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MATERIAL SAFETY DATA SHEET

Report No: STS1903151B02

Issued for

YJ POWER GROUP LIMITED

2nd Floor,B6 Building,,Tianrui Industrial
park,Fuyuanyi Road,FuYong,Bao'an,ShenZhen

Product Name:	Li-ion Polymer Battery
Model Name:	YJ903040
Nominal Voltage:	DC 3.8V
Typical Capacity:	1200mAh
Brand:	YJ
Version number:	V1.0

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Shenzhen STS Test Services Co., Ltd.

1/F, Building B, Zhuoke Science Park, No.190,Chongqing Road,

Fuyong Street, Bao'an District, Shenzhen, Guangdong,China

TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail:sts@stsapp.com



**Revision History**

Rev.	Issue Date	Report No.	Effect Page	Contents
00	16 Mar. 2019	STS1903151B02	ALL	Initial Issue





Section 1- Chemical Product and Company Identification

Product Identification: Li-ion Polymer Battery

Brand Name: YJ

Model Name: YJ903040

Rated Power: 4.56Wh

Manufacture's/Supplier Name: YJ POWER GROUP LIMITED

Address: 2nd Floor,B6 Building,,Tianrui Industrial park,Fuyuangyi Road,FuYong,Bao'an,ShenZhen

Connect Person: Mrs. Tang

Telephone: 0755-29707067

Email: 2355717239@yjbattery.com

Preparation Date: 16 Mar. 2019

This MSDS was prepared by Shenzhen STS Test Services Co., Ltd.

Item Number: STS1903151B02

Referenced documents: ISO 11014:2009 Safety data sheet for chemical products

Compiled by

:

(Brad Liang Yuan)

Technical Manager

:

(Vita Li)

Authorized Signatory

:

(Bovey Yang)





Section 2 – Hazards Identification

Preparation hazards and classification	Not dangerous with normal use. Do not dismantle, open or shred Li-ion Polymer Battery the ingredients contained within or their ingredients products could be harmful.
Appearance, Color, and Odor	Solid object with no odor, Silvery color.
Primary Route(s) of Exposure	These chemicals are contained in a sealed stainless steel enclosure. Risk of exposure occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, exposure to the electrolyte solution contained within can occur by Inhalation, Ingestion, Eye contact and Skin contact
Potential Health Effects	ACUTE (short term): see Section 8 for exposure controls In the event that this battery has been ruptured, the electrolyte solution contained within the battery would be corrosive and can cause burns. Inhalation: Inhalation of materials from a sealed battery is not an expected route of exposure. Vapors or mists from a ruptured battery may cause respiratory irritation. Ingestion: Swallowing of materials from a sealed battery is not an expected route of exposure. Swallowing the contents of an open battery can cause serious chemical burns of mouth, esophagus, and gastrointestinal tract. Skin: Contact between the battery and skin will not cause any harm. Skin contact with contents of an open battery can cause severe irritation or burns to the skin. Eye: Contact between the battery and the eye will not cause any harm. Eye contact with contents of an open battery can cause severe irritation or burns to the eye. CHRONIC (long term): see Section 11 for additional toxicological data
Medical Conditions Aggravated by Exposure	Not applicable
Reported as carcinogen	Not applicable



Section 3 – Composition/Information on Ingredients

Hazardous Ingredients (Chemical Name)	Concentration / Concentration range	CAS Number
Cobaltate, lithium	39.6%	12190-79-3
Aluminum	5.56%	7429-90-5
Polyvinylidene fluoride resin	1.15%	24937-79-9
Graphite	23.2%	7782-42-5
Copper	9.8%	7440-50-8
Rubber, styrene-butadiene, fume	1.78%	61789-96-6
Polyethylene	0.06%	9002-88-4
Polypropylene	0.78%	9003-07-0
Phosphate(1-), hexafluoro-, lithium	15.35%	21324-40-3
1, 3-Dioxolan-2-one	2.72%	96-49-1

Li-ion Polymer Battery is a mixture.

Labeling according to EC directives.

No symbol and risk phrase are required.

Note: CAS number is Chemical Abstract Service Registry Number

N/A=Not apply.

Section 4 – First-aid Measures

Inhalation	If contents of an opened battery are inhaled, remove source of contamination or move victim to fresh air. Obtain medical advice.
Skin contact	If skin contact with contents of an open battery occurs, as quickly as possible remove contaminated clothing, shoes and leather goods. Immediately flush with lukewarm, gently flowing water for at least 30 minutes. If irritation or pain persists, seek medical attention. Completely decontaminate clothing, shoes and leather goods before reuse or discard.
Eye contact	If eye contact with contents of an open battery occurs, immediately flush the contaminated eye(s) with lukewarm, gently flowing water for at least 30 minutes while holding the eyelids open. Neutral saline solution may be used as soon as it is available. If necessary, continue flushing during transport to emergency care facility. Take care not to rinse contaminated water into the unaffected eye or onto face. Quickly transport victim to an emergency care facility.
Ingestion	If ingestion of contents of an open battery occurs, never give anything by mouth if victim is rapidly losing consciousness, or is unconscious or convulsing. Have victim rinse mouth thoroughly with water. DO NOT INDUCE VOMITING. Have victim drink 60 to 240 mL (2-8 oz.) of water. If vomiting occurs naturally, have victim lean forward to reduce risk of aspiration. Have victim rinse mouth with water again. Quickly transport victim to an emergency care facility.

