



No. DGMSZ21D06SD001

Experts on International Rules&Regulations for Training, Packing, Storage&Transport of Hazardous Goods

Dangerous Goods Management(China) Ltd.

安全技术说明书

Safety data sheet

产品名称:
Product name:

可充电锂离子聚合物电池 XK 751958
Rechargeable Li-ion Polymer Battery XK 751958

委托单位:
Applicant:

深圳市辉能科技有限公司
Shenzhen Hugnen Technology(HGT) Co., LTD



安全技术说明书

Safety Data Sheet

第一部分 产品及企业标识

Section 1 product and company identification

产品名称: 可充电锂离子聚合物电池 XK 751958

Product name: Rechargeable Li-ion Polymer Battery XK 751958

商标: /

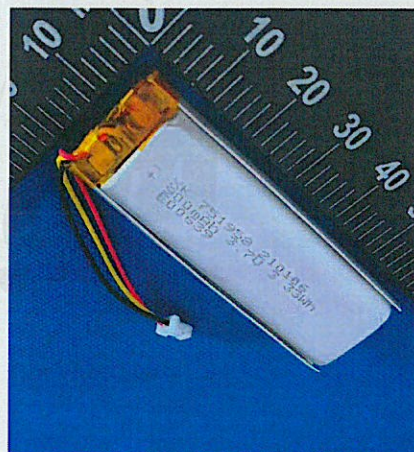
Trademark: /

型号规格: XK 751958 3.7V 900mAh 3.33Wh

Model: XK 751958 3.7V 900mAh 3.33Wh

生产商: 深圳市辉能科技有限公司

Manufacturer: Shenzhen Hugnen Technology(HGT) Co., LTD



企业名称:	深圳市辉能科技有限公司
Company name:	Shenzhen Hugnen Technology(HGT) Co., LTD
地 址:	深圳市光明新区白花洞保利华工业园 2 栋
Address:	B2, Baolihua Industrial Park, Baihua Community, Guangming Shenzhen
电子地址邮件:	sun@hugnen.com
E-mail:	
传真号码:	+86-755-23420686
Fax:	
企业应急电话:	+86-755-23420683
Emergency Phone:	

第二部分 危险性概述

Section 2 hazards summarizing

危险性类别: (见第十四部分)

Classification of Danger: (see section 14)

侵入途径: 眼睛、皮肤、食入

Invasion Route: eyes, skin contact, ingestion

健康危害: 正常条件下根据制造商的说明使用锂离子电池不会产生危害。使用不当的情况下,有破裂、火灾、热、内部成分的漏出的风险,并可能造成意外损失。使用不当的行为包括但不限于下列情况:长时间充电、短路,投入火灾,硬物撞击、尖物刺破、破碎、破裂。

Health Hazard: the lithium ion batteries are not hazardous when used according to the instructions of manufacturer under normal conditions. In case of abuse, there's risk of rupture, fire, heat, leakage of internal components, with could cause casualty loss. Abuses include but not limited to the following cases: charged for long time, short circuited, put into fire, whacked with hard object, punctured with acute object, crushed, and broken.

环境危害: 未见报道

Environmental Hazard: Not reported

燃爆危险: 高温或短路条件下可能会引发火灾或爆炸

The Danger of Burning and Exploding: May occur fire or explosion in high temperature or short circuit.

第三部分 成分/组成信息

Section 3 composition/information on ingredients

纯品 ☐

混合物 ☒

Pure chemical ☐

Mixture ☒

化学组成:

Chemical ingredients:

成分 Chemical ingredient	含量(约) %Content (about)	CAS No.
钴酸锂 Lithium Cobalt Oxide	15-40	12190-79-3
石墨 Graphite	10-30	7782-42-5
六氟磷酸锂 Phosphate(1-),hexafluoro-,lithium	10-30	21324-40-3
铜 Copper	7-13	7440-50-8
铝箔 Aluminum foil	5-10	7429-90-5
镍 Nickel	1-5	7440-02-0

第四部分 急救措施

Section 4 first-aid measures

正常环境条件下，眼睛和皮肤接触锂离子电池不会产生危害。在内部有害物质漏出的情况，如果身体部位接触到这些物质，应采取以下措施：

The lithium ion batteries are not hazardous with eye and skin contact under normal circumstance. In case of internal hazardous substance leaking an hazardous substance, following measures should be taken if body parts contact with these substance:

皮肤接触：皮肤接触后马上用肥皂和大量清水冲洗皮肤

After Skin Contact: In case of contact, immediately wash skin with soap and copious amounts of water.

眼睛接触：提起眼皮用清水冲洗 15 分钟，立即就医。

After Eye Contact: In case of contact, flush eyes with clean water for 15 minutes while lifting eyelids. Get prompt medical attention.

吸入：如有吸入，迅速脱离现场至空气新鲜处。如果停止呼吸，进行人工呼吸。如果呼吸困难，供给氧气。

After Inhalation: If inhaled, remove to fresh air. If not breathing give artificial respiration. If breathing is difficult, give oxygen.

食入：如有知觉用水冲洗口腔。就医。

After Ingestion: If swallowed, wash out mouth with water provided person is conscious. Call a physician.

第五部分 消防措施

Section 5 fire-fighting measures

危险特性：在火灾时可释放有害浓烟、气体或者蒸汽。

Characteristics of Hazard: Toxic fumes; gases or vapors may evolve on burning.

有害燃烧产物：一氧化碳和二氧化碳、HF、氟磷化物

Hazardous Combustion Products: CO, CO₂, HF, phosphorus fluoride.

灭火方法及灭火剂：对锂电池，大量冷水是一个有效的灭火剂。不要使用温或热水。不要使用哈龙类灭火材料。可使用干粉、沙、土。

Fire-extinguishing Methods and Extinguishing Media: Copious amounts of cold water are an effective extinguishing medium for lithium batteries. Don't use warm or hot water. Don't use Halon type extinguishing material. May use dry powder, sand, earth.

灭火注意事项：消防人员须佩戴防毒面具、穿全身消防服

Attention in Fire-extinguishing: The Firemen should put on antigas masks and full fire-fighting suits.

第六部分 泄露应急处理

Section 6 accidental release measures

当电池发生泄漏，液体可以用砂，土，或其他惰性物质吸收，受污染的区域应同时通风。

When leakage of batteries happens, liquid could be absorbed with sands, earth, or other inert substance, and the contaminated area should be ventilated meantime.

未放热或燃烧的破损电池，应装入密封的塑料袋或容器。

Damaged batteries that are not hot or burning should be placed in a sealed plastic bag or container.

