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检验
INSPECTION
CNAS IB0551



Report No.: SZLZ20230103MSDS01-3

MATERIAL SAFETY DATA SHEET

Product	Tapo Battery Pack
Type/Model	Tapo A100
Issue Date	2023-06-09
Validity	2023-06-09 ~ 2023-12-31
Compiler	<i>Jiangxing Xiao</i>
Reviewer	<i>Onon Huang</i>
Approver	<i>Hongbin Xu</i>

广州邦禾检测技术有限公司

Guangzhou MCM Certification & Testing Co., Ltd.



Material Safety Data Sheet

SECTION 1 - CHEMICAL AND COMPANY IDENTIFICATION		
Product	Tapo Battery Pack	
Type/Model	Tapo A100	
Parameter	3.6V, 6700mAh, 24.12Wh	
Usage	☒ Used in Portable Equipment	☐ Used in Electric Vehicle
	☐ Used in Energy Storage System	☐ Others
Company	TP-Link Corporation Limited	
Address	Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hong Kong	
Fax	--	
Zip code	--	
E-mail	shirley.hong@tp-link.com	
Emergency Telephone		
0755-26504400		

SECTION 2 - HAZARDS IDENTIFICATION	
Classification: This chemical is not considered hazardous by the Regulation (EC) No 1272/2008 (CLP). This product is an article which is a sealed battery and as such does not require an SDS per the Regulation (EC) No 1272/2008 (CLP) unless ruptured. The hazards indicated are for a ruptured battery.	
Acute toxicity – Oral	Category 4
Acute toxicity - Dermal	Category 4
Skin corrosion/irritation	Category 1B
Serious eye damage/eye irritation	Category 2
Skin sensitization	Category 1
Carcinogenicity	Category 2
Specific target organ toxicity (repeated exposure)	Category 1
Label elements: Signal Word: Danger Hazard Statements	
H302	Harmful if swallowed.
H312	Harmful in contact with skin.
H332	Harmful if inhaled.
H318	Causes serious eye damage.
H317	May cause an allergic skin reaction.
H350	May cause cancer.
H371	May cause damage to organs.
H335	May cause respiratory irritation.
Symbol  GHS08  GHS05  GHS07	
This product is an article which contains a chemical substance. Safety information is given for exposure to the	

article as solid. Intended use of the product should not result in exposure to the chemical substance, This is a battery. In case of rupture: the above hazards exist.

Precautionary Statements – Prevention

P201	Obtain special instructions before use.
P202	Do not handle until all safety precautions have been read and understood.
P281	Use personal protective equipment as required.
P264	Wash face, hands and any exposed skin thoroughly after handling.
P272	Contaminated work clothing should not be allowed out of the workplace.
P210	Keep away from heat/sparks/open flames/hot surfaces –no smoking.
P270	Do not eat, drink or smoke when using this product.

Precautionary Statements – Response

P301+ P330+ P308

If exposed or connected: Get medical advice/attention. Specific treatment(see supplemental first aid/instruction on this label).

Skin: If on skin: wash with plenty of soap and water. Take off contaminated clothing and water before reuse, if skin irritation or rash occurs: get medical advice/attention if feel unwell.

Eye: If in eyes: Rinse cautiously with water for several minutes, remove contact lenses, if present and easy to do, Continue rinsing. Call a POISON CENTER or doctor/physician if you feel unwell.

Inhalation: If inhalation: if breathing is difficult, remove victim to fresh air and keep at rest in a position comfortable for breathing. If experiencing respiratory symptoms: Call a POISON CENTER or doctor/physician if you feel unwell.

Ingestion: If swallowed: rinse mouth, do not induce vomiting, Call a POISON CENTER or doctor/physician if you feel unwell.

Precautionary Statements – Storage

P405	Store locked up
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Precautionary Statements – Disposal

P501	Dispose of contents/container to an approved waste disposal plant.
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Hazards not otherwise classified (HNOC)

Not applicable

Other information

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

Interactions with other chemicals

Use of alcoholic beverages may enhance toxic effect.

SECTION 3 - COMPOSITION/INFORMATION ON INGREDIENT			
Ingredient	Molecular formula	CAS No.	Weigh
Lithium Nickel Cobalt Aluminum Oxide	$\text{LiNi}_x\text{Co}_y\text{Al}_z\text{O}_2$	--	57%
Polyvinylidene Fluoride	$(\text{C}_2\text{H}_2\text{F}_2)_n$	24937-79-9	0.6%
Aluminium	Al	7429-90-5	4%
Graphite	$\text{C}_{24}\text{X}_{12}$	7782-42-5	25%
Styrene Butadiene Rubber	$\text{C}_{36}\text{H}_{42}\text{X}_2$	9003-55-8	0.5%
1,2-Dimethoxyethane	$\text{C}_6\text{H}_7\text{O}_2(\text{OH})_2\text{CH}_2\text{COONa}$	9004-32-4	0.3%
Copper	Cu	7440-50-8	9.7%
Lithium Hexafluorophosphate	LiPF_6	21324-40-3	2.4%
Other	--	--	0.5%

SECTION 4 - FIRST AID MEASURES
Eye Exposure: In case of contact with eyes, flush with copious of water for at least 15 minutes. Assure adequate flushing by separating the eyelids with fingers. Call a physician.
Skin Exposure : If the internal battery materials of an opened battery cell come into contact with skin, immediately flush with plenty of water or soap.
Inhalation Exposure: If inhaled the internals of battery vomiting. Seeking Immediate medical attention.
Ingestion Exposure: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

SECTION 5 - FIRE FIGHTING MEASURES
Danger characteristic: Exposure to excessive heat can cause venting of the liquid electrolyte. Battery may burst and release hazardous decomposition products when exposed to a fire situation.
Hazardous combustion products Corrosive and toxic gas may be emitted during fire.
Fire-Fighting method: The staff must equip with filtermask (full mask) or isolated breathing apparatus. The staff must wear the clothes which can defense the fire in the upwind direction. Remove the container to the open space as soon as possible. Spray water on the containers in the fireplace to keep them cool until finish extinguishment.
Fire-Fighting media: Plenty of water, dry chemical powder or carbon dioxide.

