



TEST REPORT

UL 2056

Outline of Investigation for Safety of Power Banks

Report Number..... : HK2302220164-SR-R01

Date of issue : 2023-05-10

Total number of pages : 24 pages

Testing Laboratory : Shenzhen HUAK Testing Technology Co., Ltd.

Testing location : 1-2/F., Building B2, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China

Applicant's name : LSAN Holdings LLC dba SunJack

Address : 701 S. Howard Ave, suite 106152, Tampa, FL 33606 United States

Test specification:

Standard : UL 2056 No.2 (11-03-2015)

Test procedure : Verification report

Non-standard test method..... : N/A

Test Report Form No : UL2056A

Test Report Form(s) Originator : HUAK

Master TRF : Dated 2018-09

Test item description..... : Lightstick (Mini)

Trade Mark..... : SunJack

Manufacturer : SunJack

Manufacturer : 701 S. Howard Ave, suite 106152, Tampa, FL 33606 United States

Model/Type reference : SJ-Q7M

Ratings..... : Input: 5VDC, 0.8A
USB-A Output: 5VDC, 1.2A
Typical Cell Capacity: 3.7V/2600mAh/9.6Wh

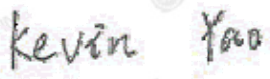

TRF No. UL2056A

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Testing procedure and testing location:		
<input checked="" type="checkbox"/>	Testing Laboratory:	Shenzhen HUAKE Testing Technology Co., Ltd.
Testing location/ address		1-2/F., B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Heping, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
<input type="checkbox"/>	Associated Laboratory:	
Testing location/ address		
	Tested by (name + signature).....:	Kevin Yao 
	Approved by (+ signature).....:	Dendi Wei 
<input type="checkbox"/>	Testing procedure: TMP	
Testing location/ address		
	Tested by (name + signature)	
	Approved by (+ signature)	
<input type="checkbox"/>	Testing procedure: WMT	
Testing location/ address		
	Tested by (name + signature)	
	Witnessed by (+ signature)	
	Approved by (+ signature)	
<input type="checkbox"/>	Testing procedure: SMT	
Testing location/ address		
	Tested by (name + signature)	
	Approved by (name + signature) :	
	Supervised by (name + signature)	
<input type="checkbox"/>	Testing procedure: RMT	
Testing location/ address		
	Tested by (name + signature)	
	Approved by (name + signature) :	
	Supervised by (name + signature):	

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List of Attachments (including a total number of pages in each attachment):

1, Photo attachments.(5 pages)

Summary of testing:

Clause(s)	Test(s)
8	General
8.4	TABLE: Abnormal Charging Test for model (battery)
8.5	TABLE: Abusive Overcharge Test for model (battery)
8.7/8.8	TABLE: Battery Pack Component Temperature Test and Battery Pack Surface Temperature Test
8.9	TABLE: Limited power sources
8.10	TABLE: Evaluation of voltage limiting components in SELV circuits
9	Power Input Test
10	Overload of Output Ports Test
12	Capacity Verification Test

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Copy of marking plate

The artwork below may be only a draft.

SunJack
Lightstick (Mini)
Model: SJ-Q7M
Input: 5VDC, 0.8A
USB-A Output: 5VDC, 1.2A
Typical Cell Capacity: 3.7V/2600mAh/9.6Wh
SunJack
701 S. Howard Ave, suite 106152, Tampa, FL 33606 United States

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Test item particulars

Classification of installation and use Lightstick (Mini)

Supply connection DC connector

Recommend charging method declared by the manufacturer..... Use the USB Micro to charge, and then charge with constant voltage at the ambient temperature of 20 °C ± 5 °C until the charging current drops to 200mA.

Maximum charge voltage 4.2VDC

Maximum charge current..... 1.3A

Specified final voltage 3.0V

Charging temperature upper limit..... 45°C

Charging temperature lower limit..... 0°C

Polymer cell electrolyte type..... gel polymer solid polymer N/A

Possible test case verdicts:

- test case does not apply to the test object..... : N/A
- test object does meet the requirement : P (Pass)
- test object does not meet the requirement..... : F (Fail)

Testing

Date of receipt of test item Feb. 02, 2023

Date (s) of performance of tests..... Feb. 02, 2023 to Mar. 02, 2023

General remarks:

The test results presented in this report relate only to the object tested.
 This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
 "(See Enclosure #)" refers to additional information appended to the report.
 "(See appended table)" refers to a table appended to the report.
Throughout this report a comma / point is used as the decimal separator.

