

# MSDS

## 化学品安全技术说明书

报告编号 : BL-DG20C0266-302  
Report No. :  
样品名称 : 锂聚合物电池  
Sample Name: LITHIUM POLYMER BATTERY  
发行日期 : 2021-01-08  
Issue Date :

申请商 : 深圳市华盛昌科技实业股份有限公司  
Prepared For : Shenzhen Everbest Machinery Industry Co., Ltd  
地址 : 深圳市南山区西丽白芒松白公路百旺信工业区5区19栋  
Address : 19th Building, 5th Region, Baiwangxin Industrial Park, SongBai Rd.,  
Baimang, Xili, Nanshan, Shenzhen, Chian  
编制单位 : 深圳市巴伦技术股份有限公司  
Prepared By : Shenzhen BALUN Technology Co., Ltd.  
地址 : 中国广东省深圳市南山区沙河西路白沙科技产业园1楼B区  
Address : Block B, FL1, Baisha Science and Technology Park, Shahe Xi Road,  
Nanshan, District, Shenzhen, 518055, P.R. China

Written by: 赖湘仪  
拟制:



**第一部分：化学品产品信息和制造商信息****Section 1-Chemical Product and Company Identification**

产品名称(Product): 锂聚合物电池 (LITHIUM POLYMER BATTERY )

商标 Trade Mark: /

型号 (Model) : PT603450-2S 额定电压 (Nominal voltage): 7.4V

参数 (Ratings) : 1200mAh, 8.88Wh

制造商: 深圳市华盛昌科技实业股份有限公司

Manufacture: Shenzhen Everbest Machinery Industry Co., Ltd

地址: 深圳市南山区西丽白芒松白公路百旺信工业区 5 区 19 栋

Address: 19th Building, 5th Region, Baiwangxin Industrial Park, SongBai Rd., Baimang, Xili, Nanshan, Shenzhen, Chian

工厂: 广东力科新能源有限公司

Factory: GUANGDONG POW-TECH NEW POWER CO., LTD

地址: 东莞市寮步镇横坑石岭工业区横东三路 9 号

Address: No.9, HENG Dong 3 ROAD, HENGKENG SHILING INDUSTRY ZONE, LIAOBU TOWN, DONGGUAN CITY, GUANGDONG PROVICE, CHINA

邮政编码 (Post Code) : / 邮箱 (E-mail) : caojiuju@cem-instruments.com

紧急联系电话 (Emergency Telephone) : 0755-27353188-8065

**第二部分：成分组成信息****Section 2- Composition/Information on Ingredient**

化学名称 Chemical Name	分子式 Molecular formula	CAS号 CAS No.	重量 Weight (%)
钴酸锂 Lithium cobaltate	CoLiO <sub>2</sub>	12190-79-3	35-38
铝箔 Aluminum Foil	Al	7429-90-5	7-10
聚偏氟乙烯 (PVDF) poly(vinylidene fluoride)	(CH <sub>2</sub> -CF <sub>2</sub> ) <sub>n</sub>	24937-79-9	0.5-2
铜箔Copper Foil	Cu	7440-50-8	5-10
石墨 Graphite	C	7782-42-5	23-25
电解液 Electrolyte	/	/	12-15

聚乙烯 Polyethylene	(C <sub>2</sub> H <sub>4</sub> ) <sub>n</sub>	9002-88-4	0.5-1
镍 Nickel	Ni	7440-02-0	2-3
聚丙烯 Polypropylene	(C <sub>3</sub> H <sub>6</sub> ) <sub>n</sub>	9003-07-0	2-5

### 第三部分：危险识别

#### Section 3- Hazards Identification

危险等级：根据法规(EC) No. 1272/2008，样品属于危险品。

入侵途径：

皮肤接触：皮肤接触电解液可能引起皮肤过敏。

眼睛接触：与有机溶液接触对眼睛有严重的危害风险。

吸入：/

摄入：吞咽是有危害的。

健康危害：/

环境危害：电池的组成物质对环境有危害。

爆燃危害：机械撞击的火焰、短路和高温条件情况下，电池会起火爆炸。

Fatality grade: In accordance with Regulation (EC) No 1272/2008, the sample is divided into dangerous article.

Invasion route:

Skin touch: May cause allergy by skin contact with the battery electrolyte.

Eyes touch: Risk of serious damage to the eyes when it contact with organic solution.

Inhalation: /

Ingestion: Harmful if swallowed.

Health hazards: /

Environment hazards: The components of the battery are harmful to the environment.

Burn & burst danger: It will explode, flame when it machine impinges, short-circuits and in high-temperature

situation.

#### 第四部分：急救措施

##### Section 4- First Aid Measures

皮肤接触：脱去被污染的衣物，并用大量流动的水清洗皮肤至少 15 分钟。如果有刺激、受伤或疼痛症状，请立即就医。

眼睛接触：翻起眼睑，用流动的水清洗至少 30 分钟。立即就医。

吸入：将患者立即从暴露现场转移至空气清新处，保持其呼吸道顺畅。如果有可能使用氧气袋。立即就医。

吞咽：至少喝 2 杯牛奶。如果患者失去意识请勿催吐，立即就医。

Skin touch: Remove any contaminated clothing and flush exposed skin with plenty of running water for at least 15 minutes. If irritation, injury or pain persists, seek medical attention.

Eyes touch: Lifting the upper and lower eyelids, flush the eyes with running water for at least 30 minutes. Seek immediate medical attention.

Inhalation: Remove the patient from exposure and move to fresh air immediately. Keep the respiratory tract smooth. Use oxygen if available. Get medical aid.

Ingestion: Give at least 2 glasses of milk. Induce vomiting unless patient is unconscious. Seek immediate medical attention.

#### 第五部分：消防措施

##### Section 5- Fire Fighting Measures

危险特性：电池接触火源可能发生爆炸并释放有害的分解产物。当机械撞击产生火焰，短路或高温条件情况下，也会发生爆炸。与氧化剂接触，电池会与氧化剂反应。

有害燃烧产物：一氧化碳、二氧化碳、金属氧化物等。

消防方法：所有人员必须佩戴过滤式防毒面具(面罩)或独立的呼吸器，穿戴可防御火和有毒气体的消防防护服。尽量在上风处灭火，尽可能将容器移至空旷处。

灭火剂：泡沫，干粉，二氧化碳，砂土。

Danger characteristic: Batteries may burst and release hazardous decomposition products when exposed to a fire situation. It will explode, flame when it machine impinges, short-circuits and in high-temperature situation. It will react with oxidizer.

