华南国家计量测试中心
广东省计量科学研究院
SOUTH CHINA NATIONAL CENTER OF METROLOGY
GUANGDONG INSTITUTE OF METROLOGY

2008002938Z

CNAS 检 测 CNAS L0730

检 测 报 告

TEST REPORT

证书编号 Certificate No. DCH20119211

委托方 Client: Shenzhen Renergy Technology Co., Ltd.

委托方地址 Add. of Client: 11F, 3 Building, Jincheng Industrial Park, Huafan Road, Dalang, Baoan, Shenzhen, China

样品名称 Description: Rechargeable Li-ion Battery

型号规格 Model/Type: AK-V32

制造厂 Manufacturer: Shenzhen Renergy Technology Co., Ltd.

出厂编号 Serial No.: 1#～26# 设备编号 Equipment No.: ———

接收日期 Date of Receipt: 2011年 9月 9日 (Y M D)

结论 Conclusion: 见检测结果页 Shown in the results of test report

检测日期 Date of Test: 2011年 10月 10日 (Y M D)

批 准 人 Approved Signatory

核 验 Inspected by

检 测 Tested by

证书专用章

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说　明

证书编号 DCH20119211
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DIRECTIONS

1. 本中心是国家质量监督检验检疫总局在华南地区设立的国家法定计量检定机构，计量授权证书号是：（国）法计（2007）01043号、（国）法计（2007）01032号。本中心是中国合格评定国家认可委员会(CNAS)认可实验室，认可证书号为：CNAS L0730.

This laboratory is the National Legal Metrological Verification Institution in southern China set up by the General Administration of Quality Supervision, Inspection and Quarantine of the People's Republic of China (AQSIQ) under authorization certificates No.(2007)01043 & (2007)01032. This laboratory is accredited by China National Accreditation Service for Conformity Assessment under Laboratory Accreditation Certification No. CNAS L0730.

2. 本中心所出具的数据均可溯源至国家计量基准和国际单位制(SI)。
All data issued by this laboratory are traceable to national primary standards and International System of Units (SI).

3. 本次检测的技术依据：
Reference documents for the test:

ST/SG/AC.10/11/REV.5-2009 关于危险货物运输的建议书 试验和标准手册 第三部分 38.3章节
Recommendations on the transport of dangerous goods / Manual of tests and criteria / Part III, Subsection 38.3

4. 本次检测所使用的主要计量标准器具：
Major standards of measurement used in the test:

设备名称/型号 Name of Equipment /Model	编号 Serial No.	证书号/有效期 Certificate No. /Due Date	计量特性 Metrological Characteristic
冲击台 Shock Testing Machine /SKT25	L081001	SSD20106116 /2011-11-22	加速度:±20%;速度:±15%; Acceleration:±20%;Velocity :±15%;
高低温冲击试验箱 High and Low Temperatures Shock Tester /TSG2055W	08110652	RZD20108422 /2011-11-07	U=0.4 ℃(k=2)
全自动电池专用落锤冲击试验机 Automatic Landing Impact Testing Machine /ZCJ1122-1	20810046	DCH20100739 /2011-12-02	允差:±10 mm MPE:±10 mm

5. 检测地点、环境条件：
Place and environmental conditions of the test:

地点 Place 本院电磁实验室(Electrics-magnetics Lab)　温度 Temperature (20±5) ℃　相对湿度 RH (40～70) %

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Ⅰ Basic information

Sample name	Rechargeable Li-ion Battery	Type	AK-V32
Nominal voltage	3.7 V	Rated capacity	1000mAh 3.7Wh
Limited charge voltage	4.2 V	Trade mark	emporia
Shape	Prismatic	Size (L×W×T)	(54.5×41.7×5.0)mm
Test item	Altitude simulation, Thermal test, Vibration, Shock, External short circuit, Impact, Overcharge		
Test conclusion	Rechargeable Li-ion Battery with the type AK-V32, which was submitted by Shenzhen Renergy Technology Co., Ltd. , has been tested according to the Section 38.3 of Fifth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.5 Section 38.3). Test result: Pass		
Remark	----		

