



Test Report issued under the responsibility of:



**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 .....: 141000139TWN-001  
 Date of issue .....: June 18, 2015  
 Total number of pages .....: 29 pages test report + Appendix 1, 1 page + Photos, 1 page.  
 Applicant's name .....: E-ONE MOLI ENERGY CORP  
 Address .....: NO.10 , Dali 2nd. Rd.,Shanhua, Tainan, 74144 Taiwan R.O.C.

**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

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**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 Li-ion Cell  
 Trade Mark .....: **MOLICEL**<sup>®</sup>  
 Manufacturer.....: Same as applicant  
 Model/Type reference .....: INR-18650A  
 Ratings .....: 3.6 Vdc, 2500 mAh

<b>Testing procedure and testing location:</b>		
<input checked="" type="checkbox"/>	<b>CB Testing Laboratory:</b>	Intertek Testing Services Taiwan Ltd.
<b>Testing location/ address .....</b>		5F, No. 423, Ruiguang Road, Neihu District, Taipei 114, Taiwan
<input type="checkbox"/>	<b>Associated CB Laboratory:</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....:</b>		Parker Chang <i>Parker Chang</i>
<b>Approved by (name + signature) .....</b>		Mojo Kuo <i>Mojo Kuo</i>
<input type="checkbox"/>	<b>Testing procedure: TMP</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....:</b>		
<b>Approved by (name + signature) .....</b>		
<input type="checkbox"/>	<b>Testing procedure: WMT</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....:</b>		
<b>Witnessed by (name + signature) .....</b>		
<b>Approved by (name + signature) .....</b>		
<input type="checkbox"/>	<b>Testing procedure: SMT</b>	
<b>Testing location/ address .....</b>		
<b>Tested by (name + signature).....:</b>		
<b>Approved by (name + signature) .....</b>		
<b>Supervised by (name + signature).....:</b>		

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

Appendix 1 (1 page) – Additional evaluation provided by manufacturer.

Photos (1 page)

**Summary of testing:****Tests performed (name of test and test clause):**

The sample(s) tested complies with the requirements of IEC 62133: 2012 (Second Edition) (EN 62133: 2013)

8.2.1 Continuous charging at constant voltage (cells)

8.3.1 External short circuit (cell)

8.3.3 Free fall

8.3.4 Thermal abuse (cells)

8.3.5 Crush (cells)

8.3.7 Forced discharge (cells)

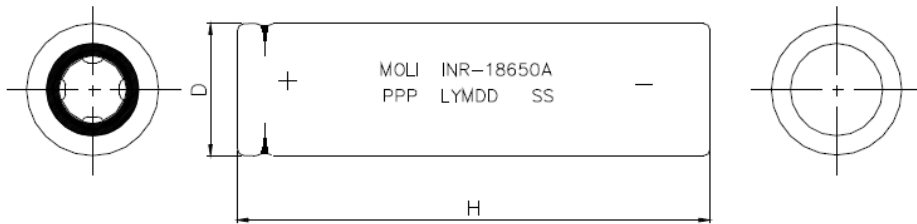
**Testing location:**

Intertek Testing Services Taiwan Ltd.

**Summary of compliance with National Differences:****The product fulfils the requirements of IEC 62133: 2012 (Second Edition) and EN 62133:2013**

**Copy of marking plate**

**MOLCEL**<sup>®</sup>  
 Rechargeable Li-ion Cell  
 3.6 Vdc, 2500 mAh  
 INR-18650A(INR19/66)



**Cell Date Code: YMDDSS**

Y: indicates calendar year, 9=2009, A=2010, B=2011, C=2012, D=2013, E=2014, F=2015 etc.

M: indicates calendar month, 1~9, 10=A, 11=B, 12=C

DD: indicates calendar date of a month, 01~31

SS: indicates the sequence number in a day, 01, 02, etc.

**Note:**

The above markings are the minimum requirements required by the safety standard. For the final production samples, the additional markings which do not give rise to misunderstanding may be added.

