APPLICATION REPORT

On Behalf of

SHENZHEN LANGHENG ELECTRONIC CO., LTD.

Li-ion Battery

Model: ARB-L16-700

Prepared For : SHENZHEN LANGHENG ELECTRONIC CO., LTD.

8/F 2nd Building, Dong Fang Ming Industrial Center, 33rd District,

Bao'an, Shenzhen 518133, China

Prepared By : Shenzhen LCS Compliance Testing Laboratory Ltd.

1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an

District, Shenzhen, Guangdong, China

Date of Test : April 15, 2016 - May 07, 2016

Date of Report : May 07, 2016

Report Number : LCS1604282385S

7	TES	Battery	Rep	ort	
IE	C162	133920	12(2 ⁿ	d Edition))

Report reference No	LCS1604282385S
3	
Tested by (+ signature)	Rick Zhu
Approved by (+ signature)	Hart Qiu
Contents	27 pages
Date of issue	May 07, 2016
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.
Address	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China
Testing location	. Same as above
Address	Same as above.
Applicant's Name	SHENZHEN LANGHENG ELECTRONIC CO., LTD.
Address	8/F 2nd Building, Dong Fang Ming Industrial Center, 33rd District, Bao'an Shenzhen 518133, China
Standard	IEC 62133: 2012(2 nd Edition)
Test procedure	Type Approval
Procedure deviation	N/A
Non-standard test method	N/A
Manufacturer	. SHENZHEN LANGHENG ELECTRONIC CO., LTD.
Address	8/F 2nd Building, Dong Fang Ming Industrial Center, 33rd District, Bao'an Shenzhen 518133, China
Fest item description	Li-ion Battery
Frade Mark	FENIX
Model/type reference	ARB-L16-700
Ratings	. 3.7V, 700mAh, 2.59Wh
Classification	Li-ion Battery
Dimension	Ф16.6mm×33.5mm
Shape	cylindrical
Mass of apparatus	17.0g

Possible test case verdicts:	es has hes
Test case does not apply to the test object	N/A
Test item does meet the requirement	P(ass)
Test item does not meet the requirement	F(ail)
Testing:	BES BES BES
Date of receipt of test item :	April 15, 2016
Date(s) of performance of test :	April 15, 2016 – May 07, 2016

General remarks:

"(see remark #)" refers to a remark appended to the report,

"(see appended table)" refers to a table appended to the report,

Throughout this report a piont is used as the decimal separator,

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 testing laboratory,

Clause numbers between brackets refer to clauses in IEC 62133(Optional remark).

General product information:

The battery, model no.: ARB-L16-700 is used in portable applications and consists of one Li-ion cell, the cell model no.: ICR16340;

The cells and batteries have been tested and evaluated according to their specified working conditions (as given below), which are provided by client;

Details information of the battery and the cell built in the battery, as following:

Product	Li-ion Cell	Li-ion Battery
Model No.	ICR16340	ARB-L16-700
Nominal voltage	3.7V	3.7V
Rated capacity	700mAh	700mAh
Charge method	0.5C constant current charge to 4.2V, then constant voltage until the charge current decrease to 0.02C.	0.2C constant current charge to 4.2V, then constant voltage until the charge current decrease to 0.02C.
Max. Charging Current	700mA	700mA
Max. Charging voltage	4.2V	4.2V
End of discharge voltage	2.75V	2.75V
Dimension	Ф16.4mm×30.8mm	Ф16.6mm×33.5mm
Weight	15.7g	17.0g
Lower charge temperature	Tes Tes	0°C
Upper charge temperature	Tes Tes	45 ℃

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Tests Performed (name of test and test clause):

Tests are made with the number of samples specified in Table 2 of IEC 62133:2012(2nd Edition).

Test items:

Cl.6 type test conditions

Cl.8.1 Charging procedures for test purposes

Cl.8.2.1 Continuous charging at constant voltage (cells)

Cl.8.2.2 Moulded case stress at high ambient temperature (battery)

Cl.8.3.1 External short circuit(cell)

Cl.8.3.2 External short circuit(battery)

Cl.8.3.3 Free fall

Cl.8.3.4 Thermal abuse (cells)

Cl.8.3.5 Crush(cells)

Cl.8.3.6 Over-charging of battery

CI.8.3.7 Forced discharge(cells)

Cl.8.3.8 Transport

CI.8.3.9 Forced internal short circuit(cells)

Testing Location:

1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China

Test conclusion:

The Li-ion Battery submitted by SHENZHEN LANGHENG ELECTRONIC CO., LTD. are tested according to IEC 62133: 2012(2nd edition) Secondary cells and batteries containing alkaline or other non-acid electrolytes Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications.

Version	Report No.	Revision Data	Summary	
V1.0	LCS1604282385S	Real Re	Original Version	

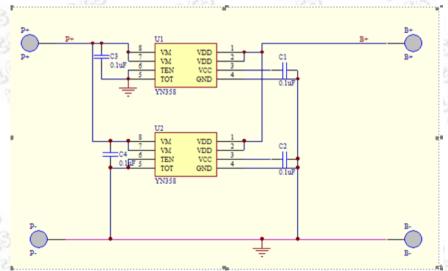
Test result: Pass.

