Test Report

Report No.: MTi160329004RS

Date of issue: Apr.18, 2016

Sample Description:	Li-ion polymer battery
Model(s):	3510095P
Applicant:	Vonino Electronics Limited
Address:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong.
Date of Test:	2016-03-29 to 2016-04-18

Shenzhen Microtest Co., Ltd
http://www.mtitest.com

Tel:(86-755)88850135 Fax: (86-755) 88850136 http://www.mtitest.com E-mail: mti@51mti.com
Add: No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China.

TEST REPORT

IEC 62133

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

Reportreference No.....:	MTi160329004RS
Tested by (printed name and signature) .....:	Henry Chen
Reviewed By (printed name and signature) .....:	Iric Yang
Approved by (printed name and signature) .....:	Zheng zhiwei
Date of issue.....:	Apr.18, 2016
Total number of pages.....:	28 Pages.
Testing laboratory :	**Shenzhen Microtest Co., Ltd.**
Address .....:	No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China.
Testinglocation.....:	Same as above
Applicant .....:	**Vonino Electronics Limited**
Address .....:	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong.
Test specification:	
Standard.....:	IEC 62133: 2012 (Second Edition)
Test procedure .....:	Type test
Non-standard test method .....:	N/A
Test Report Form No. .....:	IEC62133B
Test Report Form(s) Originator ....:	UL(Demko)
Master TRF.....:	Dated 2013-03

This report is not valid as a CB Test Report unless signed by an approved CB Testing Laboratory and appended to a CB Test Certificate issued by an NCB in accordance with IECEE 02.

Test item description..... .....:	Li-ion polymer battery
Trade Mark..... :	N/A
Manufacturer ..... :	**Vonino Electronics Limited**
Address ..... :	Miramar Tower 10F - no1010, 132 Nathan Road, Tsim Sha Tsui, Kowloon, Hong Kong.
Model/Type reference..... :	3510095P
Ratings..... :	3.7V 4000mAh 14.8Wh

Summary of testing:

The samples tested complies with the requirements of IEC62133:2012.

Tests performed (name of test and test clause):	**Testing location:**
Test items: cl.5.6.2 Design recommendation(Lithium system); cl.8.1 Charging procedure for test purposes (for Cells and Batteries); cl.8.2.1 Continuous charging at constant voltage (Cells); cl.8.2.2 Moulded case stress at high ambient temperature (Batteries) cl.8.3.1 External short circuit (Cells); cl.8.3.2 External short circuit (Batteries); cl.8.3.3 Free fall (Cells and Batteries); cl.8.3.4 Thermal abuse (Cells); cl.8.3.5 Crush (Cells); cl.8.3.6 Over-charging of battery; cl.8.3.7 Forced discharge (Cells); Tests are made with the number of cells and batteries specified in IEC 62133: 2012 (Second Edition) Table 2.	**Shenzhen Microtest Co., Ltd.** *No.102A & 302A, East Block, Hengfang Industrial Park, Xingye Road, Xixiang, Bao'an District, Shenzhen, Guangdong, China.*

Summary of compliance with National Differences

N/A.

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.

Li-ion polymer battery
Model: 3510095P (ICP4/100/95)
Nominal voltage: 3.7V
Capacity：4000mAh/14.8Wh
Vonino Electronics Limited
Date: 2016.02
Made In China
\+ red
\- balck

Test item particulars..... :	
Classification of installation and use..... :	N/A
Supply connection..... :	DC Connector
Recommend charging method declaired by the manufacturer.....:	CC/CV
Discharge current (0. 2 I_t A) .....:	800mA
Specified final voltage.....:	V
Chemistry .....:	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell..... :	4.2V
Maximum charging current..... :	2800mAh
Charging temperature upper limit..... :	45°C
Charging temperature lower limit..... :	0°C
Polymer cell electrolyte type.....:	☐ gel polymer ..... ☐ solid polymer ☒ N/A
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2016-03-29
Date (s) of performance of tests.....:	2016-03-29 to 2016-04-18

General remarks:

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

Throughout this report a ☐ comma / ☒ point is used as the decimal separator.

Manufacturer's Declaration per sub-clause 4.2.5 of IECEE 02:

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.

General product information:

This battery is constructed with one lithium-ion cell and has overcharge, over-discharge, over current and short-circuits proof circuit.

