**Test Report issued under the responsibility of:**

# TEST REPORT
## IEC 62133-2
## 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

| | |
|---|---|
| **Report Number. ..... :** | BATT-4790407080-A-1 |
| **Date of issue ..... :** | 2022-06-17 |
| **Total number of pages ..... :** | 34 |
| **Name of Testing Laboratory preparing the Report ..... :** | UL-CCIC Company Limited Guangzhou Branch |
| **Applicant's name ..... :** | INVENTUS POWER, INC. – DESIGN CENTER |
| **Address ..... :** | 5TH FL. WESTERN CHANGHUA BLDG, 921 XINGYE RD, NANCUN TOWN, PANYU, GUANGZHOU, GUANGDONG 511442, CHINA |
| **Test specification:** | |
| **Standard ..... :** | IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021 |
| **Test procedure ..... :** | CB Scheme |
| **Non-standard test method ..... :** | N/A |
| **TRF template used ..... :** | IECEE OD-2020-F1:2021, Ed.1.4 |
| **Test Report Form No. ..... :** | IEC62133_2B |
| **Test Report Form(s) Originator .... :** | DEKRA Certification B.V. |
| **Master TRF ..... :** | Dated 2021-08-31 |



If this Test Report Form is used by non-IECEE members, the IECEE/IEC logo and the reference to the CB Scheme procedure shall be removed.

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

**General disclaimer:**

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 NCB. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

| | |
|---|---|
| **Test item description ..... :** | Rechargeable Li-ion Battery Pack |
| **Trade Mark(s) ..... :** | for X1200, X1200XX (XX is a placeholder for any alphanumeric characters)<br>for 1237440, 1259621 |
| **Manufacturer ..... :** | Inventus Power, Inc.<br>1200 Internationale Parkway, Woodridge, IL 60517, USA |
| **Model/Type reference ..... :** | X1200, 1237440, X1200XX (XX is a placeholder for any alphanumeric characters), 1259621 |
| **Ratings ..... :** | Rated: 36.5Vdc, 11Ah, 401.5Wh; Nominal: 36.5Vdc, 9.9Ah, 361.4Wh (For battery pack (models X1200, 1237440) consists of cell model INR18650-29++)<br>Rated: 36Vdc, 10.0Ah, 360.0Wh; Nominal: 36Vdc, 9.7Ah, 349.2Wh (For battery pack (models X1200XX, 1259621) consists of cell model INR-18650-P28A) |

**Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):**

| | | | |
|---|---|---|---|
| ☐ | **CB Testing Laboratory:** | UL-CCIC Company Limited Guangzhou Branch | |
| **Testing location/ address.....:** | | Electronic Building, Parage Electronic Industrial Park, No. 8 Nanyun Er Road, Guangzhou Science Park, Guangzhou, 510670 China | |
| **Tested by (name, function, signature).....:** | | | |
| **Approved by (name, function, signature)...:** | | | |
| ☒ | **Testing procedure: CTF Stage 1:** | INVENTUS POWER, INC. – DESIGN CENTER | |
| **Testing location/ address.....:** | | 5TH FL. WESTERN CHANGHUA BLDG, 921 XINGYE RD, NANCUN TOWN, PANYU, GUANGZHOU, GUANGDONG 511442, CHINA | |
| **Tested by (name, function, signature).....:** | | Harlan Zhong<br>/Project Handler | Harlan Zhong |
| **Approved by (name, function, signature)...:** | | Simon Chen<br>/Project Reviewer | Simon Chen |
| ☐ | **Testing procedure: CTF Stage 2:** | | |
| **Testing location/ address.....:** | | | |
| **Tested by (name + signature) .....:** | | | |
| **Witnessed by (name, function, signature) .:** | | | |
| **Approved by (name, function, signature)...:** | | | |
| ☐ | **Testing procedure: CTF Stage 3:** | | |
| ☐ | **Testing procedure: CTF Stage 4:** | | |

| | | |
|---|---|---|
| **Testing location/ address.....:** | | |
| **Tested by (name, function, signature).....:** | | |
| **Witnessed by (name, function, signature) .:** | | |
| **Approved by (name, function, signature)...:** | | |
| **Supervised by (name, function, signature) :** | | |
| | | |

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

National Differences (3 pages)

Enclosures (10 pages)

**Summary of testing:**

| **Tests performed (name of test and test clause):** | **Testing location:** |
|---|---|
| **(1)**<br>**Battery pack Model X1200 (Internal cell model INR18650-29++ and MOSFET (Q8, Q9, Q10, Q17, Q58) model AP8600MT)**<br>8.2.2 MOULDED CASE STRESS AT HIGH AMBIENT TEMPERATURE (BATTERY)<br>8.3.3 FREE FALL | **(1)**<br>UL-CCIC Company Limited Guangzhou Branch<br>Electronic Building, Parage Electronic Industrial Park, No. 8 Nanyun Er Road, Guangzhou Science Park, Guangzhou, 510670 China |
| **(2)**<br>**Battery pack Model X1200 (Internal cell model INR18650-29++ and MOSFET (Q8, Q9, Q10, Q17, Q58) model AP8600MT)**<br>7.3.2 EXTERNAL SHORT-CIRCUIT (BATTERY)<br>7.3.6 OVER-CHARGING OF BATTERY<br>7.3.8 MECHANICAL TESTS (BATTERIES)<br>- 7.3.8.1 VIBRATION<br>- 7.3.8.2 MECHANICAL SHOCK | **(2)**<br>INVENTUS POWER, INC. – DESIGN CENTER<br>5TH FL. WESTERN CHANGHUA BLDG, 921 XINGYE RD, NANCUN TOWN, PANYU, GUANGZHOU, GUANGDONG 511442, CHINA |
| **Battery pack Model X1200C (Internal cell model INR-18650-P28A and MOSFET (Q8, Q9, Q10, Q17, Q58) model CRSM043N10N4)**<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 MECHANICAL TESTS (BATTERIES)<br>- 7.3.8.1 VIBRATION<br>- 7.3.8.2 MECHANICAL SHOCK | |
| **The test clauses 8.2.2 and 8.3.3 of IEC 62133:2012 are the same as the test cluses 7.2.2 and 7.3.3 of IEC 62133-2:2017, IEC 62133-2:2017/AMD1:2021. See GPI for details.** | |

**Summary of compliance with National Differences (List of countries addressed):**

KR

KR= Republic of Korea

☒ The product fulfils the requirements of KC62133-2(2020-07)

☒ The product fulfils the requirements of EN 62133-2: 2017, EN 62133-2:2017/A1:2021.

☒ The product fulfils the requirements of BS EN 62133-2: 2017, BS EN 62133-2:2017/A1:2021.

**Use of uncertainty of measurement for decisions on conformity (decision rule) :**

☒ No decision rule is specified by the IEC standard, when comparing the measurement result with the applicable limit according to the specification in that standard. The decisions on conformity are made without applying the measurement uncertainty ("simple acceptance" decision rule, previously known as "accuracy method").

☐ Other:… (to be specified, for example when required by the standard or client, or if national accreditation requirements apply)

**Information on uncertainty of measurement:**

The uncertainties of measurement are calculated by the laboratory based on application of criteria given by OD-5014 for test equipment and application of test methods, decision sheets and operational procedures of IECEE.

IEC Guide 115 provides guidance on the application of measurement uncertainty principles and applying the decision rule when reporting test results within IECEE scheme, noting that the reporting of the measurement uncertainty for measurements is not necessary unless required by the test standard or customer.

Calculations leading to the reported values are on file with the NCB and testing laboratory that conducted the testing.

**Copy of marking plate:**

**The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.**


2D Matrix label

T 00001
X1200
150521A

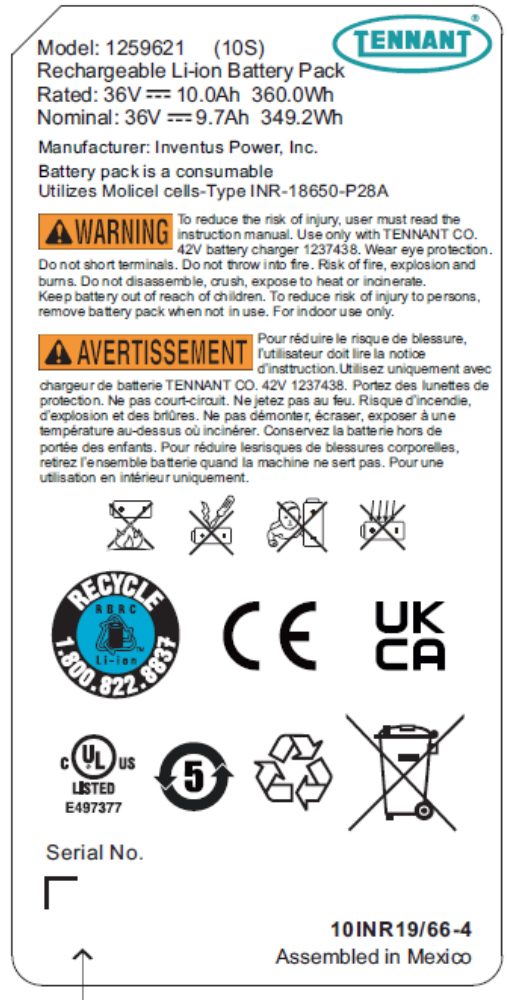

T00001X1200150521A

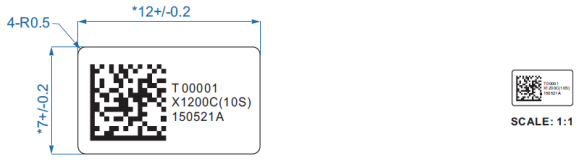
- Revision (MP-A, B, C…)
- Manufacture Date.
  15: Year
  05: Month
  21: Day(1-31)
- TACONY P/N(Fixed)
- Serial number(00001-65535)
- Customer TACONY

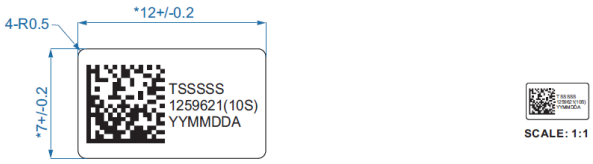

LABEL SN HERE
P/N: 90947-354

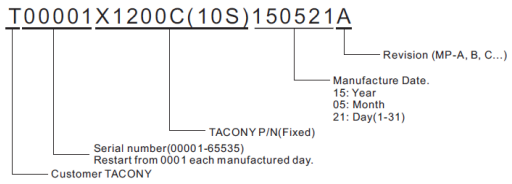

T00001123744019060 5A

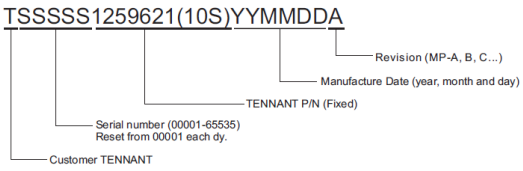
- Revision (MP-A, B, C…)
- Manufacture Date: YYMMDD, example:190605.
  19: The last two digits of the year
  06: Month (01~12)
  05: Day(01~31)
- TENNANT P/N
- Serial number(00001~65535), reset from 00001 each day.
- Customer TENNANT


