2927 Lomita Blvd., Torrance, CA 90505, USA
Email: dmo@totexmfg.com Tel: 310-326-2028 Fax: 310-326-2336 Date: Feb 2016

Distributed by Fluke Networks
battery pack used in FI-3000

Safety Data Sheet (SDS)

1. IDENTIFICATION OF THE GOODS AND COMPANY UNDERTAKING

Name of Company:	Totex Manufacturing Inc.
Address:	2927 Limta Blvd. Torrance, CA 90505 USA
Contact Person:	Derald Mo
Telephone number:	310-326-2028
Fax number:	310-326-2336
For emergency:	call CHEMTREC at 1-703-527-3887
Product Name	Lithium Ion Batteries

2. HAZARDS IDENTIFICATION

Protective Clothing	NFPA Rating (USA)	EC Classification	WHMIS (Canada)	Transportation	GHS Hazard Symbol
Not required with normal use		Not Classified as Hazardous	Not required with normal use	See Section 14	

This product is safe under normal use. Mis-handling and/or mis-use will cause serious damage to the product, and there will be the possibility of the generating of smoke or metals, rupture, or flaming.

Drop Test:	All packaging is capable of withstanding a 1.2m drop test in 6 different flat surface orientation without damage.
Toxicity:	See heading 11
Additional Information:	*Safety Instruction* Do not disassemble or reconstruct the product Do not short-circuit; Do not swallow the product Do not incinerate or heat the product Do not use or leave product nearby fire, stove, or heated place Do not immerse the product in water or sea water, or get it wet Do not give the product impact or throw it Do not drive a nail into the product, strike it by hammer or tread it

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3. COMPOSITION OF THE GOODS

Model#	Uses on	Voltage (Volts)	Capacity (mAh)	Pack Chemistry	No of cell contain in the each pack	one cell voltage (V)	One cell capacity (mA)	Equivalent Lithium Content for each cell(g)	Equivalent Lithium Content for each pack(g)	Wh
FNBP-LION-01	OEM	3.60	6000	Lithium Ion	2 P 1 S 2	3.6	3,200	0.300	1.920	21.60

Battery pack (cell) lngredient Chart

lngredient	Risk Codes	Safety Description	Hazard	Contents / Exposure Controls / Personal Protection
Cobalt oxide	R22;R43;R 50/53	S24;S37;S60;S61	Xn(Harmful)N(Dangerous for the environment)	0.1 mg/m3(TWA)
Manganese(VI)oxide	R20/22	S25	Xn(Harmful)	**Airborne Exposure Limits:**- OSHA Permissible Exposure Limit(PEL):5 mg/m3 Ceiling for manganese compounds as Mn -ACGIH Threshold Limit Value(TVL):0.2 mg/m3(TWA)for manganese,elementaland inorganic compounds as Mn
Nickel oxide	R43,R49,R5	S45,S53,S61	T(Toxic)	**Airborne Exposure Limits:** For Nickel,Metal and lnsoluble Compounds,as Ni:- OSHA Permissible Exposure Limite(PEL)- 1 mg/m3(TWA).For Nickel,Elemental/Metal:-ACGIH Threshold Limit Value(TLV)- 1.5mg/m3(TWA),A5- Not suspected as a human carcinogen.For Nickel,lnsoluble Compounds,as Ni:-ACGIH Threshold Limit Value(TLV)- 0.2 mg/m3 (TWA), A1- Confirmed human carcinogen
Carbon	R36/37/38, R36/37 R20,R10	S22;S24/25	F(Highly Flammable)Xn(Harmful)Xi(lr ritant)	**Airborne Exposure Limits:**- OSHA Permissible Exposure Limits(PELs):activated carbon(graphite,synthetic):Total particulate =15 mg/m3
Aluminium foil	R17,R15,R 36/38,R10, R67,R65,R 62,R51,53, R48/20, R38,R11	S7/8,S43,S26,S62,S6 1,S36/37,S33,S29,S1 6,S9	F(Highly Flammable)Xn(Harmful)Xi(lr ritant)	**Airborne Exposure Limits:**- OSHA Permissible Exposure Limit(PEL):15 mg/m3 (TWA)total dust and 5 mg/m3(TWA) repairable fraction for Aluminum metal as Al-ACGIH Threshold Limit Value(TLV): 10 mg/m3(TWA)Aluminum metal dusts
Copper foil	R11 R36 R37 R38	S5,S26,S16,S61, S36/37	F (Highly Flammable) N (Dangerous for the environment) Xn (Harmful) Xi (lrritant)	**Copper Dust and Mists,as Cu:**- OSHA Petmissible Exposure Limit(PEL)- 1 mg/m3(TWA)-ACGIH Threshold Limit Value (TLV)- 1 mg/m3(TWA)Copper Fume:-OSHA Permissible Exposure Limit(PEL)- 0.1 mg/m3(TWA)- ACGIH Threshold Limit Value(TLV)- 0.2 mg/m3 (TWA)
Polyvinylidene fluoride		S22;S24/25		