第七部分 操作处置与储存

Section 7 handling and storage

操作注意事项：不要以让接头短路的方式对电池进行操作

Handling: don't handling the batteries in manner that allows terminals to short circuit

储存注意事项：储存和使用时，要远离热、火花、明火或其他点火源热，并处于室温下(<30°C)通风和除湿环境。

Storage: Store and used far away from heat, sparks, open flame, or other heat ignition sources, and under room temperature(<30°C) in ventilating and dehumidifying environments

第八部分 接触控制/个体防护

Section 8 exposure controls/personal protection

最高容许浓度：没有适用标准

Maximum Allowable Concentration: No Standard available

工程控制：操作未破损的电池，没有工程控制要求。对于破损的电池，个人防护用品应包括化学品防护手套和安全眼镜。

Engineering Controls: no engineering controls are required for handling batteries that have not been damaged. Personal protective equipments for damaged batteries should include chemical resistant gloves and safety glasses.

第九部分 理化特性

Section 9 Physical and Chemical Properties

额定电容量: 900mAh

额定瓦特小时: 3.33Wh

Rated Capacity:900mAh

Watt-hour rating: 3.33Wh

尺寸: 61.0×19.5×7.5 mm

外观与性状: 银色长方体

Size: 61.0×19.5×7.5 mm

Appearance Characters: silver cuboid

第十部分 稳定性和反应活性

Section 10 stability and reactivity

稳定性: 常温常压下稳定

Stability: Stable under normal temperatures and pressures.

禁配物: 氧化剂

Incompatibility: oxidizing agents

避免接触的条件: 热和明火、短路和水

Conditions to Avoid: Heat and open flame, short circuit, and water

聚合危害: 不会发生

Hazardous polymerization: Will not occur

分解产物: 一氧化碳、二氧化碳、HF、氟磷化物

Decomposition Products: CO,CO₂,HF,phosphorus fluoride

第十一部分 毒理学资料

Section 11 toxicological information

在日常操作和使用中本产品不会引起毒理学性能

This product does not elicit toxicological properties during routine handling and use.

第十二部分 生态学资料

Section 12 ecological information

生态毒性: 无

Ecological Toxicity: N/A

生物降解性: 无

Biodegradability: N/A

非生物降解性: 无

Non-biodegradability: N/A

其它有害作用: 该物质对环境有无明显危害。

Other Hazardous: Will not effect environmental evidently

第十三部分 废弃处置

Section 13 disposal

废弃处置方法: 建议遵照国家和地方法规处置或再利用

Waste Treatment: Recycle or dispose of in accordance with government , state & local regulations.

废弃注意事项: 废电池不能被当作普通垃圾。不能扔进火中或置于高温下。不能解体, 刺穿, 破碎或类似的处理。最好的办法是回收利用。

Attention for Waste Treatment: Deserted batteries couldn't be treated as ordinary trash.

Couldn't be thrown into fire or placed in high temperature. Couldn't be dissected, pierced, crushed or treated similarly. Best way is recycling.

第十四部分 运输信息

Section 14 transport information

UN 编号: UN3480, UN3481

UN NO. UN3480, UN3481

运输专有名称: UN3480 Lithium ion batteries

UN3481 Lithium ion batteries contained in equipment

UN3481 Lithium ion batteries packed with equipment

Proper Shipping Name: UN3480 Lithium ion batteries

UN3481 Lithium ion batteries contained in equipment

UN3481 Lithium ion batteries packed with equipment

包装标志: 第 9 类

Labels for Package: Class 9

ICAO/ IATA	可根据国际民用航空组织 (ICAO), TI 或国际航空协会 (IATA), DGR 62nd 包装说明 (PI) PI965, PI966, 和 PI967 第II部分相关规定 进行空运 Can be shipped by air in accordance with international Civil Aviation Organization(ICAO), TI or International Air Transport Association (IATA), DGR Packing Instructions(PI)965, PI966 and PI967 Section II appropriate of IATA DGR 62nd Edition for transportation	DGR 62nd
IMDG CODE	《国际海运危险货物规则》 (IMDG CODE) 根据特殊规定 188 International Maritime Dangerous Goods Code under Special Provision 188	IMDG CODE (Amdt 39-18)
ADR	《国际危险货物道路运输欧洲协定》 (ADR) 根据特殊规定 188 European Agreement concerning the International Carriage of Dangerous Goods by Road under Special Provision 188	ADR 2021
RID	《国际危险货物铁路运输欧洲协定》 (RID) 根据特殊规定 188 Regulations concerning the International Carriage of Dangerous Goods by Rail under Special Provision 188	RID 2021
当符合上述规定时, 可不被申报为第 9 类危险品运输 May be shipped without being declared as Class 9 dangerous goods, when meet to the requirements above.		

危险品规例规定, 运输前, 每一个电池设计须通过联合国试验和标准手册 38.3 节所载的测试。报告编号: TCT201218B401。

The dangerous goods regulations require that each battery design be subject to tests contained in Section 38.3 of the UN Manual of Tests and Criteria prior to being offered for transport. Report NO.: TCT201218B401.

第十五部分 法规信息

Section 15 regulatory information

法规信息: 联合国《关于危险货物运输的建议书规章范本》(21 版)、国际航空运输协会《危险品规则》(62 版)、《国际海运危险货物规则》(IMDG CODE) (39-18 版)、《国际危险货物道路运输欧洲协定》(ADR) (2021 版)、《国际危险货物铁路运输欧洲协定》(RID) (2021 版)

Regulatory information: Recommendations on the transport of dangerous goods-model Regulations 21st, IATA dangerous goods regulations 62nd, International Maritime Dangerous

Goods Code (39-18), European Agreement concerning the International Carriage of Dangerous
Goods by Road (2021), Regulations concerning the International Carriage of Dangerous
Goods by Rail (2021)