<b>Test item particulars .....</b>	
<b>Classification of installation and use .....</b>	Building-in type
<b>Supply connection.....</b>	
<b>Recommend charging method declared by the manufacturer .....</b>	
<b>Discharge current (0,2 I<sub>L</sub> A) .....</b>	500 mA
<b>Specified final voltage.....</b>	2.0 Vdc
<b>Chemistry .....</b>	<input type="checkbox"/> nickel systems ..... <input checked="" type="checkbox"/> lithium systems
<b>Recommend of charging limit for lithium system</b>	
<b>Upper limit charging voltage per cell.....</b>	4.2 Vdc
<b>Maximum charging current .....</b>	5000 mA
<b>Charging temperature upper limit .....</b>	45°C
<b>Charging temperature lower limit.....</b>	0°C
<b>Polymer cell electrolyte type .....</b>	<input type="checkbox"/> gel polymer ..... <input type="checkbox"/> solid polymer
<b>Possible test case verdicts:</b>	
- 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)
<b>Testing.....</b>	
<b>Date of receipt of test item .....</b>	October 13, 2014
<b>Date (s) of performance of tests .....</b>	October 13, 2014 – October 30, 2014
<b>General remarks:</b>	
<p>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.</p>	
<p><b>Throughout this report a <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.</b></p> <p>This report is for the exclusive use of Intertek's Client and is provided pursuant to the agreement between Intertek and its Client. Intertek's responsibility and liability are limited to the terms and conditions of the agreement. Intertek assumes no liability to any party, other than to the Client in accordance with the agreement, for any loss, expense or damage occasioned by the use of this report. Only the Client is authorized to permit copying or distribution of this report and then only in its entirety. Any use of the Intertek name or one of its marks for the sale or advertisement of the tested material, product or service must first be approved in writing by Intertek. The observations and test results in this report are relevant only to the sample tested. This report by itself does not imply that the material, product, or service is or has ever been under an Intertek certification program.</p> <p>When determining the test conclusion, the Measurement Uncertainty of test has been considered.</p>	

**Manufacturer's Declaration per sub-clause 4.2.5 of IEC60080-02:**

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.

**Name and address of factory (ies)..... :** E-ONE MOLI ENERGY CORP  
NO.10 , Dali 2nd. Rd.,Shanhua, Tainan, 74144  
Taiwan R.O.C.

**General product information:**

The tested product is a Rechargeable Li-ion cell for use in a general environment. The cell is considered as Building-in type product. The electrolyte type inside is the liquid type.

"INR19/66" is the cell designation of model INR-18650A.

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
<b>4</b>	<b>Parameter measurement tolerances</b>		P
	Parameter measurement tolerances	The following tolerances are considered: a) ±1% for voltage; b) ±1% for current; c) ±2 °C for temperature; d) ±0.1% for time; e) ±1% for dimension; f) ±1% for capacity.	P
<b>5</b>	<b>General safety considerations</b>		P
<b>5.1</b>	<b>General</b>	See below	P
<b>5.2</b>	<b>Insulation and wiring</b>	See below	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
<b>5.3</b>	<b>Venting</b>	See below	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	Considered	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief	Considered	P
<b>5.4</b>	<b>Temperature/voltage/current management</b>		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

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	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
<b>5.5</b>	<b>Terminal contacts</b>	See below	P
	Terminals have a clear polarity marking on the external surface of the battery	Terminals have a clear polarity marking on the external surface of the EUT	P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Checked	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance	Checked	P
	Terminal contacts are arranged to minimize the risk of short circuits	Checked	P
<b>5.6</b>	<b>Assembly of cells into batteries</b>	See below	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	Single cell is provided within the EUT	N/A
	Each battery has an independent control and protection	Checked	P
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly	Checked	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	Checked	P
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard	Checked	P
5.6.2	Design recommendation for lithium systems only	Single cell is provided within the EUT	P



IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	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	Upper limit of the charging voltage 4.2 V / cell	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
	- 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
<b>5.7</b>	<b>Quality plan</b>	See below	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 provided an ISO 9001 certificate	P
<b>6</b>	<b>Type test conditions</b>		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	Cells are selected complied with this requirement	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	Testing was conducted in an ambient of 20 ± 5 °C, unless otherwise specified	P
<b>7</b>	<b>Specific requirements and tests (nickel systems)</b>		N/A
<b>7.1</b>	<b>Charging procedure for test purposes</b>	The EUT is lithium systems	N/A
<b>7.2</b>	<b>Intended use</b>		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)..... :		—
	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
<b>7.3</b>	<b>Reasonably foreseeable misuse</b>		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

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Clause	Requirement + Test	Result - Remark	Verdict
	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
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
<b>8</b>	<b>Specific requirements and tests (lithium systems)</b>		P
<b>8.1</b>	<b>Charging procedures for test purposes</b>	See below	P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2	Prior to charging, the EUT have been discharged at a constant current of 0.2 It A down to a specified final voltage	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	See below	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	The cell was charged at upper limit temperature 45°C and lower limit temperature -5°C	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1)..... :	Checked	P

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Clause	Requirement + Test	Result - Remark	Verdict
	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

<b>8.2</b>	<b>Intended use</b>	See below	P
8.2.1	Continuous charging at constant voltage (cells)	See below	P
	Results: No fire. No explosion..... :	No fire or explosion occur (See table 8.2.1 for details)	P
8.2.2	Moulded case stress at high ambient temperature (battery)	The EUT is cell type	N/A
	Oven temperature (°C)..... :		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A

<b>8.3</b>	<b>Reasonably foreseeable misuse</b>	See below	P
<b>8.3.1</b>	<b>External short circuit (cell)</b>	See below	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	The cells were tested until the case temperature declined by 20% of the maximum temperature rise	P
	Results: No fire. No explosion..... :	No fire or explosion (See table 8.3.1 for details)	P
<b>8.3.2</b>	<b>External short circuit (battery)</b>	The EUT is cell type	N/A
	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		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..... :		N/A
8.3.3	<b>Free fall</b>	Each fully charged cell was dropped three times from a height of 1.0 m onto a concrete floor	P

<b>IEC 62133</b>			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion.	No fire or explosion occur (See table 8.3.3 for details)	P
<b>8.3.4</b>	<b>Thermal abuse (cells)</b>	See below	P
	The cells were held at 130°C ± 2°C for: - 10 minutes; or	Test condition of the EUT is considered and tested according to standard	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) .....	44.47 g	—
	Results: No fire. No explosion.	No fire or explosion occur (See table 8.3.4 for details)	P
<b>8.3.5</b>	<b>Crush (cells)</b>	See below	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	10% of deformation has occurred compared to the initial dimension	P
	Results: No fire. No explosion.....:	No fire or explosion occur (See table 8.3.5 for details)	P
<b>8.3.6</b>	<b>Over-charging of battery</b>	The EUT is cell type	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.....:		N/A
<b>8.3.7</b>	<b>Forced discharge (cells)</b>	The EUT comply with the test	P
	Results: No fire. No explosion.....:	No fire or explosion occur (See table 8.3.7 for details)	P
<b>8.3.8</b>	<b>Transport tests</b>	See below	P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	Test report is provided to show compliance with UN Recommendations on Transport of Dangerous Goods	P
<b>8.3.9</b>	<b>Design evaluation – Forced internal short circuit (cells)</b>	The test is conducted by the cell manufacturer	N/A
	The cells complied with national requirement for .....		N/A

