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TEST REPORT

IEC 62133

Secondary Cells and Batteries Containing Alkaline or Other Non-Acid Electrolytes – Safety Requirements for Portable Sealed Secondary Cells, and for Batteries Made from Them, for Use in Portable Applications

Report Number. ..... :	50232928 001
Date of issue ..... :	12 April, 2019
Total number of pages ..... :	25 pages
Name of Testing Laboratory preparing the Report ..... :	**Shenzhen TCT Testing Technology Co., Ltd.**
Applicant's name ..... :	CHIEN TI ENTERPRISE CO., LTD
Address ..... :	No. 13, Lane 227, Fu Ying Rd., Hsin Chuang District, New Taipei City, 24258 Taiwan
Test specification:	
Standard ..... :	IEC 62133:2012
Test procedure ..... :	CB Scheme
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62133C
Test Report Form(s) Originator .... :	UL (Demko)
Master TRF ..... :	2018-07-27

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

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

General disclaimer:

The test results presented in this report relate only to the object tested.
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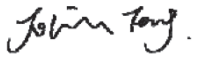
Test item description ..... :	Rechargeable Lithium ion Battery
Trade Mark ..... :	N/A
Manufacturer ..... :	GREE Energetic & Environmental Technologies Co., Ltd. of Zhuhai Building 3, No.6, Huaguan Road, Jinding Technology Industrial Park, Xiangzhou District, Zhuhai, Guangdong, P. R. China
Model/Type reference ..... :	NCR18650PF-6P7S
Ratings ..... :	25.2VDC, 16500mAh, 415.8Wh(min) 25.2VDC, 17400mAh, 438.48Wh(typ)

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

☒	**CB Testing Laboratory:**	**Shenzhen TCT Testing Technology Co., Ltd.**	
Testing location/ address..... :		1B/F, Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China	
Tested by (name, function, signature)..... :		Jokin Teng (Project Engineer)	
Approved by (name, function, signature)... :		Evan Chen (Reviewer)	
☐	**Testing procedure: CTF Stage 1:**		
Testing location/ address..... :			
Tested by (name, function, signature)..... :			
Approved by (name, function, signature)... :			
☐	**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):

Attachment 1: National Difference (2 pages).
Attachment 2: Photo documentation (4 pages).

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
cl.5.6.2 Design recommendation (Lithium system); cl.8.1 Charging procedure for test purposes (for Cells and Batteries); cl.8.2.1 Continuous charging at constant voltage (Cells); cl.8.2.2 Moulded case stress at high ambient temperature (Batteries); cl.8.3.1 External short circuit (Cells); cl.8.3.2 External short circuit (Batteries); cl.8.3.3 Free fall (for Cells and Batteries); cl.8.3.4 Thermal abuse (Cells); cl.8.3.5 Crush (Cells); cl.8.3.6 Over-charging of battery; cl.8.3.7 Forced discharge (Cells); cl.8.3.9 Design evaluation – Forced internal short circuit (Cells) Tests are made with the number of cells and batteries specified in IEC 62133: 2012 (Second Edition) Table 2.	**Shenzhen TCT Testing Technology Co., Ltd.** 1B/F, Building 1, Yibaolai Industrial Park, Qiaotou, Fuyong, Baoan District, Shenzhen, Guangdong, China

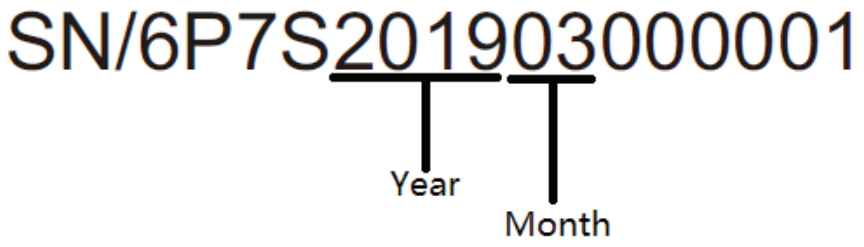
Summary of compliance with National Differences (List of countries addressed):

SG
SG=Singapore

☒ The product fulfils the requirements of **EN 62133: 2013**

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.



Test item particulars.....:	
Recommend charging method declaired by the manufacturer ..... :	Charging the battery with 3480mA constant current until 29.4V, then constant voltage until the charge current reduces to 174mA at ambient 20°C±5°C.
Discharge current (0,2 I_t A) ..... :	3480mA
Specified final voltage ..... :	19.4V
Chemistry ..... :	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....:	4.25V
Maximum charging current.....:	5000mA
Charging temperature upper limit.....:	45°C
Charging temperature lower limit.....:	10°C
Polymer cell electrolyte type ..... :	☐ gel polymer ..... ☐ solid polymer
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	15 February, 2019
Date (s) of performance of tests .....:	16 February, 2019 to 26 March, 2019
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) ..... :	Same as manufacturer

General product information and other remarks:

This battery is constructed with 42 lithium-ion cells (7S6P), and has overcharge, over-discharge, over current and short-circuits proof circuit.

The main features of the battery pack are shown as below (clause 8.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
NCR18650PF-6P7S	17400mAh	25.2V	3480mA	3480mA	5000mA	38000mA	29.4V	19.4V

The main features of the battery pack are shown as below (clause 8.1.2):

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
NCR18650PF-6P7S	29.75V	870mA	10°C	45°C

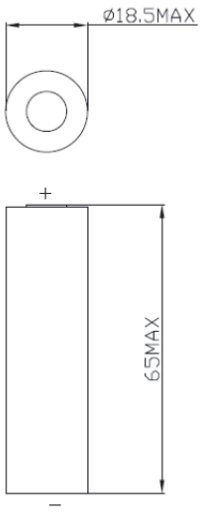
The main features of the cell in the battery pack are shown as below (clause 8.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
NCR18650PF	2900mAh	3.6V	1350mA	540mA	1350mA	10000mA	4.23V	2.5V

