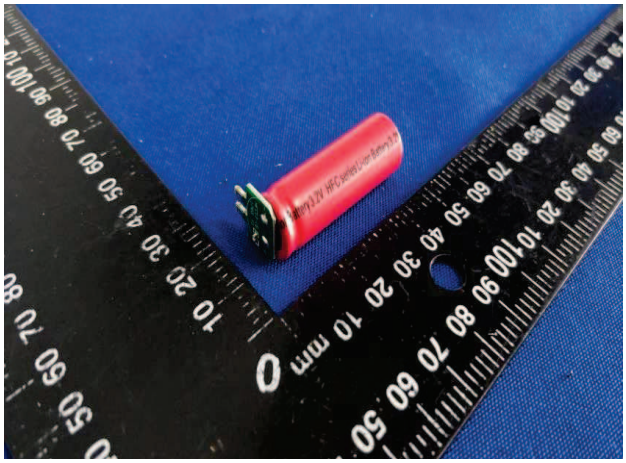
Prüfbericht-Nr.: Test Report No.:	**50236892 001**	**Auftrags-Nr.:** Order No.:	**168109660**	Seite 1 von 25 Page 1 of 25
Kunden-Referenz-Nr.: Client Reference No.:	N/A	**Auftragsdatum:** Order date:	Mar.08, 2019	
Auftraggeber: Client:	**HUNAN HUAHUI NEW ENERGY CO LTD** **NO. 7 TONGZIBA LN, JINXIU RD, HESHAN AREA, YIYANG, HUNAN 413000, P. R. China**			
Prüfgegenstand: Test item:	**Li-ion Battery**			
Bezeichnung / Typ-Nr.: Identification / Type No.:	**HFC1340-1S**			
Auftrags-Inhalt: Order content:	**TÜV Rheinland Test Report**			
Prüfgrundlage: Test specification:	**IEC 62133-2: 2017**			

Wareneingangsdatum: Date of receipt:	Mar.08, 2019
Prüfmuster-Nr.: Test sample No.:	ATSP1903037B A-001~A-053 ATSP1903037B B-001~B-022
Prüfzeitraum: Testing period:	Mar.08, 2019 - Mar.25, 2019
Ort der Prüfung: Place of testing:	ATS Electronic Technology Co., Ltd.
Prüflaboratorium: Testing laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.
Prüfergebnis*: Test result*:	Pass



geprüft von / tested by:

Eric Cui Digitally signed by Eric Cui Date: 2019.04.04 11:51:02 +08'00'

Apr.04, 2019 Eric Cui / Project Engineer

Datum Date	**Name / Stellung** Name / Position	**Unterschrift** Signature

kontrolliert von / reviewed by:

Daniel Dai

Apr.04, 2019 Daniel Dai / Reviewer

Datum Date	**Name / Stellung** Name / Position	**Unterschrift** Signature

Sonstiges / Other:

1. This test report is issued for reporting the test result only;
2. The complete test report includes the following documents:

Test report (25 pages); Attachment 1: Equipment list (2 pages); Attachment 2: Photo document (3 pages)

Zustand des Prüfgegenstandes bei Anlieferung: Condition of the test item at delivery:	Prüfmuster vollständig und unbeschädigt Test item complete and undamaged

* Legende:	1 = sehr gut	2 = gut	3 = befriedigend	4 = ausreichend	5 = mangelhaft
	P(ass) = entspricht o.g. Prüfgrundlage(n)		F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
Legend:	1 = very good	2 = good	3 = satisfactory	4 = sufficient	5 = poor
	P(ass) = passed a.m. test specification(s)		F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested

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. ..... :	**50236892 001**
Date of issue ..... :	See cover page
Total number of pages ..... :	See cover page
Name of Testing Laboratory preparing the Report ..... :	See cover page
Applicant's name ..... :	See cover page
Address ..... :	See cover page
Test specification:	
Standard ..... :	IEC 62133-2:2017
Test procedure ..... :	Test report
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62133_2A
Test Report Form(s) Originator .... :	DEKRA
Master TRF ..... :	Dated 2017-08-10

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.
This report shall not be reproduced, except in full, without the written approval of the Issuing CB Testing Laboratory. The authenticity of this Test Report and its contents can be verified by contacting the NCB, responsible for this Test Report.