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Copy of marking plate:



Circuit diagram:



Critical components information :

25	4 23		- 6			
Item	Reference	Туре	Amount	Number	Manufacturer	Remark
13	IC G	YN358	2	U1, U2	Everbright	(B-
2	Capacitor	0.1UF/25V/0603	4	C1, C2 C3, C4	SAMSUNG	1 <u>63</u>
3	РСВ	100Ω±5%/0603	1,651	7.63	ne3	65

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-8	IEC 62133: 2012	USS (SS)	0.20
Clause	Requirement – Test	Result – Remark	Verdict
5	General safety considerations	163	Р
185	Cells and batteries subject to intended use be safe and continue to function in all respects	Refer to the following clauses.	Р
Re	Cells and batteries subject to reasonably foreseeable misuse do not present significant hazards.	Refer to the following clauses.	3 P
5.2	Insulation and wiring	is Bas B	Р
S S	–Insulation Resistance between an accessible metal case (excluding electrical contacts) and positive terminals $\geq 5 M \Omega.$	LES LES	N/A
1.63 1.63	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements	See tests of clause 8.	Р
Res Res	Orientation of wiring maintains adequate creepage and clearance distances between conductors. Mechanical integrity of internal connections is sufficient to accommodate conditions of reasonably foreseeable misuse.	See tests of clause 8.) В 23
5.3	Venting	35 (35	P
, ,3 ,33 ,33	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition.	163 163 163 163	LES LPS
LES LES	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation no inhibit pressure relief.	Res Res	N/A
5.4	Temperature/voltage/current management	LES LE	Р
B	The batteries are designed such that abnormal temperature rise conditions are prevented.	33 463	SS P
3	Means is provided to limit current to safe levels during charge and discharge.	35 35 35 35 35 35	Р
કુઇ દુઉડ સ્ટિડિ	The batteries are designed such that within temperature, voltage and current limits specified by the cell manufacturer.	LES LES	Р
RES RES	Batteries provided with specifications and charging instructions for equipment manufacturers so that associated chargers are designed to maintain charging within the temperature, voltage and current limits specified;	See battery specifications;	P
5.5	Terminal contacts	Bee B	Р
3 23	Terminals have a clear polarity marking on the external surface of the battery	"+" for positive polarity and "-" for negative polarity marking on the label near the terminal	LES LES

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2	P. C. 1923	IEC 62133: 2012	(B) (B)	CS.
Clause	Requirement – Test	133	Result – Remark	Verdict
LCS.	The size and shape of the termi they can carry the maximum an		163 163	Р
REE	External terminal contact surfact conductive materials with good corrosion resistance.		Reg Reg	P
6	Terminal contacts are arranged short circuits.	to minimize the risk of	3 33	33 P
) (3) (3)	the external connector prevents connections, Battery packs with connectors designed for connectors products need not be marked w	keyed external ction to specific end	LES LES LES LES	163 183
5.6	Assembly of cells into batteries	3 33	Single cell battery	Р
5.6.1	Cells used in the battery assem matched capacities, are of the sthe same chemistry and same r	same design, and are of	162 163 163 163	N/A
Ba	The battery incorporates separately cell reversal from uneven charg designed for the selective discharges connected cells.	es as the pack is	3 <u>1</u> 63 3 <u>1</u> 63 43 <u>1</u> 63	N/A
5.6.2	Design recommendation for lith	ium system only	183	Р
83. 83. 83.	The voltage of each cell or each parallel-connected plural cell, sh 4.20V, excepting the case where devices or the likes have the eq	nould not exceed e the portable electronic	IGS IGS	N/A
982	Considered at the battery pack designer:	level and by the device	See below;	Р
B	- for the battery consisting of a scellblock	single cell or a single	3 133 13	N/A
	- for the battery consisting of se single cells or series-connected recommended that the voltages single cells or single cellblocks upper limit of the charging volta 4, by monitoring the voltage of single cellblocks;	plural cellblocks, it is s of any one of the does not exceed the age, specified in Table	163 163 163 163 163 163 163 163	N/A
Res Res	- for the battery consisting of se single cells or series-connected recommended that charging is upper limit of the charging volta one of the single cells or single measuring the voltage of every cellblocks.	plural cellblocks, it is stopped when the age is exceeded for any cellblocks by	BEST LESS	N/A
5.7	Quality plan	1300	33 350	BEP
35	The manufacture has prepared the procedures for the inspectio		The manufacturer has ISO 9001:2008 certificate and such	Р

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35	IEC 62133: 2012	(B) (B)	3.03
Clause	Requirement – Test	Result – Remark	Verdict
Reg.	components, cells and batteries and which covers the process of producing each type of cell and battery.	quality plan.	33 13

6	Type test conditions	Read Rea	Р
3	Tests were conducted with the number of cells or batteries as outlined in Table 2 of IEC 62133 with cells or batteries that were not more than six months old.	Tests are made with the number of batteries specified in Table 2. battery are not more than six months old.	33 33P 33S
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C \pm 5°C.	Tests are carried out at $20^{\circ}\text{C} \pm 5^{\circ}\text{C}$.	P

7 35	Specific requirements and tests (nickel systems)	135 GS	N/A
7.1	Charging procedure for test purposes	1,65	N/A
7.2	Intended use	165 16	N/A
7.2.1	Continuous low-rate charging (cells)	The Contract of the Contract o	N/A
3	Fully charged cells are subjected for 28 days to a charge as specified by the manufacturer.	35 <u>1</u> 35	(CS
33	Results: No fire. No explosion	185 185	N/A
1000			100

Sample No.	Model	Recommen ded Charging Method, CC, CV, or CC/CV	Recommend ed Charging Voltage Vc, Vdc	Recommended Charging Current Irec, mA	OCV at Start of Test, Vdc	Results
- B	50 - 1	ردي	130	1352	35 - ·	(CS
j - 7	33	350	B 30	B. C. S.	PGD_	13.62
§ -	300	1000	160	1133	1300 B	PRO
<u> </u>	1.33	W-CS	-0.33	<u> </u>	<u>us</u>	100
132	133	200	- 133	- (3	<u> </u>	-300

- NF: No Fire

- NE: No Explosion

- NL: No Leakage
- Fire: the emission of flames from a cell or battery.
 Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.
- Leakage: visible escape of liquid electrolyte.