第十六部分 其他信息

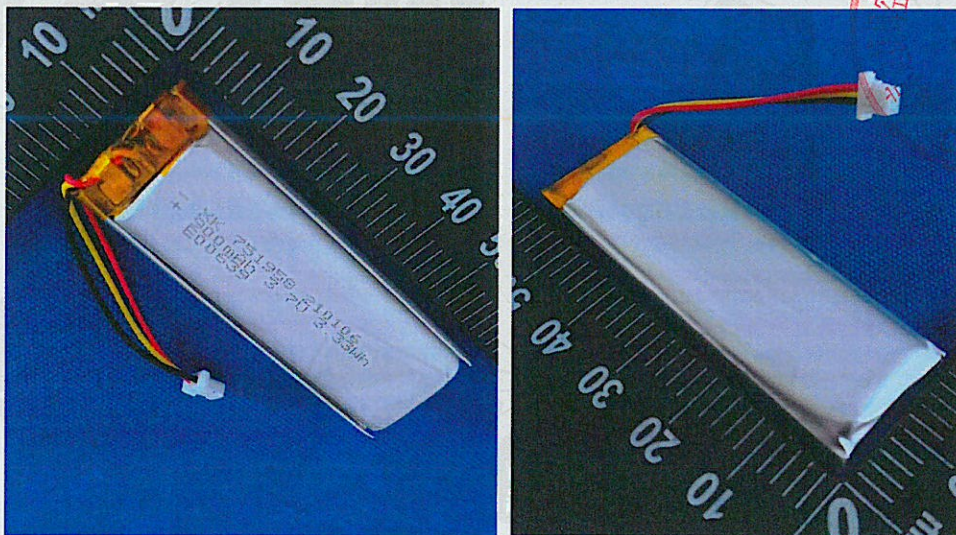
Section 16 other information

参考文献: 中华人民共和国国家标准 (GB/T 16483-2008) 化学品安全技术说明书内容和项目顺序、中华人民共和国国家标准 (GB/T 17519-2013) 化学品安全技术说明书编写指南

Reference: National standard of People's Republic of China. (GB/T 16483-2008) Safety data sheet for chemical products-Content and order of sections, National standard of People's Republic of China. (GB/T 17519-2013) Guidance on the compilation of safety data sheet for chemical products

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UN38.3 Test Report

UN38.3 检测报告

Applicant's name 委托方名称	Shenzhen Hugnen Technology(HGT) Co., LTD 深圳市辉能科技有限公司
Applicant's Address 委托方地址	B2, Baoliuhua Industrial Park, Baihua Community, Guangming Shenzhen 深圳市光明新区白花洞保利华工业园 2 栋
Name of Sample 样品名称	Rechargeable Li-ion Polymer Battery 可充电锂离子聚合物电池
Model 型号	XK 751958
Testing Laboratory 测试实验室	Shenzhen TCT Testing Technology Co., Ltd. 深圳市通测检测技术有限公司 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China 中国广东省深圳市宝安区福永桥头亿宝来工业城 1 栋 1 层 B
Report No. 报告编号	TCT201218B401
Date of Issue 签发日期	2021. 02. 07
Test Conclusion 测试结论: The test results are qualified. 测试结果为合格。	

Tested by 主检人: May Hou 侯梅

Approved by 批准人: Tomsin 杨瑞森

Inspected by 审核人: Amy Zeng 曾

Seal of TCT 报告单位 (盖章):



I、Sample Description 样品描述

Name of Sample 样品名称	Rechargeable Li-ion Polymer Battery 可充电锂离子聚合物电池		Model 型号	XK 751958	
Manufacturer's name 制造商名称	Shenzhen Hugnen Technology(HGT) Co ., LTD 深圳市辉能科技有限公司				
Manufacturer's Address 制造商地址	B2, Baolihua Industrial Park, Baihua Community, Guangming Shenzhen 深圳市光明新区白花洞保利华工业园 2 栋				
Manufacturer's Contact Telephone 制造商联系电话	+86-755-23420683	E-mail 邮箱	sun@hugnen.com	Web 网址	http://www.hugnen.com
Trade Mark 商标	----	Shape 形状	Prismatic 棱柱形	Size 尺寸 (L×W×T)	(61.0×19.5×7.5)mm
Nominal Voltage 标称电压	3.7V	Rated Capacity 额定容量	900mAh 3.33Wh	Charge Voltage 充电电压	4.2V
Nominal Charge Current 标称充电电流	450mA	Maximum Charge Current 最大充电电流	900mA	End of Charge Current 结束充电电流	9mA
Discharge Cut-off Voltage 放电截止电压	3.0V	Nominal Discharge Current 标称放电电流	450mA	Maximum Discharge Current 最大放电电流	900mA
Cell Model 电池型号	XK 751958	Cell Nominal Voltage 电池标称电压	3.7V	Cell Rated Capacity 电池额定容量	900mAh
Cells Number 电池数量	1PCS	Sample Receiving Date 样品接收日期	2020. 12. 02	Testing Date 测试日期	2021. 01. 13 — 2021. 02. 07

II、Test Standard 检测标准

UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of Tests and Criteria" Seventh revised edition (ST/SG/AC.10/11/Rev.7) .

联合国《关于危险货物运输的建议书 试验和标准手册》第七修订版 (ST/SG/AC.10/11/Rev.7)。

III、Test Item 测试项目

- | | |
|---|--|
| T.1. ☒ Altitude simulation 高度模拟 | T.5. ☒ External short circuit 外部短路 |
| T.2. ☒ Thermal test 温度试验 | T.6. ☐ Impact / ☒ Crush 撞击/挤压 |
| T.3. ☒ Vibration 振动 | T.7. ☒ Overcharge 过充电 |
| T.4. ☒ Shock 冲击 | T.8. ☒ Forced discharge 强制放电 |

IV、Test Method and Requirement 测试方法和要求

T.1. Altitude simulation 高度模拟

Purpose 目的

This test simulates air transport under low-pressure conditions.

本试验模拟在低压条件下的空运。

Test procedure 测试程序

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature (20 ± 5 °C).

试验电池和电池组应在压力等于或低于 11.6 千帕和环境温度 (20 ± 5 °C) 下存放至少 6 小时。

Requirement 要求

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

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

T.2. Thermal test 温度试验

Purpose 目的

This test assesses cell and battery seal integrity and internal electrical connections. The test is conducted using rapid and extreme temperature changes.

本试验评估电池和电池组的密封完善性和内部电连接。试验利用迅速和极端的温度变化进行。

Test procedure 测试程序

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 until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

试验电池和电池组应先在试验温度等于 72 ± 2 °C 的条件下存放至少 6 小时，接着再在试验温度等于 -40 ± 2 °C 的条件下存放至少 6 小时。两个极端试验温度之间的最大时间间隔为 30 分钟。此程序重复进行，共完成 10 次，接着将所有试验电池和电池组在环境温度 (20 ± 5 °C) 下存放 24 小时。对于大型电池和电池组，暴露于极端试验温度的时间至少应为 12 小时。

Requirement 要求

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

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

T.3. Vibration 振动

Purpose 目的

This test simulates vibration during transport.

本试验模拟运输过程中的振动。

Test procedure 测试程序

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 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.

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.

