TEST REPORT

EN 62133: 2013

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

Report Number	TCT170718B001
Date of issue	2017-09-14
Total number of pages	18 Pages.
Tested by (name + signature)	Allen zeng
Inspected by (name + signature)	Carol Xiong
Approved by (name + signature)	Tomsin

Testing laboratory	Shenzhen TCT Testing Technology Co., Ltd.
Address	1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Bao'an District, Shenzhen, Guangdong, China
Testing location	As above

Applicant's name	HCB Battery Co., Ltd.
Address	Special No.1 Taizhong Avenue, Gaoqiao Industrial Pack, Wujianshan Economic Development Zone, Whhan, Hubei, China 430040
Manufacturer's name	HCB Battery Co., Ltd.
Address	Special No.1 Taizhong Avenue, Gaoqiao Industrial Pack, Wujianshan Economic Development Zone, Whhan, Hubei, China 430040

Test specification :

Standard	EN 62133: 2013
Test procedure	Type approved
Test result	Pass
Non-standard test method	N/A

This test report is specially limited to the above client company and product model only, It may not be duplicated without prior written consent of Shenzhen TCT Testing Technology Co., Ltd.

Test item description	Li-ion Cell
Trade Mark	HCB
Model/type reference	UPC1550
Ratings	3.67V, 156mAh, 0.57252Wh

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

Attachment 1: Critical components information (page 13)

Attachment 1: Photo documentation (page 18)

Summary of testing:

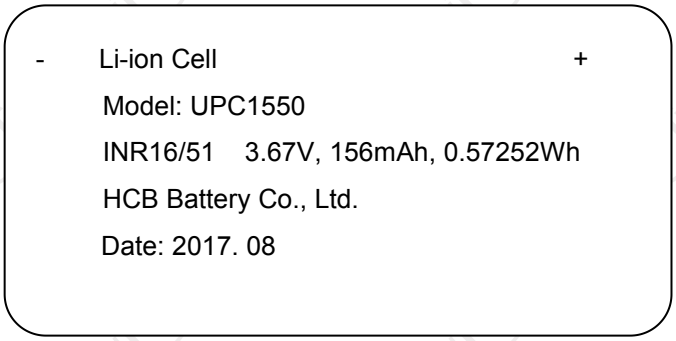
Tests performed (name of test and test clause):	**Testing location:**
cl.5.6.2 Design recommendation(Lithium system); cl.8.1 Charging procedure for test purposes (for Cells and Pack); cl.8.2.1 Continuous charging at constant voltage (Cells); cl.8.3.1 External short circuit (Cells); cl.8.3.3 Free fall (for Cells and Pack); cl.8.3.4 Thermal abuse (Cells); cl.8.3.5 Crush (Cells); cl.8.3.7 Forced discharge (Cells); cl.8.3.8 Transport tests (Cells); The electrolyte type of this cell doesn't belong to polymer, and the applicant declares that this cell isn't to be sold in France, Japan, Republic of Korea and Switzerland. Tests are made with the number of cells and batteries specified in EN 62133: 2013 (Second Edition) Table 2.	**Shenzhen TCT Testing Technology Co., Ltd.** 1B/F., Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Bao'an District, Shenzhen, Guangdong, China

Summary of compliance with National Differences:

☒ **The product fulfils the requirements of EN 62133: 2013**

Copy of marking plate:

The artwork below may be only a draft



Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

Test item particulars..... :	
Classification of installation and use.....:	To be defined in final product
Supply connection.....:	Electrode plate
Recommend charging method declared by the manufacturer.....:	Charging the battery with 50mA constant current until 3.95V and then constant voltage until charging current reduces to 1.56mA at ambient 20°C±5°C.
Discharge current (0,2 I_t A) .....:	31.2mA
Specified final voltage..... :	2.5V
Chemistry .....:	☐ nickel systems.....☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....:	3.95V
Maximum charging current..... :	50mA
Charging temperature upper limit.....:	30°C
Charging temperature lower limit..... :	15°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.....:	2017-07-18
Date (s) of performance of tests..... :	2017-07-20 to 2017-08-22

General remarks:

The test results presented in this report relate only to the object tested,
This report shall not be reproduced, except in full, without the written approval of the issuing testing laboratory,
"(CXX #)" refers to sample number of cells, "X" is 0~9;
"(BXX #)" refers to sample number of cells, "X" is 0~9;
"(see below table)" refers to a table appended to the report.

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

Name and address of factory (ies) ..... :	**Same as Applicant**

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

General product information:

The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte, case. The positive and negative electrode plates are housed in the case in the state being separated by the separator.