UN Class: UN 3480 - Class 9

Note: Under IATA Dangerous Goods Regulations Packing Instruction 965 Part 1:-
Lithium Ion can be transported and meets the following:
1) Watt-hour rating is not more than 100Wh. The Watt-hour rating is marked on the outside of the battery case except those manufactured before 1 January 2009 which may be transported without this marking until 31 December 2010.
2) Each battery mentioned above is of the type proven to meet the requirements of each test in the UN Manual and of Tests Criteria, Part III, subsection 38.3. (T1-T5, T7)

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4. FIRST AID MEASURES

In case of electrolyte leakage from the battery, necessary actions are described below.

Eye contact:	Flush the eyes with plenty of clean water such as tap water immediately, without rubbing. Seek medical treatment. If appropriate procedures are not taken, this may cause a loss of sight.
Skin contact:	Wash the contact areas off immediately with plenty of clean water such as tap water, otherwise it might cause irritation on the skin. If this chemical penetrates the clothing, immediately remove the clothing and flush the skin with water promptly. If irritation persists after washing, get medical attention.
Inhalation:	Move the exposed person to area with fresh air immediately, and seek medical treatment.
Ingestion:	Get medical attention immediately

5. FIRE FIGHTING MEASURES

Clear fire area of all non-emergency personnel. Clear away any combustible substances from the fire area.

Extinguishing method:	Since vapor, generated from burning battery packs, make eyes, nose, and throat irritate, be sure to extinguish the fire on the windward side. Wear the respiratory protection equipment in some cases.
Fire extinguishing agent:	Plenty of water, CO_2, and foam are effective.
Special protective equipment for fire fighter:	Wear the respiratory protection equipment in some cases.

6. MEASURES FOR ELECTROLYTE LEAKAGE

In case of electrolyte leakage, move the battery packs away from the fire immediately. Avoid contact with spilled or released material. Immediately remove a contaminated clothing.

Personal precautions:	Remove any ignition sources nearby. Control of dust generation. May consider wearing sufficient ventilation/respiratory protection. Prevention of skin and eye contact with the chemical.
Environmental precautions	Keeping away from drains, surface- and ground-water and soil. Alert the neighborhood if possible.
Method for cleaning up:	Use of absorbent material (e.g. sand, diatomaceous each, acid binder, universal binder, sawdust, etc.), reduction of gases/fumes with water, dilution.
Note:	Refer to heading 8 for exposure control Refer to heading 13 for disposal consideration

7. HANDLING AND STORAGE

Handling:	When packing the battery packs, do not allow terminals to contact each other, or contact with other metals. Avoid improper handling of the packaging box so as not to drop or damage it. Do not disassemble or reconstruct, swallow, incinerate or heat the product. Avoid use or leave product nearby fire, stove or heated place. Do not immerse the product in water or sea water. Dispose of or recycle the product according to your local government law/regulations.
Storage:	Do not store the battery packs in places of high temperature exceeding 35° or under direct sunlight as it will affect the battery performance only. Avoid places of high humidity, Be sure not to expose the battery pack to condensation, water drop or not to store it under frozen condition. When piling the pallets up or placing them in parallel, appropriate space between each pallet should be provided. Be sure to install suitable fire extinguishing equipment such as automatic fire extinguisher. Avoid storing the battery packs in places where it is exposed to static electricity so that no damage will be caused to the protection circuit of the battery pack.
Note:	Information in this section should relate to the protection of health, safety, and the environment. Please refer to Article 5 of Directive 98/24/EC for more details on safety handling and storage.

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8. EXPOSURE CONTROLS

Personal protective equipment: (in case of electrolyte leakage)

Respiratory Protection: Protector with ventilator (in case of high concentration of gases), air breather

Hand Protection: Suitability and durability of a glove is dependent on usage

Eye protection: Goggles / mask

Protective clothing: Use protective clothing which is chemical resistant

Facilities: Provide appropriate ventilation system such as local ventilator in the storage place. Local exhaust ventilation is recommended. Firewater monitors and deluge systems are recommended. Eye washes and showers for emergency use

Note: Refer to Article 4 of Directive 98/24/EC for more details on the health and safety of workers

9. PHYSICAL AND CHEMICAL PROPERTIES

Appearance: The product is stored in the plastic resin case / PVC sleeves. Shape, size and color varies.