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50	183	IEC 62133: 2012	(3)	3.23
Clause	Requirement – Test	183	Result – Remark	Verdict

7.2.2	Vibration	CES CES	(3)	N/A
vibration s 62133:201 maximum varied at t and 55 Hz Hz) and re		cells or batteries are subjected to a cence as outlined in Table 3 of IEC th amplitude of 0.76 mm and a total arsion of 1.52 mm. The frequency was ate of 1 Hz/min between the limits of 10 Hz e entire range of frequencies (10 Hz to 55 (55 Hz to 10 Hz) was traversed in 90 min mounting position.	163 163 163 163 163 163	N/A
300	Results: No fire	e. No explosion. No leakage	્રિક્ટ (હુડ	N/A
Sample No). <u>1</u> 60	OCV at Start of Test, Vdc	Results	0.6
Res	- 700	165 - 1655	1,65	0
Rec	3 Bar	S Res - Res	(C) +(C)	
120	er Gr	3 153 - 1553	Bes -Bes)
I.	(2 3	163 165 115 115 115 115 115 115 115 115 115	Res - Re	, O
	23	3 3	3 300 - 1	GC.
3	- CS	(3)	28 3 -	300
ટુર્ક	- 7.63	(63 - 63	23 ×23-	BOS
(3)	- 135	163 -163	183 38 5	Post Contraction of the Contract
Bass	- 735	1,65 - 1,63	ics is	130
Bess	B.G.S	163 - 163	TES TES	13

- No Fire or Explosion No Leakage Leakage

- Fire
- Explosion Bulge
- Other (Please Explain)

Ch. Lander	A 10/0/	(28)		100
7.2.3	Moulded case stress at high ar	mbient temperature	Bee	N/A
7.00 7.00 7.00 7.00	Fully charged batteries were poven at a temperature of 70°C	133	N/A	
	Results: No physical distortion of the battery casing resulting in exposure if internal components		LES .	N/A
Sample No.	Les Les	183 - 18	35 USS	- <u>1</u> (3)
Status	Res - Res	133 - 1	SS CE	j - 183
supplemer	ntary information:	160	160	35 (3)

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		IEC 62133: 2012		
Clause	Requirement – Test	1,65	Result – Remark	Verdict

- No Fire or ExplosionNo Leakage
- Leakage
- Fire
- Explosion
- Bulge
- Other (Please Explain): No physical distortion of the battery casing resulting in exposure if internal components

7.2.4	Temperature cycling				N/A
183 183	Fully charged cells or batteries are subjected to temperature cycling (-20 °C, +75 °C), in forced draught chambers. After the fifth cycle, the cells or batteries were stored for 24h prior to examination. Results: No fire. No explosion. No leakage.				
3					
Sample No.	13 - V	5 -43	103	Tes.	Bigg
Results	C3 - 5	3 - 5	3 -13-25	3 500	Tes
Sample No.	(CS -)	C3 - 5	S - 1	3 - 5 B	100
Results	~C3-	(CS -	cs - 5	(S) - 5 (S)	3 - 3

- No Fire or Explosion No Leakage
- Leakage
- Fire
- Explosion
- Bulge
- Other (Please Explain)

7.3	Reasonably for	reseeable misuse	C S	13	N/A
7.3.1	Incorrect install	ation cell	183	183	N/A
Reg Reg	- Four fully cha	arried out using: rged cells of the same brand, type, size cted in series, with one of them	RES RES	RES RES	N/A
Be	- A stabilized de	c power supply.	1300	1,33	N/A
B	Results: No fire	e. No explosion:	, BO	S BS	N/A
Sa	mple No.	OCV at Start of Test, Vdc	3	Results	30
5	<u>5</u> (3	33 13	03	100	100
S	-3.63	S S	23	Bes -	Bles
3	- 203	3 3	Bas	Bos	Res

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IEC 62133: 2012					
Clause Requirement – Test Result – Remark	Verdict				
	<u> </u>				
(3 - 13 13 - 13 13	S B				
supplementary information:	23				
- No Fire or Explosion					
- No Leakage					
- Leakage					
- Fire					
- Explosion					
- Bulge					
- Other (Please Explain)	Bee				

7.3.2	External short circ	uit (S	, c3	33	383	N/A
PRE	The cells or batter following occurred - 24 hours elapsed	63	until one of the	183 183	BES BES	N/A
G.	- The case temper maximum tempera		y 20% of the	3 160	3 3	N/A
3	Results: No fire. N	o explosion	N.S: (V	33	35	N/A
Sample No.	Ambient temperature (At 20°C ± 5°C)	OCV at start of test (Vdc)	Maximum case temperature rise ΔT, (°C)	Resistance of Circuit (mΩ)	Results	N/A
080	1,35	~ @ 3	~ (3 S		(E)	190
(ES)	CSm.	(3)	- CS	5 c 3	<u> </u>	- 12
LES.	- CS	300	<u>⇒</u> 23	503	Res	- 8
-10	3 - 3	- 300	5 - 33	Bag	-13/20	š. –
-0.0	3 - 3	- 5	3 - 500	-Bag	- Be	.e
Sample No.	Ambient temperature (At 55°C ± 5°C)	OCV at start of test (Vdc)	Maximum case temperature rise ΔT, (°C)	Resistance of Circuit (m Ω)	Results	ુહું હુંહું તહું
	Res -	150_	1,00	(B) - (B)	<u>ල</u> න —	3
50	B35	130	0.35	7.62 —	168	35)
165	USS.	100	(E)	033	3	30
130	130	THE 5	- CS	~ (B)	12 CS	
(3)	7.65	23)	2.63	5-3	12 33	- 12

- No Fire or Explosion
 No Leakage
 Leakage
 Fire
 Explosion
 Bulge
 Other (Please Explain)

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50	1,63	IEC 62133: 2012	163 63	1,03
Clause	Requirement – Test	1,65	Result – Remark	Verdict

7.3.3	Free fall	CS CS	N/A
B.S.	Each fully charged cell or battery is dropped three times from a height of 1.0m onto a concrete floor. The cells or batteries are dropped so as to obtain impacts in random orientations.	3.23	N/A
3	Results: No fire. No explosion.	5 7,65	N/A
Sample No.	793 - 183 Bes - 1	ES	135
Results	Res - Res Res -	Res Res -	BC5
Sample No.	183 - 1838 1838 -	Res	BC
Results	13 - 13 13	Res Res	B
	-		

