

Test Report

No.: SZXEC23003291301_2

Date: Sep 26, 2024

Page 1 of 5

Client Name:

Client Address:

Sample Name: 702040 500mAh 3.7V

Model No.: 702040 500mAh 3.7V

Client Ref. Information: Please see attachment

Sample Type: Portable non zinc air button battery

The above sample(s) and information were provided by the client.

THIS REPORT IS TO SUPERSEDE TEST REPORT NO.SZXEC23003291301_1, DATE: Jun 25, 2024.

SGS Job No.: SZP23-034369

Sample Receiving Date: Dec 28, 2023

Testing Period: Dec 28, 2023 ~ Jan 04, 2024

Test Requested: Select test(s) as requested by the client.

Test Method(s): Please refer to next page(s).

Test Result(s): Please refer to next page(s).

Test Requirement	Conclusion
Annex I of Regulation (EU) 2023/1542– Heavy Metals Content in batteries and waste batteries	Pass

Signed for and on behalf of

SGS-CSTC Standards Technical Services Co., Ltd. Shenzhen Branch

Ford

Ford Shi

Approved Signatory

scan to see the report



802A6AB5



SGS-CSTC Standards Technical Services Co., Ltd.
Shenzhen Branch Testing Center Chemical Laboratory

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Test Result(s):

Test Part Description:

SN ID	Sample No.	SGS Sample ID	Description
SN1	A	SZX23-0032913-0001	"702040 500mAh 3.7V"

Remarks:

- (1) 1 mg/kg = 1 ppm = 0.0001%
- (2) MDL = Method Detection Limit
- (3) ND = Not Detected (< MDL)
- (4) "-" = Not Regulated

Annex I of Regulation (EU) 2023/1542– Heavy Metals Content in batteries and waste batteries

Test Method: SGS In House Method, analysis was performed by ICP-OES or AAS or Hg-analyzer.

Test Item(s)	Limit	Unit(s)	MDL	A
Lead(Pb)	0.01	%	0.0010	ND
Cadmium(Cd)	0.002	%	0.0010	ND
Mercury(Hg)	0.0005	%	0.0001	ND
Conclusion				Pass

Notes:

Column 1 Designation of the substance or group of substances	Column 2 Conditions of restriction
1. Mercury CAS No 7439-97-6 EC No 231-106-7 and its compounds	Batteries, whether or not incorporated into appliances, light means of transport or other vehicles, shall not contain more than 0,0005 % of mercury (expressed as mercury metal) by weight
2. Cadmium CAS No 7440-43-9 EC No 231-152-8 and its compounds	Portable batteries, whether or not incorporated into appliances, light means of transport or other vehicles, shall not contain more than 0,002 % of cadmium (expressed as cadmium metal) by weight
3. Lead CAS No 7439-92-1 EC No 231-100-4 and its compounds	1. From 18 August 2024, portable batteries, whether or not incorporated into appliances, shall not contain more than 0,01 % of lead (expressed as lead metal) by weight. 2. The restriction set out in point 1 shall not apply to portable zinc-air button cells until 18 August 2028.

Remark: This report updates Client Ref.Info.

Unless otherwise stated, the decision rule for conformity reporting is based on Binary Statement for Simple Acceptance Rule (w=0) stated in ILAC-G8:09/2019.



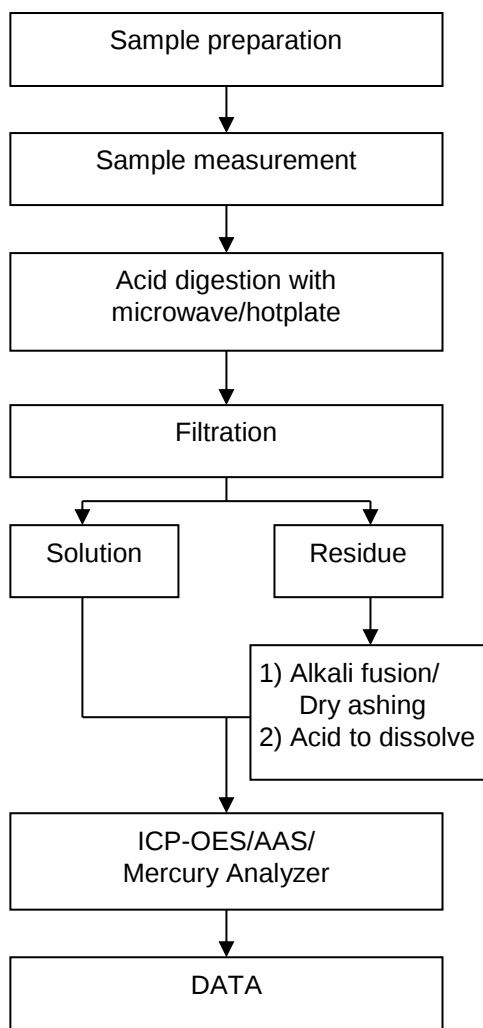
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Battery Testing Flow Chart



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Attachment:

103040 102050 103250 103035 103450 102540
 102535 103030 103665 104050 113440 113572
 113575 131670 102260 103250 102428 102060
 242626
 362220 320922 392027 352530 302020 382224
 353038 301730 350830 361525 303025 302027
 302030 362121 392121 352224 302248 302323
 303038 383038 363759 303040
 450938 482525 402050 423038 450830 402027p
 482628 401730 401450 402035 402535 403040
 401525 453035 401030 402550 402570 403048
 451730 451030 403030 402510 402513 400830
 450830 400930 451030 421230 421430 401520
 481525 451626 401730 402025 402027 402028
 402030 402040 452525 452535 402844 403035
 423038 483040 403048 423343 403450 401525
 4025100 4025130
 551430 562044 501525 503040 523035 502030
 501220 501228 502560 502638 542258 552025
 502535 503035 582040 523450 501045 551035
 502035 522024 501139 550938 505573 500947
 580948 501030 551035 501038 501045 551151
 551430 501518 551626 501730 562025 502025
 592028 582030 582040 552040 562045 502045
 572224 542256 502339 502447 582728 503035
 553190 523450 503759
 602035 602535 602920 602030 602248 603030
 601550 602560 602040 602530 602840 602025
 642030 603040 603450 651144 602530 602025p
 621324 601430 601515 602020 602035 611730p
 602550 602921 602626 603442 653667 601735
 702025 702525 751635 702040 701220 752535
 723749 723060 702020 701144 753040 701834P
 721515 701429 783040 702030 762040 702119p
 702535 753035 701020 701635 751635 751517P
 753040 752030 752035 702050 722339 702530
 723060 703667 723749 721517 701145 751520p
 721515HP
 852148 852535 801832 802030 801438 802525
 802025 801350 802535 803048 822024 802024
 802430 803450 851535 803040 801722 801934
 801990 802035 802040 802064 852149 802530
 802540 802938 803035 803245 801225
 902025 902030 951535 952626 952050 902040
 902050 902525 954292 901854 951331 901530
 901834 901854 902020 902035 952235 952525
 952626