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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 .....	See Appendix 1 for details	N/A
<b>9</b>	<b>Information for safety</b>		P
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	Checked	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.	Checked	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product	Checked	P
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user .....	Checked	P
<b>10</b>	<b>Marking</b>		P
<b>10.1</b>	<b>Cell marking</b>	See below	P
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	Checked	P
<b>10.2</b>	<b>Battery marking</b>	The EUT is cell type	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
<b>10.3</b>	<b>Other information</b>	See below	P
	Storage and disposal instructions marked on or supplied with the battery.	Storage and disposal instructions are supplied with the battery	P
	Recommended charging instructions marked on or supplied with the battery.	Recommended charging instructions are supplied with the battery	P
<b>11</b>	<b>Packaging</b>		P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	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.	The packaging was adequate to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
<b>Annex A</b>	<b>Charging range of secondary lithium ion cells for safe use</b>		P
A.1	General	See below	P
A.2	Safety of lithium-ion secondary battery	The EUT is lithium-ion secondary cell (NCA systems) type	P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.2 Vdc	P
A.3.2.1	General		N/A
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	Considered	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	A different recommended temperature range 0 to 45 °C is applied in the EUT. Tests that are specified in 8.2 to 8.3 were conducted by using cells which are charged at the -5 °C and 45 °C	P
A.4.3	High temperature range	The upper limit charging temperature 45 °C was applied in the EUT	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		N/A
A.4.4	Low temperature range	A recommended lower temperature limit 0 °C is applied in the EUT. Tests that are specified in 8.2 to 8.3 were conducted by using cells which are charged at -5 °C	P
A.4.4.1	General		N/A
A.4.4.2	Explanation of safety viewpoint		N/A



IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		P
A.4.5	Scope of the application of charging current	No alternative charging current applied to the EUT over 50 kHz	N/A
A.5	Sample preparation	The test is conducted by the cell manufacturer	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 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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE: Critical components information					
Object/part No.	Manufacturer/ trademark	Type/Model	Technical Data	Standard	Marks of Conformity
Positive Electrode	interchangeable	interchangeable	Material: NCA, L:830 x W:57.3 mm	Applicable parts of IEC 62133	Test in the appliance
Negative Electrode	interchangeable	interchangeable	Material: Graphite, L:919 x W:58.7 mm	Applicable parts of IEC 62133	Test in the appliance
Separator	UBE	UP3093	PP/PE/PP, tri-layers, L:997 x W:60.5 mm x H:16 µm, shutdown temp 130 °C, Min. extension beyond electrodes > 0.1 mm	Applicable parts of IEC 62133	Test in the appliance
Electrolyte	interchangeable	interchangeable	LiPF6+Organic Solvent	Applicable parts of IEC 62133	Test in the appliance
Cell case	interchangeable	interchangeable	Steel, Min. H:300 µm +30/-20 thick	Applicable parts of IEC 62133	Test in the appliance
Positive Tab	interchangeable	interchangeable	Material: AL diameter :L:69 x W:4 H:0.15 mm	Applicable parts of IEC 62133	Test in the appliance
Negative Tab	interchangeable	interchangeable	Material: Ni clad, diameter :L:64 x W:3 H:0.08 mm	Applicable parts of IEC 62133	Test in the appliance
Supplementary information: 1). An asterisk indicates a mark which assures the agreed level of surveillance. 2). Negative Electrode/Positive Electrode Capacity ratio 1.08.					

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.2.1: Continuous charging at constant voltage (cells)				P
Model	Recommended charging voltage $V_{c1}$ (Vdc)	Recommended charging current $I_{rec}$ (A)	OCV at start of test, (Vdc)	Results
INR-18650A	4.2	5	4.128	No fire or explosion, No leakage
INR-18650A	4.2	5	4.122	No fire or explosion, No leakage
INR-18650A	4.2	5	4.110	No fire or explosion, No leakage
INR-18650A	4.2	5	4.126	No fire or explosion, No leakage
INR-18650A	4.2	5	4.123	No fire or explosion, No leakage
<b>Supplementary information:</b> - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)				

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.2.2: Moulded case stress at high ambient temperature (Battery)			N/A
Model	Test temperature (°C) (70 ± 2 °C)	Test time (hr)	Results