SECTION 6 - ACCIDENTAL RELEASE MEASURES
Emergency treatment: If the battery material is released, remove personnel from area until the batteries cool down and fumes dissipate. Provide maximum ventilation to clear out hazardous gases and avoid skin and eye contact or inhalation of vapors. Remove spilled liquid with absorbent and incinerate waste.

SECTION 7 - HANDLING AND STORAGE

Handling:

1. Do not allow battery terminations to contact each other, or contact with other metals.
2. Do not put the cell or battery into a fire or heat it. Do not solder the cell directly. Do not use or leave the cell or battery in a place near fire or heaters.
3. Do not expose the battery to excessive physical shock or vibration.
4. Do not immerse, throw, and wet a battery in water.
5. Short-circuiting should be avoided. Short circuit will reduce the life of the battery and can lead to ignition of surrounding materials. Physical contact with to short-circuited battery can cause skin burn.
6. The batteries should not be opened, destroyed or incinerated, since they may leak or rupture and release to the environment the ingredients that they contain in the hermetically sealed container.
7. Place the cell beyond the child packing and container.
8. Do not connect the battery directly to an electric outlet or cigarette socket in a car.
9. Be sure to use the specified charger for battery, and follow the charging instructions correctly.
10. Do not mix old and new batteries together, neither with Ni-Cd, dry batteries or another manufacturer batteries or product.

Storage:

1. Batteries should be separated from other materials and stored in a noncombustible, well ventilated, sprinkler-protected structure with sufficient clearance between walls and battery stacks.
2. Keep the sample in the cool, dry and well-ventilated place (temperature: -20~30 °C, humidity: 45~85%). Do not exposure to direct sunlight for long periods. Keep away from fire and heating sources. Don't keep the samples with oxidizer and acid.
3. Equip with relevant types and quantities of the extinguishment instruments. The storage place should be equipped with suitable shelter materials for divulgence handling.
4. For rechargeable battery, charge the battery every 6 months to the amount specified by the manufacture, even if the battery is not used.

SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION

Engineering Control:

Keep away from heat and open flame. Supply with sufficient partial air exhaust. Store in a cool, dry place.

Respiratory Protection:

Not necessary under conditions of normal use. Wear self-contained breathing filtermask if the density exceed in the air. Wear breathing apparatus under the condition of emergency rescue or evacuation.

Eyes Protection:

Not necessary under conditions of normal use. Wear protective glasses if handling a leaking or ruptured battery.

Skin and Body Protection:

Not necessary under conditions of normal use. Wear fireproofing, gas defense clothes in case of handling a leaking or ruptured battery.

Hands Protection:

Not necessary under conditions of normal use. Wear chemical resistant rubber glove.

Other Protections:

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

SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES	
Appearance:	Black
Physical state:	Solid
Form:	Nearly Prismatic
Odor:	Odorless
Solubility:	Insoluble in water

SECTION 10 - STABILITY AND REACTIVITY
Stability: Stable under normal temperature and pressure.
Distribution of Ban: Explosives, inflammables, strong oxidants and corrosives.
Conditions to Avoid: Fire source, heating source, disassemble, external short circuit, crushes, deformation, high temperature above 100°C, direct sunlight and high humidity, immerse in water or overcharge.
Hazardous Polymerization: Will not occur.
Hazardous Decomposition Products: Metal oxides, carboxyl compound such as CO, CO ₂ , etc.

SECTION 11 - TOXICOLOGICAL INFORMATION
Acute Toxicity: No information is available.
Sub-acute and Chronic Toxicity: No information is available.
Irritation Data: The internal battery materials may cause irritation to eyes and skin.
Sensitization: The liquid in the battery may cause sensitization to some person.
Mutagenicity: No information is available.
Carcinogenicity: No information is available.
Others: Since the materials in this battery are sealed in the can, the potential for exposure to the components of the battery is negligible, when the battery is used as directed. However technical or electrical abuse of the battery may result in the release of battery contents.

SECTION 12 - ECOLOGICAL INFORMATION
Eco-toxicity: No information is available.
Biodegradable: No information is available.
Mobility in soil: No information is available.

Bioconcentration or biological accumulation:

No information is available.

Other harmful effects:

Don't abandon the battery into environment, may cause water or soil pollution.

SECTION 13 - DISPOSAL CONSIDERATIONS**Appropriate Method of Substance:**

The battery should be completely discharged prior to disposal in order to prevent short circuit.

The battery contains recyclable materials, and it is suggested recycle.

Refer to National or Local regulations before handling.

Disposal of the battery should be performed by permitted, professional disposal firms knowledgeable in National or Local regulations of hazardous waste treatment and hazardous waste transportation.

SECTION 14 - TRANSPORT INFORMATION

The battery has passed the test items of UN Manual of Test and Criteria Section 38.3, and Report No.: SZLZ20230103U01-2.

General packaging requirement:

1. The cells or batteries must be protected so as to prevent short circuits.
2. The cells or batteries or equipment must be packed in suitable strong outer packaging.
3. If batteries contained in equipment, equipment must be secured against movement within the outer packaging and be packed so as to prevent accidental activation.