电池和电池组紧固于振动机平台，但紧固程度不能造成电池变形以致不能准确传递振动。振动应是正弦波形，对数频率扫描从 7 赫兹到 200 赫兹，再回到 7 赫兹，跨度为 15 分钟。这一振动过程须对三个互相垂直的电池安装方位的每一方向重复进行 12 次，总共为时 3 小时。其中一个振动方向必须与端面垂直。

作对数式频率扫描，对总质量不足 12 千克的电池和电池组(电池和小型电池组)，和对 12 千克及更大的电池组(大型电池组)应有所不同。

对电池和小型电池组：从 7 赫兹开始，保持 1 gn 的最大加速度，直到频率达到 18 赫兹。然后将振幅保持在 0.8 毫米(总偏移 1.6 毫米)，并增加频率直到最大加速度达到 8 gn(频率约为 50 赫兹)。将最大加速度保持在 8 gn 直到频率增加到 200 赫兹。

对大型电池组：从 7 赫兹开始，保持 1 gn 的最大加速度，直到频率达到 18 赫兹。然后将振幅保持在 0.8 毫米(总偏移 1.6 毫米)，并增加频率直到最大加速度达到 2 gn(频率约为 25 赫兹)。将最大加速度保持在 2 gn 直到频率增加到 200 赫兹。

Requirement 要求

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

如果试验中和试验后无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在第三个垂直安装方位上的试验后立即测得的开路电压不小于在进行这一试验前电压的 90%，电池和电池组即符合本项要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

T.4. Shock 冲击

Purpose 目的

This test assesses the robustness of cells and batteries against cumulative shocks.

本试验评估电池和电池组对累积冲击效应的耐受程度。

Test procedure 测试程序

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery.

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

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.

试验电池和电池组用坚固支架紧固在试验机上，支架支撑着每个试验电池组的所有安装面。

每个电池须经受最大加速度 150 gn 和脉冲持续时间 6 毫秒的半正弦波冲击。不过，大型电池须经受最大加速度 50 gn 和脉冲持续时间 11 毫秒的半正弦波冲击。

每个电池须经受的正弦波冲击的最大加速度取决于电池组的质量。小型电池组的脉冲持续时间 6 毫秒，大型电池组的脉冲持续时间 11 毫秒。以下公式用于计算合适的最低限度最大加速度。

每个电池或电池组须在三个互相垂直的电池或电池组安装方位的正极方向经受三次冲击，接着在负极方向经受三次冲击，总共经受 18 次冲击。

The formulas below are provided to calculate the appropriate minimum peak accelerations. 以下公式用于计算合适的最低限度最大加速度。

Battery 电池组	Minimum peak acceleration 最低限度最大加速度	Pulse duration 脉冲持续时间
Small batteries 小型电池组	150 gn or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{100850}{\text{mass}^*}\right)}$ whichever is smaller	6 ms
Large batteries 大型电池组	50 gn or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{30000}{\text{mass}^*}\right)}$ whichever is smaller	11 ms

* Mass is expressed in kilograms.

*质量用千克表示

Requirement 要求

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

如果无渗漏、无排气、无解体、无破裂和无起火，并且每个试验电池或电池组在试验后的开路电压不小于其在进行这一试验前电压的 90%，电池和电池组即符合这一要求。有关电压的要求不适用于完全放电状态的试验电池和电池组。

T.5. External short circuit 外部短路

Purpose 目的

This test simulates an external short circuit.

本试验模拟外部短路。

Test procedure 测试程序

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.

对于待试电池或电池组, 应加温一段必要的时间, 使从外壳测量的温度达到均匀的稳定温度 $57 \pm 4^\circ\text{C}$ 。这段时间的长短取决于电池或电池组的大小和设计, 对于这个持续时间应加以评估和记录。如无法进行这种评估, 则小型电池和小型电池组的暴露时间应至少 6 小时, 大型电池和大型电池组的暴露时间应至少 12 小时。然后, 电池或电池组应在 $57 \pm 4^\circ\text{C}$ 条件下经受总外电阻小于 0.1 欧姆的短路条件。这一短路条件应在电池或电池组外壳温度回到 $57 \pm 4^\circ\text{C}$ 后继续至少 1 小时, 或在大型电池组的情况下外壳温度降幅达试验中所观察到的最高温升幅的二分之一并保持低于该数值。

短路和降温阶段的温度应至少相当于环境温度。

Requirement 要求

Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after the test.

如果外壳温度不超过 170°C , 并且在试验过程中及试验后 6 小时内无解体、无破裂, 无起火, 电池和电池组即符合本项要求。

T.6. Impact / Crush 撞击/挤压

Purpose 目的

These tests simulate mechanical abuse from an impact or crush that may result in an internal short circuit. 本节的试验模拟撞击或挤压等可能造成内部短路的机械性破坏。

Test procedure – Impact (applicable to cylindrical cells not less than 18.0 mm in diameter)

测试程序 – 撞击 (适用于直径不小于 18.0 毫米的圆柱形电池)

The test sample cell or component cell is to be placed on a flat smooth surface. A $15.8 \text{ mm} \pm 0.1 \text{ mm}$ 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 $9.1 \text{ kg} \pm 0.1 \text{ kg}$ mass is to be dropped from a height of $61 \pm 2.5 \text{ cm}$ 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 $15.8 \text{ mm} \pm 0.1 \text{ mm}$ diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact.

试样电池或元件电池放在平坦光滑的表面上。一根 316 型不锈钢棒横放在试样中心, 钢棒直径 $15.8 \text{ mm} \pm 0.1 \text{ mm}$, 长度至少 6 厘米, 或电池最长端的尺寸, 取二者之长者。将一块 $9.1 \text{ kg} \pm 0.1 \text{ kg}$ 的重锤从 $61 \pm 2.5 \text{ cm}$ 厘米高处跌落到钢棒和试样交叉处, 使用一个几乎没有摩擦的、对落体重锤阻力最小的垂直轨道或管道加以控制。垂直轨道或管道用于引导落锤沿与水平支撑表面呈 90° 度落下。

接受撞击的试样, 纵轴应与平坦表面平行并与横放在试样中心的直径 $15.8 \pm 0.1 \text{ mm}$ 毫米弯曲表面的纵轴垂直。每一试样只经受一次撞击。

Test procedure – Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter)

测试程序 – 挤压 (适用于棱柱形、袋状、硬币/纽扣电池和直径小于 18.0 毫米的圆柱形电池)

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 $13 \text{ kN} \pm 0.78 \text{ kN}$;
- (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.