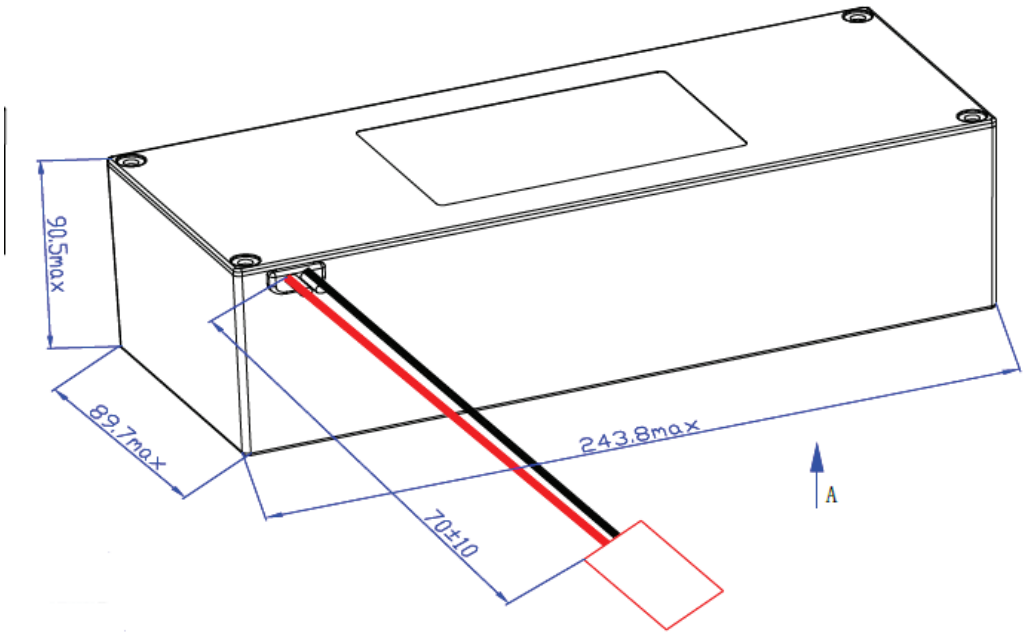
The main features of the cell in the battery pack are shown as below (clause 8.1.2):

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
NCR18650PF	4.25V	145mA	10°C	45°C

Construction:

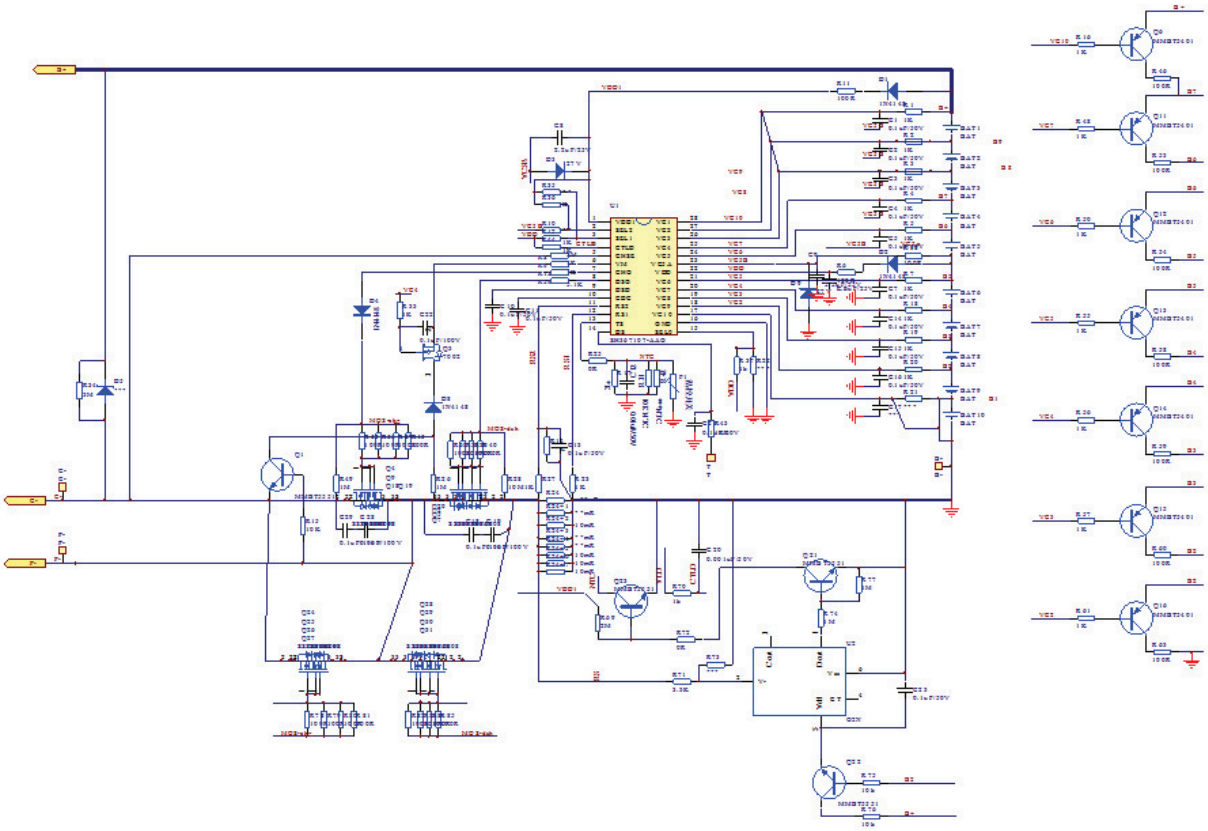


Cell (Unit: mm)



Battery (Unit: mm)

Circuit diagram:



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Clause	Requirement + Test	Result - Remark	Verdict
4	**Parameter measurement tolerances**		P
	Parameter measurement tolerances		P
5	**General safety considerations**		P
5.1	General		P
5.2	Insulation and wiring		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	No metal surface exists.	N/A
	Insulation resistance (MΩ) ..... :	N/A	—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		P
	Orientation of wiring maintains adequate creepage and clearance 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	Venting mechanism exists on top of the cylindrical cell.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief		N/A
5.4	Temperature/voltage/current management		P
	Batteries are designed such that abnormal temperature rise conditions are prevented	Overcharge, overdischarge, over current and short-circuit proof circuit used in this battery. See tests of clause 8.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	See above.	P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that associated chargers are designed to maintain charging within the temperature, voltage and current limits specified	The charging limits specified in the manufacturer's specifications.	P
5.5	Terminal contacts		P