Hazardous combustion products: Carbon monoxide, carbon dioxide, metal oxide etc.

Fire-Fighting method: The staff must equip with filter mask (full mask) or isolated breathing apparatus. The staff must wear the clothes which can defense the fire and the toxic gas. Put out the fire in the upwind direction. Remove the container to the open space as soon as possible.

Media: foam, powder, CO2, sandy clay.

## 第六部分：泄露应对措施

### Section 6- Accidental Release Measures

电池内部材料的泄露，如电池电解液，依据如下方法小心处理：

人体预防：穿戴防护设备(护目镜和防护手套)转移溢出材料。尽可能的避免接触和不要吸入气体。

环境预防：禁止排放到环境中。

清理方法：把溢出物质收集于容器中。泄露区域用干的布进行清洁。

二次危害预防：避免扩散。收集的材料请勿靠近火源。

Spilled internal cell materials, such as electrolyte leaked from a battery cell, are carefully dealt with according to the followings:

Precautions for human body: Remove spilled materials with protective equipment (protective glasses and protective gloves). Do not inhale the gas as much as possible. Moreover, avoid touching with as much as possible.

Environmental precautions: Do not throw out into the environment.

Method of cleaning up: the spilled solids are put into a container. The leaked place is wiped off with dry cloth.

Prevention of secondary hazards: avoid re-scattering. Do not bring the collected materials close to fire

## 第七部分：操作和储存

### Section 7- Handling and Storage

操作

技术措施：

使用者暴露预防：正常使用下不需要。

火灾和爆炸预防：正常使用下不需要。远离火源和热源

操作安全预防：不要破坏或拆除外部壳套。

安全操作注意事项：电池严禁拆开、破坏或焚烧，因为电池密封的材料可能泄露、破裂并释放到环境中。严禁将电池扔到火中或暴露于高温环境中。电池不可浸泡在水或海水中。严禁与强氧化剂放在一起。严禁强烈的机械撞击和抛掷。不要拆卸或使其变形。如需装料，请用专用的装料机进行装料

#### 存储

##### 技术措施：

存储条件：避免机械或电气滥用。存储于阴凉、干燥、通风良好并且温度变化较小的地方。避免高温条件。电池应远离发热设备，不要将电池长时间的暴露在直射的阳光下。

禁忌物：导电材料、水、海水、强氧化剂和强酸。

包装材料：建议使用绝缘材料或被证明耐用的材料

#### Handling

##### Technical measures:

Prevention of user exposure: Not necessary under normal use.

Prevention of fire and explosion: Not necessary under normal use. Keep away from fire and heating sources.

Precaution for safe handling: Do not damage or remove the external tube.

Specific safe handling advice: The batteries should not be opened, destroyed or incinerate, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container. Never throw out battery cells in a fire or expose to high temperatures. Do not soak battery cells in water or seawater. Do not expose to strong oxidizers. Do not give a strong mechanical shock or fling. Never disassemble or deform. In the case of charging, use only dedicated charger.

#### Storage

##### Technical measures:

Storage conditions: Avoid mechanical or electrical abuse. Storage preferably in cool, dry and ventilated area, which is subject to little temperature change. Storage at high temperatures should be avoided. Do not place the battery near heating equipment, nor expose to direct sunlight

for long periods.

Incompatible products: Conductive materials, water, seawater, strong oxidizers and strong acids.

Packing material: Insulative and tear proof materials are recommended.

#### 第八部分：接触控制和个人防护措施

##### Section 8- Exposure Controls, Personal Protection

呼吸系统保护：工作场所保持良好的通风，工作时需佩戴合格的口罩或面罩。

眼睛保护：护目镜，装配合格和安全的淋浴或冲洗眼睛设备。

身体保护：穿工作服，注意保护裸露的皮肤。

手保护：穿戴手套。

其他保护：工作场所禁止吸烟、饮食。保持良好的卫生习惯。

Respiratory protection: The work place keep well ventilated, wear qualified mask or face mask at work time.

Eyes protection: Goggles, equipped available and safety shower and wash eyes equipment.

Body protection: Wear work clothes, pay attention to protect bare skin.

Hands protection: Wear gloves

Other Protections: No smoking, dining and drinking water in the workplace. Keep good habit of hygiene.

#### 第九部分：理化性质

##### Section 9- Physical and Chemical Proper

形态

物理状态：固体      形状：方形      颜色：/      气味：/      pH：/

特定温度或温度范围对电池物理形态的变化：对于混合物产品没有有价值的信息。

闪点：无相关资料。

爆炸性能：机械撞击的火焰、短路和高温条件下，电池会起火爆炸。

密度：无相关资料。

溶解度：不溶于水。

Appearance

Physical state: Solid      Form: Cuboid      Color: /      Odor: /      pH: /

Specific temperatures/temperature ranges at which changes in physical state occur: There is no useful

information for the product as a mixture.

Flash point: No information

Explosion properties: It will explode, flame when it machine impinges, short-circuits and in high-temperature situation.

Density: No information.

Solubility: Insoluble in water.

## 第十部分：稳定性和化学反应

### Section 10- Stability and reactivity

稳定性：在正常温度和压力下稳定

禁忌物：强氧化剂、酸、碱

避免条件：高温热源、火源

燃烧产物：一氧化碳、二氧化碳、碳氢烃类分解物、有毒烟雾

Stability: Stable under normal temperature and pressure.

Distribution of Ban: Strong oxidizer, acid, alkali.