Test item description ..... :	Li-ion Battery
Trade Mark ..... :	
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	HFC1340-1S
Ratings ..... :	3.2V, 320mAh, 1.024Wh

Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):			
☐	**CB Testing Laboratory:**		
Testing location/ address ..... :			
Tested by (name, function, signature) ..... :		See cover page	
Approved by (name, function, signature)... :		See cover page	
☐	**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):

See cover page

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
cl.5.6.2 Design recommendation; cl.7.1 Charging procedure for test purposes; cl.7.2.1 Continuous charging at constant voltage (cells); cl.7.2.2 Case stress at high ambient temperature (batteries); cl.7.3.1 External short circuit (cells); cl.7.3.2 External short circuit (batteries); cl.7.3.3 Free fall; cl.7.3.4 Thermal abuse (cells); cl.7.3.5 Crush (cells); cl.7.3.6 Over-charging of battery; cl.7.3.7 Forced discharge (cells); cl.7.3.8.1 Vibration; cl.7.3.8.2 Mechanical shock; cl.7.3.9 Design evaluation - Forced internal short circuit (cells) Tests are made with the number of cells and batteries specified in IEC 62133-2: 2017 (Edition 1.0) Table 1.	**ATS Electronic Technology Co., Ltd.** 3/F, Building A, No. 1 Hedong Three Road, Jinxia Community, Changan Town, Dongguan City, Guangdong, China

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

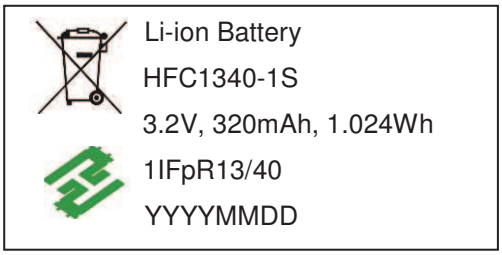
N/A

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

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.

Product label:



"+" and "-" polarity explicitly mark on the PCB.

Package label:

Warning

No Swallowing!

Do not allow children to replace batteries without adult supervision.

In case of ingestion of a cell or battery, seek medical assistance promptly.

Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion.

Keep small cells and batteries which are considered swallowable out of the reach of children.

Remark: YYYYMMDD represents the date of manufacture, YYYY represents the year, MM represents month, DD represents day.

Test item particulars.....:	
Classification of installation and use.....:	N/A
Supply Connection.....:	Terminal contact
Recommend charging method declared by the manufacturer.....:	Charging the battery with 320mA constant current and 3.8V constant voltage until the current reduces to 5mA at ambient 20°C±5°C
Discharge current (0,2 It A).....:	64mA
Specified final voltage.....:	2.3V
Upper limit charging voltage per cell.....:	3.8V
Maximum charging current.....:	640mA
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.....:	See cover page
Date (s) of performance of tests.....:	See cover page
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 applicant

General product information and other remarks:

This battery is constructed with single Lithium-ion cell, with a fuse as current-limiting protection component.

The main features of the battery pack are shown as below (clause 7.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
HFC1340-1S (battery)	320mAh	3.2V	320mA	320mA	640mA	3200mA	3.8V	2.3V

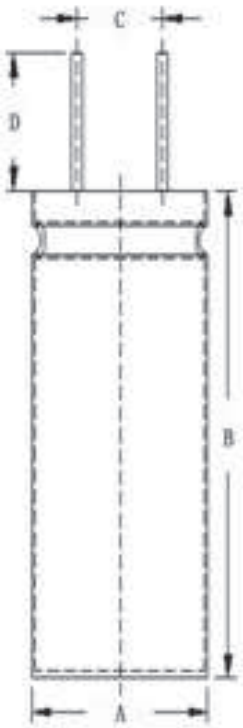
The main features of the cell in the battery pack are shown as below (clause 7.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
HFC1340-1S (cell)	320mAh	3.2V	320mA	320mA	640mA	3200mA	3.8V	2.3V