Air transportation, according to IATA-DGR 64th Edition (Effective 1 January-31December 2023)

UN Number + PSN	UN 3480, LITHIUM ION BATTERIES
Hazard Class	Class 9
Packaging requirement	Strong package, packaging according to PACKING INSTRUCTION 965, section IB
UN Number + PSN	UN 3481, LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, or UN 3481, LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT
Hazard Class	Not restricted
Packaging requirement	Strong package, packaging according to PACKING INSTRUCTION 966-967, section II

Sea transportation, according to IMO IMDG Code (Amend 40-2020)

UN Number + PSN	UN 3480, LITHIUM ION BATTERIES, or UN 3481, LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, or UN 3481, LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT
Hazard Class	Not restricted, according to sp188
Package instruction	Strong package, Packaging in accordance to corresponding requirements of sp188
EmS No.	F-A, S-I

Road transportation, according to ADR-2021

UN Number + PSN	UN 3480, LITHIUM ION BATTERIES, or UN 3481, LITHIUM ION BATTERIES PACKED WITH EQUIPMENT, or UN 3481, LITHIUM ION BATTERIES CONTAINED IN EQUIPMENT
Hazard Class	Not restricted, according to sp188
Package instruction	Strong package, Packaging in accordance to corresponding requirements of sp188

SECTION 15 - REGULATORY INFORMATION

Dangerous Goods Regulation (DGR)
Recommendations on the Transport of Dangerous Goods Model Regulations
International Maritime Dangerous Goods (IMDG)
Occupational Safety and Health Act (OSHA)
Toxic Substances Control Act (TSCA)
Code of Federal Regulations (CFR)
Technical Instructions for the Safe Transport of Dangerous Goods
California Proposition 65
Superfund Amendments and Reauthorization Act Title III (302/311/312/313) (SARA)
Globally Harmonized System of Classification and Labeling of Chemicals (GHS)
 In accordance with all Federal, State and local laws.

SECTION 16 - ADDITIONAL INFORMATION

According standard:

GB/T 16483-2008 Safety data sheet for chemical products Content and order of sections
ISO 11014:2009(E) Safety data sheet for chemical products – Content and order of sections

Editing date:

2023-01-17

Department:

Guangzhou MCM Certification & Testing Co., Ltd.
 Building 2 No. 45 Zhong Er Section of Shiguang Road, Zhongcun Street, Panyu District, Guangzhou City,
 Guangdong Province, China.
 Tel.: +86-20-3477 7662, 0086-020-3477 7662
 WEB: <https://www.mcmtek.com>
 Email: service@mcmtek.com

Other Information:

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Revision:

Replaced the original Report SZLZ20230103MSDS01-2, 2023.05.25 Issued

Sample Reference Photo

Model: Tapo A100, 3.6V, 6700mAh, 24.12Wh



--End of the report--



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CNAS L4065



Report No.:

报告编号: SZLZ20230103U01-2

UN38.3 TEST REPORT

UN38.3 检测报告

Product Name:

产品名称:

Tapo Battery Pack

锂离子电池组

Model and Parameters:

型号参数:

Tapo A100, 3.6V, 6700mAh, 24.12Wh

Test Classification:

检测类别:

Commission test

委托检测

Issue Date:

签发日期:

2023-06-09

Tested by/测试

Jiangxing Xian

Test Engineer

Reviewed by/审核

Qian Huang

Audit Engineer

Approved by/批准

Hongbin Ku

Approval Engineer

Guangzhou MCM Certification & Testing Co., Ltd.

广州邦禾检测技术有限公司



4008 368 355



<https://www.mcmtek.com>

General Information 基本信息	
Application Information/申请信息:	
Applicant: 申请单位:	TP-Link Corporation Limited
Address: 申请单位地址:	Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hong Kong
Contact Information: 联系方式:	Tel: 0755-26412682/82682 E-mail: shirley.hong@tp-link.com
General Information/基本信息:	
Product Name: 产品名称:	Tapo Battery Pack 锂离子电池组
Product Classification: 产品分类:	Rechargeable Lithium Ion Battery 可充电锂离子电池
Trade Mark: 商标名称:	
Model and Parameters: 型号参数:	Tapo A100, 3.6V, 6700mAh, 24.12Wh
Manufacturer: 制造单位:	TP-Link Corporation Limited
Address: 制造单位地址:	Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hong Kong
Contact Information: 联系方式:	Tel: 0755-26412682/82682 E-mail: shirley.hong@tp-link.com
Factory: 生产单位:	TP-LINK international shenzhen Co.,Ltd. Guangming Branch 深圳市联洲国际技术有限公司光明分公司
Address: 生产单位地址:	TP-LINK international factory -101, 1F-8F, C901/C1001/C1101/C1201, No.198, Kelian Road, Tianliao Community, Yutang Street, Guangming District, Shenzhen City, Guangdong Province, P.R. China 深圳市光明区玉塘街道田寮社区科联路 198 号普联外销厂房-101, 1 层-8 层、 C901、C1001、C1101、C1201
Testing Laboratory/测试实验室:	
Laboratory: 测试单位:	Guangzhou MCM Certification & Testing Co., Ltd. 广州邦禾检测技术有限公司
Address: 测试单位地址:	Building 2 No. 45 Zhong Er Section of Shiguang Road, Zhongcun Street, Panyu District, Guangzhou City, Guangdong Province, China. 中国 广东省广州市番禺区钟村街市广路钟二路段 45 号 2 栋
Testing Location: 测试实验室地址:	As above 同上
Test Standard/测试标准:	
Standard Used: 使用标准:	Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3 《试验和标准手册》 ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3
Deviation Description: 偏差描述:	None

Product Information/产品信息:

