
	Test Report issued under the responsibility of: NCB TÜV SÜD PSB 1 Science Park Drive, 118221 Singapore Singapore	
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		
Report Number: 211-2813277-000 Date of issue: 2013-12-25 Total number of pages 25 pages		
Applicant's name: Address:		
Test specification: Standard: IEC 62133: 2012 (Second Edition) Test procedure: CB Scheme Non-standard test method: N/A		
Test Report Form No: IEC62133B Test Report Form(s) Originator: UL(Demko) Master TRF: Dated 2013-03 Copyright © 2013 Worldwide System for Conformity Testing and Certification of Electrotechnical Equipment and Components (IECEE), Geneva, Switzerland. All rights reserved. This publication may be reproduced in whole or in part for non-commercial purposes as long as the IECEE is acknowledged as copyright owner and source of the material. IECEE takes no responsibility for and will not assume liability for damages resulting from the reader's interpretation of the reproduced material due to its placement and context. If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed. 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: Rechargeable Lithium-ion cell Trade Mark: Manufacturer: Model/Type reference: MO8882 / FST18650-2200mAh Ratings: 3.6Vd.c. 2200mAh		



Testing procedure and testing location:		
<input checked="" type="checkbox"/>	CB Testing Laboratory:	Jiangsu TÜV Product Service Ltd. Shenzhen Branch
Testing location/ address		6/F, H Hall, Culture Creative Park, No. 4001, Fuqiang Road, Futian District, Shenzhen, Guangdong, P.R. China
<input type="checkbox"/>	Associated CB Testing Laboratory:	
Testing location/ address		
Tested by (name + signature).....:		Ryan Jin
Approved by (name + signature)		Margery Liu
		
<input type="checkbox"/>	Testing procedure: TMP	
Testing location/ address		
Tested by (name + signature).....:		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: WMT	
Testing location/ address		
Tested by (name + signature).....:		
Witnessed by (name + signature)		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: SMT	
Testing location/ address		
Tested by (name + signature).....:		
Approved by (name + signature)		
Supervised by (name + signature)....:		

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

Attachment No.1: 3 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 2 of IEC 62133:2012(2nd Edition).
 cl. 8.2.1 Continuous charging at constant voltage (cell)
 cl. 8.3.1 External short circuit (cell)
 cl. 8.3.3 Free fall
 cl. 8.3.4 Thermal abuse (cells)
 cl. 8.3.5 Crush (cells)
 cl. 8.3.7 Forced discharge (cells)
 cl. 8.3.9 Forced internal short circuit (cells)
 The samples comply with the requirement of IEC 62133:2012(2nd Edition).

Testing location:

Jiangsu TÜV Product Service Ltd. Shenzhen Branch
 6/F, H Hall, Culture Creative Park, No. 4001, Fuqiang Road, Futian District, Shenzhen, Guangdong, P.R. China

Summary of compliance with National Differences

List of countries addressed:

N/A

Copy of marking plate

The following label is pasted on the cell:

Rechargeable Lithium-ion cell
 + IXR19/66 YYYY/MM/DD -
 FST18650-2200mAh 3.6V

Remark:

is the trade mark;

-YYYY|| represents the year of manufacture, -MM|| represents the month of manufacture; -DD|| represents the date of manufacture.

Test item particulars.....:	
Classification of installation and use.....:	Build-in and use in portable applications
Supply connection.....:	Supply by positive cap and negative steel can
Recommend charging method declared by the manufacturer	Charged by using the charging voltage 4.2V and charging current 1100mA, until charging current is reduced to 0.01 I _n A (22mA) by using a constant voltage charging method.
Discharge current (0,2 I_n A)	440mA
Specified final voltage	2.75V
Chemistry	<input type="checkbox"/> nickel systems <input checked="" type="checkbox"/> lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....:	4.25V
Maximum charging current	2200mA
Charging temperature upper limit	45°C
Charging temperature lower limit.....:	10°C
Polymer cell electrolyte type..... :	<input type="checkbox"/> gel polymer <input type="checkbox"/> solid polymer
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	2013-12-04
Date (s) of performance of tests	2013-12-04 to 2013-12-18
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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC60905 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	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	



Name and address of factory (ies)..... : First New Energy Co., Ltd.
 The Border of Jingguan Road and 320 National Highway, Industrial Park of Lithium Battery, Economic Development Zone, 336000 Yichun City, Jiangxi Province, PEOPLE'S REPUBLIC OF CHINA

General product information:

The cell, model: FST18650-2200mAh, is used in portable applications.

