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报告编号(Report ID): MDIDCPZN90270721

# 锂电池 UN38.3 测试报告

## Lithium Battery UN38.3 Test Report

Sample Description & Model	Rechargeable Lithium Polymer Battery 21532
Applicant	Yangdong Light Squared Lighting Co., Ltd.
Manufacturer	Guangzhou Great Power Energy & Technology Co., Ltd.

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Code: oibnz0705



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## I. SAMPLE DESCRIPTION

Sample Description	Rechargeable Lithium Polymer Battery		Sample Model	21532	
Applicant	Yangdong Light Squared Lighting Co., Ltd.				
Manufacturer	Guangzhou Great Power Energy & Technology Co., Ltd.				
Nominal Voltage	3.7V	Rated Capacity	1000mAh	Limited Charge Voltage	4.25V
Charge Current	300mA	Maximum Continuous Charge Current	1000mA	End Charge Current	30mA
Cut-off Voltage	3V	Maximum Discharge Current	1000mA	Use	To supply power for product
Cell Number In Each Battery	1PCS	Cell Model	GSP832937	Cell Capacity	1000mA
Manufacturer of cell	Guangzhou Great Power Energy & Technology Co., Ltd.				
Entrust date	2016-06-23		Finished date	2016-07-18	

## II. TEST METHOD

《United Nations Recommendations On The Transport Of Dangerous Goods, Manual Of Tests And Criteria》  
(ST/SG/AC.10/11/Rev.6, 38.3).

## III. TEST ITEM

- |                        |                           |
|------------------------|---------------------------|
| 1. Altitude simulation | 5. External short circuit |
| 2. Thermal test        | 6. Crush                  |
| 3. Vibration           | 7. Overcharge             |
| 4. Shock               | 8. Forced discharge       |

## IV. CONCLUSION

ITEM	SAMPLE NUMBER	STANDARD	CONCLUSION
Altitude simulation	N1~N10	UN38.3 ST/SG/AC.10/11/Rev.6	PASS
Thermal test			PASS
Vibration			PASS
Shock			PASS
External short circuit			PASS
Crush			PASS
Overcharge			PASS
Forced discharge			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.

Prepared by: *Zhangjij* Checked by: *Zhangchunmei* Approved by: *Yishaobin*

Issue Date: July 18, 2016



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### Notes:

N1~N10, N16~N19: Cells at first cycle in fully charged states;

N11~N15: Cells at first cycle at 50% of the design rated capacity;

N20~N29: Cells at first cycle in fully discharged states;

C1~C4: Cells after 50 cycles ending in fully charged states;

C5~C14: Cells after 50 cycles ending in fully discharged states.

### V. PHOTO OF THE SAMPLE

Battery Model: 21532



Cell Model: GSP832937



Authenticate the photo on original report only



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## VI. 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 <sub>n</sub> or result of formula Acceleration(g <sub>n</sub> ) = $\sqrt{\left(\frac{100850}{mass^*}\right)}$ Whichever is smaller	6 ms
Large batteries	50 g <sub>n</sub> or result of formula Acceleration(g <sub>n</sub> ) = $\sqrt{\left(\frac{30000}{mass^*}\right)}$ Whichever is smaller	11 ms

\* 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  $57 \pm 4^\circ\text{C}$ , 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  $57 \pm 4^\circ\text{C}$  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  $57 \pm 4^\circ\text{C}$ , 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  $170^\circ\text{C}$  and there is no disassembly, no rupture and no fire during the test and within six hours after the test.



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### 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.