Name and address of factory (ies) : Same as applicant

Remark:
 Revise the Model.

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Mar. 02, 2023	Not valid	Initial release
V2.0	May 10, 2023	May 10, 2023	Valid	Initial revision

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General product information:

1). The product covered in this report is a Lightstick (Mini) which is intended to use for mobile powering of low voltage electronic devices.

The rated capacity of the product is 2600mAh

2). The product has been evaluated according to UL 2054, except the test items in Clause 8 (details see page 3).

3). The product mainly composed of:

- Circuit Module
- Li-ion cell
- Enclosure
- Input port
- Output port

Built-in cell electrical parameter:

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Final Voltage
SJ-Q7M	2600mAh	3.7V	520mA	520mA	1300mA	1300mA	4.2V	3.0V



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UL2056			
Clause	Requirement + Test	Result - Remark	Verdict

CONSTRUCTION			P
7	General		P
7.1	Power banks shall comply with the requirements in the Standard for Household and Commercial Batteries, UL 2054.	Tested and complied.	P
7.2	The input port from external power supply is in general dc jack or USB port, and shall not be of the types described in 1.3.	DC connector used	P
7.3	If the built-in dc/dc converter circuitry generates voltage exceeding 42.4 Vac or 60 Vdc, this circuitry shall comply with the applicable requirements of either the Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1 or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.		N/A
7.4	For power banks with direct plug-in construction, the following shall be met.	Not direct plug-in construction.	N/A
	a) The power bank and its built-in ac/dc power supply shall comply with the applicable requirements of either the Standard for Information Technology Equipment-Safety-Part 1: General Requirements, UL60950-1 or the Standard for Audio/Video, Information and Communication Technology Equipment-Part 1: Safety Requirements, UL 62368-1.		P
	b) A barrier shall be provided between the built-in ac/dc power supply and built-in battery pack. The barrier shall comply with the requirements of electrical insulation and fire enclosure of either the Standard for Information Technology Equipment-Safety-Part 1: General Requirements, UL60950-1 or the Standard for Audio/Video, Information and Communication Technology Equipment-Part 1: Safety Requirements, UL 62368-1.		N/A

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UL2056			
Clause	Requirement + Test	Result - Remark	Verdict

PERFORMANCE			P
8	General		P
8.1	Unless otherwise superseded by a requirement in this Outline, power banks shall comply with the requirements of battery packs in the Standard for Household and Commercial Batteries, UL 2054.	Tested and complied.	P
8.2	For the Abnormal Charging Test and Abusive Overcharge Test in the Standard for Household and Commercial Batteries, UL 2054, 8.3 – 8.5 shall be followed.		P
8.3	The tests shall be conducted at the input point of battery protecting circuit. Note – This means dc/dc converter circuitry will be bypassed to result in battery overcharging, which is required for the evaluation of protecting circuit.		P
8.4	For the Abnormal Charging Test in the Standard for Household and Commercial Batteries, UL 2054, the following shall be taken as maximum current I _c : Rated maximum charging current of the built-in battery (rather than the power bank).	See appended table 8.4	P
8.5	For the Abusive Overcharge Test in the Standard for Household and Commercial Batteries, UL 2054, the C5 amp rate of the built-in battery (rather than the power bank) shall be taken for the purpose of this test.	See appended table 8.5	P
8.6	For the Battery Pack Component Temperature Test and Battery Pack Surface Temperature Test in the Standard for Household and Commercial Batteries, UL 2054, 8.7 and 8.8 shall be followed.		P
8.7	For output loading temperature test, a fully charged power bank shall be discharged. Any load of the output ports that can be operated at the same time shall be considered to result in maximum temperature rise.	See appended table 8.7/8.8	P
8.8	For input loading temperature test, a fully discharged power bank shall be charged in accordance with manufacturer's specifications. Any load of the output ports that can be operated at the same time shall be considered to result in maximum temperature rise.	See appended table 8.7/8.8	P

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UL2056			
Clause	Requirement + Test	Result - Remark	Verdict

8.9	Each output port shall be a limited power source in accordance with the Standard for Household and Commercial Batteries, UL 2054, the Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1, or the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1, or a Class 2 power source in accordance with the Standard for Class 2 Power Units, UL 1310.	See appended table 8.9	P
8.10	Each output port shall be a SELV circuit in accordance with the Standard for Information Technology Equipment – Safety – Part 1: General Requirements, UL 60950-1 or be an ES1 in accordance with the Standard for Audio/Video, Information and Communication Technology Equipment – Part 1: Safety Requirements, UL 62368-1.	SELV circuit, dc output rated less than 60Vdc.	P