This battery is constructed with 2 lithium ion cells through 1S2P and has overcharge, over-discharge, over current and short-circuits proof circuit.
电池由 2 个电芯通过 1 串 2 并组成，含有过充、过放、过流和短路的保护线路。

Label/标签:



Technical Parameters/技术参数:

	Cell	Battery
Model 型号	CMICR18650F9	Tapo A100
Rated Capacity 额定容量	(mAh) 3350	6700
Nominal Voltage 标称电压	(V) 3.6	3.6
Standard Charge Current 标准充电电流	(mA) 975	Input: 1000
Standard Discharge Current 标准放电电流	(mA) 650	600
Maximum Charge Current 最大充电电流	(mA) 1625	Input: 2000
Maximum Discharge Current 最大放电电流	(mA) 4875	1000
Maximum Charge Voltage 最大充电电压	(V) 4.2	Input: 5.25
Cut-Off Voltage 放电截止电压	(V) 2.5	2.5

Remark/备注:

Revision 修改
Replaced the original Report SZLZ20230103U01-1, 2023.05.25 Issued
取代原报告 SZLZ20230103U01-1, 2023.05.25 签发

Test Conclusion 测试结论				
Clause 条款	Test item 测试项目	Sample No. 样品编号	Test Result 测试结论	Remark 备注
38.3.4.1	Altitude simulation 高度模拟	B1#~B8#	P	/
38.3.4.2	Thermal test 温度循环测试		P	/
38.3.4.3	Vibration 振动		P	/
38.3.4.4	Shock 冲击		P	/
38.3.4.5	External short circuit 外部短路		P	/
38.3.4.6	Impact 撞击	C1#~C10#	P	/
	Crush 挤压	/	N/A	/
38.3.4.7	Overcharge 过度充电	B9#~B16#	P	/
38.3.4.8	Forced discharge 强制放电	C11#~C30#	P	/
Ambient Temperature: 环境温度: 20 ± 5°C Receipt Date: 接收日期: 2023-01-03 Test Date: 测试时间: 2023-01-03 ~ 2023-01-17				
Test Conclusion/测试结论: The Tapo Battery Packs submitted by TP-Link Corporation Limited have passed the test items of Manual of Test and Criteria ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3. 由 TP-Link Corporation Limited 送检的锂离子电池组符合《试验和标准手册》ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3 的要求。 Seal: 检测专用章:				

Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3 《试验和标准手册》ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3			
Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
38.3.2	Scope 范围		P
	All cell types shall be subjected to tests T.1 to T.6 and T.8. 所有电芯类型应该进行 T.1 到 T.6 和 T.8。		N/A
	All non-rechargeable battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5. 所有不可充电电池，包括由测试合格的电芯组成的电池应该进行 T.1 到 T.5。		N/A
	All rechargeable battery types, including those composed of previously tested cells, shall be subjected to tests T.1 to T.5 and T.7. 所有可充电电池，包括由测试合格的电芯组成的电池应该进行 T.1 到 T.5，以及 T.7 的测试。		P
	In addition, rechargeable single cell batteries with overcharge protection shall be subjected to test T.7. 另外，有过充保护的的可充单电芯电池应该进行 T.7 的测试。		N/A
	A component cell that is not transported separately from the battery it is part of needs only to be tested according to tests T.6 and T.8. 不单独运输的作为配件的电芯进行 T.6 和 T.8 的测试。		P
	A component cell that is transported separately from the battery it is part of needs only to be tested according to tests T.1 to T.6 and T.8. 单独运输的作为配件的电芯进行 T.1 到 T.6，以及 T.8 的测试。		N/A
	A cell or battery that is an integral part of the equipment it is intended to power that is transported only when installed in the equipment may be in accordance with the applicable tests when installed in the equipment. 作为设备组成部分的用作设备电源的电芯或电池，如果只能在设备中运输，可按照装在设备中的适用测试要求进行试验。	Batteries may be shipped separately 电池可能单独运输	N/A
38.3.3(d)	Batteries or single cell batteries not equipment with battery overcharge protection that are design for use only as a component in another battery or in equipment, which affords such protection, are not subjected to the requirement of T.7. 未安装过充电保护装置、按设计要求只能在另一个带过充保护装置的电池组或设备中的电芯或单电芯电池，无需 T.7 试验。	With overcharge protection 带过充电保护装置	N/A

Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3 《试验和标准手册》ST/SG/AC.10/11/Rev.7/Amend.1, section 38.3			
Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
38.3.3(f)	When testing a battery assembly in which the aggregate lithium content of all anodes when fully charged, is not more than 500g, or in the case of a lithium battery, with a Watt-hour rating of not more than 6200Wh, that is assembled from batteries that have passed all applicable tests, one assembled battery in a fully charged state shall be tested under tests T3, T4 and T5, and in addition, test T7 in the case of a rechargeable battery. 当试验集成电池时，如果集成电池在完全充电时所有阳极的合计锂含量不大于 500g，或在锂离子电池组的情况下，额定瓦特-小时不超过 6200Wh 时，并且是用通过所有试验的电池集合而成的，须对一个完全充电状态的集成电池做试验 T.3、T.4 和 T5，另外，如果是可充电电池，则还需进行 T.7 试验。	Not battery assembly 非集成电池	N/A
38.3.3(g)	When batteries that have passed all applicable tests are electrically connected to form battery in which the aggregate lithium content of all anodes, when fully charged more than 500g, or in the case of a lithium ion battery, with a Watt-hour rating of more than 6200Wh, the assembled battery does not need to be tested if the assembled battery is of a type that has been verified as preventing: - Overcharge; - Short circuits; and - Over discharge between the batteries. 对于已通过所有适用试验的若干电池组成的集成电池，如在完全充电时所有阳极的总锂含量超过 500g，或在锂离子电池的情况下，如额定的瓦特-小时数超过 6200Wh 时，当集成电池如经过验证属于可防止下列情况，即无需进行试验： - 过充电； - 短路；且 - 电池之间的过放。	Not battery assembly 非集成电池	N/A
	For an assembled battery not equipped with overcharge protection that is designed for use only as a component in another battery, in equipment, or in a vehicle, which affords such protection: - the overcharge protection shall be verified at the battery, equipment or vehicle level, as appropriate, and - the use of charging systems without overcharge protection shall be prevented through a physical system or process controls. 用于未配备过充保护装置的集成电池，该集成电池仅作为提供过充保护的另一电池、设备或车辆的组件使用 -过充保护应在电池、设备或车辆级别进行验证 -应通过物理系统或过程控制来防止使用无过充保护的充电系统。		N/A
38.3.4	Procedure 程序		P