Odour: No odor

Specific temperatures/temperature ranges at which changes in physical state occur:

There is no useful information for the product as a mixture

Flash point: N/A

Explosion properties: N/A

10. STABILITY AND REACTIVITY

Stability: Stable under normal conditions of use

Condition to Avoid: Avoid impact, deconstruct, direct sunlight, high temperature, high humidity, sparks, open flames and other ignition sources

Materials to avoid: Conductive materials, water, seawater, strong oxidizers and strong acids

Hazardous decomposition products: Acrid or harmful fume is emitted during fire

11. TOXICOLOGICAL INFORMATION

In case of electrolyte leakage from the product

Irritation: Irritating to eyes, skin, and throat

Sensitivity: Sensitive to skin

Respiratory irritation: Inhalation of vapours may cause irritation to the respiratory system

12. ECOLOGICAL INFORMATION

Since a battery cell and the internal materials remain in the environment, do not bury or throw out into the environment.

13. DISPOSAL CONSIDERATIONS

When the battery is worn out, dispose of it under the ordinance of each local government or the law issued by relating government.

14. TRANSPORT INFORMATION

During the transportation of a large amount of battery packs by sea, air, trailer, or railway, do not leave them in place of high temperatures and do not allow them to be exposed to condensation. Confirm no leakage and no over-spilt from a container.

Properly store cargo to prevent falling, dropping and breakage. Prevent collapse of cargo piles and wet by rain.

The container must be handled carefully. Do not give shocks that result in a mark of hitting on the product.

Please refer to heading 7 also.

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Packaging:

1) Package <= 12 packs
a. Packed in strong boxes
b. Packed in a way to prevent short circuits

2) Package > 12 packs
1. Packed in strong packaging marked to say that it contains Lithium Ion Batteries
2. Accompanied by a document indicating that the package contains lithium Ion batteries
3. Be capable of withstanding 1.2metre drop test in any orientation without short circuiting, damage or release
4. Maximum 10 Kg gross weight

Air Shipment:

Our "Lithium Ion batteries" is not recognized as "DANGEROUS GOODS" because we meet the requirment under IATA Dangerous Goods Regulations edition 56th 2015.
1) Section IB of Packing Instruction PI965:-
2) Each battery mentioned above is of the type proven to meet the requirements of each test in the UN Manual of Tests and Criteria, Part III, subsection 38.3.
3) Each package is withstanding a 1.2m drop test and without:
a) damage to cells or batteries contained therin;
b) shifting of the contents so as to allow battery to battery (cell to cell) contact;
c) release of contents
4) Watt-hour rating is not more than 100Wh.
5) Quantity per package is less than 10 kg (gross)

Sea Shipment:

Our "Lithium Ion batteries" can be shipped because we meet the requirement under IMO-IMDG Code Special Provision 188 & 230:-
Each battery is of the type proven to meet the requirement of each test in the UN Manual of Tests and Criteria, Part 111, sub-section 38.3.
Each battery is not charged more than 50%

Regulation depends on region and transportattion mode
Worldwide, air transporation:

IATA-DGR [As non-DANGEROUS GOODS: " packing instruction 965 section II" / Almost as above however displayed as DANGEROUS GOODS: " packing instruction 965 section IB "] (When batteries are packaged with equipments or contained in equipments, refer packing instruction 966 or 967 instead of 965.)

15. REGULATORY INFORMATION

Regulation specifically applicable: Directive 67/548/EEC & 1999/45/EC

16. OTHER INFORMATION

The information contained in this Safety data sheet is based on the present state of knowledge and current legislation.
This safety data sheet provides guidance on health, safety and environmental aspects of the product and should not be construed as any guarantee of technical performance or suitability for particular applications.