- No Fire or Explosion
- No Leakage
- Leakage
- Fire
- Explosion
- Bulge

Other (Please Explain)

Mechanical shock	(crash hazard)	33	Beeg	Bas	N/A
of three shocks of three mutually perp directions was perp initial 3 millisecond	equal magnitude a pendicular direction pendicular to a flat ls, the minimum av	applied in each of ns. At least on of the face. During the verage acceleration	163 163 163 163	163 163 163 163	N/A
Results: No fire. N	o explosion. No lea	akage.	3	eS "	N/A
Bess -	182 - 1	7,33 - 7,0	35 - 3	<u>C</u> S	65
0.50	1000 -	1 CS - 1	35 -	NGS -	- " CE
Res	Picos-	Res -	185 -	185	- 03
700	Res	300	130 -	185	- 0
	Fully charged cells of three shocks of three mutually per directions was per initial 3 millisecond was 75 gn. The per and 175 gn.	of three shocks of equal magnitude a three mutually perpendicular direction directions was perpendicular to a flat initial 3 milliseconds, the minimum awas 75 gn. The peak acceleration wa and 175 gn.	Fully charged cells or batteries were subjected to a total of three shocks of equal magnitude applied in each of three mutually perpendicular directions. At least on of the directions was perpendicular to a flat face. During the initial 3 milliseconds, the minimum average acceleration was 75 g _n . The peak acceleration was between 125 g _n	Fully charged cells or batteries were subjected to a total of three shocks of equal magnitude applied in each of three mutually perpendicular directions. At least on of the directions was perpendicular to a flat face. During the initial 3 milliseconds, the minimum average acceleration was 75 g _n . The peak acceleration was between 125 g _n and 175 g _n .	Fully charged cells or batteries were subjected to a total of three shocks of equal magnitude applied in each of three mutually perpendicular directions. At least on of the directions was perpendicular to a flat face. During the initial 3 milliseconds, the minimum average acceleration was 75 g _n . The peak acceleration was between 125 g _n and 175 g _n .

supplementary information:

- No Fire or Explosion
- No Leakage
- Leakage
- Fire
- Explosion Bulge

Other (Please Explain)

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50	1,63	IEC 62133: 2012	163 63	1,03
Clause	Requirement – Test	1,65	Result – Remark	Verdict

7.3.5	Thermal abuse			300		N/A
	circulating air-co temperature was a temperature of	Ils were placed in a nvention oven. The raised at a rate of 130°C ± 2°C. The continues before the second of the se	oven 5°C/min ± 2°C/mir cell remained at that		183 183 183 183	N/A
	Results: No fire.	No explosion.		183		N/A
Sample No.	Res -	130 -	- 650	163 -	n.38 -	13
Results	Res	360_	130 -	35 -	(C)	03

- No Fire or Explosion No Leakage
- Leakage
- Fire
- Explosion
- Bulge
- Other (Please Explain)

7.3.6	Crushing of cells	Res	130	180	N/A
163 163	Fully charged cells were crushed surfaces with a hydraulic ram extended to kN.	Res Res	163 163	Bes	
	The crushing is performed in a m most adverse result.	133	363	N/A	
	- Once the maximum force has been applied, - or an abrupt voltage drop of one-third of the original voltage has been obtained, The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set				
0					
3 33 33					
- 23	Results: No fire. No explosion	PRO PRO		N/A	
Model	OCV at start of test, (Vdc)	OCV at removal of c	crushing force,	Results	N/A
120	3 33- 36	300	Bess	-733	
Re	B B B	Para Real	3,50	_ B3	_
-12	33 33	Real Real	a Be	- 0	2) -
- 1	350	1150 15E		30 - 0	35
	TO TEST	160	60	(6.5)	135

No Fire or Explosion

		IEC 6	2133: 2012			
Clause F	Requirement – Test	35	3	Result – Remark	1.63	Verdict
No LeakageLeakageFireExplosionBulgeOther (Pleas		LES LES LES	163 163 163	162 162 163 163	162 162 163	3

7.3.7	Low pressure					N/A
<u>ş</u> 5 &3 	Each fully charged continuous in an ambient temper pressure is gradually less than 11.6kPa he	rature of 20°C ±5°C reduced to a press	3 3 3 3	LES LES	N/A	
0.83	Results: No fire. No 6	explosion. No leaka	age.			N/A
Sample No.	ES#	0.33	J. (3)	33	300	- 3
Results	-0.85	763	1 13 3	3	350	-

- No Fire or Explosion
- No Leakage
- Leakage
- Fire

- Explosion Bulge Other (Please Explain)

7.3.8	Overcharge			11.33			N/A
Re	A discharged cell charge of 2.5 time for a time that prorated capacity).	s the recom	mended char	ging current	133	3 <u>1</u> 3	N/A
	Results: No fire. N	lo explosion		: 135			N/A
Sample no.	Model	OCV at start of test (Vdc)	Maximum Charging Current (2.0 /t A)	Maximum Charging Voltage (Vdc)	Total Time of Charging (h)	temperature of the outer casing (°C)	Results
B20	3/50	435		(C) -	B32	TES .	- 5
<u> 130</u>	100	-36	28 -	1300 G	RES	300	
300	3 - 3		(63)	130	TO S	- 35	3 -
- 0	35 - <u>1</u> 3	S -	n.CS	ES	-1300	3 - 50	23-
	150 - 3	35 _	130	-1,03	- 0	3S - "	3
supplemen	ntary information:	100	130	1.9	9	(35)	650

- NF: No Fire - NE: No Explosion

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30	Tes Tes	IEC 62133: 2012	CS CS	3.63
Clause	Requirement – Test	1,62	Result – Remark	Verdict

- Fire: the emission of flames from a cell or battery.
- Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

Remark: Total time of charging ≤0.1h means the PCB protection in a flash.