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Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
	Test T.1 to T.5 shall be conducted in sequence on the same cell or battery. 小型电芯或电池应按顺序进行试验 T.1 至 T.5。 Test T.6 and T.8 shall be conducted using not otherwise tested cells or batteries. 试验 T.6 和 T.8 应使用未试验过的电芯或电池。 Test T.7 may be conducted using undamaged batteries previously used in tests T.1 to T.5 for purpose of testing on cycled batteries. 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进行。	Complied. 符合	P
38.3.4.1	Altitude Simulation 高度模拟		P
	Test samples shall be stored at a pressure of 11.6kPa or less for at least six hour at ambient temperature (20±5°C). 试验电芯和电池在环境温度(20±5°C)下, 储存在小于等于 11.6kPa 的压力下至少 6 小时。		P
	Results: no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%. 试验结果: 无泄漏、无排气、无解体、无破裂、无着火和开路电压降不低于 90%。	See the TABLE: 38.3.4.1	P
	The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states. 测试电压的要求不适用于完全放电的电芯和电池。		N/A
38.3.4.2	Thermal Test 温度试验		P
	Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72±2°C, followed by storage for at least six hours at a test temperature equal to -40±2°C, The maximum time interval between test temperature extremes is 30 minutes, This procedure is to be repeated 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 12hours. 将电芯和电池在温度为 72±2°C 的条件下贮存不少于 6 个小时; 然后, 在温度-40±2°C 条件下贮存不少于 6 个小时; 两个温度间的间隔最长为 30min,重复操作上述步骤到 10 次; 然后, 在环境温度为 20±5°C 的条件下放置 24 个小时。 大电芯和大电池储存时间至少 12h。	6h applied on 72±2°C and -40±2°C	P
	Results: no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%. 试验结果: 无泄漏、无排气、无解体、无破裂、无着火和开路电压降不低于 90%。	See the TABLE: 38.3.4.2	P

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Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
	The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states. 测试电压的要求不适用于完全放电的电芯和电池。		N/A
38.3.4.3	Vibration 振动		P
	For cells and small batteries: from 7 Hz a peak acceleration of $1g_n$ is maintained until 18 Hz reached. The amplitude is then maintained at 0.8mm (1.6mm total excursion) and the frequency increased until a peak acceleration of $8g_n$ occurs (approximately 50Hz). A peak acceleration of $8g_n$ is then maintained until the frequency is increased to 200Hz. 对于电芯和小电池: 保持峰值加速度 $1g_n$, 从 7Hz 到 18Hz。然后振幅保持在 0.8mm (总偏移量为 1.6mm), 增加频率, 直到峰值加速度达到 $8g_n$ (约 50Hz)。然后保持 $8g_n$ 的峰值加速度, 直到频率增加到 200Hz。		P
	For large batteries: from 7 Hz to a peak acceleration of $1g_n$ is maintained until 18 Hz reached. The amplitude is then maintained at 0.8 mm (1.6 mm total excursion) and the frequency increased until a peak acceleration of $2g_n$ occurs (approximately 25 Hz). A peak acceleration of $2g_n$ is then maintained until the frequency is increased to 200 Hz. 对于大电池: 保持峰值加速度 $1g_n$, 从 7Hz 到 18Hz。然后振幅保持在 0.8mm (总偏移量为 1.6mm), 增加频率, 直到峰值加速度达到 $2g_n$ (约 25Hz)。然后保持 $2g_n$ 的峰值加速度, 直到频率增加到 200Hz。		N/A
	Results: no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%. 试验结果: 无泄漏、无排气、无解体、无破裂、无着火和开路电压降不低于 90%。	See the TABLE: 38.3.4.3	P
	The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states. 测试电压的要求不适用于完全放电的电芯和电池。		N/A
38.3.4.4	Shock 冲击		P
	Each cell shall be subjected to a half-sine shock of peak acceleration of $150g_n$ and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of $50g_n$ and pulse duration of 11 milliseconds. 每一个电芯应承受峰值加速度为 $150g_n$ 、脉宽为 6 毫秒的半正弦冲击。或者, 大电芯可以按峰值加速度为 $50g_n$ 、脉宽为 11 毫秒的半正弦冲击。		N/A