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Clause	Requirement + Test	Result - Remark	Verdict
	Terminals have a clear polarity marking on the external surface of the battery	Special designed connector used. Also the connector construction designed wrong polarity insert prevented.	P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	DC Connector contacts complied with the requirements.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance	Complied.	P
	Terminal contacts are arranged to minimize the risk of short circuits	Complied.	P
5.6	Assembly of cells into batteries		P
5.6.1	If there is more than one battery housed in a single battery case, cells used in the assembly of each battery have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer	7S6P	P
	Each battery has an independent control and protection		N/A
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate separate circuitry to prevent the cell reversal caused by uneven discharges		N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application		P
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard		N/A
5.6.2	Design recommendation for lithium systems only		P
	For the battery consisting of a single cell or a single cellblock: - Charging voltage of the cell does not exceed the upper limit of the charging voltage specified in Clause 8.1.2, Table 4; or		N/A
	- Charging voltage of the cell does not exceed the different upper limit of the charging voltage determined through Clause 8.1.2, NOTE 1.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - The voltages of any one of the single cells or single cellblocks does not exceed the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, by monitoring the voltage of every single cell or the single cellblocks; or	Max. charging voltage of each cell: 4.23V, not exceed 4.25V specified in Clause 8.1.2, table 4.	P
	- The voltages of any one of the single cells or single cellblocks does not exceed the different upper limit of the charging voltage, determined through Clause 8.1.2, NOTE 1, by monitoring the voltage of every single cell or the single cellblocks		N/A
	For the battery consisting of series-connected plural single cells or series-connected plural cellblocks: - Charging is stopped when the upper limit of the charging voltage, specified in Clause 8.1.2, Table 4, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks; or		N/A
	- Charging is stopped when the upper limit of the different charging voltage, determined through Clause 8.1.2, NOTE 1, is exceeded for any one of the single cells or single cellblocks by measuring the voltage of every single cell or the single cellblocks		N/A
5.7	Quality plan		P
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	Complied. ISO 9001: 2015 certificate provided.	P

6	**Type test conditions**		**P**
	Tests were made with the number of cells or batteries specified in Table 1 for nickel-cadmium and nickel-metal hydride systems and Table 2 for lithium systems, using cells or batteries that are not more than six months old	Complied. Lithium system.	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.	Tests are carried out at 20°C ± 5°C.	P

7	**Specific requirements and tests (nickel systems)**		**N/A**
7.1	Charging procedure for test purposes	Lithium system.	N/A
7.2	Intended use		N/A
7.2.1	Continuous low-rate charging (cells)		N/A
	Results: No fire. No explosion	(See Table 7.2.1)	N/A
7.2.2	Vibration		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion. No leakage	(See Table 7.2.2)	N/A
7.2.3	Moulded case stress at high ambient temperature		N/A
	Oven temperature (°C) ..... :		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A
7.2.4	Temperature cycling		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3	Reasonably foreseeable misuse		N/A
7.3.1	Incorrect installation cell		N/A
	The test was carried out using: - Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or		N/A
	- A stabilized dc power supply.		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.1)	N/A
7.3.2	External short circuit		N/A
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.2)	N/A
7.3.3	Free fall		N/A
	Results: No fire. No explosion.		N/A
7.3.4	Mechanical shock (crash hazard)		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3.5	Thermal abuse		N/A
	Oven temperature (°C) ..... :		—
	Results: No fire. No explosion.		N/A
7.3.6	Crushing of cells		N/A
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.6)	N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
7.3.7	Low pressure		N/A
	Chamber pressure (kPa)..... :		—
	Results: No fire. No explosion. No leakage.		N/A
7.3.8	Overcharge		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.8)	N/A
7.3.9	Forced discharge		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.9)	N/A
8	**Specific requirements and tests (lithium systems)**		**P**
8.1	Charging procedures for test purposes		P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2		P
8.1.2	Second procedure: This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9		P
	If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit	Charge temperature range: 10-45°C declared. 10°C used for lower limit tests. 45°C used for upper limit tests.	N/A
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :		N/A
	For a different upper limit charging voltage (i.e. other than for lithium cobalt oxide systems at 4,25 V), the applied upper limit charging voltage and upper limit charging temperatures were adjusted accordingly	4.25V applied.	N/A
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :		N/A
8.2	Intended use		P
8.2.1	Continuous charging at constant voltage (cells)	Tested complied.	P
	Results: No fire. No explosion..... :	(See Table 8.2.1)	P
8.2.2	Moulded case stress at high ambient temperature (battery)	Tested complied.	P
	Oven temperature (°C)..... :	70°C	—
	Results: No physical distortion of the battery casing resulting in exposure if internal components	No physical distortion of the battery casing resulting in exposure of internal components.	P
8.3	Reasonably foreseeable misuse		P
8.3.1	External short circuit (cell)	Tested complied.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		P
	Results: No fire. No explosion..... :	(See Table 8.3.1)	P
8.3.2	External short circuit (battery)	Tested complied.	P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		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		P
	Results: No fire. No explosion..... :	(See Table 8.3.2)	P
8.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.4	Thermal abuse (cells)	Tested complied.	P
	The cells were held at 130°C ± 2°C for: - 10 minutes; or		P
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)		N/A
	Oven temperature (°C)..... :	130°C	—
	Gross mass of cell (g) ..... :	<500g, small cell.	—
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained; or		N/A
	- 10% of deformation has occurred compared to the initial dimension		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.5)	P
8.3.6	Over-charging of battery	Tested complied.	P
	Test was continued until the temperature of the outer casing: - Reached steady state conditions (less than 10°C change in 30-minute period); or		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	- Returned to ambient		P
	Results: No fire. No explosion..... :	(See Table 8.3.6)	P
8.3.7	Forced discharge (cells)	Tested complied.	P
	Results: No fire. No explosion..... :	(See Table 8.3.7)	P
8.3.8	Transport tests	See below.	P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	Manufacturer provided UN38.3 test report.	P
8.3.9	Design evaluation – Forced internal short circuit (cells)	Tested complied.	P
	The cells complied with national requirement for .... :	France, Japan, Republic of Korea and Switzerland.	—
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	800N for cylindrical cells.	P
	Results: No fire ..... :	(See Table 8.3.9)	P
9	**Information for safety**		P
	The manufacturer of secondary cells ensures that information is provided about current, voltage and temperature limits of their products.	Information for safety mentioned in manufacturer's specifications.	P
	The manufacturer of batteries ensures that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards.	Information for safety mentioned in manufacturer's specifications.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product		N/A
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user ..... :		N/A
10	**Marking**		P
10.1	Cell marking	The final product is battery.	N/A
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.		N/A
10.2	Battery marking		P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	The battery is marked in accordance with IEC 61960, also see page 4.	P