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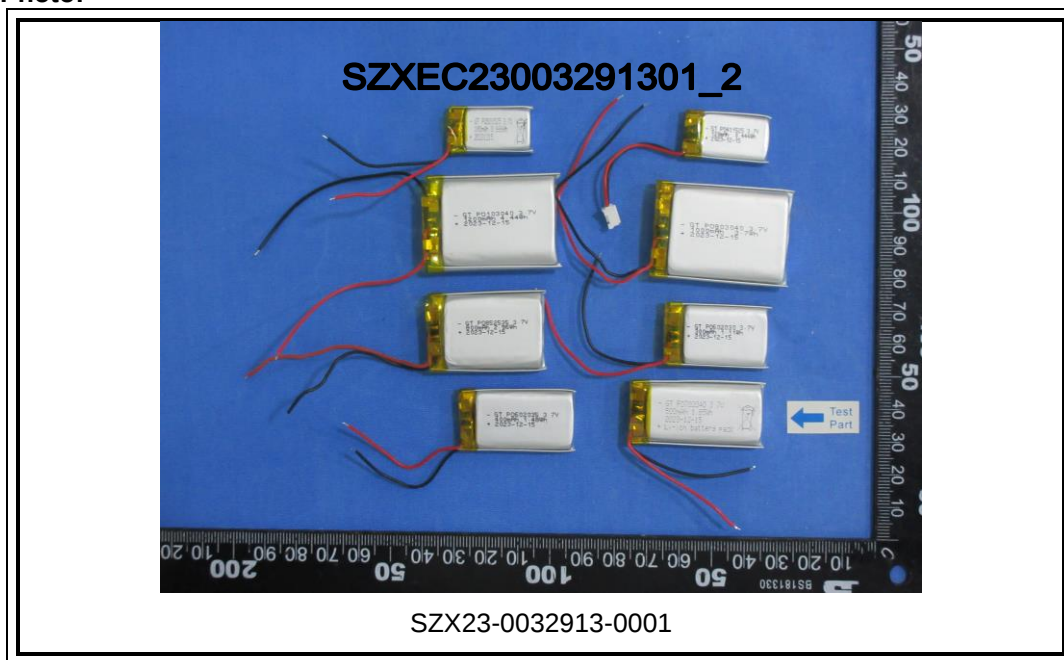
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Date: Sep 26, 2024

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Sample Photo:



SGS authenticate the photo on original report only
*** End of Report ***



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	Test Report issued under the responsibility of: NCB TÜV SÜD PSB Pte. Ltd. 15 International Business Park, TÜV SÜD@IBP Singapore 609937 Singapore	
TEST REPORT IEC 62133-2 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 Number.: 085-28224158-000 Date of issue: 2024-05-23 Total number of pages.....: 24 pages		
Name of Testing Laboratory preparing the Report.....: Guangzhou CPUP Certification Technology Service Co., Ltd.		
Applicant's name: Address:		
Test specification: Standard.....: IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021 Test procedure: CB Scheme Non-standard test method: N/A		
TRF template used: IECEE OD-2020-F1:2021, Ed.1.4 Test Report Form No.: IEC62133_2C Test Report Form(s) Originator: DEKRA Certification B.V. Master TRF.....: Dated 2022-07-01		
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General disclaimer: 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 NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.		

Test item description..... :	Rechargeable Li-ion Battery	
Trade Mark(s) :	N/A	
Manufacturer :	Same as the applicant	
Model/Type reference :	GT PO502030	
Ratings :	3.7Vd.c., 200mAh	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):		
☒	CB Testing Laboratory:	Guangzhou CPUP Certification Technology Service Co., Ltd.
Testing location/ address..... :		Room C101/C102/C103/C104, No.9, Hengji Road, Yunxing Zhukeng, Shiqiao Street, Panyu District, Guangzhou, Guangdong, China
Tested by (name, function, signature)..... :		Tracy Chen Project Handler
Approved by (name, function, signature)... :		Leo Zhi Project Reviewer
☐	Testing procedure: CTF Stage 1:	
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Approved by (name, function, signature)... :		
☐	Testing procedure: CTF Stage 2:	
Testing location/ address..... :		
Tested by (name + signature) :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature)... :		
☐	Testing procedure: CTF Stage 3:	
☐	Testing procedure: CTF Stage 4:	
Testing location/ address..... :		
Tested by (name, function, signature)..... :		
Witnessed by (name, function, signature) . :		
Approved by (name, function, signature)... :		
Supervised by (name, function, signature) :		

List of Attachments (including a total number of pages in each attachment): Attachment No.1: 3 pages of (Republic of Korea) NATIONAL DIFFERENCES Attachment No.2: 5 pages of Photo Documentation	
Summary of testing:	
Tests performed (name of test and test clause): Tests are made with the number of samples specified in Table 1 of IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021. Cl. 7.2.1 Continuous charging at constant voltage (cells) Cl. 7.2.2 Case stress at high ambient temperature (battery) Cl. 7.3.1 External short circuit (cell) Cl. 7.3.2 External short circuit (battery) Cl. 7.3.3 Free fall Cl. 7.3.4 Thermal abuse (cells) Cl. 7.3.5 Crush (cells) Cl. 7.3.6 Over-charging of battery Cl. 7.3.7 Forced discharge (cells) Cl. 7.3.8.1 Vibration Cl. 7.3.8.2 Mechanical shock Cl. 7.3.9 Design evaluation – Forced internal short-circuit (cells) The samples comply with the requirements of IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021.	Testing location: Guangzhou CPUP Certification Technology Service Co., Ltd. Address: Room C101/C102/C103/C104, No.9, Hengji Road, Yunxing Zhukeng, Shiqiao Street, Panyu District, Guangzhou, Guangdong, China
Summary of compliance with National Differences (List of countries addressed): Republic of Korea ☒ The product fulfils the requirements of EN 62133-2:2017; EN 62133-2:2017/A1:2021.	
Use of uncertainty of measurement for decisions on conformity (decision rule) : ☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method"). ☐ Other:... (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)	
Information on uncertainty of measurement: The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE. IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer. Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

Rechargeable Li-ion Battery 2024-04-09
GT PO502030 (1INP5/20/31)
3.7Vd.c., 200mAh, 0.74Wh Red+, Black-
CAUTION

- Do not disassemble or modify
- Keep out of reach of Children



Remark: "2024-04-09" means the manufacture date is April. 09, 2024. This date is not the manufacture date of actual products and only for example.

Test item particulars.....:	
Classification of installation and use.....:	Used in portable applications
Supply Connection	Supplied by lead wires
Recommend charging method declared by the manufacturer	Charge at constant current 40mA until voltage reaches 4.20V, then charge at constant voltage 4.20V till charge current is 10mA.
Discharge current (0,2 It A)	40mA
Specified final voltage.....	3.0V
Upper limit charging voltage per cell.....	4.20V
Maximum charging current	200mA
Charging temperature upper limit	55°C
Charging temperature lower limit.....	10°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	2024-04-11
Date (s) of performance of tests	2024-04-11 to 2024-04-30
General remarks:	
"(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.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC62133:	
The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided :	☐ Yes ☒ Not applicable
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies) : Same as the applicant	

General product information and other remarks:

1. The Rechargeable Li-ion Battery, Model GT PO502030 is used for portable appliance and consists of single cell, cell model: GT PO502030 . The cell is tested with battery.