Section 5 – Fire-fighting Measures



Flammable Properties	In the event that this battery has been ruptured, the electrolyte solution contain within the battery would be flammable. Like any sealed container, battery cells may rupture when exposed to excessive heat; this could result in the release of flammable or corrosive materials.
Suitable extinguishing Media	Use extinguishing media suitable for the materials that are burning.
Unsuitable extinguishing Media	Not available
Explosion Data	Sensitivity to Mechanical Impact: This may result in rupture in extreme cases Sensitivity to Static Discharge: Not Applicable
Specific Hazards arising from the chemical	Fires involving Li-ion Polymer Battery an be controlled with water. When water is used, however, hydrogen gas may evolve. In a confined space, hydrogen gas can form an explosive mixture. In this situation, smothering agents are recommended to extinguish the fire
Protective Equipment and precautions for firefighters	As for any fire, evacuate the area and fight the fire from a safe distance. Wear a pressure-demand, self-contained breathing apparatus and full protective gear. Fight fire from a protected location or a safe distance. Use NIOSH/MSHA approved full-face self-contained breathing apparatus(SCBA) with full protective gear.
NFPA	Health: 0 Flammability: 0 Instability: 0

Section 6 – Accidental Release Measures

Personal Precautions, protective equipment, and emergency procedures	Restrict access to area until completion of clean-up. Do not touch the spilled material. Wear adequate personal protective equipment as indicated in Section 8.
Environmental Precautions	Prevent material from contaminating soil and from entering sewers or waterways.
Methods and materials for Containment	Stop the leak if safe to do so. Contain the spilled liquid with dry sand or earth. Clean up spills immediately.
Methods and materials for cleaning up	Absorb spilled material with an inert absorbent (dry sand or earth). Scoop contaminated absorbent into an acceptable waste container. Collect all contaminated absorbent and dispose of according to directions in Section 13. Scrub the area with detergent and water; collect all contaminated wash water for proper disposal.

Section 7 – Handling and Storage



Handling	Don't handling Li-ion Polymer Battery with metal work. Do not open, disassemble, crush or burn battery. Ensure good ventilation/ exhaustion at the workplace. Prevent formation of dust. Information about protection against explosions and fires: Keep ignition sources away- Do not smoke.
Storage	If the Li-ion Polymer Battery are subject to storage for such a long term as more than 3 months, it is recommended to recharge the Li-ion Polymer Battery periodically. 3 months: -10°C~+40°C, 45 to 85%RH And recommended at 0°C~+35°C for long period storage. The capacity recovery rate in the delivery state (50% capacity of fully charged) after storage is assumed to be 80% or more. The voltage for a long time storage shall be 3.7V-4.2V range. Do not storage Li-ion polymer battery haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects. Keep out of reach of children. Do not expose Li-ion Polymer Battery to heat or fire. Avoid storage in direct sunlight. Do not store together with oxidizing and acidic materials.

Section 8 – Exposure Controls and Personal Protection

Engineering Controls	Use local exhaust ventilation or other engineering controls to control sources of dust, mist, fumes and vapor. Keep away from heat and open flame. Store in a cool, dry place.
Personal Protective Equipment	Respiratory Protection: Not necessary under normal conditions. Skin and body Protection: Not necessary under normal conditions, Wear neoprene or nitrile rubber gloves if handling an open or leaking battery. Hand protection: Wear neoprene or natural rubber material gloves if handling an open or leaking battery. Eye Protection: Not necessary under normal conditions, Wear safety glasses if handling an open or leaking battery.
Other Protective Equipment	Have a safety shower and eye wash fountain readily available in the immediate work area.
Hygiene Measures	Do not eat, drink, or smoke in work area. Maintain good housekeeping.



