Lithium Battery UN38.3 Test Report

锂电池UN38.3 测试报告

Sample name :		**Lithium Polymer Battery**
物品名称	:	聚合物锂离子电池
Model/Type	:	**ZN-703048**
型号规格：		
Applicant	:	**FOSHAN ZHAONENG BATTERY INDUSTRIAL CO., LTD.**
申请商	:	佛山市兆能电池实业有限公司

深圳立讯检测股份有限公司
Shenzhen LCS Compliance Testing Laboratory Ltd.

UN38.3 Test Report
UN38.3测试报告

Report reference No .....: 报告号.....:	LCS1701101062S	
Tested by (+ signature) .....: 测试(签名) .....:	Yibo Yan 颜以波	
Checked by (+ signature) .....: 审核(签名) .....:	Fiona.Jin 金梦霞	
Approved by (+ signature) .....: 批准(签名) .....:	Jim Deng 邓兴勇	
Contents.....: 页数.....:	16pages	
Date of issue .....: 签发日期.....:	2017.01.18	
Testing Laboratory Name .....: 测试实验室.....:	Shenzhen LCS Compliance Testing Laboratory Ltd. 深圳立讯检测股份有限公司	
Address .....: 地址.....:	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China 深圳市宝安区西乡街道固戍社区塘西队西井工业区星源科技园B栋1楼	
Applicant's Name .....: 申请商.....:	FOSHAN ZHAONENG BATTERY INDUSTRIAL CO., LTD. 佛山市兆能电池实业有限公司	
Address .....: 地址.....:	No.8th, Nanda Road, JinshaChengnan Industrial Zone, Danzao Town, Nanhai District, Foshan City, Guangdong, China 中国广东省佛山市南海区丹灶镇金沙城南工业区南达路8号	
Manufacturer .....: 制造商.....:	FOSHAN ZHAONENG BATTERY INDUSTRIAL CO., LTD. 佛山市兆能电池实业有限公司	
Address .....: 地址.....:	No.8th, Nanda Road, JinshaChengnan Industrial Zone, Danzao Town, Nanhai District, Foshan City, Guangdong, China 中国广东省佛山市南海区丹灶镇金沙城南工业区南达路8号	
Standard .....: 标准.....:	Section 38.3 of 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 Section 38.3) 联合国《关于危险品货物运输的建议书试验和标准手册》第六修订版第38.3节	
Test item description .....: 测试项目描述.....:	Lithium Polymer Battery 聚合物锂离子电池	
Trade Mark .....: 商标.....:	N/A	
Model/type reference .....: 型号/引用型号.....:	ZN-703048	
Ratings.....: 额定值.....:	3.7V, 1100mAh, 4.07Wh	

Classification.....: 类别.....:	Lithium Polymer Battery 聚合物锂离子电池
Sample shape .....: 样品形状.....:	Prismatic 棱形

Details information of the battery and the cell built in the battery, as following:
电池和电芯的详细信息见下表：

Product 产品	Cell 电芯	Battery 电池
Nominal voltage 标称电压	3.7V	3.7V
Rated capacity 额定容量	1100mAh	1100mAh
Charge method 充电方法	220 mA CC(constant current) charge to 4.2V, then CV (constant voltage 4.2 V) charge till charge current decline to 0.05C. 以40 mA恒流充电至4.2V，然后4.2V恒压充电至电流小于等于0.05C.。	220 mA CC(constant current) charge to 4.2V, then CV (constant voltage 4.2V) charge till charge current decline to 0.05C. 以40 mA恒流充电至4.2V，然后4.2V恒压充电至电流小于等于0.05C.。
Max. Discharging Current 最大放电电流	1100mA	1100mA
Max. Charging voltage 充电终止电压	4.2V	4.2V
End of discharge voltage 放电终止电压	3.0V	3.0V
Dimension 尺寸	42.6*29.5*6.3(mm)	49.5*30.5*7.0(mm)
Weight 重量	17.7g	20.0g