Remark: "Assembled in Mexico" is only for the factory INVENTUS POWER MEXICO, S.A. DE C.V, there maybe other description for other factories.

| | |
|---|---|
| **Test item particulars.....:** | N/A |
| **Classification of installation and use.....:** | -- |
| **Supply Connection.....:** | -- |
| **Recommend charging method declared by the manufacturer.....:** | CC/CV |
| **Discharge current (0,2 It A).....:** | 2.2A(For battery pack (models X1200, 1237440) consists of cell model INR18650-29++)<br>2.0A(For battery pack (models X1200XX, 1259621) consists of cell model INR-18650-P28A) |
| **Specified final voltage.....:** | 28V |
| **Upper limit charging voltage per cell.....:** | 4.25V |
| **Maximum charging current.....:** | 5.3A |
| **Charging temperature upper limit.....:** | 45°C |
| **Charging temperature lower limit.....:** | 0°C |
| **Polymer cell electrolyte type.....:** | ☐ gel polymer ☐ solid polymer ☒ N/A |
| **Possible test case verdicts:** | |
| **- test case does not apply to the test object.....:** | N/A |
| **- test object does meet the requirement.....:** | P (Pass) |
| **- test object does not meet the requirement.....:** | F (Fail) |
| **Testing.....:** | |
| **Date of receipt of test item .....:** | 2022-05-13 |
| **Date (s) of performance of tests.....:** | 2022-05-17 to 2022-05-31 |

**General remarks:**

"(See Enclosure #)" refers to additional information appended to the report.
"(See appended table)" refers to a table appended to the report.

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

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

| | |
|---|---|
| The application for obtaining a CB Test Certificate includes more than one factory location and a declaration from the Manufacturer stating that the sample(s) submitted for evaluation is (are) representative of the products from each factory has been provided ..... : | ☒ **Yes**<br>☐ **Not applicable** |

**When differences exist; they shall be identified in the General product information section.**

| | |
|---|---|
| **Name and address of factory (ies) ..... :** | ICC ELECTRONICS (DONGGUAN) LTD<br>NO.23, SHANGYUAN ROAD, QINGXI TOWN, DONGGUAN CITY, GUANGDONG PROVINCE, 523640, P.R. CHINA<br><br>INVENTUS POWER(MALAYSIA) SDN.BHD<br>PLO 176, JALAN CYBER 7, KAWASAN PERINDUSTRIAN SENAI III, 81400 SENAI, JOHOR, MALAYSIA<br><br>INVENTUS POWER MEXICO, S.A. DE C.V.<br>CALLE GUERRERO NEGRO NO. 9985 PARQUE INDUSTRIAL PACIFICO TIJUANA BAJA CALIFORNIA C.P. 22643 MEXICO |

**General product information and other remarks:**

- The suffix, XX of the battery pack model name X1200XX is not related safety.

- Electronic components mounted on PWB with 10S/4P certified cells, fixed with plastic cell holder and housed with plastic enclosure and secured together by Screws for battery pack Model X1200, 1237440, X1200XX, 1259621.

- Model difference:
Model X1200 is identical to Model 1237440 except for model name and trademark, see page 6 for detail.
Model X1200XX is identical to Model 1259621 except for model name and trademark, see page 7 for detail.
Battery pack model X1200 and 1237440 consists of cell model INR18650-29++, battery pack model X1200XX and 1259621 consists of cell model INR-18650-P28A.

- Inner cells (Model INR18650-29++) is approved by IEC 62133-2:2017, all evaluations comply with the requirements of standard IEC 62133-2:2017/AMD1:2021, CB original test report No. BA-4788739161-A-1, issued on 2019-01-16, issued by UL-CCIC Company Limited Guangzhou Branch. CB Certification No. DK-80097-UL, certified on 2019-01-17, certified by UL (Demko);
CB amendment test report No. BA-4789201634-A-1, issued on 2019-11-14, issued by Underwriters Laboratories Taiwan Co., Ltd. CB Certification No. DK-80097-M1-UL, certified on 2019-11-15, certified by UL (Demko).

- Inner cells (Model INR-18650-P28A) is approved by IEC 62133-2:2017, all evaluations comply with the requirements of standard IEC 62133-2:2017/AMD1:2021, CB original test report No. MH27672-4788624074-2 Original, issued on 2018-10-25, issued by Underwriters Laboratories Taiwan Co., Ltd. CB Certification No. DK-77764-UL, certified on 2018-10-31, certified by UL (Demko);
CB amendment 1 test report No. MH27672-4788624074-2 Amendment 1, issued on 2019-07-30, issued by Underwriters Laboratories Taiwan Co., Ltd. CB Certification No. DK-77764-M1-UL, certified on 2019-07-30, certified by UL (Demko);
CB amendment 2 test report No. MH27672-4788624074-2 Amendment 2, issued on 2021-08-09, issued by Underwriters Laboratories Taiwan Co., Ltd. CB Certification No. DK-77764-M2-UL, certified on 2021-08-16, certified by UL (Demko).

- Battery Pack (Model: X1200, 1237440) has been evaluated to comply with UN 38.3 cover in original test reports No. RZUN2018-2570, amendment test reports No. RZUN2018-2570-M1, RZUN2018-2570-M2 and RZUN2018-2570-M3 issued by Vkan Certification & Testing Co., Ltd.

- Battery Pack (Model: X1200XX, 1259621) has been evaluated to comply with UN 38.3 cover in original test reports No. RZUN2021-3602, amendment test reports No. RZUN2021-3602-M1 issued by CVC Testing Technology Co., Ltd.

- Type reference 10INR19/65-4 is IEC designation which is identical Model X1200 and 1237440 except for model designation.

- Type reference 10INR19/66-4 is IEC designation which is identical Model X1200XX and 1259621 except for model designation.

**Battery pack information**

| | |
|---|---|
| Model Name | X1200, 1237440, X1200XX, 1259621 |
| Nominal Capacity | Rated: 11Ah, 401.5Wh; Nominal: 9.9Ah, 361.4Wh (For battery pack models X1200, 1237440)<br>Rated: 10.0Ah, 360.0Wh; Nominal: 9.7Ah, 349.2Wh (For battery pack models X1200XX, 1259621) |
| Nominal Voltage | 36.5Vdc (For battery pack models X1200, 1237440)<br>36Vdc (For battery pack models X1200XX, 1259621) |
| Normal Charge Current | 5.3A |
| Maximum Charge Current | 5.3A |
| Normal Charge Voltage | 41V |
| Maximum Charge Voltage | 42V |
| Normal Discharge Current | 12A |
| Maximum Discharge Current | 20A |
| Discharge Cut-Off Voltage | 28V |
| Charging Temperature Range | 0~45°C |
| Discharging Temperature Range | -10~60°C |
| End of Charge Current | 600mA |

Reissue Report Summary:
This report was reissued of CB original test report No. BATT-4788801961-A-1, issued on 2019-02-15, issued by UL-CCIC Company Limited Guangzhou Branch, CB certification No. DK-80807-UL, certificated on 2019-02-18, CB amendment test report No. BATT-4788801961-A-1-Amendment-1, issued on 2019-07-03, issued by UL-CCIC Company Limited Guangzhou Branch, CB certification No. DK-80807-A1-UL, certificated on 2019-07-04, certificated by UL (Demko). It was reissued due to the following additions:
1) Upgrade the standard version from IEC 62133: 2012 to IEC 62133-2:2017, IEC 62133-2:2017/AMD1: 2021
2) Add battery pack model name X1200XX, 1259621
3) Update the Ratings
4) Update the marking plate
5) Update CB Testing Laboratory address
6) Update address of factory (ies)
7) Update the of Cell model name from INR18650-29E to INR18650-29++ and update technical data, see TABLE: Critical components information for details
8) Add one alternate sources for MOSFET (Q8, Q9, Q10, Q17, Q58) with model CRSM043N10N4
9) Add one alternate sources for Cell model INR-18650-P28A
10) Update Summary of compliance with National Differences

Based on previously conducted testing and the review of product construction, the following test items were considered in this test report:

**Battery pack Model X1200 (Internal cell model INR18650-29++ and MOSFET (Q8, Q9, Q10, Q17, Q58) model AP8600MT)**

7.3.2 EXTERNAL SHORT-CIRCUIT (BATTERY)
7.3.6 OVER-CHARGING OF BATTERY
7.3.8 MECHANICAL TESTS (BATTERIES)
- 7.3.8.1 VIBRATION
- 7.3.8.2 MECHANICAL SHOCK

**Battery pack Model X1200C (Internal cell model INR-18650-P28A and MOSFET (Q8, Q9, Q10, Q17, Q58) model CRSM043N10N4)**

7.2.2 CASE STRESS AT HIGH AMBIENT TEMPERATURE (BATTERY)
7.3.2 EXTERNAL SHORT-CIRCUIT (BATTERY)
7.3.3 FREE FALL
7.3.6 OVER-CHARGING OF BATTERY
7.3.8 MECHANICAL TESTS (BATTERIES)
- 7.3.8.1 VIBRATION
- 7.3.8.2 MECHANICAL SHOCK

The test cluses 7.2.2 and 7.3.3 for model X1200 are the same as the test clauses 8.2.2 and 8.3.3 which were conducted in the report BATT-4788801961-A-1, the test results refer to the test clauses 8.2.2 and 8.3.3 in the report BATT-4788801961-A-1.

