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报告编号(Report ID): MMIWQV5M80819721



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UN38.3 测试报告

UN38.3 Test Report

Sample Description & Model	Rechargeable Li-ion Polymer Battery 603040 (3.7V 1.4Ah 5.18Wh)
Applicant	Ledlenser Corporation Ltd.
Manufacturer	ZHUHAI GREAT POWER ENERGY CO.,LTD



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Code: r06j36jp8

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I、SAMPLE DESCRIPTION

Sample description		Rechargeable Li-ion Polymer Battery		Sample model	603040
Applicant		Ledlenser Corporation Ltd.			
Manufacturer	Name	ZHUHAI GREAT POWER ENERGY CO.,LTD			
	Address	XinQing Technology Park, Zhufeng Avenue, Jing An Town, DouMen District, Zhuhai City, Guangdong Province, P.R.China			
	Tel	0756-6333555			
	E-mail	li-ion@greatpower.net		Web	---
Nominal voltage		3.7V	Rated capacity	1.4Ah	Limited charge voltage 4.2V
Charge current		280mA	Maximum continuous charge current	700mA	End charge current 14mA
Cut-off voltage		3.0V	Maximum discharge current	1.4A	Mass 35g
Cell number		2PCS	Cell model	GSP583040	Cell capacity 700mAh
Manufacturer of cell		ZHUHAI GREAT POWER ENERGY CO.,LTD			
Electrochemistry System		LiNiCoMnO ₂			
Entrust date		2018-12-07		Finished date	2018-12-26

II、TEST METHOD

UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Manual of Tests and Criteria (ST/SG/AC.10/11/Rev.6/Amend.1), Part III sub-section.

III、TEST ITEM & CONCLUSION

ITEM	SAMPLE NUMBER	STANDARD	CONCLUSION
Altitude simulation	N1~N4 C1~C4	UN38.3 ST/SG/AC.10/11/Rev.6/ Amend.1	PASS
Thermal test			PASS
Vibration			PASS
Shock			PASS
External short circuit			PASS
Crush	N9~N13 C9~C13		PASS
Overcharge	N5~N8 C5~C8		PASS
Forced discharge	N14~N23 C14~C23		PASS

The Samples 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/Amend.1), Part III sub-section.

Appraiser: *Lin Liangjian* Checker: *Jin Shitang*Approver: *Yi Shaoqun*

Issue Date: December 26, 2018



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Notes:

N1~N8: Cells at first cycle in fully charged states;

N9~N13: Cells at first cycle at 50% of the design rated capacity;

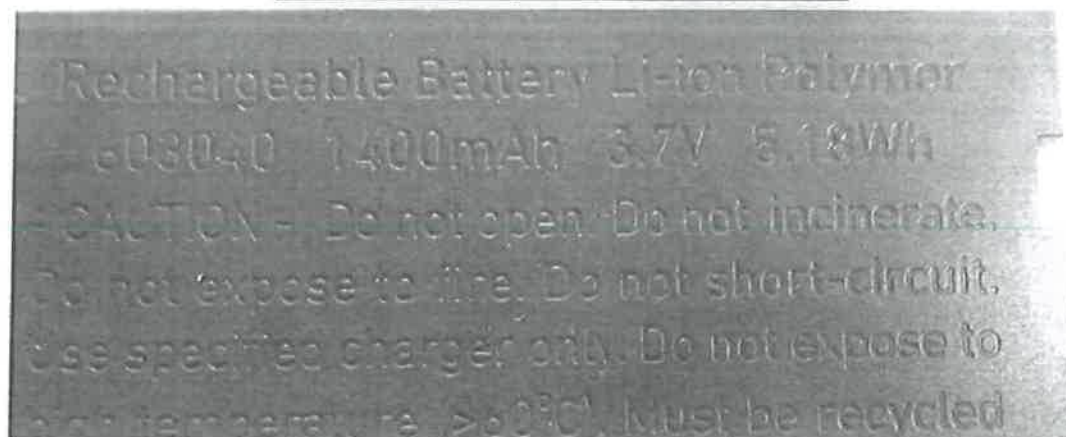
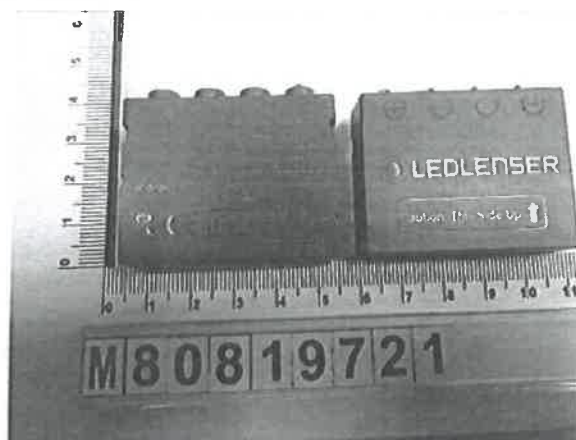
N14~N23: Cells at first cycle in fully discharged states;