Additionally, details information of the cell as following:

Product name	Rechargeable Lithium-ion cell
Type/model	FST18650-2200mAh
Nominal voltage	3.6V
Rated capacity	2200mAh
Upper limit charging voltage	4.25V
Charging current declared by manufacturer	1100mA
Maximum Charging Current	2200mA
Charging temp. upper limit	45°C
Charging temp. lower limit	10°C
Charge procedure #1 at 20°C±5°C	Charged by using the charging voltage 4.2V and charging current 1100mA, until charging current is reduced to 0.01 I _t A (22mA) by using a constant voltage charging method.
Charging procedure #2 at 10°C or +45°C	Stored for 1 h to 4 h, charged by using the upper limited charging voltage 4.25V and maximum charging current 2200mA, until charging current is reduced to 0.05 I _t A (110mA) by using a constant voltage charging method.
Final discharge voltage	2.75V
Dimensions	Max.Ø18.4mmx65.3mm
Weight	≤45g

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



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		N/A
	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		N/A
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		N/A
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/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		N/A
	Terminals have a clear polarity marking on the external surface of the battery		N/A

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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	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		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		P
	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		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



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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 ISO9001:2008 certificate and such quality plan.	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	Tests are performed according to specified in Table 2 of the standard. The samples are not more than 6 months old.	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	The tests are conducted in an ambient of 20°C ± 5°C.	P

7	Specific requirements and tests (nickel systems)		N/A
7.1	Charging procedure for test purposes		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).....:		—



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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)..... :		—



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Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion. No leakage.		N/A
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		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		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)		P
	Results: No fire. No explosion..... :	(See Table 8.2.1)	P
8.2.2	Moulded case stress at high ambient temperature (battery)		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



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Clause	Requirement + Test	Result - Remark	Verdict
	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)		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
	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)	N/A
8.3.3	Free fall		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		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) :	≤45g	—
	Results: 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		N/A
	- 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		P
	Results: No fire. No explosion..... :	(See Table 8.3.5)	P
8.3.6	Over-charging of battery		N/A



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Clause	Requirement + Test	Result - Remark	Verdict
	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)		P
	Results: No fire. No explosion..... :	(See Table 8.3.7)	P
8.3.8	Transport tests		P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods		P
8.3.9	Design evaluation – Forced internal short circuit (cells)		P
	The cells complied with national requirement for:		—
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		P
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached		P
	Results: No fire :	(See Table 8.3.9)	P
9	Information for safety		P
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	Showed in cell specification.	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.		N/A
	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.	Cell marked as specified in IEC 61960.	P



IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
10.2	Battery marking		N/A
	Batteries marked in accordance with the requirements for the cells from which they are assembled.		N/A
	Batteries marked with an appropriate caution statement.		N/A
10.3	Other information		N/A
	Storage and disposal instructions marked on or supplied with the battery.		N/A
	Recommended charging instructions marked on or supplied with the battery.		N/A

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		N/A
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



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Clause	Requirement + Test	Result - Remark	Verdict
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		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		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle to cylindrical cell		P
A.5.5.1	Insertion of nickel particle to winding core		P
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		P
A.5.6	Insertion of nickel particle to prismatic cell		N/A

