



Ref. Certif. No.

SG PSB-BT-01688

IEC SYSTEM FOR MUTUAL RECOGNITION OF TEST CERTIFICATES FOR ELECTRICAL EQUIPMENT  
(IECEE) CB SCHEME

## CB TEST CERTIFICATE

Product

Battery Packs  
( Rechargeable Li-ion Battery Pack )

Name and address of the applicant

**TD HiTech Energy Inc.**  
No. 18-1, Guangfu North Road, Hukou Township  
30351 Hsinchu  
TAIWAN

Name and address of the manufacturer

TD HiTech Energy Inc.  
No. 18-1, Guangfu North Road, Hukou Township, 30351 Hsinchu,  
TAIWAN

Name and address of the factory

TD HiTech Energy Inc.  
5F,6F, No.21, Shuili Rd., East Dist., 30059 Hsinchu City, TAIWAN

Ratings and principal characteristics

Rated voltage: 48 Vdc  
Rated capacity: 9.75 Ah

Trade mark

+STROMER-

Model/type Ref.

ST1303AA (13INR19/65-3)

A sample of the product was tested and found  
to be in conformity with  
as shown in the Test Report Ref. No.  
which forms part of this certificate

IEC 62133-2:2017  
081-200327-000

This CB Test Certificate is issued by the National Certification Body

CBS 107652 0001 Rev. 00

Date, 2020-03-23



( Owen Hsu )


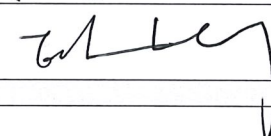
Page 1 of 1

TÜV SÜD PSB Pte Ltd • 1 Science Park Drive • Singapore 118221

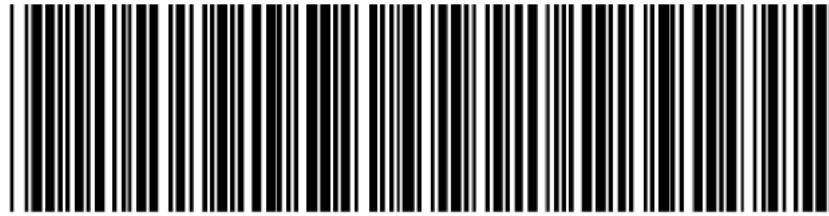


PSB Singapore

|   |  |   |
|---|--|---|
|    | <b>Test Report issued under the responsibility of:</b><br><br><b>NCB TÜV SÜD PSB Pte Ltd.</b><br><b>1 Science Park Drive, 118221 Singapore</b><br><b>Singapore</b> |  |
| <p style="text-align: center;"><b>TEST REPORT</b><br/> <b>IEC 62133-2</b><br/> <b>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 –</b><br/> <b>Part 2: Lithium systems</b></p>  |  |   |
| <p><b>Report Number.</b> ..... 081-200327-000<br/> <b>Date of issue</b> ..... 2020-03-12<br/> <b>Total number of pages</b> ..... 28</p>   |  |   |
| <p><b>Name of Testing Laboratory preparing the Report</b> ..... TÜV SÜD Asia Ltd. Taiwan Branch</p>   |  |   |
| <p><b>Applicant's name</b> ..... TD HiTech Energy Inc.<br/> <b>Address</b> ..... No. 18-1, Guangfu North Road, Hukou Township, 30351 Hsinchu, TAIWAN</p>  |  |   |
| <p><b>Test specification:</b><br/> <b>Standard</b> ..... IEC 62133-2:2017<br/> <b>Test procedure</b> ..... CB Scheme<br/> <b>Non-standard test method</b> ..... N/A</p>   |  |   |
| <p><b>Test Report Form No.</b> ..... IEC62133_2A<br/> <b>Test Report Form(s) Originator</b> .... DEKRA<br/> <b>Master TRF</b> ..... Dated 2017-08-10</p>  |  |   |
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| <p><b>General disclaimer:</b><br/> The test results presented in this report relate only to the object tested.<br/> This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.</p>  |  |   |

|   |   |   |
|---|---|---|
| <b>Test item description .....</b>  | Rechargeable Li-ion Battery Pack  |   |
| <b>Trade Mark .....</b>   | +STROMER-   |   |
| <b>Manufacturer.....</b>  | Same as applicant.  |   |
| <b>Model/Type reference .....</b>   | ST1303AA (13INR19/65-3)   |   |
| <b>Ratings .....</b>  | 48 Vdc, 9.75 Ah   |   |
| <b>Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):</b> |   |   |
| <input checked="" type="checkbox"/> <b>CB Testing Laboratory:</b>                                 | TÜV SÜD Asia Ltd. Taiwan Branch   |   |
| <b>Testing location/ address .....</b>  | 7F., No.37, Sec. 2, Zhongyang S., Rd., Beitou District, Taipei City, 11270, TAIWAN. |   |
| <b>Tested by (name, function, signature) .....</b>  | Mr. Frank Tsai<br>(Project Handler)   |  |
| <b>Approved by (name, function, signature) ..</b>   | Mr. Ethan Huang<br>(Reviewer)   |  |
| <input type="checkbox"/> <b>Testing procedure: CTF Stage 1:</b>                                   | N/A   |   |
| <b>Testing location/ address .....</b>  | N/A   |   |
| <b>Tested by (name, function, signature) .....</b>  |   |   |
| <b>Approved by (name, function, signature) ..</b>   |   |   |
| <input type="checkbox"/> <b>Testing procedure: CTF Stage 2:</b>                                   | N/A   |   |
| <b>Testing location/ address .....</b>  | N/A   |   |
| <b>Tested by (name + signature) .....</b>   |   |   |
| <b>Witnessed by (name, function, signature) ..</b>  |   |   |
| <b>Approved by (name, function, signature) ..</b>   |   |   |
| <input type="checkbox"/> <b>Testing procedure: CTF Stage 3:</b>                                   | N/A   |   |
| <input type="checkbox"/> <b>Testing procedure: CTF Stage 4:</b>                                   | N/A   |   |
| <b>Testing location/ address .....</b>  | N/A   |   |
| <b>Tested by (name, function, signature) .....</b>  |   |   |
| <b>Witnessed by (name, function, signature) ..</b>  |   |   |
| <b>Approved by (name, function, signature) ..</b>   |   |   |
| <b>Supervised by (name, function, signature) :</b>  |   |   |

|   |  |
|---|--|
| <b>List of Attachments (including a total number of pages in each attachment):</b>  |  |
| Attachment No. 1  | National Differences 2 pages   |
| Attachment No. 2  | Photo 7 pages  |
| <b>Summary of testing:</b>  |  |
| <b>Tests performed (name of test and test clause):</b><br>All test results were found satisfactory in accordance with IEC 62133-2: 2017 and EN 62133-2:2017<br>- 5.2 Insulation and wiring<br>- 7.1 Charging procedures for test purposes<br>- 7.1.1 First procedure<br>- 7.1.2 Second procedure<br>- 7.2.2 Case stress at high ambient temperature (battery)<br>- 7.3.2 External short-circuit (battery)<br>- 7.3.3 Free fall<br>- 7.3.6 Over-charging of battery<br>- 7.3.8.1 Vibration<br>- 7.3.8.2 Mechanical shock | <b>Testing location:</b><br>All tests as described in Test Case and Measurement Sections were performed at the laboratory described on page 2. |
| <b>Summary of compliance with National Differences (List of countries addressed):</b><br>Canada (CA)  |  |
| <input checked="" type="checkbox"/> <b>The product fulfils the requirements of IEC 62133-2:2017 (Edition 1.0) and EN 62133-2:2017.</b>  |  |