Possible test case verdicts:
报告中可能用到的结论标识：

Test case does not apply to the test object.....: 测试项目不适用于该产品.....:	N/A 不适用
Test item does meet the requirement 测试项目符合标准的要求.....:	P(ass) 合格
Test item does not meet the requirement .....: 测试项目不符合标准的要求.....:	F(ail) 不合格

Testing:
测试：

Date of sample received.....: 样品接收日期.....:	2016.12.21

Date(s) of performance of test.....: 测试执行日期.....:	2016.12.21~2017.01.06

Version 版本	Report No. 报告编号	Revision Data 修订数据	Summary 概要
V1.0	LCS1701101062S	/	Original Version 原始版本

Test conclusion:
检验结论：
The Lithium Polymer BatterysubmittedbyFOSHAN ZHAONENG BATTERY INDUSTRIAL CO., LTD.are tested according to Section 38.3 of 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 Section 38.3).
由佛山市兆能电池实业有限公司送检的聚合物锂离子电池，依据联合国《关于危险品货物运输的建议书试验和标准手册》第六修订版第38.3 节进行检测。
Test result: Pass
检验结果: 通过

Ⅰ、CONCLUSION 结论

Item 项目	Sample Number 样品编号	Standard 标准	Conclusion 结论
Altitude simulation 高空模拟	B01-B10	Section 38.3 of the Fifth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.6 Section 38.3). 联合国《关于危险品货物运输的建议书试验和标准手册》第六修订版第38.3 节	PASS 合格
Thermal test 耐热测试			PASS 合格
Vibration 振动测试			PASS 合格
Shock 冲击测试			PASS 合格
External short circuit 外部短路			PASS 合格
Crush /Impact 挤压测试 /撞击测试	C01-C05		PASS 合格
Overcharge 过充电测试	B11-B18		PASS 合格
Forced discharge 强制放电测试	C6-C25		PASS 合格

Notes备注:

The conditions of the battery of sample No. B01 to B14 are at first cycle, in fully charged state;

样品编号B01-B14的状态为第一个交替充电放电周期完全充电状态的电池;

The conditions of thecells of sample No. C01 to C05 are at first cycle at 50% of the design rated capacity, in fully charged state;

样品编号C01-C05的状态为第一个交替充电放电周期完全充电状态电芯容量设计值的50%的电芯;

The conditions of the batteries of sample No.B15 to B18 are full charged after fifty cycle;

样品编号B15-B18的状态为在五十个交替充电放电周期结束后完全充电状态的电池;

The conditions of the cells of sample No.C06 to C15 are at first cycle, in fully discharged state;

样品编号C06-C15的状态为第一个交替充电放电周期完全放电状态的电芯;

The conditions of the cells of sample No.C16 to C25 are after fifty cycles ending in fully discharged state.

样品编号C16-C25的状态为在五十个交替充电放电周期结束后完全放电状态的电芯。

Ⅱ、MAIN TEST EQUIPMENT 主要测试设备

NO.编号	Instrument Name 仪器名称
LCS-S-224	Battery charge tester 电池充放电测试仪
LCS-S-218	Battery low press tester 高空模拟试验箱
LCS-S-222	Rapid temperature rise tester 高低温循环箱
LCS-S-213	Vibration tester 振动台
LCS-S-214	Vertical shock Tester 垂直冲击台
LCS-S-220	Battery external short-circuit tester 电池短路试验机
LCS-S-231	DC source 直流稳压电源
LCS-S-215	Battery crush tester 电池挤压试验机
LCS-S-379	Scales 天平
LCS-S-230	Digital multimeter 万用表
LCS-S-115	Temperature recorder 温度记录仪
LCS-S-223	Free fall tester 跌落试验机