9	Power Input Test		P
9.1	The current input to a power bank shall not exceed 110% of the marked input current rating of the power bank, when the power bank is operated under the conditions of maximum normal load.	See appended table 9	P
9.2	Maximum normal load shall consist of the maximum current draw while the power bank is operating in all possible modes. This may include charging the built-in battery, and output ports unloaded or loaded at the rated maximum normal load. Any load that can be operated at the same time shall be considered in order to obtain the maximum normal load.	Input load and output load can't be operated at the same time.	N/A

10	Overload of Output Ports Test		P
10.1	Each power output pin of output port shall be overloaded in accordance with 10.2 – 10.5.		P
10.2	In accordance with manufacturer's specifications, fully charge the built-in battery of power bank.		P
10.3	The power bank is covered with one layer of cheesecloth and placed on a softwood board covered with one layer of tissue paper.		P
10.4	Each power output pin of output port shall then be loaded to draw the maximum current, for at least 1 h.		P
10.5	After this test, the cheesecloth and tissue paper shall remain intact.	See table 10	P

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UL2056			
Clause	Requirement + Test	Result - Remark	Verdict

11	Flammability of Photovoltaic Cells Test		N/A
11.1	This test shall be conducted if the power bank is provided with integral photovoltaic cells as a power source.	No photovoltaic cells used.	N/A
11.2	In accordance with manufacturer's specifications, fully charge the built-in battery of the power bank.		N/A
11.3	The power bank is covered with one layer of cheesecloth and placed on a softwood board covered with one layer of tissue paper.		N/A
11.4	The power bank is subjected to single component fault that is likely to occur and which would result in flammability issue of the photovoltaic cells, such as back-feed of battery power, and is kept in this state for 1 h.		N/A
11.5	After this test, the cheesecloth and tissue paper shall remain intact.		N/A

12	Capacity Verification Test		P
12.1	The marked electrical capacity of power bank, measured at the power output pin of output port, shall comply with the Standard for Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes – Secondary Lithium Cells and Batteries for Portable Applications, IEC 61960, Clause 7.3.1, Discharge Performance at 20 °C (Rated Capacity), and the modified test method in 12.2.	See table 12	P
12.2	The power bank is discharged at a constant current equals to rated current of the output port, until its voltage is equal to the end-of-discharge voltage of the output port, specified by the manufacturer.		P

MARKINGS			P
13	General		P
13.1	Unless otherwise superseded by a requirement in this Outline, power banks shall comply with the requirements in the Standard for Household and Commercial Batteries, UL 2054.	See marking plate on page 4	P
13.2	For electrical ratings, the following information shall be provided	See marking plate on page 4	P
	a) Input rating in Vdc and A. If there are more than one input ports, the rating of each port shall be provided;	Input rating of input port provided.	P

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UL2056			
Clause	Requirement + Test	Result - Remark	Verdict
	b) Output rating in Vdc and A. If there are more than one output ports, it shall include rating of each port and the combined rating (if it is not equal to the summation of all ports); and	Output rating of output port marked.	P
	c) Electrical capacity in Ah or mAh. If there are more than one output ports/output ratings, either the capacity of each port/rating shall be provided, or the minimum capacity of these ports/ratings shall be provided.	Capacity of output marked.	P

INSTRUCTIONS			P
14	General		P
14.1	Power banks shall be provided with legible instructions pertaining to the proper selection and replacement of its power supply or charger.	User manual provided.	P
14.2	Power banks shall be provided with legible instructions pertaining to a risk of fire or injury to persons associated with the use of the product.	User manual provided.	P
14.3	An illustration is allowed with a required instruction to clarify the intent but shall not replace the written instruction.	No related illustration in the user manual	N/A

15	Instructions Pertaining to Risk of Fire or Injury to Persons		P
15.1	Instructions pertaining to a risk of fire or injury to persons shall warn the user of reasonably foreseeable risks and state the precautions to be taken to reduce such risks. Such instructions shall be preceded by the heading "INSTRUCTIONS PERTAINING TO RISK OF FIRE OR INJURY TO PERSONS" or the equivalent.	User manual provided.	P
15.2	Unless otherwise indicated, the text of the instructions in 15.4 shall be in the words specified or words that are equivalent, clear, and understandable. Substitution of the signal word "DANGER" for "WARNING" is allowed when the risk associated with the product is such that a situation exists which, if not avoided, will result in death or serious injury.	User manual provided.	P
15.3	Numbering of the items in the list in 15.4 and including other instructions pertaining to a risk of fire or injury to persons that the manufacturer determines to be necessary and that do not conflict with the intent of the instructions are acceptable.	User manual provided.	P

