APPLICATION FOR IEC REPORT

On Behalf of

Shenzhen City Bai Jia Ying Technology Co., Ltd.

Lithium-ion Battery

Model: 18650 1200mAh

Prepared For : **Shenzhen City Bai Jia Ying Technology Co., Ltd.**
4th floor, A building, Weixin industrial park, Shitoushan Industrial Zone, Shiyan Street, Bao'an District, Shenzhen

Prepared By : **Shenzhen Anbotek Compliance Laboratory Limited**
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Date of Test: Apr. 23, 2018 to May. 10, 2018
Date of Report: May. 10, 2018
Report Number: SZABB180426003-01

TEST REPORT

IEC 62133-2: 2017

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 –

Part 2: Lithium systems

Report	
Reference No.	SZABB180426003-01
Compiled by (+ signature)	Fannie Zhu / Project Engineer
Approved by (+ signature)	Jeff Zhu / Project Manager
Date of issue	May. 10, 2018
Contents	25 pages(including 3 pages of photos)
Testing laboratory	
Name	Shenzhen Anbotek Compliance Laboratory Limited
Address	East of 4/F., Building A, Hourui No.3 Industrial Zone, Xixiang Street, Bao'an District, Shenzhen, Guangdong, China
Testing location	Shenzhen Anbotek Compliance Laboratory Limited
Client	
Name	Shenzhen City Bai Jia Ying Technology Co., Ltd.
Address	4th floor, A building, Weixin industrial park, Shitoushan Industrial Zone, Shiyan Street, Bao'an District, Shenzhen
Test specification	
Standard	IEC 62133-2: 2017
Test procedure	Compliance with IEC 62133-2: 2017
Procedure deviation	N.A.
Non-standard test method	N.A.
Test item	
Description	Lithium-ion Battery
Trademark	BJY
Model and/or type reference	18650 1200mAh
Serial number	N.A.
Manufacturer	Shenzhen City Bai Jia Ying Technology Co., Ltd.
Address	4th floor, A building, Weixin industrial park, Shitoushan Industrial Zone, Shiyan Street, Bao'an District, Shenzhen
Rating(s)	Battery: DC 3.7V, 1200mAh Cell: DC 3.7V, 1200mAh

Particulars: test item vs. test requirements

Ambient temperature: 20 °C ± 5 °C.

Test case verdicts

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

Date of receipt of test item: Apr. 23, 2018

Date(s) of performance of test: Apr. 23, 2018 to May. 10, 2018

General remarks

This test report shall not be reproduced except in full without the written approval of the testing laboratory.

The test results presented in this report relate only to the item tested.

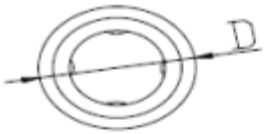
"(see remark #)" refers to a remark appended to the report.

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

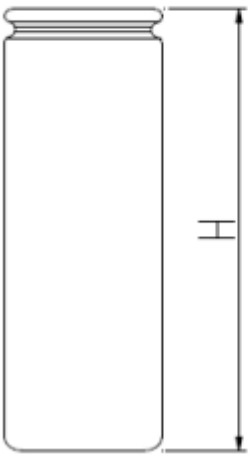
Throughout this report a dot is used as the decimal separator.

Comments:

1. If no otherwise specified, all tests performed at the model: 18650 1200mAh
2. The cell construction of model 18650, as following:



test item	technical specification
D	18.0mm
H	65.0mm



General product information one lithium-ion cell (1S1P),and has overcharge,over discharge, over current and short-circuits proof circuit.

The main features of the battery are show as below(clause 8.1.1)

Model	Nominal Capacity	Nominal Voltage	Nominal Charge Current	Nominal Discharge Current	Max. Charge Current	Max. Discharge Current	Max. Charge Voltage	Cut-off Voltage
18650 1200mAh	1200mAh	3.7V	600mA	600mA	1200mA	1200mA	4.2V	3V

The main features of the battery are show as below(clause 8.1.2)

Model	Upper limit Charge Voltage	Taper-off Current	Lower Charge temperature	Upper Charge temperature
18650 1200mAh	4.25V	60mA	0℃	45℃

The main features of the cell in the battery are show as below(clause 8.1.1)

Model	Nominal Capacity	Nominal Voltage	Nominal Charge Current	Nominal Discharge Current	Max. Charge Current	Max. Discharge Current	Max. Charge Voltage	Cut-off Voltage
18650	1200mAh	3.7V	600mA	600mA	1200mA	1200mA	4.2V	3V

The main features of the cell in the battery are show as below(clause 8.1.2)