Section 9 - Physical and Chemical Properties

Physical State	Form: Solid
	Color: Silvery
	Odour: Monotony
Change in condition:	
pH, with indication of the concentration	Not applicable
Melting point/freezing point	Not available.
Boiling Point, initial boiling point and Boiling range:	Not available.
Flash Point	Not available.
Upper/lower flammability or explosive limits	Not available.
Vapor Pressure:	Not applicable
Vapor Density: (Air = 1)	Not applicable
Density/relative density	Not available.
Solubility in Water:	Insoluble
n-octanol/water partition coefficient	Not available.
Auto-ignition temperature	130°C
Decomposition temperature	Not available.
Odour threshold	Not available.
Evaporation rate	Not available.
Flammability (soil, gas)	Not available.
Viscosity	Not applicable

Section 10 - Stability and Reactivity

Stability	The product is stable under normal conditions.
Conditions to Avoid (e.g. static discharge, shock or vibration)	Do not subject Li-ion Polymer Battery to mechanical shock. Vibration encountered during transportation does not cause leakage, fire or explosion. Do not disassemble, crush, short or install with incorrect polarity. Avoid mechanical or electrical abuse.
Incompatible Materials	Not Available
Hazardous Decomposition Products	This material may release toxic fumes if burned or exposed to fire
Possibility of Hazardous Reaction	Not Available



Section 11 - Toxicological Information

Irritation	Risk of irritation occurs only if the cell is mechanically, thermally or electrically abused to the point of compromising the enclosure. If this occurs, irritation to the skin, eyes and respiratory tract may occur.
Sensitization	Not Available
Neurological Effects	Not Available
Teratogenicity	Not Available
Reproductive Toxicity	Not Available
Mutagenicity (Genetic Effects)	Not Available
Toxicologically Synergistic Materials	Not Available

Section 12 - Ecological Information

General note:	Water hazard class 1(Self-assessment): slightly hazardous for water. Do not allow undiluted product or large quantities of it to reach ground water, water course or sewage system.
Anticipated behavior of a chemical product in environment/possible environmental impact/ecotoxicity	Not Available
Mobility in soil	Not Available
Persistence and Degradability	Not Available
Bioaccumulation potential	Not Available
Other Adverse Effects	Not Available

Section 13 – Disposal Considerations

Product disposal recommendation: Observe local, state and federal laws and regulations.

Packaging disposal recommendation: Be aware discarded batteries may cause fire, tape the battery terminals to insulate them. Don't disassemble the battery. Completely discharge containers(no tear drops, no powder rest, scraped carefully). Containers may be recycled or re-used. Observe local, state and federal laws and regulations.

Section 14 – Transport Information

The Li-ion Polymer Battery tested according to the requirements of the UN manual of tests and Criteria, Part III, subsection 38.3.

Li-ion Polymer Battery according to Section II/Section IB of Packing Instruction 965, or Section II of Packing Instruction 966~967 of the 2019 IATA Dangerous Goods regulations 60th Edition may be transported and Applicable U.S.DOT regulations for the safe transport of Li-ion Polymer Battery.

More information concerning shipping, testing, marking and packaging can be obtained from label master at <http://www.labelmaster.com/>.



The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design shall be chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of moisture.

The package must be handled with care and that a flammability hazard exists if the package is damaged.

Each package must be labeled with a Li-ion Polymer Battery handling label or in addition to be Class 9 hazard label.

Polymer Li-ion batteries can be treated as "Non-dangerous goods" under the United Nations Recommendations on the Transport of Dangerous Goods, Special Provision 188, provided that packaging is strong and prevent the products from short-circuit.

With regard to transport, the following regulations are cited and considered:

- The International Civil Aviation Organization (ICAO) Technical Instructions.
- The International Air transport Association (IATA) Dangerous Goods Regulations.

UN number of Li-ion Polymer Battery: Un3480 or Un3481;

UN Proper shipping name/Description (technical name): Lithium ion batteries of Lithium ion batteries

Contained in equipment of Lithium ion batteries packed with equipment.

- The International Maritime Dangerous Goods (IMDG) Code.

For Polymer Li-ion batteries by sea, provided that packaging is strong and prevent the products from short-circuit.

UN number of Li-ion Polymer Battery: Un3480 or Un3481;

UN Proper shipping name/Description (technical name): Lithium ion batteries of Lithium ion batteries

Contained in equipment of Lithium ion batteries packed with equipment.

- The US Hazardous Materials Regulation (HMR) pursuant to a final rule issued by RSPA
- The Office of Hazardous Materials Safety within the US Department of Transportation's (DOT) Research and Special Programs Administration (RSPA)

Section 15 - Regulatory Information

OSHA hazard communication standard (29 CFR 1910.1200)

_____ Hazardous

_____ ☒ Non-hazardous

Section 16 - Other Information

The information above is believed to be accurate and represents the best information currently available to us. However, concord makes no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. Although reasonable precautions have been taken in the preparation of the data contained herein, it is offered solely for your information, consideration and investigation. This material safety data sheet provides guidelines for the safe handling and use of this product; it does not and cannot advise on all possible situations, therefore, your specific use of this product should be evaluated to determine if additional precautions are required.

The data/information contained herein has been reviewed and approved for general release on the basis that this document contains no export controlled information.