Conditions to Avoid: High temperature heat source, fire source

Decomposition Products: CO, CO<sub>2</sub>, Hydrocarbon hydrocarbon decomposition, toxic smoke

## 第十一部分：毒理学信息

### Section 11- Toxicological information

关于产品本身现无相关数据。电池内部材料信息如下：

钴酸锂氧化物- CoLiO<sub>2</sub>

急性毒性：无相关数据。参考钴：LDLO,豚鼠口服 20 mg/kg。

局部影响：不可知。

致敏作用：对呼吸系统和神经系统可能有刺激作用。

慢性毒性/长期毒性：长期吸入钴的粉尘或蒸汽，可能导致严重的呼吸器官疾病。过敏或有过敏史的人可能引起皮肤反应或肺病。

皮肤腐蚀性：虽然比较少见，但可能引起皮疹、红斑等过敏反应。



#### 铝

局部影响：铝本身无毒。当进入到伤口时，可能导致皮炎。

慢性毒性/长期毒性：长期吸入铝粉颗粒或烟气，可能导致肺部疾病(铝肺)。

#### 碳粉

急性毒性：不可知

局部影响：进入眼睛，对眼睛有刺激作用，可能导致结膜炎、角膜增厚或浮肿的眼睑炎症。

慢性毒性/长期毒性：长期吸入高浓度的碳粉尘颗粒，可能导致肺部疾病或支气管疾病。

致癌性：研究表明，碳不是致癌物质和具有自然毒性的物质。

#### 铜

急性毒性：普通大小的颗粒 60~100mg 可导致肠道絮乱并伴有反胃和炎症。TDLO, 兔子皮下注射 375 mg/kg.

局部影响：粗颗粒会刺激鼻子和气管。当进入眼睛时，有红眼疼痛症状。

致敏作用：长期或反复的皮肤接触可能导致皮肤过敏。

生殖影响：TDLO, 小鼠口服 152 mg/kg。

#### 有机电解液

急性毒性：50LD, 小鼠口服 2,000 mg/kg 或更多。

皮肤刺激：兔子-平和

眼睛刺激：兔子-非常严重

There is no available data on the product itself. The information of the internal cell material is as follows.

#### Lithium cobalt Oxide- LiCoO<sub>2</sub>

Acute toxicity: No applicable data. Reference cobalt: LDLO, oral-Guinea pig 20mg/kg

Local effects: Unknown.

Sensitization: The nervous system of respiratory organs may be stimulated sensitively.

Chronic toxicity/Long term toxicity: By the long-term inhalation of coarse particulate or vapor of cobalt, it is possible to cause the serious respiratory-organs disease. Skin reaction or a lung disease for allergic or hypersensitive person may be caused.

Skin causticity: Although it is very rare, the rash of the skin and allergic erythema may result.

**Aluminum**

Local effects: Aluminum itself has no toxicity. When it goes into a wound, dermatitis may be caused.

Chronic toxicity/Long term toxicity: By the long-term inhalation of coarse particulate or fume, it is possible to cause a lung damage (aluminum lungs).

**Carbon**

Acute toxicity: Unknown

Local effects: When it goes into one's eyes, it stimulates one's eyes; conjunctivitis, thickening of corneal epithelium or edematous inflammation palpebra may be caused.

Chronic toxicity/Long term toxicity: Since the long-term inhalation of high levels of carbon coarse particulate may become a cause of a lung disease or a tracheal disease.

Carcinogenicity: Carbon is not recognized as a cause of cancer by research organizations and natural toxic substance research organizations of cancer.

**Copper**

Acute toxicity: 60-100mg sized coarse particulate causes a gastrointestinal disturbance with nausea and inflammation. TDLO, hypodermic-Rabbit 375mg/kg

Local effects: Coarse particulate stimulates a nose and a tracheal. When it goes into one's eyes, the symptom of the reddening and the pain is caused.

Sensitization: Sensitization of the skin may be caused by long-term or repetitive contact.

Reproductive effects: TDLO, oral-Rat 152mg/kg

**Organic Electrolyte**

Acute toxicity: 50 LD, oral-Rat 2,000mg/kg or more

Local effects: Unknown.

Skin irritation: Rabbit-Mild.

Eye irritation: Rabbit-Very severe.

**第十二部分：生态学信息****Section 12- Ecological Information**

对该产品的生态学信息无相关资料。

本产品不允许排入下水道和/或河流。

流动性：无相关资料。

持久性和降解性：无相关资料。

潜在生物积累性：无相关资料。

生态毒性：

对水生物有毒，可能对水生环境产生长期的不利影响。

No information is available about this product's ecological data.

This product is not allowed to discharge into the sewer or/and rivers.

Mobility: Not available

Persistence and degradability: Not available

Bioaccumulative potential: Not available

Ecotoxicity:

Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

### 第十三项：废弃处置

#### Section 13- Disposal Considerations

禁止弃置于下水道或水渠。

废物：

依据现有的法规回收或处理废弃物，尽可能选择有资质的废弃物回收者或公司。禁止将废弃物直接排入环境中。

污染包装：

完全清空容器，并保留容器标识。选择有资质的废弃处理承保人。

Do not put into drains or waterways.

Waste:

Recycle or dispose of waste in compliance with current legislation, preferably via a certified collector or company. Do not dispose of waste into the environment.

Soiled packaging:

Empty container completely. Keep label(s) on container. Give to a certified disposal contractor.

#### 第十四部分：运输信息

##### Section 14 – Transport Information

电池已经通过了UN38.3测试。运输过程中请根据 IATA DGR第62版包装说明PI 965 Section IB / PI 965 Section II / PI 966 Section II / PI 967 Section II\*, IMDG CODE (inc Amdt 39~18) 特殊规定188及ADR2019执行。电池应该牢固的放置, 防止短路。运输前要检查包装容器是否完整、密封, 运输过程中要确保容器不泄露、不脱落、不损坏。严禁与氧化剂、酸等混装混运。运输工具必须彻底清洗、消毒, 否则不得装运其他货物。运输途中应防暴晒、雨淋、高温, 应远离火源。海运运输时, 放置点应远离卧室和厨房, 并与机舱、电源和火源处隔离。道路运输时, 应按照规定的路线行驶, 在居民区和拥挤区域内不要停车。严禁使用木质、水泥散装运输。

The Batteries have been tested under provisions of the UN Manual of Tests and Criteria, Part III, sub-section 38.3 . Transportation should comply with the **PACKING INSTRUCTION PI 965 Section IB / PI 966 Section II / PI 967 Section II\* of IATA DGR 62<sup>nd</sup> Edition, the special provision 188 of IMDG CODE (inc Amdt 39-18) and ADR 2019**. The batteries should be securely packed and protected against short-circuits.