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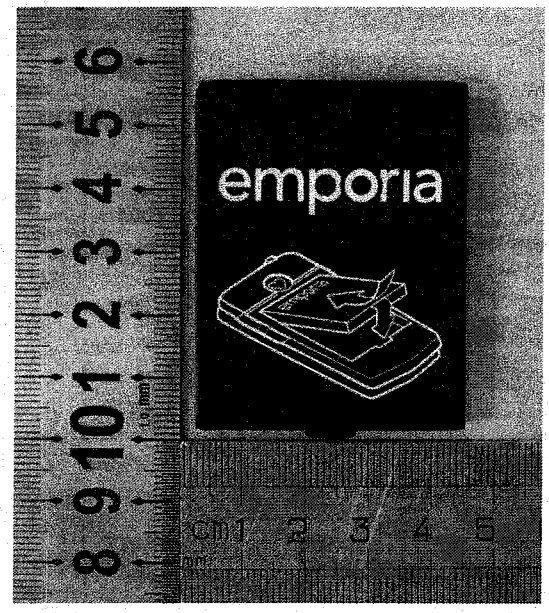
II Photos of the Sample

Battery



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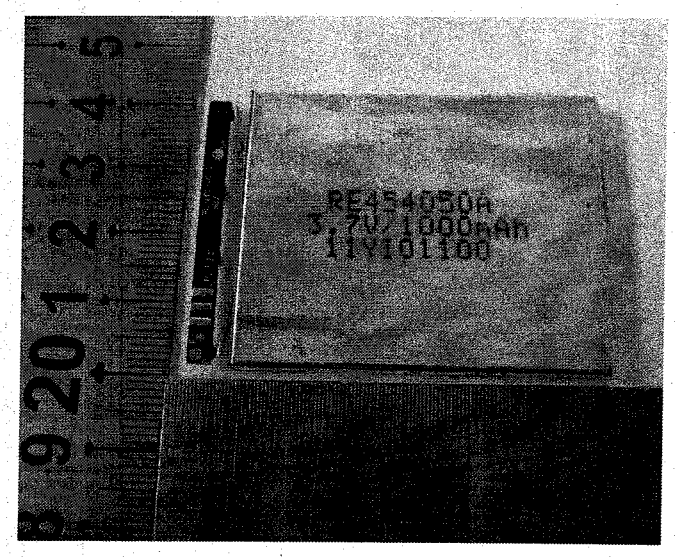
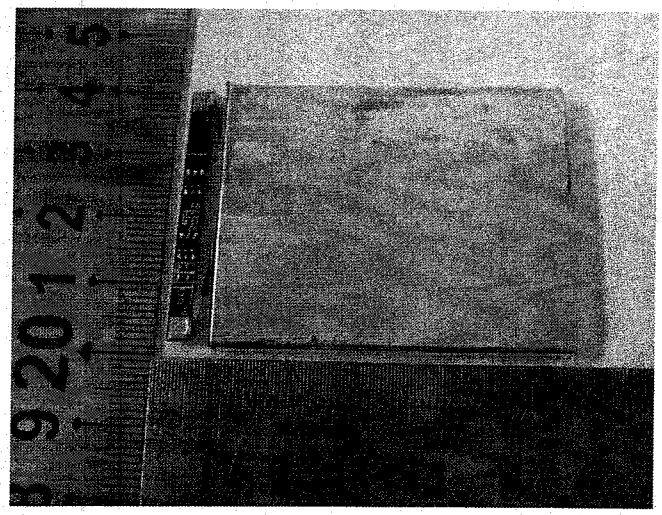
Cell