Ⅲ、TEST METHOD AND DATA测试方法和数据

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

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

小型电池或电池组必须按顺序进行试验T1至T5。试验T6和T8应使用未另外试验过的电池或电池组。试验T7可以使用原先在试验T1至T5中使用过的未损坏的电池组进行，以便测试交替充电放电的电池组。

要求电池和电池组无渗漏、无排气、无解体、无破裂和无起火并且每个电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的90%。有关电压的要求不适用于完全放电状态的电池和电池组。

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

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

Where$M_1$is the mass before the test and$M_2$is the mass after the test, when mass loss does not exceed the values in Table below, it shall be considered as “no mass loss”.

质量损失依照下式计算：

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

式中M_1是试验前的质量，M_2是试验后的质量。如质量损失不超过下表所列数值，即视为“无质量损失”。

Mass M of cell or battery 电池或电池组质量M	Mass lost limite 质量损失限值
M＜1g	0.5%
1g≤M≤75g	0.2%
M＞75g	0.1%

Test T1: Altitude simulation 高度模拟

Test procedure 试验程序：

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20 ± 5 °C). 试验电池和电池组在压力不大于11.6kPa和温度20℃±5°C的环境下存放至少6小时。

Requirement 要求：

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

样品（电池）应无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90％,此要求不适用于完全放完电的电池和电芯。

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltageloss 电压损失 (%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	20.452	4.18	20.448	4.17	0.020	0.24	PASS/合格
B02	20.436	4.18	20.433	4.17	0.015	0.24	PASS/合格
B03	20.458	4.17	20.451	4.17	0.034	0.00	PASS/合格
B04	20.396	4.17	20.393	4.17	0.015	0.00	PASS/合格
B05	20.412	4.17	20.403	4.17	0.044	0.00	PASS/合格
B06	20.425	4.18	20.423	4.17	0.010	0.24	PASS/合格
B07	20.191	4.17	20.186	4.16	0.025	0.24	PASS/合格
B08	20.413	4.18	20.412	4.18	0.005	0.00	PASS/合格
B09	20.409	4.17	20.409	4.17	0.000	0.00	PASS/合格
B10	20.445	4.17	20.443	4.16	0.010	0.24	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无排气、无分解、无破裂以及无着火现象

Test T.2: Thermal test 耐热测试

Test procedure 测试程序

Test cells and batteries are to be stored for at least six hours at a test temperature equal to72 ± 2 °C, followed by storage for at least six hours at a test temperature equal to - 40 ± 2 °C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

试验电池和电池组在试验温度等于72℃±2℃下存放至少6小时，然后在试验温度等于-40℃±2℃下存放至少6小时。两个极端温度之间的最大时间间隔为30分钟。这一过程须重复10次，接着将所有电池在环境温度20℃±5℃下存放24小时。对于大型电池和电池组，暴露于极端试验温度的时间至少应为12小时。

Requirement 要求

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

样品（电池）应无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90％,此要求不适用于完全放完电的电池和电芯。

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltageloss 电压损失 (%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	20.448	4.17	20.441	4.12	0.034	1.20	PASS/合格
B02	20.433	4.17	20.427	4.13	0.029	0.96	PASS/合格
B03	20.451	4.17	20.448	4.13	0.015	0.96	PASS/合格
B04	20.393	4.17	20.389	4.13	0.020	0.96	PASS/合格
B05	20.403	4.17	20.401	4.12	0.010	1.20	PASS/合格
B06	20.423	4.17	20.419	4.13	0.020	0.96	PASS/合格
B07	20.186	4.16	20.182	4.13	0.020	0.72	PASS/合格
B08	20.412	4.18	20.408	4.13	0.020	1.20	PASS/合格
B09	20.409	4.17	20.403	4.12	0.029	1.20	PASS/合格
B10	20.443	4.16	20.438	4.13	0.024	0.72	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无排气、无分解、无破裂以及无着火现象