Examine whether the package of the containers are integrate and tighten closed before transport. Take in a cargo of them without falling, dropping, and breakage. Prevent collapse of cargo piles. Don't put the goods together with oxidizer and chief food chemicals. The transport vehicle and ship must be cleaned and sterilized otherwise it is not allowed to assemble articles. During transport, the vehicle should prevent exposure, rain and high temperature. For stopovers, the vehicle should be away from fire and heat sources. When transported by sea, the assemble place should keep away from bedroom and kitchen, and isolated from the engine room, power and fire source. Under the condition of Road Transportation, the driver should drive in accordance with regulated route, don't stop over in the residential area and congested area. Forbid to use wooden, cement for bulk transport.

##### UN编码

##### UN-Number

· ADR, IMDG, IATA

UN3480 or UN3481

##### UN的运输名称 UN proper shipping name

LITHIUM ION BATTERIES (锂离子电池)

##### 运输危险品分类 Transport hazard class(es)

· ADR, IMDG, IATA

9 Miscellaneous dangerous substances and articles. (第9类危险品)

用户特别注意事项：警告：杂项危险物品

**Special precautions for user:** Warning: Miscellaneous dangerous substances and articles

## 第十五项：管理信息

### Section 15- Regulatory information

法规信息：

国际航空运输协会:危险物品法规

ISO 11014-2009 化学品用安全资料表 内容和排列顺序章节。

Regulatory Information:

International Air Transport Association: Dangerous Goods Regulation

ISO 11014-2009 Safety data sheet for chemical products - Content and order of sections.

### Section 16- Other Information

## 第十六项：其他信息

上述信息是基于现有的数据信息，在实际应用过程中，可能出现其他未预料的情况，其相应信息可能需要修改，我方不承担责任，在操作中请根据实际情况做出相应的正确处理。

The above information is based on the data of which we are aware and is believed to be correct as of the data hereof. Since this information may be applied under conditions beyond our control and with which may be unfamiliar and since data made available subsequent to the data hereof may suggest modifications of the information, we do not assume any responsibility for the results of its use. This information is furnished upon condition that the person receiving it shall make his own determination of the suitability of the material for his particular purpose.



中国认可  
国际互认  
检测  
TESTING  
CNAS L6791

## UN38.3 Test Report

### UN38.3 测试报告

Sample name : LITHIUM POLYMER BATTERY  
物品名称 : 锂聚合物电池

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Model/Type : PT603450-2S  
型号规格 : 7.4V, 1200mAh, 8.88Wh

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Client : Shenzhen Everbest Machinery Industry Co., Ltd  
申请商 : 深圳市华盛昌科技实业股份有限公司

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**Shenzhen BALUN Technology Co., Ltd.**  
**深圳市巴伦技术股份有限公司**



UN38.3 TEST REPORT UN38.3检验报告			
Report Number. .... 报告编号.....	BL-SZ1970236-301		
Applicant's name ..... 委托单位名称.....	Shenzhen Everbest Machinery Industry Co., Ltd 深圳市华盛昌科技实业股份有限公司		
Address..... 地址.....	19th Building, 5th Region, Baiwangxin Industrial Park, SongBai Rd., Baimang, Xili, Nanshan, Shenzhen, Chian 深圳市南山区西丽白芒松白公路百旺信工业区5区19栋		
Testing Laboratory ..... 测试实验室.....	Shenzhen BALUN Technology Co., Ltd. 深圳市巴伦技术股份有限公司		
Testing Location ..... 测试地点.....	Block B, 1st FL, Baisha Science and Technology Park, Shahe Xi Road, Nanshan District, Shenzhen, 518055, P.R. China 中国广东省深圳市南山区沙河西路白沙科技产业园1楼B区		
Test method and criterion ..... 测试方法和判定标准.....	ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3		
Date(s) of performance of tests ..... 测试时间.....	2019.07.12 – 2019.07.31		
Name of samples ..... 样品名称.....	LITHIUM POLYMER BATTERY 锂聚合物电池	Trade Mark 商标	--
Model ..... 型号.....	PT603450-2S	Ratings: 额定参数	7.4V, 1200mAh, 8.88Wh
Apperance..... 样品外观.....	Approx. 55(H) x 35(W) x 16.5(T)(mm), Black prismatic battery with DC connection. Weight approx. 44g 约55(H) x 35(W) x 16.5(T)(mm), 带连接端子的黑色方形电池, 重约44g.		
Manufacture's name ..... 制造商名称.....	Shenzhen Everbest Machinery Industry Co., Ltd 深圳市华盛昌科技实业股份有限公司		
Manufacture's Address ..... 制造商地址.....	19th Building, 5th Region, Baiwangxin Industrial Park, SongBai Rd., Baimang, Xili, Nanshan, Shenzhen, Chian 深圳市南山区西丽白芒松白公路百旺信工业区5区19栋		
Name of Factory (ies) ..... 生产厂名称.....	GUANGDONG POW-TECH NEW POWER CO., LTD 广东力科新能源有限公司		
Address of Factory (ies)..... 生产厂地址.....	No.9, HENGdong 3 ROAD, HENGKENG SHILING INDUSTRY ZONE, LIAOBU TOWN, DONGGUAN CITY, GUANGDONG PROVICE, CHINA 东莞市寮步镇横坑石岭工业区横东三路9号		
Conclusion ..... 结论.....	The sample has passed the test items of UNITED NATIONS "Recommendations of the TRANSPORT OF DANGEROUS GOODS" Manual of Tests and Criteria ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3 经测试, 该样品符合联合国《关于危险货物运输的建议书 试验和标准手册》 ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3 标准要求。		
2019.11.06 Date 日期		2019.11.6 Date 日期	
赖春花 Tested by 检测		林章军 Approved by 批准	

Description and illustration of the sample:

样品说明及描述:

☐ Large cells and batteries

☒ Small cells and batteries

☐ Primary cells and batteries

☒ Rechargeable cells and batteries

Parameter 参数	Nominal capacity 额定容量	Nominal voltage 标称电压	Nominal Charge Current 标准充电电流	Nominal Discharge Current 标准放电电流	Maximum Charge Current 最大充电电流	Maximum Discharge Current 最大放电电流	Limited Charge Voltage 充电限制电压	Cut-off Voltage 放电截止电压
Product 成品	1200mAh	7.4V	200mA	200mA	1200mA	1200mA	8.4V	6.5V
Cell 电芯	1200mAh	3.7V	240mA	240mA	1200mA	1200mA	4.2V	3.0V