The main features of the battery 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 Volta
3510095P	4000mAh	3.7V	800mA	800mA	2800mAh	2800mAh	4.2V	3.0V

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
3510095P	4.2V	200mA	-5℃	45℃

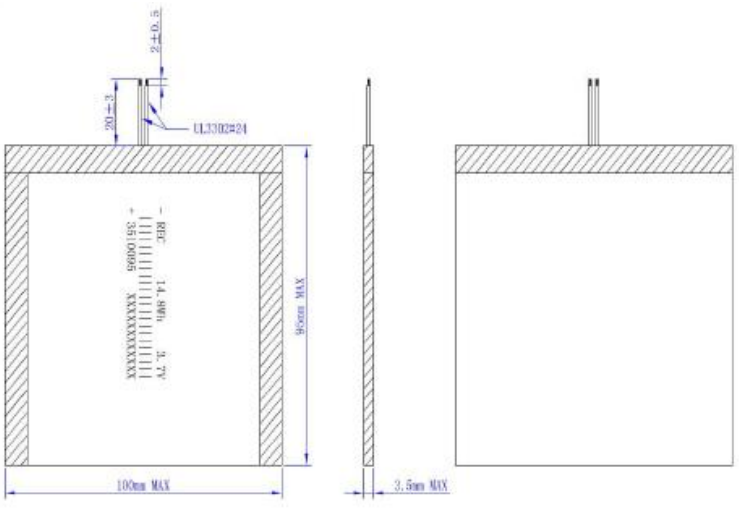
The main features of the cell are shown as below (clause 8.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltag
3510095P	2800mAh	3.7V	800mA	800mA	2800mAh	2800mAh	4.2V	3.0V

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
3510095P	4.2V	200mA	-5℃	45℃

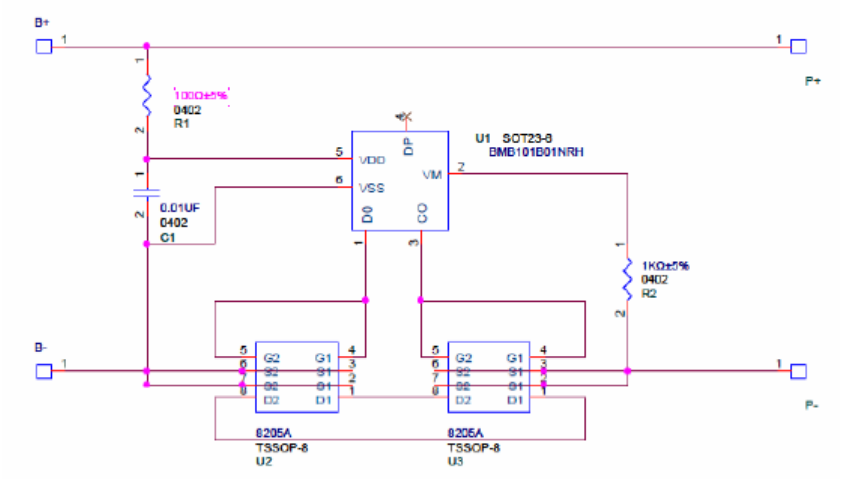
Construction: (Unit: mm)



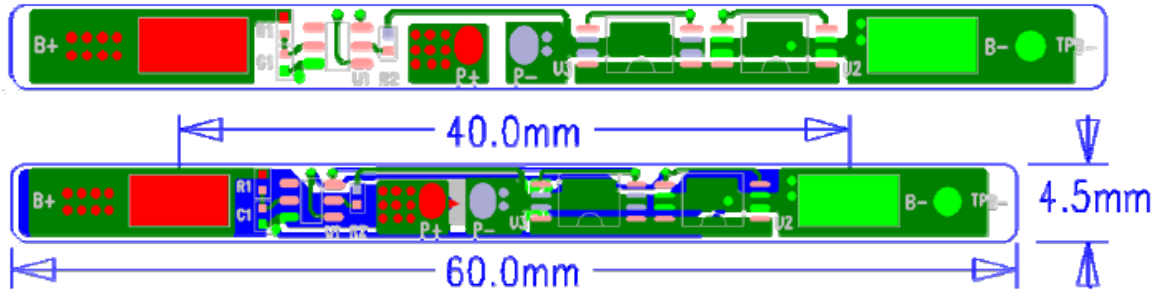
Battery

H(max.): W(max.): T(max.)= 97mm:70mm:3.5m

Circuit diagram:



PCB Layout:



IEC 62133			
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		N/A
	Insulation resistance (MΩ) ..... :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	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		P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		P
5.4	Temperature/voltage/current management		N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented		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	See marking plate	P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		P

IEC 62133			
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	Single cell.	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		P
	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	Max charging voltage:4.2V not exceed the upper limit in 8.1.2, NOTE 1.	P
	- 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

IEC 62133			
Clause	**Requirement – Test**	**Result - Remark**	**Verdict**
	- 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
	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	The manufacturer has ISO 9001:2008 certification 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. Tabel 2 for 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 systems.	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		N/A
7.2.3	Moulded case stress at high ambient temperature		N/A
	Oven temperature (°C) .....:		—

IEC 62133			
Clause	**Requirement – Test**	**Result - Remark**	**Verdict**
	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
	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.....:		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.....:		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.....:		N/A
7.3.7	Low pressure		N/A
	Chamber pressure (kPa).....:		—
	Results: No fire. No explosion. No leakage.		N/A

IEC 62133			
Clause	**Requirement – Test**	**Result - Remark**	**Verdict**
7.3.8	Overcharge		N/A
	Results: No fire. No explosion.....:		N/A
7.3.9	Forced discharge		N/A
	Results: No fire. No explosion.....:		N/A

8	**Specific requirements and tests (lithium systems)**		**P**
8.1	Charging procedures for test purposes		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 0-45°C declared. -5°C used for lower limit, 45°C used for upper limit.	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	Lithium cobalt oxide system only.	N/A
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) .....:		N/A
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)	No moulded case exists.	N/A
	Oven temperature (°C).....:		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A
8.3	Reasonably foreseeable misuse		P
8.3.1	External short circuit (cell)		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

IEC 62133			
Clause	**Requirement – Test**	**Result - Remark**	**Verdict**
	Results: No fire. No explosion.....:	See Table 8.3.1	P
8.3.2	External short circuit (battery)		P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or	Protection circuit were used.	P
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	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		P
	Results: No fire. No explosion.....:	See Table 8.3.2	P
8.3.3	Free fall	Fully charged cells and batteries were dropped three times from a height of 1.0 m onto a concrete floor.	P
	Results: 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		P
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or		P
	- Returned to ambient		N/A
	Results: No fire. No explosion.....:	See Table 8.3.6	P

IEC 62133			
Clause	**Requirement – Test**	**Result - Remark**	**Verdict**
8.3.7	Forced discharge (cells)		P
	Results: No fire. No explosion.....:	See Table 8.3.7	P
8.3.8	Transport tests		N/A
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	UN38.3 report provided	N/A
8.3.9	Design evaluation – Forced internal short circuit (cells)		N/A
	The cells complied with national requirement for .....:	France, Japan, Korea and Switzerland.	—
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 580 N (prismatic 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		N/A
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	The final product is battery.	N/A
10.2	Battery marking		P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	See marking plate	P
	Batteries marked with an appropriate caution statement.		N/A
10.3	Other information		P

IEC 62133			
Clause	**Requirement – Test**	**Result - Remark**	**Verdict**
	Storage and disposal instructions marked on or supplied with the battery.	Information for disposal 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
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		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		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
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	Charging temperature declared by client is: -5-45°C	P
A.4.3	High temperature range		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

IEC 62133			
Clause	**Requirement – Test**	**Result - Remark**	**Verdict**
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range		N/A
A.4.4	Low temperature range		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		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
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 prismatic 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

