	Ref. Certif. No.
	JPTUV-168416

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

CB TEST CERTIFICATE

Product	Rechargeable Li-Ion Battery
Name and address of the applicant	Karma Medical Products Co., Ltd. No. 2363, Sec. 2, University Rd. Min-Hsiung Shiang, Chia-yi 621 Taiwan
Name and address of the manufacturer	Full Power Electronics Co., Ltd. No. 6, Shinjan Rd. Chien-Chen Dist., Kaohsiung City 806034 Taiwan
Name and address of the factory Note: *When more than one factory, please report on page 2*	Full Power Electronics Co., Ltd. No. 6, Shinjan Rd. Chien-Chen Dist., Kaohsiung City 806034 Taiwan
Ratings and principal characteristics	DC 25.2V; Capacity: 11.5Ah; 289.8Wh
Trademark / Brand (if any)	Karma
Customer's Testing Facility (CTF) Stage used	N/A
Model / Type Ref.	KLB7S4P
Additional information (if necessary may also be reported on page 2)	N/A
A sample of the product was tested and found to be in conformity with	IEC 62133-2:2017+A1
As shown in the Test Report Ref. No. which forms part of this Certificate	CN24GTHA 001

This CB Test Certificate is issued by the National Certification Body

TÜVRheinland®

TÜV Rheinland Japan Ltd.
4-25-2 Kita-Yamata, Tsuzuki-ku
Yokohama 224-0021, Japan
Mail: info@jpn.tuv.com

Date: 2024-01-09

Signature: Dennis Chiu

10/061SMD 2024-12 rke-simplified

Test Report issued under the responsibility of:

TÜVRheinland®

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. ..... :	**CN24GTHA 001**
Date of issue ..... :	2024-12-19
Total number of pages ..... :	26
Name of Testing Laboratory preparing the Report ..... :	TÜV Rheinland Taiwan Ltd., Taoyuan Testing Laboratories
Applicant's name ..... :	Karma Medical Products Co., Ltd.
Address ..... :	No. 2363, Sec. 2, University Rd. Min-Hsiung Shiang, Chia-yi 621 Taiwan
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_2C
Test Report Form(s) Originator .... :	DEKRA Certification B.V.
Master TRF ..... :	Dated 2022-07-01

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
Trade Mark(s) ..... :	Karma
Manufacturer ..... :	Full Power Electronics Co., Ltd. No. 6, Shinjan Rd. Chien-Chen Dist., Kaohsiung City 806034 Taiwan
Model/Type reference ..... :	KLB7S4P
Ratings ..... :	DC 25.2V, Capacity: 11.5Ah, 289.8Wh

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☒	**CB Testing Laboratory:**	TÜV Rheinland Taiwan Ltd., Taoyuan Testing Laboratories	
Testing location/ address..... :		4F-1, No. 38, Huaya 1st Road, Guishan District, Taoyuan City 333 Taiwan Chinese Taipei	
Tested by (name, function, signature)..... :			X Project Engineer Signed by: Bruce C.C. Tsai
Approved by (name, function, signature)... :			X Nick Yang Reviewer Signed by: Nick C. L. Yang
☐	**Testing procedure: CTF Stage 1:**	N/A	
Testing location/ address..... :			
Tested by (name, function, signature)..... :			
Approved by (name, function, signature)... :			
☐	**Testing procedure: CTF Stage 2:**	N/A	
Testing location/ address..... :			
Tested by (name + signature) ..... :			
Witnessed by (name, function, signature) .:			
Approved by (name, function, signature)... :			
☐	**Testing procedure: CTF Stage 3:**	N/A	
☐	**Testing procedure: CTF Stage 4:**	N/A	
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):