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **4** | **PARAMETER MEASUREMENT TOLERANCES** | | P |
| | Parameter measurement tolerances | | P |
| **5** | **GENERAL SAFETY CONSIDERATIONS** | | P |
| **5.1** | **General** | | P |
| | Cells and batteries so designed and constructed that they are safe under conditions of both intended use and reasonably foreseeable misuse | | P |
| **5.2** | **Insulation and wiring** | | P |
| | The insulation resistance between the positive terminal and externally exposed metal surfaces of the battery (excluding electrical contact surfaces) is not less than 5 MΩ | Battery does not contain any exposed metal surfaces. | N/A |
| | Insulation resistance (MΩ) ..... : | | — |
| | Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements | | P |
| | Orientation of wiring maintains adequate clearances and creepage distances between conductors | | P |
| | Mechanical integrity of internal connections accommodates reasonably foreseeable misuse | | P |
| **5.3** | **Venting** | | P |
| | Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition | The batteries will relieve excessive pressure safely. | P |
| | Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief | | P |
| **5.4** | **Temperature, voltage and current management** | | P |
| | Batteries are designed such that abnormal temperature rise conditions are prevented | See Critical components information table | P |
| | Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer | | 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 | | P |
| **5.5** | **Terminal contacts** | | P |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current | | P |
| | External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance | | P |
| | Terminal contacts are arranged to minimize the risk of short circuits | | P |
| **5.6** | **Assembly of cells into batteries** | | P |
| 5.6.1 | General | | P |
| | Each battery has 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 | Connector designed to avoid short-circuit | 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 has protective circuitry that can maintain the cells within their operating regions | | N/A |
| | Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly | | P |
| | Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer | Battery without selective discharge function. | N/A |
| | Protective circuit components are added as appropriate and consideration given to the end-device application | | 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 | | P |
| 5.6.2 | Design recommendation | | P |
| | 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 | | N/A |

| IEC 62133-2 | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | 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 | | 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 | | P |
| | For batteries consisting of series-connected cells or cell blocks, nominal charge voltage are not counted as an overcharge protection | | P |
| | 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 | | P |
| | It is recommended that the cells and cell blocks are not discharged beyond the cell manufacturer's specified final voltage | | P |
| | For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry are incorporated into the battery management system | | N/A |
| 5.6.3 | Mechanical protection for cells and components of batteries | | P |
| | Mechanical protection for cells, cell connections and control circuits within the battery are provided to prevent damage as a result of intended use and reasonably foreseeable misuse | | 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 | | P |
| | The battery case and compartments housing cells are designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer | | P |
| | For batteries intended for building into a portable end product, testing with the battery installed within the end product is considered when conducting mechanical tests | This shall be considered in end product. | 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 | ISO9001 cert. has been provided. | P |
| **5.8** | **Battery safety components** | | N/A |
| **6** | **TYPE TEST AND SAMPLE SIZE** | | 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 | Lithium ion system | P |
| | The internal resistance of coin cells are measured in accordance with Annex D. Coin cells with internal resistance less than or equal to 3 Ω are tested in accordance with Table 1 | Not Coin cells | N/A |
| | Unless otherwise specified, tests are carried out in an ambient temperature of 20 °C ± 5 °C | | P |
| | The safety analysis of 5.6.1 identify those components of the protection circuit that are critical for short-circuit, overcharge and over discharge protection | | P |
| | When conducting the short-circuit test, consideration is 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 | | P |
| **7** | **SPECIFIC REQUIREMENTS AND TESTS** | | P |
| **7.1** | **Charging procedure for test purposes** | | P |
| 7.1.1 | First procedure | | P |
| | This charging procedure applies to subclauses other than those specified in 7.1.2 | | P |
| | Unless otherwise stated in this document, the charging procedure for test purposes is carried out in an ambient temperature of 20 °C ± 5 °C, using the method declared by the manufacturer | | P |
| | Prior to charging, the battery has been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage | | 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 | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | After stabilization for 1 h to 4 h, at an ambient temperature of the highest test temperature and the lowest test temperature, respectively, 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 current to constant voltage charging method | | N/A |
| **7.2** | **Intended use** | | P |
| 7.2.1 | Continuous charging at constant voltage (cells) | Cells had been certified | 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.....: | (See appended table 7.2.1) | N/A |
| 7.2.2 | Case stress at high ambient temperature (battery) | | P |
| | Oven temperature (°C).....: | 70°C | — |
| | Results: no physical distortion of the battery case resulting in exposure of internal protective components and cells | | P |
| **7.3** | **Reasonably foreseeable misuse** | | P |
| 7.3.1 | External short-circuit (cell) | Cells had been certified | 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.....: | (See appended table 7.3.1) | N/A |
| 7.3.2 | External short-circuit (battery) | | P |
| | The batteries 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 |
| | 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 | The batteries were tested until this occurred | P |
| | A single fault in the discharge protection circuit is conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test | | P |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | A single fault applies to protective component parts such as MOSFET (metal oxide semiconductor field-effect transistor), fuse, thermostat or positive temperature coefficient (PTC) thermistor | (See appended table 7.3.2) | P |
| | Results: no fire, no explosion ..... : | (See appended table 7.3.2) | P |
| 7.3.3 | Free fall | Pack was subjected to this test. | P |
| | Results: no fire, no explosion | | P |
| 7.3.4 | Thermal abuse (cells) | Cells had been certified | N/A |
| | Oven temperature (°C) ..... : | | — |
| | Results: no fire, no explosion | | N/A |
| 7.3.5 | Crush (cells) | Cells had been certified | 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 ..... : | (See appended table 7.3.5) | N/A |
| 7.3.6 | Over-charging of battery | | P |
| | The supply voltage which is: | | 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 | | N/A |
| | Results: no fire, no explosion ..... : | (See appended table 7.3.6) | P |
| 7.3.7 | Forced discharge (cells) | Cell had been certified | N/A |
| | Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | The discharged cell is then subjected to a forced discharge at 1 It A to the negative value of the upper limit charging voltage | | N/A |
| | - 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 |
| | - 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 ..... : | (See appended table 7.3.7) | N/A |
| 7.3.8 | Mechanical tests (batteries) | | 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) | Cells had been certified | 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 ..... : | (See appended table 7.3.9) | N/A |
| **8** | **INFORMATION FOR SAFETY** | | P |
| **8.1** | **General** | | P |
| | Manufacturers of secondary cells provides information about current, voltage and temperature limits of their products | | N/A |
| | Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users | Related information provided. | P |
| | Systems analyses are performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product | Considered in end product. | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | As appropriate, any information relating to hazard avoidance resulting from a system analysis is provided to the end user | Considered in end product. | N/A |
| **8.2** | **Small cell and battery safety information** | | 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 |
| | - 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 |
| **9** | **MARKING** | | P |
| **9.1** | **Cell marking** | | N/A |
| | Cells are marked as specified in IEC 61960, except coin cells | | N/A |
| | Coin cells whose external surface area is too small to accommodate the markings on the cells show the designation and polarity | | N/A |
| | 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 | | N/A |
| **9.2** | **Battery marking** | | P |
| | Batteries are marked as specified in IEC 61960, except for coin batteries | See marking plate, Page 4. | P |
| | Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity | | N/A |
| | Batteries are marked with an appropriate caution statement | | P |
| | - Terminals have clear polarity marking on the external surface of the battery, or | | N/A |
| | - Not be marked with polarity markings if the design of the external connector prevents reverse polarity connections | | P |
| **9.3** | **Caution for ingestion of small cells and batteries** | | N/A |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | Coin cells and batteries identified as small batteries include a caution statement regarding the hazards of ingestion in accordance with 8.2 | | N/A |
| | Small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion is given on the immediate package | | N/A |
| **9.4** | **Other information** | | P |
| | The following information are marked on or supplied with the battery: | | P |
| | - Storage and disposal instructions | Related information provided.<br>See Enclosure ID 09 | P |
| | - Recommended charging instructions | Related information provided.<br>See GPI for detail. | P |
| **10** | **PACKAGING AND TRANSPORT** | | P |
| | Packaging for coin cells are not be small enough to fit within the limits of the ingestion gauge of Figure 3 | See Annex E for details. | N/A |
| **ANNEX A** | **CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE** | | N/A |
| **A.1** | **General** | Cells had been certified | N/A |
| **A.2** | **Safety of lithium ion secondary battery** | | N/A |
| **A.3** | **Consideration on charging voltage** | | 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 |
| **A.4** | **Consideration of temperature and charging current** | | 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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 |
| 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 |
| **A.5** | **Sample preparation** | | N/A |
| A.5.1 | General | | N/A |
| A.5.2 | Insertion procedure for nickel particle to generate internal short | | N/A |
| 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 |
| **A.6** | **Experimental procedure of the forced internal short-circuit test** | | 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 |

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|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| 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 |
| 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 |
| **ANNEX B** | **RECOMMENDATIONS TO EQUIPMENT MANUFACTURERS AND BATTERY ASSEMBLERS** | | P |
| **ANNEX C** | **RECOMMENDATIONS TO THE END-USERS** | | N/A |
| **ANNEX D** | **MEASUREMENT OF THE INTERNAL AC RESISTANCE FOR COIN CELLS** | | N/A |
| **D.1** | **General** | | N/A |
| **D.2** | **Method** | | N/A |
| | A sample size of three coin cells is required for this measurement | | N/A |
| | Coin cells with an internal resistance greater than 3 Ω require no further testing .....: | (See appended table D.2) | N/A |
| | Coin cells with an internal resistance less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1 | | N/A |
| **ANNEX E** | **PACKAGING AND TRANSPORT** | | P |
| **ANNEX F** | **COMPONENT STANDARDS REFERENCES** | | N/A |

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

| 7.2.1 | TABLE: Continuous charging at constant voltage (cells) | | | N/A |
|---|---|---|---|---|
| **Sample No.** | **Recommended charging voltage Vc (Vdc)** | **Recommended charging current $I_{rec}$ (A)** | **OCV before test (Vdc)** | **Results** |
| -- | -- | -- | -- | -- |

**Supplementary information:**

A - No fire or explosion

B - No leakage

- Others (please explain)

| 7.3.1 | TABLE: External short circuit (cell) | | | | N/A |
|---|---|---|---|---|---|
| **Sample No.** | **Ambient (°C)** | **OCV at start of 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:**

A - No fire or explosion

- Others (please explain)

| IEC 62133-2 | | | |
|---|---|---|---|
| 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** |
| For Battery pack Model X1200 (Internal cell model INR18650-29++ and MOSFET (Q8, Q9, Q10, Q17, Q58) model AP8600MT) | | | | | | |
| 6540.001-1-01 | 23.0 | 40.64 | 88 | 1.0 | Normal | A, B |
| 6540.001-1-02 | 23.0 | 40.75 | 91 | 0.9 | Normal | A, B |
| 6540.001-1-03 | 21.3 | 40.63 | 90 | 0.1 | Short circuit F1 | A, B |
| 6540.001-1-04 | 20.9 | 40.96 | 95 | 0.5 | Short circuit Q9(S to D) | A, B |
| 6540.001-1-05 | 21.1 | 40.56 | 92 | 1.9 | Short circuit RS1 | A, B |
| For Battery pack Model X1200C (Internal cell model INR-18650-P28A and MOSFET (Q8, Q9, Q10, Q17, Q58) model CRSM043N10N4) | | | | | | |
| 6540.101-1-04 | 24.0 | 40.93 | 88 | 0.3 | normal | A, B |
| 6540.101-1-05 | 24.2 | 40.67 | 91 | 0.4 | normal | A, B |
| 6540.101-1-06 | 24.1 | 40.59 | 90 | 0.2 | short circuit F1 | A, B |
| 6540.101-1-07 | 23.6 | 40.95 | 95 | 0.1 | short circuit Q9(S to D) | A, B |
| 6540.101-1-08 | 24.0 | 40.08 | 92 | 0.1 | short circuit RS1 | A, B |

**Supplementary information:**

A - No fire or explosion

B - Rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reaches a low-end steady state condition.