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15.4	<p>The instructions pertaining to a risk of fire or injury to persons shall include those items in the following list that are applicable to the product. The statement "IMPORTANT SAFETY INSTRUCTIONS" or the equivalent shall precede the list, and the statement "SAVE THESE INSTRUCTIONS" or the equivalent shall either precede or follow the list. The word "WARNING" shall be entirely in upper case letters or shall be emphasized to distinguish it from the rest of the text.</p> <p>IMPORTANT SAFETY INSTRUCTIONS</p> <p>WARNING – When using this product, basic precautions should always be followed, including the following:</p> <ul style="list-style-type: none"> a) Read all the instructions before using the product. b) To reduce the risk of injury, close supervision is necessary when the product is used near children. c) Do not put fingers or hands into the product. d) Do not expose power bank to rain or snow. e) Use of a power supply or charger not recommended or sold by power pack manufacturer may result in a risk of fire or injury to persons. f) Do not use the power bank in excess of its output rating. Overload outputs above rating may result in a risk of fire or injury to persons. g) Do not use the power bank that is damaged or modified. Damaged or modified batteries may exhibit unpredictable behavior resulting in fire, explosion or risk of injury. h) Do not disassemble the power bank. Take it to a qualified service person when service or repair is required. Incorrect reassembly may result in a risk of fire or injury to persons. i) Do not expose a power pack to fire or excessive temperature. Exposure to fire or temperature above 100°C may cause explosion. The temperature of 100°C can be replaced by the temperature of 212°F. j) Have servicing performed by a qualified repair person using only identical replacement parts. This will ensure that the safety of the product is maintained. k) Switch off the power bank when not in use. <p>SAVE THESE INSTRUCTIONS</p>	User manual provided.	P
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	APPENDIX A		P
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	<p>Standards for Components</p> <p>Standards under which components of the products covered by this outline of investigation are evaluated include the following:</p> <p>Title of Standard – UL Standard Designation</p> <p>Automatic Electrical Controls for Household and Similar Use, Part 1: General Requirements – UL 60730-1</p> <p>Low-Voltage Fuses – Part 1: General Requirements – UL 248-1</p> <p>Low-Voltage Fuses – Part 14: Supplemental Fuses – UL 248-14</p> <p>Marking and Labeling Systems – UL 969</p> <p>Polymeric Materials – Use in Electrical Equipment Evaluations – UL 746C</p> <p>Printed-Wiring Boards – UL 796</p> <p>Tests for Flammability of Plastic Materials for Parts in Devices and Appliances – UL 94</p> <p>Thermal-Links – Requirements and Application Guide – UL 60691</p> <p>Thermistor-Type Devices – UL 1434</p>		P
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TABLE: Critical components information					P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity
Plastic enclosure	Mitsubishi Engineering- Plastics Corporation	M7025L2	V2.130	UL94	UL E53664
PCB	Shenzhen JLC Technology Group Co.,Ltd.	KB6160A	tg135	UL94	E123995
Internal wire	DONGGUAN SHUNSHUNFA WIRE & CABLE CO LTD	AWM1007	22AWG, VW-1 Tmax: 80C Vmax: 300Vac	UL758	UL E487181
Battery cell	JIANGXI FAR EAST BATTERY CO LTD	18650	3.7V, 2600mAh	UL1642, UL2580	MH48852, MH64480

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UL2056			
Clause	Requirement + Test	Result - Remark	Verdict

8.4	TABLE: Abnormal Charging Test					P
Ambient temperature: 22.7°C						
Id	1.3			A		
Ue	3.0			V		
Ic	3.9			A		
Uc	5.0			V		
Sample No.	1#	2#	3#	4#	5#	
Cell Case temp. (°C)	57.8	57.5	57.4	57.8	57.6	
POWER BANK surface temp. (°C)	44.2	44.3	44.1	44.3	42.0	
Faulted Protective Device	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	
Supplementary information: 1) Test Charging current is $3 \times I_{max}(1.3) = 3.9A$. 2) Charge until the power bank fully charged plus additional 7hrs. -No explosion or fire, or chemical leak.						