- Photo Documentation (5 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All applicable tests according to the referenced standard(s) have been carried out. ☒ 5.2 Insulation resistance ☐ 7.2.1 Continuous charging at constant voltage (cells) ☒ 7.2.2 Case stress at high ambient temperature (batteries) ☐ 7.3.1 External short circuit (cells) ☒ 7.3.2 External short circuit (batteries) ☒ 7.3.3 Free fall (cells and batteries) ☐ 7.3.4 Thermal abuse (cells) ☐ 7.3.5 Crush (cells) ☒ 7.3.6 Over-charging of battery ☐ 7.3.7 Forced discharge (cells) ☒ 7.3.8.1 Vibration (batteries) ☒ 7.3.8.2 Mechanical shock (batteries) ☐ 7.3.9 Design evaluation – Forced internal short circuit (cells) ☐ Annex D Measurement of the internal AC resistance for coin cells	Unless otherwise indicated, all tests were performed at the location stated in “Testing procedure and testing location”.

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

N/A

☒ **The product fulfils the requirements of EN 62133-2:2017+A1:2021**

☒ **The product fulfils the requirements of 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.

Explanation of the date code:

Assembly Code (15 Characters)
The Code is"184-002-2433XXXXX".

Full Power Part No
184-002

Year Code (2 Characters)
Depend on TABLE1

year-month cycle(2 Characters)
Depend on TABLE2

Unique Sequence Identifier Code (5 Characters)
Sequuencing up each week from 00001 to 99999

TABLE1 TABLE1	
Year	Year Code
2022	22
2023	23
2024	24
2025	25
2026	26

Test item particulars.....:	
Classification of installation and use.....:	portable applications
Supply Connection.....:	DC Connector
Recommend charging method declared by the manufacturer.....:	C.C-C.V. mode
Discharge current (0,2 It A).....:	See General product information for details
Specified final voltage.....:	See General product information for details
Upper limit charging voltage per cell.....:	See General product information for details
Maximum charging current.....:	See General product information for details
Charging temperature upper limit.....:	N/A
Charging temperature lower limit.....:	N/A
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.....:	2024-09-24
Date (s) of performance of tests.....:	2024-09-30 to 2024-11-18
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** ☒ **Not applicable**
When differences exist; they shall be identified in the General product information section.	
Name and address of factory (ies).....:	1) Full Power Electronics Co., Ltd. No. 6, Shinjan Rd. Chien-Chen Dist., Kaohsiung City 806034 Taiwan

General product information and other remarks:

- The equipment under test (EUT) is a rechargeable Lithium battery module, which is constructed certified cells and has overcharge, over-discharge protection and abnormal temperature sensor.
- The top enclosure and bottom enclosure are secured together by screws.

Product specification:

Item	Specification	Remark
Cell arrangement:	7S4P	
Nominal voltage (Vdc):	25.2	
Nominal capacity (Ah):	11.5	
End of discharge voltage (EODV) (Vdc):	17.5	
Standard charge voltage (Vdc):	28.7	
Maximum charge voltage (Vdc):	29.4	
Standard charge current (A):	5	
Maximum charge current (A):	6	
Standard discharge current (A):	11.5	
Maximum discharge current (A):	32	
Discharge current (0,2 I_t A) (A):	2.3	
Upper limit charging voltage per cell (Vdc):	4.20	
Operation temperature range (°C):	5 – 40 / 0 - 40	Charge / Discharge
Mass of equipment: (kg)(Nominal):	Approx. 3.0	

Additional Information:

- The battery cell used in the product is a certified product which was investigated to comply with the following standards: IEC 62133-2:2017

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	The test voltage is applied between the positive terminal and screw heads.	P
	Insulation resistance (MΩ) ..... :	9999	—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements	Internal wires and conductors possess adequate cross-sectional areas for their intended application.	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 pressure relief mechanism is provided.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	**Temperature, voltage and current management**		P
	Batteries are designed such that abnormal temperature rise conditions are prevented		P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	The design of the battery is within the 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	Battery specifications and charging instructions were provided.	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	Compliance checked.	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	Compliance checked.	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	The battery is equipped with 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 has protective circuitry that can maintain the cells within their operating regions	No multi-batteries housed in a single battery case.	N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly	The battery is designed according to the cell manufacturer's recommendations and specifications.	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	No 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	The upper limit of the charging voltage of the battery pack does not exceed the limit of the cell.	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	All cells use the same capacity, design, chemistry and come 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	The end of discharge voltage of battery does not exceed the end of discharge voltage specified by cell manufacturer.	P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry are incorporated into the battery management system		P
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	Mechanical protection was provided by the battery case.	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	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	ISO 9001 certified manufacturer / factory.	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		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	See clause 7.3.2.	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