7.3.9	Forced discharge		38		N/A
B	A discharged cell is su A for 90 min	bjected to a reverse charg	e at 1 I _t	Reg Re	S
3	Results: No fire. No ex	plosion	: De 33	Bee 1	N/A
Sample no.	Model	OCV before application of reverse charge (Vdc)	Measured Reverse Charge It (A)	Total Time for Reversed Charge Application (Min)	Results
Bear	300	Par - Par	-1,35	135	-00
1100	1720	Resident Residence	- 133	7.65	- 0
1500	100	Bes Bi	- 13co	- 13C2	_
75-00	3 3	B95	150 - Be	- Bee	2
	B B	13000	1120	20 16	9

supplementary information:

- NF: No Fire
- NE: No Explosion
- Fire: the emission of flames from a cell or battery.
- Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

Remark: Total time of charging ≤0.1h means the PCB protection in a flash.

8	Specific requirements and tests	1,35	P
8.1	Charging procedure for test purposes	G RESS B	55 P
8.1.1	First procedure	38 BGS 1	Co.
3 .S	Test is carried out at 20°C ± 5°C. Charging method declared by the manufacturer.	LES LES	PS
LES LES	Prior to charging, the battery shall have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage.	Less Less	P
8.1.2	Second procedure	133 BBS	- 3
Pe	For clause 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9 charging procedure After stabilization for 1 to 4 hours respectively at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 4		3 P 33
) 3 33	cells are charged by using the upper limited charging voltage and maximum charging current, until the charging current is reduced to 0,05 /t A, using a constant voltage charging method.	LES LES	LES PS

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35	IEC 62133:	2012	3.28
Clause	Requirement – Test	Result – Remark	Verdict
163	- Upper limit charging voltage	4.25V	3 -0
BESS	- Maximum charging current Specified by the manufacturer of cells	700mA	<u>(3</u> - 1
Big	Charging temp. Upper limit	45 ℃	133 -
10	Charging temp. Lower limit	-5℃	Res -

8.2	Intended use	(ES) (ES)	P
8.2.1	Continuous charging at constant voltage (cells)	Res Res	PS
LES G	Fully charged cells are subjected for 7 days to a charge as specified by the manufacturer.	162 163 163	Р
Ban	Results:: No fire, no explosion, no leakage	See below table;	Р
		1 (21.7) W (41.9)	

Sample No.	Model	Recommen ded Charging Method, CC, CV, or CC/CV	Recommend ed Charging Voltage Vc, Vdc	Recommended Charging Current Irec, mA	OCV at Start of Test, Vdc	Results
C01#	ICR16340	CC/CV	4.2	140	4.17	NF, NE, NL
C02#	ICR16340	CC/CV	4.2	140	4.17	NF, NE, NL
C03#	ICR16340	CC/CV	4.2	140	4.18	NF, NE, NL
C04#	ICR16340	CC/CV	4.2	140	4.17	NF, NE, NL
C05#	ICR16340	CC/CV	4.2	140	4.18	NF, NE, NL

- NF: No Fire - NE: No Explosion - NL: No Leakage

Fire: the emission of flames from a cell or battery.
Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

- Leakage: visible escape of liquid electrolyte.

8.2.2	Moulded case stress at high a	mbient temperature (battery)	SO TES	Р		
3		ed in an air-circulating oven at a 7 hours. Afterwards, they are	IGS IG	3 35 P		
	Results: no physical distortion in exposure if internal components	of the battery casing resulting pents.	133 3	36P		
Sample N	lo. B01#	B02#	B03#	Р		

35	1,35	IEC 62133: 2012	(3)	3,63
Clause	Requirement – Test	1,63	Result – Remark	Verdict

	No evidend	e of mechani	cal damage			300	
Status	No physica component		the battery case	resulting in expos	ure of internal	RES	
8.3	Reasonably fo	reseeable mi	suse	B 68	Res	Rec	Р
8.3.1	External short	circuit (cell)	GS CS	B. CS	BES	De	g P
	Fully charged 8.1.2;	each cell acc	ording to the sec	ond procedure in	Pag	3	SEP
ව දුරි	Fully charged 20°C ± 5°C.	cells were sul	ojected to a shor	t circuit test at	3	85	Ρ
(3)	The external re	esistance of 8	0±20 mΩ.	R3 5	23	35	Р
BCS.		The cells were tested for 24 h or until the case temperature eclined by 20% of the maximum temperature rise.					
11.3	Results: no fire	e, no explosio	n. 63	183	33	Р	
Re	After the test	132	1,65	183	See below		S P
Sample No.	Ambient temperature (At 20°C ± 5°C)	OCV at start of test (Vdc)	Maximum case temperature rise ΔT, (°C)	Resistance of Circuit (mΩ)	Charging temp. Upper limit (°C)	Results	CS P
C06	23.2	4.17	83.7	80	45	NF, NE	Р
C07	23.1	4.17	90.5	80	45	NF, NE	Р
C08	23.1	4.18	92.0	80	45	NF, NE	Р
C09	23.2	4.17	84.6	80	45	NF, NE	Р
C10	23.0	4.18	87.0	80	45	NF, NE	P
Sample No.	Ambient temperature (At 20°C ± 5°C)	OCV at start of test (Vdc)	Maximum case temperature rise ΔT, (°C)	Resistance of Circuit (mΩ)	Charging temp. Lower limit (°C)	Results	B
C11	23.1	4.16	90.7	80	-5	NF, NE	Р
C12	23.0	4.15	92.2	80	-5	NF, NE	Р
C13	23.1	4.16	90.8	80	-5	NF, NE	Р
C14	23.1	4.16	85.3	80	-5	NF, NE	Р
C15	23.0	4.15	91.5	80	-5	NF, NE	3 P

- NF: No Fire

⁻ NE: No Explosion

<sup>Fire: the emission of flames from a cell or battery.
Explosion: failure that occurs when a cell container or battery case opens violently and major components are</sup>

3	183	N.C.S	IEC 62133: 2012	1.C3	CS.	3,03
Clause	Requirement – Tes	st US	13	Result – Remark	(7,63	Verdict
forcibly	waallad	11,60	11.35	7,65	7 (3)	0.18

forcibly expelled.