8.5	TABLE: Abusive Overcharge Test					P
Ambient temperature: 22.7°C						
Sample No.	6#	7#	8#	9#	10#	
Ic(A)	1.3	1.3	1.3	1.3	0.65	
Cell Case temp. (°C)	72.7	75.0	72.8	72.1	72.2	
POWER BANK surface temp. (°C)	52.6	52.8	53.3	53.2	52.9	
Faulted Protective Device	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	U4 pin 3 to pin 4 short circuit	
Supplementary information: 1) Test current is 10 times C5 for 4pcs and 5 times C5 for 1pc. 2) Charge until protective device operated, reset 10 times before stop the test at test current of 100A. -No explosion or fire.						

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UL2056			
Clause	Requirement + Test	Result - Remark	Verdict

8.7/8.8	TABLE: Battery Pack Component Temperature Test and Battery Pack Surface Temperature Test	P
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Power bank Component Temperature Test

Sample No.	11#				12#				Limited T	
	Charging)		Discharging		Charging		Discharging		Charging	Discharging
PCB near U1	89.5	89.9	87.5	87.5	89.1	89.6	89.6	89.9	130	130
Type-C port	73.2	73.6	72.4	72.4	72.3	72.8	71.5	71.8	--	--
Cell body	79.5	79.9	78.0	78.0	77.3	78.8	77.6	77.9	--	--
Enclosure inside	69.3	69.7	68.1	68.1	69.3	69.8	68.5	68.8	80	80
Ambient	44.6	45.0	55.0	55.0	44.5	45.0	54.7	55.0	--	--

Power bank Surface Temperature Test

Sample No.	11#				12#				Limited T	
	Charging		Discharging		Charging		Discharging		Charging	Discharging
Enclosure outside	67.5	67.9	66.4	66.6	67.2	67.2	67.2	67.3	75	75
Ambient	44.6	45.0	54.8	55.0	45.0	45.0	54.9	55.0	--	--

Supplementary information:
 1) Input temperature test: Charging: 5VDC, 0.8A
 2) Output temperature test: Discharge: 5VDC, 1.2A
 -Component & surface temperature not exceed the limits.
 *The test temperature was actual test ambient temperature.

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Clause	Requirement + Test	Result - Remark	Verdict

8.9	TABLE: Limited power sources					P
USB: Circuit output tested:						
Note: Measured Uoc (V) with all load circuits disconnected:						
Components	Sample No.	Uoc (V)	Isc (A)		VA	
			Meas.	Limit	Meas.	Limit
Normal condition	13#	5.07	1.79	8	6.3	100

8.10	TABLE: Evaluation of voltage limiting components in SELV circuits			P
Component (measured between)		max. voltage (V) (normal operation)		Voltage Limiting Components
		V peak	V d.c.	
Power bank directly output (+) to (-)		--	5.07	--
Fault test performed on voltage limiting components		Voltage measured (V) in SELV circuits (V peak or V d.c.)		
--		--		
supplementary information:				
Directly measured on the fully charged Power bank output.				

9	TABLE: Power Input Test			P
U (V)	Prated (W)	P (W)	Condition/status	
5.0	4.0	2.5	POWER BANK charging with fully discharged battery inside.	
Supplementary information:				
1) The Input load and output loads can't be operated at the same time.				
- The input to power bank not exceed 110% of the marked input current rating.				

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Clause	Requirement + Test	Result - Remark	Verdict

10	TABLE: Overload of Output Ports Test					P
	Ambient temperature (°C)				22.3	—
	Power source for EUT: Manufacturer, model/type, output rating				See cover page	—
Component No.	Fault	Supply voltage (V)	Test time	Current drawn (A)	Observation	
USB A Output	Overload	5.0	1.5h	2.1	NC, NT	
Test results:						Verdict
- Chemical leaks					No	P
- Explosion of the battery					No	P
- Emission of flame or expulsion of molten metal					No	P
- Electric strength tests of equipment after completion of tests					Yes	P
- cheesecloth and tissue paper shall remain intact					NC, NT	P
Supplementary information: NC = Cheesecloth remain intact YC = Cheesecloth charred or flamed NT = Tissue paper remained intact YT = Tissue paper charred or flamed						

11	TABLE: Flammability of Photovoltaic Cells Test					N/A
	Ambient temperature (°C)					—
	Power source for EUT: Manufacturer, model/type, output rating					—
Component No.	Fault	Supply voltage (V)	Test time	Current drawn (A)	Observation	
Test results:						Verdict
- Chemical leaks						
- Explosion of the battery						
- Emission of flame or expulsion of molten metal						
- Electric strength tests of equipment after completion of tests						
- cheesecloth and tissue paper shall remain intact						