Model	Upper limit Charge Voltage	Taper-off Current	Lower Charge temperature	Upper Charge temperature
18650	4.25V	60mA	0℃	45℃

Copy of marking:

Lithium-ion Battery
18650 1200mAh 1ICR18/65
3.7Vd.c., 1200mAh, 4.44Wh
Red Wire(+), Black Wire(-)
Shenzhen City Bai Jia Ying Technology Co., Ltd.
2018.04.10

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
4	**PARAMETER MEASUREMENT TOLERANCES**		
	Parameter measurement tolerances		P
5	**GENERAL SAFETY CONSIDERATIONS**		
5.1	**General**		**P**
	Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse		P
5.2	**Insulation and wiring**		**P**
	The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ	No metal case exists.	N
	Insulation resistance (MΩ)..... :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearance and creepage distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	**Venting**		**P**
	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	Venting mechanism incorporate on the cell.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N
5.4	**Temperature, voltage and current management**		**P**
	Batteries are designed such that abnormal temperature rise conditions are prevented	Overcharge, over discharge, over current and short-circuit proof circuit used in this battery. See tests of clause 7.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	See above.	P

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified	The charging limits specified in the user manual.	P
5.5	**Terminal contacts**		**P**
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Lead wire complied with the requirements.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		P
	Terminal contacts are arranged to minimize the risk of short-circuit		P
5.6	**Assembly of cells into batteries**	Single cell battery.	**P**
5.6.1	General		N
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region		N
	This protection may be provided external to the battery such as within the charger or the end devices		N
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N
	If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions		N
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		P
	Protective circuit components added as appropriate and consideration given to the end-device application		P

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
	The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance		P
5.6.2	Design recommendation		P
	For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2	Charging voltage: 4.2V, not exceed 4.25V specified in Clause 7.1.2, Table 2.	P
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks		N
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		P
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		P
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage		P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		N
5.6.3	Mechanical protection for cells and components of batteries		P
	Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse		P

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product		P
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		P
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N
5.7	**Quality plan**		**P**
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery		P
5.8	**Battery safety components**		
	According annex F		
6	**TYPE TEST AND SAMPLE SIZE**		
	Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old		P
	Coin cells with resistance ≤ 3 Ω (measured according annex D) are tested according table 1		N
	Unless otherwise specified, tests are carried out in an ambient temperature of 20℃ ± 5℃	Tests are carried out at 20℃ ± 5℃.	P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection		P
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test		P
7	**SPECIFIC REQUIREMENTS AND TESTS**		
7.1	**Charging procedure for test purposes**	Lithium system.	P
7.1.1	First procedure		P

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
	This charging procedure applies to subclauses other than those specified in 7.1.2		P
	Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of 20℃ ± 5℃, using the method declared by the manufacturer		P
	Prior to charging, the battery have been discharged at 20℃ ± 5℃ at a constant current of 0,2 It A down to a specified final voltage		P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Charge temperature 0-45℃ declared.	P
7.2	**Intended use**		P
7.2.1	Continuous charging at constant voltage (cells)	Test complied.	P
	Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer		P
	Results: No fire. No explosion. No leakage..... :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)		N
	Oven temperature (℃)..... :		—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells		N
7.3	**Reasonably foreseeable misuse**		P
7.3.1	External short-circuit (cell)		P
	The cells were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N
	- The case temperature declined by 20 % of the maximum temperature rise		P
	Results: No fire. No explosion..... :	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)		P

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or		P
	- The case temperature declined by 20 % of the maximum temperature rise		N
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		P
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor	MOFET	P
	Results: No fire. No explosion..... :	(See appended table 7.3.2)	P
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion	No fire. No explosion	P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (℃)..... :	130°C	—
	Results: No fire. No explosion	No fire. No explosion	P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N
	Results: No fire. No explosion..... :	(See Table 7.3.5)	P
7.3.6	Over-charging of battery	Tested complied.	P
	The supply voltage which is:		P
	- 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or		P
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
	- Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached		P
	Test was continued until the temperature of the outer casing:		P
	- Reached steady state conditions (less than 10℃ change in 30-minute period); or		P
	- Returned to ambient		N
	Results: No fire. No explosion..... :	(See appended table 7.3.6)	P
7.3.7	Forced discharge (cells)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P
	Results: No fire. No explosion..... :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)		P
7.3.8.1	Vibration	Tested complied.	P
	Results: No fire, no explosion, no rupture, no leakage or venting.....:	(See appended table 7.3.8.1)	P
7.3.8.2	Mechanical shock	Tested complied.	P
	Results: No leakage, no venting, no rupture, no explosion and no fire.....:	(See appended table 7.3.8.2)	P
7.3.9	Design evaluation – Forced internal short-circuit (cells)	Not request by client, not complied with national requirement for France, Japan, Republic of Korea and Switzerland.	N
	The cells complied with national requirement for.....:		—
	The pressing was stopped upon:		N
	- A voltage drop of 50 mV has been detected; or		N
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached		N
	Results: No fire..... :		N