IEC 62133-2			
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)		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)	Test according to this requirement.	P
	Oven temperature (°C).....:	70.0 °C for 7 hrs.	—
	Results: no physical distortion of the battery case resulting in exposure of internal protective components and cells	After testing, there is 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)		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)	Test according to this requirement.	P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or	Normal condition samples complied.	P
	- The case temperature declined by 20 % of the maximum temperature rise	Single fault samples complied.	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

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	(See appended table 7.3.2)	P
	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	Test according to this requirement.	P
	Results: no fire, no explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)		N/A
	Oven temperature (°C) ..... :		—
	Results: no fire, no explosion		N/A
7.3.5	Crush (cells)		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	Test according to this requirement.	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		N/A
	- Returned to ambient		P
	Results: no fire, no explosion ..... :	(See appended table 7.3.6)	P
7.3.7	Forced discharge (cells)		N/A

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Discharge a single cell to the lower limit discharge voltage specified by the cell manufacturer		N/A
	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	Test according to this requirement.	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	Test according to this requirement.	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)		N/A
	The cells complied with national requirement for ..... :	France, Japan, Korea, Switzerland	—
	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	Information for safety mentioned in manufacturer's specifications.	P
	Manufacturers of batteries provides information regarding how to minimize and mitigate hazards to equipment manufacturers or end-users	Information for safety mentioned in manufacturer's specifications.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	Systems analyses are performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, any information relating to hazard avoidance resulting from a system analysis is provided to the end user		P
	Do not allow children to replace batteries without adult supervision		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:	The cell did not fit within the limits of the ingestion gauge.	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 copy of marking plate. The battery is marked in accordance with IEC 61960.	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		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	- Not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	**Caution for ingestion of small cells and batteries**	Not a small cell or battery.	N/A
	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	Information mentioned in the production specification.	P
	- Recommended charging instructions	Information mentioned in the production specification.	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	Not coin cells.	N/A
ANNEX A	**CHARGING AND DISCHARGING RANGE OF SECONDARY LITHIUM ION CELLS FOR SAFE USE**		N/A
A.1	**General**		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

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

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Clause	Requirement + Test	Result - Remark	Verdict
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
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**		P
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

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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 Vc (Vdc)**	**Recommended charging current I_{rec} (A)**	**OCV before test (Vdc)**	**Results**

Supplementary information:

Test result key:

A: No fire or explosion

B: No leakage

C: 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:

Test result key:

A: No fire or explosion

B: 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**
KLB7S4P #004	24.4	28.4	80.4	14.9	Normal condition	A
KLB7S4P #024	24.4	28.5	80.4	17.6	Normal condition	A
KLB7S4P #002	22.0	28.7	80.4	20.5	F1: S-C	A
KLB7S4P #003	23.8	28.3	80.4	3.9	QD3 pin D to S: S-C	A, B
KLB7S4P #020	23.1	28.2	80.4	2.4	QD1 pin D to S: S-C	A, B

Supplementary information:

1. S-C = short circuited, O-C = open circuited.

Test result key:

A: No fire or explosion

B: Others (please explain): Fuse opened

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				

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

Supplementary information:
Test result key:
A: No fire or explosion
B: Others (please explain)

7.3.6	TABLE: Over-charging of battery				P
Constant charging current (A) .....:		23			—
Supply voltage (Vdc) .....:		35.28			—
Sample No.	**OCV before charging (Vdc)**	**Total charging time (minute)**	**Maximum outer case temperature (°C)**	**Results**	
KLB7S4P #005	19.6	476	31.8	A, B	
KLB7S4P #009	19.4	476	37.1	A, B	
KLB7S4P #011	19.6	476	34.4	A, B	
KLB7S4P #012	19.3	425	29.8	A, B	
KLB7S4P #013	19.6	425	30.1	A, B	

Supplementary information:
* The worst condition (typical capacity) is considered
Test result key:
A: No fire or explosion
B: Others (please explain): Protection circuit activates and stops charging immediately.