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Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:
 NC = Cheesecloth remain intact
 YC = Cheesecloth charred or flamed
 NT = Tissue paper remained intact
 YT = Tissue paper

12	TABLE: Capacity Verification Test					P
Ambient temperature: 22.9°C						
Output						
Sample No.	26#	27#	28#	29#	30#	
Discharge Power (W) (USB Output)	10	10	10	10	10	
Capacity (Ah) (USB Output)	1.3	1.2	1.1	1.2	1.2	
Rated capacity (Ah)	2.6Ah					
Supplementary information: - Marked capacity verified and complied.						

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Photo attachments:

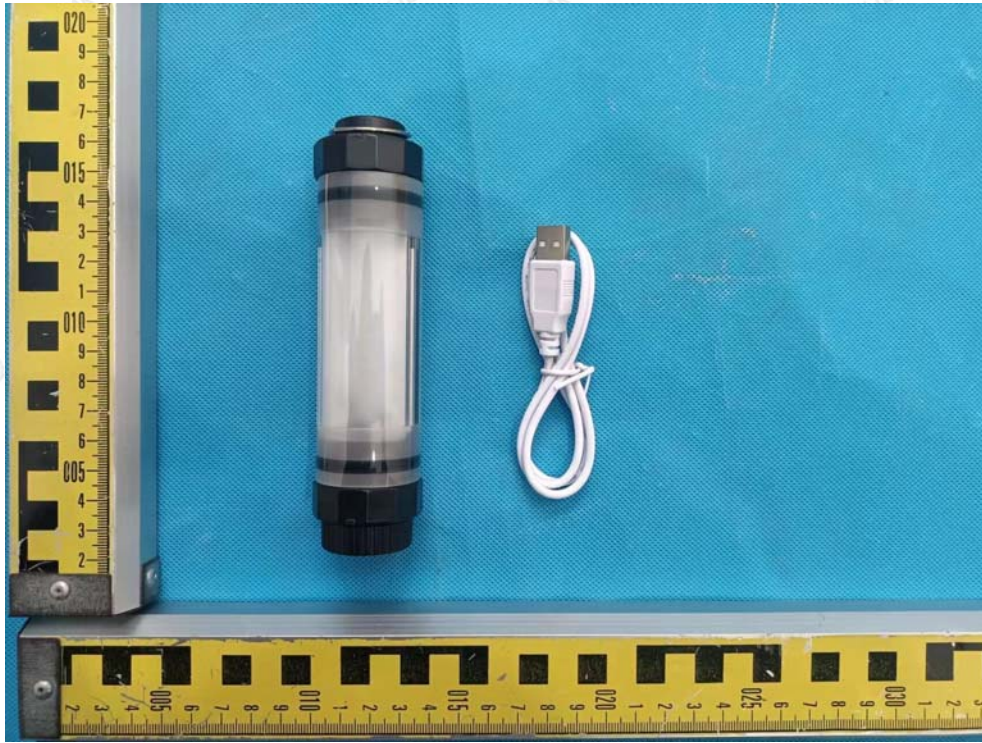


Photo 1: Overall view



Photo 2: Overall view

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Photo 3: Overall view



Photo 4: Overall view

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Photo 5: Overall view



Photo 6: Overall view

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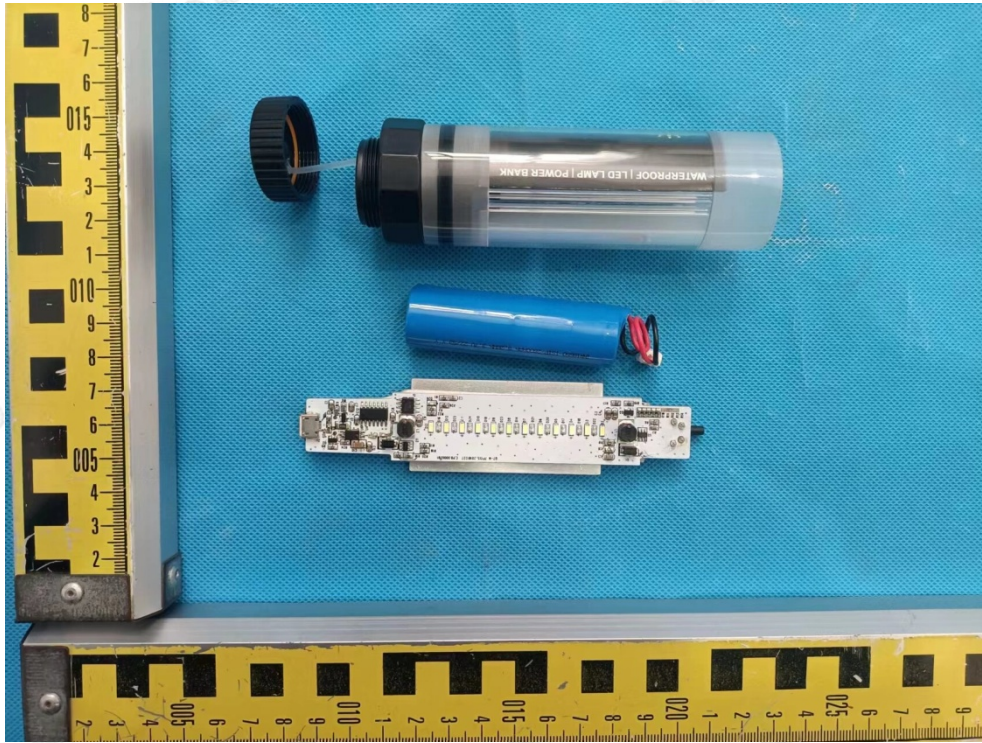