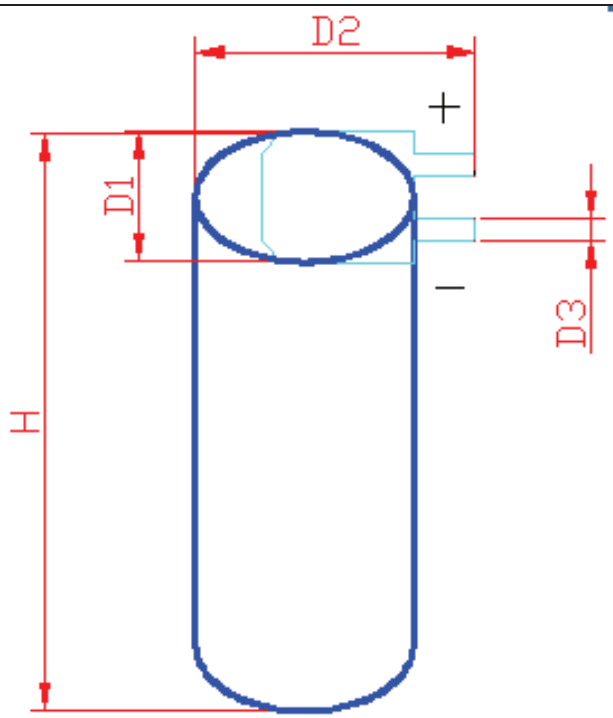
The main features of the cell in the battery pack are shown as below (clause 7.1.2):

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
HFC1340-1S (cell)	3.8V	16mA	0°C	45°C

Construction:

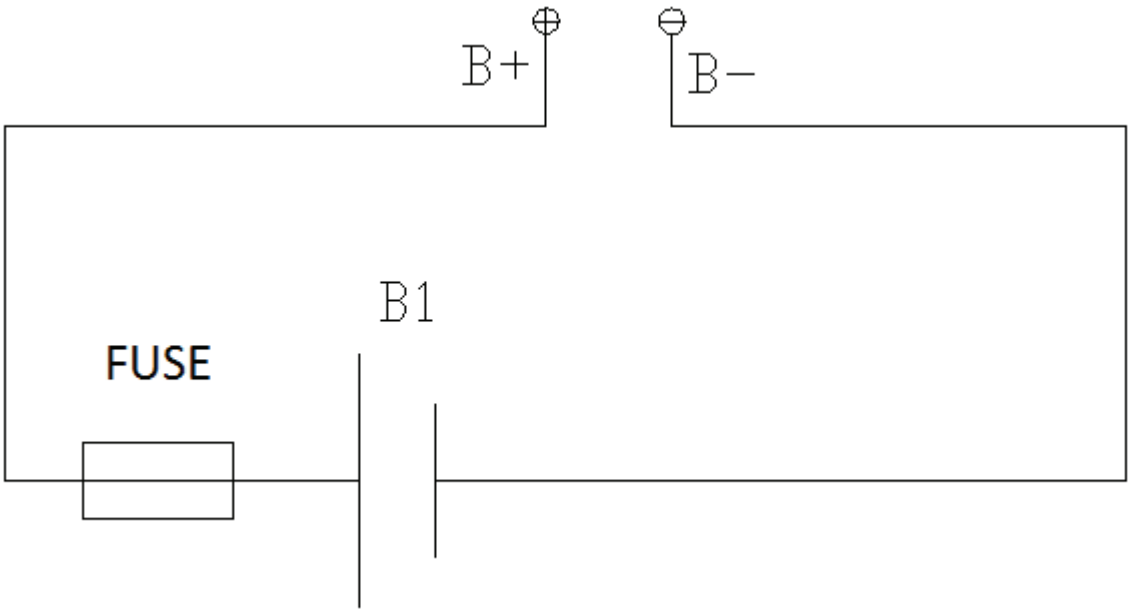


A(Max.): B(Max.)=13.0mm: 40.0mm
Cell (Unit: mm)



D2(Max.): H(Max.)=17.6mm: 42.2mm
Battery (Unit: mm)

Circuit diagram:



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	No metal case exists.	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 clearance 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	Venting mechanism exists on bottom 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 and current management**		P
	Batteries are designed such that abnormal temperature rise conditions are prevented		N/A
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		P
	Batteries are provided with specifications and charging instructions for equipment manufacturers so that specified chargers are designed to maintain charging within the temperature, voltage and current limits specified	The charging limits are specified in the manufacturer's specifications.	P
5.5	**Terminal contacts**		P
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Complied.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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-circuit		P
5.6	**Assembly of cells into batteries**		P
5.6.1	General		P
	Each battery have an independent control and protection for current, voltage, temperature and any other parameter required for safety and to maintain the cells within their operating region	Fuse used only.	N/A
	This protection may be provided external to the battery such as within the charger or the end devices		N/A
	If protection is external to the battery, the manufacturer of the battery provide this safety relevant information to the external device manufacturer for implementation		N/A
	If there is more than one battery housed in a single battery case, each battery have protective circuitry that can maintain the cells within their operating regions		N/A
	Manufacturers of cells specify current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly	Current, voltage and temperature specified by cell manufacturer.	P
	Batteries that are designed for the selective discharge of a portion of their series connected cells incorporate circuitry to prevent operation of cells outside the limits specified by the cell manufacturer		N/A
	Protective circuit components 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	Safety analysis report provided by manufacturer.	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	Single cell battery. Charging cell voltage: 3.8V, not exceed 3.8V specified in Table 2.	P