广东出入境检验检疫局检验检疫技术中心
GUANGDONG INSPECTION AND QUARANTINE TECHNOLOGY CENTER

地址：中国广州市珠江新城花城大道66号B座
Add: Tower B,No.66 Huacheng Avenue, Zhujiang Xincheng,Guangzhou,China
Website:www.iqtc.cn Postcode:510623

QR CODE: B8O4VB8Z4X
No: 01051700007179-1(E)
Date: 2017-11-22
Page: 1 of 13

UN38. 3 报告

UN38.3 Test Report

样品名称： 锂离子充电电池

Sample Name: Li-ion Rechargeable Battery

委托单位： 惠州隆基电子有限公司

Applicant: HUIZHOU LONGJI ELECTRONICS CO.,LTD

广东出入境检验检疫局检验检疫技术中心

Inspection & Quarantine Technology Center of Guangdong Entry-Exit Inspection & Quarantine Bureau of The People's Republic of China

地址：中国广州市珠江新城花城大道66号B座
Add: Tower B,No.66 Huacheng Avenue, Zhujiang Xincheng,Guangzhou,China
Website:www.iqtc.cn Postcode:510623

检 验 证 书
TEST REPORT

样品名称 Sample Name	锂离子充电电池 Li-ion Rechargeable Battery				
型号 Model	FNBP-LION-01 3.6V 6.4Ah 23Wh				
委托单位 Applicant	惠州隆基电子有限公司 HUIZHOU LONGJI ELECTRONICS CO.,LTD				
委托单位地址 Applicant Address	广东省惠州市博罗县石湾镇南亚北路里波水第二工业区 No.2 LIBo SHUI INDUSTRIAL DISTRICT,NAN YA BEI LU,SHEK WAN, BOLUO, HUIZHOU, GUANGDONG, CHINA				
生产单位 Manufacture	惠州隆基电子有限公司 HUIZHOU LONGJI ELECTRONICS CO.,LTD				
生产单位地址 Manufacture Address	广东省惠州市博罗县石湾镇南亚北路里波水第二工业区 No.2 LIBo SHUI INDUSTRIAL DISTRICT,NAN YA BEI LU,SHEK WAN, BOLUO, HUIZHOU, GUANGDONG, CHINA				
标称电压 Nominal Voltage	3.6V	额定容量 Rated Capacity	6.4Ah	充电限制电压 Limited Charge Voltage	4.2V
标准充电电流 Standard Charge Current	2.5A	最大充电电流 Maximum Charge Current	2.5A	截止电流 Cut Off Current	0.13A
标准放电电流 Standard discharge Current	3.25A	最大放电电流 Maximum Discharge Current	3.25A	放电截止电压 Discharge Cut-off Voltage	2.5V
电芯数目 Cell contain	2PCS	电芯型号 Cell Model	NCR18650BF	电芯容量 Cell Capacity	3.25Ah
电芯生产单位 Manufacturer of cell	PANASONIC				
接样时间 Accepted date	2017-10-27	测试日期 Test date	2017-10-27~2017-11-22		
测试方法和判定标准 Test method and criterion	联合国《关于危险货物运输的建议书 试验和标准手册》Rev.6, 38.3 UNITED NATIONS " Recommendations on the TRANSPORT OF DANGEROUS GOODS", Manual of Tests and Criteria Rev.6, 38.3				
测试项目 Test items	高度模拟、温度试验、振动、冲击、外部短路、撞击、过度充电、强制放电。 Altitude simulation, Thermal test, Vibration, Shock, External short circuit, Impact, Overcharge, Forced discharge.				
结论 Conclusion	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》Rev.6, 38.3 标准要求。 The sample has passed the test items of UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS", Manual of Test and Criteria Rev.6, 38.3.				
备注 Remark	检测结果仅对样品有效。 The test results are only valid for the test samples submitted the applicant.				

批准 Approver: 审核 Checker: 主检 Appraiser:

地址：中国广州市珠江新城花城大道66号B座
Add: Tower B,No.66 Huacheng Avenue, Zhujiang Xincheng,Guangzhou,China
Website:www.iqtc.cn Postcode:510623

序号 No.	测试项目名称 Name of test	标准要求或标准条款号 Stand requirement or the clause number of standard	测试结果 Test result	本项结论 Test conclusion	备注 Remark
1	高空模拟 Altitude simulation	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.1 Test T.1	见附表 1 See Appendix 1	合格 Passed	/
2	温度循环 Thermal test	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.2Test T.2	见附表 2 See Appendix 2	合格 Passed	/
3	振动 Vibration	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.3 Test T.3	见附表 3 See Appendix 3	合格 Passed	/
4	冲击 Shock	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.4Test T.4	见附表 4 See Appendix 4	合格 Passed	/
5	外部短路 External short circuit	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.5Test T.5	见附表 5 See Appendix 5	合格 Passed	/
6	撞击 Impact	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.7Test T.7	见附表 6 See Appendix 6	合格 Passed	/
7	过度充电 Overcharge	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.7Test T.7	见附表 7 See Appendix 7	合格 Passed	/
8	强制放电 Forced discharge	联合国《关于危险货物运输的建议书试验和标准手册》UN Manual of Tests and Criteria Rev.6, 38.3 试验 T.8Test T.8	见附表 8 See Appendix 8	合格 Passed	/