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Clause	Requirement + Test	Result - Remark	Verdict
	Batteries marked with an appropriate caution statement.		N/A
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.	Information for storage and disposal instructions mentioned in manufacturer's specifications.	P
	Recommended charging instructions marked on or supplied with the battery.	Information for recommended charging instructions mentioned in manufacturer's specifications.	P
11	**Packaging**		**P**
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants.		P
Annex A	**Charging range of secondary lithium ion cells for safe use**		**P**
A.1	General		P
A.2	Safety of lithium-ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General		P
A.3.2	Upper limit charging voltage	4.25V applied.	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	4.25V applied.	N/A
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range	See A.4.2.2.	P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied	Charging temperature range declared by client is: 10-45°C	N/A
A.4.3	High temperature range	Not higher than the temperature specific in this standard.	N/A
A.4.3.1	General		N/A
A.4.3.2	Explanation of safety viewpoint		N/A
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range		N/A
A.4.4	Low temperature range	Not lower than the temperature specific in this standard.	N/A
A.4.4.1	General		N/A
A.4.4.2	Explanation of safety viewpoint		N/A
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		N/A
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range		N/A
A.4.5	Scope of the application of charging current		P
A.5	Sample preparation		P
A.5.1	General		P
A.5.2	Insertion procedure for nickel particle to generate internal short		P
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		P
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle to cylindrical cell		P
A.5.5.1	Insertion of nickel particle to winding core		P
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		P
A.5.6	Insertion of nickel particle to prismatic cell		N/A

	TABLE: Critical components information				P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Cell	Energy Company of Panasonic Group Energy Company, SANYO Electric Co., Ltd.	NCR18650PF	3.6V, 2900mAh	IEC 62133: 2012	Tested with appliance
-Positive electrode	Hunan Shanshan Technology Co., Ltd	LC400	$LiCoO_2$, PVDF NMP, Conductive Additive	--	--
-Negative electrode	Shanghai Shanshan Technology Co., Ltd	FSN	Graphite, CMC, SBR, Distilled Water Conductive Additive	--	--
-Separator	Fushan Jinhui Hi-tech	Jh20	Shutdown temperature: 130°C	--	--
-Electrolyte	Dongguan Shan Shan Technical Joint-stock Co., Ltd	LD-1129	$LiPF_6$+EMC+EC+ DEC	--	--
PCB	SHENZHEN XUZHAN PRECISE CIRCUIT CO LTD	JSW	V-0, 130°C	UL 796	UL E319520
PCB (Alternative)	Interchangeable	Interchangeable	V-0, 130°C	UL 796	UL approved
Protective IC (U1)	SINO WEALTH ELECTRONIC LTD.	SH367107-AAC	V_{CU}: 4.25±0.025V, V_{DL}: 2.7V±0.05V	--	Tested with appliance
MOSFET (Q2, Q4, Q5, Q7, Q9, Q18, Q19, Q20, Q24~Q31)	Suzhou Silikron Semiconductor Corp	SSF6808	V_{DS}: 68V, V_{GS}: ±20V, I_D: 79A	--	Tested with appliance
TDS (F1)	BAOYING SAFTTY ELECTRONIC TECHNOLOGY CO LTD	BW-DCP	T_{OTR}: 65°C	UL 60730-1 UL 873	UL E336656
Lead wire	DONGGUAN ZHONGZHEN ELECTRONIC WIRE CO LTD	3135	12AWG, 200°C, 600V	UL 758	UL E355578
Lead wire (Alternative)	Interchangeable	Interchangeable	12AWG, 200°C, 600V	UL 758	UL approved
Tape	CHANGSHU FUBANG ADHESIVE TAPE LTD CO	FM-01 (a)	130°C	UL 510	UL E248834
Tape (Alternative)	Interchangeable	Interchangeable	130°C	UL 510	UL approved

DC Connector	SHENZHEN GRID POWER CONNECTORS CO LTD	GPL45	2pin, 600V, 45A	UL 1977	UL E357218
Plastics	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	AC310(+)	PC/ABS, Min. Thk 1.5mm, V-0, 85°C	UL 94	UL E162823

Supplementary information:

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

7.2.1	TABLE: Continuous low rate charge (cells)	N/A

Model	Recommended charging method, (CC, CV, or CC/CV)	Recommended charging voltage V_c, (Vdc)	Recommended charging current I_{rec}, (A)	OCV at start of test, (Vdc)	Results

Supplementary information:

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

7.2.2	TABLE: Vibration	N/A

Model	OCV at start of test, (Vdc)	Results

Supplementary information:

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

7.3.1	TABLE: Incorrect installation (cells)	N/A
Model	**OCV of reversed cell, (Vdc)**	**Results**

Supplementary information:

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

7.3.2	TABLE: External short circuit				N/A
Model	**Ambient (at 20°C ± 5ºC or 55°C ± 5°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum case temperature rise ΔT, (°C)**	**Results**

Supplementary information:

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

7.3.6	TABLE: Crush			N/A
Model	**OCV at start of test, (Vdc)**	**OCV at removal of crushing force, (Vdc)**	**Results**	

Supplementary information:

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

7.3.8	TABLE: Overcharge			N/A
Model	**OCV prior to charging, (Vdc)**	**Maximum charge current, (A)**	**Time for charging, (hours)**	**Results**

Supplementary information:

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

7.3.9	TABLE: Forced discharge (cells)			N/A
Model	**OCV before application of reverse charge, (Vdc)**	**Measured reverse charge I_t, (A)**	**Time for reversed charge, (minutes)**	**Results**

Supplementary information:

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

8.2.1	TABLE: Continuous charging at constant voltage (cells)			P
Model	**Recommended charging voltage V_c, (Vdc)**	**Recommended charging current I_{rec}, (mA)**	**OCV at start of test, (Vdc)**	**Results**
C1#	4.20	1350	4.20	P
C2#	4.20	1350	4.19	P
C3#	4.20	1350	4.20	P
C4#	4.20	1350	4.20	P
C5#	4.20	1350	4.20	P

Supplementary information:

- No fire
- No explosion
- No leakage

8.3.1	TABLE: External short circuit (cell)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature ~~rise ΔT~~, (°C)**	**Results**
Samples charged at charging temperature upper limit (45°C)					
C1#	22.5	4.22	79	105.6	P
C2#	22.5	4.21	82	105.7	P
C3#	22.5	4.20	81	109.1	P
C4#	22.5	4.22	80	109.7	P
C5#	22.5	4.21	81	102.2	P
Samples charged at charging temperature lower limit (10°C)					
C6#	22.7	4.16	80	102.4	P
C7#	22.7	4.17	82	104.5	P
C8#	22.7	4.17	79	101.7	P
C9#	22.7	4.16	81	100.0	P
C10#	22.7	4.18	81	101.2	P
Supplementary information: - No fire - No explosion					