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III Abstract of test result

Test contents

NO.	Test item	Test reference	Conclusion	Remark
1	Altitude simulation	UN Manual of Tests and Criteria, part III, subsection 38.3.4.1	Pass	----
2	Thermal test	UN Manual of Tests and Criteria, part III, subsection 38.3.4.2	Pass	----
3	Vibration	UN Manual of Tests and Criteria, part III, subsection 38.3.4.3	Pass	----
4	Shock	UN Manual of Tests and Criteria, part III, subsection 38.3.4.4	Pass	----
5	External short circuit	UN Manual of Tests and Criteria, part III, subsection 38.3.4.5	Pass	----
6	Impact	UN Manual of Tests and Criteria, part III, subsection 38.3.4.6	Pass	----
7	Overcharge	UN Manual of Tests and Criteria, part III, subsection 38.3.4.7	Pass	----

Procedure

Test 1 to test 5 must be conducted in sequence on the same cell or battery. Test 6 should be conducted using not otherwise tested cells or batteries. Test 7 may be conducted using undamaged batteries previously used in test 1 to 5 for purpose of testing cycled batteries.

Batteries of $1^{\#}$~$8^{\#}$ are full charged after one cycle;
Component cells of $9^{\#}$~$18^{\#}$ are 50% charged after one cycle;
Batteries of $19^{\#}$~$26^{\#}$ are full charged after fifty cycles.

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1 Altitude simulation

1) Requirement

Cells and batteries meet this requirement if there is no mass loss, 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.

2) Test procedure

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) ℃.

3) Data showed in table 1

Table 1

The state of batteries	NO.	Pre-test		After test		Mass loss (%)	Voltage after test / Voltage pre-test (%)	Status
		Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
Full charged after one cycle	1#	22.497	4.19	22.496	4.18	0.00	99.8	Pass
	2#	22.506	4.18	22.504	4.18	0.01	100.0	Pass
	3#	22.502	4.18	22.502	4.18	0.00	100.0	Pass
	4#	22.489	4.17	22.488	4.17	0.00	100.0	Pass
Full charged after fifty cycles.	19#	22.521	4.18	22.521	4.17	0.00	99.8	Pass
	20#	22.497	4.18	22.495	4.18	0.01	100.0	Pass
	21#	22.483	4.19	22.482	4.19	0.00	100.0	Pass
	22#	22.513	4.18	22.512	4.18	0.00	100.0	Pass

2 Thermal test

1) Requirement

Cells and batteries meet this requirement if there is no mass loss, 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.

2) Test procedure

Test cells and batteries are to be stored for at least six hours at a test temperature equal to (75±2) ℃, followed by storage for at least six hours at a test temperature equal to (-40±2) ℃. The maximum time

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interval between test temperature extremes is 30 minutes. This procedure is to be repeated 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20±5) ℃.

3) Data showed in table 2

Table 2

The state of batteries	NO.	Pre-test		After test		Mass loss (%)	Voltage after test / Voltage pre-test (%)	Status
		Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
Full charged after one cycle	1#	22.496	4.18	22.493	4.16	0.01	99.5	Pass
	2#	22.504	4.18	22.500	4.17	0.02	99.8	Pass
	3#	22.502	4.18	22.499	4.16	0.01	99.5	Pass
	4#	22.488	4.17	22.482	4.16	0.03	99.8	Pass
Full charged after fifty cycles.	19#	22.521	4.17	22.517	4.16	0.02	99.8	Pass
	20#	22.495	4.18	22.493	4.16	0.01	99.5	Pass
	21#	22.482	4.19	22.480	4.16	0.01	99.3	Pass
	22#	22.512	4.18	22.507	4.17	0.02	99.8	Pass

3 Vibration

1) Requirement

Cells and batteries meet this requirement if there is no mass loss, 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.

2) Test procedure

Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transit 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 is as follows: 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.

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3) Data showed in table 3

Table 3

The state of batteries	NO.	Pre-test		After test		Mass loss (%)	Voltage after test / Voltage pre-test (%)	Status
		Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			
Full charged after one cycle	1#	22.493	4.16	22.492	4.16	0.00	100.0	Pass
	2#	22.500	4.17	22.497	4.17	0.01	100.0	Pass
	3#	22.499	4.16	22.498	4.16	0.00	100.0	Pass
	4#	22.482	4.16	22.482	4.15	0.00	99.8	Pass
Full charged after fifty cycles.	19#	22.517	4.16	22.515	4.16	0.01	100.0	Pass
	20#	22.493	4.16	22.492	4.16	0.00	100.0	Pass
	21#	22.480	4.16	22.480	4.15	0.00	99.8	Pass
	22#	22.507	4.17	22.506	4.17	0.00	100.0	Pass

4 Shock

1) Requirement

Cells and batteries meet this requirement if there is no mass loss, 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.