	TABLE: Critical components information				P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Cell	Hubei Uee Energy Technology Co., Ltd.	3510095P /4000mAh	3.7V 4000mAh	IEC62133;2012	- Tested with appliance
PCB	Shenzhen nine and xu precision circuit co., LTD	MB-496	V-0, 130 ºC	--	--
Protect IC	MITSUMI	RBG59	VDD:-0.3~12V Over charge detection voltage：4.30±0.050V Over discharge detection voltage：2.400±0.100V Self-consume current: 6.0uA max Operating Ambient temperature:-40~85℃	--	--
MOSFET	Depp micro	8205A	VDS:20V VGS:±12V, ID:5A (Tc=25°C), TJ:-55-150°C	--	--
Positive electrode	Hu nan Shan ShanTechnical Joint-stock Co., Ltd	LC412	LiCO2,PVDF, Conductive, Aluminum Foil	--	Tested with appliance
Negative electrode	Shenzhen XFH Tech. Co. Ltd	HSG-X	Graphite, CMC, SBR, Conductive , Copper Foil	--	Tested with appliance
Separator	Dalian Ecopower Technolopy Co., Ltd	0.020*88.5*1980mm	Shutdown temperature: 134℃	--	Tested with appliance
Electrolyte	Dong Guan Shan Shan Technical Joint-stock Co., Ltd	LD-1129	LiPF6+DMC+EMC+EC	--	Tested with appliance
Aluminium plastic film	Japan T&T Entertechno Co. ,Ltd	Toppen	113um(Thickness)	--	Tested with appliance
Wire	Corythosaurus	9294	1.4mm	--	--

Supplementary information:

[1)] Provided evidence ensures the agreed level of compliance. See OD-CB2039.

7.2.1	TABLE: Continuous low rate charge (cells)				N/A
Model	**Recommended charging method, (CC, CV, or CC/CV)**	**Recommended charging voltage V_c, (Vdc)**	**Recommended charging current I_{rec}, (A)**	**OCV at start of test, (Vdc)**	**Results**

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

7.2.2	TABLE: Vibration		N/A
Model	**OCV at start of test, (Vdc)**	**Results**	

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

7.3.1	TABLE: Incorrect installation (cells)	N/A
Model	**OCV of reversed cell, (Vdc)**	**Results**

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

7.3.2	TABLE: External short circuit				N/A
Model	**Ambient (at 20°C ± 5°C or 55°C ± 5°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum case temperature rise ΔT, (°C)**	**Results**

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

7.3.6	TABLE: Crush			N/A
Model	**OCV at start of test, (Vdc)**	**OCV at removal of crushing force, (Vdc)**	**Results**	

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

7.3.8	TABLE: Overcharge			N/A
Model	**OCV prior to charging, (Vdc)**	**Maximum charge current, (A)**	**Time for charging, (hours)**	**Results**

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

7.3.9	TABLE: Forced discharge (cells)			N/A
Model	**OCV before application of reverse charge, (Vdc)**	**Measured reverse charge I_t, (A)**	**Time for reversed charge, (minutes)**	**Results**

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

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**
Cell #1	4.20	800	4.19	P
Cell #2	4.20	800	4.19	P
Cell #3	4.20	800	4.19	P
Cell #4	4.20	800	4.19	P
Cell #5	4.20	800	4.19	P

Supplementary information:

- No fire or explosion
- No leakage

8.3.1	TABLE: External short circuit (cell)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature (°C)**	**Results**
Samples charged at charging temperature upper limit(45°C)					
Cell #6	23.5	4.19	85.2	92.5	P
Cell #7	23.5	4.18	87.9	94.8	P
Cell #8	23.5	4.19	87.2	92.0	P
Cell #9	23.5	4.19	88.6	96.1	P
Cell #10	23.5	4.19	86.1	99.5	P
Samples charged at charging temperature lower limit(-5°C)					
Cell #11	23.5	4.18	89.6	107.2	P
Cell #12	23.5	4.18	87.3	99.3	P
Cell #13	23.5	4.18	85.1	106.1	P
Cell #14	23.5	4.17	87.9	103.3	P
Cell #15	23.5	4.19	86.1	104.9	P
Supplementary information: - No fire or explosion					

8.3.2	TABLE: External short circuit (battery)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature (°C)**	**Results**
Samples charged at charging temperature upper limit(45°C)					
Battery1#	54.7	4.19	86.5	54.8	P
Battery2#	54.7	4.19	87.6	54.8	P
Battery3#	54.7	4.20	88.3	54.8	P
Battery4#	54.7	4.19	81.4	54.8	P
Battery5#	54.7	4.19	89.6	54.8	P
Samples charged at charging temperature lower limit(-5°C)					
Battery6#	54.7	4.18	81.9	54.8	P
Battery7#	54.7	4.18	82.5	54.9	P
Battery8#	54.7	4.18	85.6	54.9	P
Battery9#	54.7	4.17	83.3	54.8	P
Battery10#	54.7	4.18	88.8	54.8	P
Supplementary information: - No obvious temperature rise due to rapid decline in short circuit current. The test was terminated after 2 hour while the current reaches a low end steady state condition. - No fire or 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)					
Cell #29	4.19	4.19	--	--	P
Cell #30	4.19	4.19	--	--	P
Cell #31	4.19	4.19	--	--	P
Cell #32	4.18	4.18	--	--	P
Cell #33	4.19	4.19	--	--	P

Note:
A 13kN force applied at the wide side of prismatic cells.
No voltage abrupt drop occurred.