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Clause	Requirement + Test			Result - Remark	Verdict
5.1 – 5.6	TABLE: Critical components information				P
Object/part no.	Manufacturer/ trademark	Type/model	Technical data	Standard	Mark(s) of conformity
1.Cell	First New Energy Co.,Ltd.	FST18650-2200mAh	3.6Vd.c., 2200mAh	-	-
-Electrolyte	Tianjin JINNIU Power Sources Material Co.,Ltd	JN-1104	LiPF ₆ , DC, EMC, EC	-	-
-Separator	China Sciences Group	25um	PP, one layer, 25µm(thickness)×60.5mm(width)×1600mm(length)	-	-
- Positive electrode	First New Energy Co.,Ltd	145µm(thickness)×57.5mm(width)×620mm(length)	PVDF, NMP, NCM, Conductive Additive, Aluminum Foil	-	-
-Negative electrode	First New Energy Co.,Ltd	160µm(thickness)×59mm(width)×650mm(length)	Graphite, CMC, SBR, H ₂ O, Conductive Additive, Copper Foil	-	-
-Positive electrode tab	Yixing Huineng battery material Co. Ltd.	0.10mm(thickness)×3.0mm(width)	Aluminum belt	-	-
-Negative electrode tab	Wuxi Toyon Electronics Co.,Ltd	0.07mm(thickness)×4.0mm(width)	Nickel belt	-	-
-Steel can	Wuxi Jinyang New Type Power Supply Material Co., Ltd.	18650	Steel, 0.22mm	-	-
-NCM	Seimi Tongda Lithium Energy(Wu Xi)Co.,Ltd	L-5550	D50:8.5-13.5µm, Surface area: 0.15-0.45m ² /g, Weight percentage of elements: Co:10.5%-13.5%, Li:7.1%-7.7%, Mn:15.5%-18.5%, Ni:29.9%-31.9%	-	-
-Graphite	Changsha Xingcheng Microlite Graphite Co., Ltd	MD-1	D50:17µm, Surface area: 2.5m ² /g	-	-
-PTC	CHANGZHOU WUJIN ZHONGRUI ELECTRONICS TECHNOLOGY CO LTD	PTC18RH6	V _{max} :15Vdc, V _r :13V, I _h :3A, I _t :6A, I _{max} :40A, I _{sc} :40A, T _{moa} :85°C	UL 1434	UL E340030
Supplementary information: none					



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Clause	Requirement + Test	Result - Remark			Verdict
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: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)					

7.2.2	TABLE: Vibration			N/A
Model	OCV at start of test, (Vdc)		Results	
Supplementary information: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)				



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Clause	Requirement + Test	Result - Remark	Verdict
7.3.1	TABLE: Incorrect installation (cells)		N/A
Model	OCV of reversed cell, (Vdc)	Results	
Supplementary information: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- 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: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)						



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Clause	Requirement + Test	Result - Remark		Verdict
7.3.6	TABLE: Crush			N/A
Model	OCV at start of test, (Vdc)	OCV at removal of crushing force, (Vdc)	Results	
Supplementary information: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)				

IEC 62133				
Clause	Requirement + Test	Result - Remark		Verdict
7.3.8	TABLE: Overcharge			N/A
Model	OCV prior to charging, (Vdc)	Maximum charge current, (A)	Time for charging, (hours)	Results
Supplementary information: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)				

IEC 62133				
Clause	Requirement + Test	Result - Remark		Verdict
7.3.9	TABLE: Forced discharge (cells)			N/A
Model	OCV before application of reverse charge, (Vdc)	Measured reverse charge I_r , (A)	Time for reversed charge, (minutes)	Results
Supplementary information:				
A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- 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} , (A)	OCV at start of test, (Vdc)	Results	
FST18650-2200mAh	4.2	1.1	4.186	A,B	
FST18650-2200mAh	4.2	1.1	4.190	A,B	
FST18650-2200mAh	4.2	1.1	4.192	A,B	
FST18650-2200mAh	4.2	1.1	4.187	A,B	
FST18650-2200mAh	4.2	1.1	4.186	A,B	
Supplementary information:					
A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)					



IEC 62133					
Clause	Requirement + Test			Result - Remark	Verdict
8.3.1	TABLE: External short circuit (cell)				P
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise ΔT, (K)	Results
Samples charged at charging temperature upper limit					
FST18650-2200mAh	23.1	4.225	0.078	39.4	A
FST18650-2200mAh	23.1	4.222	0.076	40.3	A
FST18650-2200mAh	23.1	4.220	0.078	41.7	A
FST18650-2200mAh	23.1	4.221	0.076	37.6	A
FST18650-2200mAh	23.1	4.220	0.075	41.0	A
Samples charged at charging temperature lower limit					
FST18650-2200mAh	23.1	4.207	0.077	39.5	A
FST18650-2200mAh	23.1	4.208	0.075	39.9	A
FST18650-2200mAh	23.1	4.205	0.079	40.9	A
FST18650-2200mAh	23.1	4.203	0.076	39.6	A
FST18650-2200mAh	23.1	4.200	0.074	40.4	A
Supplementary information:					
A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)					