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

| 7.3.5 | TABLE: Crush (cells) | | | N/A |
|---|---|---|---|---|
| **Sample No.** | **OCV before test (Vdc)** | **OCV at removal of crushing force (Vdc)** | **Maximum force applied to the cell during crush (kN)** | **Results** |
| **Samples charged at charging temperature upper limit** | | | | |
| -- | -- | -- | -- | -- |
| **Samples charged at charging temperature lower limit** | | | | |
| -- | -- | -- | -- | -- |

**Supplementary information:**

A - No fire or explosion

- Others (please explain)

| 7.3.6 | TABLE: Over-charging of battery | | | P |
|---|---|---|---|---|
| **Constant charging current (A) .....:** | | **22 ##** | | — |
| **Supply voltage (Vdc) .....:** | | **51** | | — |
| **Sample No.** | **OCV before charging (Vdc)** | **Total charging time (minute)** | **Maximum outer case temperature (°C)** | **Results** |
| For Battery pack Model X1200 (Internal cell model INR18650-29++ and MOSFET (Q8, Q9, Q10, Q17, Q58) model AP8600MT) | | | | |
| 6540.001-1-01 | 34.62 | 255 | 21.4 | A, B |
| 6540.001-1-02 | 34.80 | 255 | 21.7 | A, B |
| 6540.001-1-03 | 34.66 | 255 | 21.5 | A, B |
| 6540.001-1-04 | 33.02 | 255 | 21.7 | A, B |
| 6540.001-1-05 | 34.87 | 255 | 21.9 | A, B |
| For Battery pack Model X1200C (Internal cell model INR-18650-P28A and MOSFET (Q8, Q9, Q10, Q17, Q58) model CRSM043N10N4) | | | | |
| 6540.101-1-12 | 34.64 | 283 | 22.4 | A, B |
| 6540.101-1-13 | 34.81 | 283 | 24.6 | A, B |
| 6540.101-1-14 | 34.65 | 283 | 22.7 | A, B |
| 6540.101-1-15 | 34.03 | 283 | 22.5 | A, B |
| 6540.101-1-16 | 34.86 | 283 | 22.5 | A, B |

**Supplementary information:**

A - No fire or explosion

B - The test was continued until the temperature of the outer casing reached steady state conditions

##- Used a more severe condition as charging current 22A for test.

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

| 7.3.7 | TABLE: Forced discharge (cells) | | | N/A |
|---|---|---|---|---|
| **Sample No.** | **OCV before application of reverse charge (Vdc)** | **Measured reverse charge $I_t$ (A)** | **Lower limit discharge voltage (Vdc)** | **Results** |
| -- | -- | -- | -- | -- |

**Supplementary information:**

A - No fire or explosion

- Others (please explain)

| 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** |
| For Battery pack Model X1200 (Internal cell model INR18650-29++ and MOSFET (Q8, Q9, Q10, Q17, Q58) model AP8600MT) | | | | | |
| 6540.001-1-06 | 40.56 | 40.55 | 2622 | 2622 | A, B, C, D |
| 6540.001-1-07 | 40.58 | 40.56 | 2630 | 2630 | A, B, C, D |
| 6540.001-1-08 | 40.63 | 40.60 | 2615 | 2615 | A, B, C, D |
| For Battery pack Model X1200C (Internal cell model INR-18650-P28A and MOSFET (Q8, Q9, Q10, Q17, Q58) model CRSM043N10N4) | | | | | |
| 6540.101-1-01 | 40.67 | 40.65 | 2602 | 2602 | A, B, C, D |
| 6540.101-1-02 | 40.79 | 40.76 | 2605 | 2605 | A, B, C, D |
| 6540.101-1-03 | 40.88 | 40.86 | 2609 | 2609 | A, B, C, D |

**Supplementary information:**

A - No fire or explosion

B - No rupture

C - No leakage

D - No venting

- Others (please explain)

| 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** |
| For Battery pack Model X1200 (Internal cell model INR18650-29++ and MOSFET (Q8, Q9, Q10, Q17, Q58) model AP8600MT) | | | | | |
| 6540.001-1-06 | 40.52 | 40.52 | 2622 | 2622 | A, B, C, D |
| 6540.001-1-07 | 40.52 | 40.52 | 2630 | 2630 | A, B, C, D |
| 6540.001-1-08 | 40.57 | 40.57 | 2615 | 2615 | A, B, C, D |
| For Battery pack Model X1200C (Internal cell model INR-18650-P28A and MOSFET (Q8, Q9, Q10, Q17, Q58) model CRSM043N10N4) | | | | | |

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

| | | | | | |
|---|---|---|---|---|---|
| 6540.101-1-01 | 40.65 | 40.63 | 2602 | 2602 | A, B, C, D |
| 6540.101-1-02 | 40.76 | 40.76 | 2605 | 2605 | A, B, C, D |
| 6540.101-1-03 | 40.86 | 40.86 | 2609 | 2609 | A, B, C, D |

**Supplementary information:**

A - No fire or explosion

B - No rupture

C - No leakage

D - No venting

- Others (please explain)

| **7.3.9** | **TABLE: Forced internal short circuit (cells)** | | | | **N/A** |
|---|---|---|---|---|---|
| **Sample No.** | **Chamber ambient T (°C)** | **OCV before test (Vdc)** | **Particle location [1)]** | **Maximum applied pressure (N)** | **Results** |
| **Samples charged at charging temperature upper limit** | | | | | |
| -- | -- | -- | -- | -- | -- |
| **Samples charged at charging temperature lower limit** | | | | | |
| -- | -- | -- | -- | -- | -- |

**Supplementary information:**

[1)] Identify one of the following:

1: Nickel particle inserted between positive and negative (active material) coated area.

2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

A - No fire

- 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 [1)]** |
| -- | -- | -- | -- | -- |

**Supplementary information:**

[1)] Coin cells with an internal resistance less than or equal to 3 Ω, see test result on corresponding tables according to Clause 6 and Table 1.

| IEC 62133-2 | | | |
|---|---|---|---|
| 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[1)]** |
| 01. Cell | SAMSUNG SDI CO LTD | INR18650-29++ | 3.65Vdc, 2750mAh or 2850mAh | IEC 62133-2:2017 | Certif. No. DK-80097-M1-UL by UL (Demko) |
| **01a. Cell (Alternate)** | **E-One Moli Energy Corp.** | **INR-18650-P28A** | **3.6 Vdc, Typical 2.8 Ah, Minimum 2.7 Ah** | **IEC 62133-2:2017** | **Certif. No. DK-77764-M2-UL by UL (Demko)** |
| 02. PWB | SHEN ZHEN SUN & LYNN CIRCUITS CO LTD | SL-M | V-0, 130°C | UL 796 | UL(E234156) |
| 02a.PWB (Alternate) | Interchangeable | Interchangeable | Min V-0, Min 130°C | UL796 | UL |
| 03. MOSFET IC (Q50) | Advanced Power Electronics Corp. | AP9585GM | Vdss=80V Id=2.7A | -- | -- |
| 04. MOSFET IC (Q8, Q9, Q10, Q17, Q58) | Advanced Power Electronics Corp. | AP8600MT | Vdss=80V Id=120A | -- | -- |
| **04a. MOSFET IC (Q8, Q9, Q10, Q17, Q58) (Alternate)** | **CR Micro** | **CRSM043N10N4** | **Vdss=100V Id=80A** | **--** | **--** |
| 05. IC (U7, U6) | TEXAS INSTRUMENTS | BQ771800 | Vss=30V Function Temp -40°C~110°C | -- | -- |
| 06.IC (U2) | TEXAS INSTRUMENTS | BQ76930 | Vbat=36V Function Temp -40°C~85°C | -- | -- |
| 07.IC (U3) | TEXAS INSTRUMENTS | BQ8050 | Vbat=34V Function Temp -40°C~110°C | -- | -- |

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

| | | | | | |
|---|---|---|---|---|---|
| 08.Fuse(F1) | LITTELFUSE INC | 456*<br>(* - With or without one prefix character and with or without additional suffix characters that signify options that do not affect the electrical characteristics.) | 30A, 125V | UL248-1, UL248-14 | UL(E10480) |
| 09.Charging Wiring (Input wire) | XINGDA ELECTRONICS WIRE & CABLE CO LTD | 1015 | Rated 105°C, 600V,18AWG | UL758 | UL(E187208) |
| 09a. Charging Wiring (Input wire) (Alternate) | Interchangeable | Interchangeable | Rated 105°C, 600V,18AWG | UL758 | UL |
| 10. Discharging Wire (Output wire) | HARVEST ELECTRIC WIRE & PRODUCTS MFG CO LTD | 1015 | Rated 105°C, 600V,16AWG | UL758 | UL(E311047) |
| 10a. Discharging Wire (Output wire) (Alternate) | Interchangeable | Interchangeable | Rated 105°C, 600V,16AWG | UL758 | UL |
| 11. Enclosure | LOTTE ADVANCED MATERIALS CO LTD | UF-1017(+) | Min thickness 2.2mm, V-0, 80°C | UL94 UL746C | UL(E115797) |
| 12. Internal Plastic Cell Holder | LOTTE ADVANCED MATERIALS CO LTD | UF-1017(+) | Min thickness 1.0mm, V-0, 80°C | UL94 UL746C | UL(E115797) |
| 13. Current Sensing Resistor (RS1) | Interchangeable | Interchangeable | 0.0005ohm, 5W | -- | -- |
| 14.PCB Connector | Interchangeable | Interchangeable | Phosphor bronze material or copper alloy pins housed in bodies of plastic rated V-2 min | UL94 UL746C | UL |
| 15.Output connector | Interchangeable | Interchangeable | Min. V-2, Min.115°C | UL94 UL746C | UL |
| 16.Input connector | Interchangeable | Interchangeable | Min. V-2, Min. 65°C | UL94 UL746C | UL |

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

Supplementary information:

[1)] Provided evidence ensures the agreed level of compliance. See OD-2039.

[2)] The CBTL has verified the component information.

[3)] License available upon request.