Supplementary information:
- No fire or explosion

8.3.6	TABLE: Over-charging of battery			P
Constant charging current (A) ..... :		**8.0**		—
Supply voltage (Vdc) ..... :		**5.0**		—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum outer casing temperature, (°C)**	**Results**
Battery14#	3.26	22.6	35.6	P
Battery15#	3.21	22.5	37.3	P
Battery16#	3.29	22.1	37.0	P
Battery17#	3.23	22.5	37.5	P
Battery18#	3.25	22.6	35.9	P

Supplementary information:
The supply voltage as specified in battery specifications.
- No fire or 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**
Cell #34	3.26	2800	90	P
Cell #35	3.24	2800	90	P
Cell #36	3.27	2800	90	P
Cell #37	3.25	2800	90	P
Cell #38	3.26	2800	90	P

Supplementary information:

- No fire or explosion

8.3.8 T-5	TABLE: External short circuit (cell)				N/A
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature (°C)**	**Results**

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 fire
- No explosion

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)**	**Results**
Supplementary information:					
- No fire					

Photos of The Product

Photo 1

[√] General view of battery

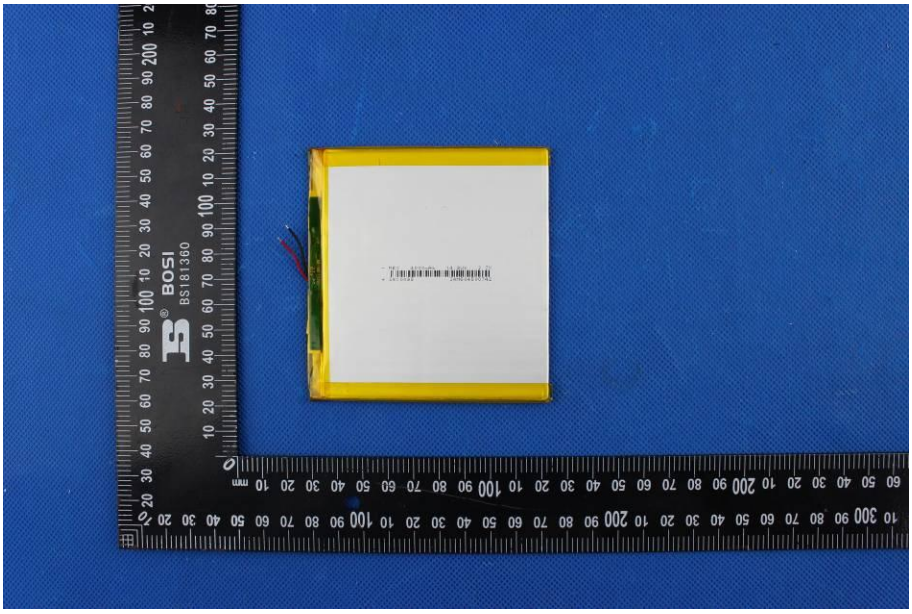


Photo 2

[√] General view of battery

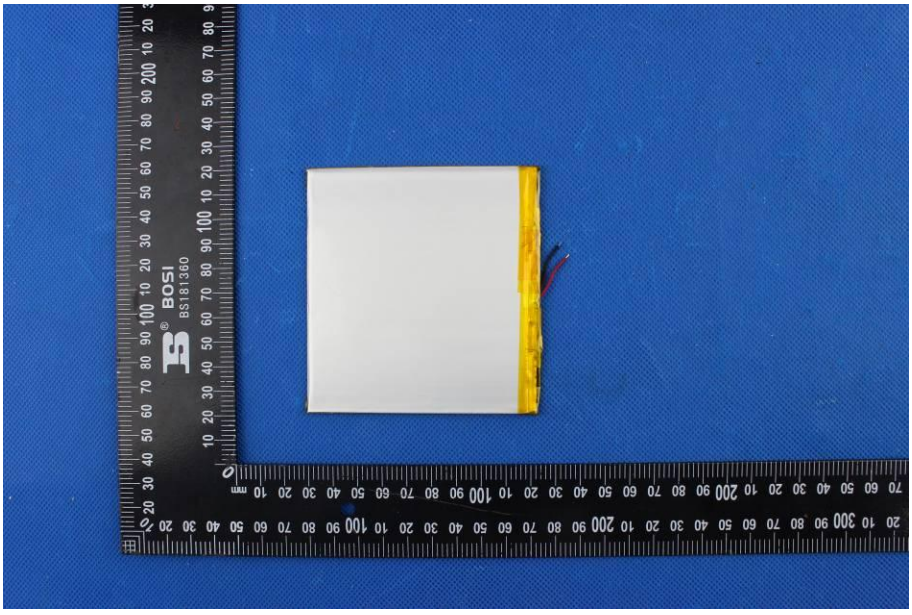


Photo 3

[√] **General view of cell and PCB**

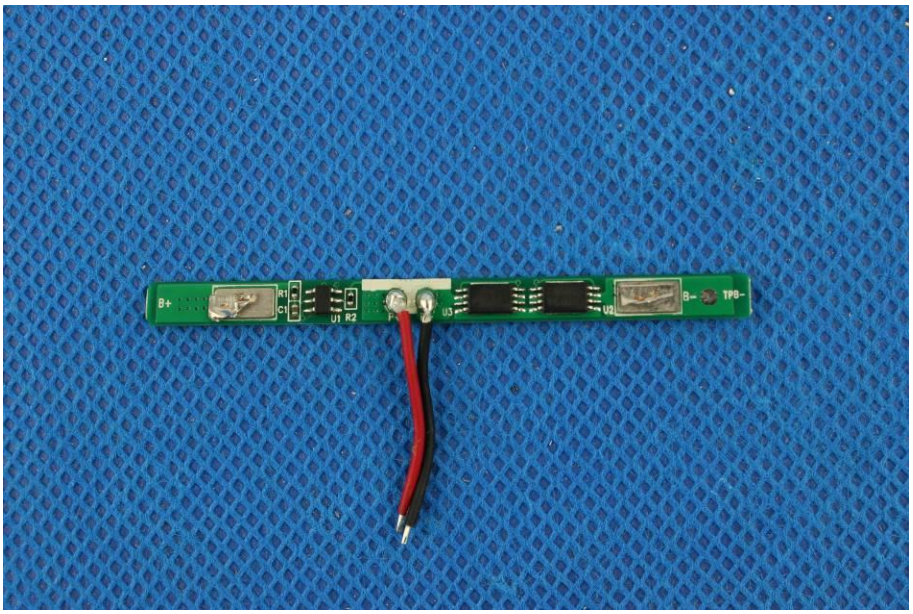


Photo 4

[√] **General view of cell and PCB**

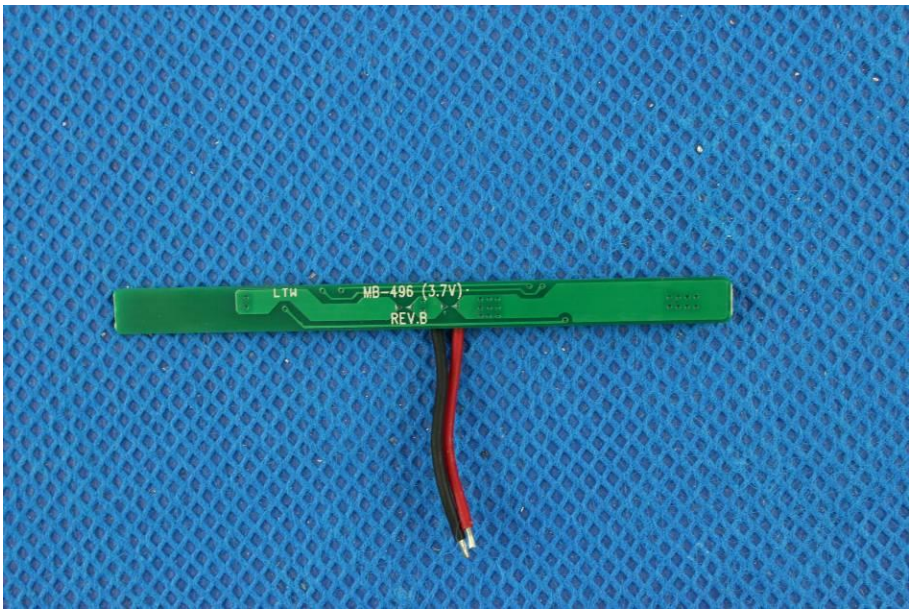


Photo 5

[√] Component view of Cell

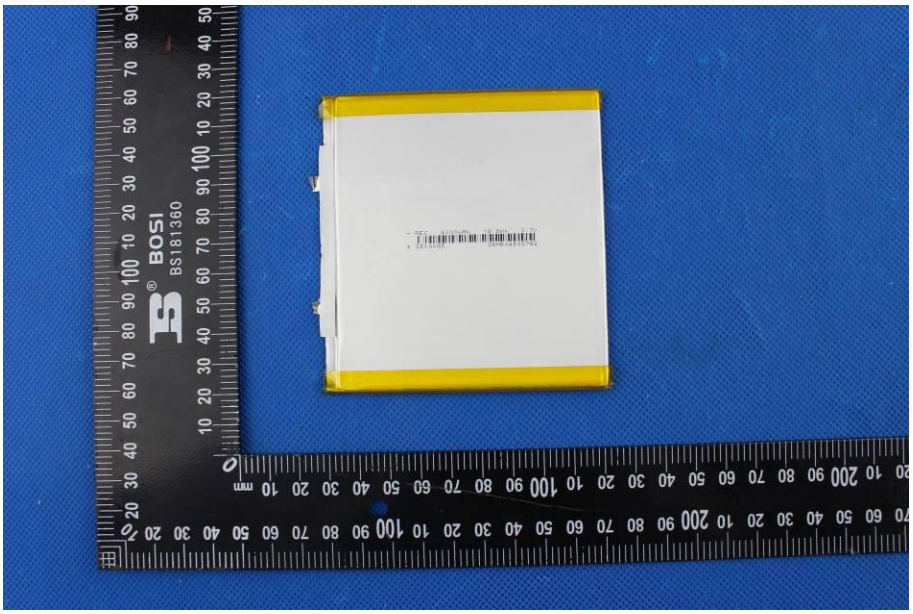
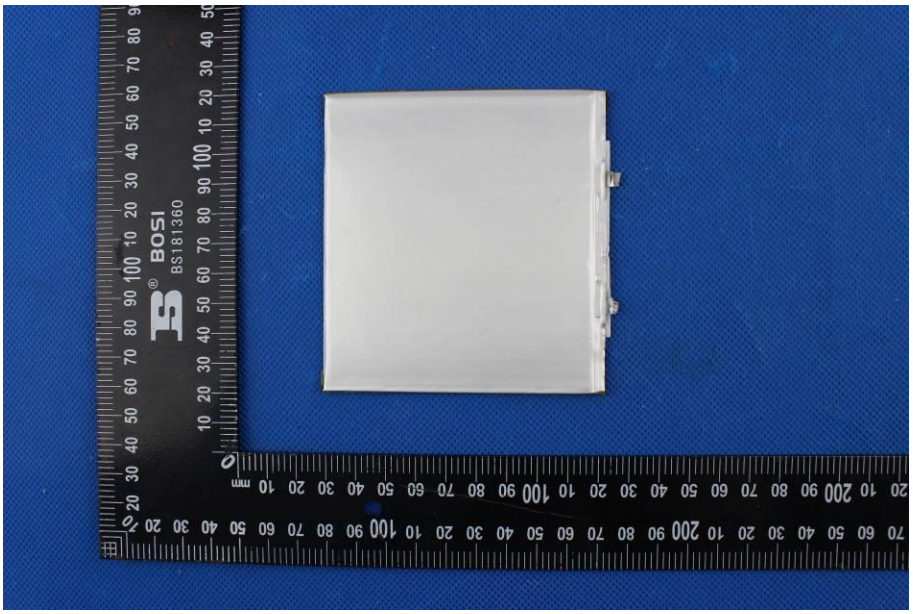


Photo 6

[√] Trace view of Cell



---------- End Of Report ----------