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

- (a)施加的力量达到 13 千牛顿 $\pm$ 0.78 千牛顿；
- (b)电池的电压下降至少 100 毫伏；或
- (c)电池形变达原始厚度的 50%或以上。

一旦达到最大压力、电压下降 100 毫伏或更多，或电池变形至少达原厚度的 50%，即可解除压力。

棱柱形或袋状电池应从最宽的一面施压。纽扣/硬币形电池应从其平坦表面施压。圆柱形电池应从与纵轴垂直的方向施压。

每个试样电池或元件电池只做一次挤压试验。试样应继续观察 6 小时。试验应使用之前未做过其他试验的电池或元件电池进行。

Requirement 要求

Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.

如果外壳温度不超过 170 °C，并且在试验过程中及试验后 6 小时内无解体、无破裂，无起火，电池和电池组即符合本项要求。

T.7. Overcharge 过充电

Purpose 目的

This test evaluates the ability of a rechargeable battery or a single cell rechargeable battery to withstand an overcharge condition.

本试验评估可再充电电池组或可再充电单一电池电池组承受过度充电状况的能力。

Test procedure 测试程序

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

(a) When the manufacturer's recommended charge voltage is not more than 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.

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

充电电流必须是制造商建议的最大持续充电电流的两倍。试验的最小电压如下：

(a)制造商建议的充电电压不大于 18 伏时，试验的最小电压应是电池组最大充电电压的两倍或 22 伏两者中的较小者。

(b)制造商建议的充电电压大于 18 伏时，试验的最小电压应是最大充电电压的 1.2 倍。

试验应在环境温度下进行。进行试验的时间应为 24 小时。

Requirement 要求

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

充电电池组在试验过程中和试验后 7 天内无解体、无起火，即符合本项要求。

T.8. Forced discharge 强制放电

Purpose 目的

This test evaluates the ability of a primary or a rechargeable cell to withstand a forced discharge condition.

本试验评估原电池或充电电池承受强制放电状况的能力。

Test procedure 测试程序

Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 V 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).

每个电池应在环境温度下与 12 伏直流电源串联在起始电流等于制造商给定的最大放电电流的条件下强制放电。

将适当大小和额定值的电阻负荷与试验电池串联，计算得出给定的放电电流。对每个电池进行强制放电，放电时间(小时)应等于其额定容量除以初始试验电流(安培)。

Requirement 要求

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

原电池或充电电池如在试验过程中和试验后 7 天内无解体，无起火，即符合本项要求。

V、General terms and definitions 一般术语与定义

Table 38.3.1: Mass loss limit

表 38.3.1: 质量损失限值

Mass M of cell or battery 电池或电池组质量 M	Mass loss limit 质量损失限值
$M < 1 \text{ g}$	0.5%
$1 \text{ g} \leq M \leq 75 \text{ g}$	0.2%
$M > 75 \text{ g}$	0.1%

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

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

质量损失的量化值，可用以下公式计算：

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

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 38.3.1, it shall be considered as "no mass loss".

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表 38.3.1 所列的数值，应视为“无质量损失”。

Leakage means the visible escape of electrolyte or other material from a cell or battery or the loss of material (except battery casing, handling devices or labels) from a cell or battery such that the loss of mass exceeds the values in Table 38.3.1.

渗漏是指可以看到的电解液或者其他物质从电池或电池组中漏出，或电池或电池组中的物质损失（不包括电池外壳、搬运装置、或标签），质量损失超过表 38.3.1 所列的数值。

Venting means the release of excessive internal pressure from a cell or battery in a manner intended by design to preclude rupture or disassembly.

排气是指按设计方式释放电池或电池组内部过高的压力，防止其破裂或解体。

Disassembly means a vent or rupture where solid matter from any part of a cell or battery penetrates a wire mesh screen (annealed aluminium wire with a diameter of 0.25 mm and grid density of 6 to 7 wires per cm) placed 25 cm away from the cell or battery.

解体是指排气或破裂使电池或电池组任何部分的固体物质穿过放在离电池或电池 25 cm 处的丝网筛（直径 0.25 mm 的软铝丝，网格密度每厘米 6 至 7 条铝丝）。

Rupture means the mechanical failure of a cell container or battery case induced by an internal or external cause, resulting in exposure or spillage but not ejection of solid materials.

破裂是指内部或外部原因引起的电池容器或电池组外壳机械损坏，造成内装物暴露或溢出，但无固体喷射。

Fire means that flames are emitted from the test cell or battery.

起火是指试验电池或电池组有火焰冒出。

VI、Main Test Apparatus 主要测试仪器

Serial No. 设备编号	Name of Equipment 设备名称	Model 型号	Calibration Date /Due Date 校准日期/到期日
TC-B01	Low Altitude Simulation Tester 低压高空模拟试验箱	GX-3020-Z	2020. 04. 15
			2021. 04. 14
TC-B04	Vertical Shock Test Instrument 垂直冲击试验台	SY10-2	2020. 04. 15
			2021. 04. 14
TC-B05	Vibration test instrument 振动试验台	ES-3-150	2020. 04. 15
			2021. 04. 14
TC-B07	Battery Test System 电池测试系统	CTS 20V/10A	2020. 04. 15
			2021. 04. 14
TC-B11	Crush Test Instrument 温控型电池挤压试验机	BE-6045T	2020. 04. 15
			2021. 04. 14
TC-B13	Battery Short Circuit Tester 电池短路试验机	GX-6055-B	2020. 04. 15
			2021. 04. 14
TC-B14	Electronic Balance 电子天平	PTT-A+300	2020. 04. 15
			2021. 04. 14
TC-B15	Data Collector 数据采集器	34970A	2020. 04. 15
			2021. 04. 14
TC-B18	DC POWER 直流源	PSW 80-27	2020. 04. 15
			2021. 04. 14
TC-B21	Battery Impact Tester 电池冲击试验机	BE-5066	2020. 04. 15
			2021. 04. 14
TC-B25	Digital Multimeter 数字万用表	15B	2020. 09. 03
			2021. 09. 02
TC-B30	Programmable high & low temperature test chamber 可编程式高低温试验机	GX-3000-150	2020. 09. 03
			2021. 09. 02