Test item 测试项目	Samle No. 样品编号	State 状态	Remark 备注
T1~T5	B01~B04	at first cycle, in fully charged state 一次循环的满电状态;	--
	B05~B08	after twenty five cycles ending in fully charged state 二十五次循环后完全满电状态;	--
T6	C01~C05	at first cycle at 50% of the design rated capacity 一次循环50%满电状态;	--
	C06~C10	after twenty five cycles ending at 50% of the design rated capacity 二十五次循环50%满电状态;	--
T7	B09~B12	at first cycle, in fully charged state 一次循环的满电状态;	--
	B13~B16	after twenty five cycles ending in fully charged state 二十五次循环后完全满电状态;	--
T8	C11~C20	at first cycle, in fully discharged state 一次循环后完全放电状态;	--
	C21~C30	after twenty five cycles ending in fully discharged state 二十五次循环后完全放电状态。	--

Possible test case verdicts:

可能的试验情况判定:

- test case does not apply to the test object .....:

试验样品不适用该条款 .....:

N/A

- test object does meet the requirement .....:

试验样品满足要求 .....:

P (Pass)

- test object does not meet the requirement .....:

试验样品不满足要求 .....:

F (Fail)



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Clause 章节	Requirement 标准要求	Result 测试结果	Verdict 判定

<b>38.3 Lithium batteries / 锂电池</b>			
<b>38.3.4</b>	<b>Procedure / 测试步骤</b>		<b>P</b>
	<p>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.</p> <p>小型电池或电池组应按顺序进行试验T.1至T.5。试验T.6和T.8应使用未另外试验过的电池或电池组。试验T.7可以使用原先在试验T.1至T.5中使用过的未损坏电池组进行，以便测试经过充放电的电池组。</p>		<b>P</b>
<b>38.3.4.1</b>	<b>Test 1: Altitude simulation / 测试1: 高度模拟</b>		<b>P</b>
	<p><b>Test procedure / 测试步骤:</b></p> <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 (<math>20 \pm 5</math>) °C.</p> <p>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(<math>20 \pm 5</math>°C)下存放至少6小时。</p>		<b>P</b>
	<p><b>Requirement / 标准要求</b></p> <p>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.</p> <p>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。</p>	<p>The test results meet the requirements. See table 1.</p> <p>测试结果符合要求。见表1。</p>	<b>P</b>
<b>38.3.4.2</b>	<b>Test 2: Thermal test / 测试2: 热冲击</b>		<b>P</b>
	<p><b>Test procedure / 测试步骤:</b></p> <p>Test cells and batteries are to be stored for at least six hours at a test temperature equal to <math>72 \pm 2</math> °C, followed by storage for at least six hours at a test temperature equal to <math>-40 \pm 2</math> °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 (<math>20 \pm 5</math> °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.</p> <p>试验电池和电池组应先在试验温度等于<math>72 \pm 2</math>°C的条件下存放至少6小时，接着再在试验温度等于<math>-40 \pm 2</math>°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(<math>20 \pm 5</math>°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。</p>		<b>P</b>
	<p><b>Requirement / 标准要求:</b></p> <p>Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no</p>	<p>The test results meet the requirements. See table 1.</p> <p>测试结果符合要求。见表1。</p>	<b>P</b>



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Clause 章节	Requirement 标准要求	Result 测试结果	Verdict 判定
	<p>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.</p> <p>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。</p>		
38.3.4.3	<p><b>Test 3: Vibration / 测试3: 振动</b></p>		P
	<p><b>Test procedure / 测试步骤:</b></p> <p>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.</p> <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).</p> <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.</p> <p>For large batteries: from 7 Hz to a peak acceleration of 1gn 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 2gn occurs (approximately 25 Hz). A peak acceleration of 2gn is then maintained until the frequency is increased to 200 Hz.</p> <p>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。</p> <p>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。</p> <p>对电池和小型电池组：从7 赫兹开始，保持1gn 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。</p> <p>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。</p>		P
	<p><b>Requirement / 标准要求:</b></p> <p>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</p>	<p>The test results meet the requirements. See table 1. 测试结果符合要求。见表1。</p>	P



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Clause 章节	Requirement 标准要求	Result 测试结果	Verdict 判定									
	<p>procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.</p> <p>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。</p>											
38.3.4.4	<b>Test 4: Shock / 测试4: 冲击</b>		P									
	<p>Test procedure / 测试步骤:</p> <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.</p> <p>Each cell shall be subjected to a half-sine shock of peak acceleration of 150 g<sub>n</sub> and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 g<sub>n</sub> and pulse duration of 11 milliseconds.</p> <p>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.</p> <p>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.</p> <table><thead><tr><th>Battery</th><th>Minimum peak acceleration</th><th>Pulse duration</th></tr></thead><tbody><tr><td>Small batteries</td><td>150 g<sub>n</sub> or result of formula <math>Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^*}\right)}</math> whichever is smaller</td><td>6 ms</td></tr><tr><td>Large batteries</td><td>50 g<sub>n</sub> or result of formula <math>Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^*}\right)}</math> whichever is smaller</td><td>11 ms</td></tr></tbody></table> <p>* Mass is expressed in kilograms.</p> <p>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。</p> <p>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。</p> <p>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。</p> <p>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。</p>		Battery	Minimum peak acceleration	Pulse duration	Small batteries	150 g <sub>n</sub> or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^*}\right)}$ whichever is smaller	6 ms	Large batteries	50 g <sub>n</sub> or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^*}\right)}$ whichever is smaller	11 ms	P
	Battery	Minimum peak acceleration	Pulse duration									
Small batteries	150 g <sub>n</sub> or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{100850}{mass^*}\right)}$ whichever is smaller	6 ms										
Large batteries	50 g <sub>n</sub> or result of formula $Acceleration(g_n) = \sqrt{\left(\frac{30000}{mass^*}\right)}$ whichever is smaller	11 ms										
<p>Requirement / 标准要求:</p> <p>Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no</p>		<p>The test results meet the requirements. See table 1.</p> <p>测试结果符合要求。见表1。</p>	P									