**Copy of marking plate:**

ST1303AA 131NR19/65-3 401979-A0F1945-00001~401979-A0F1945-000015

Spec : 48V/9.75Ah Rechargeable Li-ion Battery Pack

Manufacturer : TD HiTech

D/C : 2020/01/05

MADE IN TAIWAN

**Date of manufacture designation:****Date code YYYY/MM/DD**

**YYYY** is manufacturing year; 2019, 2020 ...

**MM** is manufacturing month; 01: January, 02: February ...

**DD** is manufacturing day; 01, 02 ...

**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.**

|   |  |
|---|--|
| <b>Test item particulars.....:</b>  |  |
| <b>Classification of installation and use.....:</b> For use in portable applications.   |  |
| <b>Supply Connection .....</b> Exclusive connector  |  |
| <b>Recommend charging method declared by the manufacturer .....</b> CC-CV   |  |
| <b>Discharge current (0,2 It A) .....</b> 1.95 A  |  |
| <b>Specified final voltage.....:</b> 32.5 Vdc   |  |
| <b>Upper limit charging voltage per cell.....:</b> 4.2 Vdc  |  |
| <b>Maximum charging current .....</b> 5 A   |  |
| <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 <input checked="" type="checkbox"/> N/A  |  |
| <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> 2020-02-20  |  |
| <b>Date (s) of performance of tests .....</b> 2020-02-21 to 2020-03-06  |  |
| <b>General remarks:</b>   |  |
| "(See Enclosure #)" refers to additional information appended to the report.<br>"(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.   |  |
| <b>Manufacturer's Declaration per sub-clause 4.2.5 of IEC60068-2-1:</b>   |  |
| 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<br><input checked="" type="checkbox"/> Not applicable |
| <b>When differences exist; they shall be identified in the General product information section.</b>   |  |
| <b>Name and address of factory (ies) .....</b>  |  |
| TD HiTech Energy Inc. (ID No.: 107684)<br>5F,6F, No.21, Shuili Rd., East Dist., 30059 Hsinchu City, TAIWAN  |  |

**General product information and other remarks:**

This equipment is a Rechargeable Li-ion Battery Pack for use in portable applications.

Model 13INR19/65-3 is the marking of IEC 62133-2 requirement for model ST1303AA.

The Rechargeable Li-ion Battery equipped with the battery cell is CB certified component of IEC 62133-2:2017, see TABLE: Critical components information for details.

The maximum ambient temperature specified as 45 °C for charge condition; 65 °C for discharge condition.

Specification for the Rechargeable Lithium-ion battery is as follows:

|                               |              |
|-------------------------------|--------------|
| Model/Type reference          | ST1303AA     |
| Battery Cell Configuration    | 13S3P        |
| Nominal voltage (Vdc)         | 48 Vdc       |
| Nominal capacity (mAh, Wh)    | 9.75 Ah      |
| Maximum Charge Voltage (Vdc)  | 54.6 Vdc     |
| Maximum charge current (A)    | 5 A          |
| Specified final voltage (Vdc) | 32.5 Vdc     |
| Weight (kg)                   | Approx. 3 kg |

The measurement uncertainty is not accounted for the decision rule in statement of conformity.

| IEC 62133-2 |  |   |         |
|-------------|--|---|---------|
| Clause      | Requirement + Test   | Result - Remark   | Verdict |
| <b>4</b>    | <b>PARAMETER MEASUREMENT TOLERANCES</b>  |   | P       |
|             | Parameter measurement tolerances   | Both normal and foreseeable misuses are evaluated in the report. All control and measure values were within the tolerances.                             | P       |
| <b>5</b>    | <b>GENERAL SAFETY CONSIDERATIONS</b>   |   | P       |
| <b>5.1</b>  | <b>General</b>   | See below.  | P       |
|             | Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse   | Considered.   | P       |
| <b>5.2</b>  | <b>Insulation and wiring</b>   | See below.  | 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   | Not less than 5 MΩ.   | P       |
|             | Insulation resistance (MΩ) ..... :   | > 9999 MΩ   | —       |
|             | Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements   | See test of clause 7.   | P       |
|             | Orientation of wiring maintains adequate clearance and creepage distances between conductors   | See test of clause 7.   | P       |
|             | Mechanical integrity of internal connections accommodates reasonably foreseeable misuse  | See test of clause 7.   | P       |
| <b>5.3</b>  | <b>Venting</b>   |   | 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            | For the battery pack, the pressure relief mechanism along the cell's top and side sealing, this can release the pressure during the abnormal operation. | 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 and evaluated for the batteries.   | P       |
| <b>5.4</b>  | <b>Temperature, voltage and current management</b>   |   | P       |
|             | Batteries are designed such that abnormal temperature rise conditions are prevented  | Mosfet, fuse and protective IC are provided.  | P       |
|             | Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer   | Mosfet, fuse and protective IC are provided.  | P       |
|             | Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified | The charging limits specified in the Battery Pack specification.  | P       |

| IEC 62133-2 |  |   |         |
|-------------|--|---|---------|
| Clause      | Requirement + Test   | Result - Remark   | Verdict |
| <b>5.5</b>  | <b>Terminal contacts</b>   |   | P       |
|             | The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current   | Maximum anticipated current can carry.  | P       |
|             | External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance   | The external terminal contact surfaces complied with the requirements.  | P       |
|             | Terminal contacts are arranged to minimize the risk of short-circuit   | Special battery connector designation to prevent short circuit. Proper spacing was maintained to prevent the short circuit. | P       |
| <b>5.6</b>  | <b>Assembly of cells into batteries</b>  |   | P       |
| 5.6.1       | General  | See below.  | P       |
|             | Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region  | Only one battery and has an independent control and protection.   | P       |
|             | This protection may be provided external to the battery such as within the charger or the end devices  |   | N/A     |
|             | If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation  |   | N/A     |
|             | If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions   | Only one battery provided.  | N/A     |
|             | Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly   | Current, voltage and temperature limits specified by cell manufacturer.   | P       |
|             | Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer                             | Checked.  | P       |
|             | Protective circuit components added as appropriate and consideration given to the end-device application   | See critical component lists for protective circuit components.   | P       |
|             | The manufacturer of the battery provide a safety analysis of the battery safety circuitry with a test report including a fault analysis of the protection circuit under both charging and discharging conditions confirming the compliance | Safety analysis report provided by manufacturer.  | P       |
| 5.6.2       | Design recommendation  | See below.  | P       |

| IEC 62133-2 |  |  |         |
|-------------|--|--|---------|
| Clause      | Requirement + Test   | Result - Remark  | Verdict |
|             | For the battery consisting of a single cell or a single cellblock, it is recommended that the charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Table 2  | Charging voltage: 4.2 Vdc.   | P       |
|             | For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that the voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Table 2, by monitoring the voltage of every single cell or the single cellblocks | The measured voltage of cells or cell blocks did not exceed the upper limit of the charging voltage 4.2 Vdc. | P       |
|             | For the battery consisting of series-connected plural single cells or series-connected plural cellblocks, it is recommended that charging is stopped when the upper limit of the charging voltage is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks                | The upper limit of the charging voltage is stopped, when charging voltage reaches.                           | P       |
|             | For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection   |  | N/A     |
|             | For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer  | All used certified cells are the same manufacturer and type.   | P       |
|             | It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage   | End of discharge: 32.5 V, not exceed the final voltage specified by cell manufacturer.                       | P       |
|             | For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system  | The RECHARGEABLE LI-ION BATTERY PACK provided an BMU Solution.   | P       |
| 5.6.3       | Mechanical protection for cells and components of batteries  | See below.   | P       |
|             | Mechanical protection for cells, cell connections and control circuits within the battery provided to prevent damage as a result of intended use and reasonably foreseeable misuse   | Mechanical protection for cell connections and control circuits provided.                                    | P       |
|             | The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product   | The outer housing of a battery pack that provides mechanical protection.                                     | P       |
|             | The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer  | Suitable space provided in the RECHARGEABLE LI-ION BATTERY PACK.   | P       |
|             | For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests   |  | N/A     |
| 5.7         | Quality plan   |  | P       |

| IEC 62133-2 |   |  |         |
|-------------|---|--|---------|
| Clause      | Requirement + Test  | Result - Remark  | Verdict |
|             | The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery | The manufacturer has ISO 9001:2015 certificate and such quality plan.          | P       |
| <b>5.8</b>  | <b>Battery safety components</b>  |  | P       |
|             | According annex F   | Considered.<br>See critical component lists for protective circuit components. | P       |

|          |  |   |     |
|----------|--|---|-----|
| <b>6</b> | <b>TYPE TEST AND SAMPLE SIZE</b>   |   | P   |
|          | Tests are made with the number of cells or batteries specified in Table 1 using cells or batteries that are not more than six months old   | Complied.<br>Lithium system.                | P   |
|          | Coin cells with resistance $\leq 3 \Omega$ (measured according annex D) are tested according table 1   |   | N/A |
|          | Unless otherwise specified, tests are carried out in an ambient temperature of $20^\circ\text{C} \pm 5^\circ\text{C}$  | Considered and evaluated for the batteries. | P   |
|          | The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and overdischarge protection  | Considered.                                 | P   |
|          | When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test | See clause 7.3.2.                           | P   |