VII、Test Data 测试数据

T.1. Altitude simulation 高度模拟

Test sample status 测试样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
first cycle, fully charged state 首次循环满电状态	1#	16.538	4.18	16.538	4.18	0.00	100.0	Pass 合格
	2#	16.563	4.18	16.563	4.18	0.00	100.0	Pass 合格
	3#	16.336	4.19	16.333	4.19	0.02	100.0	Pass 合格
	4#	16.441	4.18	16.441	4.18	0.00	100.0	Pass 合格
	5#	16.434	4.19	16.434	4.18	0.00	99.8	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	6#	16.572	4.17	16.572	4.17	0.00	100.0	Pass 合格
	7#	16.593	4.18	16.592	4.18	0.01	100.0	Pass 合格
	8#	16.495	4.18	16.494	4.18	0.01	100.0	Pass 合格
	9#	16.517	4.19	16.517	4.18	0.00	99.8	Pass 合格
	10#	16.589	4.18	16.589	4.18	0.00	100.0	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.4 °C。

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 测试后, 样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

T.2. Thermal test 温度试验

Test sample status 测试样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
first cycle, fully charged state 首次循环满电状态	1#	16.538	4.18	16.536	4.14	0.01	99.0	Pass 合格
	2#	16.563	4.18	16.558	4.14	0.03	99.0	Pass 合格
	3#	16.333	4.19	16.332	4.15	0.01	99.0	Pass 合格
	4#	16.441	4.18	16.436	4.14	0.03	99.0	Pass 合格
	5#	16.434	4.18	16.432	4.15	0.01	99.3	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	6#	16.572	4.17	16.571	4.13	0.01	99.0	Pass 合格
	7#	16.592	4.18	16.589	4.15	0.02	99.3	Pass 合格
	8#	16.494	4.18	16.493	4.14	0.01	99.0	Pass 合格
	9#	16.517	4.18	16.514	4.14	0.02	99.0	Pass 合格
	10#	16.589	4.18	16.588	4.14	0.01	99.0	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.3 °C。

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 测试后, 样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

T.3. Vibration 振动

Test sample status 测试样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
first cycle, fully charged state 首次循环满电状态	1#	16.536	4.14	16.536	4.14	0.00	100.0	Pass 合格
	2#	16.558	4.14	16.558	4.14	0.00	100.0	Pass 合格
	3#	16.332	4.15	16.331	4.15	0.01	100.0	Pass 合格
	4#	16.436	4.14	16.433	4.14	0.02	100.0	Pass 合格
	5#	16.432	4.15	16.432	4.14	0.00	99.8	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	6#	16.571	4.13	16.571	4.13	0.00	100.0	Pass 合格
	7#	16.589	4.15	16.588	4.15	0.01	100.0	Pass 合格
	8#	16.493	4.14	16.493	4.14	0.00	100.0	Pass 合格
	9#	16.514	4.14	16.514	4.13	0.00	99.8	Pass 合格
	10#	16.588	4.14	16.588	4.14	0.00	100.0	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.3 °C。

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 测试后, 样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

T.4. Shock 冲击

Test sample status 测试样品状态	No. 编号	Pre-test 试验前		After test 试验后		Mass loss 质量损失 (%)	Change ratio 电压比(%)	Status 结果
		Mass 质量 (g)	Voltage 电压 (V)	Mass 质量 (g)	Voltage 电压 (V)			
first cycle, fully charged state 首次循环满电状态	1#	16.536	4.14	16.536	4.14	0.00	100.0	Pass 合格
	2#	16.558	4.14	16.557	4.14	0.01	100.0	Pass 合格
	3#	16.331	4.15	16.331	4.15	0.00	100.0	Pass 合格
	4#	16.433	4.14	16.433	4.13	0.00	99.8	Pass 合格
	5#	16.432	4.14	16.432	4.14	0.00	100.0	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	6#	16.571	4.13	16.568	4.13	0.02	100.0	Pass 合格
	7#	16.588	4.15	16.588	4.14	0.00	99.8	Pass 合格
	8#	16.493	4.14	16.493	4.14	0.00	100.0	Pass 合格
	9#	16.514	4.13	16.512	4.13	0.01	100.0	Pass 合格
	10#	16.588	4.14	16.588	4.14	0.00	100.0	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.4 °C。

After the test, there is no leakage, no venting, no disassembly, no rupture and no fire. And change ratio is not less than 90 %. 测试后, 样品无渗漏、无排气、无解体、无破裂和无起火。电压比不小于 90 %。

T.5. External short circuit 外部短路

Test sample status 测试样品状态	No. 编号	Maximum external temperature (°C) 表面最高温度(°C)	Status 结果
first cycle, fully charged state 首次循环满电状态	1#	57.2	Pass 合格
	2#	57.5	Pass 合格
	3#	57.4	Pass 合格
	4#	57.6	Pass 合格
	5#	57.7	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	6#	57.9	Pass 合格
	7#	57.8	Pass 合格
	8#	57.6	Pass 合格
	9#	57.5	Pass 合格
	10#	57.3	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.3 °C。

Test sample 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.

测试样品表面温度不超过 170 °C，测试中与测试后 6 小时内无解体、无破裂、无起火。

T.6. Crush 挤压

Test sample status 测试样品状态	No. 编号	Maximum external temperature (°C) 表面最高温度(°C)	Status 结果
first cycle, 50% charged state 首次循环 50%充电状态	11#	23.8	Pass 合格
	12#	23.5	Pass 合格
	13#	23.6	Pass 合格
	14#	23.9	Pass 合格
	15#	24.2	Pass 合格
25th cycle, 50% charged state 25 次循环 50%充电状态	16#	24.1	Pass 合格
	17#	24.0	Pass 合格
	18#	23.8	Pass 合格
	19#	23.7	Pass 合格
	20#	23.9	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.3 °C。

Test sample 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.

测试样品表面温度不超过 170 °C，测试中与测试后 6 小时内无解体、无破裂、无起火。

T.7. Overcharge 过充电

Test sample status 测试样品状态	No. 编号	Status 结果
first cycle, fully charged state 首次循环满电状态	21#	Pass 合格
	22#	Pass 合格
	23#	Pass 合格
	24#	Pass 合格
25th cycle, fully charged state 25 次循环满电状态	25#	Pass 合格
	26#	Pass 合格
	27#	Pass 合格
	28#	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.9 °C.

There is no disassembly and no fire during the test and within seven days after the test.

样品在测试中和测试后 7 天内无解体、无起火。

T.8. Forced discharge 强制放电

Test sample status 测试样品状态	No. 编号	Status 结果
first cycle, fully discharged state 首次循环完全放电状态	29#	Pass 合格
	30#	Pass 合格
	31#	Pass 合格
	32#	Pass 合格
	33#	Pass 合格
	34#	Pass 合格
	35#	Pass 合格
	36#	Pass 合格
	37#	Pass 合格
	38#	Pass 合格
25th cycle, fully discharged state 25 次循环完全放电状态	39#	Pass 合格
	40#	Pass 合格
	41#	Pass 合格
	42#	Pass 合格
	43#	Pass 合格
	44#	Pass 合格
	45#	Pass 合格
	46#	Pass 合格
	47#	Pass 合格
	48#	Pass 合格

Notes 注释: Ambient temperature 环境温度: 23.8 °C.