8.3.2	TABLE: External short circuit (battery)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature ~~rise ΔT~~, (°C)**	**Results**
Samples charged at charging temperature upper limit (45°C)					
B1#	55.1	29.51	82	55.4	P
B2#	55.1	29.49	79	55.4	P
B3#	55.1	29.53	78	55.3	P
B4#	55.1	29.57	81	55.3	P
B5#	55.1	29.52	80	55.3	P
Samples charged at charging temperature lower limit (10°C)					
B6#	55.1	29.51	81	55.3	P
B7#	55.1	29.51	80	55.2	P
B8#	55.1	29.46	82	55.4	P
B9#	55.1	29.53	79	55.3	P
B10#	55.1	29.55	81	55.3	P

Supplementary information:
- No fire
- No explosion

8.3.5	TABLE: Crush				P
Model	**OCV at start of test, (Vdc)**	**OCV at removal of crushing force, (Vdc)**	**Width/ diameter of cell before crush, (mm)**	**Required deformation for crush, (mm)**	**Results**
Samples charged at charging temperature upper limit (45°C)					
C1#	4.21	4.21	--	--	P
C2#	4.22	4.22	--	--	P
C3#	4.21	4.21	--	--	P
C4#	4.20	4.20	--	--	P
C5#	4.22	4.22	--	--	P
Samples charged at charging temperature lower limit (10°C)					
C6#	4.16	4.16	--	--	P
C7#	4.17	4.17	--	--	P
C8#	4.16	4.16	--	--	P
C9#	4.17	4.17	--	--	P
C10#	4.17	4.17	--	--	P

Note: A 13kN force applied at the longitudinal axis of cylindrical cells. No voltage abrupt occurred.

Supplementary information:
- No fire
- No explosion

8.3.6	TABLE: Over-charging of battery			P
Constant charging current (A) .....:		**34.8**		—
Supply voltage (Vdc) .....:		**35.0**		—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum outer casing temperature, (°C)**	**Results**
B1#	22.26	--	24.9	P
B2#	22.21	--	24.7	P
B3#	22.32	--	25.3	P
B4#	22.19	--	25.0	P
B5#	22.25	--	25.2	P

Supplementary information:
- No fire
- No explosion

8.3.7	TABLE: Forced discharge (cells)			P
Model	**OCV before application of reverse charge, (Vdc)**	**Measured Reverse charge I_t, (A)**	**Time for reversed charge, (minutes)**	**Results**
C1#	3.17	2.9	90	P
C2#	3.16	2.9	90	P
C3#	3.21	2.9	90	P
C4#	3.19	2.9	90	P
C5#	3.18	2.9	90	P

Supplementary information:

- No fire
- No explosion

8.3.9	TABLE: Forced internal short circuit (cells)				P
Model	**Chamber ambient, (°C)**	**OCV at start of test, (Vdc)**	**Particle location [1)]**	**Maximum applied pressure, (N)**	**Results**
C1#	45	4.21	1	800	P
C2#	45	4.22	1	800	P
C3#	45	4.21	1	800	P
C4#	45	4.22	2	800	P
C5#	45	4.22	2	800	P
C6#	10	4.17	1	800	P
C7#	10	4.16	1	800	P
C8#	10	4.16	1	800	P
C9#	10	4.17	2	800	P
C10#	10	4.16	2	800	P

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.

- No fire

-- End of Report --

National Difference			
Consumer Goods	Requirement + Test	Result - Remark	Verdict

TTACHMENT TO TEST REPORT IEC 62133 (Ed 2.0) SINGAPORE NATIONAL DIFFERENCES	
Differences according to ..... :	Consumer Protection (Consumer Goods Safety Requirements) Regulations [CGSR] as detailed in Appendix F Additional Safety Requirements Imposed by SPRING Singapore as the Safety Authority
Attachment Form No. ..... :	SG_ND_IEC62133C
Attachment Originator..... :	TÜV Rheinland (Shenzhen) Co., Ltd.
Master Attachment..... :	Date 2015-08

Portable power banks[1]	**1 Portable power banks shall comply with the requirements of the following safety standards:** 1.1 IEC 62133:2012 Secondary cells and batteries containing alkaline or non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications; and 1.2 IEC 60950-1:2005+A1:2009+A2:2013 Information technology equipment – Safety – Part 1: General requirements OR 1.3 Any other industry standard specific to power banks **2 Portable power banks shall be supplied with the following safety information:** 2.1 'Minimum Instructions for use' as specified below 2.2 Instructions on how to charge the portable power bank 2.3 Information on the minimum and maximum operating temperatures of the portable power bank		N/A

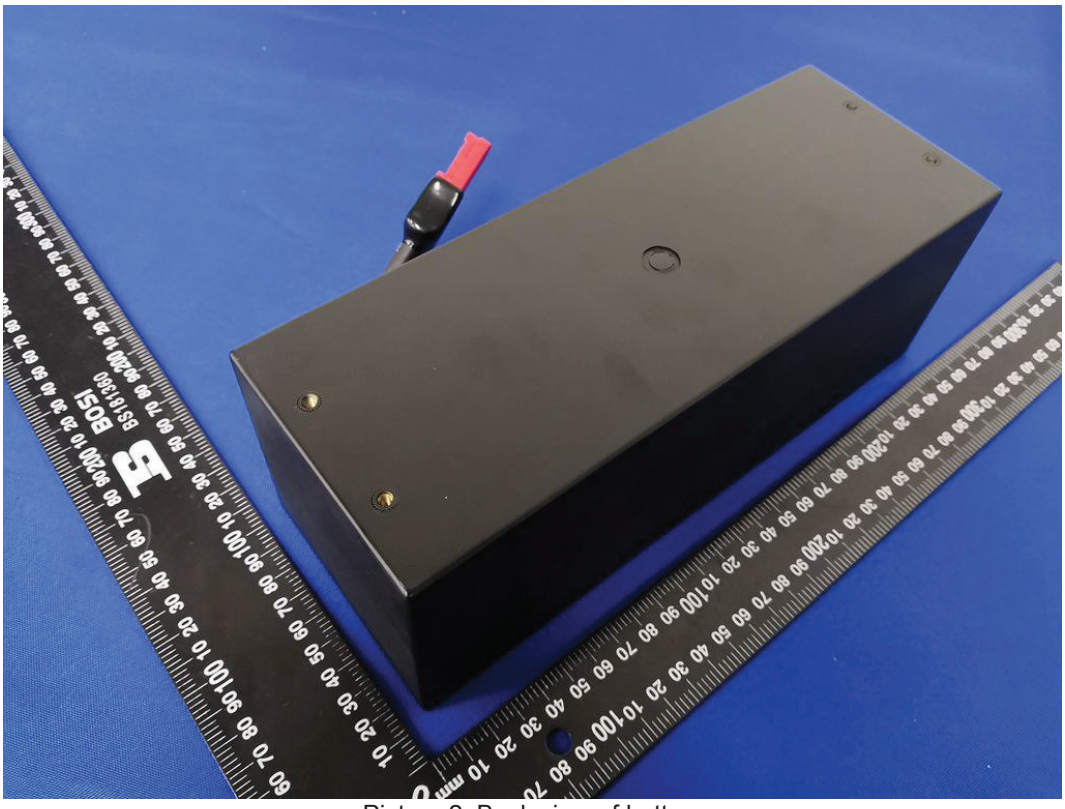
National Difference			
Consumer Goods	Requirement + Test	Result - Remark	Verdict
	Minimum Instructions[2] for Use for Portable Power Banks to be provided with portable power banks to the customer a) The power bank will generate heat when charging. Always charge in a well ventilated area. Do not charge under pillows, blankets or on flammable surfaces. b) Keep the power bank away from heat sources, direct sunlight, combustible gas, humidity, water or other liquids. c) Do not disassemble, open, microwave, incinerate, paint or insert foreign objects into the power bank. d) Do not subject the power bank to mechanical shock such as crushing, bending, puncturing or shredding. Avoid dropping or placing heavy object on the power bank. e) Do not short-circuit the power bank or store it in a receptacle where it may be short-circuited by other metallic or conductive objects. f) Do not operate the power bank if it has been wet or otherwise damaged, to prevent against electric shock, explosion and/or injury. Contact the dealer or authorized agent. g) Power bank usage by children should be supervised. h) Please read the operating instructions (including charging instructions and information on the minimum and maximum operating temperatures), supplied with this power bank.		N/A