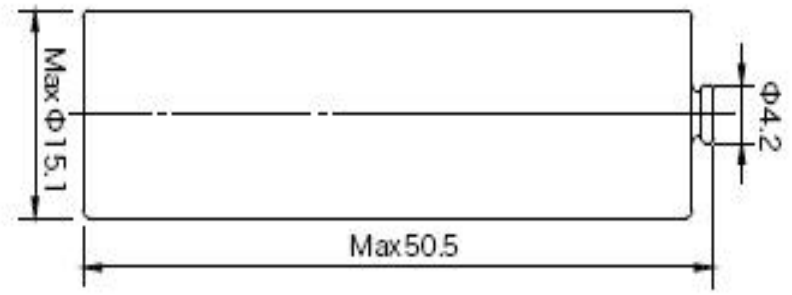
The main features of the cell are shown as below (clause 8.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
UPC1550	156mAh	3.67V	50mA	100mA	50mA	700mA	3.95V	2.5V

The main features of the cell are shown as below (clause 8.1.2):

Model	Upper limit charge voltage	Taper-off current (0.05 It A)	Lower charge temperature	Upper charge temperature
UPC1550	3.95V	7.8mA	15°C	30°C

Construction:



Cell (Unit: mm)

Circuit diagram:

None, Cell only.

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
4	**Parameter measurement tolerances**		**P**
	Parameter measurement tolerances		P
5	**General safety considerations**		**P**
5.1	General		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/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 creepage and clearance 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	Explosion-proof safety valve for venting exists.	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/current management		N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented	Cell only.	N/A
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		N/A
	Batteries are 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		N/A
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery	Special designed connector used. Also the connector construction designed wrong polarity insert prevented.	P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Electrode plate contacts complied with the requirements.	P

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	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 circuits		P
5.6	Assembly of cells into batteries		N/A
5.6.1	If there is more than one battery housed in a single battery case, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer	Cell only	N/A
	Each battery has an independent control and protection		N/A
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		N/A
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate separate circuitry to prevent the cell reversal caused by uneven discharges		N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		N/A
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard		N/A
5.6.2	Design recommendation for lithium systems only		N/A
	For the battery consisting of a single cell or a single cellblock: - Charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Clause 8.1.2, Table 4; or	Cell only	N/A
	- Charging voltage of the cell does not exceed the different upper limit of the charging voltage determined through Clause 8.1.2, NOTE 1.		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - The voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, by monitoring the voltage of every single cell or the single cellblocks; or		N/A
	- The voltages of any one of the single cells or single cellblocks does not exceed the different upper limit of the charging voltage, determined through Clause 8.1.2, NOTE 1, by monitoring the voltage of every single cell or the single cellblocks		N/A

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - Charging is stopped when the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks; or		N/A
	- Charging is stopped when the upper limit of the different charging voltage, determined through Clause 8.1.2, NOTE 1, 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
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	Complied. ISO 9001: 2008 Certificate provided.	P

6	**Type test conditions**		**P**
	Tests were made with the number of cells or batteries specified in Table 1 for nickel-cadmium and nickel-metal hydride systems and Table 2 for lithium systems, using cells or batteries that are not more than six months old	Complied. Lithium system.	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	Tests are carried out at 20°C ± 5°C.	P

7	**Specific requirements and tests (nickel systems)**		**N/A**
7.1	Charging procedure for test purposes	Lithium system.	N/A
7.2	Intended use		N/A
7.2.1	Continuous low-rate charging (cells)		N/A
	Results: No fire. No explosion		N/A
7.2.2	Vibration		N/A
	Results: No fire. No explosion. No leakage	(See Table 7.2.2)	N/A
7.2.3	Moulded case stress at high ambient temperature		N/A
	Oven temperature (°C).....:		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A
7.2.4	Temperature cycling		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3	Reasonably foreseeable misuse		N/A
7.3.1	Incorrect installation cell		N/A

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	The test was carried out using: - Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or		N/A
	- A stabilized dc power supply.		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.1)	N/A
7.3.2	External short circuit		N/A
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.2)	N/A
7.3.3	Free fall		N/A
	Results: No fire. No explosion.		N/A
7.3.4	Mechanical shock (crash hazard)		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3.5	Thermal abuse		N/A
	Oven temperature (°C)..... :		—
	Results: No fire. No explosion.		N/A
7.3.6	Crushing of cells		N/A
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.6)	N/A
7.3.7	Low pressure		N/A
	Chamber pressure (kPa)..... :		—
	Results: No fire. No explosion. No leakage.		N/A
7.3.8	Overcharge		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.8)	N/A
7.3.9	Forced discharge		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.9)	N/A