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UN38.3 检 测 报 告

UN38.3 Test Report

申请商名称: [REDACTED]

Applicant's name: [REDACTED]

产品名称 Product Name:	锂离子聚合物电池 Li-ion Polymer Battery
商标名称 Brand Name:	■
型号 Model Name:	YJ903040
报告编号 Report No :	STS1903151B01
测试标准 Test Standard:	ST/SG/AC.10/11/Rev.6/Amend.1/Section 38.3

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Shenzhen STS Test Services Co., Ltd.
1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China
TEL: +86-755 3688 6288 FAX: +86-755 3688 6277 E-mail: sts@stsapp.com



**TEST REPORT****UN38.3, Sixth Edition Amend.1****Recommendations on transport of dangerous goods, manual of test and criteria,
Section 38.3 – Lithium metal and Li-ion polymer batteries****Report Number**: STS1903151B01**Tested by (+ signature)**: 黎旭**Reviewed by (+ signature)**: 易正元**Approved by (+ signature)**: 杨超**Date of issue**.....: 16 Mar.2019**Total number of pages**: 15 Pages**Testing laboratory**: Shenzhen STS Test Services Co., Ltd.**Address**: 1/F., Building B, Zhuoke Science Park, No.190, Chongqing Road,
Fuyong Street, Bao'an District, Shenzhen, Guangdong, China**Applicant's name**.....: [REDACTED]**Address**: [REDACTED]**Test specification:****Standard**.....: ST/SG/AC.10/11/Rev.6/Amend.1/Section 38.3**Test procedure**: Test report**Non-standard test method**.....: N/A**Test item description**: Li-ion Polymer Battery**Trade Mark**: [REDACTED]**Manufacturer**: [REDACTED]**Address**: [REDACTED]**Model/Type reference**: YJ903040**Ratings**: Rated Voltage: 3.8Vd.c.
Rated Capacity :1200mAh, 4.56Wh

**Summary of testing:****Tests performed (name of test and test clause):**

Test items	Sample Number
T.1: Altitude simulation / 高度模拟	B1# - B10 #
T.2: Thermal test / 温度测试	
T.3: Vibration / 振动	
T.4 Shock / 冲击	
T.5 External short circuit / 外接短路	
T.6 Crush / 挤压 or Impact/撞击	C11# - C20#
T.7 Overcharge / 过充电	B21# - B28#
T.8 Forced discharge / 强制放电	C29#- C48#

The sample's status is good.

样品状况良好。

The conditions of the batteries of samples No. B1# to B5# are at first cycle, in fully charged states.

样品编号 B1# - B5#为第一次循环充放电周期完全充电状态的电池。

The conditions of the batteries of samples No. B6# to B10# are after twenty five cycles, in fully charged states.

样品编号 B6# - B10#为第二十五次循环充放电周期完全充电状态的电池。

The conditions of the cells of samples No. C11# to C15# are at first cycle at 50% of the design rated capacity.

样品编号 C11# - C15#为第一次循环充放电周期充电至标称容量的 50%状态的电芯。

The conditions of the cells of samples No. C16# to C20# are after twenty five cycles at 50% of the design rated capacity.

样品编号 C16# - C20#为第二十五次循环充放电周期充电至标称容量的 50%状态的电芯。

The conditions of the batteries of samples No. B21# - B24# are at first cycle, in fully charged states.

样品编号 B21# - B24#为第一次循环充放电周期后完全充电状态的电池。

The conditions of the batteries of samples No. B25# - B28# are after twenty five cycles ending in fully charged states.

样品编号 B25# - B28#为第二十五次循环充放电周期后完全充电状态的电池。

The conditions of the cells of samples No. C24# to C33# are at first cycle, in fully discharged states.

样品编号 C29# - C38#为第一次循环充放电周期完全放电状态的电芯。

The conditions of the cells of samples No. C34# to C43# are after twenty five cycles ending in fully discharged states.

样品编号 C39# to C48#为第二十五次循环充放电周期后完全放电状态的电芯。

The Li-ion polymer Battery submitted by manufacturer are single cell batteries. According to the standard, a single cell Battery is considered a "cell" and shall be tested according to the testing requirements for "cell".



制造商提供的锂离子聚合物电池为单电芯电池，根据标准规定，单电芯电池要作为电芯来评估，按照电芯的测试要求进行测试。

Test Procedure:

1. Each battery type is subjected to tests T.1 to T.8. Tests T.1 to T.5 are conducted in sequence on the same battery. Tests 6 and 8 are conducted using not otherwise tested 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.