Attachment 2 Photo Documentation

Product: Rechargeable Lithium ion Battery

Type Designation: NCR18650PF-6P7S

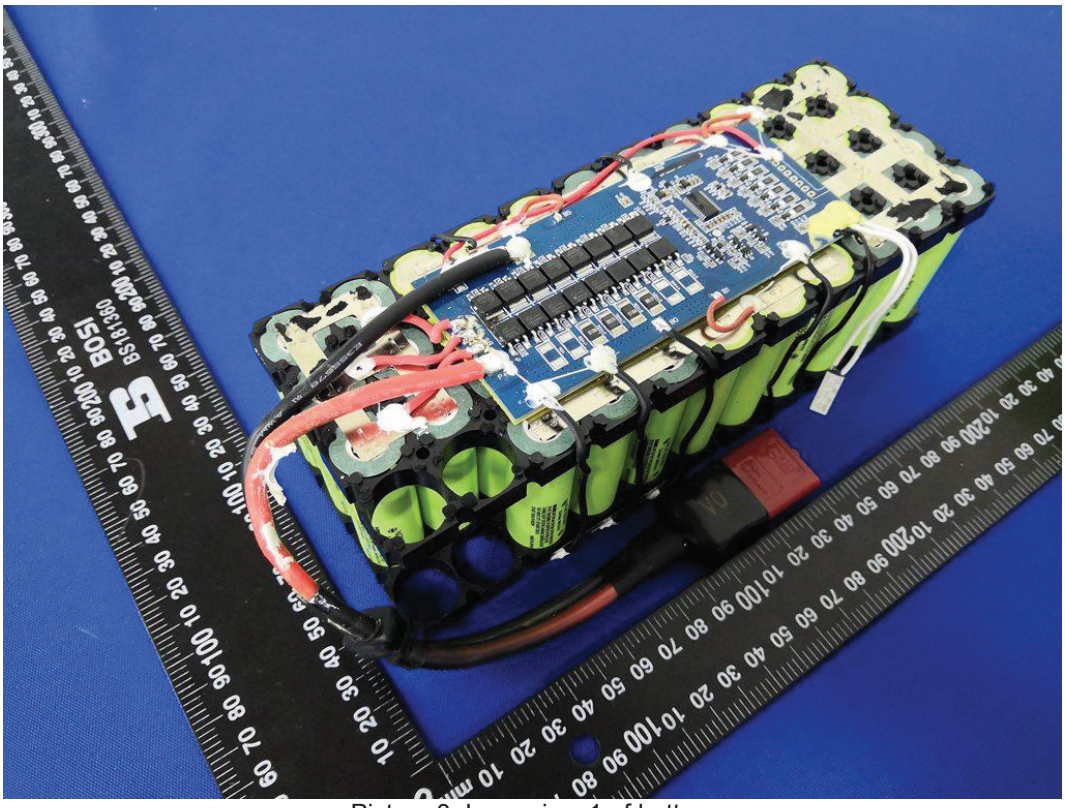
Picture 1. Front view of battery



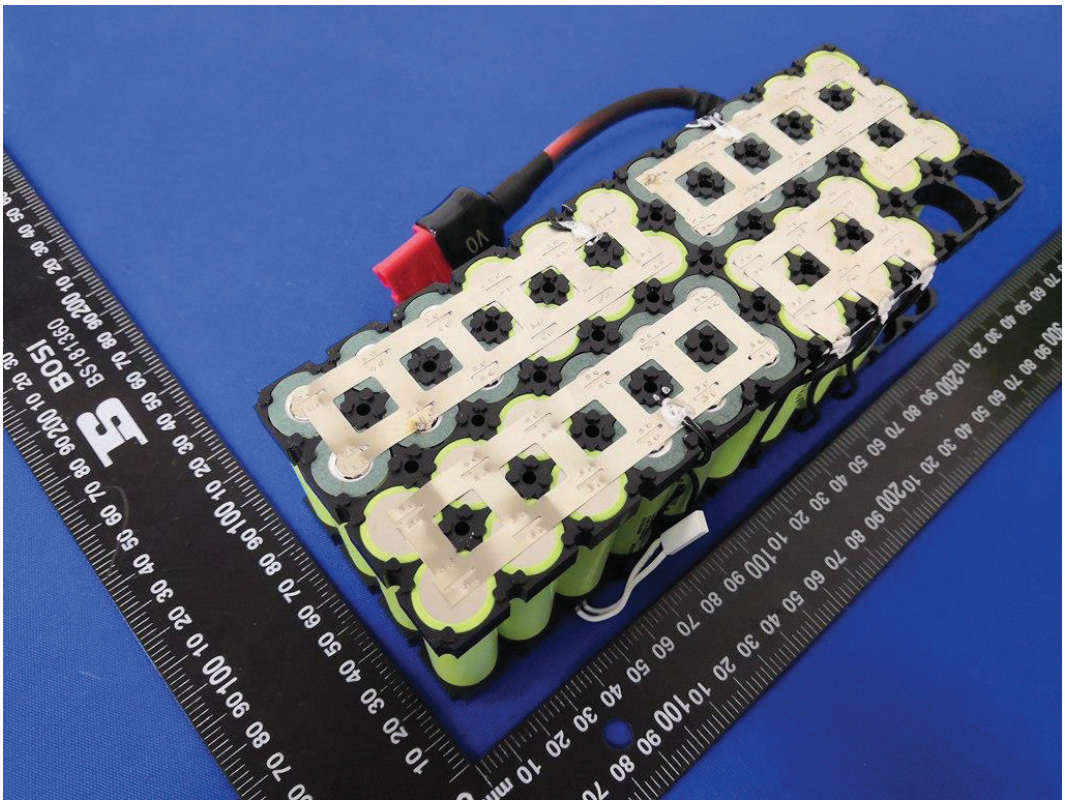
Picture 2. Back view of battery

Product: Rechargeable Lithium ion Battery