2. Additionally, detailed information of the cell and battery are as following:

Product name	Rechargeable Li-ion Cell	Rechargeable Li-ion Battery
Type/model	GT PO502030	GT PO502030
Nominal voltage	3.7Vd.c.	3.7Vd.c.
Rated capacity	200mAh	200mAh
Charging voltage recommended by manufacturer	4.20V	4.20V
Upper limit charging voltage	4.20V	4.20V
Final voltage	3.0V	3.0V
Charging current declared by manufacturer	40mA	40mA
Maximum charging current	200mA	200mA
Charging temperature upper limit	55°C	55°C
Charging temperature lower limit	10°C	10°C
First charging procedure (20°C ± 5°C)	Charge at constant current 40mA until voltage reaches 4.20V, then charge at constant voltage 4.20V till charge current is 10mA.	Charge at constant current 40mA until voltage reaches 4.20 V, then charge at constant voltage 4.20V till charge current is 10mA.
Second charging procedure	After stabilization for 1h to 4h at 10°C and 60°C, respectively, cells are charged at constant current 200mA until voltage reaches 4.20V, then charge at constant voltage 4.20V till charge current reduced to 0.05 It A (10mA).	-
Dimensions(mm)	Max.5.0mm(T)×Max.20.0mm(W) ×Max.30.5mm(H)	Max.5.0mm(T)×Max.20.5mm(W) ×Max.32.0mm(H)
Weight (g)	Approx. 4.3g	Approx. 4.7g
Lower limit discharge voltage	2.3V	-
Maximum discharging current	200mA	200mA
Discharging temperature range	-20°C to 55°C	-20°C to 55°C
Cell configuration	-	1S1P

Remark:

The final evaluation of the battery must be conducted in the end product for which the battery will be used.

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
4	PARAMETER MEASUREMENT TOLERANCES		P
	Parameter measurement tolerances		P
5	GENERAL SAFETY CONSIDERATIONS		P
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 externally exposed metal surfaces	N/A
	Insulation resistance (MΩ) :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate clearances 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		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/A
5.4	Temperature, voltage and current management		P
	Batteries are designed such that abnormal temperature rise conditions are prevented		P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		P
	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		P
5.5	Terminal contacts		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		N/A
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance		N/A
	Terminal contacts are arranged to minimize the risk of short circuits		N/A
5.6	Assembly of cells into batteries		P
5.6.1	General		P
	Each battery has 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		P
	This protection may be provided external to the battery such as within the charger or the end devices		P
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		P
	If there is more than one battery housed in a single battery case, each battery has protective circuitry that can maintain the cells within their operating regions		N/A
	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		N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application	Considered in end-device	N/A
	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		N/A
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		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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/A
	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/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage are not counted as an overcharge protection		N/A
	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		N/A
	It is recommended that the cells and cell blocks are not discharged beyond the cell manufacturer's specified final voltage	Considered in end-device	N/A
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry are incorporated into the battery management system		N/A
5.6.3	Mechanical protection for cells and components of batteries	Considered in end-device	N/A
	Mechanical protection for cells, cell connections and control circuits within the battery are provided to prevent damage as a result of intended use and reasonably foreseeable misuse		N/A
	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		N/A
	The battery case and compartments housing cells are designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer		N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product is considered when conducting mechanical tests		N/A
5.7	Quality plan		P

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Clause	Requirement + Test	Result - Remark	Verdict
	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		N/A

6	TYPE TEST AND SAMPLE SIZE		P
	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
	The internal resistance of coin cells are measured in accordance with Annex D. Coin cells with internal resistance less than or equal to 3 Ω are tested in accordance with Table 1		N/A
	Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C $\pm$ 5 °C		P
	The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and over discharge protection		P
	When conducting the short-circuit test, consideration is 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		P
7.1	Charging procedure for test purposes		P
7.1.1	First procedure		P
	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 °C $\pm$ 5 °C, using the method declared by the manufacturer		P
	Prior to charging, the battery has been discharged at 20 °C $\pm$ 5 °C 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

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Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h to 4 h, at an ambient temperature of the highest test temperature and the lowest test temperature, respectively, 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 current to constant voltage charging method		P
7.2	Intended use		P
7.2.1	Continuous charging at constant voltage (cells)		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)	The test is specially requested by Applicant.	P
	Oven temperature (°C)..... :	70 °C ± 2 °C	—
	Results: no physical distortion of the battery case resulting in exposure of internal protective components and cells		P
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/A
	- 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
	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		P
	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
	A single fault in the discharge protection circuit is conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test		P

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Clause	Requirement + Test	Result - Remark	Verdict
	A single fault applies to protective component parts such as MOSFET (metal oxide semiconductor field-effect transistor), fuse, thermostat or positive temperature coefficient (PTC) thermistor		P
	Results: no fire, no explosion..... :	(See appended table 7.3.2)	P
7.3.3	Free fall		P
	Results: no fire, no explosion		P
7.3.4	Thermal abuse (cells)		P
	Oven temperature (°C) :	130°C±2°C	—
	Results: no fire, no explosion		P
7.3.5	Crush (cells)		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/A
	Results: no fire, no explosion..... :	(See appended table 7.3.5)	P
7.3.6	Over-charging of battery		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/A
	- 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 °C change in 30-minute period); or		N/A
	- Returned to ambient		P
	Results: no fire, no explosion..... :	(See appended table 7.3.6)	P
7.3.7	Forced discharge (cells)		P
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer		P
	The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage		P

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Clause	Requirement + Test	Result - Remark	Verdict
	- 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/A
	- 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		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		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)		P
	The cells complied with national requirement for :	France, Japan, Korea, Switzerland	—
	The pressing was stopped upon:		P
	- A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	400N	P
	Results: no fire..... :	(See appended table 7.3.9)	P
8	INFORMATION FOR SAFETY		P
8.1	General		P
	Manufacturers of secondary cells provides information about current, voltage and temperature limits of their products		P
	Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users		P
	Systems analyses are performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis is provided to the end user		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Do not allow children to replace batteries without adult supervision		P
8.2	Small cell and battery safety information		P
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:		P
	- Keep small cells and batteries which are considered swallowable out of the reach of children		P
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		P
	- In case of ingestion of a cell or battery, seek medical assistance promptly		P
9	MARKING		P
9.1	Cell marking		N/A
	Cells are marked as specified in IEC 61960, except coin cells		N/A
	Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity		N/A
	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/A
9.2	Battery marking		P
	Batteries are marked as specified in IEC 61960, except for coin batteries	Battery marked as specified in IEC 61960-3:2017	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity		N/A
	Batteries are marked with an appropriate caution statement		P
	- Terminals have clear polarity marking on the external surface of the battery, or		P
	- Not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	Caution for ingestion of small cells and batteries		N/A
	Coin cells and batteries identified as small batteries include a caution statement regarding the hazards of ingestion in accordance with 8.2	Not Coin batteries	N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion is given on the immediate package	Not for direct sale in consumer-replaceable applications	N/A
9.4	Other information		P
	The following information are marked on or supplied with the battery:		P
	- Storage and disposal instructions		P
	- Recommended charging instructions		P
10	PACKAGING AND TRANSPORT		N/A
	Packaging for coin cells are not be small enough to fit within the limits of the ingestion gauge of Figure 3		N/A
ANNEX A	CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE		P
A.1	General		P
A.2	Safety of lithium ion secondary battery		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage		P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		P
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range		P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		P
A.4.3	High temperature range		N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint	Considered in end-device	N/A
A.4.3.3	Safety considerations when specifying charging conditions in the high temperature range		N/A
A.4.3.4	Safety considerations when specifying a new upper limit in the high temperature range		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
A.4.4	Low temperature range		N/A
A.4.4.1	General		N/A
A.4.4.2	Explanation of safety viewpoint	Considered in end-device	N/A
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		N/A
A.4.5	Scope of the application of charging current		P
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint	Considered in end-device	N/A
A.4.6.3	Discharge current and temperature range	Considered in end-device	N/A
A.4.6.4	Scope of application of the discharging current		P
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle in winding core		N/A
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		N/A
A.5.6	Insertion of nickel particle in prismatic cell		P
A.6	Experimental procedure of the forced internal short-circuit test		P
A.6.1	Material and tools for preparation of nickel particle		N/A
A.6.2	Example of a nickel particle preparation procedure		N/A
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P