C1~C8: Cells after 25 cycles ending in fully charged states;

C9~C13: Cells after 25 cycles at 50% of the design rated capacity;

C14~C23: Cells after 25 cycles ending in fully discharged states.

IV、PHOTO OF THE SAMPLE



Authenticate the photo on original report only

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V、TEST METHOD

Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.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.

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”.

Mass M of cell or battery	Mass loss limit
$M < 1\text{g}$	0.5%
$1\text{g} \leq M \leq 75\text{g}$	0.2%
$M > 75\text{g}$	0.1%

T.1 Altitude simulation

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature ($20 \pm 5^\circ\text{C}$).

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.

T.2 Thermal test

Test cells and batteries are to be stored for at least six hours at a test temperature equal to $72 \pm 2^\circ\text{C}$, followed by storage for at least six hours at a test temperature equal to $-40 \pm 2^\circ\text{C}$. 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 ($20 \pm 5^\circ\text{C}$). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

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.



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T.3 Vibration

Cells and batteries are 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 shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be 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 must be perpendicular to the terminal face.

The logarithmic frequency sweep shall differ for cells and batteries with a gross mass of not more than 12 kg (cells and small batteries), and for batteries with a gross mass of more than 12 kg (large batteries).

For cells and small batteries: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 g_n occurs (approximately 50 Hz).

A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200 Hz.

For large batteries: from 7 Hz to a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 g_n occurs (approximately 25 Hz). A peak acceleration of 2 g_n is then maintained until the frequency is increased to 200 Hz.

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 after testing in its 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.

T.4 Shock

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 shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 milliseconds.

Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. The formulas below are provided to calculate the appropriate minimum peak accelerations.

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

* Mass is expressed in kilograms.

Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.

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.

T.5 External short circuit

The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57±4°C, measured on the external case. This period of time depends on the size and design of the cell or battery and should be assessed and documented. If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. Then the cell or battery at 57±4°C shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm. 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, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value. The short circuit and cooling down phases shall be conducted at least at ambient temperature.

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.

T.6 Impact / Crush

Impact (applicable to cylindrical cells not less than 18 mm in diameter)

The test sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm \pm 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 \pm 0.1 kg mass is to be 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 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 \pm 0.1mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.

Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18 mm in diameter)

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 \pm 0.78 kN;
- (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.

Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for a further 6 h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests.

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.

T.7 Overcharge

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



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- (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.

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

T.8 Forced discharge

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).

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.



