IT6502D
17.	BCTC-BAT-044	数字万用表 Digital Multimeter	UT139C
18.	BCTC-BAT-045	数字万用表 Digital Multimeter	UT139C

注：以上仪器设备均在计量校准周期内。

Remark: The above equipment are within the calibration cycle.

声 明

STATEMENT

1. 本次检测所用的测量设备的量值均可以溯源到国家计量标准。

The equipment lists are traceable to the national reference standards.

2. 检测报告未经本实验室书面批准，不得部分复制。

The test report can not be partially copied unless prior written approval is issued from our lab.

3. 报告未加盖“检测专用章”无效。

The test report is invalid without stamp of laboratory.

4. 报告无检测、批准人员签字无效。

The test report is invalid without signature of person(s) testing and authorizing.

5. 本次检测的结果仅对所检测样品有效。

The test process and test result is only related to the Unit Under Test.

6. 本实验室的质量体系符合ISO/IEC17025标准的要求。

The quality system of our laboratory is in accordance with ISO/IEC17025.

7. 如对本报告有异议，可在收到报告后15天内向本单位申诉，逾期不予受理。

If there is any objection to report, the client should inform issuing laboratory within 15 days from the date of receiving test report.

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***** 结束 *****

***** END *****