测试环境 Test environment condition	环境温度：20℃-25℃；环境湿度：45%-75% Ambient temperature: 20℃-25℃, Ambient humidity: 45%-75%				
分包测试情况 Subcontracted test condition	测试项目 Test items	/			
	分包实验室 Subcontracted Laboratory	名称 Name	/	邮编 Post code	/
		地址 Address	/	电话 Tel	/

地址：中国广州市珠江新城花城大道66号B座
Add: Tower B,No.66 Huacheng Avenue, Zhujiang Xincheng,Guangzhou,China
Website:www.iqtc.cn Postcode:510623

序号 No.	附表 1 Appendix 1	测试项目名称 Name of test	高空模拟 Altitude simulation

标准要求 Requirement of Standard	试验电池或电池组在压力等于或低于 11.6kPa 和环境温度 20℃±5℃下存放至少 6h。试验电池或电池组应无重量损失、无渗漏、无排气、无解体、无破裂和无燃烧，并且每个试验电池或电池组在试验后的开路电压不少于其在进行这一试验前电压的 90%（完全放电状态的试验电池或电池组除外）。 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. 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.
样品状态 Sample status	b1#~b4#：第一个循环完全充电的电池； b1#~b4#: first cycle in fully charged states; b5#~b8#：第五十个循环完全充电的电池。 b5#~b8#: after 50 cycles ending in fully charged states.

样品编号 Sample No.	测试前 Before		测试后 After		质量损失 Mass loss (%)	剩余电压 Residual OCV(%)	测试结果 Test result
	电池质量 m_1(g)	开路电压 v_1(v)	电池质量 m_2(g)	开路电压 v_2(v)			
b1#	100.946	4.13	100.938	4.13	0.01	100.00	O
b2#	100.911	4.12	100.899	4.12	0.01	100.00	O
b3#	100.780	4.13	100.768	4.13	0.01	100.00	O
b4#	100.834	4.12	100.822	4.11	0.01	99.76	O
b5#	100.813	4.13	100.804	4.12	-0.01	99.76	O
b6#	100.947	4.12	100.937	4.12	0.01	100.00	O
b7#	100.953	4.12	100.939	4.12	0.01	100.00	O
b8#	100.976	4.12	100.959	4.12	0.02	100.00	O

注：L-泄漏； V-排气； D-解体； R-破裂； F-起火； O-无泄漏、无排气、 无解体、无破裂、无起火。
Note: L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O- No Leakage, No Venting, No Disassembly, No Rupture & No Fire.

GUANGDONG INSPECTION AND QUARANTINE TECHNOLOGY CENTER 报告专用章 (05)

序号 No.	附表 2 Appendix 2	测试项目名称 Name of test	温度循环 Thermal test
标准要求 Requirement of Standard	试验电池或电池组在试验温度等于 72℃±2℃下存放至少 6h，接着在试验温度等于-40℃±2℃下存放至少 6h（大型电池或电池组暴露于极端试验温度的时间至少为 12h）。两个极端试验温度之间的最大时间间隔为 30min。重复 10 次，再将所有试验电池或电池组在环境温度 20℃±5℃下存放 24h。试验电池或电池组应无重量损失、无渗漏、无排气、无解体、无破裂和无燃烧，并且每个试验电池或电池组在试验后的开路电压不少于其在进行这一试验前电压的 90%（完全放电状态的试验电池或电池组除外）。 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.). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours. Cells and batteries meet this requirement if there is no 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.		
样品状态 Sample status	b1#~b4#：第一个循环完全充电的电池； b1#~b4#: first cycle in fully charged states; b5#~b8#：第五十个循环完全充电的电池。 b5#~b8#: after 50 cycles ending in fully charged states.		