Photo 7: Overall view

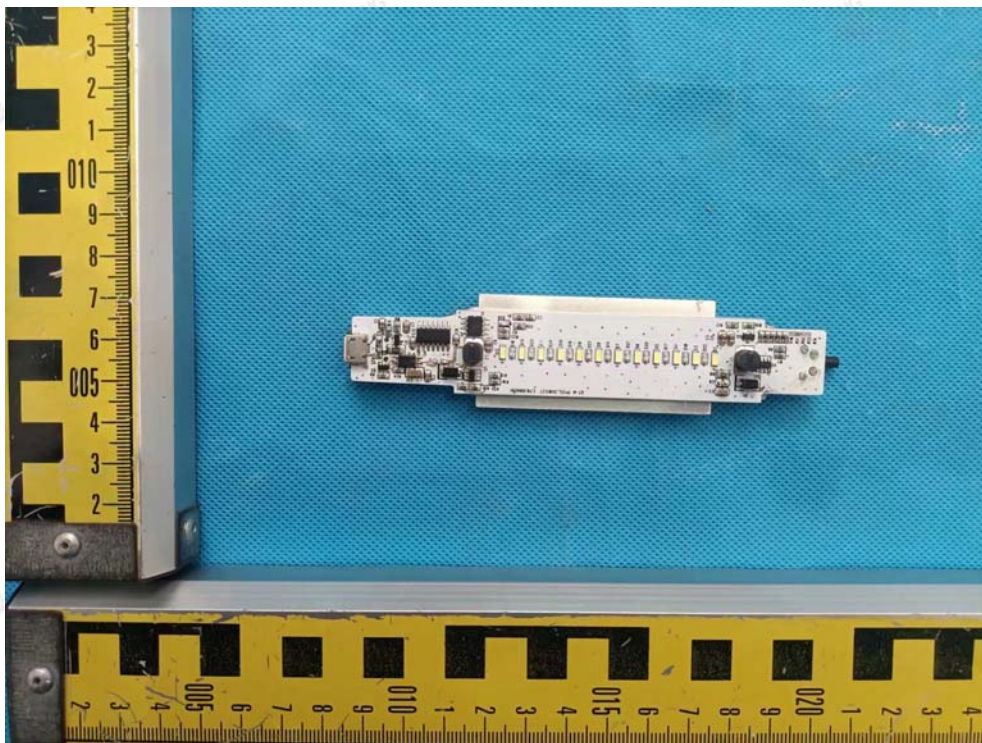


Photo 8: Internal view

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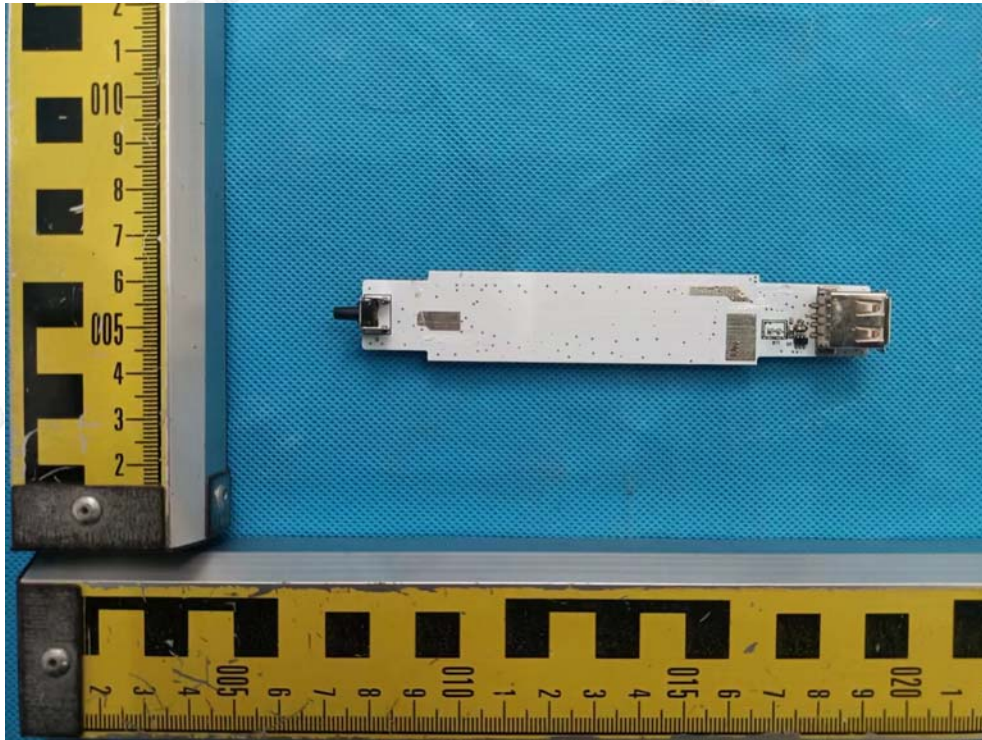