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Clause	Requirement + Test	Result - Remark	Verdict
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P
ANNEX B	RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS		P
ANNEX C	RECOMMENDATIONS TO THE END-USERS		N/A
ANNEX D	MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS		N/A
D.1	General		N/A
D.2	Method		N/A
	A sample size of three coin cells is required for this measurement		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
	Coin cells with an internal resistance less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
ANNEX E	PACKAGING AND TRANSPORT		N/A
ANNEX F	COMPONENT STANDARDS REFERENCES		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

7.2.1	TABLE: Continuous charging at constant voltage (cells)				P
Sample No.	Recommended charging voltage Vc (Vdc)	Recommended charging current I _{rec} (A)	OCV before test (Vdc)	Results	
C1#	4.20	0.04	4.174	A, B	
C2#	4.20	0.04	4.173	A, B	
C3#	4.20	0.04	4.175	A, B	
C4#	4.20	0.04	4.175	A, B	
C5#	4.20	0.04	4.174	A, B	
Supplementary information: A - No fire or explosion B - No leakage C - 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 rise ΔT (°C)	Results
Samples charged at charging temperature upper limit					
C6#	55.5	4.150	84	117.4	A
C7#	55.5	4.155	86	120.8	A
C8#	55.5	4.154	87	110.6	A
C9#	55.5	4.153	85	117.6	A
C10#	55.5	4.154	83	115.4	A
Samples charged at charging temperature lower limit					
C11#	55.5	4.074	88	117.5	A
C12#	55.5	4.071	84	115.8	A
C13#	55.5	4.075	85	108.4	A
C14#	55.5	4.073	82	116.4	A
C15#	55.5	4.072	86	109.9	A
Supplementary information: A - No fire or explosion B - Others (please explain)					

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict

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 rise ΔT (°C)	Component single fault condition	Results
B1#	22.3	4.168	82	22.5	No	A
B2#*	22.4	4.170	88	40.0	Yes	A
B3# *	22.4	4.170	85	40.9	Yes	A
B4# **	22.3	4.169	84	22.6	Yes	A
B5# **	22.3	4.170	87	22.5	Yes	A
Supplementary information: A - No fire or explosion B - Others (please explain) * MOSFET(Q1) pin1 & pin3 was short circuited ** PTC(F1) was short circuited						

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	
Samples charged at charging temperature upper limit					
C26#	4.155	4.153	12.93	A	
C27#	4.158	4.155	12.95	A	
C28#	4.160	4.157	12.98	A	
C29#	4.159	4.157	12.94	A	
C30#	4.157	4.155	12.92	A	
Samples charged at charging temperature lower limit					
C31#	4.080	4.078	12.96	A	
C32#	4.082	4.080	12.94	A	
C33#	4.079	4.076	12.97	A	
C34#	4.078	4.075	12.95	A	
C35#	4.081	4.079	12.94	A	
Supplementary information:					
A - No fire or explosion					
B - Others (please explain)					

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.6	TABLE: Over-charging of battery			P
Constant charging current (A)		0.4		—
Supply voltage (Vdc)		5.88		—
Sample No.	OCV before charging (Vdc)	Total charging time (minute)	Maximum outer case temperature (°C)	Results
B6#	3.445	266	29.3	A
B7#	3.448	266	29.4	A
B8#	3.442	266	29.3	A
B9#	3.447	266	28.8	A
B10#	3.446	266	29.0	A
Supplementary information: A - No fire or explosion B - 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 (A)	Lower limit discharge voltage (Vdc)	Results
C36#	3.012	0.2	2.3	A
C37#	3.017	0.2	2.3	A
C38#	3.015	0.2	2.3	A
C39#	3.014	0.2	2.3	A
C40#	3.012	0.2	2.3	A
Supplementary information: A - No fire or explosion B - Others (please explain)				

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Clause	Requirement + Test	Result - Remark	Verdict

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	
B11#	4.170	4.163	4.606	4.604	A, B, C, D	
B12#	4.168	4.162	4.624	4.622	A, B, C, D	
B13#	4.168	4.161	4.643	4.641	A, B, C, D	
Supplementary information: A - No fire or explosion B - No rupture C - No leakage D - No venting E - 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	
B14#	4.169	4.167	4.625	4.624	A, B, C, D	
B15#	4.170	4.168	4.638	4.636	A, B, C, D	
B16#	4.168	4.167	4.602	4.602	A, B, C, D	
Supplementary information: A - No fire or explosion B - No rupture C - No leakage D - No venting E - Others (please explain)						

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Clause	Requirement + Test	Result - Remark	Verdict

7.3.9	TABLE: Forced internal short circuit (cells)					P
Sample No.	Chamber ambient T (°C)	OCV before test (Vdc)	Particle location ¹⁾	Maximum applied pressure (N)	Results	
Samples charged at charging temperature upper limit						
C44#	60	4.151	1	400	A	
C45#	60	4.153	1	400	A	
C46#	60	4.154	1	400	A	
C47#	60	4.152	1	400	A	
C48#	60	4.155	1	400	A	
Samples charged at charging temperature lower limit						
C49#	10	4.072	1	400	A	
C50#	10	4.075	1	400	A	
C51#	10	4.074	1	400	A	
C52#	10	4.071	1	400	A	
C53#	10	4.073	1	400	A	
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. Remark: there is no particle location 2 for this cell. A - No fire B - Others (please explain)						

D.2	TABLE: Internal AC resistance for coin cells				N/A
Sample no.	Ambient T (°C)	Store time (h)	Resistance Rac (Ω)	Results ¹⁾	
Supplementary information: ¹⁾ Coin cells with an internal resistance less than or equal to 3 Ω, see test result on corresponding tables according to Clause 6 and Table 1.					