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
8	**Specific requirements and tests (lithium systems)**		**P**
8.1	Charging procedures for test purposes	Complied.	P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2		P
8.1.2	Second procedure: This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9		P
	If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit	Charge temperature range 15-30°C declared. 10°C used for lower limit tests. 45°C used for upper limit tests.	N/A
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1).....:		N/A
	For a different upper limit charging voltage (i.e. other than for lithium cobalt oxide systems at 4,25 V), the applied upper limit charging voltage and upper limit charging temperatures were adjusted accordingly		P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1).....:	3.95V applied.	P
8.2	Intended use		P
8.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	Results: No fire. No explosion.....:	(See Table 8.2.1)	P
8.2.2	Moulded case stress at high ambient temperature (battery)	Cell only.	N/A
	Oven temperature (°C).....:		—
	Results: No physical distortion of the battery casing resulting in exposure of internal components		N/A
8.3	Reasonably foreseeable misuse		P
8.3.1	External short circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		P
	Results: No fire. No explosion.....:	(See Table 8.3.1)	P
8.3.2	External short circuit (battery)	Cell only.	N/A
	The batteries were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	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
	Results: No fire. No explosion..... :	(See Table 8.3.2)	P
8.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.4	Thermal abuse (cells)		P
	The cells were held at 130°C ± 2°C for: - 10 minutes; or	Tested complied.	P
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)		N/A
	Oven temperature (°C)..... :	130°C	—
	Gross mass of cell (g)..... :	<500g, small cell.	—
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.5	Crush (cells)		P
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or	Tested complied.	P
	- An abrupt voltage drop of one-third of the original voltage has been obtained; or		N/A
	- 10% of deformation has occurred compared to the initial dimension		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.5)	P
8.3.6	Over-charging of battery	Cell only	N/A
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or		N/A
	- Returned to ambient		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.6)	N/A
8.3.7	Forced discharge (cells)	Tested complied.	P
	Results: No fire. No explosion..... :	(See Table 8.3.7)	P
8.3.8	Transport tests	Tested complied.	P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	Tested complied.	P
8.3.9	Design evaluation – Forced internal short circuit (cells)		N/A
	The cells complied with national requirement for..... :	The applicant declares that this cell isn't to be sold in France, Japan, Republic of Korea and Switzerland.	—

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
	The pressing was stopped upon: - 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		N/A
	Results: No fire.....:		N/A
9	**Information for safety**		**P**
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	Information for safety mentioned in manufacturer's specifications.	P
	The manufacturer of batteries ensures that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards.	Information for safety mentioned in manufacturer's specifications.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user.....:		N/A
10	**Marking**		**P**
10.1	Cell marking		P
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	The cell is marked in accordance with IEC 61960 also see Copy of marking plate.	P
10.2	Battery marking		N/A
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	Cell only.	N/A
	Batteries marked with an appropriate caution statement.		N/A
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.	Information for storage instructions mentioned in manufacturer's specifications.	P
	Recommended charging instructions marked on or supplied with the battery.	Information for recommended charging instructions mentioned in manufacturer's specifications.	P
11	**Packaging**		**P**
	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

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
Annex A	**Charging range of secondary lithium ion cells for safe use**		**P**
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	Max. Charging voltage is 3.95V	P
A.3.2	Upper limit charging voltage	3.95V applied.	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	3.95V applied.	P
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 range declared by client is: 15-30°C	N/A
A.4.3	High temperature range	Charging high temperature declared by client is: 30°C.	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range		N/A
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range	45°C used.	N/A
A.4.4	Low temperature range	Charging low temperature declared by client is: 15°C.	N/A
A.4.4.1	General		N/A
A.4.4.2	Explanation of safety viewpoint		N/A
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	10°C used.	N/A
A.4.5	Scope of the application of charging current		P
A.5	Sample preparation		N/A
A.5.1	General		N/A
A.5.2	Insertion procedure for nickel particle to generate internal short		N/A
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		N/A

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

EN 62133: 2013			
Clause	Requirement + Test	Result - Remark	Verdict
A.5.3	Disassembly of charged cell		N/A
A.5.4	Shape of nickel particle		N/A
A.5.5	Insertion of nickel particle to cylindrical cell		N/A
A.5.5.1	Insertion of nickel particle to winding core		N/A
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		N/A
A.5.6	Insertion of nickel particle to prismatic cell		N/A