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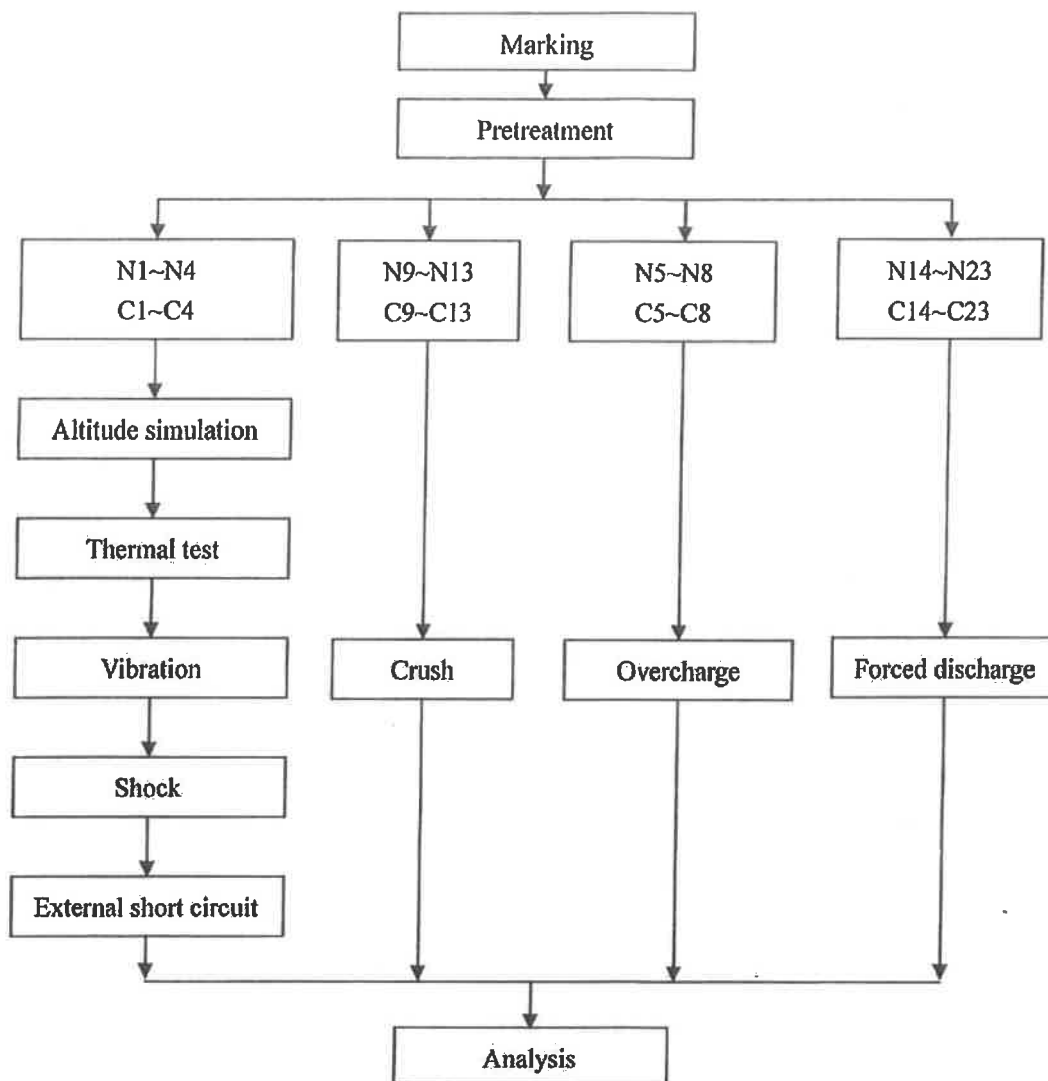


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VI、TEST PROCEDURE



VII、TEST APPARATUS

IE-0121 High precision battery test system

IE-0434 Vacuum drying oven

IE-0090 Multimeter

IE-0824 Tableland air pressure gauge

IE-0259 Electronic balance

IE-0219 Rapid temperature change test chamber

IE-0281 Temperature controlled short circuit testing machine

IE-0664 Pneumatic vertical impact testing platform

IE-0503 Electric vibration test system

IE-0185 The digital thermometer (TC)

IE-0198 Battery crush testing machine

IE-0511 Programmable DC power source

IE-0512 Programmable DC power source



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VIII、 DATA

1. Altitude simulation

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Whether leakage, venting, disassembly, rupture, fire (Y/N)
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	36.113	4.135	36.108	4.135	0.014	0.000	N
N2	35.764	4.145	35.758	4.144	0.017	0.024	N
N3	35.654	4.140	35.647	4.139	0.020	0.024	N
N4	36.310	4.135	36.301	4.134	0.025	0.024	N
C1	35.726	4.148	35.715	4.148	0.031	0.000	N
C2	36.136	4.153	36.127	4.151	0.025	0.048	N
C3	35.905	4.145	35.898	4.145	0.019	0.000	N
C4	35.955	4.132	35.949	4.131	0.017	0.024	N