8.3.2	External short	circuit (batte	ry)	CS.		133	J.C.S	Р
Be	Fully charged procedure in 8		according to the seco	ond	3	PGS.	Pe	Р 283
	Fully charged circuit test at 5		e subjected to a shor	rt y	ુક્ક કુક	J.C.S	3	JES-
) ()	The external re	esistance of 8	30±20 mΩ.		11 (3)	3	3 3	Р
50 183 185	The battery pack were tested for 24 h or until the case temperature declined by 20% of the maximum temperature rise.							
AGE A	battery pack s one hour after state condition where the per	hould remain the current rent. This typicall cell voltage (w 0,8 V and is	hort circuit current, the on test for an addition eaches a low end stelly refers to a condition series cells only) of the decreasing by less.	onal eady n he	3 33 35	LES LES LES	BES BES B	N/A
3	Results: no fire	e, no explosic	on.		133	s Be	35	Р
ટુડ	After the test	P.S.	3 133		See	below	33	Р
Sample No.	Ambient temperature (At 55°C ± 5°C)	OCV at start of test (Vdc)	Maximum case temperature rise ΔT, (°C)	Resis of Ci (m	rcuit	Charging temp. Upper limit (°C)	Results	P
B04#	55.1	4.18	0.4	8	0	45	NF, NE	P
B05#	55.1	4.18	0.3	8	0	45	NF, NE	P
B06#	55.3	4.17	0.2	8	0	45	NF, NE	P
B07#	55.2	4.17	0.4	8	0	45	NF, NE	Р
B08#	55.2	4.18	0.3	8	0 (3	45	NF, NE	Р
Sample No.	Ambient temperature (At 55°C ± 5°C)	OCV at start of test (Vdc)	Maximum case temperature rise ΔT, (°C)		tance rcuit Ω)	Charging temp. Lower limit (°C)	Results	P
B09#	55.2	4.16	0.2	8	0	-5	NF, NE	P
B10#	55.3	4.15	0.3	8	0	-5	NF, NE	P S
B11#	55.1	4.15	0.3	8	0	-5	NF, NE	CSP.
B12#	55.2	4.16	0.3	8	0	-5	NF, NE	3 P
B13#	55.2	4.14	0.4	8	1150	-5	NF, NE	Р

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30	Tes Tes	IEC 62133: 2012	CS CS	3.63
Clause	Requirement – Test	1,62	Result – Remark	Verdict

- NF: No Fire
- NE: No Explosion
- Fire: the emission of flames from a cell or battery.
- Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

8.3.3	Free fall	RES	BES .	SS			
2S	Ambient tempe	erature of 20±5℃	BESS	RES			
from a height After the test		cells or batteries were		Three times	Res	Р	
		the cell or battery shat one hour and then a v med.		130	i ges i ges is	3	
B	Results: no fire	e, no explosion	S TES	3	CS I	3 P	
Samp	ole No.	C16#	C17#	5	C18#	(89)	
Sta	atus	NF, NE	NF, NE	333	NF, NE	BES	
Samp	Sample No. B14#		B15#	063	B16#	1100	
Sta	atus	NF, NE	NF, NE	003	NF, NE	Re	

supplementary information:

- NF: No Fire
- NE: No Explosion
- Fire: the emission of flames from a cell or battery.
- Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

8.3.4	Thermal abuse (ce	lls)	Thermal abuse (cells)					
ડ્ડ ડુંટુંડ ડુંટુંડ ડુંટુંડ	air-convention over a rate of 5°C/min ±	2°C/min to a temper ained at that temper	rature was raised at	63 163 163 163	es P			
13	Results: no fire, no	explosion	163	33	P			
After the	test (Charging temp.	Upper limit 45°C)	1,35	T.CS	183			
Sample No.	C19#	C20#	C21#	C22#	C23#			
Status	NF, NE	NF, NE	NF, NE	NF, NE	NF, NE			

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35	1,35	IEC 62133: 2012	(3)	3,63
Clause	Requirement – Test	1,63	Result – Remark	Verdict

Sample No.	C24#	C25#	C26#	C27#	C28#	5
Status	NF, NE	1				

- NF: No Fire
- NE: No Explosion
- Fire: the emission of flames from a cell or battery.
- Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

8.3.5	Crush (cells)	BES.	BES.	1,63	CS	Р	
REE	Each fully charged procedure at the up is immediately transurfaces in an amb	oper limit charging t sferred and crushe	temperature in 8.1.2,	163 163	P.C.S.	Р	
	Fully charged cells surfaces with a hyd kN.		veen two flat a force of 13 kN ± 1	133 133	3	63 p	
ß	The crushing is per most adverse resul		er that will cause the	See below	Š.	J.PS	
S.S.	- Once the maximu	m force has been a	applied,	(ES	S	Р	
Pas	- or an abrupt voltage drop of one-third of the original voltage has been obtained,			J. (3)	ES	N/A	
18. 18.	- or 10 % of deform initial dimension, th condition occurs fire force should be rele	e force is released st should be the inc	(whichever	LES LES		N/A	
3 §S	A cylindrical or pris longitudinal axis pa crushing apparatus Test only the wide:	rallel to the flat sur	faces of the))) (S	3 3		
(35)	Results: no fire, no	100	(3)	(23)	33	P	
After the	test (Charging temp. l	Jpper limit 45°C)	133	1,35	13	- 1	
Sample No.	C29#	C30#	C31#	C32#	C3:	3#	
Status	NF, NE	NF, NE	NF, NE	NF, NE	NF,	NIE	

supplementary information:

- NF: No Fire
- NE: No Explosion
- Fire: the emission of flames from a cell or battery.
- Explosion: failure that occurs when a cell container or battery case opens violently and major components are

30	Tes Tes	IEC 62133: 2012	183 RS	CS
Clause	Requirement – Test	35 7,63	Result – Remark	Verdict

forcibly expelled.