|            |   |  |     |
|------------|---|--|-----|
| <b>7</b>   | <b>SPECIFIC REQUIREMENTS AND TESTS</b>  |  | P   |
| <b>7.1</b> | <b>Charging procedure for test purposes</b>   |  | P   |
| 7.1.1      | First procedure   | Discharge current ( $0.2 I_t$ A)<br>See page 5 for details.<br>The charging procedure using the method as per the manufacture's specification. | P   |
|            | This charging procedure applies to subclauses other than those specified in 7.1.2   | Considered.  | P   |
|            | Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of $20^\circ\text{C} \pm 5^\circ\text{C}$ , using the method declared by the manufacturer | Considered.  | P   |
|            | Prior to charging, the battery have been discharged at $20^\circ\text{C} \pm 5^\circ\text{C}$ at a constant current of $0,2 I_t$ A down to a specified final voltage  | Considered.  | P   |
| 7.1.2      | Second procedure  |  | N/A |
|            | This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9  | Certified cell used.   | N/A |

| IEC 62133-2 |  |   |         |
|-------------|--|---|---------|
| Clause      | Requirement + Test   | Result - Remark   | Verdict |
|             | After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method |   | N/A     |
| <b>7.2</b>  | <b>Intended use</b>  | See below.  | P       |
| 7.2.1       | Continuous charging at constant voltage (cells)  | Certified cell used.  | N/A     |
|             | Fully charged cells are subjected for 7 days to a charge using the charging method for current and standard voltage specified by the cell manufacturer   |   | N/A     |
|             | Results: No fire. No explosion. No leakage.....:   |   | N/A     |
| 7.2.2       | Case stress at high ambient temperature (battery)  | See below.  | P       |
|             | Oven temperature (°C).....:  | The batteries were fully charged and tested in the conditions of 70 °C for 7 h.                               | —       |
|             | Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells  | No physical distortion of the battery case resulting in exposure of internal protective components and cells. | P       |
| <b>7.3</b>  | <b>Reasonably foreseeable misuse</b>   | See below.  | P       |
| 7.3.1       | External short-circuit (cell)  | Certified cell used.  | N/A     |
|             | The cells were tested until one of the following occurred:   |   | N/A     |
|             | - 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     |
| 7.3.2       | External short-circuit (battery)   | See below.  | P       |
|             | The batteries were tested until one of the following occurred:   | The batteries were fully charged and subjected to a short circuit test.                                       | P       |
|             | - 24 hours elapsed; or   |   | N/A     |
|             | - The case temperature declined by 20 % of the maximum temperature rise  | During the test, until reached steady state condition.  | P       |
|             | In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition   |   | N/A     |
|             | A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test   | Considered.   | P       |

| IEC 62133-2 |  |  |         |
|-------------|--|--|---------|
| Clause      | Requirement + Test   | Result - Remark  | Verdict |
|             | A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor   | Considered.  | P       |
|             | Results: No fire. No explosion..... :  | (See appended table 7.3.2)                                   | P       |
| 7.3.3       | Free fall  | The battery was fully charged and tested for this condition. | P       |
|             | Results: No fire. No explosion   | No fire, no explosion to the apparatus after the test.       | P       |
| 7.3.4       | Thermal abuse (cells)  | Certified cell used.   | N/A     |
|             | Oven temperature (°C)..... :   |  | —       |
|             | Results: No fire. No explosion   |  | N/A     |
| 7.3.5       | Crush (cells)  | Certified cell used.   | N/A     |
|             | The crushing force was released upon:  |  | N/A     |
|             | - The maximum force of 13 kN ± 0,78 kN has been applied; or  |  | N/A     |
|             | - An abrupt voltage drop of one-third of the original voltage has been obtained  |  | N/A     |
|             | Results: No fire. No explosion..... :  |  | N/A     |
| 7.3.6       | Over-charging of battery   |  | P       |
|             | The supply voltage which is:   | See below.   | P       |
|             | - 1,4 times the upper limit charging voltage presented in Table A.1 (but not to exceed 6,0 V) for single cell/cell block batteries or  |  | N/A     |
|             | - 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and   |  | P       |
|             | - Sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached  |  | P       |
|             | Test was continued until the temperature of the outer casing:  |  | P       |
|             | - Reached steady state conditions (less than 10 °C change in 30-minute period); or   |  | P       |
|             | - Returned to ambient  |  | P       |
|             | Results: No fire. No explosion..... :  | (See appended table 7.3.6)                                   | P       |
| 7.3.7       | Forced discharge (cells)   | Certified cell used.   | N/A     |
|             | If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration |  | N/A     |

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|-------------|---|------------------------------|---------|
| Clause      | Requirement + Test  | Result - Remark              | Verdict |
|             | If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration |                              | N/A     |
|             | Results: No fire. No explosion..... :   |                              | N/A     |
| 7.3.8       | Mechanical tests (batteries)  | See below.                   | P       |
| 7.3.8.1     | Vibration   |                              | P       |
|             | Results: No fire, no explosion, no rupture, no leakage or venting. .... :   | (See appended table 7.3.8.1) | P       |
| 7.3.8.2     | Mechanical shock  |                              | P       |
|             | Results: No leakage, no venting, no rupture, no explosion and no fire ..... :   | (See appended table 7.3.8.2) | P       |
| 7.3.9       | Design evaluation – Forced internal short-circuit (cells)   | Certified cell used.         | N/A     |
|             | The cells complied with national requirement for ..... :  |                              | —       |
|             | The pressing was stopped upon:  |                              | N/A     |
|             | - A voltage drop of 50 mV has been detected; or   |                              | N/A     |
|             | - The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached   |                              | N/A     |
|             | Results: No fire ..... :  |                              | N/A     |

|            |   |   |     |
|------------|---|---|-----|
| <b>8</b>   | <b>INFORMATION FOR SAFETY</b>   |   | P   |
| <b>8.1</b> | <b>General</b>  |   | P   |
|            | Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products                                      | Information for safety mentioned in manufacturer's specification. | P   |
|            | Manufacturers of batteries ensure 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 specification. | P   |
|            | Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product                     | To be evaluated in final systems.                                 | N/A |
|            | As appropriate, any information relating to hazard avoidance resulting from a system analysis provided to the end user  | To be evaluated in final systems.                                 | N/A |
|            | Do not allow children to replace batteries without adult supervision  |   | P   |
| <b>8.2</b> | <b>Small cell and battery safety information</b>  | Not Small batteries.  | N/A |
|            | The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:                                |   | N/A |

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|-------------|---|-----------------|---------|
| Clause      | Requirement + Test  | Result - Remark | Verdict |
|             | - Keep small cells and batteries which are considered swallowable out of the reach of children                        |                 | N/A     |
|             | - Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion |                 | N/A     |
|             | - In case of ingestion of a cell or battery, seek medical assistance promptly   |                 | N/A     |

|            |   |  |            |
|------------|---|--|------------|
| <b>9</b>   | <b>MARKING</b>  |  | <b>P</b>   |
| <b>9.1</b> | <b>Cell marking</b>   | See below.   | <b>P</b>   |
|            | Cells marked as specified in IEC 61960, except coin cells   | Certified cell is marked in accordance with IEC 61960.   | <b>P</b>   |
|            | Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity  | Not coin cells.  | <b>N/A</b> |
|            | By agreement between the cell manufacturer and the battery and/or end product manufacturer, component cells used in the manufacture of a battery need not be marked   | Certified cell is marked in accordance with IEC 61960.   | <b>P</b>   |
| <b>9.2</b> | <b>Battery marking</b>  |  | <b>P</b>   |
|            | Batteries marked as specified in IEC 61960, except for coin batteries   | Batteries of lithium system are marked in accordance with IEC 61960. See Copy of Marking Plate item in the beginning of this report. | <b>P</b>   |
|            | Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement               | Not coin battery.  | <b>N/A</b> |
|            | Terminals have clear polarity marking on the external surface of the battery  | The positive and negative polarity is marked on the external surface.  | <b>P</b>   |
|            | Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections | Special battery connector designation to prevent short circuit.  | <b>P</b>   |
| <b>9.3</b> | <b>Caution for ingestion of small cells and batteries</b>   |  | <b>N/A</b> |
|            | Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2   | Not coin cells and batteries.  | <b>N/A</b> |
|            | When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package  |  | <b>N/A</b> |