IEC 62133						
Clause	Requirement + Test				Result - Remark	Verdict
8.3.2	TABLE: External short circuit (battery)					N/A
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise ΔT, (K)	Results	
Samples charged at charging temperature upper limit						
Samples charged at charging temperature lower limit						
Supplementary information:						
A- No fire or explosion						
B- No leakage						
C- Leakage						
D- Fire						
E- Explosion						
F- Bulge						
G- Others (please explain)						

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						
FST18650-2200mAh	4.224	4.224	18.20	1.820	A	
FST18650-2200mAh	4.220	4.220	18.13	1.813	A	
FST18650-2200mAh	4.218	4.218	18.15	1.815	A	
FST18650-2200mAh	4.216	4.216	18.15	1.815	A	
FST18650-2200mAh	4.220	4.220	18.17	1.817	A	
Samples charged at charging temperature lower limit						



IEC 62133						
Clause	Requirement + Test			Result - Remark		Verdict
FST18650-2200mAh	4.190	4.190	18.21	1.821	A	
FST18650-2200mAh	4.189	4.189	18.15	1.815	A	
FST18650-2200mAh	4.192	4.192	18.17	1.817	A	
FST18650-2200mAh	4.190	4.190	18.16	1.816	A	
FST18650-2200mAh	4.189	4.189	18.15	1.815	A	
Supplementary information: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)						

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, (Ω)	Maximum outer casing temperature, ($^{\circ}$ C)	Results	
Supplementary information: A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)					

IEC 62133				
Clause	Requirement + Test	Result - Remark		Verdict
8.3.7	TABLE: Forced discharge (cells)			P
Model	OCV before application of reverse charge, (Vdc)	Measured Reverse charge I _r , (A)	Time for reversed charge, (minutes)	Results
FST18650-2200mAh	3.411	2.2	90	A
FST18650-2200mAh	3.408	2.2	90	A
FST18650-2200mAh	3.382	2.2	90	A
FST18650-2200mAh	3.392	2.2	90	A
FST18650-2200mAh	3.364	2.2	90	A
Supplementary information:				
A- No fire or explosion				
B- No leakage				
C- Leakage				
D- Fire				
E- Explosion				
F- Bulge				
G- Others (please explain)				

8.3.9	TABLE: Forced internal short circuit (cells)				P
Model	Chamber ambient, (°C)	OCV at start of test, (Vdc)	Particle location ¹⁾	Maximum applied pressure, (N)	Results
FST18650-2200mAh	45.0	4.218	1	320.5	A
FST18650-2200mAh	45.0	4.216	1	276.2	A
FST18650-2200mAh	45.0	4.202	1	800.0	A
FST18650-2200mAh	45.0	4.220	1	265.8	A
FST18650-2200mAh	45.0	4.216	1	800.0	A
FST18650-2200mAh	10.0	4.190	1	800.0	A
FST18650-2200mAh	10.0	4.186	1	258.1	A
FST18650-2200mAh	10.0	4.178	1	262.0	A
FST18650-2200mAh	10.0	4.180	1	282.5	A
FST18650-2200mAh	10.0	4.182	1	290.2	A



IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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 positive aluminium foil in this product. A- No fire or explosion B- No leakage C- Leakage D- Fire E- Explosion F- Bulge G- Others (please explain)			