2) Test procedure

Test cells and batteries shall be secured to the testing machine by means of rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a half-sine shock of peak acceleration of 150 g_n 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.

3) Data showed in table 4

Table 4

The state of batteries	NO.	Pre-test		After test		Mass loss (%)	Voltage after test / Voltage pre-test (%)	Status
		Mass (g)	Voltage (V)	Mass (g)	Voltage (V)			

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Full charged after one cycle	1#	22.492	4.16	22.490	4.16	0.01	100.0	Pass
	2#	22.497	4.17	22.496	4.16	0.00	99.8	Pass
	3#	22.498	4.16	22.498	4.16	0.00	100.0	Pass
	4#	22.482	4.15	22.481	4.15	0.00	100.0	Pass
Full charged after fifty cycles.	19#	22.515	4.16	22.514	4.16	0.00	100.0	Pass
	20#	22.492	4.16	22.489	4.15	0.01	99.8	Pass
	21#	22.480	4.15	22.480	4.15	0.00	100.0	Pass
	22#	22.506	4.17	22.505	4.17	0.00	100.0	Pass

5 External short circuit

1) Requirement

Cells and batteries meet this requirement if their external temperature does not exceed 170℃ and there is no disassembly, no rupture and no fire within six hours of this test.

2) Test procedure

The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches (55±2) ℃ 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 (55±2) ℃. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned (55±2) ℃. The cell or battery must be observed for a further six hours for the test to be concluded.

3) Data showed in table 5

Table 5

The state of cells	NO.	Peak temperature (℃)	Status
Full charged after one cycle	1#	55.4	Pass
	2#	55.3	Pass
	3#	55.3	Pass
	4#	55.2	Pass
Full charged after fifty cycles.	19#	55.3	Pass
	20#	55.4	Pass
	21#	55.3	Pass
	22#	55.3	Pass

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6 Impact

1) Requirement

Cells and component cells meet this requirement if their external temperature does not exceed 170℃ and there is no disassembly and no fire within six hours of this test.

2) Test procedure

The test sample cell or component cell is to be placed on a flat surface. A 15.8 mm diameter bar is to be placed across the centre of the sample. A 9.1 kg mass is to be dropped from a height of (61±2.5) cm onto the sample. A cylindrical or prismatic cell is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm diameter curved surface lying across the centre of the test sample. A prismatic cell is also to be rotated 90 degrees around its longitudinal axis so that both the wide and narrow sides will be subject to the impact. Each sample is to be subjected to only a single impact. Separate samples are to be used for each impact.

A coin or button cell is to be impacted with the flat surface of the sample parallel to the flat surface and the 15.8 mm diameter curved surface lying across its center.

3) Data showed in table 6

Table 6

The state of cells	NO.	Peak temperature (℃)	Status
50% charged after one cycle	9#	91.6	Pass
	10#	100.4	Pass
	11#	93.7	Pass
	12#	95.2	Pass
	13#	103.8	Pass
	14#	70.1	Pass
	15#	103.8	Pass
	16#	110.4	Pass
	17#	106.8	Pass
	18#	98.4	Pass

7 Overcharge

1) Requirement

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

2) Test procedure

The charge current shall be twice the manufacturer's recommended maximum continuous charge current.

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The minimum voltage of the test shall be as follows:

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

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

Test shall be conducted at ambient temperature. The duration of the test shall be 24 hours.

3) Data showed in table 7

Table 7

The state of batteries	NO.	Status
Full charged after one cycle	5#	Pass
	6#	Pass
	7#	Pass
	8#	Pass
Full charged after fifty cycles.	23#	Pass
	24#	Pass
	25#	Pass
	26#	Pass