2. Thermal test

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Whether leakage, venting, disassembly, rupture, fire (Y/N)
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	36.108	4.135	36.093	4.086	0.042	1.185	N
N2	35.758	4.144	35.744	4.101	0.039	1.038	N
N3	35.647	4.139	35.633	4.093	0.039	1.111	N
N4	36.301	4.134	36.281	4.078	0.055	1.355	N
C1	35.715	4.148	35.707	4.059	0.022	2.146	N
C2	36.127	4.151	36.116	4.092	0.030	1.421	N
C3	35.898	4.145	35.880	4.083	0.050	1.496	N
C4	35.949	4.131	35.935	4.082	0.039	1.186	N

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3. Vibration

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Whether leakage, venting, disassembly, rupture, fire (Y/N)
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	36.093	4.086	36.093	4.086	0.000	0.000	N
N2	35.744	4.101	35.744	4.101	0.000	0.000	N
N3	35.633	4.093	35.633	4.093	0.000	0.000	N
N4	36.281	4.078	36.281	4.078	0.000	0.000	N
C1	35.707	4.059	35.706	4.059	0.003	0.000	N
C2	36.116	4.092	36.116	4.091	0.000	0.024	N
C3	35.880	4.083	35.880	4.083	0.000	0.000	N
C4	35.935	4.082	35.935	4.081	0.000	0.024	N

4. Shock

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Whether leakage, venting, disassembly, rupture, fire (Y/N)
	Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
N1	36.093	4.086	36.093	4.086	0.000	0.000	N
N2	35.744	4.101	35.744	4.101	0.000	0.000	N
N3	35.633	4.093	35.633	4.093	0.000	0.000	N
N4	36.281	4.078	36.281	4.078	0.000	0.000	N
C1	35.706	4.059	35.706	4.058	0.000	0.025	N
C2	36.116	4.091	36.116	4.091	0.000	0.000	N
C3	35.880	4.083	35.880	4.083	0.000	0.000	N
C4	35.935	4.081	35.934	4.081	0.003	0.000	N

5. External short circuit

No.	Peak temperature (°C)	Whether disassembly, rupture, fire (Y/N)
N1	57.8	N
N2	57.7	N
N3	57.9	N
N4	57.8	N
C1	57.9	N
C2	57.7	N
C3	57.7	N
C4	57.6	N

6. Crush

No.	Peak temperature (°C)	Whether disassembly, fire (Y/N)
N9	23.5	N
N10	23.6	N
N11	23.5	N
N12	23.7	N
N13	23.6	N
C9	23.5	N
C10	23.6	N
C11	23.5	N
C12	23.4	N
C13	23.7	N



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7. Overcharge

No.	Whether disassembly, fire (Y/N)
N5	N
N6	N
N7	N
N8	N
C5	N
C6	N
C7	N
C8	N

8. Forced discharge

No.	Whether disassembly, fire (Y/N)
N14	N
N15	N
N16	N
N17	N
N18	N
N19	N
N20	N
N21	N
N22	N
N23	N
C14	N
C15	N
C16	N
C17	N
C18	N
C19	N
C20	N
C21	N
C22	N
C23	N

*** End of report ***

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Pony Testing International Group