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:
Test result key:
A: No fire or explosion
B: Others (please explain)

IEC 62133-2			
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**
KLB7S4P #006	28.0	28.0	2241.8	2241.8	A, B, C, D
KLB7S4P #007	28.4	0.0	2243.8	2243.8	A, B, C, D, E
KLB7S4P #010	28.4	28.4	2244.4	2244.3	A, B, C, D

Supplementary information:

Test result key:

A: No fire or explosion

B: No rupture

C: No leakage

D: No venting

E: Others (please explain):There is no voltage after vibration test.

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**
KLB7S4P #006	28.0	28.0	2241.8	2241.8	A, B, C, D
KLB7S4P #008	28.4	28.4	2242.2	2242.2	A, B, C, D
KLB7S4P #010	28.4	28.4	2244.4	2244.3	A, B, C, D

Supplementary information:

Test result key:

A: No fire or explosion

B: No rupture

C: No leakage

D: No venting

E: Others (please explain)

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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 [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.

Test result key:

A: No fire

B: 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)]**
Enclosure material	SABIC	PC-BPL1000	V-0, thickness: 0.8mm min.	UL 94 CAN/CSA C22.2 No. 0.17	UL(E207780)
Rechargeable cells (7S4P)	Samsung SDI CO., LTD	INR18650-35E/63	Lithium-Ion type 3.6Vdc, Rated : 3400mAh(Min. 3350mAh)	IEC 62133-2:2017	CB (NL-53895)
PCB material	Interchangeable	Interchangeable	V-0 130°C	UL 94 CAN/CSA C22.2 No. 0.17	UL(E348018)
Fuse (F1)	LITTELFUSE	156.5677.560	32 Vdc, 60A	--	--
Protection IC (U4)	TI	BQ7693003DBTR	--	--	--
MOSFET (QC2, QC3, QD2, QD3)	Hunteck	HGB016NE6A	I_D=180A, V_{DS}=65V	--	--
Current sensing resistor (R1, R2, R3)	Interchangeable	Interchangeable	SMD type, 3mΩ, 2W	--	--
Thermistors (TH1, TH2)	E WAY	ESTA4103F3435F-301052ASC	NTC type, 10kΩ, at 25°C	--	--
Thermistors (TH1, TH2) (Alternate)	Interchangeable	Interchangeable	NTC type, 10kΩ, at 25°C	--	--
Connector material	Interchangeable	Interchangeable	250V, 13A, V-2 or better, 105°C	UL 94, UL 746C	UL(E235269), cUL
Insulation wiring	Interchangeable	Interchangeable	FEP, PTFE, PVC, TFE, neoprene, polyimide or marked VW-1 or FT-1 or better; minimum 60 V, 80 °C.	UL 758 CAN/CSA C22.2 NO. 210	UL(E193578)

Supplementary information:

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

[2)] 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

Supplementary information: No listing of test equipment used necessary for chosen test procedure.