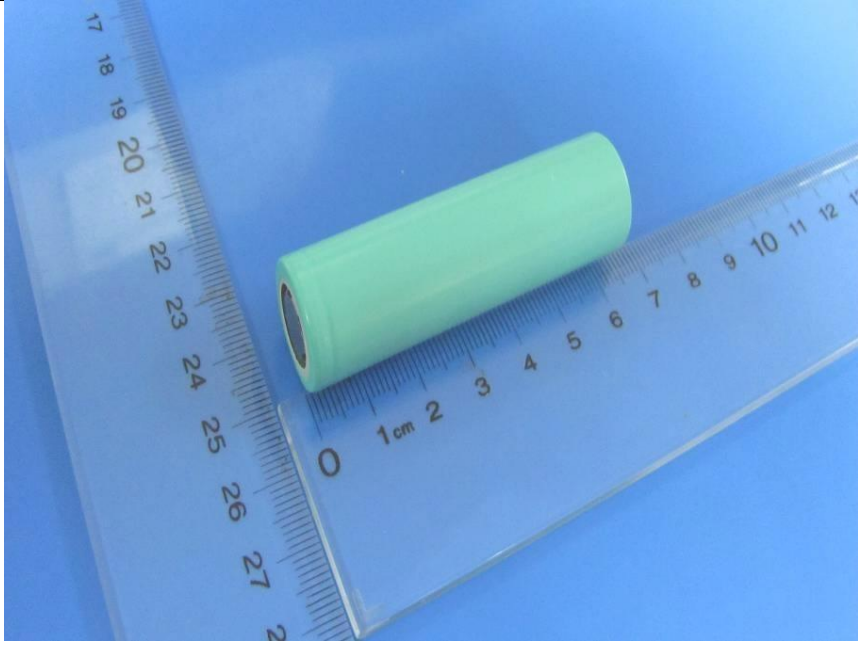


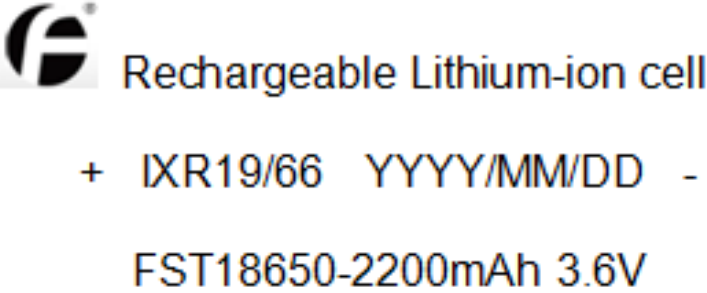
List of test equipment used

Item	Reference No.	Testing / measuring equipment / material used	Range used	Calibration Due date
1	68-5-53-13-001	Temperature and humidity tester	15~35°C, 10~95%RH	2014-04-22
2	68-5-53-13-002	Temperature and humidity tester	15~35°C, 10~95%RH	2014-04-22
3	68-5-53-13-003	Temperature and humidity tester	15~35°C, 10~95%RH	2014-04-22
4	68-5-53-13-004	Temperature and humidity tester	15~35°C, 10~95%RH	2014-04-22
5	68-5-53-13-005	Temperature and humidity tester	15~35°C, 10~95%RH	2014-04-22
6	68-5-53-13-007	Temperature and humidity tester	15~35°C, 10~95%RH	2014-04-22
7	68-5-47-13-001	Electrical analytical balance	200g/0.1mg	2014-04-15
8	68-5-34-13-001	Multiple meter	0~1000V, 0~10A,0~50MΩ	2014-04-22
9	68-5-40-13-003	Temperature data logger/34970A	600°C~-190°C, 10mV~100V, 1mA~1A	2014-04-24
10	68-5-93-13-023	Battery short circuit tester	80±20mΩ,30±10mΩ	-
11	68-5-93-13-011	Crush tester/HY-GBD-31A	0~13kN,0~5mm/S,0~10V	2014-04-25
12	68-5-93-13-012	Internal short tester	-	2014-04-25
13	68-5-18-13-003	Measure tape	7.5m	2014-04-21
14	68-5-99-13-001	Glove box/1220/1000	dew. -25°C	-
15	68-5-35-13-002	Micro-ohm meter	10mΩ~30KΩ	2014-04-22
16	68-5-66-13-015	cyclor	0~5V,0~6A	2014-04-15
17	68-5-66-13-005	cyclor	0~5V,0~6A	2014-04-15
18	68-5-90-13-005	High-low temperature chamber	150°C~-70°C	2014-04-15
19	68-5-34-13-002	Multiple meter	0~1000V, 0~10A,0~50MΩ	2014-04-22
20	68-5-93-09-003	Battery Free fall tester/GX-6052	0~1.5m	-
21	68-5-90-13-011	Oven/SPH301	RT+20°C~200°C	2014-04-15
22	68-5-39-13-002	Stop watch	0.01S	2014-04-17
23	68-5-18-13-001	Digital caliper	0~200mm	2014-04-18
24	68-5-66-13-007	Cyclor/5V/60A	0~5V,0~60A	2014-05-06