**Supplementary information:**

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.1: External short circuit (cell)						P
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (mΩ)	Maximum case temperature rise ΔT, (°C)	Results	
<b>Samples charged at charging temperature lower limit</b>						
INR-18650A	20.8	4.187	91	89.8	No fire or explosion	
INR-18650A	20.9	4.188	92	90.3	No fire or explosion	
INR-18650A	20.8	4.187	93	83.5	No fire or explosion	
INR-18650A	21.8	4.190	94	88.6	No fire or explosion	
INR-18650A	21.0	4.188	94	94.7	No fire or explosion	
<b>Samples charged at charging temperature upper limit</b>						
INR-18650A	22.2	4.112	91	92.3	No fire or explosion	
INR-18650A	22.2	4.114	92	91.3	No fire or explosion	
INR-18650A	22.2	4.123	93	90.3	No fire or explosion	
INR-18650A	22.0	4.131	94	92.6	No fire or explosion	
INR-18650A	22.2	4.117	94	97.4	No fire or explosion	
<b>Supplementary information:</b>						
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>						

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.2: 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
<b>Samples charged at charging temperature lower limit</b>					
<b>Samples charged at charging temperature upper limit</b>					
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>					

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.3: Free fall			P
Model	High Level	Results	
INR-18650A	1000 mm	No fire or explosion, No leakage	
INR-18650A	1000 mm	No fire or explosion, No leakage	
INR-18650A	1000 mm	No fire or explosion, No leakage	
<b>Supplementary information:</b> - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)			

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.4: Thermal abuse			P
Model	Test temperature (°C) (130 ± 2 °C)	Test time (min)	Results
<b>Samples charged at charging temperature lower limit</b>			
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
<b>Samples charged at charging temperature upper limit</b>			
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
INR-18650A	130	10 min	No fire or explosion
<b>Supplementary information:</b>			
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>			



IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.5: 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
<b>Samples charged at charging temperature upper limit</b>					
INR-18650A	4.190	4.189	18.50	1.9	No fire or explosion
INR-18650A	4.190	4.189	18.35	1.9	No fire or explosion
INR-18650A	4.191	4.19	18.24	1.9	No fire or explosion
INR-18650A	4.190	4.189	18.26	1.9	No fire or explosion
INR-18650A	4.191	4.189	18.17	1.9	No fire or explosion
<b>Supplementary information:</b>					
<ul style="list-style-type: none"> <li>- No fire or explosion</li> <li>- No leakage</li> <li>- Leakage</li> <li>- Fire</li> <li>- Explosion</li> <li>- Bulge</li> <li>- Others (please explain)</li> </ul>					

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.6: Over - charging of battery				N/A
Constant charging current (A) .....				—
Supply voltage (Vdc) .....				—
Model	OCV before charging, (Vdc)	Resistance of circuit, ( $\Omega$ )	Maximum outer casing temperature, ( $^{\circ}\text{C}$ )	Results
<b>Supplementary information:</b> - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain)				

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.7: Forced discharge (cells)					P
Model	OCV before application of reverse charge, (Vdc)	Measured Reverse charge $I_r$ (A)	Time for reversed charge, (minutes)	Results	
INR-18650A	2.998	2.5	90	No fire or explosion	
INR-18650A	2.979	2.5	90	No fire or explosion	
INR-18650A	3.002	2.5	90	No fire or explosion	
INR-18650A	2.998	2.5	90	No fire or explosion	
INR-18650A	2.978	2.5	90	No fire or explosion	

**Supplementary information:**

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

TABLE 8.3.9: Forced internal short circuit (cells)						N/A
Model	Chamber ambient, (°C)	OCV at start of test, (Vdc)	Particle location <sup>1)</sup>	Maximum applied pressure, (N)	Results	

**Supplementary information:**  
<sup>1)</sup> Identify one of the following:  
 1: Nickel particle inserted between positive and negative (active material) coated area.  
 2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

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

**List of test equipment used**

**(Note: This is an example of the required attachment. Other forms with a different layout but containing similar information are also acceptable.)**

Clause	Measurement/ testing	Testing/measuring equipment/material used, (equipment ID)	Range used	Last calibration date	Calibration due date
Note: Refer to the project file.					