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|-------------|-----------------------------------|---|---------|
| Clause      | Requirement + Test                | Result - Remark   | Verdict |
| <b>9.4</b>  | <b>Other information</b>          | See below.  | P       |
|             | Storage and disposal instructions | Information for safety mentioned in manufacturer's specification. | P       |
|             | Recommended charging instructions | Information for safety mentioned in manufacturer's specification. | P       |

|           |   |  |     |
|-----------|---|--|-----|
| <b>10</b> | <b>PACKAGING AND TRANSPORT</b>  |  | P   |
|           | Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3   | Not coin cells.  | N/A |
|           | 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 proper packaging description is provided in the product specification, which can avoid the mechanical damage during the transport, handling, and stacking. | P   |

|                |   |  |     |
|----------------|---|--|-----|
| <b>ANNEX A</b> | <b>CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE</b>       |  | N/A |
| <b>A.1</b>     | <b>General</b>  |  | N/A |
| <b>A.2</b>     | <b>Safety of lithium ion secondary battery</b>  |  | N/A |
| <b>A.3</b>     | <b>Consideration on charging voltage</b>  |  | N/A |
| A.3.1          | General   |  | N/A |
| A.3.2          | Upper limit charging voltage  |  | N/A |
| 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 |
| <b>A.4</b>     | <b>Consideration of temperature and charging current</b>                                |  | N/A |
| A.4.1          | General   |  | N/A |
| A.4.2          | Recommended temperature range   |  | N/A |
| A.4.2.1        | General   |  | N/A |
| 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 |
| A.4.3.3        | Safety considerations when specifying charging conditions in the high temperature range |  | N/A |

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|-------------|---|-----------------|---------|
| Clause      | Requirement + Test  | Result - Remark | Verdict |
| A.4.3.4     | Safety considerations when specifying a new upper limit in the 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 the low temperature range       |                 | N/A     |
| A.4.4.4     | Safety considerations when specifying a new lower limit in the low temperature range          |                 | N/A     |
| A.4.5       | Scope of the application of charging current  |                 | N/A     |
| A.4.6       | Consideration of discharge  |                 | N/A     |
| A.4.6.1     | General   |                 | N/A     |
| A.4.6.2     | Final discharge voltage and explanation of safety viewpoint                                   |                 | N/A     |
| A.4.6.3     | Discharge current and temperature range   |                 | N/A     |
| A.4.6.4     | Scope of application of the discharging current   |                 | N/A     |
| <b>A.5</b>  | <b>Sample preparation</b>   |                 | N/A     |
| A.5.1       | General   |                 | N/A     |
| A.5.2       | Insertion procedure for nickel particle to generate internal short                            |                 | 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 in cylindrical cell  |                 | N/A     |
| A.5.5.1     | Insertion of nickel particle in winding core  |                 | N/A     |
| A.5.5.2     | Marking the position of the nickel particle on both ends of the winding core of the separator |                 | N/A     |
| A.5.6       | Insertion of nickel particle in prismatic cell  |                 | N/A     |
| <b>A.6</b>  | <b>Experimental procedure of the forced internal short-circuit test</b>                       |                 | N/A     |
| A.6.1       | Material and tools for preparation of nickel particle   |                 | N/A     |
| A.6.2       | Example of a nickel particle preparation procedure  |                 | N/A     |
| A.6.3       | Positioning (or placement) of a nickel particle   |                 | N/A     |
| A.6.4       | Damaged separator precaution  |                 | N/A     |
| A.6.5       | Caution for rewinding separator and electrode   |                 | N/A     |
| A.6.6       | Insulation film for preventing short-circuit  |                 | N/A     |
| A.6.7       | Caution when disassembling a cell   |                 | N/A     |
| A.6.8       | Protective equipment for safety   |                 | N/A     |
| A.6.9       | Caution in the case of fire during disassembling  |                 | N/A     |

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

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| Clause      | Requirement + Test | Result - Remark | Verdict |

| TABLE: Critical components information                      |                                 |                 |                           |                   | P                                   |
|---|---------------------------------|-----------------|---------------------------|-------------------|-------------------------------------|
| Object / part No.   | Manufacturer / trademark        | Type / model    | Technical data            | Standard          | Mark(s) of conformity <sup>1)</sup> |
| Enclosure for front   | Polyplastic Taiwan Co., Ltd.    | M90             | Min. HB, 3.5 mm thickness | UL 94             | UL* (E146187)                       |
| Enclosure for rear  | Polyplastic Taiwan Co., Ltd.    | M90             | Min. HB, 3.5 mm thickness | UL 94             | UL* (E146187)                       |
| Enclosure (middle)  | Interchangeable                 | Interchangeable | Metal                     | --                | --                                  |
| Marking label   | KK ENTERPRISE CO LTD            | HTLSMI          | 125 °C                    | UL 969            | UL*                                 |
| Battery Cell (Lithium-ion Rechargeable Battery cell, 13S3P, | SAMSUNG SDI Co., Ltd.           | INR18650-35E++  | 3.6 Vdc, 3400 mAh         | IEC 62133-2:2017, | CB by DEKRA Ref Cert No.: NL-53895  |
| Resistors (R40)   | TT Electronics                  | LRMAP3920       | --                        | --                | --                                  |
| Mosfet (Q10,Q11,Q12, Q13,Q15,Q16, Q17,Q18)                  | infineon                        | IPB042N10N3 G   | --                        | --                | --                                  |
| NTC Thermistor (RT1)  | Interchangeable                 | Interchangeable | 10 K $\Omega$ ±1%         | --                | --                                  |
| Mosfet (Q19)  | International IOR Rectifier     | IRF9120/DPAK    | --                        | --                | --                                  |
| TVS (D8)  | Hanwei Electronics Co., Ltd.    | ER3D            | --                        | --                | --                                  |
| Step-Down Regulator (U100)                                  | LINEAR Technology               | LT8620          | --                        | --                | --                                  |
| Power Transformer (T100)                                    | JET SIGNAL Industries Co., Ltd. | JS19SW07        | --                        | --                | --                                  |
| Mosfet (Q102)   | Alfa-MOS Technology Corporation | AFN8936S89RG    | --                        | --                | --                                  |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| TABLE: Critical components information                                      |                            |                         |                                  |  |                                     | P |
|---|----------------------------|-------------------------|----------------------------------|--|-------------------------------------|---|
| Object / part No.   | Manufacturer / trademark   | Type / model            | Technical data                   | Standard                                     | Mark(s) of conformity <sup>1)</sup> |   |
| Protection IC (U200)  | Micro                      | OZ890                   | --                               | --   | --                                  |   |
| TRANSISTOR (Q200)   | ON Semiconductor           | MMBT2222L               | --                               | --   | --                                  |   |
| TRANSISTOR (Q201)   | ONSEMI                     | 2N2907A                 | --                               | --   | --                                  |   |
| Mosfet (Q202)   | TOSHIBA                    | T2N7002BK               | --                               | --   | --                                  |   |
| Microchip (U303)  | MICREL                     | MIC5283                 | --                               | --   | --                                  |   |
| Microchip (U304)  | Microchip                  | PIC18F4685-I/PT         | --                               | --   | --                                  |   |
| EEPROM (U300)   | MICROCHIP                  | 24AA256/24LC256/24FC256 | --                               | --   | --                                  |   |
| EMC-OPTIMIZED HIGH SPEED CAN TRANSCEIVER (U301)                             | TEXAS INSTRUMENTS          | SN65HVD1040A-Q1         | --                               | --   | --                                  |   |
| FUSE (F300, F301)   | Fuzetec Technology Co Ltd. | FSMD010-1206-R          | 60 Vdc, 0.25 A                   | IEC/EN 62319-1-1:2005<br>IEC/EN 62319-1:2005 | TUV R 50090556                      |   |
| Real time clock module (U302)   | SEIKO EPSON CORPORATION    | RX8010SJ                | --                               | --   | --                                  |   |
| Internal wiring (Red & black)   | Interchangeable            | Interchangeable         | Rated minimum 80 °C, V-2, 14 AWG | UL 758                                       | UL*                                 |   |
| PCB   | Interchangeable            | Interchangeable         | V-1 min., min. 105 °C            | UL 796                                       | UL*                                 |   |
| Connector   | Interchangeable            | Interchangeable         | V-2 min., 105 °C                 | UL 94  | UL*                                 |   |
| Supplementary information:  |                            |                         |                                  |  |                                     |   |
| 1) Provided evidence ensures the agreed level of compliance. See OD-CB2039. |                            |                         |                                  |  |                                     |   |
| 2) *License available upon request.   |                            |                         |                                  |  |                                     |   |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