每一种类型的电池均应进行 T.1 至 T.8 项试验。电池必须按顺序在相同的一组电池上进行试验 T.1 至 T.5。试验 T.6 和 T.8 应使用未另外试验过的电池。试验 T.7 可以使用先前在试验 T.1 至 T.5 中使用过的未损坏电池进行，以便测试进行在循环过的电池上。

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

$$\text{Mass loss(\%)} = (M1 - M2) / M1 \times 100$$

为了量化质量损失，可用以下公式计算：质量损失(%)=(M1-M2)/M1×100

Where M1 is the mass before the test and M2 is the mass after the test. When mass loss does not exceed the values in Table below, it is

式中：M1 是试验前的质量，M2 是试验后的质量。如果质量损失不超过下表所列的数值，应视为“无质量损失”。

Mass M of cell or battery 电芯或电池的质量	Mass loss limit 质量损失限值
$M < 1g$	0.5%
$1g \leq M \leq 75g$	0.2%
$M > 75g$	0.1%

3. In test T.1 to T.4, 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 battery after testing is not less than 90% of its voltage immediately prior to this procedure.

在测试 T.1 至 T.4 中，电池须满足无渗漏、无泄气、无解体、无破裂和无起火，并且每个试验电池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%。

Comment:

This report also includes:

- Photo documentation: 1 pages

**Possible test case verdicts:**

- test case does not apply to the test object N (not applicable)

判定不适用于测试对象:

- test object does meet the requirement P (Pass)

测试符合规定:

-test object does not meet the requirement : F (Fail)

测试不符合规定:

Testing

Date of receipt of test item 18 Jan. 2019

Date(s) of performance of tests 18 Jan. 2019 ~ 16 Mar. 2019

General remarks:

The test results presented in this report relate only to the object tested.

本报告的测试结果仅对送检样品负责。

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"(See Enclosure #)" refers to additional information appended to the report.

"(See appended table)" refers to a table

Throughout this report a point is used

General product information:

The batteries, model no. YJ903040, are Li-ion Polymer Battery and used in port-able applications, consist of single Li-ion Polymer cell, model no. YJ903040

Additionally, details information of the cell and battery, as following:

Product name/产品名称	Li-ion Polymer Cell	Li-ion Polymer Battery
Type/model/型号	YJ903040	YJ903040
Nominal voltage/标称电压	3.8V	3.8V
Rated capacity/额定容量	1200mAh	1200mAh
Recommended charging Voltage/推荐充电电压	4.35V	4.35V
Maximum charging Current/最大充电电流	1200mA	1200mA
Maximum discharging Current/最大放电电流	1200mA	1200mA
Discharge cut-off voltage/放电截止电压	3.0V	3.0V
Dimensions/尺寸	TxWxL: MAX 8.3mm x 29.4mmx 41.3mm	TxWxL: MAX 8.3mm x 29.4mmx 41.3mm
Weight/重量	Approx.18.8g	Approx. 20.1g

The final evaluation of the battery must be conducted in the end product for which the battery will be used.



Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.1	Test T.1: Altitude simulation/高度模拟		P
	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) /温度为 20±5°C、大气压力不大于 11.6 kPa 的环境中贮存不少于 6 个小时。		
	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./电芯和电池符合要求：无质量损失、无漏液、无冒烟、无分解、无破裂以及无着火现象：电芯或电池测试后的开路电压不低于测试前开路电压的 90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池	No leakage, no venting, no disassembly, no rupture and no fire./无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1./测试数据见表 1。	P
38.3.4.2	Test .2: thermal test/温度测试		P
	Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±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 10 times, after which all test cells and batteries are to be stored for 24 hours at ambient temperature(20±5°C). /首先将样品放在 72 ±2°C 的环境中放置至少 6 个小时，然后放在-40±2°C 的环境中放置至少 6 个小时，温度暂缓的最大间隔时间为 30 分钟。如此循环 10 次，最后将样品放在 20±5°C 的环境中静置 24 小时。		P
	For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours./对于大电芯，在高温和低温中放置的时间最少为 12 小时。		N
	Cells and batteries meet this requirement if there is no mass loss no leakage, no venting, disassembly, no rupture and no fire and if the open circuit voltage of each cell or battery after testing is not less than 60% of its voltage immediately prior to this procedure. The requirement I relating to voltage is not applicable to test cells and batteries st fully discharged states./电芯和电池符合要求：无质量损失、无漏液、无冒烟、无分解、无破裂以及无着火现象：电芯和电池测试后的开路电压不低于测试前开路电压的 90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire./无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1./测试数据见表 1。	P
38.3.4.3	Test t.3: Vibration/振动		P