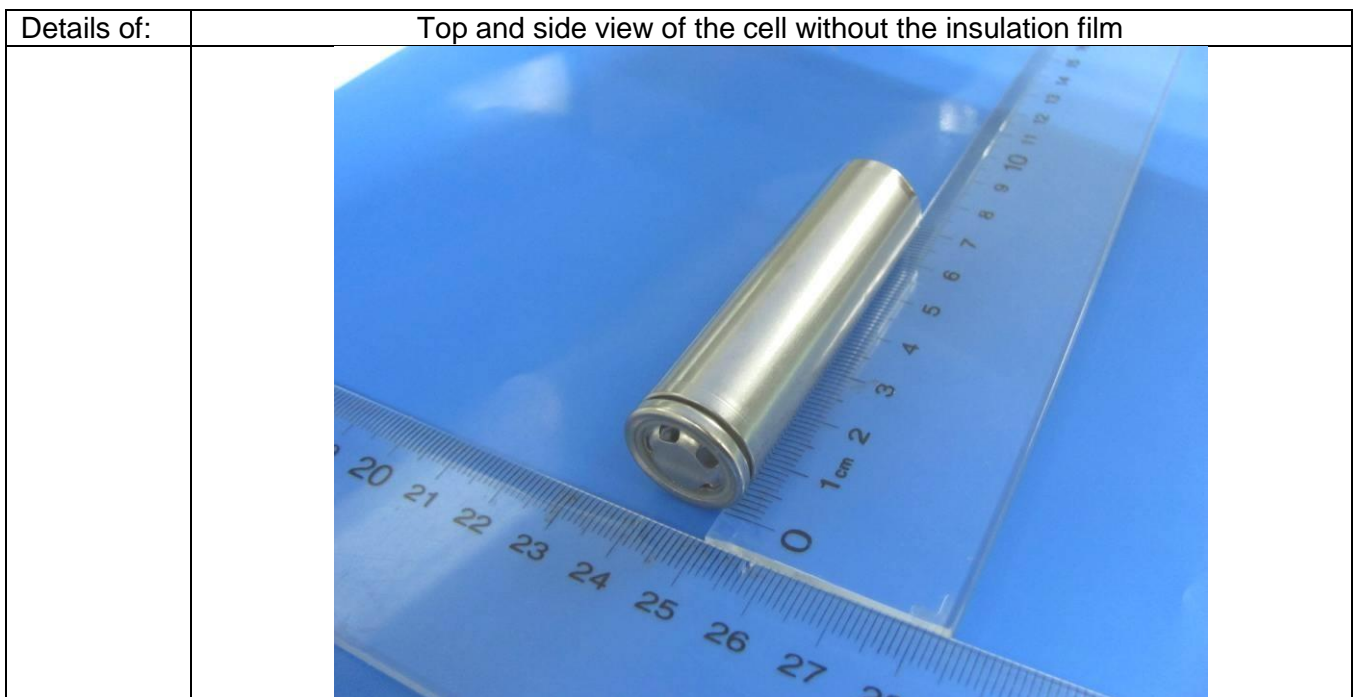
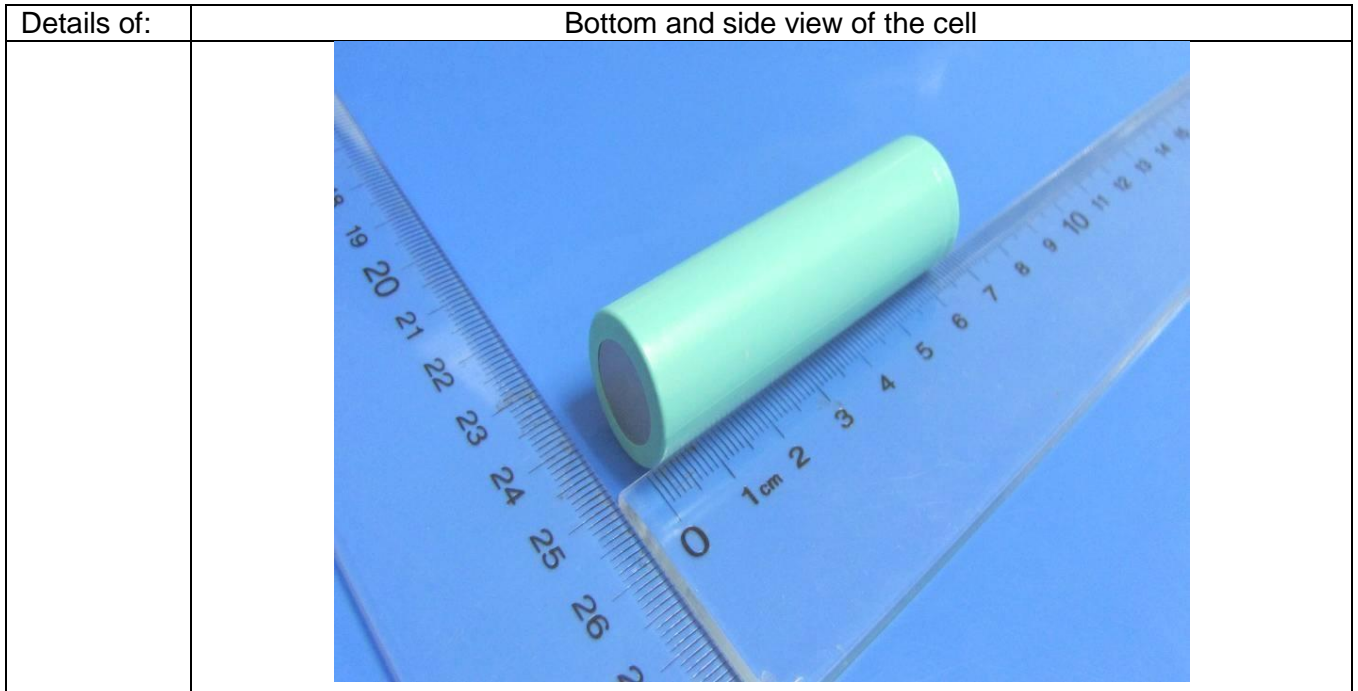
---END OF REPORT---