Type Designation: NCR18650PF-6P7S



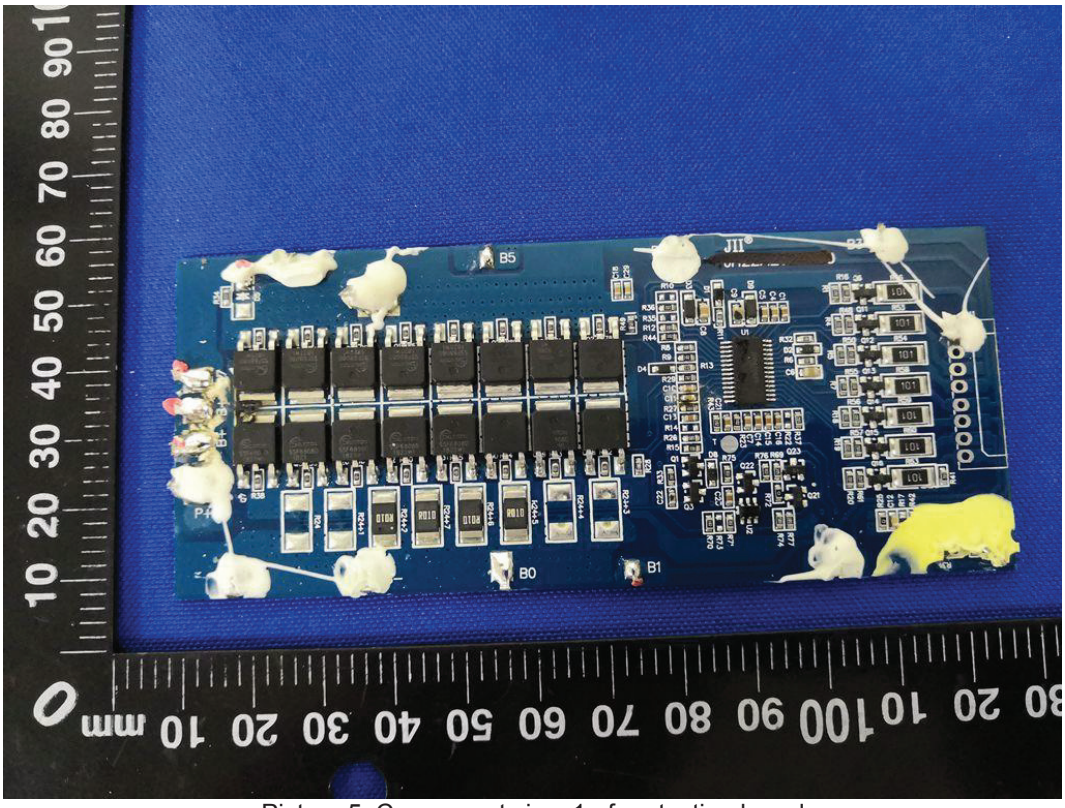
Picture 3. Inner view-1 of battery



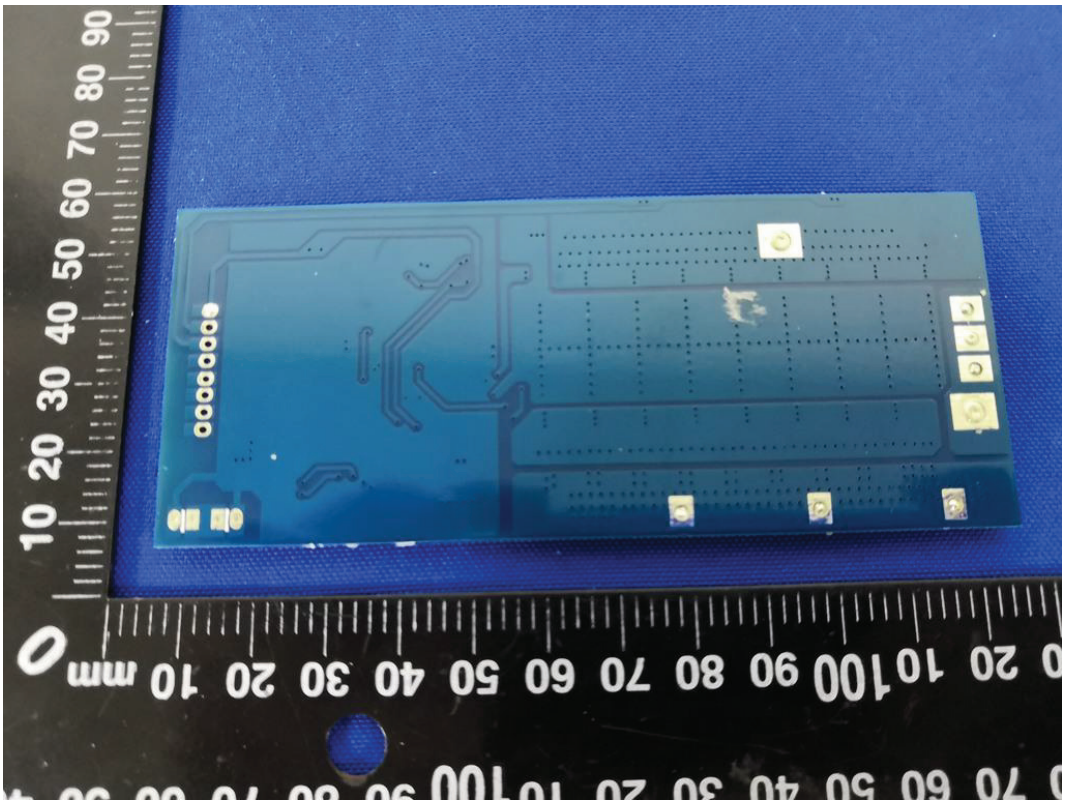
Picture 4. Inner view-2 of battery

Product: Rechargeable Lithium ion Battery

Type Designation: NCR18650PF-6P7S



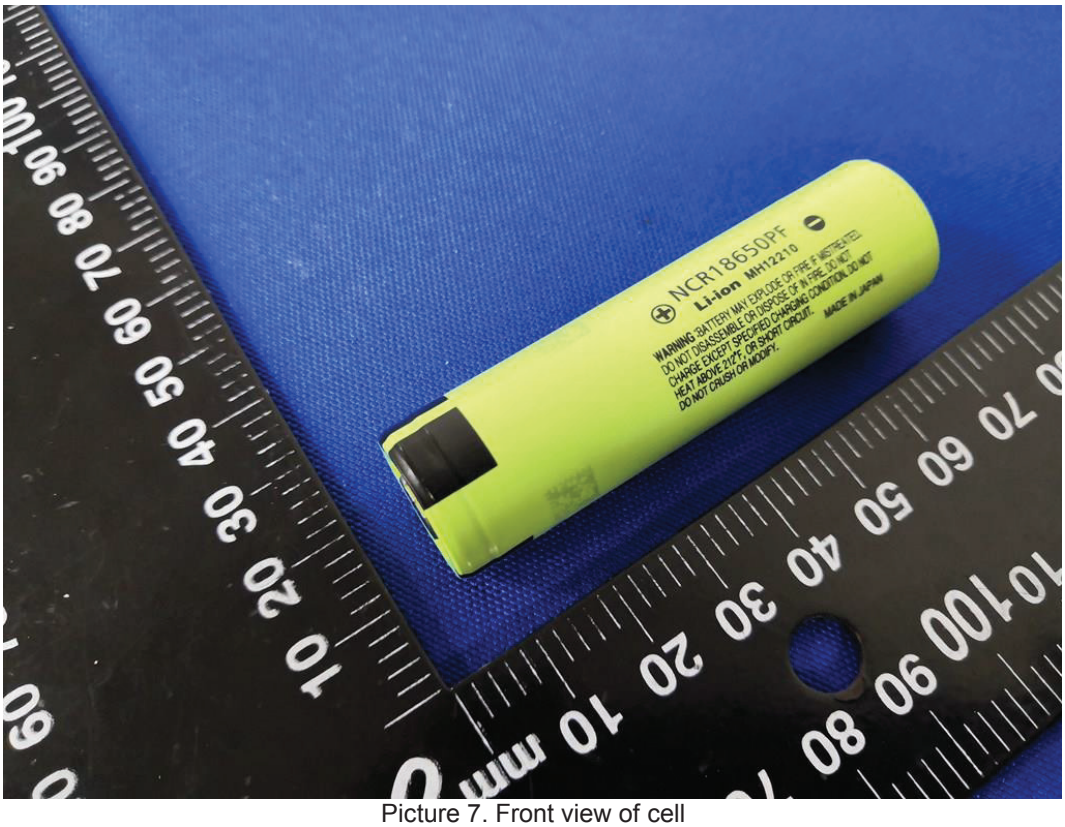