样品编号 Sample No.	测试前 Before		测试后 After		质量损失 Mass loss (%)	剩余电压 Residual OCV(%)	测试结果 Test result
	电池质量 m_1(g)	开路电压 v_1(v)	电池质量 m_2(g)	开路电压 v_2(v)			
b1#	100.938	4.13	100.917	4.10	0.02	99.27	O
b2#	100.899	4.12	100.879	4.10	0.02	99.51	O
b3#	100.768	4.13	100.750	4.10	0.02	99.27	O
b4#	100.822	4.11	100.804	4.10	0.02	99.76	O
b5#	100.804	4.12	100.783	4.10	0.04	99.51	O
b6#	100.937	4.12	100.915	4.10	-0.11	99.51	O
b7#	100.939	4.12	100.924	4.10	0.01	99.51	O
b8#	100.959	4.12	100.948	4.10	0.01	99.51	O

注：L-泄漏； V-排气； D-解体； R-破裂； F-起火； O-无泄漏、无排气、 无解体、无破裂、无起火。
Note:L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O- No Leakage, No Venting, No Disassembly, No Rupture & No Fire.

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序号 No.	附表 3 Appendix 3	测试项目名称 Name of test	振动 Vibration

标准要求 Requirement of Standard	将电池或电池组直接安装或通过夹具安装在振动台的台面上，用正弦波，频率在 7Hz 和 200Hz 之间摆动再回到 7Hz 的对数扫频 15min，对三个互相垂直的电池或电池组安装方向的每个方向重复进行 12 次，一共振动 3h。试验电池或电池组应无重量损失、无渗漏、无排气、无解体、无破裂和无燃烧，并且每个试验电池或电池组在试验后的开路电压不少于其在进行这一试验前电压的 90%（完全放电状态的试验电池或电池组除外）。 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. 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.
样品状态 Sample status	b1#~b4#：第一个循环完全充电的电池； b1#~b4#: first cycle in fully charged states; b5#~b8#：第五十个循环完全充电的电池。 b5#~b8#: after 50 cycles ending in fully charged states.

样品编号 Sample No.	测试前 Before		测试后 After		质量损失 Mass loss (%)	剩余电压 Residual OCV(%)	测试结果 Test result
	电池质量 m_1(g)	开路电压 v_1(v)	电池质量 m_2(g)	开路电压 v_2(v)			
b1#	100.917	4.10	100.915	4.09	0.00	99.76	O
b2#	100.879	4.10	100.878	4.09	0.00	99.76	O
b3#	100.750	4.10	100.748	4.09	0.00	99.76	O
b4#	100.804	4.10	100.803	4.09	0.00	99.76	O
b5#	100.783	4.10	100.782	4.09	0.00	99.76	O
b6#	100.915	4.10	100.914	4.09	0.00	99.76	O
b7#	100.924	4.10	100.923	4.09	0.00	99.76	O
b8#	100.948	4.10	100.946	4.09	0.00	99.76	O

注：L-泄漏； V-排气； D-解体； R-破裂； F-起火； O-无泄漏、无排气、 无解体、无破裂、无起火。
Note:L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O- No Leakage, No Venting, No Disassembly, No Rupture & No Fire.

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序号 No.	附表 4 Appendix 4	测试项目名称 Name of test	冲击 Shock

标准要求 Requirement of Standard	将电池或电池组用坚硬支架紧固在试验装置上，对于小型电池组，应以加速度为 150gn 或 gn=$\sqrt{(100850 / mass)}$ 中较小者的正弦波冲击，脉冲持续时间 6ms，按三个相互垂直的轴向分别对其正负极各冲击 3 次，共冲击 18 次。各试验电池或电池组应无重量损失、无渗漏、无排气、无解体、无破裂和无燃烧，并且每个试验电池或电池组在试验后的开路电压不少于其在进行这一试验前电压的 90%（完全放电状态的试验电池或电池组除外）。 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 small batteries shall be subjected to a half-sine shock of peak acceleration of 150gn or acceleration (gn) =$\sqrt{(100850 / mass)}$ 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. 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.(NOTE: Mass is expressed in kilograms)
样品状态 Sample status	b1#~b4#：第一个循环完全充电的电池； b1#~b4#: first cycle in fully charged states; b5#~b8#：第五十个循环完全充电的电池。 b5#~b8#: after 50 cycles ending in fully charged states.