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Clause	Requirement – Test	Result - Remark	Verdict
8	**INFORMATION FOR SAFETY**		P
8.1	**General**		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products		P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards		P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N
	As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N
	Do not allow children to replace batteries without adult supervision		N
8.2	**Small cell and battery safety information**		N
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		N
	- Keep small cells and batteries which are considered swallowable out of the reach of children		N
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		N
	- In case of ingestion of a cell or battery, seek medical assistance promptly		N
9	**MARKING**		P
9.1	**Cell marking**		N
	Cells marked as specified in IEC 61960, except coin cells	The final product is battery	N
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N
	By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked		N

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
9.2	**Battery marking**		P
	Batteries marked as specified in IEC 61960, except for coin batteries		P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement		N
	Terminals have clear polarity marking on the external surface of the battery		P
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		P
9.3	**Caution for ingestion of small cells and batteries**		P
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2		P
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package		N
9.4	**Other information**		P
	Storage and disposal instructions		P
	Recommended charging instructions	Information for recommended charging instructions mentioned in manufacturer's specifications.	P
10	**PACKAGING AND TRANSPORT**		
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3		N
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict

ANNEX A	**CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE**		
A.1	**General**		**P**
A.2	**Safety of lithium ion secondary battery**	Complied.	**P**
A.3	**Consideration on charging voltage**	Complied.	**P**
A.3.1	General	Charging voltage is 4.2V	P
A.3.2	Upper limit charging voltage	4.25V	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		N
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	4.25V applied.	N
A.4	**Consideration of temperature and charging current**		**P**
A.4.1	General		P
A.4.2	Recommended temperature range	See A.4.2.2.	P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied	Charging temperature declared by client is: 0-45℃	P
A.4.3	High temperature range	Not higher than the temperature range specific in this standard.	N
A.4.3.1	General		N
A.4.3.2	Explanation of safety viewpoint		N
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		N
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N
A.4.4	Low temperature range	Lower than the temperature range specific in this standard.	P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	-5℃ applied.	P
A.4.5	Scope of the application of charging current		N
A.4.6	Consideration of discharge		N

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
A.4.6.1	General		N
A.4.6.2	Final discharge voltage and explanation of safety viewpoint		N
A.4.6.3	Discharge current and temperature range		N
A.4.6.4	Scope of application of the discharging current		N
A.5	**Sample preparation**		**N**
A.5.1	General		N
A.5.2	Insertion procedure for nickel particle to generate internal short		N
A.5.3	Disassembly of charged cell		N
A.5.4	Shape of nickel particle		N
A.5.5	Insertion of nickel particle in cylindrical cell		N
A.5.5.1	Insertion of nickel particle in winding core		N
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N
A.5.6	Insertion of nickel particle in prismatic cell		N
A.6	**Experimental procedure of the forced internal short-circuit test**		N
A.6.1	Material and tools for preparation of nickel particle		N
A.6.2	Example of a nickel particle preparation procedure		N
A.6.3	Positioning (or placement) of a nickel particle		N
A.6.4	Damaged separator precaution		N
A.6.5	Caution for rewinding separator and electrode		N
A.6.6	Insulation film for preventing short-circuit		N
A.6.7	Caution when disassembling a cell		N
A.6.8	Protective equipment for safety		N
A.6.9	Caution in the case of fire during disassembling		N
A.6.10	Caution for the disassembling process and pressing the electrode core		N
A.6.11	Recommended specifications for the pressing device		N

IEC 62133-2: 2017			
Clause	Requirement – Test	Result - Remark	Verdict
ANNEX B	**RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS**		**P**
ANNEX C	**RECOMMENDATIONS TO THE END-USERS**		**P**
ANNEX D	**MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS**		**N**
D.1	**General**		N
D.2	**Method**		N
	A sample size of three coin cells is required for this measurement.....:	(See appended table D.2)	N
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N
ANNEX E	**PACKAGING AND TRANSPORT**		**P**
ANNEX F	**COMPONENT STANDARDS REFERENCES**		**P**

	TABLE: List of critical components				P
Object/part No.	Manufacturer/ trademark	Type/model	Technical data	Standard (Edition / year)	Mark(s) of conformity[1])
Cell	BJY	18650	DC 3.7V, 1200mAh	IEC 62133-2: 2017	Test with appliance
1) An asterisk indicates a mark which assures the agreed level of surveillance.					