Photo 9: PCB view

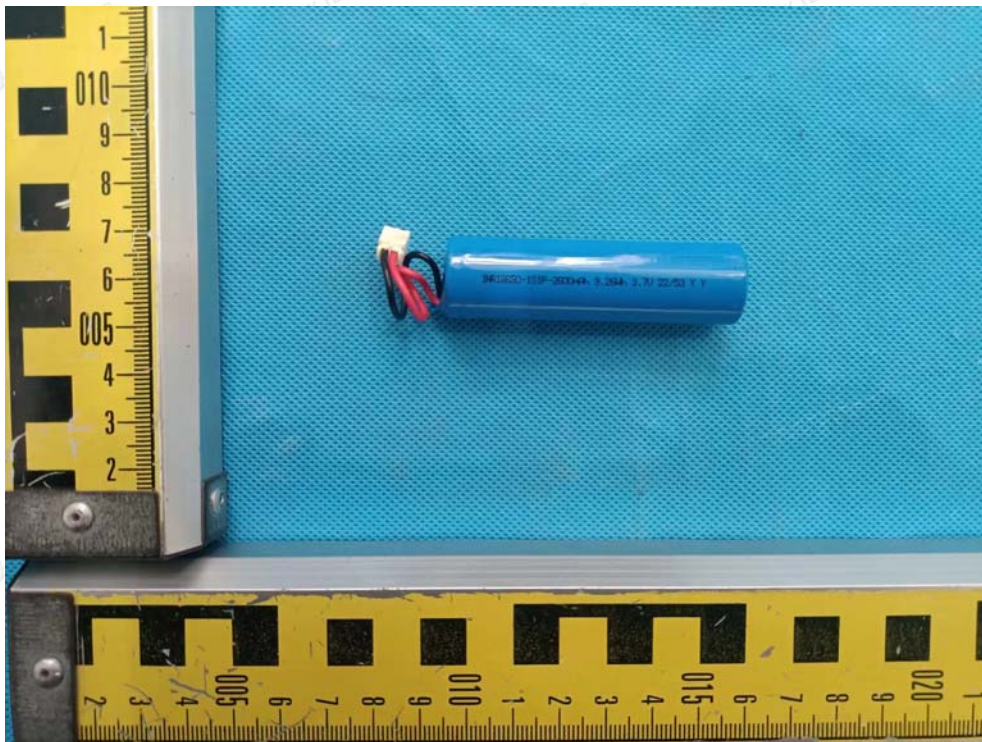


Photo 10: Battery view

-----End of report-----

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