IEC 62133-2						
Clause	Requirement + Test		Result - Remark		Verdict	
	TABLE: Critical components information					P
Object / part No.	Manufacturer/ trademark	Type / model	Technical data	Standard	Mark(s) of conformity ¹⁾	
1. Rechargeable Li-ion Cell		GT PO502030	3.7Vd.c., 200mAh	IEC 62133-2:2017, IEC 62133-2:2017/AM D1:2021	Tested with battery	
-Electrolyte	Hunan Dajing New Material Co., Ltd	DJ60G3	LiPF ₆ , EC, EMC, DMC, DEC, PC, VC	-	-	
-Separator	Shenzhen Jinglitai Technology Co., Ltd	16μm(T)×26mm(W)×470mm(L)	PP/PE/PP	-	-	
-Positive electrode		0.125mm(T)×23mm(W)×261mm(L)	LiNiCoMnO ₂ , PVDF, SP, Aluminium Foil	-	-	
-Negative electrode		0.115mm(T)×24mm(W)×230mm(L)	Graphite, SBR, CMC, SP, Copper Foil	-	-	
-Aluminium plastic film	Jiangsu Gongju Lithium Battery Materials Co., Ltd.	0.113*480	Nylon, PP, Aluminium	-	-	
2. IC (U1)	Dongguan hundred power supply technology Co., Ltd.	DW01A	Overcharge detection Voltage: 4.28V±0.050V; Overdischarge detection voltage: 2.40V±0.100V;	IEC 62133-2:2017, IEC 62133-2:2017/AM D1:2021	Tested with battery	
3. MOSFET (U2)	Dongguan hundred power supply technology Co., Ltd.	8205A	V _{DS} : 16V, V _{GS} : ±12V, I _D : 5A@T _A =25°C	IEC 62133-2:2017, IEC 62133-2:2017/AM D1:2021	Tested with battery	
4. PTC (F1)	Jinrui Electronic material	JK-nSMD150L	V _{max} : 6.0V, I _{max} : 50.0A, I _{hold} : 1.5A, I _{trip} : 3.0A, R _{1max} : 0.065Ω	IEC 62133-2:2017, IEC 62133-2:2017/AM D1:2021	Tested with battery	
5. PCB Material	Dongguan hundred power supply technology Co., Ltd.	XLB-1S1436-PTC	FR4, 0.6mm thick	IEC 62133-2:2017, IEC 62133-2:2017/AM D1:2021	Tested with battery	

IEC 62133-2					
Clause	Requirement + Test			Result - Remark	Verdict
5. Wiring	HUIZHUO CITY JINFA ELECTRONIC TECHNOLOGY CO., LTD.	3302	28AWG, 300°C, 30V	IEC 62133-2:2017, IEC 62133-2:2017/AM D1:2021	Tested with battery
Supplementary information:					
1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.					

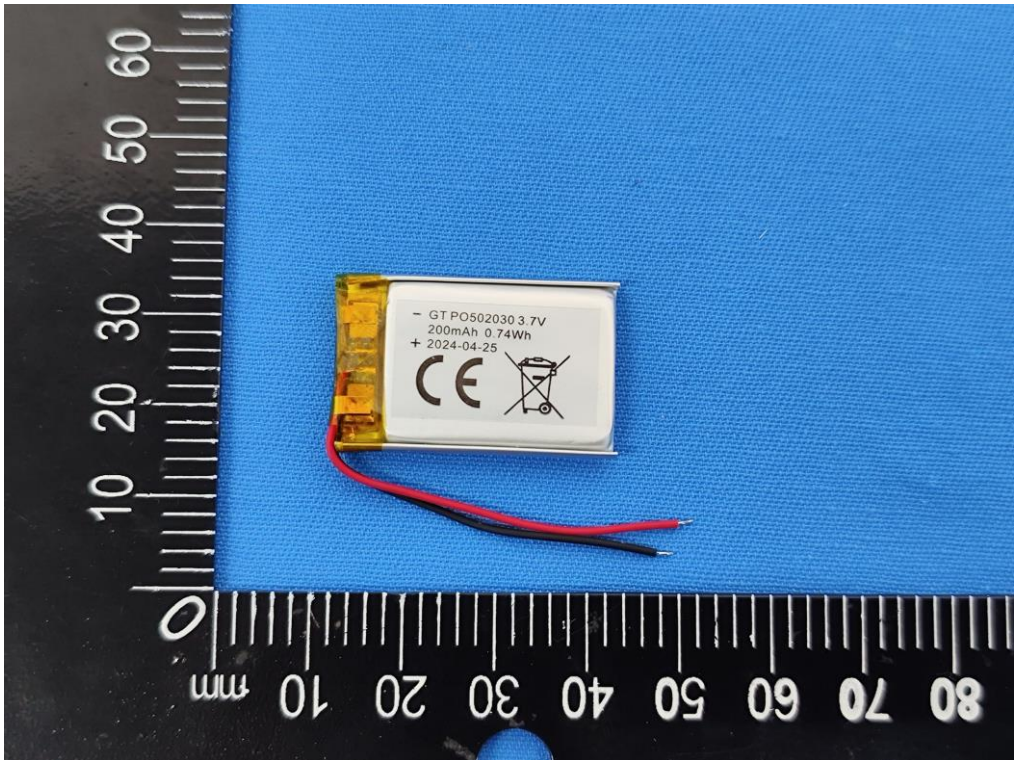
---End of report---

ATTACHMENT to IEC62133_2C			
Clause	Requirement + Test	Result - Remark	Verdict
ATTACHMENT TO TEST REPORT IEC 62133-2 (Republic of Korea) NATIONAL DIFFERENCES (Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems)			
Differences according to : National standard KC62133-2(2020-07)			
TRF template used:..... : IECEE OD-2020-F3:2022, Ed. 1.2			
Attachment Form No. : KR_ND_IEC62133_2C			
Attachment Originator : KTR			
Master Attachment..... : 2023-08-02			
Copyright © 2022 IEC System for Conformity Testing and Certification of Electrical Equipment (IECEE), Geneva, Switzerland. All rights reserved.			
	National Differences		P
7.3.6	Over-charging of battery		N/A
(Revision)	[Add the bolded text] b) Test The test shall be carried out in an ambient temperature of 20 °C ± 5 °C. Each test battery shall be discharged at a constant current of 0,2 I _A , to a final discharge voltage specified by the manufacturer. Sample batteries shall then be charged at a constant current of 2,0 I _A , using a supply voltage which is: • 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 • 1,2 times the upper limit charging voltage presented in Table A.1 per cell for series connected multi-cell batteries, and • sufficient to maintain a current of 2,0 I_A throughout the duration of the test or until the supply voltage is reached. <u>• In case the charging voltage specified by the manufacturer is higher than the overcharge test voltage, the maximum charging voltage specified by manufacturer should be applied with 2,0 I_A, (e.g., quick charging power bank, etc.)</u>	No this condition	N/A