**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 |
|---|---|---|---|---|---|
| 7.2.2 | CASE STRESS AT HIGH AMBIENT TEMPERATURE (BATTERY) | DC Source / 113 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 114 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 118 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | E-Load / 154 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 155 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 156 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | Constant Temp&Hum Box/96 (ESPEC, EW0240) | -40～150°C | 2021-10-09 | 2022-10-08 |
| | | Digital multimeter / 04 (Agilent, 34401A) | 0.1-1000Vdc,0.1-750Vac,100Ω-100MΩ | 2021-10-13 | 2022-10-12 |
| | | Thermo-hygrometers/161 (Anymetre, JB913) | 15~30°C, 40~80%RH | 2021-06-03 | 2022-06-02 |
| | | Clock/191 (SEIKO, QHL068W) | 1 min-24 hours | 2021-06-08 | 2022-06-07 |
| 7.3.2 | EXTERNAL SHORT-CIRCUIT (BATTERY) | Constant Temp&Hum Box/96 (ESPEC, EW0240) | -40～150°C | 2021-10-09 | 2022-10-08 |
| | | DC Source / 113 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 114 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 118 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 119 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | Thermo-hygrometers/161 (Anymetre, JB913) | 15~30°C, 40~80%RH | 2021-06-03 | 2022-06-02 |
| | | Digital multimeter / 04 (Agilent, 34401A) | 0.1-1000Vdc,0.1-750Vac,100Ω-100MΩ | 2021-10-13 | 2022-10-12 |

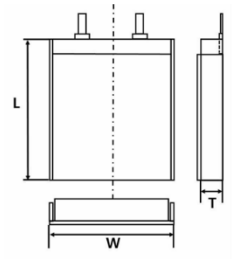
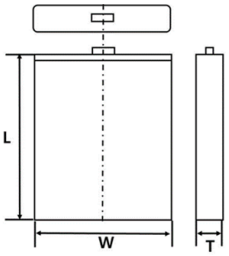
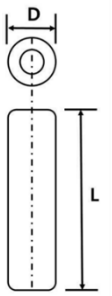
| | | | | | |
|---|---|---|---|---|---|
| | | E-Load / 150 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 153 (KIKUSUI, PLZ164W) | 1~60V,0~50A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 154 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 155 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 156 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | DC low resistance tester/66 (Jinko, JK2511) | 0 ~ 2kΩ | 2021-10-11 | 2022-10-10 |
| | | Data Acquisition Card/101 (Agilent, 34901A) | 1-20CH: -30～300°C (Type J) 1-10CH: 0.1-60Vdc | 2021-10-09 | 2022-10-08 |
| | | Data Acquisition/06 (Agilent,34970A) | 1-20CH: 0～200°C (Type J) 1-10CH: 0.1～60Vdc | 2021-10-09 | 2022-10-08 |
| | | Type J Thermocouple/190 (Omega, TT-J-30-SLE-1000) | Type J (-30~200°C) | 2020-12-25 | -- |
| 7.3.3 | FREE FALL | DC Source / 113 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 114 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 118 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | E-Load / 154 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 155 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 156 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | Digital multimeter / 04 (Agilent, 34401A) | 0.1-1000Vdc,0.1-750Vac,100Ω-100MΩ | 2021-10-13 | 2022-10-12 |
| | | Thermo-hygrometers/161 (Anymetre, JB913) | 15~30°C, 40~80%RH | 2021-06-03 | 2022-06-02 |
| | | Concrete Floor/ 124 (Inventus Power) | 110cm*110cm*8.5cm | -- | -- |
| | | Flexible Rule/180 (JIADESI, 315025) | 0-5m | 2020-11-05 | 2023-11-04 |
| 7.3.6 | OVER-CHARGING OF | DC Source / 113 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |

| | | | | | |
|---|---|---|---|---|---|
| | BATTERY | DC Source / 114 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 118 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 119 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | Thermo-hygrometers/161 (Anymetre, JB913) | 15~30°C, 40~80%RH | 2021-06-03 | 2022-06-02 |
| | | Digital multimeter / 04 (Agilent, 34401A) | 0.1-1000Vdc,0.1-750Vac,100Ω-100MΩ | 2021-10-13 | 2022-10-12 |
| | | E-Load / 150 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 153 (KIKUSUI, PLZ164W) | 1~60V,0~50A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 154 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 155 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | E-Load / 156 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | Data Acquisition Card/101 (Agilent, 34901A) | 1-20CH: -30 ~ 300°C (Type J) 1-10CH: 0.1-60Vdc | 2021-10-09 | 2022-10-08 |
| | | Data Acquisition/06 (Agilent,34970A) | 1-20CH: 0 ~ 200°C (Type J) 1-10CH: 0.1 ~ 60Vdc | 2021-10-09 | 2022-10-08 |
| | | Type J Thermocouple/190 (Omega, TT-J-30-SLE-1000) | Type J (-30~200°C) | 2020-12-25 | -- |
| 7.3.8.1 | VIBRATION | DC Source / 113 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 114 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 118 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | E-Load / 154 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | Electrical Scale/17 (Balance, BWSS-30) | 0～30kg | 2021-10-15 | 2022-10-14 |
| | | Vibration Test Bench/99 (Chinasti, DC-300-3) | 2.94kN,5Hz-2kHz,40mm, 2m/s, 980m/s2 | 2021-10-09 | 2022-10-08 |

| | | | | | |
|---|---|---|---|---|---|
| | | Digital multimeter / 04 (Agilent, 34401A) | 0.1-1000Vdc,0.1-750Vac,100Ω-100MΩ | 2021-10-13 | 2022-10-12 |
| | | Thermo-hygrometers/161 (Anymetre, JB913) | 15~30°C, 40~80%RH | 2021-06-03 | 2022-06-02 |
| 7.3.8.2 | Mechanical Shock | DC Source / 113 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 114 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | DC Source / 118 (KIKUSUI, PAT60-67T) | 1-60Vdc, 0.1-50A | 2021-10-09 | 2022-10-08 |
| | | E-Load / 154 (KIKUSUI, PLZ164W) | 1~150V, 0.1~33A,1-10Ω | 2021-10-09 | 2022-10-08 |
| | | Electrical Scale/17 (Balance, BWSS-30) | 0～30kg | 2021-10-15 | 2022-10-14 |
| | | Impact Test Bench/98 (Chinasti, CL-20/KCL-2000) | 40-200G, 5-10m/s, 3-7ms | 2021-10-09 | 2022-10-08 |
| | | Digital multimeter / 04 (Agilent, 34401A) | 0.1-1000Vdc,0.1-750Vac,100Ω-100MΩ | 2021-10-13 | 2022-10-12 |
| | | Thermo-hygrometers/161 (Anymetre, JB913) | 15~30°C, 40~80%RH | 2021-06-03 | 2022-06-02 |

| IEC62133_2B ATTACHMENT | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| **ATTACHMENT TO TEST REPORT**<br>**IEC 62133-2**<br>**(Republic of Korea) NATIONAL DIFFERENCES**<br>(Secondary cells and batteries containing alkaline or other non-acid electrolytes - Safety requirements for portable sealed secondary lithium cells, and for batteries made from them, for use in portable applications - Part 2: Lithium systems) | | | |
| **Differences according to**.....: | National standard KC62133-2(2020-07) | | |
| **TRF template used: .....:** | IECEE OD-2020-F3, Ed. 1.1 | | |
| **Attachment Form No**.....: | KR_ND_IEC62133_2B | | |
| **Attachment Originator .....**: | KTR | | |
| **Master Attachment**.....: | Dated 2022-05-27 | | |
|  | | | |
| | **National Differences** | | N/A |
| **7.3.6** | **Over-charging of battery** | | N/A |
| *(Revision)* | ***[Add the bolded text]***<br><br>b) Test<br>The test shall be carried out in an ambient temperature of 20 °C ± 5 °C. Each test battery shall be discharged at a constant current of 0,2 It A, to a final discharge voltage specified by the manufacturer. Sample batteries shall then be charged at a constant current of 2,0 It A, using a supply voltage which is:<br>• 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<br>• 1,2 times the upper limit charging voltage presented in Table A.1 per cell for series connected multi-cell batteries, and<br>• sufficient to maintain a current of 2,0 It A throughout the duration of the test or until the supply voltage is reached.<br>**• In case the charging voltage specified by the manufacturer is higher than the overcharge test voltage, the maximum charging voltage specified by manufacturer should be applied with 2.0 ItA,**<br>**(e.g., quick charging power bank, etc.)** | See Table 7.3.6 for test result | N/A |

| IEC62133_2B ATTACHMENT | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | ***[Replace to the following statement]***<br><br>c) Acceptance criteria<br>Filling beyond the manufacturer's specified limits should not result in ignition or explosion | | N/A |
| **Annex G** | **Definition for shape and materials of outer case for cell** | | — |
| *(Addition)* | G.1 General<br>Annex G provides definitions for shape and materials of outer case for cell<br><br>G.2 Shape of outer case for cell<br>G 2.1 Cylindrical cell<br>Cell with a cylindrical shape in which the overall height is equal to or greater than diameter.<br><br>G 2.2 Prismatic cell<br>Cell having the shape of a parallelepiped whose faces are rectangular<br><br>G.3 Materials of outer case for cell<br>G.3.1 Soft case<br>Non-metallic outer case or container for cell<br><br>G.3.2 Hard case<br>Metallic outer case or container for cell. | (Shape of outer cases)<br>☒ Cylindrical<br>☐ Prismatic<br><br>(Materials of outer cases)<br>☒ Hard<br>☐ Soft | — |
| **Annex H** | **Calculation method of the volumetric energy density for cell** | | — |
| *(Addition)* | Annex H provide a calculation method of the volumetric energy density for cell in use of smart phone, tablet, notebook.<br><br>H.1 General<br>Unless otherwise stated in the Annex E, the dimensions for calculation are based on these for cell before shipment and the volumetric energy density shall be calculated with a maximum values specified by manufacturer. If the specification for cell can't be provided a dimension for calculation, the manufacturer's other documentation shall be provided to demonstrate compliance for its calculation. | 589Wh/L (For cell model INR-18650-P28A)<br>601.8Wh/L (For cell model INR18650-29++) | — |