Test T.3: Vibration 振动

Test procedure测试程序：

1. Cells and batteries are firmly secured to the platform of the vibration machine /电芯和电池牢固地安装在振动台（的台面）上。

2. The vibration:a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes/振动以正弦波形式，对数扫描频率从7Hz增加至200Hz，然后再回到7Hz，一个循环持续15分钟。

3. the logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached, The amplitude is then maintained at 0,8mm (1,6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50Hz), A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz/对数扫频为:从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。

4. This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell /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，共3 个小时。

Requirement 要求

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

样品（电池）应无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90％,此要求不适用于完全放完电的电池和电芯。

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltageloss 电压损失 (%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	20.441	4.12	20.439	4.12	0.010	0.00	PASS/合格
B02	20.427	4.13	20.424	4.12	0.015	0.24	PASS/合格
B03	20.448	4.13	20.445	4.12	0.015	0.24	PASS/合格
B04	20.389	4.13	20.385	4.13	0.020	0.00	PASS/合格
B05	20.401	4.12	20.388	4.12	0.064	0.00	PASS/合格
B06	20.419	4.13	20.416	4.12	0.015	0.24	PASS/合格
B07	20.182	4.13	20.179	4.13	0.015	0.00	PASS/合格
B08	20.408	4.13	20.405	4.13	0.015	0.00	PASS/合格
B09	20.403	4.12	20.401	4.11	0.010	0.24	PASS/合格
B10	20.438	4.13	20.431	4.13	0.034	0.00	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无排气、无分解、无破裂以及无着火现象

Test T4: Shock 冲击

Test procedure测试程序:

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a halfsine shock of peak acceleration of 150gn and pulse duration of 6 milliseconds. Each cell or battery shall be 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 or battery for a total of 18 shocks. However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50gn and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.

以稳固的托架固定住每个电芯和电池样品的安装表面。对每个电芯或电池以峰值为150gn 的半正弦的加速度冲击，脉冲持续6 毫秒，大型电池和大型电池组须经受最大加速度50gn 和脉冲持续时间11 毫秒的半正弦波冲击。每个电池或电池组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。

Battery	Minimum peak acceleration	Pulse duration
Small batteries	150 g_n or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^*}\right)}$ whichever is smaller	6 ms
Large batteries	50 g_n or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^*}\right)}$ whichever is smaller	11 ms

* Mass is expressed in kilograms.

Requirement 要求:

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

样品（电池）应无漏液、无排气、无分解、无破裂以及无着火现象的发生。样品试验后开路电压应不低于试验前开路电压的90％,此要求不适用于完全放完电的电池和电芯。

Data数据：

No. 编号	Pre-test测试前		After test测试后		Mass loss 质量损失 (%)	Voltageloss 电压损失 (%)	Verdict# （判定#）
	Mass(g) 质量(g)	Voltage(V) 电压(V)	Mass(g) 质量(g)	Voltage(V) 电压(V)			
B01	20.439	4.12	20.438	4.11	0.005	0.24	PASS/合格
B02	20.424	4.12	20.421	4.12	0.015	0.00	PASS/合格
B03	20.445	4.12	20.442	4.12	0.015	0.00	PASS/合格
B04	20.385	4.13	20.383	4.12	0.010	0.24	PASS/合格
B05	20.388	4.12	20.386	4.12	0.010	0.00	PASS/合格
B06	20.416	4.12	20.413	4.11	0.015	0.24	PASS/合格
B07	20.179	4.13	20.178	4.12	0.005	0.24	PASS/合格
B08	20.405	4.13	20.399	4.12	0.029	0.24	PASS/合格
B09	20.401	4.11	20.397	4.1	0.020	0.24	PASS/合格
B10	20.431	4.13	20.428	4.13	0.015	0.00	PASS/合格

#：No leakage, No venting,No disassembly No rupture and no fire

#：无漏液、无排气、无分解、无破裂以及无着火现象

Test T.5: External short circuit 外短路测试

Test procedure 测试程序:

The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 55 ± 2 °C and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at 57 ± 4 °C. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57 ± 4°C.