|  |  |  |                       |         |     |
|--|--|--|-----------------------|---------|-----|
| 7.2.1  | TABLE: Continuous charging at constant voltage (cells) |  |                       |         | N/A |
| Sample no.   | Recommended charging voltage<br>Vc (Vdc)               | Recommended charging current<br>I <sub>rec</sub> (A) | OCV before test (Vdc) | Results |     |
|  |  |  |                       |         |     |
|  |  |  |                       |         |     |
|  |  |  |                       |         |     |
|  |  |  |                       |         |     |
|  |  |  |                       |         |     |
| <b>Supplementary information:</b><br>- No fire or explosion<br>- No leakage<br>- Others (please explain) |  |  |                       |         |     |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| 7.3.1   | TABLE: External short-circuit (cell) |                       |                            |                                      |         | N/A |
|---|--------------------------------------|-----------------------|----------------------------|--------------------------------------|---------|-----|
| Sample no.  | Ambient T (°C)                       | OCV before test (Vdc) | Resistance of circuit (mΩ) | Maximum case temperature rise ΔT (K) | Results |     |
| Samples charged at charging temperature upper limit |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
| Samples charged at charging temperature lower limit |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
|   |                                      |                       |                            |                                      |         |     |
| Supplementary information:                          |                                      |                       |                            |                                      |         |     |
| - No fire or explosion                              |                                      |                       |                            |                                      |         |     |
| - Others (please explain)                           |                                      |                       |                            |                                      |         |     |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| 7.3.2  | TABLE: External short-circuit (battery) |                       |                            |                                      |                                  | P                     |
|--|---|-----------------------|----------------------------|--------------------------------------|----------------------------------|-----------------------|
| Sample no.   | Ambient T (°C)                          | OCV before test (Vdc) | Resistance of circuit (mΩ) | Maximum case temperature rise ΔT (K) | Component single fault condition | Results               |
| ST1303AA / No. 01  | 24.7                                    | 54.61                 | 85.71                      | 1.4                                  | Normal                           | No Fire, No Explosion |
| ST1303AA / No. 02  | 23.2                                    | 54.66                 | 76.13                      | 0.2                                  | Fault C,E FET (Q7)               | No Fire, No Explosion |
| ST1303AA / No. 03  | 23.1                                    | 54.64                 | 77.82                      | 0.1                                  | Fault C,E FET (Q7)               | No Fire, No Explosion |
| ST1303AA / No. 04  | 23.2                                    | 54.63                 | 77.91                      | 0.3                                  | Fault Fuse (F1, F2)              | No Fire, No Explosion |
| ST1303AA / No. 05  | 23.0                                    | 54.65                 | 85.86                      | 0.1                                  | Fault Fuse (F1, F2)              | No Fire, No Explosion |
| <b>Supplementary information:</b><br>- No fire or explosion<br>- Others (please explain) |   |                       |                            |                                      |                                  |                       |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| <b>7.3.5</b>   | <b>TABLE: Crush (cells)</b> |  |   | <b>N/A</b> |
|--|-----------------------------|--|---|------------|
| Sample no.   | OCV before test (Vdc)       | OCV at removal of crushing force (Vdc) | Maximum force applied to the cell during crush (kN) | Results    |
| <b>Samples charged at charging temperature upper limit</b>                               |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
| <b>Samples charged at charging temperature lower limit</b>                               |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
|  |                             |  |   |            |
| <b>Supplementary information:</b><br>- No fire or explosion<br>- Others (please explain) |                             |  |   |            |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| <b>7.3.6</b>  | <b>TABLE: Over-charging of battery</b> |                              |                                     | <b>P</b>              |
|---|--|------------------------------|-------------------------------------|-----------------------|
| <b>Constant charging current (A) .....</b>  |  | <b>19.5 A</b>                |                                     | <b>—</b>              |
| <b>Supply voltage (Vdc) .....</b>   |  | <b>65.52 Vdc</b>             |                                     | <b>—</b>              |
| Sample no.  | OCV before charging (Vdc)              | Total charging time (minute) | Maximum outer case temperature (°C) | Results               |
| ST1303AA / No. 06   | 35.3                                   | 65 min                       | 24.2                                | No Fire, No Explosion |
| ST1303AA / No. 07   | 35.2                                   | 65 min                       | 24.6                                | No Fire, No Explosion |
| ST1303AA / No. 08   | 35.6                                   | 65 min                       | 24.3                                | No Fire, No Explosion |
| ST1303AA / No. 09   | 35.7                                   | 60 min                       | 23.3                                | No Fire, No Explosion |
| ST1303AA / No. 10   | 35.8                                   | 60 min                       | 23.3                                | No Fire, No Explosion |
| <b>Supplementary information:</b><br>- No fire or explosion<br>- Others (please explain): in case of a rapid decline in the short-circuit current, the battery should remain on test for an additional one hour after the current reaches a low end steady state condition. |  |                              |                                     |                       |

| <b>7.3.7</b>   | <b>TABLE: Forced discharge (cells)</b>         |                                   |                                     | <b>N/A</b> |
|--|--|-----------------------------------|-------------------------------------|------------|
| Sample no.   | OCV before application of reverse charge (Vdc) | Measured reverse charge $I_t$ (A) | Lower limit discharge voltage (Vdc) | Results    |
|  |  |                                   |                                     |            |
|  |  |                                   |                                     |            |
|  |  |                                   |                                     |            |
|  |  |                                   |                                     |            |
|  |  |                                   |                                     |            |
| <b>Supplementary information:</b><br>- No fire or explosion<br>- Others (please explain) |  |                                   |                                     |            |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| 7.3.8.1  | TABLE: Vibration      |                      |                      |                     |   | P |
|--|-----------------------|----------------------|----------------------|---------------------|---|---|
| Sample no.   | OCV before test (Vdc) | OCV after test (Vdc) | Mass before test (g) | Mass after test (g) | Results   |   |
| ST1303AA / No. 11  | 53.35                 | 53.13                | 3023.4               | 3023                | No fire,<br>No explosion,<br>No rupture,<br>No leakage,<br>No venting |   |
| ST1303AA / No. 12  | 53.24                 | 53.07                | 3016.5               | 3016                | No fire,<br>No explosion,<br>No rupture,<br>No leakage,<br>No venting |   |
| ST1303AA / No. 13  | 53.34                 | 53.04                | 3028                 | 3027                | No fire,<br>No explosion,<br>No rupture,<br>No leakage,<br>No venting |   |
| <b>Supplementary information:</b><br>- No fire or explosion<br>- No rupture<br>- No leakage<br>- No venting<br>- Others (please explain) |                       |                      |                      |                     |   |   |

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|-------------|--------------------|-----------------|---------|
| Clause      | Requirement + Test | Result - Remark | Verdict |

| 7.3.8.2  | TABLE: Mechanical shock |                      |                      |                     |   | P |
|--|-------------------------|----------------------|----------------------|---------------------|---|---|
| Sample no.   | OCV before test (Vdc)   | OCV after test (Vdc) | Mass before test (g) | Mass after test (g) | Results   |   |
| ST1303AA / No. 14  | 53.13                   | 53.09                | 3023                 | 3023                | No fire,<br>No explosion,<br>No rupture,<br>No leakage,<br>No venting |   |
| ST1303AA / No. 15  | 53.07                   | 53.03                | 3016                 | 3016                | No fire,<br>No explosion,<br>No rupture,<br>No leakage,<br>No venting |   |
| ST1303AA / No. 16  | 52.82                   | 52.69                | 3027                 | 3027                | No fire,<br>No explosion,<br>No rupture,<br>No leakage,<br>No venting |   |
| <b>Supplementary information:</b><br>- No fire or explosion<br>- No rupture<br>- No leakage<br>- No venting<br>- Others (please explain) |                         |                      |                      |                     |   |   |