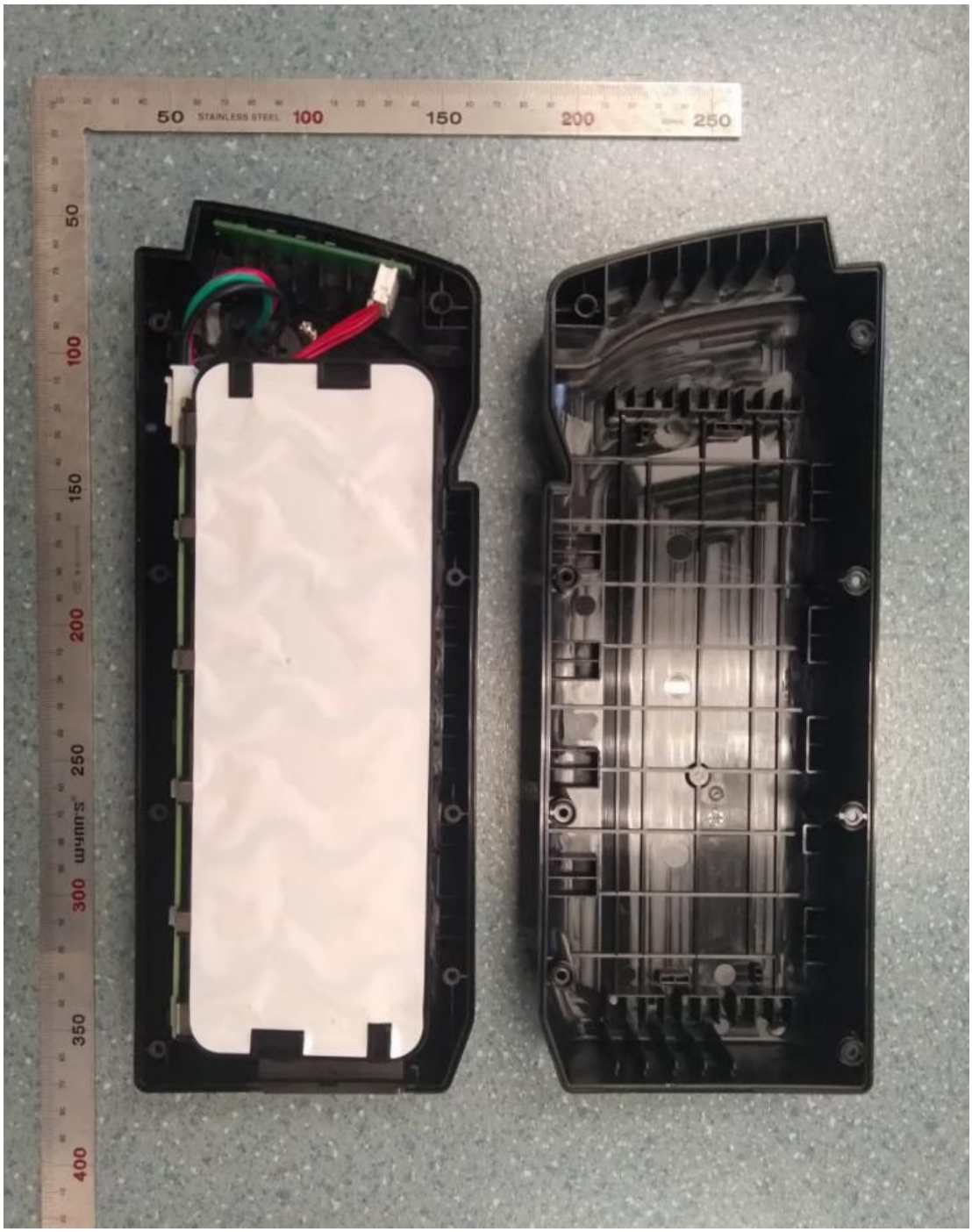
| IEC62133_2B ATTACHMENT | | | |
|---|---|---|---|
| Clause | Requirement + Test | Result - Remark | Verdict |
| | H.2 Calculation Method<br>  <br><br>L : Length (max.) of cell (including terrace)<br>W : Width (max.) of cell<br>T : Thickness (max.) when shipping charge<br>(For reference, Please<br>Exclude the dimension of any tape that<br>Is attached to cell)<br>$Volumetric\ energy\ density\ (Wh/L) = \frac{Nominal\ voltage\ (V) \times Rated\ capacity\ (Ah)}{Length\ (L) \times Width\ (W) \times Thickness\ (T)}$<br>[H.1 – Prismatic cell using soft case]<br>  <br><br>L : Length (max.) of cell<br>W : Width (max.) of cell<br>T : Thickness when shipping charge<br>(For reference, Please<br>Exclude the dimension of any tape that<br>Is attached to cell)<br>$Volumetric\ energy\ density\ (Wh/L) = \frac{Nominal\ voltage\ (V) \times Rated\ capacity\ (Ah)}{Length\ (L) \times Width\ (W) \times Thickness\ (T)}$<br>[H.2 – Prismatic cell using hard case]<br>  <br><br>D : Diameter (max.) of cell<br>L : Length (max.) of cell<br>(According to shape of cell at shipping,<br>The dimension of tube for cell may be included<br>In overall dimension of cell )<br>$Volumetric\ energy\ density\ (Wh/L) = \frac{Nominal\ voltage\ (V) \times Rated\ capacity\ (Ah)}{3.14159 \times \frac{Diameter\ (D)^2}{4} \times Length(L)}$<br>[H.3 – Cylindrical cell using hard case] | | — |

# ENCLOSURE

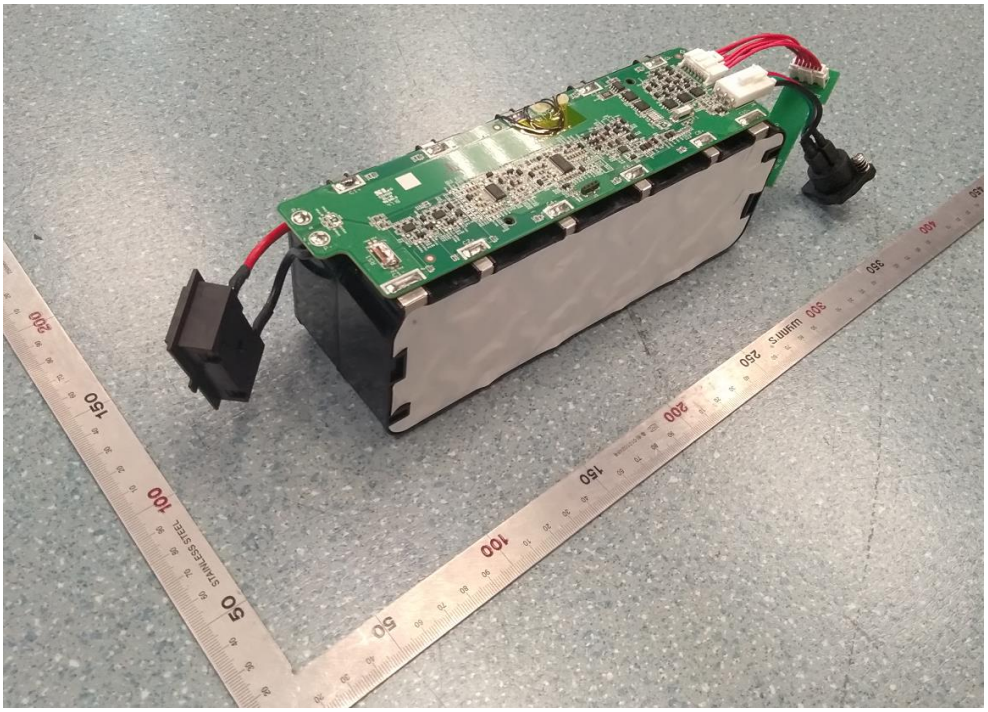
| Supplement ID | Description |
|---|---|
| 01 | Overall view of Rechargeable Li-ion Battery Pack |
| 02 | Construction view 1 of Rechargeable Li-ion Battery Pack |
| 03 | Internal view of Rechargeable Li-ion Battery Pack (Internal cell model INR18650-29++) |
| 04 | Internal view of Rechargeable Li-ion Battery Pack (Internal cell model INR-18650-P28A) |
| 05 | PWB over view of Rechargeable Li-ion Battery Pack |
| 06 | PWB layout of Rechargeable Li-ion Battery Pack |
| 07 | Dimensional drawing of Rechargeable Li-ion Battery Pack |
| 08 | Package of Rechargeable Li-ion Battery Pack |
| 09 | Safety information and instruction |