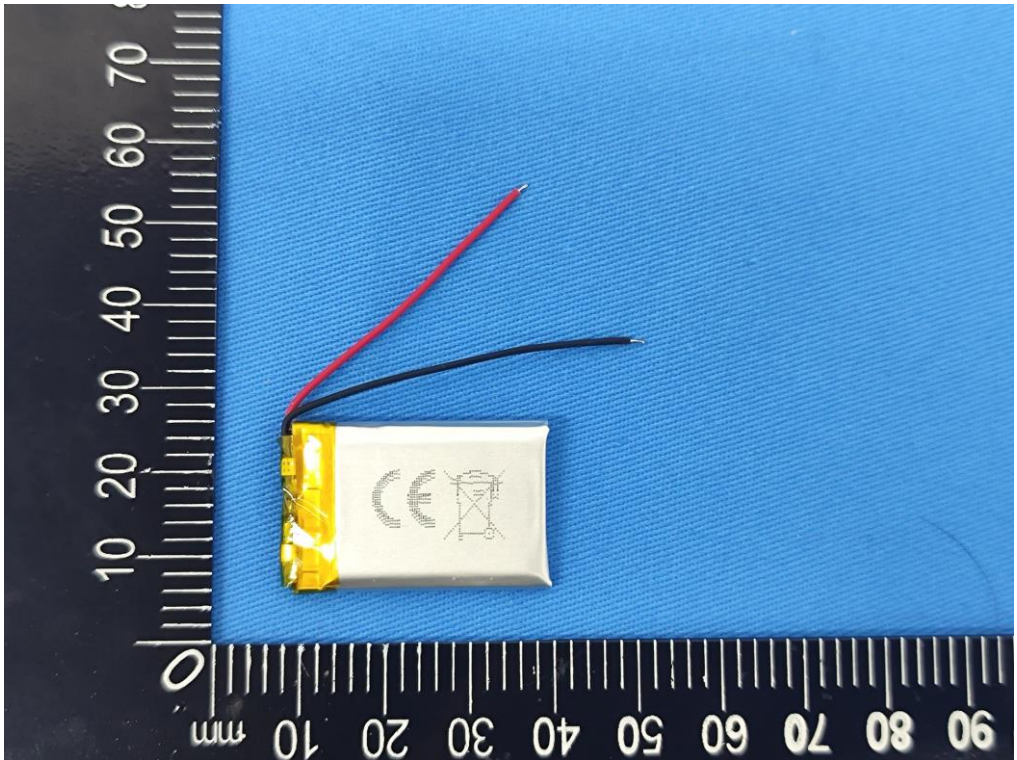
ATTACHMENT to IEC62133_2C			
Clause	Requirement + Test	Result - Remark	Verdict
	[Replace to the following statement] c) Acceptance criteria Filling beyond the manufacturer's specified limits should not result in ignition or explosion		N/A
Annex G	Definition for shape and materials of outer case for cell		—
(Addition)	G.1 General Annex G provides definitions for shape and materials of outer case for cell G.2 Shape of outer case for cell G 2.1 Cylindrical cell Cell with a cylindrical shape in which the overall height is equal to or greater than diameter. G 2.2 Prismatic cell Cell having the shape of a parallelepiped whose faces are rectangular G.3 Materials of outer case for cell G.3.1 Soft case Non-metallic outer case or container for cell G.3.2 Hard case Metallic outer case or container for cell.	(Shape of outer cases) ☐ Cylindrical ☒ Prismatic (Materials of outer cases) ☐ Hard ☒ Soft	—
Annex H	Calculation method of the volumetric energy density for cell		—
(Addition)	Annex H provide a calculation method of the volumetric energy density for cell in use of smart phone, tablet, notebook. H.1 General Unless otherwise stated in the Annex E, the dimensions for calculation are based on these for cell before shipment and the volumetric energy density shall be calculated with a maximum values specified by manufacturer. If the specification for cell can't be provided a dimension for calculation, the manufacturer's other documentation shall be provided to demonstrate compliance for its calculation.	Not in use of smart phone, tablet, notebook	—

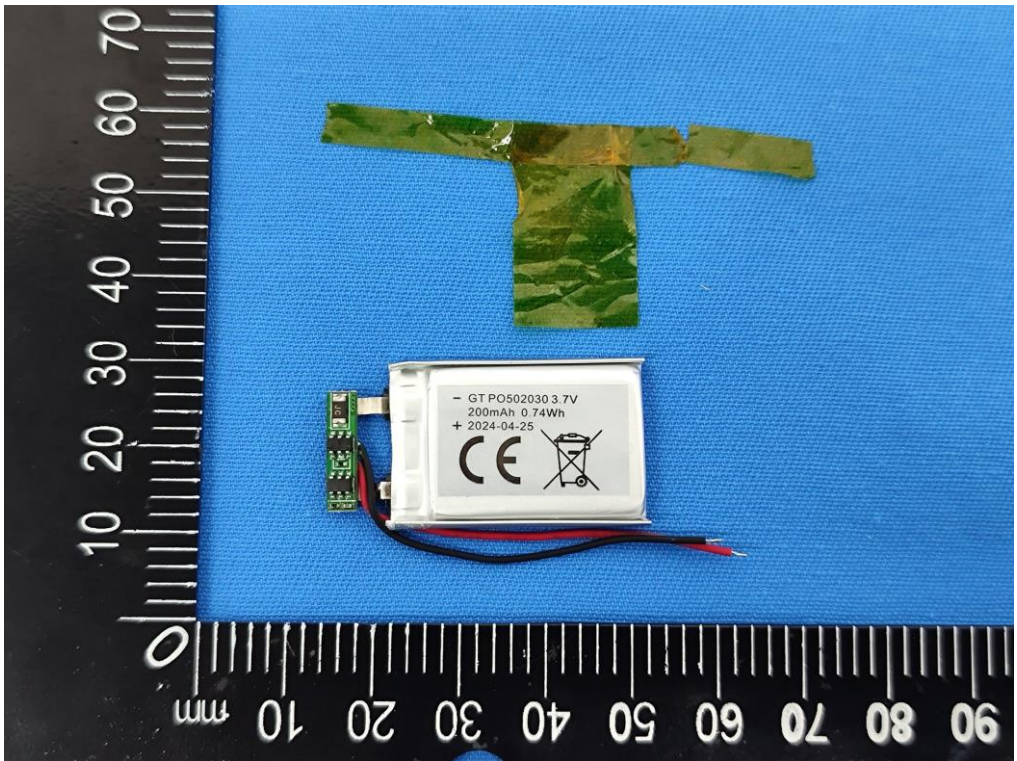
ATTACHMENT to IEC62133_2C			
Clause	Requirement + Test	Result - Remark	Verdict
	H.2 Calculation Method L : Length (max.) of cell (including terrace) W : Width (max.) of cell T : Thickness (max.) when shipping charge (For reference, Please Exclude the dimension of any tape that is attached to cell) $\text{Volumetric energy density (Wh/L)} = \frac{\text{Nominal voltage (V)} \times \text{Rated capacity (Ah)}}{\text{Length (L)} \times \text{Width (W)} \times \text{Thickness (T)}}$ [H.1 – Prismatic cell using soft case] L : Length (max.) of cell W : Width (max.) of cell T : Thickness when shipping charge (For reference, Please Exclude the dimension of any tape that is attached to cell) $\text{Volumetric energy density (Wh/L)} = \frac{\text{Nominal voltage (V)} \times \text{Rated capacity (Ah)}}{\text{Length (L)} \times \text{Width (W)} \times \text{Thickness (T)}}$ [H.2 – Prismatic cell using hard case] D : Diameter (max.) of cell L : Length (max.) of cell (According to shape of cell at shipping, The dimension of tube for cell may be included in overall dimension of cell) $\text{Volumetric energy density (Wh/L)} = \frac{\text{Nominal voltage (V)} \times \text{Rated capacity (Ah)}}{3.14159 \times \frac{\text{Diameter (D)}^2}{4} \times \text{Length (L)}}$ [H.3 – Cylindrical cell using hard case]		