试验电芯或电池在57℃±4℃的环境温度下，经受外电阻小于0.1欧姆的短路试验，短路时间持续到电池壳温度恢复到57℃±4℃后继续至少1小时。要求电池外壳温度不超过170℃，并且试验后6小时内无解体、无破裂和无起火。

Requirement 要求：

Cells and batteries meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire during the test and within six hours after the test. 如果电芯和电池外表面温度不超过170℃, 6 小时内无着火, 无破裂, 无解体, 那么电芯和电池适合这要求.

Data数据：

No. 编号	Peak temperature(℃) 最高温度	No disassembly, No rupture and no fire 无解体、无破裂和无起火
B01	55.7	PASS/合格
B02	55.8	PASS/合格
B03	55.9	PASS/合格
B04	55.3	PASS/合格
B05	55.2	PASS/合格
B06	55.7	PASS/合格
B07	55.5	PASS/合格
B08	55.6	PASS/合格
B09	55.3	PASS/合格
B10	55.8	PASS/合格

Test T.6: Impact (applicable to cylindrical cells not less than 18 mm in diameter) / Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells 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)/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)

Test procedure 测试程序– Impact撞击：

The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm ± 0.1mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the Centre of the sample. A 9.1 kg ± 0.1 kg mass is to be 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 shall be oriented 90 degrees from the horizontal supporting surface.

The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1mm diameter curved surface lying across the Centre of the test sample. Each sample is to be subjected to only a single impact.

将试验电芯或组成电芯放在平坦光滑平面上，将一根长度不少于7cm的316型不锈钢棒横放在试样中心后，将一质量为9.1kg 的物体从61±2.5cm 的高度落向样品。待测试电池纵轴与平面平行，与横放在试样中心的直径15.8±0.1 毫米弯曲表面的纵轴垂直。每个样品只经受一次撞击。

Test Procedure测试程序– Crush挤压：

A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options

below is reached.

(a) The applied force reaches 13 KN ± 0.78 KN;

Example: The force shall be applied by a hydraulic ram with a 32 mm diameter piston until a pressure of 17 MPa is reached on the hydraulic ram.

(b) The voltage of the cell drops by at least 100 mV; or

(c) The cell is deformed by 50% or more of its original thickness.

Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.

A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.

将电芯或组成电芯放在两个平面之间挤压，挤压力度逐渐加大，在第一个接触点上的速度大约为1.5厘米/秒。挤压持续进行，直到出现以下三种情况之一：

(a)施加的力量达到13KN± 0.78KN；

(b)电池的电压下降至少100毫伏；

(c)电池变形达原始厚度的50%或以上。

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，圆柱形电池应从与纵轴垂直的方向施压。每个样品只经受一次挤压。

Requirement 要求:

Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test. 电芯或组成电芯的最高表面温度应不超过170℃，试验结束后6个小时之内，试验样品应无分解和无着火现象发生。

Data数据（Crush 挤压）：

No. 编号	Peak temperature(℃) 最高温度	No disassembly, No fire 无解体、无着火
C01	27.3	PASS/合格
C02	28.1	PASS/合格
C03	27.6	PASS/合格
C04	27.4	PASS/合格
C05	27.5	PASS/合格

Test T.7: Overcharge 过度充电

Test procedure 测试程序：

The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:

(a) when the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V.

(b)when the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.

以2 倍制造厂推荐的最大持续充电电流对样品充电，本测试最小电压为:

(a)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该小于两倍的厂家标定最大充电电压或者是22V

(b)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该1.2 倍的厂家标定最大充电电压

20±5℃的环境温度下，试验持续24 小时。

Requirement 要求：

Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.