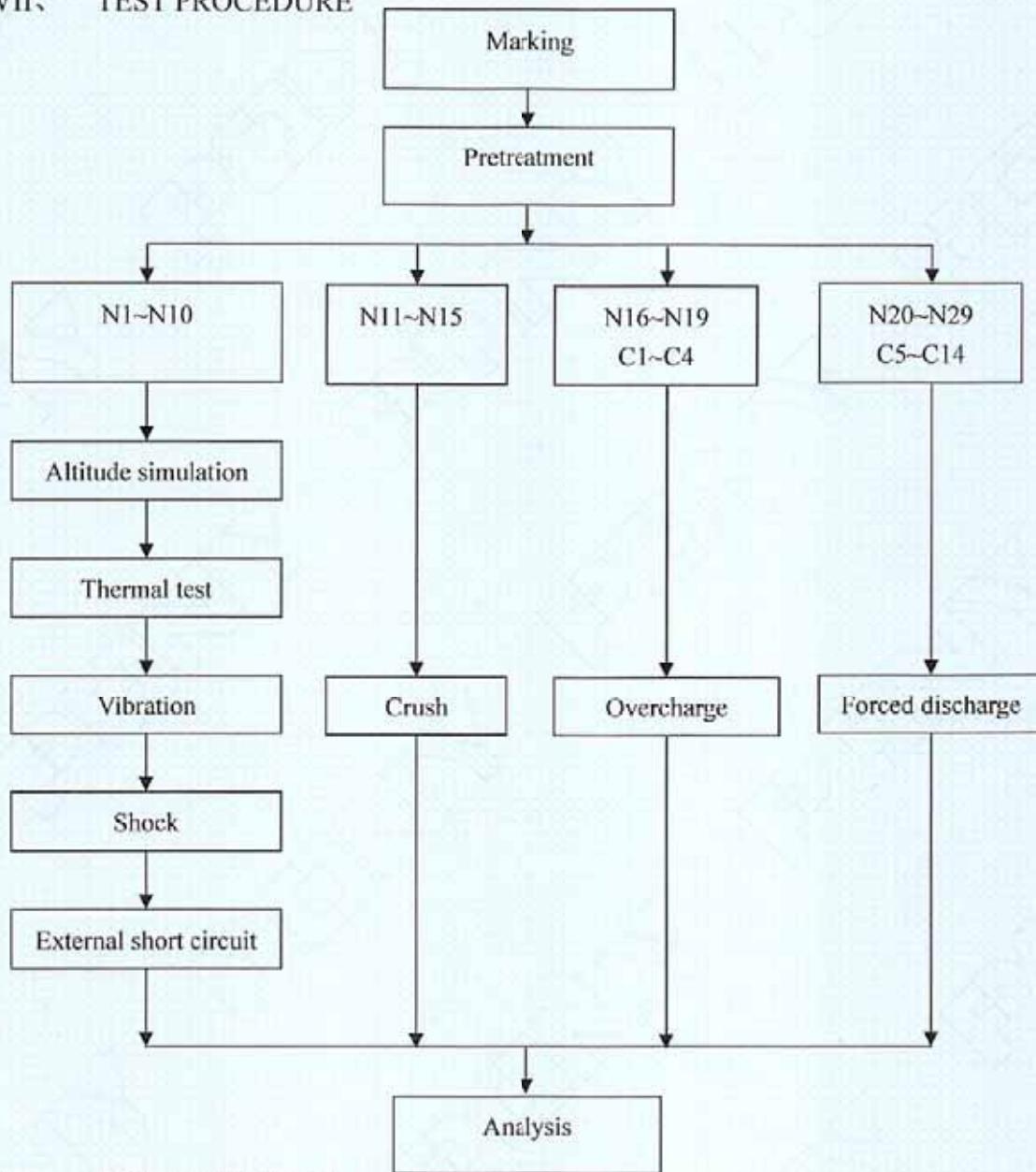
The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere).

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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## VII. TEST PROCEDURE



## VIII. TEST APPARATUS

IE-0121 Rechargeable battery test system	IE-0287 Shock test instrument
IE-0434 Vacuum chamber	IE-0281 Temperature control circuit tester
IE-0090 Digital multimeter	IE-0185 Thermoelectric pair
IE-0259 Electronic balance	IE-0198 Battery extrusion needling machine
IE-0328 Temperature change chamber	IE-0511 DC regulated power supply
IE-0128 Electrodynamical type vibration test instrument	
IE-0077 TPR series high precision DC regulated power supply	