Picture 5. Component view-1 of protection board



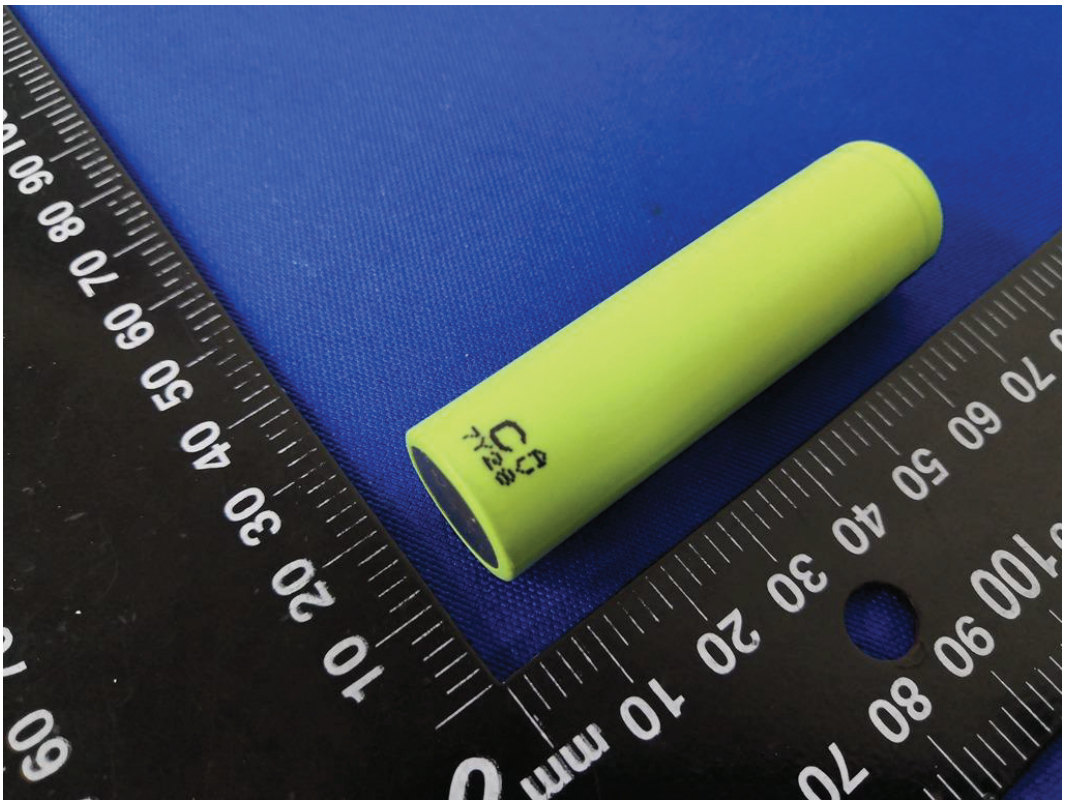
Picture 6. Component view-2 of protection board

Product: Rechargeable Lithium ion Battery

Type Designation: NCR18650PF-6P7S



Picture 7. Front view of cell



Picture 8. Back view of cell