7.2.1	TABLE: Continuous charging at constant voltage (cells)			P
Sample No.	**Recommended charging voltage V_c, (Vdc)**	**Recommended charging current I_{rec}, (mA)**	**OCV at start of test, (Vdc)**	**Results**
Cell- 01	4.20	600	4.19	No fire or explosion, No leakage
Cell- 02	4.20	600	4.19	
Cell- 03	4.20	600	4.19	
Cell- 04	4.20	600	4.19	
Cell- 05	4.20	600	4.19	
Supplementary information: - No fire or explosion - No leakage - Others (please explain)				

7.2.2	TABLE: Moulded case stress at high ambient temperature (battery)		N
Sample No.	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Results**
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--	--	--	
--	--	--	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)			

7.3.1	TABLE: External short circuit (cell)				P
Sample No.	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature (°C)**	**Results**
Charging temperature: -5℃					
Cell- 06	55.1	4.11	80.3	74.7	No fire or explosion
Cell- 07	55.1	4.11	81.5	77.5	
Cell- 08	55.1	4.11	75.4	80.5	
Cell- 09	55.1	4.12	76.9	75.2	
Cell- 10	55.1	4.12	82.4	79.5	
Charging temperature: 45℃					
Cell- 11	55.2	4.21	80.3	82.3	No fire or explosion
Cell- 12	55.2	4.21	81.5	81.5	
Cell- 13	55.2	4.21	75.4	84.2	
Cell- 14	55.2	4.21	76.9	78.2	
Cell- 15	55.2	4.21	82.4	76.5	
Supplementary information: - No fire or explosion - Others (please explain)					

7.3.2	TABLE: External short-circuit (battery)					P
Sample no.	**Ambient T (°C)**	**OCV before test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature (°C)**	**Component single fault condition**	**Results**
Battery- 04	22.9	4.17	80.3	74.6	S-C IC U1 pin 2-6	No fire or explosion
Battery- 05	22.9	4.17	81.5	77.4	S-C R1	
Battery- 06	22.9	4.17	75.4	22.9	--	
Battery- 07	22.9	4.17	76.9	23.0	--	
Battery- 08	22.9	4.17	82.4	23.1	--	
Supplementary information: - No fire or explosion - Others (please explain)						

7.3.5	TABLE: Crush (cells)			P
Sample no.	**OCV before test (Vdc)**	**OCV at removal of crushing force (Vdc)**	**Maximum force applied to the cell during crush (kN)**	**Results**
Charging temperature: -5℃				
Cell-29	4.12	4.11	13	No fire or explosion
Cell-30	4.11	4.11	13	
Cell-31	4.11	4.10	13	
Cell-32	4.12	4.11	13	
Cell-33	4.11	4.11	13	
Charging temperature: 45℃				
Cell- 34	4.21	4.21	13	No fire or explosion
Cell- 35	4.21	4.20	13	
Cell- 36	4.21	4.20	13	
Cell- 37	4.21	4.20	13	
Cell- 38	4.21	4.20	13	
Supplementary information: - No fire or explosion - Others (please explain)				

7.3.6	TABLE: Over-charging of battery			P
Constant charging current (A).....:		**2.4A**		—
Supply voltage (Vdc).....:		**5.88V**		—
Sample no.	**OCV before charging (Vdc)**	**Total charging time (minute)**	**Maximum outer case temperature (°C)**	**Results**
Battery- 12	3.33	46	26.3	No fire or explosion
Battery- 13	3.33	46	27.2	
Battery- 14	3.33	46	26.3	
Battery- 15	3.34	46	26.5	
Battery- 16	3.33	46	26.6	
Supplementary information: - No fire or explosion - Others (please explain)				

7.3.7	TABLE: Forced discharge (cells)			P
Sample no.	**OCV before application of reverse charge (Vdc)**	**Measured reverse charge I_t (mA)**	**Lower limit discharge voltage (Vdc)**	**Results**
Cell- 39	3.33	1200	-4.20	No fire or explosion
Cell- 40	3.33	1200	-4.20	
Cell- 41	3.33	1200	-4.20	
Cell- 42	3.33	1200	-4.20	
Cell- 43	3.32	1200	-4.20	

Supplementary information:
- No fire or explosion
- Others (please explain)