There is no disassembly and no fire during the test and within seven days after the test.

样品在测试中和测试后 7 天内无解体、无起火。

VIII、Conclusion 结论

No. 序号	Name of test items 测试项目名称	Cause number of standard 标准条款号	Test Result 检查结果	Conclusion 结论	Remark 备注
1	Altitude simulation 高空模拟	38.3 Test T.1 38.3 试验 T.1	See Appendix T.1. Altitude simulation 见附表 T.1. 高度模拟	Pass 合格	/
2	Thermal test 温度试验	38.3 Test T.2 38.3 试验 T.2	See Appendix T.2. Thermal test 见附表 T.2.温度试验	Pass 合格	/
3	Vibration 振动	38.3 Test T.3 38.3 试验 T.3	See Appendix T.3. Vibration 见附表 T.3.振动	Pass 合格	/
4	Shock 冲击	38.3 Test T.4 38.3 试验 T.4	See Appendix T.4. Shock 见附表 T.4.冲击	Pass 合格	/
5	External short circuit 外部短路	38.3 Test T.5 38.3 试验 T.5	See Appendix T.5. External short circuit 见附表 T.5.外部短路	Pass 合格	/
6	Crush 挤压	38.3 Test T.6 38.3 试验 T.6	See Appendix T.6. Crush 见附表 T.6.挤压	Pass 合格	/
7	Overcharge 过度充电	38.3 Test T.7 38.3 试验 T.7	See Appendix T.7. Overcharge 见附表 T.7.过充电	Pass 合格	/
8	Forced discharge 强制放电	38.3 Test T.8 38.3 试验 T.8	See Appendix T.8. Forced discharge 见附表 T.8.强制放电	Pass 合格	/

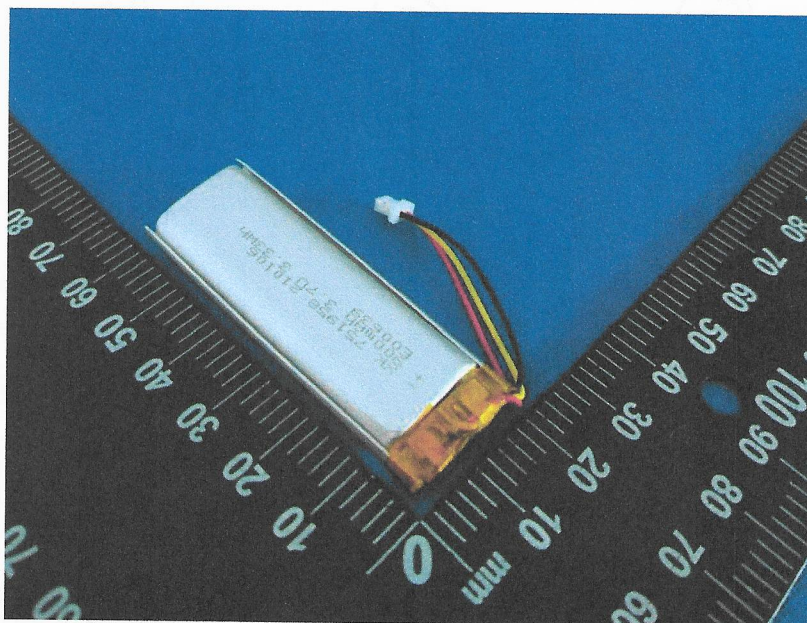
According to the standard:

依据标准:

UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS Manual of Tests and Criteria" Seventh revised edition (ST/SG/AC.10/11/Rev.7) .

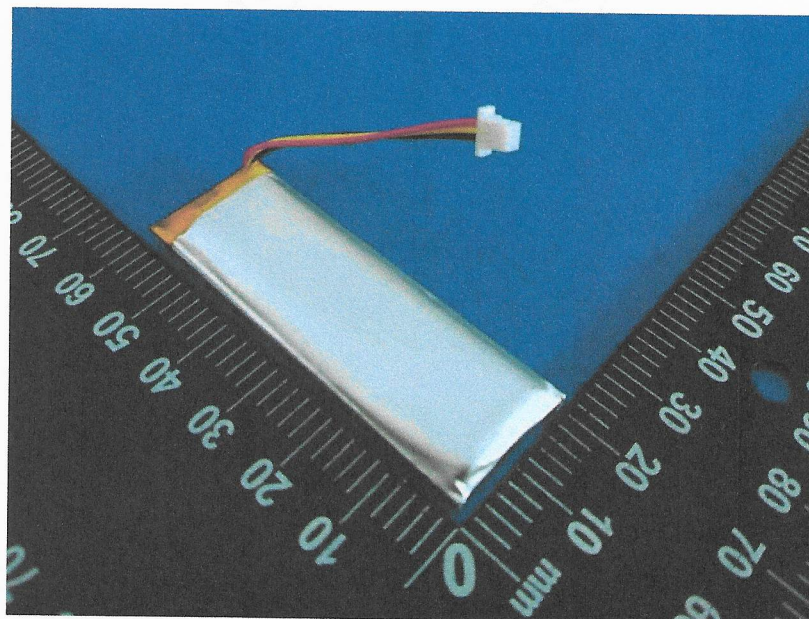
联合国《关于危险货物运输的建议书 试验和标准手册》第七修订版 (ST/SG/AC.10/11/Rev.7)。