样品编号 Sample No.	测试前 Before		测试后 After		质量损失 Mass loss (%)	剩余电压 Residual OCV(%)	测试结果 Test result
	电池质量 m_1(g)	开路电压 v_1(v)	电池质量 m_2(g)	开路电压 v_2(v)			
b1#	100.915	4.09	100.915	4.09	0.00	100.00	O
b2#	100.878	4.09	100.878	4.09	0.00	100.00	O
b3#	100.748	4.09	100.748	4.09	0.00	100.00	O
b4#	100.803	4.09	100.803	4.09	0.00	100.00	O
b5#	100.782	4.09	100.782	4.09	0.00	100.00	O
b6#	100.914	4.09	100.914	4.09	0.00	100.00	O
b7#	100.923	4.09	100.923	4.09	0.00	100.00	O
b8#	100.946	4.09	100.946	4.09	0.00	100.00	O

注：L-泄漏； V-排气； D-解体； R-破裂； F-起火； O-无泄漏、无排气、 无解体、无破裂、无起火。
Note:L-Leakage, V-Venting, D-Disassembly, R-Rupture, F-Fire, O- No Leakage, No Venting, No Disassembly, No Rupture & No Fire.

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序号 No.	附表 5 Appendix 5	测试项目名称 Name of test	外部短路 External short circuit
标准要求 Requirement of Standard	待试验电池或电池组的外壳温度稳定在 57℃±4℃后，在 57℃±4℃下使电池或电池组经受总外电阻小于 0.1Ω 的短路条件，当电池或电池组外壳温度回到 57℃±4℃后继续至少 1h，然后短路断开，再观察电池或电池组 6h 才结束试验。电池或电池组的外壳温度应不超过 170℃，并且试验后 6h 内应无解体、无破裂和无燃烧。 The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches 57 ± 4 °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 ± 4 °C. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57 ± 4 °C. The cell or battery must be observed for a further six hours for the test to be concluded. 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 within six hours of this test.		
样品状态 Sample status	b1#~b4#：第一个循环完全充电的电池； b1#~b4#： first cycle in fully charged states; b5#~b8#：第五十个循环完全充电的电池。 b5#~b8#： after 50 cycles ending in fully charged states.		

样品编号 Sample No.	样品表面最高温度 Max External Temperature (℃)	测试结果 Test result	备注 Remark
b1#	58.0	O	/
b2#	57.6	O	/
b3#	57.1	O	/
b4#	56.9	O	/
b5#	57.2	O	/
b6#	57.3	O	/
b7#	57.4	O	/
b8#	57.5	O	/

注： D-解体； R-破裂； F-起火； O-无解体、无破裂、无起火。
Note: D-Disassembly, R-Rupture, F-Fire, O-No Disassembly, No Rupture & No Fire.

GUANGDONG INSPECTION AND QUARANTINE TECHNOLOGY CENTER 广东出入境检验检疫局检验检疫技术中心 报告专用章 (05)

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Add: Tower B,No.66 Huacheng Avenue, Zhujiang Xincheng,Guangzhou,China
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序号 No.	附表 6 Appendix 6	测试项目名称 Name of test	撞击 Impact

标准要求 Requirement of Standard	撞击（适用与直径不小于 18mm 的圆柱形电池）： 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的中心，钢棒的直径（15.8±0.1）毫米，长度至少 6 厘米，或电池最长端的尺度，取二者之长者，用一块（9.1±0.1）千克的重锤从（61±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表面支撑表面呈 90 度落下。 接受撞击的试样，纵轴应于平坦表面平行并与横放在试中心的直径（15.8±0.1）毫米弯曲表面的纵轴垂直，每个试样只经受一次撞击。 试验电池或电池组的组成电芯外部温度不超过 170℃，并且在试验过程中和试验后 6 小时内应无解体、无破裂、无起火。 **Impact**(applicable to cylindrical cells not less than 18mm in diameter): 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 centre 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. 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 centre of the test sample. Each sample is to be subjected to only a single impact. 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.
样品状态 Sample status	C1#~C5#：第一个循环 50%的额定容量的电芯。 C1#~C5#: first cycle at 50% of the design rated capacity of cell.

样品编号 Sample No.	样品表面最高温度 Max External Temperature（℃）	测试结果 Test result	备注 Remark
C1#	114.8	O	/
C2#	115.9	O	/
C3#	117.1	O	/
C4#	114.5	O	/
C5#	116.1	O	/

注： D-解体； R-破裂； F-起火； O-无解体、无破裂、无起火。
Note: D-Disassembly, R-Rupture, F-Fire, O-No Disassembly, No Rupture & No Fire.