Attachment No. 1
Photo Documentation

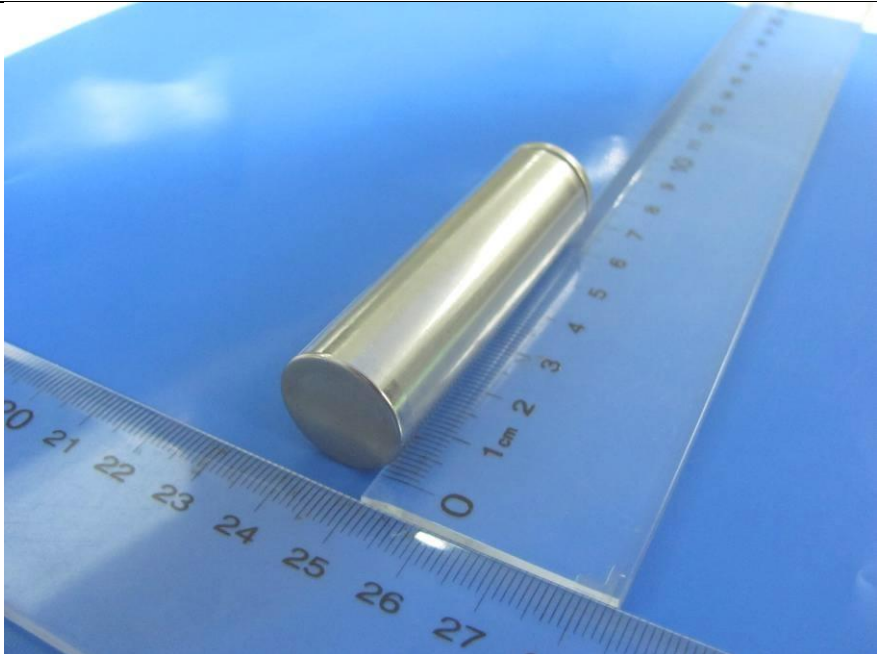
Details of:	Top and side view of the cell, model: FST18650-2200mAh
	

Details of:	The marking on the cell
	 <p>Rechargeable Lithium-ion cell + IXR19/66 YYYY/MM/DD - FST18650-2200mAh 3.6V</p>

Attachment No. 1



Attachment No. 1

Details of:	Bottom and side view of the cell without the insulation film
	

Details of:	Top view of the cell without the insulation film and the vent position
	