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Clause 章节	Requirement 标准要求	Result 测试结果	Verdict 判定
	<p>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.</p> <p>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。</p>		
38.3.4.5	<b>Test 5: External short circuit / 测试5: 外部短路</b>		P
	<p><b>Test procedure / 测试步骤:</b></p> <p>The cell or battery to be tested shall be shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of <math>57 \pm 4^{\circ}\text{C}</math>, 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 <math>57 \pm 4^{\circ}\text{C}</math> shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm.</p> <p>This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to <math>57 \pm 4^{\circ}\text{C}</math>, 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.</p> <p>The short circuit and cooling down phases shall be conducted at least at ambient temperature.</p> <p>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<math>57 \pm 4^{\circ}\text{C}</math>。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，大型电池和小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<math>57 \pm 4^{\circ}\text{C}</math>条件下经受总外电阻小于0.1欧姆的短路条件。</p> <p>这一短路条件应在电池或电池组外壳温度回到<math>57 \pm 4^{\circ}\text{C}</math>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到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。</p> <p>短路和降温阶段的温度应至少相当于环境温度。</p>		P
	<p><b>Requirement / 标准要求:</b></p> <p>Cells and batteries meet this requirement if their external temperature does not exceed <math>170^{\circ}\text{C}</math> and there is no disassembly, no rupture and no fire within six hours after this test.</p> <p>如果外壳温度不超过<math>170^{\circ}\text{C}</math>，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。</p>	<p>The test results meet the requirements. See table 1.</p> <p>测试结果符合要求。见表1。</p>	P
38.3.4.6	<b>Test 6: Impact / Crush / 测试6: 撞击 / 挤压</b>		P
	<p><b>Test procedure / 测试步骤:</b></p> <p><b>Impact</b> (applicable to cylindrical cells not less than 18.0 mm in diameter)</p>		N/A



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Clause 章节	Requirement 标准要求	Result 测试结果	Verdict 判定
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*NOTE: Diameter here refers to the design parameter (for example the diameter of 18650 cells is 18.0 mm).*

The 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 center of the test sample. Each sample is to be subjected to only a single impact.

撞击(适用于直径不小于18.0毫米的圆柱形电池)

备注: 这里的直径指的是设计参数(如18650电芯的直径是18.0mm)。

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毫米 $\pm$ 0.1毫米, 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9.1千克 $\pm$ 0.1千克的重锤从61 $\pm$ 2.5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毫米弯曲表面的纵轴垂直。每一试样只经受一次撞击。

Test procedure / 测试步骤:

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

*NOTE: Diameter here refers to the design parameter (for example the diameter of 18650 cells is 18.0 mm).*

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;  
Example: The force shall be applied by a hydraulic ram with a 32 mm diameter piston until a pressure of 17 MPa is reached on the hydraulic ram.
- (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.

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

备注: 这里的直径指的是设计参数(如18650电芯的直径是18.0mm)。

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:

P



ST/SG/AC.10/11/Rev.6/ Amend.1 Section 38.3			
Clause 章节	Requirement 标准要求	Result 测试结果	Verdict 判定
	<p>(a) 施加到电芯上的压力达到13 kN ± 0.78 kN;</p> <p>(b) 电芯电压下降至少100mV; 或</p> <p>(c) 电芯形变与原电芯相比变化50%或以上。</p> <p>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。</p> <p>棱柱形或袋装电芯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。</p> <p>每个样品只经受一次挤压。试验后样品应再观察6个小时, 试验应使用之前未做过其他试验的电池或元件电池进行。</p>		
	<p>Requirement / 标准要求:</p> <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.</p> <p>如果外壳温度不超过170℃, 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。</p>	<p>The test results meet the requirements. See table 2.</p> <p>测试结果符合要求。见表2。</p>	P
38.3.4.7	<b>Test 7: Overcharge / 测试7: 过充电</b>		P
	<p>Test procedure / 测试步骤:</p> <p>The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:</p> <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.</p> <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.</p> <p>Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.</p> <p>充电电流应是制造商建议的最大连续充电电流的两倍。最小试验电压应满足如下所述:</p> <p>(a) 制造商建议的充电电压不大于18V时, 最小试验电压应是电池最大充电电压的2倍或22V两者中的较小值。</p> <p>(b) 制造商建议的充电电压大于18伏特时, 最小试验电压应是最大充电电压的1.2倍。</p> <p>试验应在环境温度下进行。进行试验的时间应为24小时。</p>		P
	<p>Requirement / 标准要求:</p> <p>Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.</p> <p>充电电池组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。</p>	<p>The test results meet the requirements. See table 3.</p> <p>测试结果符合要求。见表3。</p>	P
38.3.4.8	<b>Test 8: Forced discharge / 测试8: 强制放电</b>		P
	<p>Test procedure / 测试步骤:</p> <p>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</p>		P

## ST/SG/AC.10/11/Rev.6/ Amend.1 Section 38.3

Clause 章节	Requirement 标准要求	Result 测试结果	Verdict 判定
	<p>discharge current specified by the manufacturer.</p> <p>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).</p> <p>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。</p> <p>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)。</p>		
	<p>Requirement / 标准要求:</p> <p>Primary or rechargeable cells meet this requirement if there is no disassembly and no fire within seven days of the test.</p> <p>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。</p>	<p>The test results meet the requirements. See table 4.</p> <p>测试结果符合要求。见表4。</p>	P