Critical components information					**P**
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity** [1)]
Cell	HCB BATTERY CO., LTD.	UPC1550	3.67V, 156mAh	IEC 62133: 2012	Tested with appliance
- Positive electrode	ShenZhen Perfect Power Technology Co., LTD.	LCO-12B	$LiNi_xCo_yMn_{1-x-y}O_2$, (Ni:Co:Mn=0.5:0.2:0.3) Carbon black, NMP, PVDF	--	--
- Negative electrode	ShenZhen Perfect Power Technology Co., LTD.	MAG-4	Graphite, CMC, SBR, Distilled Water, Conductive	--	--
- Separator	Best New Energy Technology CO., LTD.	Jh20	PP, Shut down temperature: 130°C	--	--
- Electrolyte	Shenzhen CAPCHEM Technology Co., Ltd.	LD-1129	$LiPF_6$+DMC+EMC+EC	--	--

Supplementary information:

[1)] **Provided evidence ensures the agreed level of compliance.**

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

8.2.1	TABLE: Continuous charging at constant voltage (cells)			P
Model	**Recommended charging voltage V_c, (Vdc)**	**Recommended charging current I_{rec}, (mA)**	**OCV at start of test, (Vdc)**	**Results**
C1#	3.95	50	3.92	P
C2#	3.95	50	3.92	P
C3#	3.95	50	3.91	P
C4#	3.95	50	3.92	P
C5#	3.95	50	3.92	P

Supplementary information:
- No fire
- No explosion
- No leakage

8.3.1	TABLE: External short circuit (cells)				P
Model	**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 (45°C)					
C1#	25.0	3.93	83	137.0	P
C2#	25.0	3.92	82	133.1	P
C3#	25.0	3.92	82	136.2	P
C4#	25.0	3.93	82	136.5	P
C5#	25.0	3.92	83	135.4	P
Samples charged at charging temperature lower limit (10°C)					
C6#	25.0	3.91	82	135.3	P
C7#	25.0	3.91	82	130.8	P
C8#	25.0	3.90	83	134.8	P
C9#	25.0	3.90	83	134.4	P
C10#	25.0	3.91	82	135.1	P

Supplementary information:
- No fire
- No explosion

8.3.2	TABLE: External short circuit (battery)				N/A
Model	**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 (°C)					
Samples charged at charging temperature lower limit (°C)					

Supplementary information:

- No fire
- No explosion

8.3.5	TABLE: Crush				P
Model	**OCV at start of test, (Vdc)**	**OCV at removal of crushing force, (Vdc)**	**Width/ diameter of cell before crush, (mm)**	**Required deformation for crush, (mm)**	**Results**
Samples charged at charging temperature upper limit (45°C)					
C1#	3.92	--	--	--	P
C2#	3.93	--	--	--	P
C3#	3.92	--	--	--	P
C4#	3.92	--	--	--	P
C5#	3.93	--	--	--	P

Note:

A 13kN force applied at the wide side of prismatic cells.

No voltage abrupt drop occurred.

Supplementary information:

- No fire
- No explosion

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

8.3.6	TABLE: Over-charging of battery				N/A
Constant charging current (A).....:					—
Supply voltage (Vdc).....:					—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum outer casing temperature, (°C)**	**Results**	

Supplementary information:

- No fire
- No explosion

8.3.7	TABLE: Forced discharge (cells)				P
Model	**OCV before application of reverse charge, (Vdc)**	**Measured Reverse charge I_t, (mA)**	**Time for reversed charge, (minutes)**	**Results**	
C1#	3.05	156	90	P	
C2#	3.06	156	90	P	
C3#	3.05	156	90	P	
C4#	3.06	156	90	P	
C5#	3.05	156	90	P	

Supplementary information:

- No fire
- No explosion

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

8.3.8 T5	TABLE: External short circuit (cells)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature ~~rise ΔT,~~ (°C)**	**Results**
C1#	55.0	3.91	82	138.1	P
C2#	55.0	3.91	83	137.1	P
C3#	55.0	3.92	82	139.0	P
C4#	55.0	3.92	82	136.6	P
C5#	55.0	3.91	82	136.4	P
C6#	55.0	3.92	83	135.8	P
C7#	55.0	3.91	82	137.3	P
C8#	55.0	3.92	82	137.0	P
C9#	55.0	3.91	82	134.9	P
C10#	55.0	3.91	82	135.8	P

Supplementary information:

The external short-circuit test of 10 pcs samples performed after the test of Altitude, Thermal cycling, Vibration and Shock in sequence.