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Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
	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. 每个电池应承受的峰值加速度取决于电池的质量。小电池的脉宽应为 6 毫秒, 大电池的脉宽应为 11 毫秒。	6ms applied.	P
	- For small battery, smaller one of $150g_n$ or $\sqrt{100850/mass}$	150g _n applied.	P
	- For large battery, smaller one of $50g_n$ or $\sqrt{30000/mass}$		N/A
	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. 每一个电芯或电池在安装位置的 3 个垂直的轴向的正方向和负方向各进行 3 次冲击, 总共 18 次。		P
	Results: no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%. 试验结果: 无泄漏、无排气、无解体、无破裂、无着火和开路电压降不低于 90%。	See the TABLE: 38.3.4.4	P
	The requirement relating to voltage is not applicable to test cells and batteries at fully discharge states. 测试电压的要求不适用于完全放电的电芯和电池。		N/A
38.3.4.5	External Short Circuit 外部短路		P
	The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of $57\pm4^{\circ}\text{C}$, measured on the external case. 待测电芯或电池应加热一段时间, 以稳定均衡在 $57\pm4^{\circ}\text{C}$ 的温度, 并测量外壳上的温度。		P
	The exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. 小电芯或小电池的暴露/加热时间应至少为 6 小时, 大电芯或大电池的暴露/加热时间应至少为 12 小时。		P
	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. 然后, 在 $57\pm4^{\circ}\text{C}$ 下的电芯或电池应经受一次短路, 外部线路总的电阻小于 0.1 欧姆。	See the TABLE: 38.3.4.5	P

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Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
	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. 在电芯或电池外部外壳温度恢复到 $57\pm4^{\circ}\text{C}$ 后，短路状态继续持续至少一小时，或对于大电池的情况下，降至试验期间观察到的最大温升的一半，并保持在该值以下。		P
	The short circuit and cooling down phases shall be conducted at least at ambient temperature. 短路和冷却阶段应至少在环境温度下进行。		P
	Results: external case 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. 试验结果：外部温度不超过 170°C，试验期间和试验后 6 小时内，无解体、破裂或起火现象。	See the TABLE: 38.3.4.5	P
38.3.4.6	Test T.6: Impact, Crush 撞击, 挤压		P
38.3.4.6.2	Impact 撞击		P
	Applicable to cylindrical cells not less than 18.0 mm in diameter. 适用于直径不小于 18.0 mm 的圆柱型电芯。	Cylindrical cell, diameter is not less than 18.0mm 圆柱形电芯，直径不小于 18.0mm	P
	The test cell is placed on a flat smooth surface. A stainless steel bar (type 316 or equivalent) ($\varnothing 15.8 \text{ mm} \pm 0.1 \text{ mm}$, length: $\geq 60 \text{ mm}$ or of the longest dimension of the cell, whichever is greater) is placed across the centre of the test sample. 试验电芯放置平坦表面上。一根直径为 15.8 ± 0.1 毫米，长度至少 6 厘米（或该电芯的最大尺寸，以较大者为准）的 316 型不锈钢棒横放在样品的中心。		P
	A mass of $9.1 \text{ kg} \pm 0.1 \text{ kg}$ is dropped from a height of $61 \text{ cm} \pm 2.5 \text{ cm}$ at the intersection of the bar and the test sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. 一个重达 9.1 ± 0.1 千克的铁锤从 61 ± 2.5 厘米高处以几乎无摩擦和零拉力的姿态沿垂直轨道或通道跌落至不锈钢棒与样品的交结点上。		P
	The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the steel bar lying across the centre of the test sample. Each sample is to be subjected to only a single impact. 被撞击的测试样品的长轴平行于平面，并与横放在样品中心的不锈钢棒垂直，每只样品只经受一次撞击。		P
38.3.4.6.3	Crush 挤压		N/A

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Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
	Applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter. 适用于棱柱形、袋形、硬币/纽扣式电池和直径小于 18.0 mm 的圆柱型电芯。	Cylindrical cell, diameter is not less than 18.0mm 圆柱形电芯, 直径不小于 18.0mm	N/A
	A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5cm/s at the first point of contact. 在两个平面间对电芯或元件电芯进行挤压, 挤压在第一个接触点的速度约为 1.5cm/s。		N/A
	The crushing is to be continued until the first of the three options below is reached. (a) The applied force reaches 13kN±0.78kN; (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 100mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released. 直到发生下述三个条件中的任一条件: (a) 作用力达到 13kN±0.78kN; (b) 电芯电压下降至少 100mV; 或 (c) 电芯厚度和最初比较变形 50%以上。 一旦达到最大压力, 电压降超过 100 mV 或者电芯变形至少 50%, 压力应该解除。		N/A
	A prismatic or pouch cell shall be crushed by applying the force to the widest side. 棱形或袋装电芯应该在宽面施加挤压力 A button/coin cell shall be crushed by applying the force on its flat surface. 纽扣/硬币电芯应该在平面施加挤压力 For cylindrical cells, the crush force shall be applied perpendicular to longitudinal axis. 圆柱型电芯应该在长轴的垂直方向施加挤压力。		N/A
	Each test cell or component cell is to be subjected to one crushed only. The test sample shall be observed for a further 6h. The test shall be conducted using test cell or component cells that have not previously been subjected to others tests. 每一个测试的电芯或元件电芯只进行一次挤压, 测试后再观察 6h。用于测试的电芯或元件电芯之前没有进行过其它的测试。		N/A
38.3.4.6.4	Result of Impact and Crush / 撞击和挤压试验结果		P