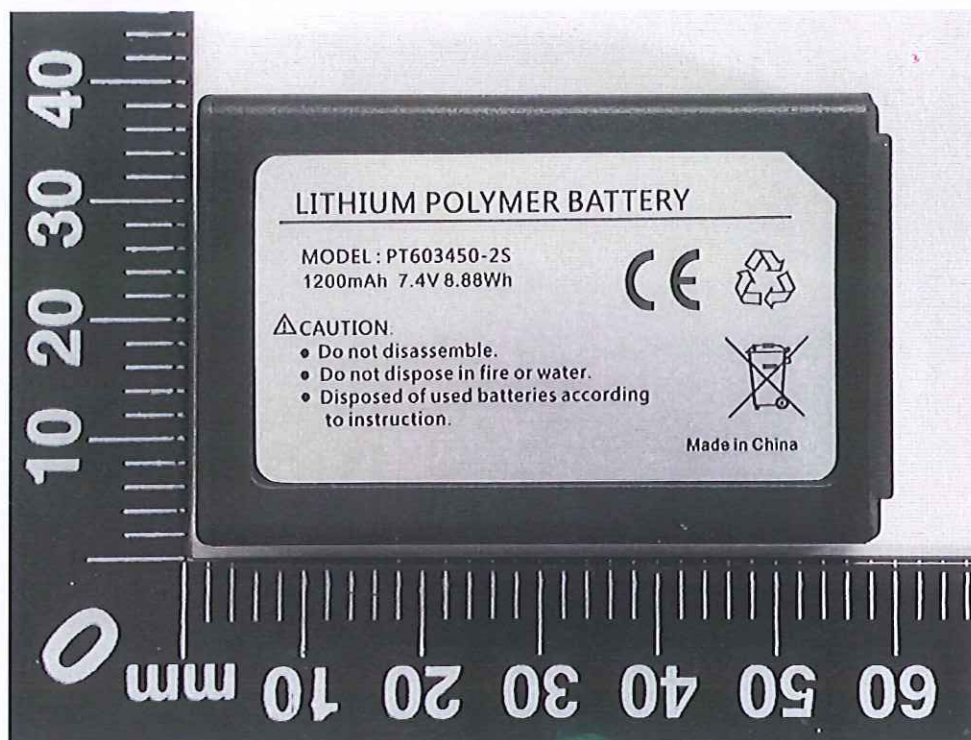
Table: T6 / 表2 试验6 <input type="checkbox"/> Impact / 撞击 <input checked="" type="checkbox"/> Crush / 挤压			P
Sample No, 样品编号	OCV Prior to test (V) 试验前电压	External Peak temperature(°C) 表面最高温度(°C)	Results 结果
C01	3.88	24.1	P
C02	3.86	24.2	P
C03	3.87	24.2	P
C04	3.88	24.1	P
C05	3.89	24.0	P
C06	3.86	24.3	P
C07	3.87	24.1	P
C08	3.87	24.2	P
C09	3.89	24.2	P
C10	3.88	24.1	P
<b>Remark / 备注:</b> No disassembly ,no rupture and no fire; external temperature does not exceed 170 °C. 无解体、无破裂和无起火现象; 表面温度不超过170°C。			

Table3: T7 Overcharge / 表3: 测试7 过充电				P
Charge voltage / 充电电压 (V)		16.8	Charge current / 充电电流 (A)	2.4
Sample NO. 样品序号	OCV Prior to test (V) 试验前电压 (V)	Phenomenon 现象		Results 结果
B09	8.35	No disassembly, no fire / 无解体, 无着火		P
B10	8.35	No disassembly, no fire / 无解体, 无着火		P
B11	8.35	No disassembly, no fire / 无解体, 无着火		P
B12	8.35	No disassembly, no fire / 无解体, 无着火		P
B13	8.36	No disassembly, no fire / 无解体, 无着火		P
B14	8.35	No disassembly, no fire / 无解体, 无着火		P
B15	8.36	No disassembly, no fire / 无解体, 无着火		P
B16	8.35	No disassembly, no fire / 无解体, 无着火		P

Table4: T8 Forced discharge /表4: 测试8 强制放电		P
Sample NO. 样品序号	Phenomenon / 现象	Results 结果
C11	No disassembly, no fire / 无解体, 无着火	P
C12	No disassembly, no fire / 无解体, 无着火	P
C13	No disassembly, no fire / 无解体, 无着火	P
C14	No disassembly, no fire / 无解体, 无着火	P
C15	No disassembly, no fire / 无解体, 无着火	P
C16	No disassembly, no fire / 无解体, 无着火	P
C17	No disassembly, no fire / 无解体, 无着火	P
C18	No disassembly, no fire / 无解体, 无着火	P
C19	No disassembly, no fire / 无解体, 无着火	P
C20	No disassembly, no fire / 无解体, 无着火	P
C21	No disassembly, no fire / 无解体, 无着火	P
C22	No disassembly, no fire / 无解体, 无着火	P
C23	No disassembly, no fire / 无解体, 无着火	P
C24	No disassembly, no fire / 无解体, 无着火	P
C25	No disassembly, no fire / 无解体, 无着火	P
C26	No disassembly, no fire / 无解体, 无着火	P
C27	No disassembly, no fire / 无解体, 无着火	P
C28	No disassembly, no fire / 无解体, 无着火	P
C29	No disassembly, no fire / 无解体, 无着火	P
C30	No disassembly, no fire / 无解体, 无着火	P