Clause	Requirement + Test	Result - Remark	Verdict
	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 200Hz 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 the three mutually perpendicular mounting positions of the cell. One of the terminal face. /样品必须牢固地安装在振动台面上。振动以正弦波形式，以 7Hz 增加至 200Hz，然后减少回到 7Hz 为一个循环，一个循环持续 15 分钟。对样品从三个互相垂直的方向上循环 12 次，共 3 个小时，其中一个振动方向必须是垂直样品的极性平面。		P
	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). /对于质量不大于 12kg 的样品（电芯和电池）和质量超过 12kg 的电池（大电池），对数扫频不同。		P
	For cells and small batteries: from 7 Hz a peak acceleration of 1 gn 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 gn occurs (approximately 50 Hz). A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz. /对于电芯和小电池，对数扫频为：从 7Hz 开始保持 1gn 的最大加速度直到频率为 18Hz，然后将振幅保持在 0.8mm (总偏移 1.6mm) 并增加频率直到最大加速度达到 8gn (频率约为 50Hz)，将最大加速度保持在 8gn 直到频率增加到 200Hz。		P
	For large batteries: from 7 Hz to a peak acceleration of 1 gn 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 gn occurs (approximately 25 Hz). A peak acceleration of 2 gn is then maintained until the frequency is increased to 200 Hz. /对于大电池，对数扫频为：从 7Hz 开始保持 1gn 的最大加速度直到频率为 18Hz，然后将振幅保持在 0.8mm (总偏移 1.6mm) 并增加频率直到最大加速度达到 2gn (频率约为 25Hz)，将最大加速度保持在 2gn 直到频率增加到 200Hz。		N



Clause	Requirement + Test	Result - Remark	Verdict
	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./电芯和电池符合要求：无质量损失、无漏液、无冒烟、无分解、无破裂以及无着火现象；电芯或电池测试后的开路电压不低于测试前开路电压的 90%。此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire./无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1./测试数据见表 1	P
38.3.4.4	Test T.4: Shock/冲击		P
	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 half-sine shock of peak acceleration of 150 gn 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. /以稳固的托架固定住每个样品。对每个样品以峰值为 150gn 的半正弦的加速度撞击，脉冲持续 6ms。每个样品必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。		P
	However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50 gn 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. /大电芯和大电池须经受最大加速度50gn和脉冲持续时间11ms的半正弦波冲击。每个样品必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。		N



Clause	Requirement + Test	Result - Remark	Verdict
	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. / 电芯和电池符合要求: 无质量损失、无漏液、无冒烟、无分解、无破裂以及无着火现象; 电芯或电池测试后的开路电压不低于测试前开路电压的 90%。 此项关于电压方面的要求不适用于完全放电后的电芯和电池。	No leakage, no venting, no disassembly, no rupture and no fire./无漏液、无冒烟、无分解、无破裂以及无着火现象。 The data see table 1./测试数据见表 1	P
38.3.4.5	Test T.5: External short circuit/外部短路		P
	The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches $57\pm4^{\circ}\text{C}$ 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 $57\pm4^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $57\pm4^{\circ}\text{C}$. /保持测试环境温度稳定在 $57\pm4^{\circ}\text{C}$, 以便样品外表温度达到 $57\pm4^{\circ}\text{C}$, 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, 样品的外表温度恢复到 $57\pm4^{\circ}\text{C}$ 之后保持短路状态 1 小时以上。		P
	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./电芯和电池符合要求: 在测试过程中以及之后 6 个小时内, 外表温度不超过 170°C , 并且无分解、无破裂和无着火现象发生。	No disassembly, no rupture and no fire during the test and within six hours after the test./在测试过程中以及之后 6 个小时内, 外表温度不超过 170°C , 并且无分解、无破裂和无着火现象发生。 The data see table 1. / 测试数据见表 1。	P
38.3.4.6	Test T.6: Impact / Crush/撞击/挤压		P
	Test procedure – Impact (applicable to cylindrical cells greater than or equal to 18 mm in diameter) / 撞击(适合于直径大于或等于 18mm 的圆柱形电芯)		N



Clause	Requirement + Test	Result - Remark	Verdict
	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 center 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. /将样品放在一个平坦的光滑平面上。将一直径为15.8 mm± 0.1mm，长度不小于6cm的316不锈钢棒横过样品中部放置后，将一质量为9.1 kg±0.1kg的重物从61±2.5 cm的高度落向样品。		N
	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 center of the test sample. Each sample is to be subjected to only a single impact. /接受撞击的样品，纵轴应与平坦的表面平行并与横放在样品中心的直径15.8 mm±0.1mm弯曲表面的纵轴垂直。每一个样品只接受一次撞击。		N
	Test Procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells not more than 18 mm in diameter). /挤压 (适用于棱柱形、袋状、硬币/纽扣电芯和直径不超过18mm的圆柱形电芯)	Pouch cell/袋状电芯	P
	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. /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1.5cm/s。挤压持续进行，直到出现以下三种情况之一		P
	(a) The applied force reaches 13 kN±0.78 kN; /施 加力达到 13 kN±0.78 kN		P
	(b) The voltage of the cell drops by at least 100 mV;/样品的电压下降至少100mV		N
	(c) 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。		N