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锂电池或锂电池组 UN38.3 试验概要

Lithium Cell or Battery UN38.3 Test Summary

单位信息 Company information

委托单位 Applicant:	阳江纳谷科技有限公司 Ledlenser Corporation Ltd.		
生产商 Manufacturer	名称 Name	珠海鹏辉能源有限公司 ZHUHAI GREAT POWER ENERGY CO.,LTD	
	地址 Address	广东省珠海市斗门区井岸镇珠峰大道新青科技园 XINQING TECHNOLOGY PARK, ZHUFENG AVENUE, JING AN TOWN,DOUMEN DISTRICT, ZHUHAI CITY, GUANGDONG PROVINCE	
	电话 Tel.	020-39197511	
	邮箱 E-mail	xgqiang@greatpower.net	
	网址 Website	www.greatpower.net	
测试单位 Test Lab.	名称 Name	谱尼测试集团深圳有限公司 Pony Testing Group Shenzhen Co., Ltd.	
	地址 Address	深圳市宝安区福海街道和平社区骏丰中城智造创新园 A2 栋一层 1/F., Building A2, Junfeng Zhongcheng Zhizao Innovation Park, Heping Community, Fuhai Road, Bao'an District, Shenzhen, Guangdong, China	
	电话 Tel.	86-755-26050909	
	邮箱 E-mail	cst@ponytest.com	
	网址 Website	www.ponytest.com	

样品信息 Sample information:

样品名称 Sample name	可充电锂离子聚合物电池 Rechargeable Li-ion Polymer Battery	样品型号 Sample model	603040
原始测试型号 Original tested type	/	产品参数 Sample parameter	3.7V 1.4Ah
样品质量 Sample mass	35g	额定瓦时 Watt-hour rating	5.18Wh
电池或电池组类型 cell or battery type	锂离子电池 Lithium ion battery	物理形状 Physical description:	灰色棱柱形 Gray Prismatic
原报告编号 Original test report No.	MMIWQV5M80819721	测试报告日期 Date of test report	2018-12-26


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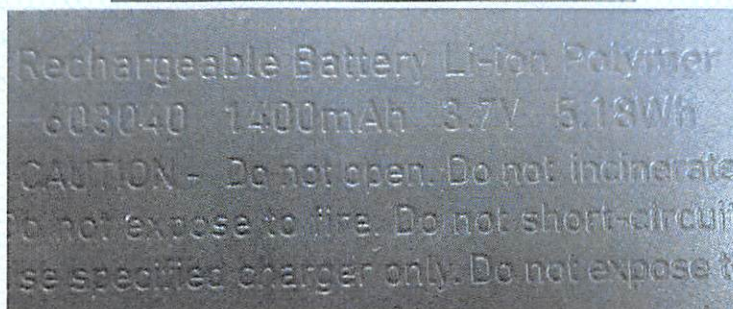
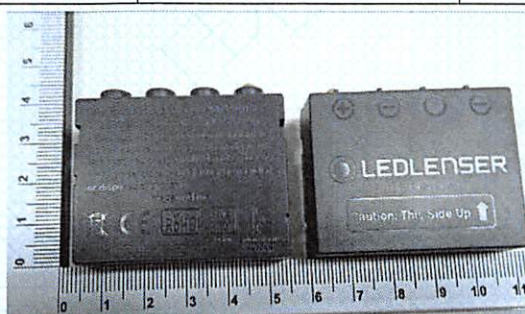
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测试方法 Test method:

《联合国关于危险品运输的建议书 试验和标准手册》 第六修订版修正 1 第III部分 38.3 章节
 United nations "recommendations on the TRANSPORT OF DANGEROUS GOODS" Manual of Tests and
 Criteria 38.3(ST/SG/AC.10/11/Rev.6/Amend.1)

测试项目及结论 Test item & conclusion:

测试项目 Test item	结论 Conclusion	测试项目 Test item	结论 Conclusion
T1: 高度模拟 Altitude Simulation	通过 Pass	T5: 外部短路 External short circuit	通过 Pass
T2: 温度试验 Thermal test	通过 Pass	T6: 挤压 Crush	通过 Pass
T3: 振动 Vibration	通过 Pass	T7: 过度充电 Overcharge	通过 Pass
T4: 冲击 Shock	通过 Pass	T8: 强制放电 Forced discharge	通过 Pass
38.3.3 (f)	不适用 Not Applicable	38.3.3 (g)	不适用 Not Applicable

 样品图片
Sample Picture

 测试结论
Test Conclusion

测试样品符合联合国《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III部分 38.3 章节要求。
 The tested samples meet the requirements of test items of the UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" manual of TESTS AND Criteria ST/SG/AC.10/11/Rev.6/Amend.1 38.3.

备注 Remark

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