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Clause 条款	Requirement + Test 要求+测试方法	Result - Remark 备注-结果	Verdict 判断
	Results: 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. 试验结果: 外部温度不超过 170°C, 试验期间和试验后 6 小时内, 无解体或起火现象。	See the TABLE: 38.3.4.6	P
38.3.4.7	Overcharge 过度充电		P
	Applicable to rechargeable lithium cell/battery with overcharge protection. 适用于具有过充电保护功能的可充电锂电芯/电池。	With overcharge Protection 带有过充保护功能	P
	The charge current shall be twice the manufacturers' recommended maximum continuous charge current. 充电电流应为制造商推荐的最大持续充电电流的两倍。	4.0A applied	P
	- 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. 制造商建议的充电电压不大于 18 伏时, 实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。	10.50V applied.	P
	- When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times maximum charge voltage. 制造商建议的充电电压大于 18 伏时, 实验的最小电压应是最大充电电压的 1.2 倍。		N/A
	Tests are to be at ambient temperature. The duration of the test shall be 24 hours. 测试在室温下进行, 测试时间为 24h。		P
	Results: there is no disassembly and no fire during the test and within seven days after this test. 试验结果: 试验期间和试验后 7 天内, 无解体或起火现象。	See the TABLE: 38.3.4.7	P
38.3.4.8	Forced Discharge 强制放电		P
	Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer. 在环境温度下, 将单个电芯连接在 12V 的直流电源上进行强制放电, 此直流电源提供给每个电芯的初始电流为制造厂指定的最大放电电流。		P
	Results: there is no disassembly and no fire during the test and within seven days after this test. 试验结果: 试验期间和试验后 7 天, 无解体或起火现象。	See the TABLE: 38.3.4.8	P

TABLE: 38.3.4.1 Altitude simulation 高度模拟							P
Sample No.	Before Test		After Test		Mass loss (%)	Residual OCV (%)	Results
	Mass(g)	OCV(V)	Mass(g)	OCV(V)			
Fully charged at first cycle							
B1#	112.963	4.18	112.963	4.18	0.000	100.00	O
B2#	113.068	4.18	113.068	4.18	0.000	100.00	O
B3#	112.985	4.18	112.985	4.18	0.000	100.00	O
B4#	113.033	4.18	113.033	4.18	0.000	100.00	O
Fully charged after 25 cycles							
B5#	113.016	4.18	113.016	4.18	0.000	100.00	O
B6#	113.047	4.18	113.047	4.18	0.000	100.00	O
B7#	112.959	4.17	112.959	4.17	0.000	100.00	O
B8#	112.942	4.18	112.942	4.18	0.000	100.00	O
Results: O = no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%							

TABLE: 38.3.4.2 Thermal test 温度试验							P
Sample No.	Before Test		After Test		Mass loss (%)	Residual OCV (%)	Results
	Mass(g)	OCV(V)	Mass(g)	OCV(V)			
Fully charged at first cycle							
B1#	112.963	4.18	112.938	4.12	0.022	98.56	O
B2#	113.068	4.18	113.045	4.13	0.020	98.80	O
B3#	112.985	4.18	112.956	4.12	0.026	98.56	O
B4#	113.033	4.18	113.010	4.12	0.020	98.56	O
Fully charged after 25 cycles							
B5#	113.016	4.18	112.989	4.12	0.024	98.56	O
B6#	113.047	4.18	113.013	4.12	0.030	98.56	O
B7#	112.959	4.17	112.928	4.12	0.027	98.80	O
B8#	112.942	4.18	112.918	4.12	0.021	98.56	O
Results: O = no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%							

TABLE: 38.3.4.3 Vibration 振动							P
Sample No.	Before Test		After Test		Mass loss (%)	Residual OCV (%)	Results
	Mass(g)	OCV(V)	Mass(g)	OCV(V)			
Fully charged at first cycle							
B1#	112.938	4.12	112.938	4.12	0.000	100.00	O
B2#	113.045	4.13	113.044	4.12	0.001	99.76	O
B3#	112.956	4.12	112.956	4.11	0.000	99.76	O
B4#	113.010	4.12	113.009	4.12	0.001	100.00	O
Fully charged after 25 cycles							
B5#	112.989	4.12	112.988	4.11	0.001	99.76	O
B6#	113.013	4.12	113.011	4.12	0.002	100.00	O
B7#	112.928	4.12	112.928	4.11	0.000	99.76	O
B8#	112.918	4.12	112.918	4.12	0.000	100.00	O
Results: O = no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%							

TABLE: 38.3.4.4 Shock 冲击							P
Sample No.	Before Test		After Test		Mass loss (%)	Residual OCV (%)	Results
	Mass(g)	OCV(V)	Mass(g)	OCV(V)			
Fully charged at first cycle							
B1#	112.938	4.12	112.937	4.11	0.001	99.76	O
B2#	113.044	4.12	113.044	4.12	0.000	100.00	O
B3#	112.956	4.11	112.954	4.11	0.002	100.00	O
B4#	113.009	4.12	113.009	4.11	0.000	99.76	O
Fully charged after 25 cycles							
B5#	112.988	4.11	112.987	4.11	0.001	100.00	O
B6#	113.011	4.12	113.011	4.11	0.000	99.76	O
B7#	112.928	4.11	112.928	4.11	0.000	100.00	O
B8#	112.918	4.12	112.916	4.12	0.002	100.00	O
Results: O = no leakage, no venting, no disassembly, no rupture, no fire, and the open circuit voltage drop not less than 90%							

TABLE: 38.3.4.5 External Short-circuit 外部短路				P
Sample No.	Ambient(°C) (At 57± 4°C)	Testing resistance (mΩ)	Max. External Temperature(°C)	Results
Fully charged at first cycle				
B1#	57.3	88.7	58.3	O
B2#	57.3	85.6	58.5	O
B3#	57.3	86.2	58.4	O
B4#	57.3	88.5	58.3	O
Fully charged after 25 cycles				
B5#	57.2	83.8	58.5	O
B6#	57.2	83.4	58.6	O
B7#	57.2	86.3	58.3	O
B8#	57.2	84.5	58.4	O
Results: O = no disassembly, no rupture, no fire during the test and within six hours after the test.				