Clause	Requirement + Test	Result - Remark	Verdict
	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. /棱柱形或袋状电芯应从最宽的一面施压。纽扣/硬币形电芯应从其平坦表面施压。圆柱形应从与纵轴垂直的方向施压。		P
	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. /每个样品都是全新样品，并且只经受一次施压。施压结束后样品应静置观察6小时。		P
	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. /电芯满足要求：在测试过程中以及之后6个小时内，外表温度不超过 170°C，并且无分解和无着火现象发生。	No disassembly and no fire. /无分解，无着火现象发生。 The data see table 2. /测试数据见表 2。	P
38.3.4.7	Test T.7: Overcharge/过充电		P
	The charge current shall be twice the manufacturer's recommended maximum continuous charge current. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours. The minimum voltage of the test shall be as follows: /在室温下，以2倍的制造商宣称的最大持续充电电流对样品充电，测试时间为24小时。测试的最小电压如下：		P
	(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. /如果制造商宣称的充电电压不超过18V，本测试的最小充电电压应是制造商宣称的最大充电电压的两倍或者是22V之中的较小者。	The voltage of the test is 8.7V, and the current is 2.4A. /测试电压为 8.7V，电流为 2.4A.	P
	(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. /如果制造商宣称的充电电压超过18V，本测试的最小充电电压应该是制造商宣称的最大充电电压的1.2倍。		N
	There is no disassembly and no fire during the test and within seven days after the test. /在测试中和测试完成后 7 天内，样品无分解和无着火现象。	No disassembly and no fire. /无分解，无着火现象发生。 The data see table 3. /测试数据见表 3。	P
38.3.4.8	Test T.8: Forced discharge/强制放电		P



Clause	Requirement + Test	Result - Remark	Verdict
	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. /在室温下，将单个电芯连接在12V的直流电源上进行强制放电，此直流电源供给每个电芯初始电流为制造商宣称的最大放电电流。 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). /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)。		P
	There is no disassembly and no fire during the test and within seven days after the test. /在测试中和测试完成后 7 天内，样品无分解和无着火现象发生	No disassembly and no fire. /无分解和无着火现象发生。 The data see table 4. / 测试数据见表 4	P





Table 1: T.1~T.5 / 表 1. 测试 T.1~测试 T.5

Sample No. 样品编号	Mass prior to Test (g)/试验前质量	OCV prior to test (V)/试验前电压	Test 1: Altitude Simulation/ 试验1: 高度模拟		Test 2: Thermal test/ 试验 2: 温度试验		Test 3: Vibration/ 试验 3: 振动		Test 4 : Shock/ 试验 4: 冲击		Test 5 :External Short Circuit/ 试验5: 外部短路
			Mass loss(%) 质量损失 (%)	Change ratio 电压比 (%)	Mass loss(%) 质量损失 (%)	Change ratio 电压比 (%)	Mass loss(%) 质量损失 (%)	Change ratio 电压比 (%)	Mass loss(%) 质量损失 (%)	Change ratio 电压比 (%)	Temp. (°C)温度 (°C)
B1#	20.029	4.348	0.005	99.928	0.010	99.690	0.010	99.928	0.005	99.952	57.5
B2#	20.056	4.342	0.005	99.952	0.005	99.761	0.005	99.952	0.000	100.00	58.1
B3#	20.033	4.347	0.010	99.905	0.010	99.713	0.010	100.00	0.005	99.952	56.7
B4#	20.102	4.338	0.005	99.928	0.010	99.690	0.010	100.00	0.000	99.928	58.0
B5#	20.018	4.340	0.005	99.928	0.005	99.713	0.005	99.952	0.000	100.00	57.7
B6#	20.025	4.339	0.005	99.905				99.928	0.005	99.952	57.2
B7#	20.047	4.345	0.010	99.952				99.952	0.010	99.993	58.0
B8#	20.052	4.343	0.005	99.928	0.005	99.690	0.005	99.952	0.005	100.00	57.3
B9#	20.078	4.347	0.010	99.905	0.010	99.713	0.010	100.00	0.000	99.952	57.6
B10#	20.031	4.338	0.005	99.952	0.005	99.761	0.005	99.952	0.000	100.00	57.2

Table 2: Crush or impact/ 表 2: 挤压或撞击

Test 6: Crush or impact / 试验 6 挤压或撞击	Sample No. 样品编号	C11#	C12#	C13#	C14#	C15#	C16#	C17#	C18#	C19#	C20#
	OCV prior to test (V) 试验前电压	3.755	3.763	3.751	3.776	3.737	3.780	3.775	3.776	3.752	3.750
	Temp. (°C) 温度	83.5	86.3	86.2	85.2	85.8	86.7	85.5	86.2	87.3	87.1

Table 3: Overcharge / 表 3: 过充电

Test 7: Overcharge/ 试验 7 过充电	Sample No. 样品编号	B21#	B22#	B23#	B24#	B25#	B26#	B27#	B28#
	OCV prior to test (V) 试验前电压	4.342	4.338	4.345	4.339	4.340	4.348	4.339	4.348