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序号 No.	附表 7 Appendix 7	测试项目名称 Name of test	过度充电 Overcharge
标准要求 Requirement of Standard	充电电流必须是制造商建议的最大连续充电电流的两倍，试验的最小电压应为如下： （a）制造商建议的充电电压不大于 18V 时，试验的最小电压应是电池组最大充电电压的两倍或 22V 两者中的较少者。 （b）制造商建议的充电电压大于 18V 时，试验的最小电压应是最大充电电压的 1.2 倍。 可再充电电池组在环境温度下试验 24h。试样在试验后 7 天内应无解体和无燃烧。 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 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V. (b) When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage. Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours. Rechargeable batteries meet this requirement if there is no disassembly and no fire within seven days of the test.		
样品状态 Sample status	b9#~b12#：第一个循环完全充电的电池； b9#~b12#: first cycle in fully charged states; b13#~b16#：第五十个循环完全充电的电池。 b13#~b16#: after 50 cycles ending in fully charged states.		

样品编号 Sample No.	测试结果 Test result	备注 Remark
b9#	O	/
b10#	O	/
b11#	O	/
b12#	O	/
b13#	O	/
b14#	O	/
b15#	O	/
b16#	O	/

注： D-解体； R-破裂； F-起火； O-无解体、无破裂、无起火。
Note: D-Disassembly, R-Rupture, F-Fire, O-No Disassembly, No Rupture & No Fire.

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序号 No.	附表 8 Appendix 8	测试项目名称 Name of test		强制放电 Forced discharge	
标准要求 Requirement of Standard	试验原电池或可再充电电池在环境温度下与 12V 的直流电源串联，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。原电池或可再充电电池在试验后 7 天内应无解体和无燃烧。 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).Primary or rechargeable cells meet this requirement if there is no disassembly and no fire within seven days of the test.				
样品状态 Sample status	C6#~C15#：第一个循环完全放电的电芯； C6#~C15#: first cycle in fully discharged states; C16#~C25#：第五十个循环完全放电的电芯。 C16#~C25#: after 50 cycles in fully discharged states.				
样品编号 Sample No.	测试结果 Test result	备注 Remark	样品编号 Sample No.	测试结果 Test result	备注 Remark
C6#	O	/	C16#	O	/
C7#	O	/	C17#	O	/
C8#	O	/	C18#	O	/
C9#	O	/	C19#	O	/
C10#	O	/	C20#	O	/
C11#	O	/	C21#	O	/
C12#	O	/	C22#	O	/
C13#	O	/	C23#	O	/
C14#	O	/	C24#	O	/
C15#	O	/	C25#	O	/

注： D-解体； R-破裂； F-起火； O-无解体、无破裂、无起火。
Note: D-Disassembly, R-Rupture, F-Fire, O-No Disassembly, No Rupture & No Fire.

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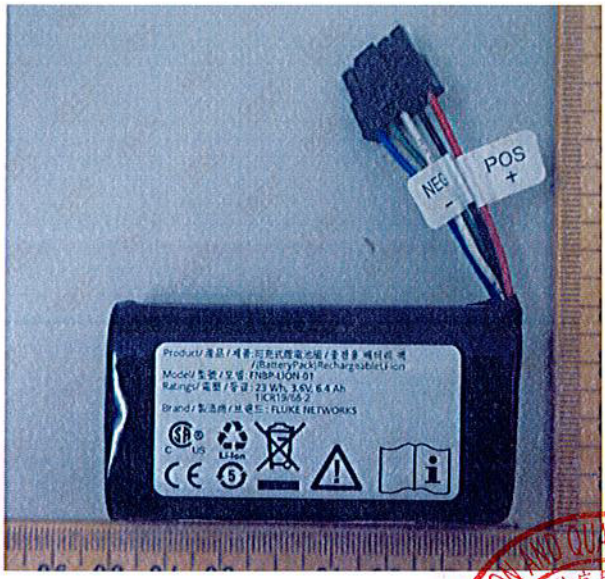
样品图片
Photo of the sample

电池/Battery



电芯/Cell

* * * * * * * *

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Important

1.本报告无检验单位公章无效。

The test report is invalid without the official stamp of IQTC.

2.未经本实验室书面同意，不得部分地复制本报告。

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3.本报告无批准人、审核人及主检人签名无效。

The test report is invalid without the signatures of Approver, Checker and Appraiser.

4.客户必须如实提供样品及资料，并保证申报品名和样品以及运输货物相同，否则本检测单位不承担任何相关责任。

The client should provide samples and relevant data, at the same time, they should guarantee the consistence of the product's name they declared, the samples they provided and the goods to be transported. Otherwise we will not bear any relevant responsibilities.

5.本报告涂改无效。

The test report is invalid if altered.

6.对检验报告若有异议，应于收到报告之日起十五天内向检验单位提出。

Objection to the test report must be submitted to IQTC within 15 days.

7.本报告仅对送检样品负责。

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