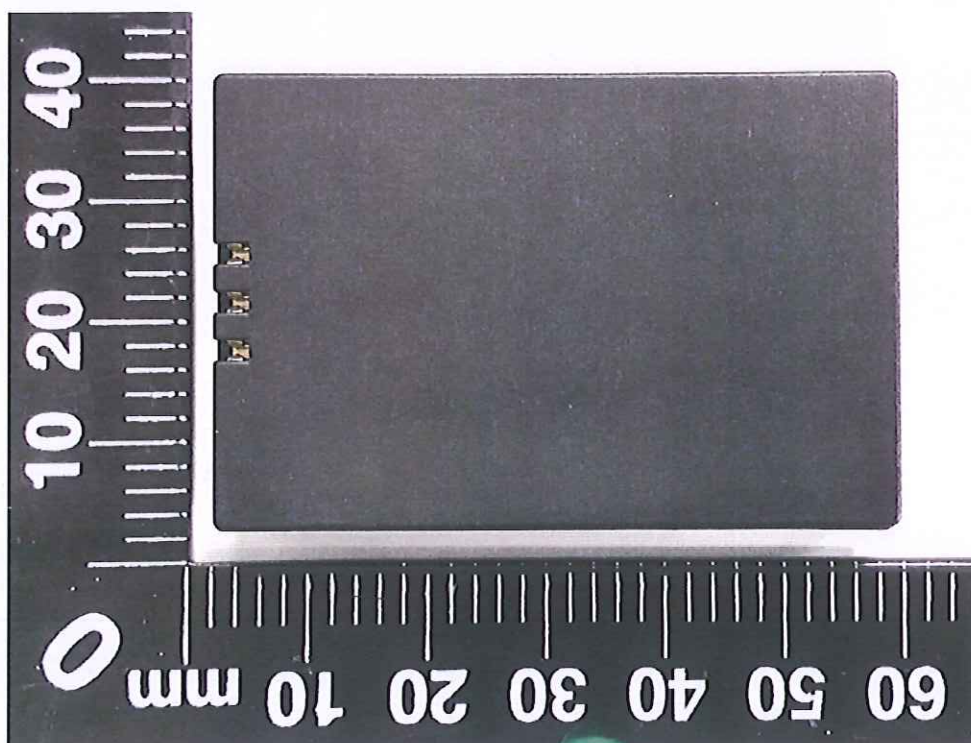


# Sample photos / 样品图片



Picture 1 Front view of battery

图1: 电池正面



Picture 2 Back view of battery

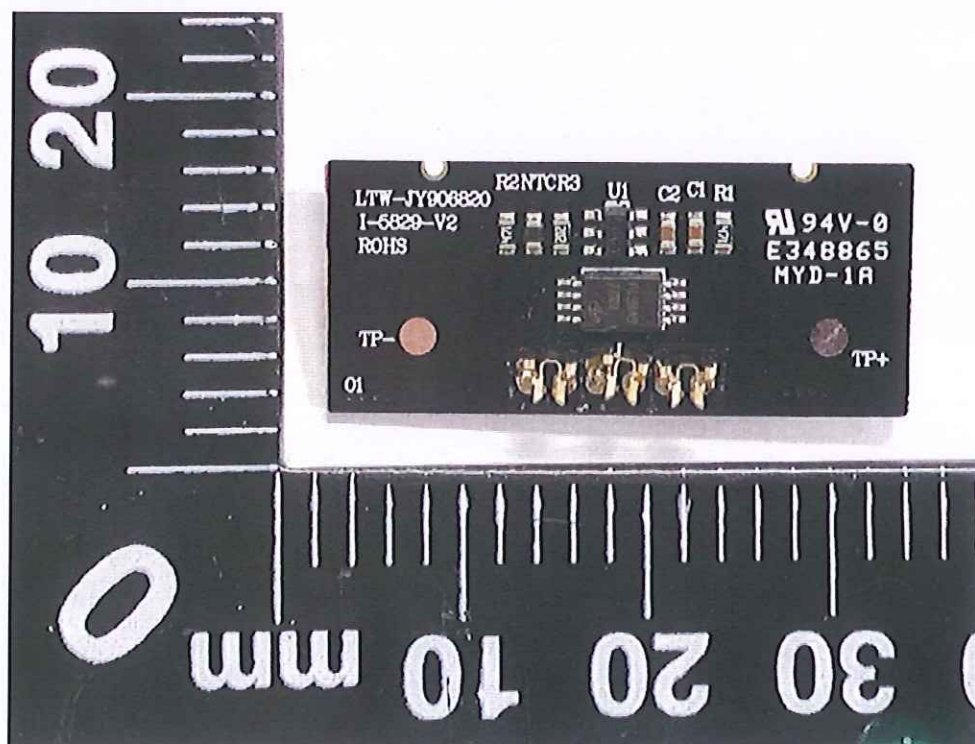
图2: 电池反面

# Sample photos / 样品图片



Picture 3 Side view of battery

图3: 电池内部

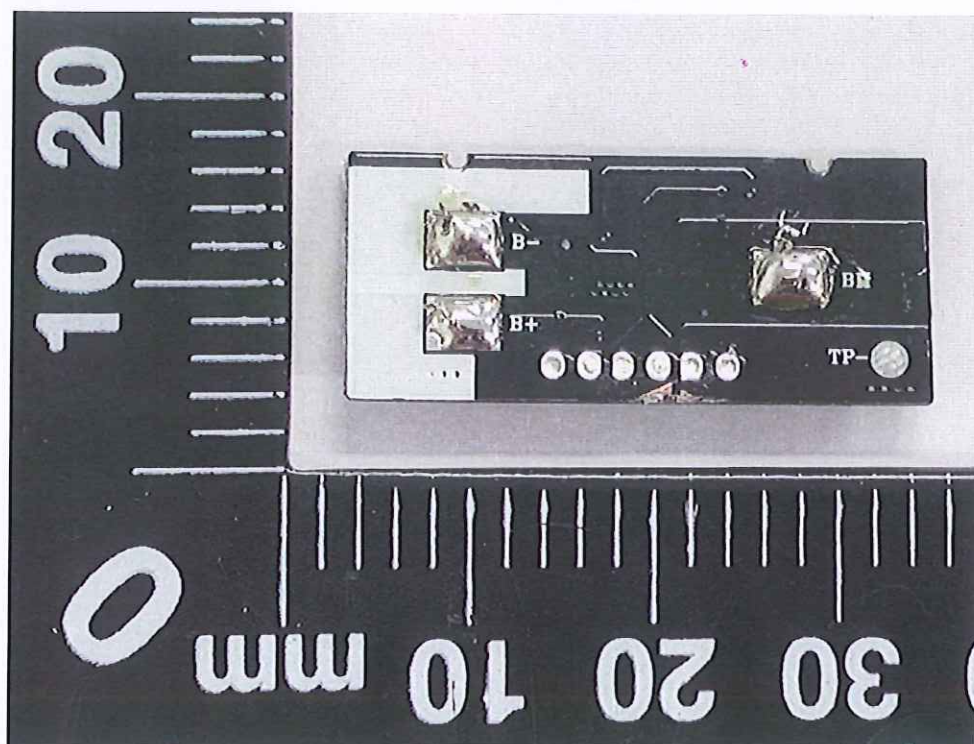


Picture 4 Front view of PCM

图4: 保护电路正面



Sample photos / 样品图片



Picture 5 Back view of PCM

图5: 保护电路反面



Picture 6 Front view of cell

图6: 电芯正面

## 声明

1. 本实验室是经过中国合格评定国家认可委员会认可的检测实验室，证书号：L6791。

The Laboratory has met the requirements of the CNAS Accreditation Criteria,  
The accreditation certificate number is L6791.

2. 报告未加盖“检测专用章”无效。

The test report is invalid without the "Special detection stamp".

3. 报告无检测、批准人员签字无效。

The report is invalid without the signatures of testing engineer and Ratifier.

4. 报告涂改无效。

The test report is invalid if altered.

5. 本报告仅对送检样品有效。

The test report is valid for the tested samples only.

6. 未经本实验室书面同意，不得部分地复制本报告。

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We will not be handling any late cases.