Product: Rechargeable Li-Ion Battery

Type Designation: KLB7S4P

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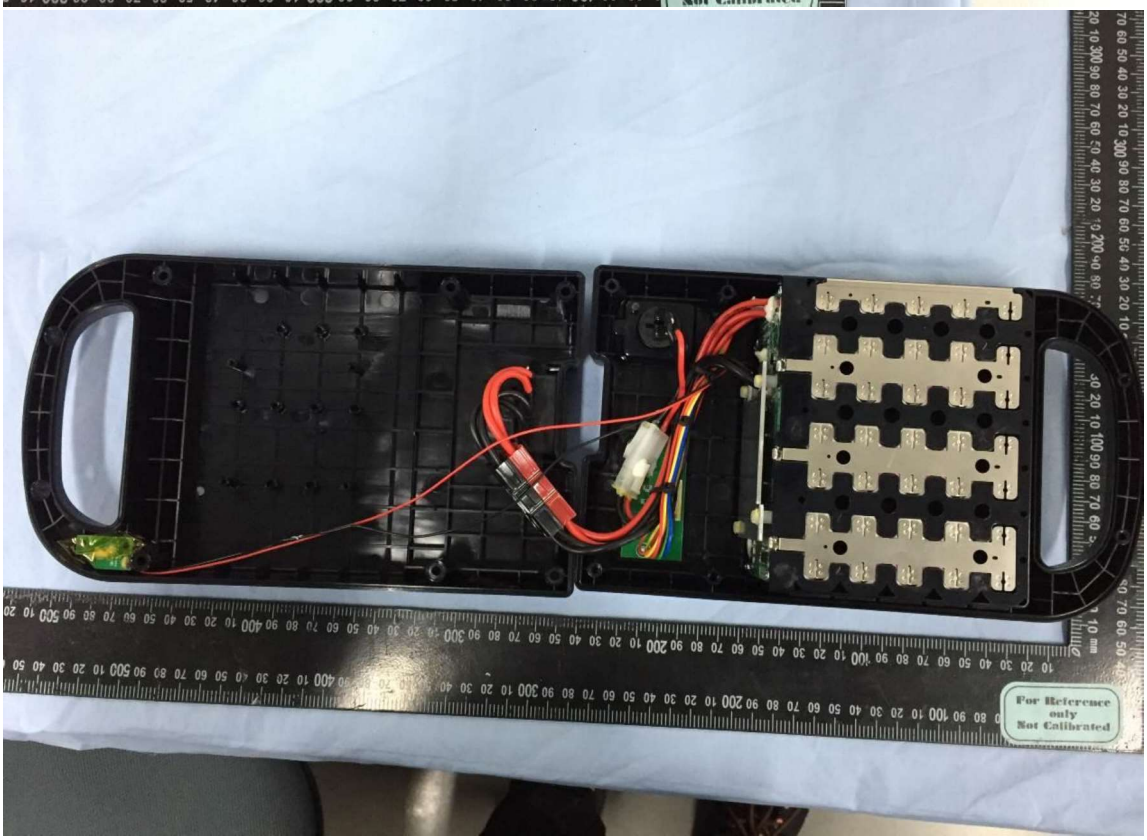