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

| 7.3.9   | TABLE: Forced internal short circuit (cells) |                       |                                 |                              |         | N/A |
|---|--|-----------------------|---------------------------------|------------------------------|---------|-----|
| Sample no.  | Chamber ambient T (°C)                       | OCV before test (Vdc) | Particle location <sup>1)</sup> | Maximum applied pressure (N) | Results |     |
| Samples charged at charging temperature upper limit   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
| Samples charged at charging temperature lower limit   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
|   |  |                       |                                 |                              |         |     |
| <b>Supplementary information:</b><br><sup>1)</sup> Identify one of the following:<br>1: Nickel particle inserted between positive and negative (active material) coated area.<br>2: Nickel particle inserted between positive aluminium foil and negative active material coated area.<br><br>- No fire or explosion<br>- Others (please explain) |  |                       |                                 |                              |         |     |

| D.2   | TABLE: Internal AC resistance for coin cells |                |                    |                       | N/A |
|---|--|----------------|--------------------|-----------------------|-----|
| Sample no.  | Ambient T (°C)                               | Store time (h) | Resistance Rac (Ω) | Results <sup>1)</sup> |     |
|   |  |                |                    |                       |     |
|   |  |                |                    |                       |     |
|   |  |                |                    |                       |     |
| <b>Supplementary information:</b><br><sup>1)</sup> Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables |  |                |                    |                       |     |

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

**List of test equipment used:**

A completed list of used test equipment shall be provided in the Test Reports when a Customer's Testing Facility according to CTF stage 1 or CTF stage 2 procedure has been used.

Note: This page may be removed when CTF stage 1 or CTF stage 2 are not used. See also clause 4.8 in OD 2020 for more details.

| Clause | Measurement / testing | Testing / measuring equipment / material used, (Equipment ID) | Range used | Last Calibration date | Calibration due date |
|--------|-----------------------|---|------------|-----------------------|----------------------|
|        |                       |   |            |                       |                      |
|        |                       |   |            |                       |                      |
|        |                       |   |            |                       |                      |
|        |                       |   |            |                       |                      |
|        |                       |   |            |                       |                      |
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|        |                       |   |            |                       |                      |
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|        |                       |   |            |                       |                      |
|        |                       |   |            |                       |                      |
|        |                       |   |            |                       |                      |
|        |                       |   |            |                       |                      |

| IEC 62133-2 ATTACHMENT NO.1  |                    |                 |         |
|--|--------------------|-----------------|---------|
| Clause   | Requirement + Test | Result - Remark | Verdict |
| <p align="center"><b>ATTACHMENT TO TEST REPORT IEC 62133-2</b><br/> <b>CANADA NATIONAL DIFFERENCES</b><br/>         (Secondary cells and batteries containing alkaline or other non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications – Part 2: Lithium systems)</p> |                    |                 |         |
| Differences according to ..... : CAN/CSA-E62133:13   |                    |                 |         |

|   |  |  |     |
|---|--|--|-----|
| 1 | <p><i>[Add the following]</i><br/>           This Standard covers secondary cells and batteries that are intended to be installed or used in accordance with CSA C22.1, <i>Canadian Electrical Code, Part I</i>.</p>   | Equipment in compliance with IEC 62133. Overall acceptance has to be evaluated during the national approval process. | N/A |
| 2 | <p><b>2 Normative references</b><br/> <i>[Add the following]</i><br/>           Where reference is made to CSA Group publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition. This Standard refers to the following publications, and the years shown indicate the latest editions available at the time of printing:<br/> <b>CSA Group</b><br/>           C22.1-12<br/> <i>Canadian Electrical Code, Part I</i><br/>           CAN/CSA-C22.2 No. 0-10<br/> <i>General requirements — Canadian Electrical Code, Part II</i><br/>           C22.2 No. 0.15-01 (R2012)<br/> <i>Adhesive labels</i><br/>           CAN/CSA-C22.2 No. 0.17-00 (R2013)<br/> <i>Evaluation of properties of polymeric materials</i><br/>           C22.2 No. 39-12<br/> <i>Fuseholder assemblies</i><br/>           C22.2 No. 127-09<br/> <i>Equipment and lead wires</i><br/>           CAN/CSA-C22.2 No. 198.1-06 (R2010)<br/> <i>Extruded insulating tubing</i><br/>           C22.2 No. 235-04 (R2013)<br/> <i>Supplementary protectors</i><br/>           Certification Informs, Component Acceptance Service No. 53 (January 2013)<br/> <i>Positive temperature coefficient (PTC) thermistors</i></p> | Add.   | N/A |
| 3 | <p><i>[Add the following clause]</i><br/> <b>3A General requirements</b><br/>           General requirements applicable to these products are provided in CAN/CSA-C22.2 No. 0.</p>   | Add.   | N/A |

| IEC 62133-2 ATTACHMENT NO.1 |   |  |         |
|-----------------------------|---|--|---------|
| Clause                      | Requirement + Test  | Result - Remark  | Verdict |
| 5                           | <p><b>5 General safety considerations</b></p> <p><b>5.1 General</b></p> <p><i>[Add the following at the end of Clause 5.1]</i></p> <p>All safety components shall be suitable for use in accordance with the applicable CSA Group Standards where available.</p> <p>Examples of such components and subassemblies are as follows:</p> <p>a) wiring in accordance with CSA C22.2 No. 127;</p> <p>b) insulation tubing in accordance with CAN/CSA-C22.2 No. 198.1;</p> <p>c) protection devices such as fuses in accordance with CSA C22.2 No. 235, and PTC thermistors in accordance with CSA Component Acceptance Service No. 53;</p> <p>d) fuseholders in accordance with CSA C22.2 No. 39; and</p> <p>e) printed wiring boards and outer plastic enclosures shall be flammability rated a minimum of V-1 in accordance with CAN/CSA-C22.2 No. 0.17.</p> | Critical components are complied with relevant IEC standards for correct application and use. For others, shall be evaluated during the national approval. | N/A     |
| 9                           | <p><b>9 Marking</b></p> <p><b>9.1 Cell marking</b></p> <p><i>[Add the following after the first paragraph]</i></p> <p>Cell marking shall also include the model or type number.</p> <p>Cautions and warnings shall be in English and French in accordance with CAN/CSA-C22.2 No. 0. If external labels are used, they shall be a suitable type in accordance with CSA C22.2 No. 0.15.</p> <p><b>10.2 Battery marking</b></p> <p><i>[Add the following after the first paragraph]</i></p> <p>Cautions and warnings shall be in English and French in accordance with CAN/CSA-C22.2 No. 0. If external labels are used, they shall be a suitable type in accordance with CSA C22.2 No. 0.15.</p>  | Compliance shall be evaluated during the national approval.  | N/A     |

# Attachment No. 2

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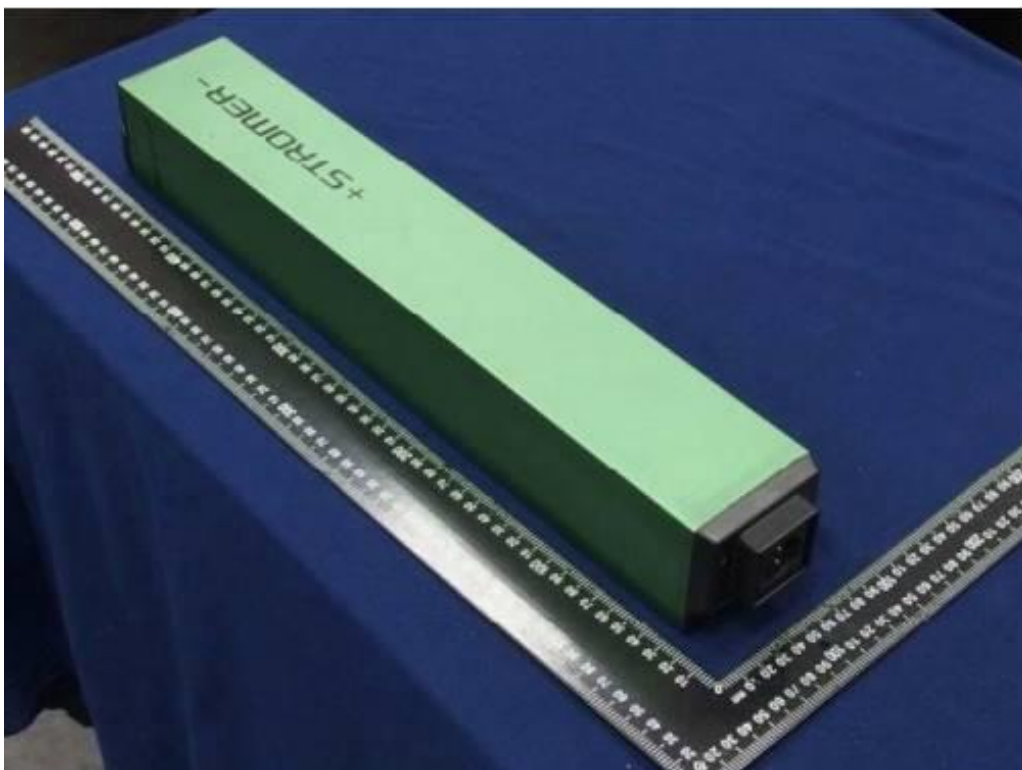