IX、Picture of the sample 样品图片



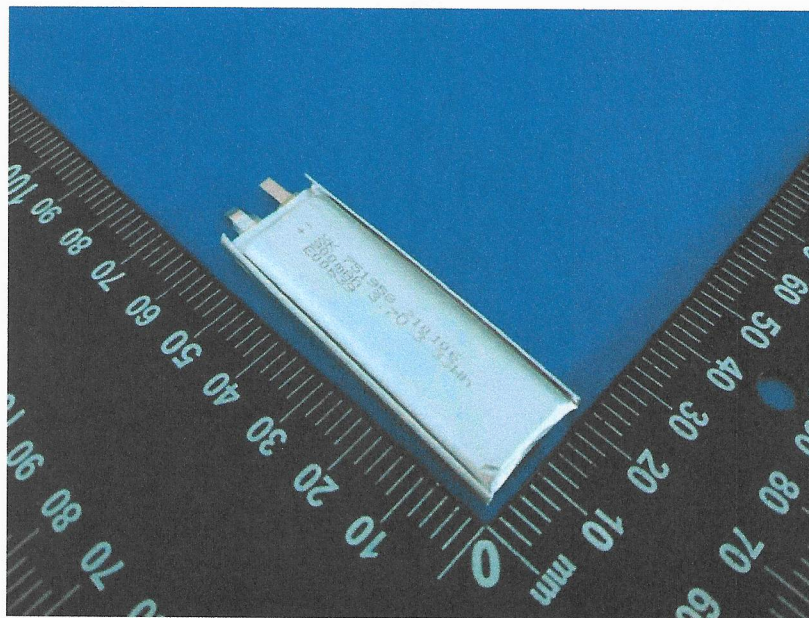
Picture 1. Battery view

图片 1. 电池组视图



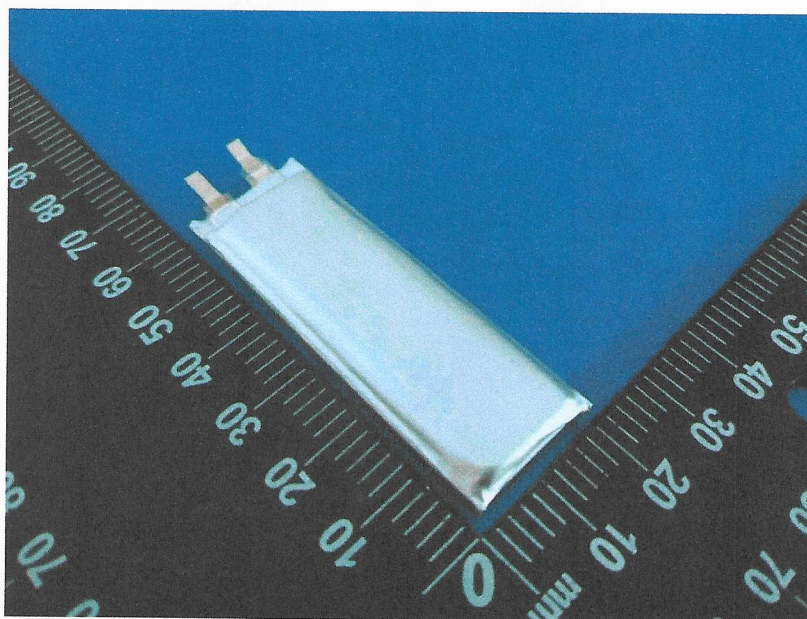
Picture 2. Battery view

图片 2. 电池组视图



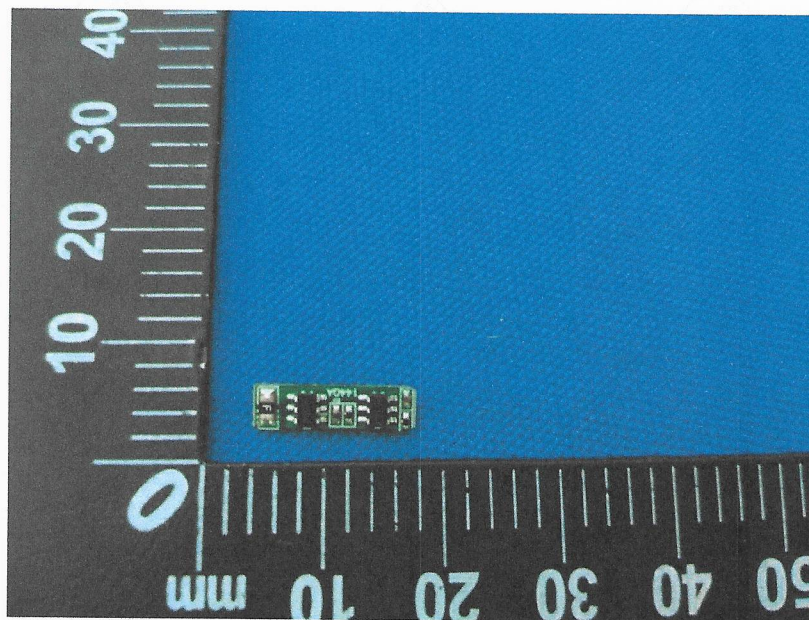
Picture 3. Cell view

图片 3. 电池视图



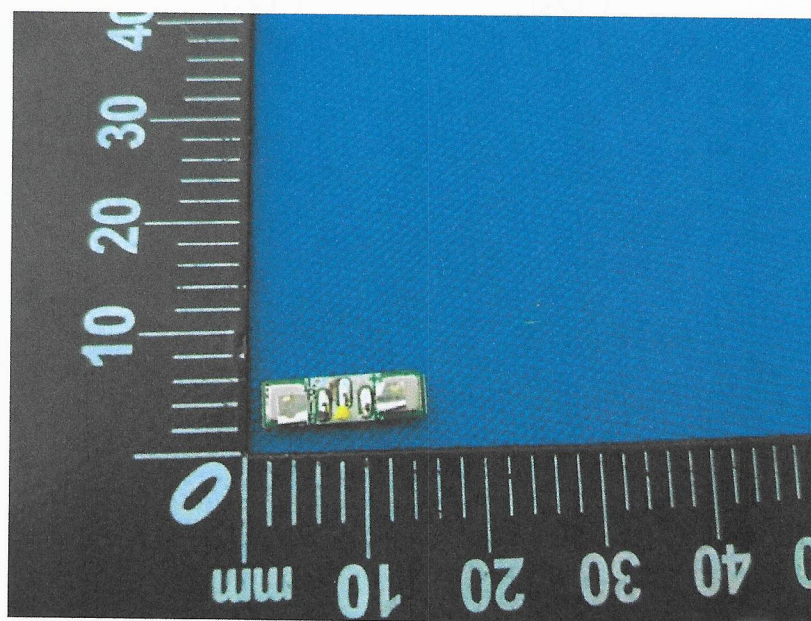
Picture 4. Cell view

图片 4. 电池视图



Picture 5. Protection board view

图片 5. 保护板视图



Picture 6. Protection board view

图片 6. 保护板视图

*****End of Report 报告结束*****

Important Notice

注意事项

1. The test report is invalid without the official stamp of TCT.
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对报告书若有异议，应于收到报告之日起 15 天内向本公司提出。
6. The test report is valid for the tested samples only.
本报告仅对本次测试样品有效。
7. The Chinese contents in this report are only for reference.
本报告中的中文内容仅供参考。