Table 4: Force discharge / 表 4: 强制放电

Test 8: Forced discharge/ 试验 8 强制 放电	Sample No. 样品编号	C29#	C30#	C31#	C32#	C33#	C34#	C35#	C36#	C37#	C38#
	OCV prior to test (V) 试验前电压	3.128	3.118	3.123	3.132	3.128	3.116	3.117	3.135	3.122	3.118
	Sample No. 样品编号	C39#	C40#	C41#	C42#	C43#	C44#	C45#	C46#	C47#	C48#
	OCV prior to test (V) 试验前电压	3.137	3.128	3.130	3.135	3.121	3.125	3.120	3.127	3.121	3.130



Photos

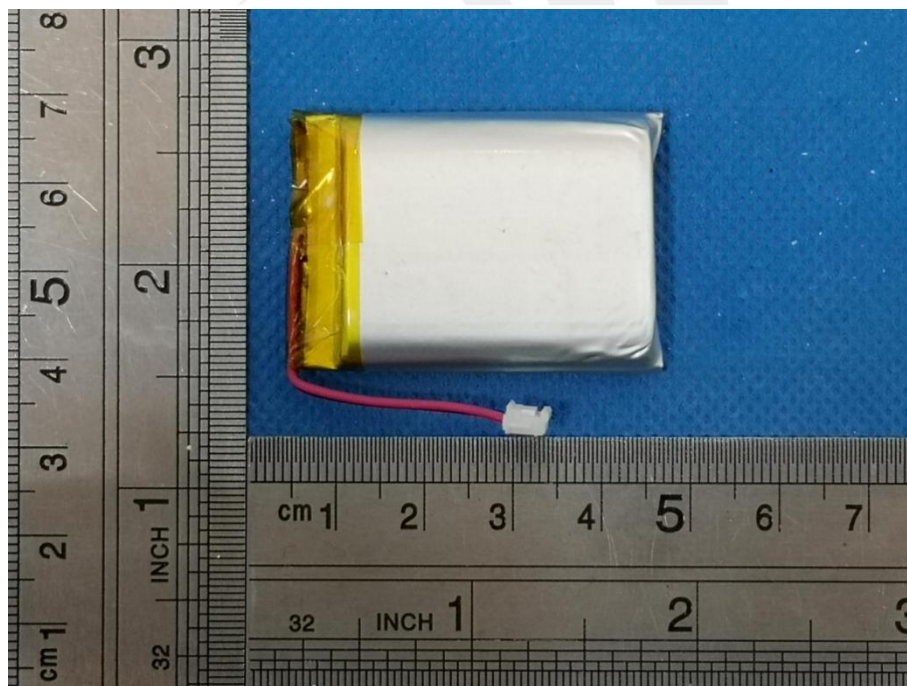
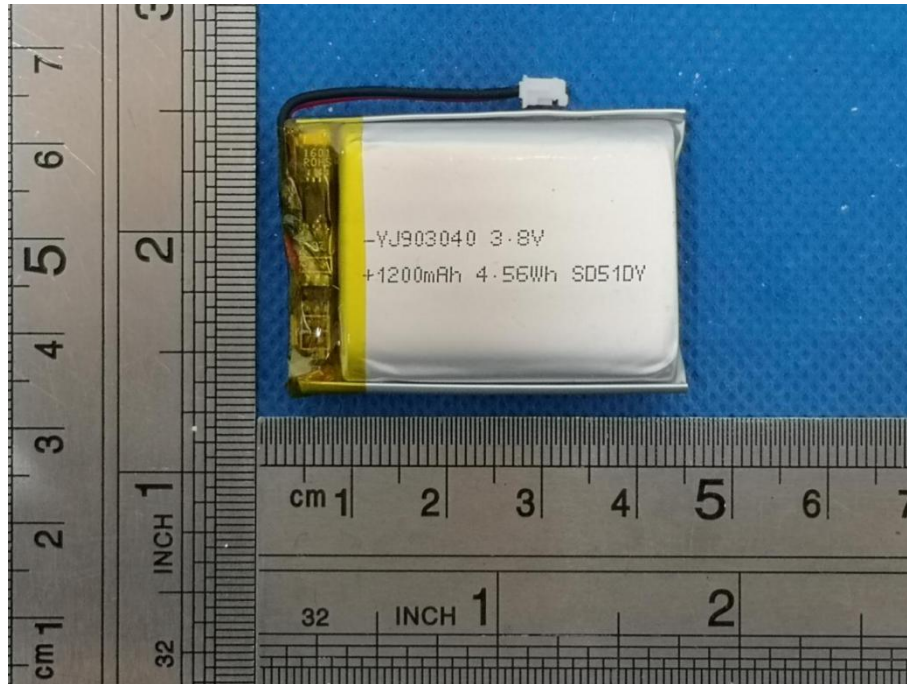


Fig. 2 Back view of Battery

===END OF TEST REPORT===