TABLE: 38.3.4.6 Impact 撞击					P
TABLE: 38.3.4.6 Crush 挤压					N/A
Sample No.	Max. External Temperature(°C)	Results	Sample No.	Max. External Temperature(°C)	Results
50% of the design rated capacity at first cycle			50% of the design rated capacity after 25 cycles		
C1#	67.3	O	C6#	65.9	O
C2#	76.8	O	C7#	67.3	O
C3#	71.2	O	C8#	73.9	O
C4#	66.5	O	C9#	71.5	O
C5#	69.6	O	C10#	68.1	O
Results: O = no disassembly, no fire during the test and within six hours after this test.					

TABLE: 38.3.4.7 Overcharge 过度充电					P
The test current = 4.0A					-
The test voltage = 10.50V					-
Sample No.	OCV(V)	Results	Sample No.	OCV(V)	Results
Fully charged at first cycle			Fully charged after 25 cycles		
B9#	4.18	O	B13#	4.17	O
B10#	4.18	O	B14#	4.18	O
B11#	4.17	O	B15#	4.18	O
B12#	4.18	O	B16#	4.18	O
Results: O = no disassembly, no fire during the test and within seven days after this test.					

TABLE: 38.3.4.8 Forced discharge 强制放电					P
Sample No.	OCV(V)	Results	Sample No.	OCV(V)	Results
Fully discharged at first cycle			Fully discharged after 25 cycles		
C11#	3.126	O	C21#	3.136	O
C12#	3.133	O	C22#	3.128	O
C13#	3.134	O	C23#	3.126	O
C14#	3.130	O	C24#	3.133	O
C15#	3.128	O	C25#	3.132	O
C16#	3.136	O	C26#	3.127	O
C17#	3.132	O	C27#	3.132	O
C18#	3.125	O	C28#	3.129	O
C19#	3.133	O	C29#	3.131	O
C20#	3.134	O	C30#	3.126	O
Results: O = no disassembly, no fire during the test and within seven days after this test.					

Photos of the Battery 电池照片

Front view /前视图



Back view /后视图



Photos of the Cell 电芯照片

Front view /前视图



Side view /侧视图



-- End of Report --

Important Note
注意事项

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本检测报告仅对收到的样品负责。
7. The test items in this report are not in the scope of CMA. They do not have the impartial function.
本报告检测项目不在 CMA 范围内，不具备对社会证明作用。
8. As for the test results, "N/A" means "Not applicable", "P" means "Pass" and "F" means "Fail".
本检测结果中"N/A"表示“不适用”，“P”表示“通过”，“F”表示“不通过”。

Testing Lab.: Guangzhou MCM Certification & Testing Co., Ltd.

检测单位: 广州邦禾检测技术有限公司

Address: Building 2 No. 45 Zhong Er Section of Shiguang Road, Zhongcun Street, Panyu District, Guangzhou City, Guangdong Province, China.

地址: 中国 广东省广州市番禺区钟村街市广路钟二路段 45 号 2 栋

Tel/电话: +86-20-3477 7662 或 0086-020-3477 7662

Email/电子邮箱: service@mcmtek.com

Web/公司网址: <https://www.mcmtek.com>

锂电池 UN38.3 试验概要 Lithium Battery Test Summary

项目编号: SZLZ20230103UG01-2

单位信息 Company Information					
委托单位 Consignor		TP-Link Corporation Limited Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hong Kong 电话/Tel: 0755-26412682/82682 邮箱/Mail: shirley.hong@tp-link.com 网址/Website: /			
生产单位 Manufacturer		TP-Link Corporation Limited Room 901, 9/F., New East Ocean Centre, 9 Science Museum Road, Tsim Sha Tsui, Kowloon, Hong Kong 电话/Tel: 0755-26412682/82682 邮箱/Mail: shirley.hong@tp-link.com 网址/Website: /			
测试单位 Test Lab		广州邦禾检测技术有限公司 中国 广东省广州市番禺区钟村街市广路钟二路段 45 号 2 栋 电话/Tel: 0086-020-3477 7662 邮箱/Mail: service@mcmtek.com 网址/Website: https://www.mcmtek.com			
电池信息 Battery Information					
名称 Name	锂离子电池组 Tapo Battery Pack		电池/电芯类别 Battery/Cell Classification		锂离子电池 Li-ion Battery
型号 Type	Tapo A100		商标 Trademark		
额定电压 Normal Voltage	3.6V		额定容量 Rated Capacity		6700mAh
额定能量 Watt-hour rating	24.12Wh		外观/Appearance		黑色, 近棱柱形 Black, Nearly Prismatic
质量/Mass	113.06g		锂含量/Li Content		不适用 N/A
测试信息 Test Information					
测试报告编号 Test Report Number	SZLZ20230103U01-2		测试报告签发日期 Date of Test Report		2023-06-09
测试标准 Edition of UN Manual of Tests and Criteria Used	联合国《试验和标准手册》(第 7 版修订 1) 38.3 节 UN "Manual of Tests and Criteria" ST/SG/AC.10/11/Rev.7/Amend1/Subsection 38.3				
T.1: 高度模拟 Altitude Simulation	通过 Pass	T.2: 温度试验 Thermal Test	通过 Pass	T.3: 振动 Vibration	通过 Pass
T.4: 冲击 Shock	通过 Pass	T.5: 外部短路 External Short Circuit	通过 Pass	T.6: 撞击/挤压 Impact/Crush	通过 Pass
T.7: 过度充电 Overcharge	通过 Pass	T.8: 强制放电 Forced Discharge	通过 Pass	/	
UN38.3.3(f)	不适用 N/A		UN38.3.3(g)		不适用 N/A
签名 Signatory 职务 Title	 检验员		签发日期 Issued Date 2023-06-09		