PSB Singapore

Type Designation: ST1303AA (13INR19/65-3)

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External view



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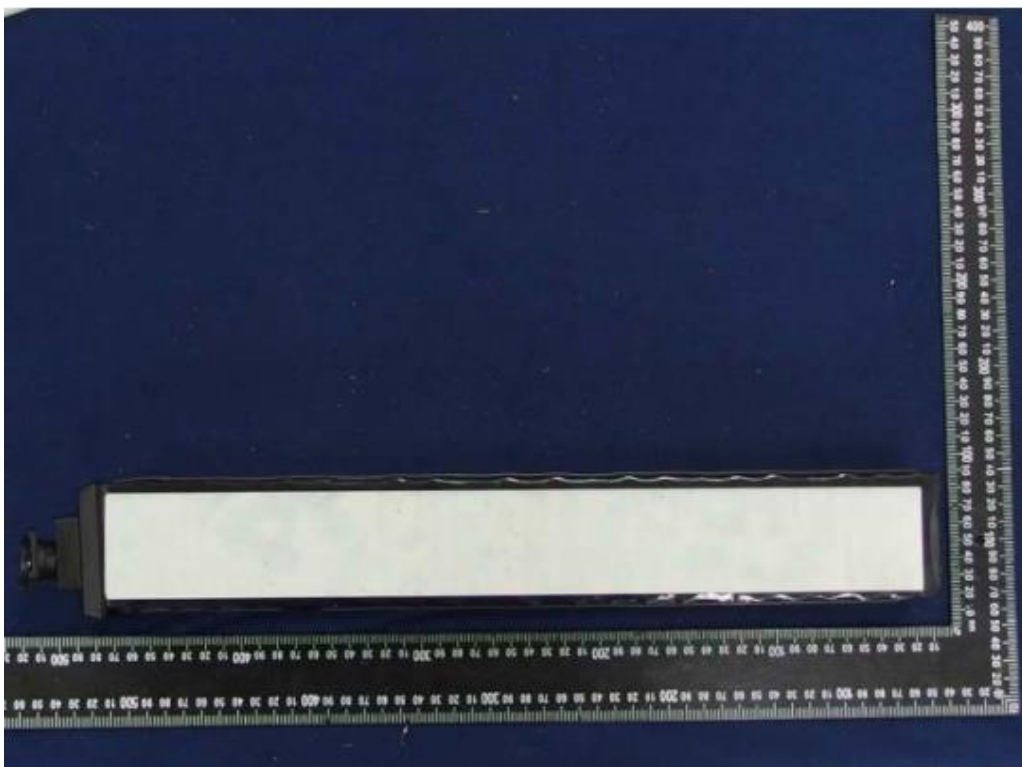
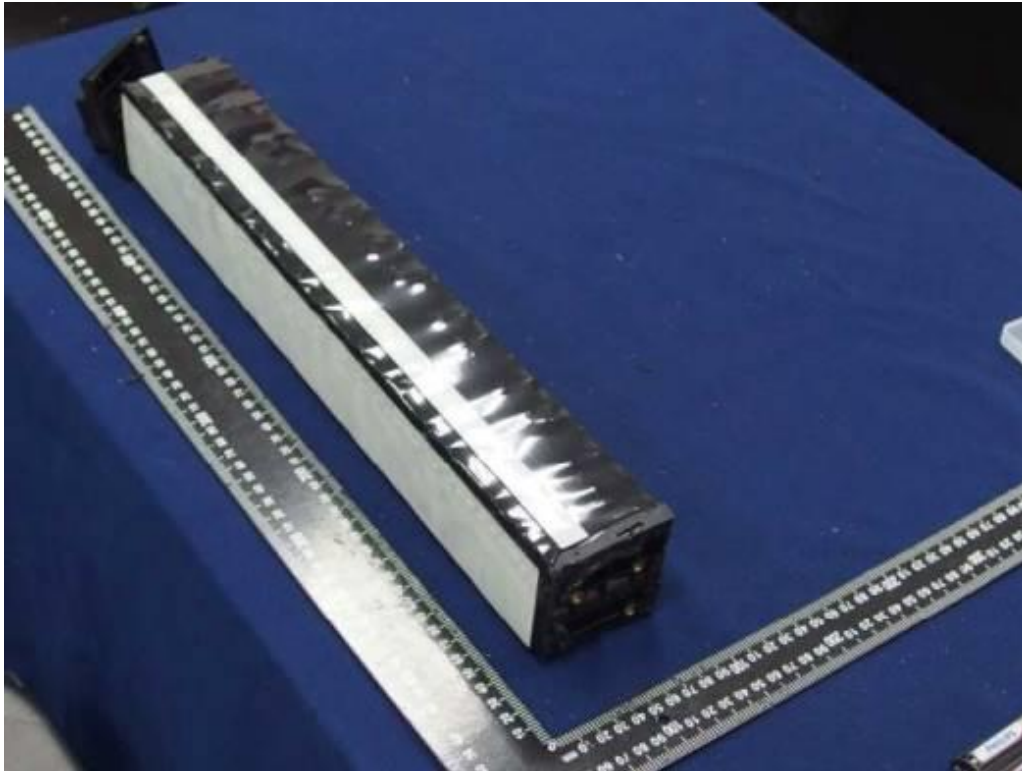