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## IX. 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	21.466	4.214	21.463	4.213	0.014	0.024	N
N2	21.770	4.212	21.770	4.211	0.000	0.024	N
N3	21.768	4.213	21.765	4.213	0.014	0.000	N
N4	21.872	4.214	21.870	4.213	0.009	0.024	N
N5	21.627	4.210	21.625	4.210	0.009	0.000	N
N6	21.726	4.212	21.724	4.211	0.009	0.024	N
N7	21.595	4.209	21.595	4.208	0.000	0.024	N
N8	21.504	4.210	21.504	4.210	0.000	0.000	N
N9	21.820	4.208	21.820	4.207	0.000	0.024	N
N10	21.702	4.211	21.700	4.210	0.009	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	21.463	4.213	21.457	4.171	0.028	0.997	N
N2	21.770	4.211	21.763	4.169	0.032	0.997	N
N3	21.765	4.213	21.761	4.167	0.018	1.092	N
N4	21.870	4.213	21.866	4.166	0.018	1.116	N
N5	21.625	4.210	21.619	4.167	0.028	1.021	N
N6	21.724	4.211	21.717	4.163	0.032	1.140	N
N7	21.595	4.208	21.587	4.162	0.037	1.093	N
N8	21.504	4.210	21.494	4.165	0.047	1.069	N
N9	21.820	4.207	21.814	4.160	0.027	1.117	N
N10	21.700	4.210	21.695	4.166	0.023	1.045	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	21.457	4.171	21.457	4.170	0.000	0.024	N
N2	21.763	4.169	21.762	4.168	0.005	0.024	N
N3	21.761	4.167	21.761	4.167	0.000	0.000	N
N4	21.866	4.166	21.865	4.165	0.005	0.024	N
N5	21.619	4.167	21.616	4.165	0.014	0.048	N
N6	21.717	4.163	21.716	4.161	0.005	0.048	N
N7	21.587	4.162	21.586	4.161	0.005	0.024	N
N8	21.494	4.165	21.492	4.162	0.009	0.072	N
N9	21.814	4.160	21.814	4.160	0.000	0.000	N
N10	21.695	4.166	21.694	4.163	0.005	0.072	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	21.457	4.170	21.456	4.170	0.005	0.000	N
N2	21.762	4.168	21.762	4.168	0.000	0.000	N
N3	21.761	4.167	21.761	4.167	0.000	0.000	N
N4	21.865	4.165	21.865	4.165	0.000	0.000	N
N5	21.616	4.165	21.616	4.165	0.000	0.000	N
N6	21.716	4.161	21.716	4.160	0.000	0.024	N
N7	21.586	4.161	21.585	4.161	0.005	0.000	N
N8	21.492	4.162	21.492	4.162	0.000	0.000	N
N9	21.814	4.160	21.814	4.160	0.000	0.000	N
N10	21.694	4.163	21.694	4.163	0.000	0.000	N

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## 5. External short circuit

No.	Peak temperature (°C)	Whether disassembly, rupture, fire (Y/N)
N1	57.4	N
N2	57.5	N
N3	57.9	N
N4	57.6	N
N5	57.8	N
N6	57.3	N
N7	57.2	N
N8	57.6	N
N9	57.5	N
N10	57.8	N

## 6. Crush

No.	Peak temperature (°C)	Whether disassembly, fire (Y/N)
N11	24.6	N
N12	24.6	N
N13	24.8	N
N14	24.9	N
N15	24.8	N

## 7. Overcharge

No.	Whether disassembly, fire (Y/N)
N16	N
N17	N
N18	N
N19	N
C1	N
C2	N
C3	N
C4	N



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## 8. Forced discharge

No.	Whether disassembly, fire (Y/N)
N20	N
N21	N
N22	N
N23	N
N24	N
N25	N
N26	N
N27	N
N28	N
N29	N
C5	N
C6	N
C7	N
C8	N
C9	N
C10	N
C11	N
C12	N
C13	N
C14	N

\*\*\* End of report \*\*\*



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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:		阳江市阳东区极光照明科技有限公司 Yangdong Light Squared Lighting Co., Ltd
生产商 Manufacturer	名称 Name	广州鹏辉能源科技股份有限公司 Guangzhou Great Power Energy & Technology Co., Ltd.
	地址 Address	广州市番禺区沙湾镇市良路西村段 922 号 922 Xicun Section, Shiliang Road, Shawan, Panyu, Guangzhou, GD, PRC
	电话 Tel.	0086-20-39196888
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	网址 Website	<a href="http://www.greatpower.net/">http://www.greatpower.net/</a>
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.
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	网址 Website	<a href="http://www.ponytest.com">www.ponytest.com</a>

### 样品信息 Sample information:

样品名称 Sample name	可充电锂聚合物电池 Rechargeable Lithium Polymer Battery	样品型号 Sample model	21532
原始测试型号 Original tested type	/	产品参数 Sample parameter	3.7V 1000mAh
样品质量 Sample mass	22g	额定瓦时 Watt-hour rating	3.7Wh
电池或电池组类型 cell or battery type	锂离子电池芯 Lithium ion cell	物理形状 Physical description:	黑色棱柱形 Black Prismatic
原报告编号 Original test report No.	MDIDCPZN90270721	测试报告日期 Date of test report	2016-07-18



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Pony Testing International Group

**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)

**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	
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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 38.3.
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备注 Remark	/		
签名 Signature	 刘伟 技术经理 Technical Manager	签发日期 Issue date	2020-01-06