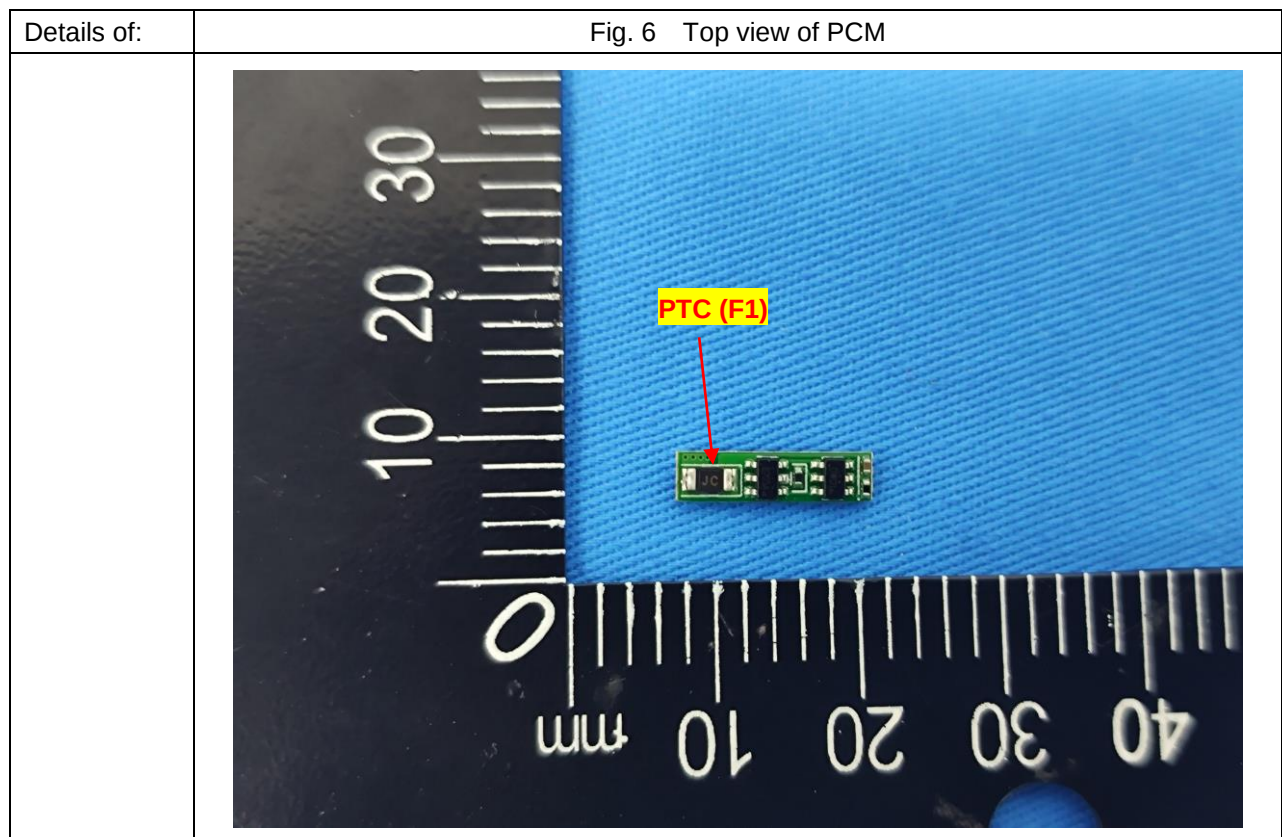
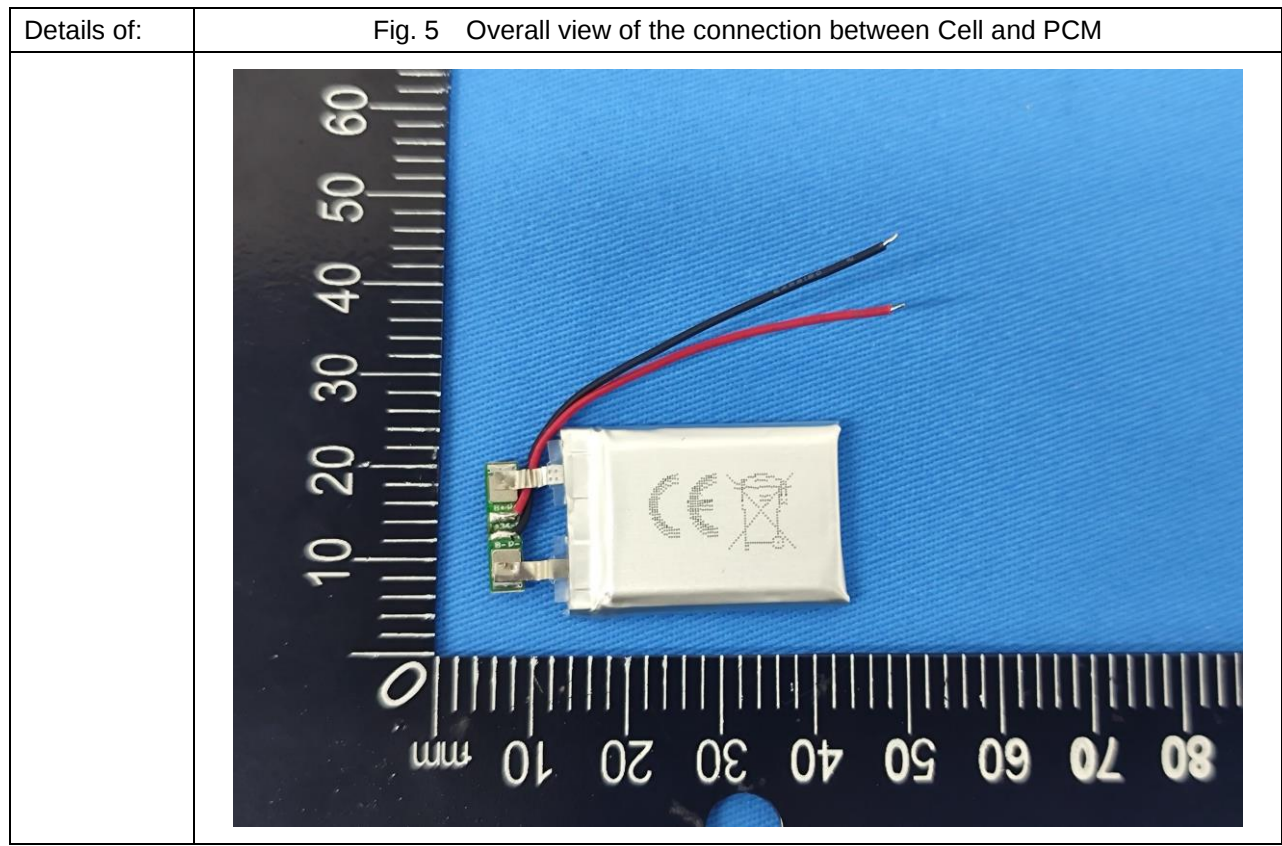
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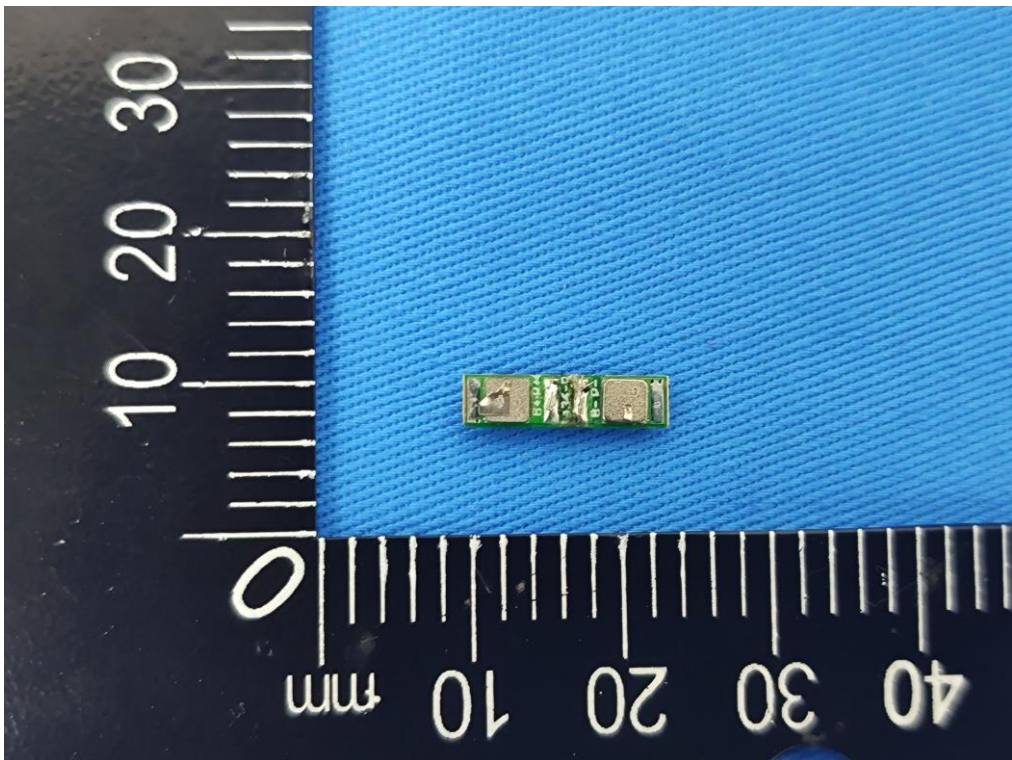
Details of:	Fig. 1 Overall view 1 of Rechargeable Li-ion Battery, Model GT PO502030
	