Product: Rechargeable Li-Ion Battery

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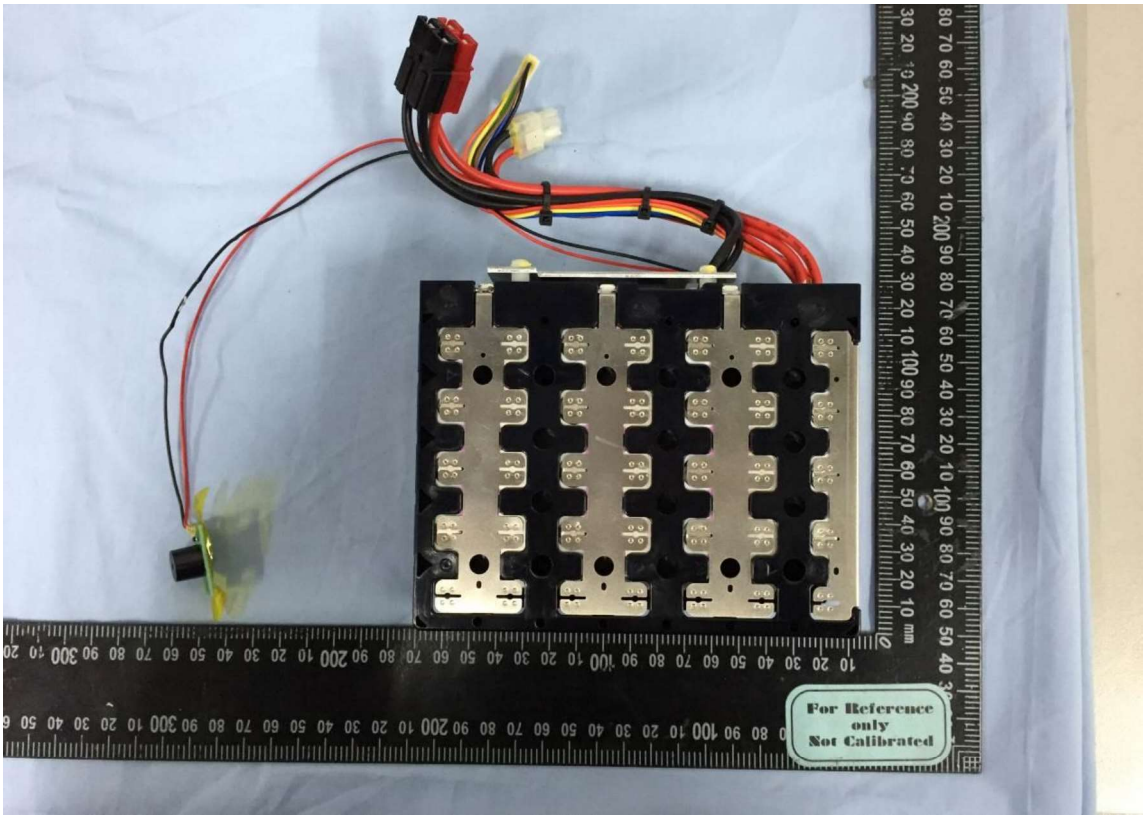