7.3.8.1	TABLE: Vibration				P
Sample no.	**OCV before test (Vdc)**	**OCV after test (Vdc)**	**Mass before test (g)**	**Mass after test (g)**	**Results**
Battery- 17	4.17	4.17	38.71	38.70	P
Battery- 18	4.17	4.17	38.27	38.27	P
Battery- 19	4.17	4.17	38.98	38.98	P

Supplementary information:
- No fire or explosion
- No rupture
- No leakage
- No venting
- Others (please explain)

7.3.8.2	TABLE: Mechanical shock				P
Sample no.	**OCV before test (Vdc)**	**OCV after test (Vdc)**	**Mass before test (g)**	**Mass after test (g)**	**Results**
Battery- 21	4.17	4.17	38.56	38.56	P
Battery- 22	4.17	4.17	38.48	38.48	P
Battery- 23	4.17	4.17	38.84	38.84	P

Supplementary information:
- No fire or explosion
- No rupture
- No leakage
- No venting
- Others (please explain)

7.3.9	TABLE: Forced internal short circuit (cells)				N
Sample no.	**Chamber ambient T (°C)**	**OCV before test (Vdc)**	**Particle location 1)**	**Maximum applied pressure (N)**	**Results**
Charging temperature: -5℃					
--	--	--	--	--	No fire or explosion
--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	
Charging temperature: 45℃					
--	--	--	--	--	No fire or explosion
--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	
--	--	--	--	--	

Supplementary information:

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
- Others (please explain)

D.2	TABLE: Internal AC resistance for coin cells			N
Sample no.	**Ambient T (°C)**	**Store time (h)**	**Resistance Rac (Ω)**	**Results 1)**
--	--	--	--	--
--	--	--	--	--
--	--	--	--	--

Supplementary information:

1) Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

Photo 1
Battery
[√] front
[ ] rear
[ ] right side
[ ] left side
[ ] top
[ ] bottom
[ ] internal

Photo 2
Battery
[ ] front
[√] rear
[ ] right side
[ ] left side
[ ] top
[ ] bottom
[ ] internal

Photo 3
Cell

[√] front

[ ] rear

[ ] right side

[ ] left side

[ ] top

[ ] bottom

[ ] internal

Photo 4
Cell

[ ] front

[√] rear

[ ] right side

[ ] left side

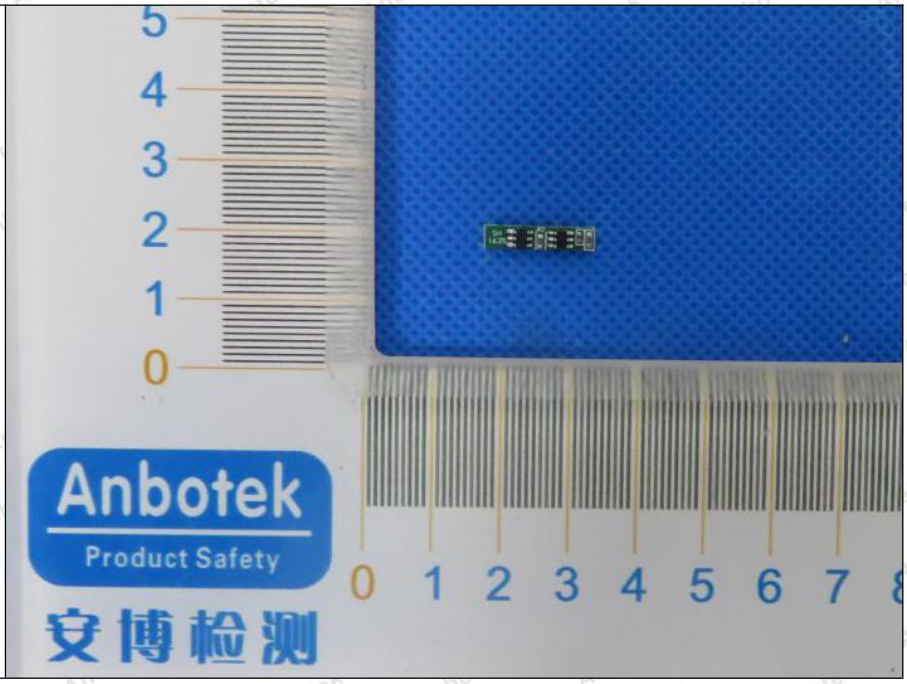
[ ] top

[ ] bottom

[ ] internal

Photo 5
PCM
[√] front
[ ] rear
[ ] right side
[ ] left side
[ ] top
[ ] bottom
[ ] internal

Photo 6
PCM
[ ] front
[√] rear
[ ] right side
[ ] left side
[ ] top
[ ] bottom
[ ] internal



End of the report