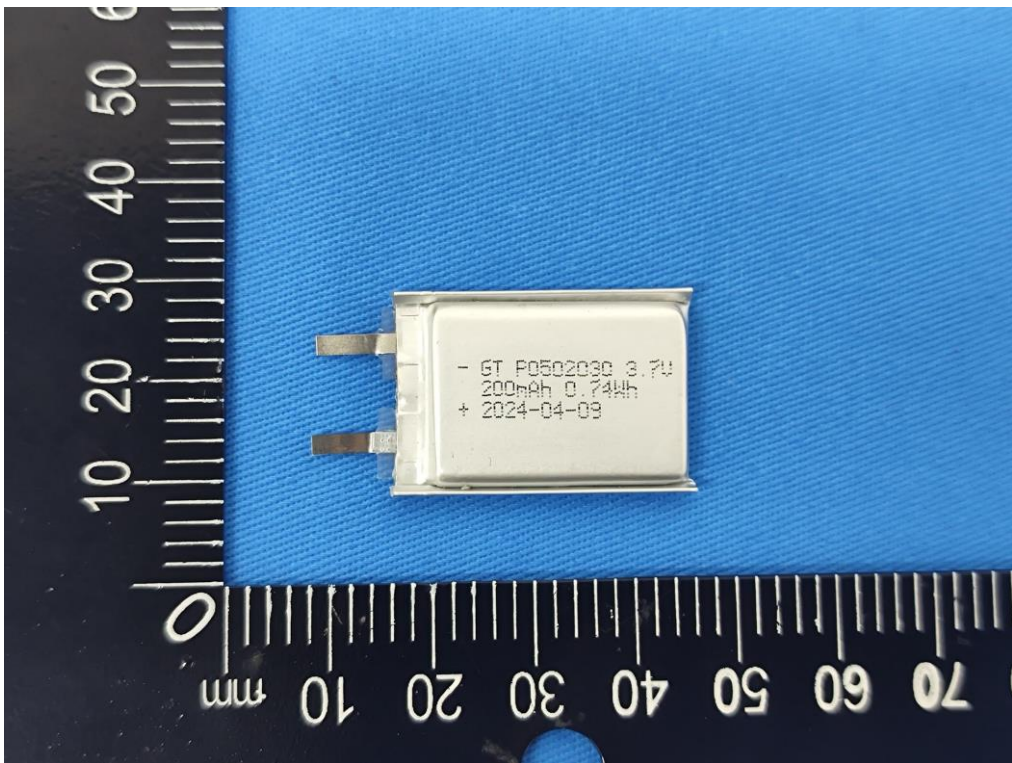
Details of:	Fig. 2 Label artwork of Rechargeable Li-ion Battery, Model GT PO502030
	The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks. Rechargeable Li-ion Battery 2024-04-09 GT PO502030 (1INP5/20/31) 3.7Vd.c., 200mAh, 0.74Wh Red+, Black- CAUTION -Do not disassemble or modify -Keep out of reach of Children  Remark: "2024-04-09" means the manufacture date is April. 09, 2024. This date is not the manufacture date of actual products and only for example.

Details of:	Fig. 3 Overall view 2 of Battery
	 A photograph showing a small, rectangular, white battery with a yellow label on the left side. The battery is placed on a blue surface next to a black ruler with white markings. The ruler shows measurements in millimeters (0 to 90) and centimeters (0 to 10). The battery has two wires extending from it: a red wire and a black wire. The battery label features a CE mark and a crossed-out trash can symbol.

Details of:	Fig. 4 Overall view of Battery with insulation tape removed
	 A photograph showing the same battery as in Fig. 3, but with the insulation tape removed. The battery is now white and rectangular. It is placed on a blue surface next to a black ruler with white markings. The ruler shows measurements in millimeters (0 to 90) and centimeters (0 to 10). The battery has two wires extending from it: a red wire and a black wire. The battery label features a CE mark, a crossed-out trash can symbol, and the following text: "GT P0502030 3.7V", "200mAh 0.74Wh", and "+ 2024-04-25". A piece of green and yellow tape is visible on the blue surface above the battery.



Details of:	Fig. 7 Bottom view of PCM
	

Details of:	Fig. 8 Overall view 1 of Rechargeable Li-ion Cell, Model GT PO502030
	

Details of:	Fig. 9 Overall view 2 of Cell

--End of photo documentation--