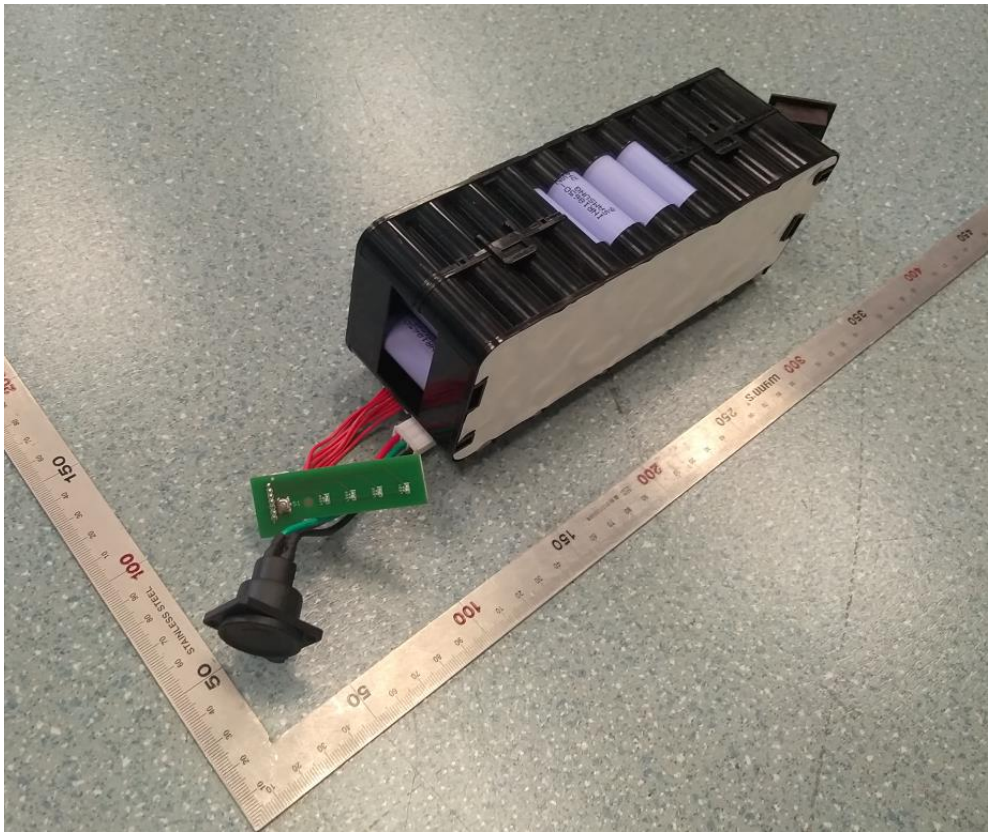
**ID 01**

**ID 02**

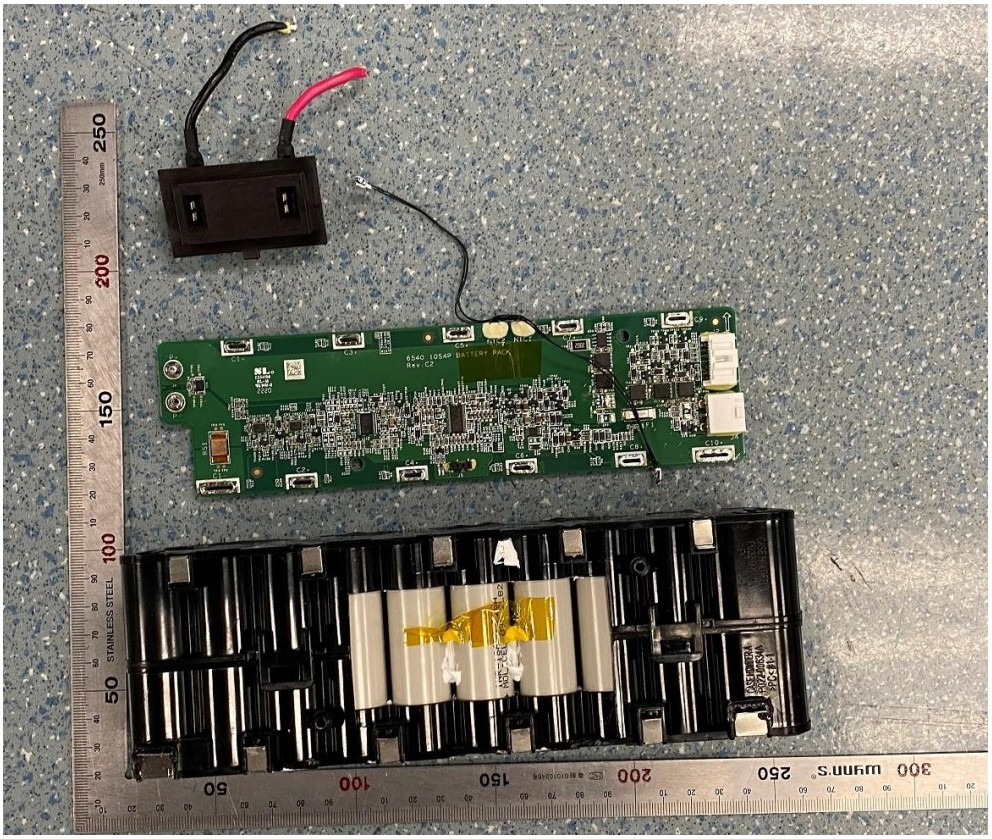

50
STAINLESS STEEL
100
150
200
250
50
100
150
200
250
300
350
400

**ID 03**

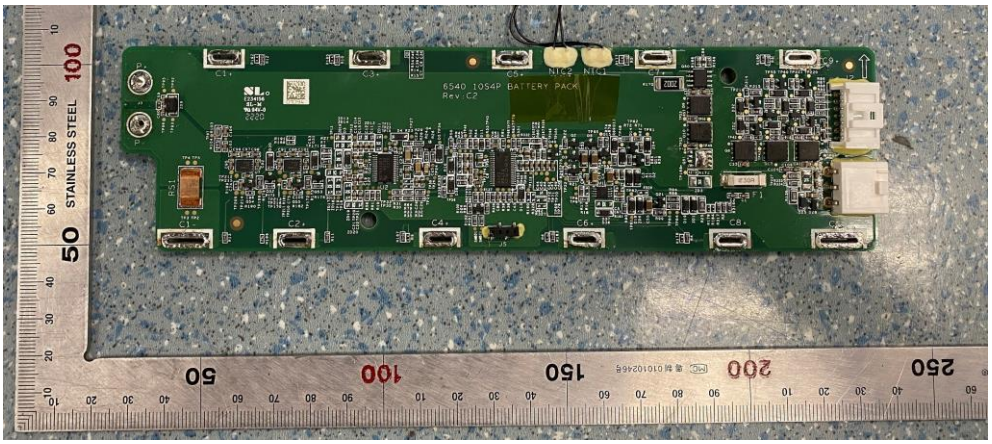


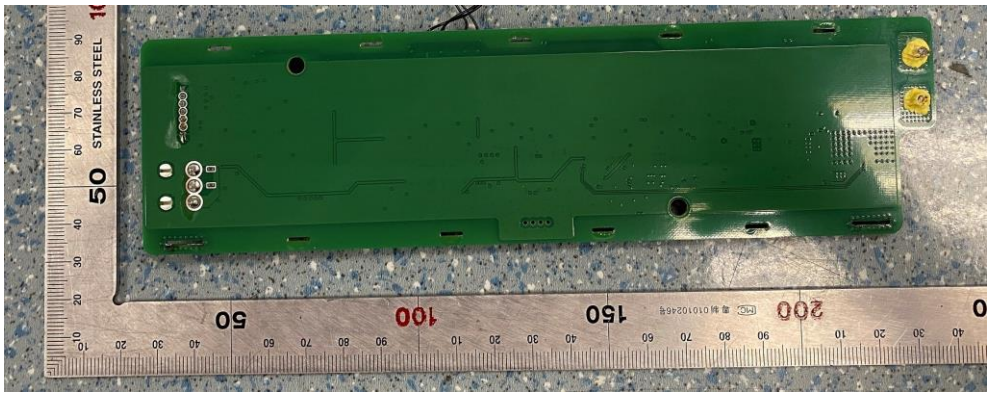


**ID 04**

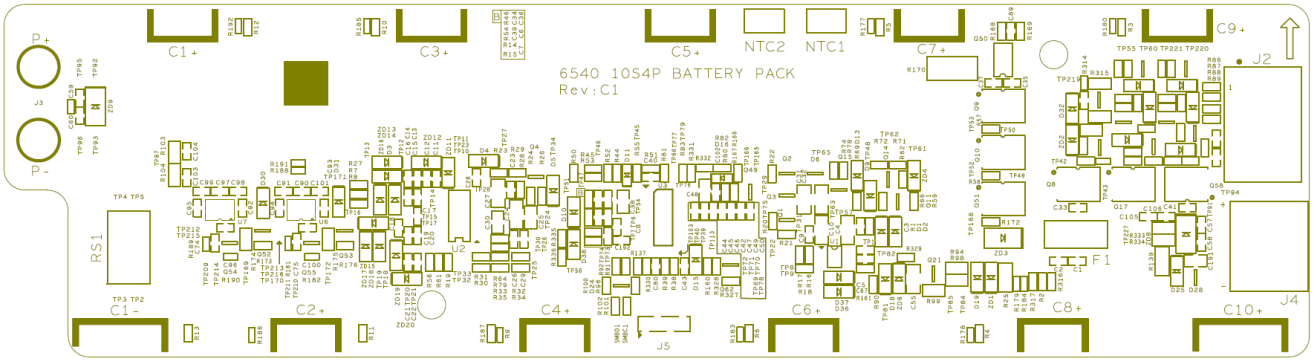


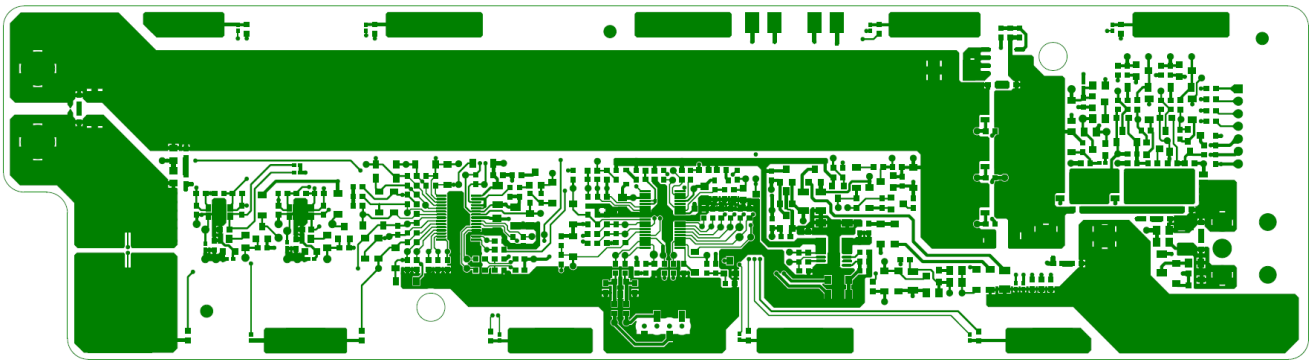
**ID 05**


STAINLESS STEEL
6540 10S4P BATTERY PACK
Rev C2

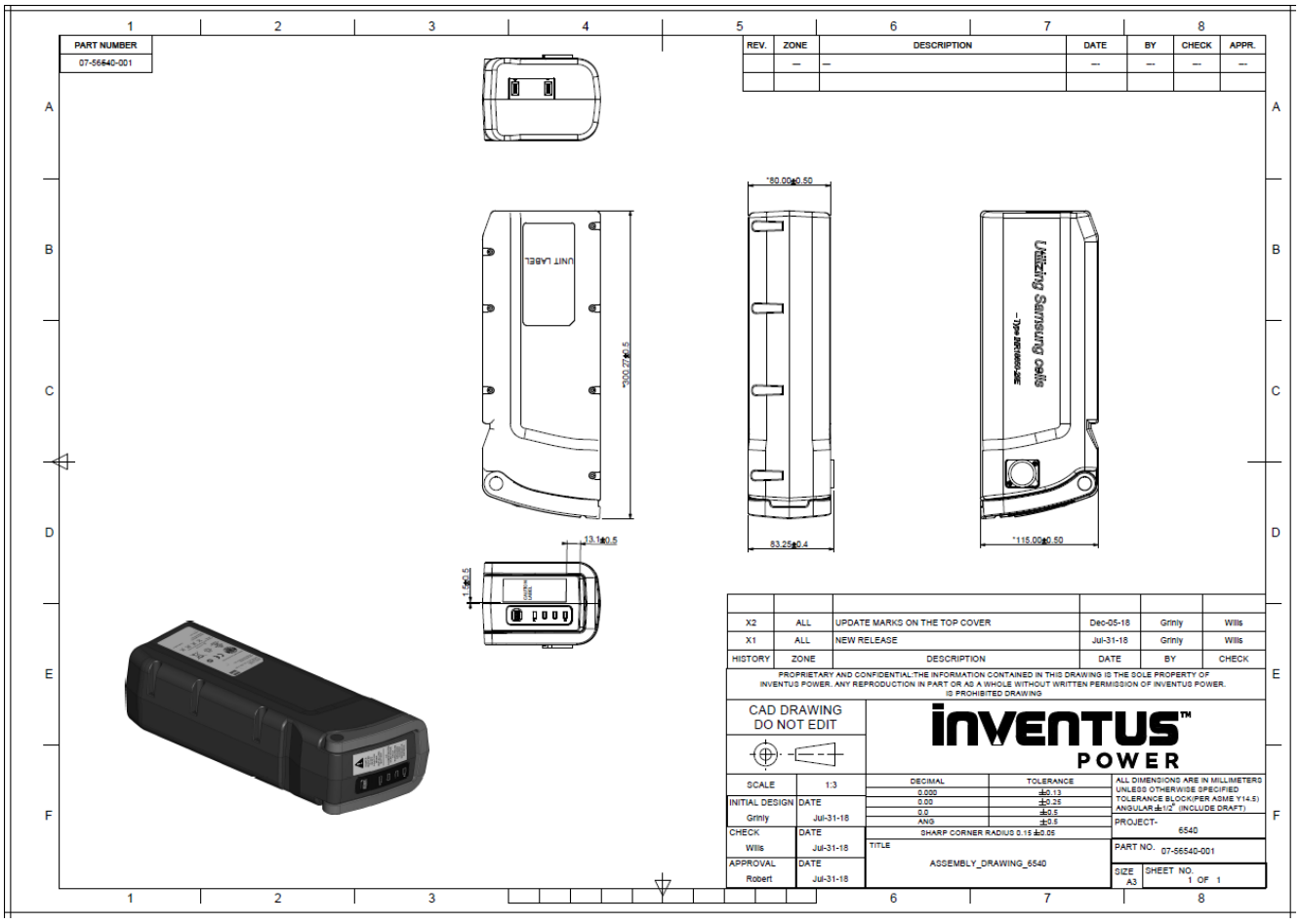

STAINLESS STEEL

**ID 06**

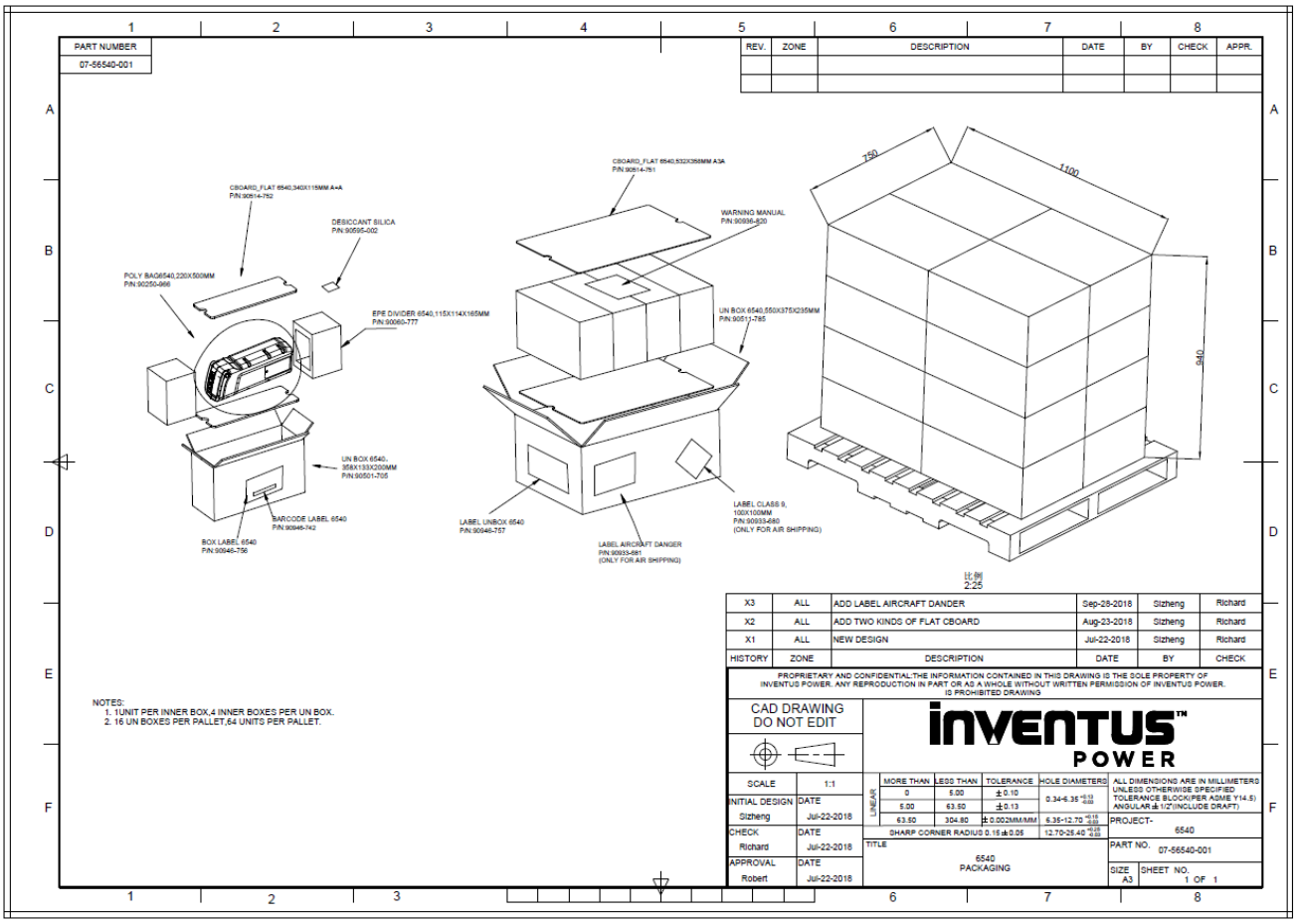

6540 10S4P BATTERY PACK
Rev:C1
P+
P-
C1+
C3+
C5+
NTC2
NTC1
C7+
C9+
J2
RS1
C1-
C2+
C4+
C6+
C8+
C10+
J4
J5
F1



**ID 07**


PART NUMBER
07-56540-001
REV. ZONE DESCRIPTION DATE BY CHECK APPR.
UNIT LABEL
*80.00±0.50
*300.72±0.5
83.25±0.4
*115.05±0.50
Utilizing Samsung cells
X2 ALL UPDATE MARKS ON THE TOP COVER Dec-05-18 Grinly Wills
X1 ALL NEW RELEASE Jul-31-18 Grinly Wills
HISTORY ZONE DESCRIPTION DATE BY CHECK
PROPRIETARY AND CONFIDENTIAL:THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF INVENTUS POWER. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT WRITTEN PERMISSION OF INVENTUS POWER. IS PROHIBITED DRAWING
CAD DRAWING DO NOT EDIT
INVENTUS POWER
SCALE 1:3
INITIAL DESIGN Grinly DATE Jul-31-18
CHECK Wills DATE Jul-31-18
APPROVAL Robert DATE Jul-31-18
DECIMAL TOLERANCE
0.000 ±0.13
0.00 ±0.25
0.0 ±0.5
ANG ±0.5
SHARP CORNER RADIUS 0.15 ±0.05
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWISE SPECIFIED
TOLERANCE BLOCK(PER ASME Y14.5)
ANGULAR:±1/2° (INCLUDE DRAFT)
PROJECT- 6540
TITLE ASSEMBLY_DRAWING_6540
PART NO. 07-56540-001
SIZE A3
SHEET NO. 1 OF 1

**ID 08**


PART NUMBER
07-56540-001
REV. ZONE DESCRIPTION DATE BY CHECK APPR.
CBOARD_FLAT 6540,340X115MM A+A
P/N:90514-752
DESICCANT SILICA
P/N:90595-002
POLY BAG6540,220X500MM
P/N:90250-666
EPE DIVIDER 6540,115X114X165MM
P/N:90060-777
UN BOX 6540,
355X193X200MM
P/N:90551-705
BARCODE LABEL 6540
P/N:90946-742
BOX LABEL 6540
P/N:90946-756
CBOARD_FLAT 6540,532X358MM A3A
P/N:90514-751
WARNING MANUAL
P/N:90936-820
UN BOX 6540,550X375X235MM
P/N:90511-785
LABEL UNBOX 6540
P/N:90946-757
LABEL AIRCRAFT DANGER
P/N:90933-891
(ONLY FOR AIR SHIPPING)
LABEL CLASS 9,
100X100MM
P/N:90933-680
(ONLY FOR AIR SHIPPING)
150
1100
640
比例
2:25
X3 ALL ADD LABEL AIRCRAFT DANDER Sep-28-2018 Sizheng Richard
X2 ALL ADD TWO KINDS OF FLAT CBOARD Aug-23-2018 Sizheng Richard
X1 ALL NEW DESIGN Jul-22-2018 Sizheng Richard
HISTORY ZONE DESCRIPTION DATE BY CHECK
NOTES:
1. 1UNIT PER INNER BOX,4 INNER BOXES PER UN BOX.
2. 16 UN BOXES PER PALLET,64 UNITS PER PALLET.
PROPRIETARY AND CONFIDENTIAL:THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF INVENTUS POWER. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT WRITTEN PERMISSION OF INVENTUS POWER. IS PROHIBITED DRAWING
CAD DRAWING DO NOT EDIT
INVENTUS POWER
SCALE 1:1
INITIAL DESIGN Sizheng DATE Jul-22-2018
CHECK Richard DATE Jul-22-2018
APPROVAL Robert DATE Jul-22-2018