8.3.6	Over-charging o	f battery			0.33		Р
Be	The test shall be +20 °C±5°C.	e carried out i	n an ambient te	emperature of	REE	3 3	3 33 P
) 3	Each test batter of 0,2 h A, to a fi manufacturer.				3	ું હું કું હું હું કું હું હું	Р
IGS IGS IGS IGS	A discharged ba 5.0V per cell or supplied by the current of 2.0 k. Total Time of Chithe temperature conditions (less returns to ambie	not to exceed recommende A. narging: The of the outer of than 10 °C cl	I the maximum d charger, at a test shall be co casing reaches	voltage charging ntinued until steady state	33 133 133 133 133 133	LES LES LES	P
- 7	Results: no fire,	no explosion	Bass	Pas	Be	35	© P
3	After the test	323	Res	Reco	No fire, no e	explosion.	BEP
Sample no.	Model	OCV at start of test (Vdc)	Maximum Charging Current (2.0 h A)	Maximum Charging Voltage (Vdc)	Total Time of Charging (h)	temperature of the outer casing (°C)	Results
B17#	ARB-L16-700	3.30	5 1.4	5	0.36	37.3	NF, NE
B18#	ARB-L16-700	3.30	1.4	5	0.37	38.5	NF, NE
B19#	ARB-L16-700	3.28	1.4	5	0.37	37.3	NF, NE
B20#	ARB-L16-700	3.28	1.4	5	0.35	39.3	NF, NE
B21#	ARB-L16-700	3.29	1.4	5	0.36	37.5	NF, NE

supplementary information:

- NF: No Fire
- NE: No Explosion
- Fire: the emission of flames from a cell or battery.
 Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

Remark: Total time of charging ≤0.1h means the PCB protection in a flash.

8.3.7	Forced discha	arge (cells)	PRO		Tes Te	P
	A discharged It A for 90 mir	cell is subjected to a revers	se charge at 1	LES LES		
	Results: no fir	e, no explosion	33	3	Res	BEP
Sample no.	Model	OCV before application of reverse	Measured Rev Charge It (A		Total Time for Reversed Charge Application	Results

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35	Tes Tes	IEC 62133: 2012	(CS) (CS)	CS.
Clause	Requirement – Test	1,62	Result – Remark	Verdict

183	850	charge (Vdc)	Res 1	(Min)	Ba
C34#	ICR16340	3.30	0.7	90	NF, NE
C35#	ICR16340	3.28	0.7	90	NF, NE
C36#	ICR16340	3.29	0.7	90	NF, NE
C37#	ICR16340	3.29	0.7	90	NF, NE
C38#	ICR16340	3.28	0.7	90	NF, NE

supplementary information: - NF: No Fire

- NE: No Explosion
- Fire: the emission of flames from a cell or battery.
 Explosion: failure that occurs when a cell container or battery case opens violently and major components are forcibly expelled.

8.3.8	Transport test	3 63	3 P
3	Regulations concerning international transport of lithium ion batteries are based on the UN Recommendations on the Transport of Dangerous Goods. Testing requirements are defined in the UN Manual of Tests & Criteria.		63 163 163
Res	Testing laboratory	LES LES	08

0 (60)		G(S) 0	(25)	1255		28	1/2
8.3.9	Design evaluation – Forced internal short circuit (cells)			S BES	N/A		
	The	cells complied with	nation requirement for		Prisma	atic cells	3 -
B	The pressing was stopped upon: -A voltage drop of 50 mV has been detected; or						
-The pressing force of 800N (cylindrical cells) or 400N (prismatic cells) has been reached					P.CS	N/A	
	Resu	ılts: No fire.			BRE	N/A	
Model		Chamber ambient, (°C)	OCV at start of test, (Vdc)	Particle location		Maximum applied pressure, (N)	Results
Res		185	135 E	<u>(3)</u>	200	183 - 183	
300	3	350	300	Bes -	9.11	Bes - Bes	
Be	23	1500	300	Res	3	Res Re	3.
	1,33	- 63	163	130	3	Bee B	23
3	BE	- BGE	188	- 5	(CS)	NES	3
	B	30 - BC	- 133		350	(35)	138

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30	133	0.83	IEC 62	133: 2012	23	3	Bag
Clause	Requirement	– Test	3	aret	esult – Remark	23	Verdict
163-	Les CS	3	(3) -	3	133 -	333	B
BESS	133	5	188	ES	163	183	\
Res	3	30	BC12	P. C.S.	13	500	
\overline{D}_{ij}	28	160 160	B 620	RRE	PGS.	PG	5

- 1)Identify one of the following;
- 1:Nickel particle inserted between positive and negative (active material) coated area.
 2:Nickel particle inserted between positive aluminium foil and negative active material coated area.
- No Fire or Explosion
- No Leakage
- Leakage
- Fire
- Explosion
- Bulge
- Other (Please Explain)

9	Information for safety	33 7,63	3 P
3 33 33	Information is provided to equipment manufacturers in the form of instructions to minimize and mitigate hazards associated with the cells or batteries in accordance with guidelines outlined in informative Annex B.	162 162 162 162 163 163	LES LES
R.C.	Information is provided to end-users in the form of instructions to minimize and mitigate hazards associated with the batteries in accordance with guidelines outlined in informative Annex C.	LES LES	Р

10	Marking	23 E23	3P
10.1	Cell marking	(3)	N/A
:3	Rechargeable Li or Li-ion	Page Page	N/A
CS.	Battery designation	13 13 B	N/A
BES	Polarity of terminal	LES LES	Р
BRE	Date of manufacture	LES LES	N/A
Big	Name or identification of the manufacturer or supplier	S LES LES	N/A
	Nominal voltage(V)	3.7	35 P
	Rated Capacity (mAh)	700	Р
10.2	Battery marking	See below	P
33	Rechargeable Li or Li-ion	Li-ion	Р