试验样品在试验中和试验后7 天内，应无解体和无着火现象发生。

Data数据:

No. 编号	No disassembly, No fire 无解体、无着火
B11	PASS/合格
B12	PASS/合格
B13	PASS/合格
B14	PASS/合格
B15	PASS/合格
B16	PASS/合格
B17	PASS/合格
B18	PASS/合格

Test T.8: Forced discharge (for cell)强制放电

Test procedure测试程序

Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.

The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere).

20±5℃的环境温度下，将电池连接在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商指定的最大放电电流。

对于指定的放电电流则需要和测试电芯串联一个匹配的电阻，每一个电芯的强制放电时间等于额容量除以初始的测试电流。

Requirement要求

Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.

试验样品在试验中和试验后7 天内，应无解体和无着火现象发生。

Data数据：

No. 编号	No disassembly and no fire 无解体、无着火
C06	PASS/合格
C07	PASS/合格
C08	PASS/合格
C09	PASS/合格
C10	PASS/合格
C11	PASS/合格
C12	PASS/合格
C13	PASS/合格
C14	PASS/合格
C15	PASS/合格
C16	PASS/合格
C17	PASS/合格
C18	PASS/合格
C19	PASS/合格
C20	PASS/合格
C21	PASS/合格
C22	PASS/合格
C23	PASS/合格
C24	PASS/合格
C25	PASS/合格