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Inner view



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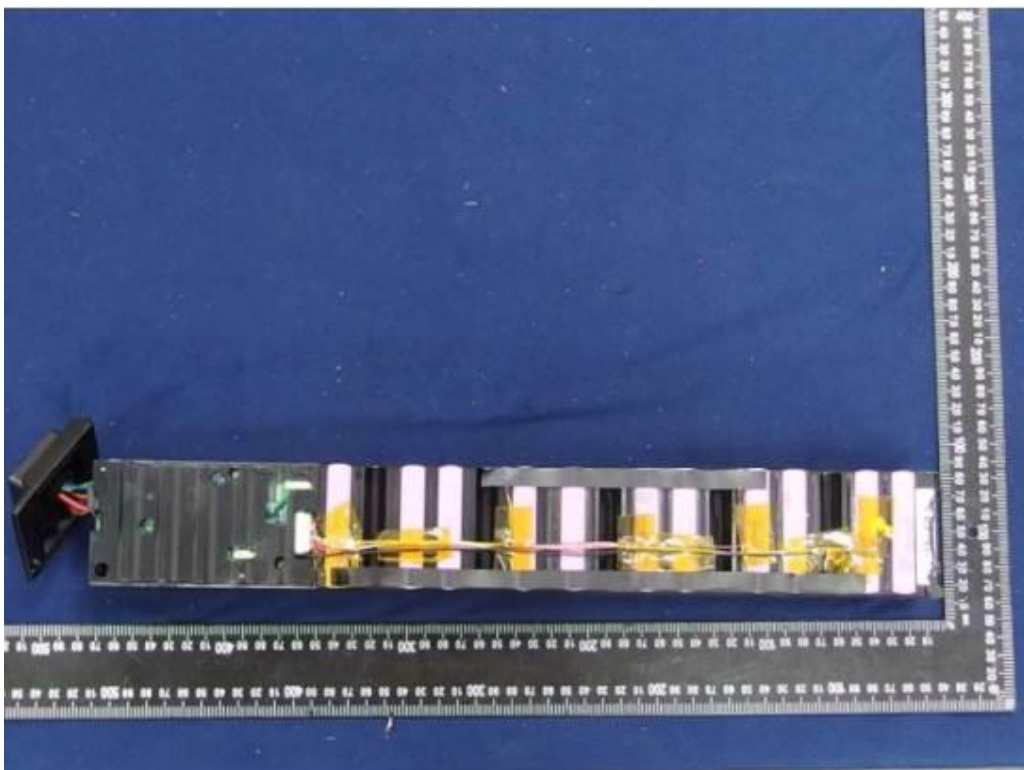
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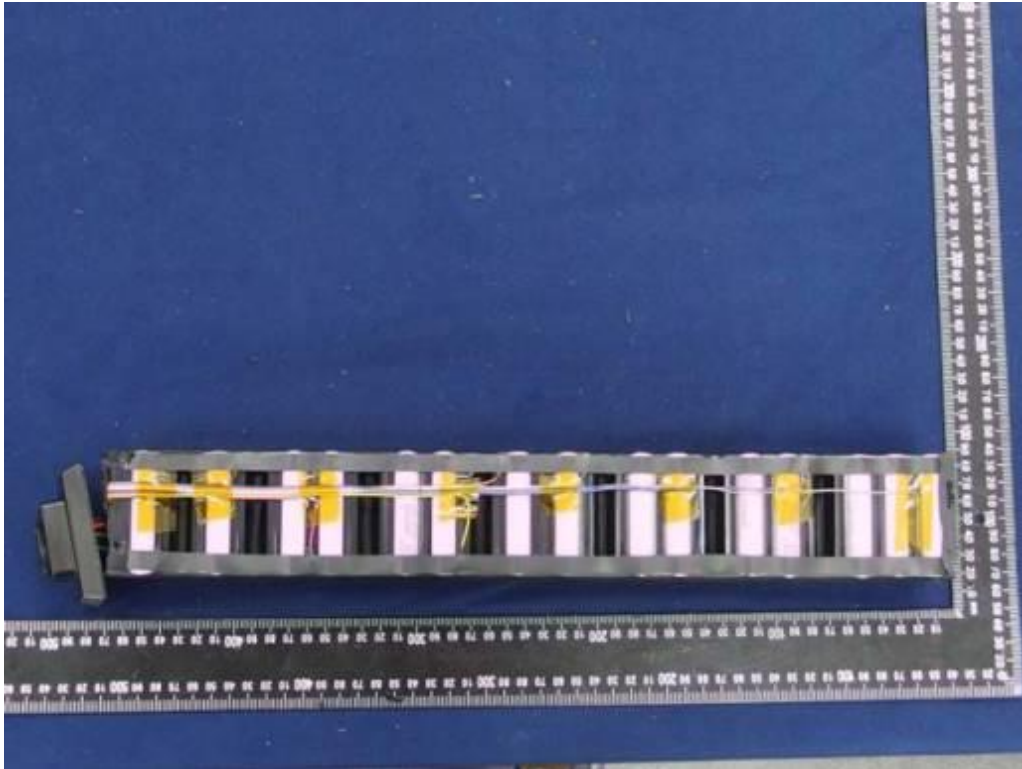
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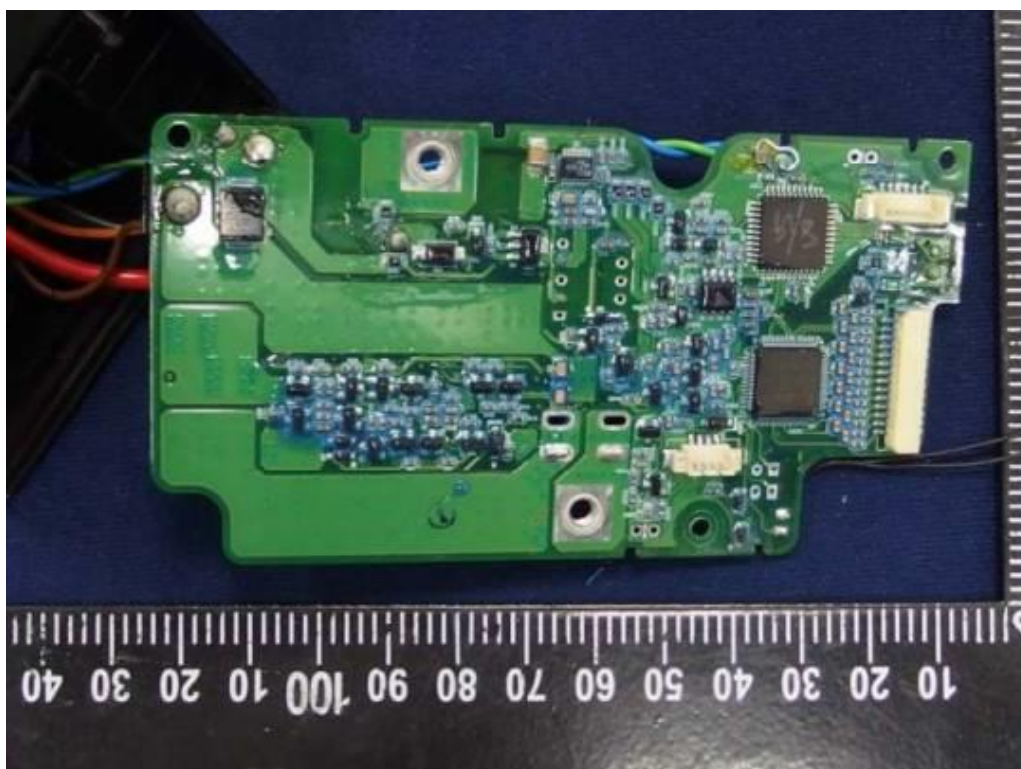
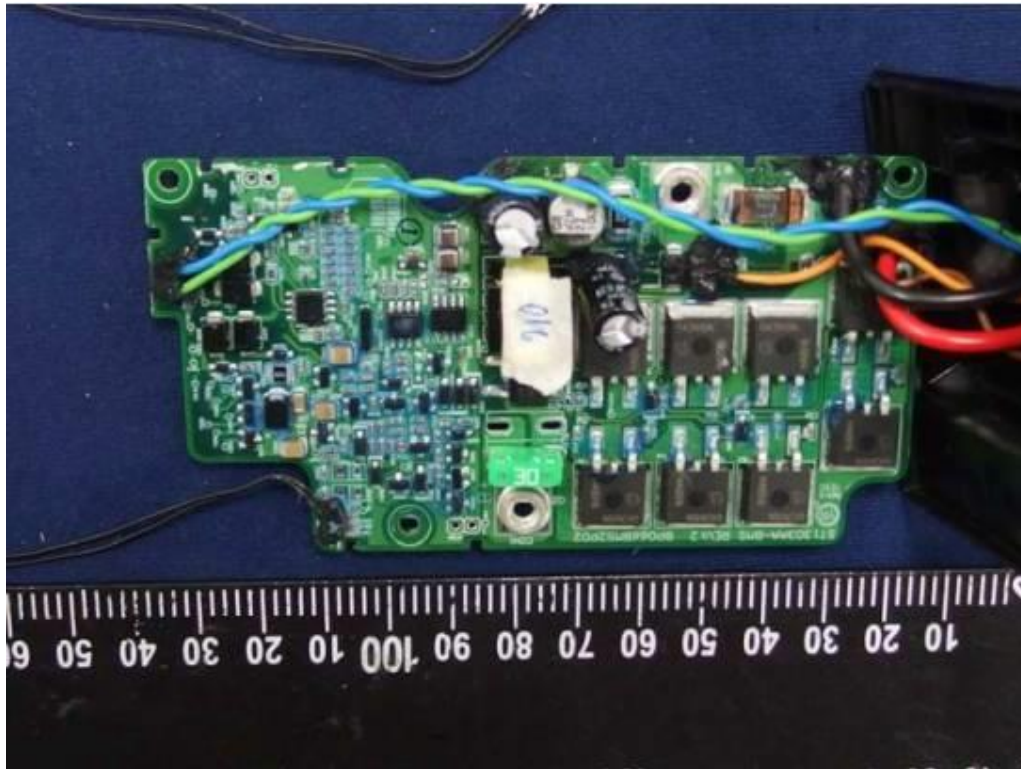


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PCB board



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