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		A COLOR	
5	IEC 62133: 2012	LES LES	CS
Clause	Requirement – Test	Result – Remark	Verdict
LC3	Battery designation	(3)	Р
335	Polarity of terminal	On the battery	Р
Re	Date of manufacture	On the battery	N/A
B	Name or identification of the manufacturer or supplier	S RES	35 P
3	Nominal voltage(V)	3.7	SEP
S	Rated Capacity (mAh)	700	J.P
ලිදි . අයි	Caution statement	For details please see the picture	Р
10.3	Other information	160	P
PEE	Disposal instructions are marked on the battery or supplied in the information packaged with the battery.	See Specification book	Р
B	Recommended charging instruction are marked on the battery or supplied in the information packaged with the battery.	See Specification book	3 P

11	Packaging	130 BOS	P
REE REE REE	Cells or batteries were provided with packaging that was adequate to avoid mechanical damage during transport, handling and stacking. The materials and pack design was chosen to prevent the development of unintentional electrical conduction, corrosion of the terminal and ingress of moisture.	Les Les	P

Annex A	Charging range of secondary lithium i	on cells for safe use	P
A.1	General	135	Р
A.2	Safety of lithium-ion secondary battery	Complied	Р
A.3	Consideration on charging voltage	Complied	Р
A.3.1	General	623	Ρ
A.3.2	Upper limit charging voltage	4.2V	Ρ
A.3.2.1	General	Bas Bas	Р
A.3.2.2	Explanation of safety viewpoint	Red Red	Р
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	4.2V	3 3
A.4	Consideration of temperature and charging current	32 (35	P
A.4.1	General	(\$5 ~ CS	P
A.4.2	Recommended temperature range	See A.4.2.2.	Р
A.4.2.1	General	(2)	Р
A.4.2.2	Safety consideration when a different recommended	Charging temperature for cell	Р

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30	Tes Tes	IEC 62133: 2012	CS CS	3.63
Clause	Requirement – Test	1,62	Result – Remark	Verdict

Oladoo	Troquiromont Tool	rtobait rtomant	VOIGIO
160	temperature range is applied	declared by client is: 0-45°C	0.5
A.4.3	High temperature range	Not higher than the temperature range specific in this standard.	N/A
A.4.3.1	General	Book Be	N/A
A.4.3.2	Explanation of safety viewpoint	Bise Bis	N/A
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range	3 3 S	N/A
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range	(S) (S)	N/A
A.4.4	Low temperature range	Charging low temperature declared by client is: 0°C	Р
A.4.4.1	General	(3)	Р
A.4.4.2	Explanation of safety viewpoint	(25) (25)	Р
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range	163	Р
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	-5℃	S P
A.4.5	Scope of the application of charging current	32	P
A.5	Sample preparation	50 (3)	N/A
A.5.1	General	(3) (3)	N/A
A.5.2	Insertion procedure for nickel particle to generate internal short	185 185 183 183	N/A
BES	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point	Les Les	N/A
A.5.3	Disassembly of charged cell	1650	N/A
A.5.4	Shape of nickel particle	H:0.2mm T:0.1mm L shape(Angle:90±10°): 1.0mm	N/A
A.5.5	Insertion of nickel particle to cylindrical cell	3 33 3	N/A
A.5.5.1	Insertion of nickel particle to winding core	as Base	N/A
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator	LES LES	N/A
A.5.6	Insertion of nickel particle to prismatic cell	1.85	N/A

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Photo Documentation

Photo 1

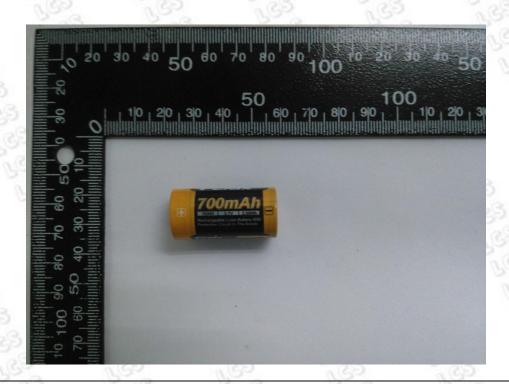
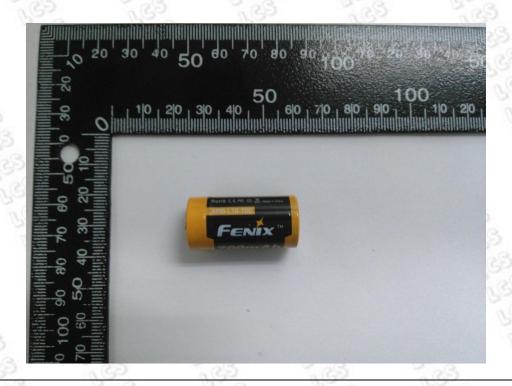


Photo 2



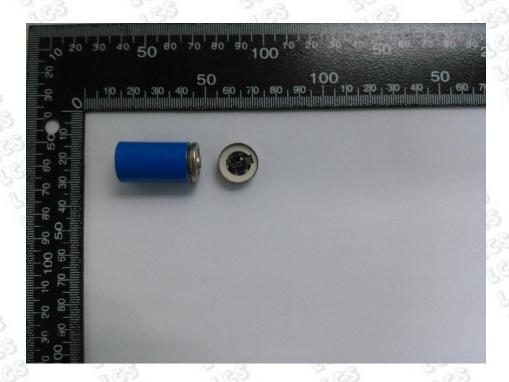
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Photo Documentation

Photo 3



Photo 4



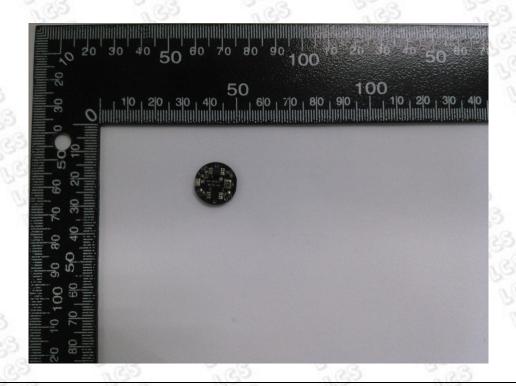
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Photo Documentation

Photo 5



Photo6



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