MORE THAN LESS THAN TOLERANCE HOLE DIAMETERS
LINEAR
0 5.00 ±0.10 0.34-6.35 +0.13 -0.00
5.00 63.50 ±0.13
63.50 304.80 ±0.002MM/MM 6.35-12.70 +0.15 -0.00
SHARP CORNER RADIUS 0.15±0.05 12.70-25.40 +0.20 -0.00
ALL DIMENSIONS ARE IN MILLIMETERS UNLESS OTHERWIDE SPECIFIED TOLERANCE BLOCK(PER ASME Y14.5) ANGULAR ± 1/2°(INCLUDE DRAFT)
PROJECT- 6540
TITLE 6540 PACKAGING
PART NO. 07-56540-001
SIZE A3 SHEET NO. 1 OF 1

**ID 09**

a) Do not dismantle, open or shred secondary cells or batteries.
b) Do not expose cells or batteries to heat or fire. Avoid storage in direct sunlight.
c) Do not short-circuit a cell or a battery. Do not store cells or batteries haphazardly in a box or drawer where they may short-circuit each other or be short-circuited by other metal objects.
d) Do not remove a cell or battery from its original packaging until required for use.
e) Do not subject cells or batteries to mechanical shock.
f) In the event of a cell leaking, do not allow the liquid to come in contact with the skin or eyes. If contact has been made, wash the affected area with copious amounts of water and seek medical advice.
g) Do not use any charger other than that specifically provided for use with the equipment.
h) Observe the plus (+) and minus (–) marks on the cell, battery and equipment and ensure correct use.
i) Do not use any cell or battery which is not designed for use with the equipment.
j) Do not mix cells of different manufacture, capacity, size or type within a device.
k) Keep cells and batteries out of the reach of children.
l) Seek medical advice immediately if a cell or a battery has been swallowed.
m) Always purchase the correct cell or battery for the equipment.
n) Keep cells and batteries clean and dry.
o) Wipe the cell or battery terminals with a clean dry cloth if they become dirty.
p) Secondary cells and batteries need to be charged before use. Always use the correct charger and refer to the manufacturer's instructions or equipment manual for proper charging instructions.
q) Do not leave a battery on prolonged charge when not in use.
r) After extended periods of storage, it may be necessary to charge and discharge the cells or batteries several times to obtain maximum performance.
s) Secondary cells and batteries give their best performance when they are operated at normal room temperature (20 °C ± 5 °C).
t) Retain the original product literature for future reference.
u) Use only the cell or battery in the application for which it was intended.
v) When possible, remove the battery from the equipment when not in use.
w) Dispose of properly.

## Battery Pack disposal instruction

- When the battery reaches the end of its useful life, the spent battery should be disposed of by a qualified recycles or hazardous materials hander
- Do not mix this battery with the solid waste stream.
- Contact your local Technologies Service Center for recycling or disposal information.