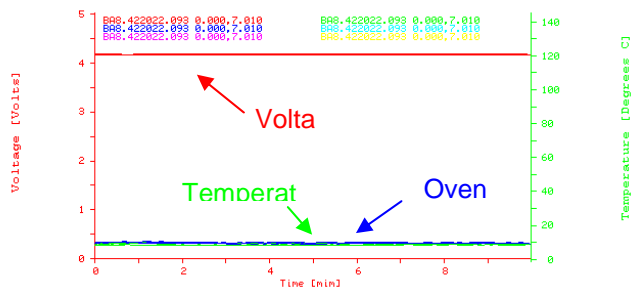
Appendix 1

Additional evaluation provided by manufacturer

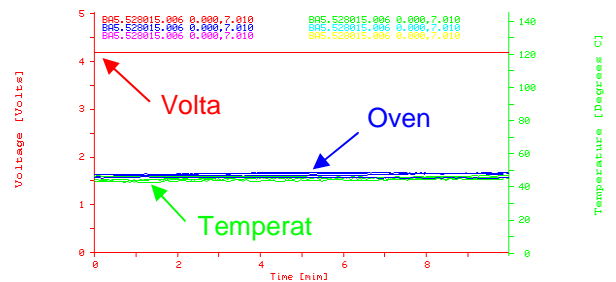
Date	Department	Model	Lot	Code	Cell No	I-ACR	I-OCV	I-Wt	C1	F-ACR
2014/10/16	QA	INR-18650A	GAX2E8220 2	a-10°C	92	12.0	4.079	44.5978	2706	11.2
2014/10/16	QA	INR-18650A	GAX2E8220 2	a-10°C	93	12.1	4.082	44.4597	2705	11.2
2014/10/16	QA	INR-18650A	GAX2E8220 2	a-10°C	94	12.2	4.080	44.3834	2701	11.3
2014/10/16	QA	INR-18650A	GAX2E8220 2	a-10°C	95	11.9	4.079	44.5057	2708	11.2
2014/10/16	QA	INR-18650A	GAX2E8220 2	a-10°C	96	11.9	4.079	44.6220	2695	11.2
2015/6/10	QA	INR-18650A	GAX5F5280 1	a-45°C	6	11.4	4.135	44.9344	2740	11.2
2015/6/10	QA	INR-18650A	GAX5F5280 1	a-45°C	7	11.3	4.135	44.9707	2732	11.2
2015/6/10	QA	INR-18650A	GAX5F5280 1	a-45°C	8	11.8	4.135	44.9198	2727	11.3
2015/6/10	QA	INR-18650A	GAX5F5280 1	a-45°C	9	11.5	4.135	45.0528	2739	11.2
2015/6/10	QA	INR-18650A	GAX5F5280 1	a-45°C	10	11.5	4.137	44.9656	2742	10.3

F-OCV	F_Date	Type	max °C	short-circuit at a pressure(Pound)	Safety Evaluation Result	Note
4.235	2014/11/6	0	12	----	PASS	Test to 180 Pound without short-circuit
4.233	2014/11/6	0	9	----	PASS	Test to 180 Pound without short-circuit
4.234	2014/11/6	0	10	----	PASS	Test to 180 Pound without short-circuit
4.233	2014/11/6	0	10	----	PASS	Test to 180 Pound without short-circuit
4.235	2014/11/6	0	10	----	PASS	Test to 180 Pound without short-circuit
4.235	2015/6/11	0	47	15	PASS	
4.235	2015/6/11	0	48	10	PASS	
4.224	2015/6/11	0	48	60	PASS	
4.223	2015/6/11	0	46	10	PASS	
4.248	2015/6/12	0	48	----	PASS	Test to 180 Pound without short-circuit

10°C



45°C



short-circuit



Photos

External view of EUT



External view of EUT