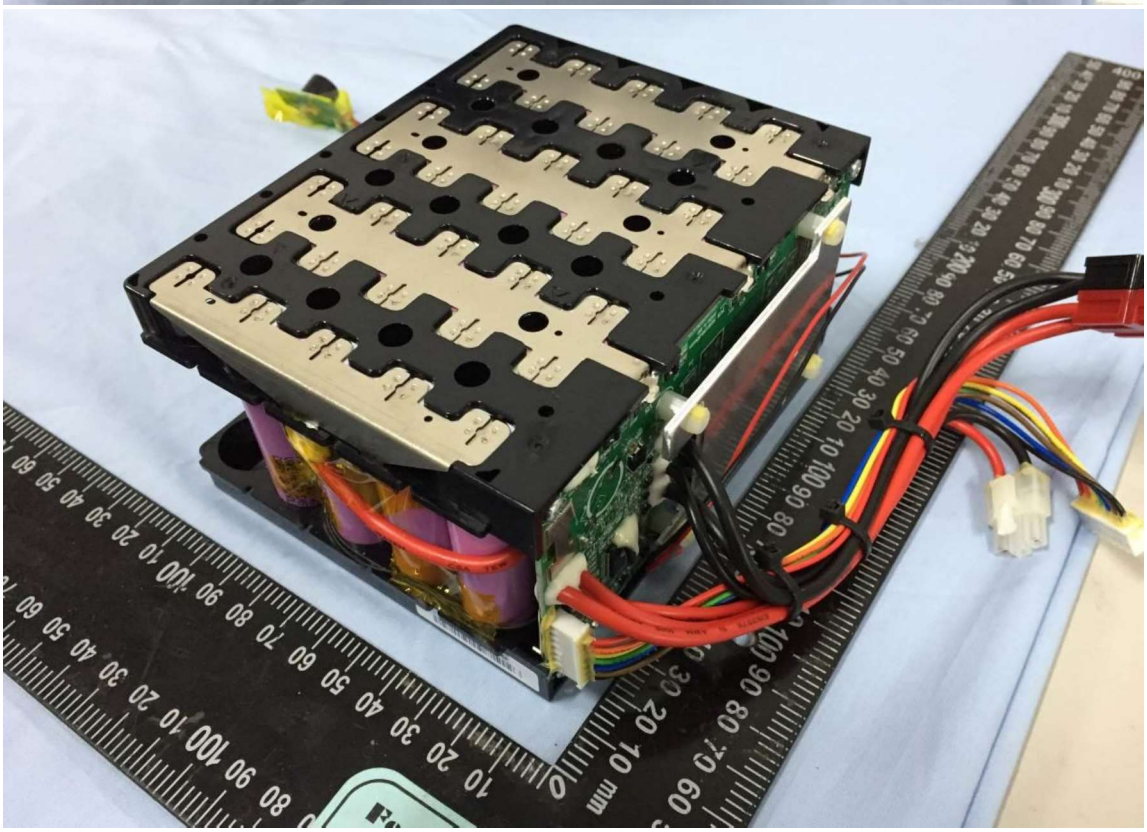

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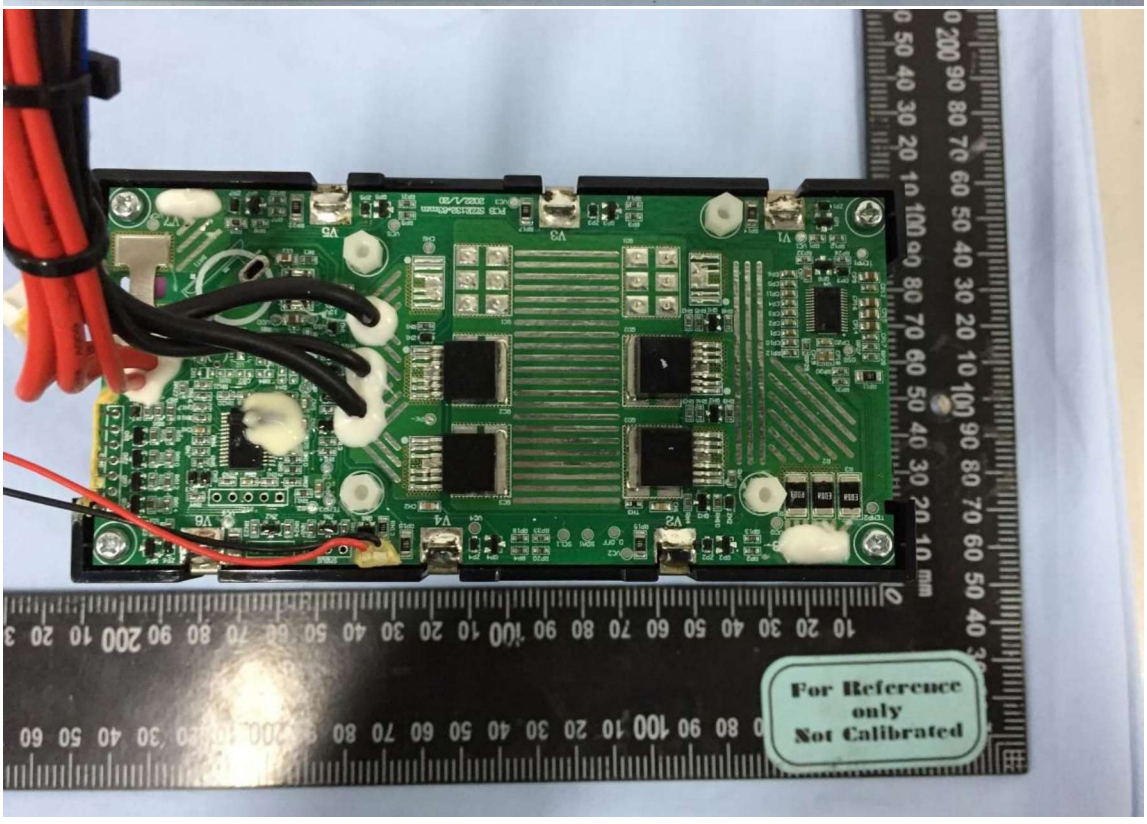

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