Ⅳ、THE PHOTO OF SAMPLE 样品图片

Figure 1

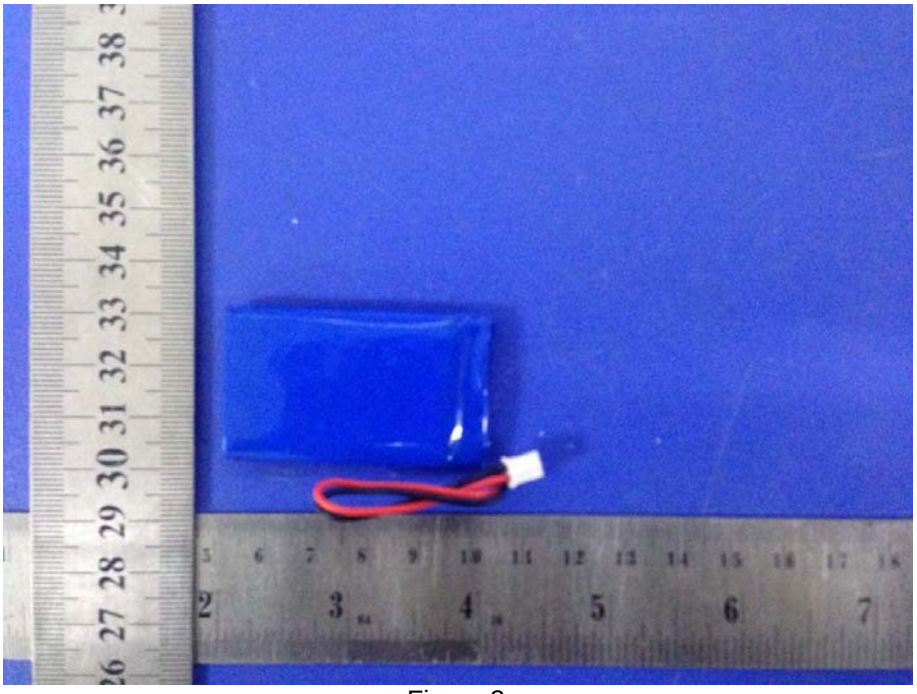

Figure 2

Figure 3

Figure 4

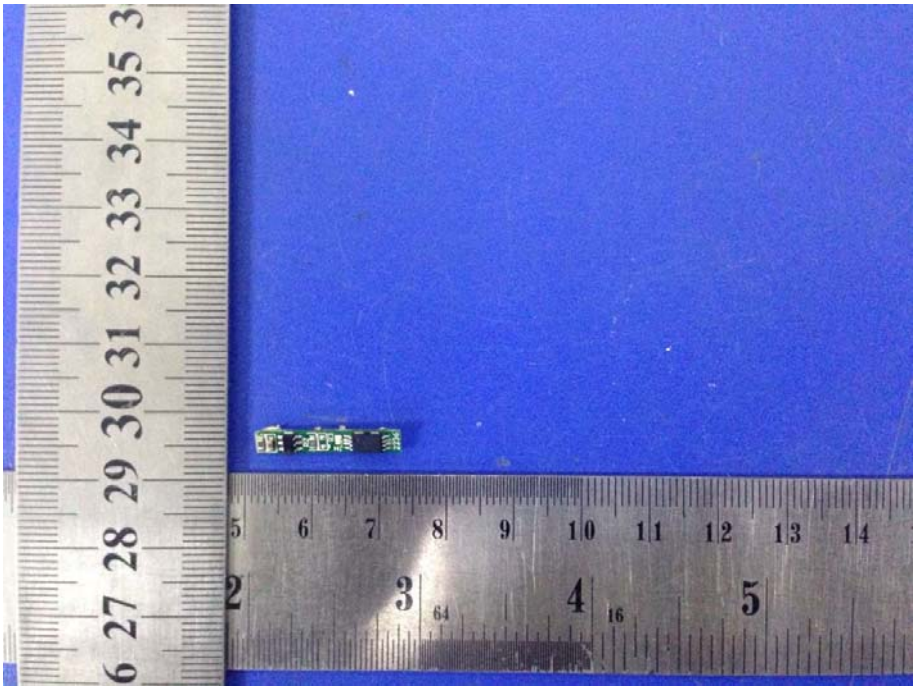

Figure 5

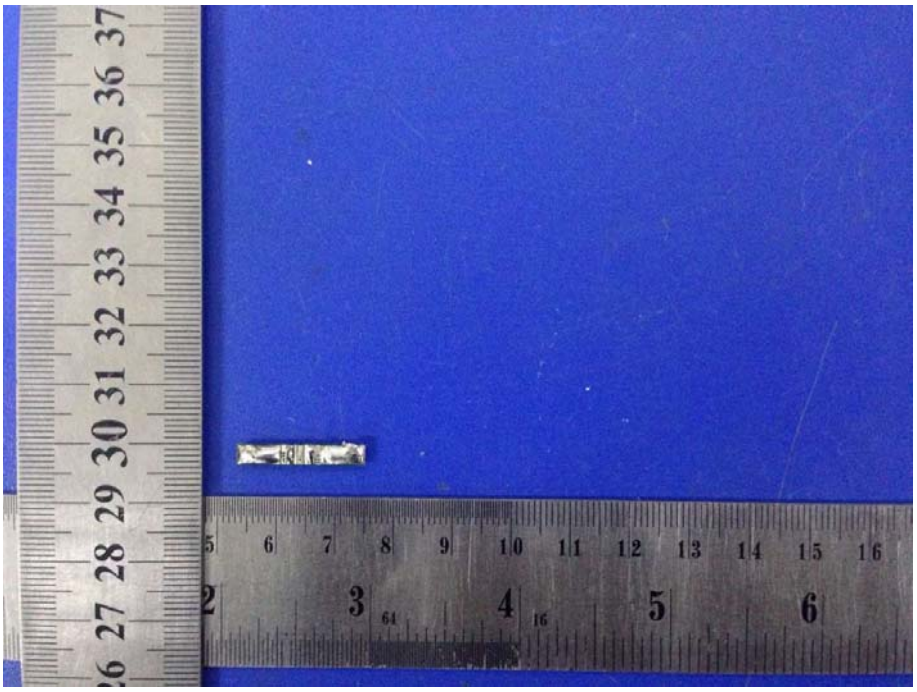

Figure 6

End of report