- No excessive temperature rise, no rupture, no explosion and no fire

8.3.9	TABLE: Forced internal short circuit (cells)					N/A
Model	**Chamber ambient, (°C)**	**OCV at start of test, (Vdc)**	**Particle location [1)]**	**Maximum applied pressure, (N)**	**Voltage drop, (mV)**	**Results**

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.

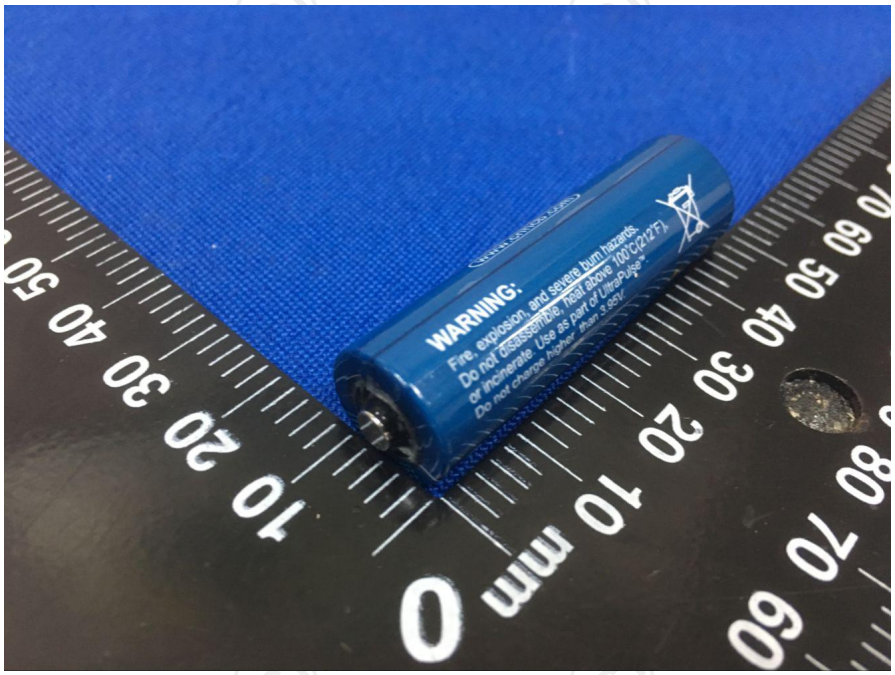
- No fire

Hotline: 400-6611-140 Tel: 86-755- 27673339 Fax: 86-755-27673332 http://www.tct-lab.com

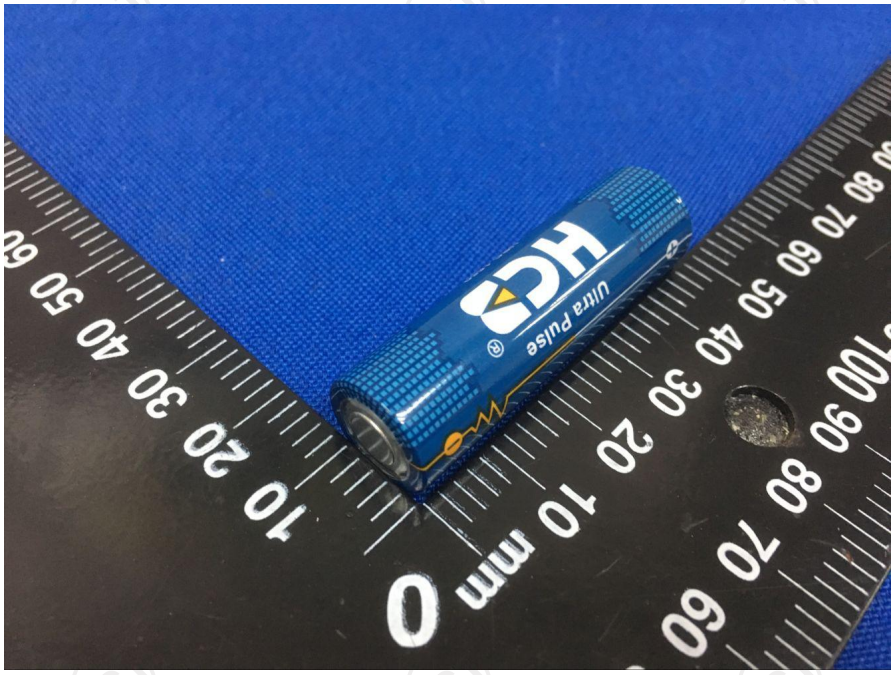
Attachment 1

Photo Documentation

Product: Li-ion Cell
Type Designation: UPC1550



Picture 1. Cell view-1



Picture 2. Cell view-2

***** End of Test Report *****