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		N/A
	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		N/A
	For batteries consisting of series-connected cells or cell blocks, nominal charge voltage not be counted as an overcharge protection		N/A
	For batteries consisting of series-connected cells or cell blocks, cells have closely matched capacities, be of the same design, be of the same chemistry and be from the same manufacturer		N/A
	It is recommended that the cells and cell blocks not discharged beyond the cell manufacturer's specified final voltage	Final voltage of cell: 2.3V, not exceed the final voltage specified by cell manufacturer.	P
	For batteries consisting of series-connected cells or cell blocks, cell balancing circuitry incorporated into the battery management system		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 provided to prevent damage as a result of intended use and reasonably foreseeable misuse	Mechanical protection for cell connections and control circuit provided.	P
	The mechanical protection can be provided by the battery case or it can be provided by the end product enclosure for those batteries intended for building into an end product	Build-in battery, mechanical protection for cells should be provided by end product.	N/A
	The battery case and compartments housing cells designed to accommodate cell dimensional tolerances during charging and discharging as recommended by the cell manufacturer	To be evaluated in final system.	N/A
	For batteries intended for building into a portable end product, testing with the battery installed within the end product considered when conducting mechanical tests		N/A
5.7	**Quality plan**		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer prepares and implements a quality plan that defines procedures for the inspection of materials, components, cells and batteries and which covers the whole process of producing each type of cell or battery	Complied. ISO 9001: 2015 certificate provided.	P
5.8	**Battery safety components**		N/A
	According annex F	See TABLE: critical components information	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
	Coin cells with resistance ≤ 3 Ω (measured according annex D) are tested according 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 overdischarge protection		P
	When conducting the short-circuit test, consideration given to the simulation of any single fault condition that is likely to occur in the protecting circuit that would affect the short-circuit test	See clause 7.3.2	P
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	See page 6	P
	Prior to charging, the battery have been discharged at 20 °C ± 5 °C at a constant current of 0,2 It A down to a specified final voltage	See page 6	P
7.1.2	Second procedure		P
	This charging procedure applies only to 7.3.1, 7.3.4, 7.3.5, and 7.3.9		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	After stabilization for 1 h and 4 h, respectively, at ambient temperature of highest test temperature and lowest test temperature, as specified in Table 2, cells are charged by using the upper limit charging voltage and maximum charging current, until the charging current is reduced to 0,05 It A, using a constant voltage charging method	Charge temperature 0-45°C declared. 45°C used for upper limit test temperature, -5°C used for lower limit test temperature.	P
7.2	**Intended use**		P
7.2.1	Continuous charging at constant voltage (cells)		P
	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	Charging for 7 days with 320mA	P
	Results: No fire. No explosion. No leakage ..... :	(See appended table 7.2.1)	P
7.2.2	Case stress at high ambient temperature (battery)	Requested by client.	P
	Oven temperature (°C) ..... :	70°C	—
	Results: No physical distortion of the battery case resulting in exposure of internal protective components and cells	No physical distortion of the battery case.	P
7.3	**Reasonably foreseeable misuse**		P
7.3.1	External short-circuit (cell)	Tested complied.	P
	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		P
	Results: No fire. No explosion..... :	(See appended table 7.3.1)	P
7.3.2	External short-circuit (battery)	Tested complied.	P
	The batteries were tested until one of the following occurred:		P
	- 24 hours elapsed; or		N/A
	- The case temperature declined by 20 % of the maximum temperature rise		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		P
	A single fault in the discharge protection circuit conducted on one to four (depending upon the protection circuit) of the five samples before conducting the short-circuit test	Single failure conducted on four samples.	P
	A single fault applies to protective component parts such as MOSFET, fuse, thermostat or positive temperature coefficient (PTC) thermistor	Single fault applies on Fuse.	P
	Results: No fire. No explosion..... :	(See appended table 7.3.2)	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
7.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion	No fire. No explosion.	P
7.3.4	Thermal abuse (cells)	Tested complied.	P
	Oven temperature (°C) ..... :	130°C	—
	Results: No fire. No explosion	No fire. No explosion	P
7.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon:		P
	- The maximum force of 13 kN ± 0,78 kN has been applied; or		P
	- 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)	P
7.3.6	Over-charging of battery	Tested complied.	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	5.32V applied.	P
	- 1,2 times the upper limit charging voltage resented in Table A.1 per cell for series connected multi-cell batteries, and		N/A
	- 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)	Tested complied.	P
	If the discharge voltage reaches the negative value of upper limit charging voltage within the testing duration, the voltage is maintained at the negative value of the upper limit charging voltage by reducing the current for the remainder of the testing duration		N/A
	If the discharge voltage does not reach the negative value of upper limit charging voltage within the testing duration, the test is terminated at the end of the testing duration		P
	Results: No fire. No explosion..... :	(See appended table 7.3.7)	P
7.3.8	Mechanical tests (batteries)		P
7.3.8.1	Vibration	Tested complied.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
	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	Tested complied.	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)	Tested complied.	P
	The cells complied with national requirement for ..... :	France, Japan, Republic of Korea and Switzerland.	—
	The pressing was stopped upon:		P
	- 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	P
	Results: No fire ..... :	(See appended table 7.3.9)	P
8	**INFORMATION FOR SAFETY**		P
8.1	**General**		P
	Manufacturers of secondary cells ensure that information is provided about current, voltage and temperature limits of their products	Information for safety mentioned in manufacturer's specifications	P
	Manufacturers of batteries ensure that equipment manufacturers and, in the case of direct sales, end-users are provided with information to minimize and mitigate hazards	Information for safety mentioned in manufacturer's 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, any information relating to hazard avoidance resulting from a system analysis provided to the end user		N/A
	Do not allow children to replace batteries without adult supervision	Warning for keep out of children marked on package label	P
8.2	**Small cell and battery safety information**		P
	The following warning language is to be provided with the information packaged with the small cells and batteries or equipment using them:	Warning language provided on battery package label	P
	- Keep small cells and batteries which are considered swallowable out of the reach of children		P
	- Swallowing may lead to burns, perforation of soft tissue, and death. Severe burns can occur within 2 h of ingestion		P
	- In case of ingestion of a cell or battery, seek medical assistance promptly		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
9	**MARKING**		P
9.1	**Cell marking**	The final product is battery.	N/A
	Cells 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 marked as specified in IEC 61960, except for coin batteries	The battery is marked in accordance with IEC 61960-3, also see page 5.	P
	Coin batteries whose external surface area is too small to accommodate the markings on the batteries show the designation and polarity. Batteries also marked with an appropriate caution statement		N/A
	Terminals have clear polarity marking on the external surface of the battery	“+” and “-” polarity explicitly mark on the PCB, See page 5.	P
	Batteries with keyed external connectors designed for connection to specific end products need not be marked with polarity markings if the design of the external connector prevents reverse polarity connections		N/A
9.3	**Caution for ingestion of small cells and batteries**		P
	Coin cells and batteries identified as small batteries according to 8.2 include a caution statement regarding the hazards of ingestion in accordance with 8.2	See page 5.	P
	When small cells and batteries are intended for direct sale in consumer-replaceable applications, caution for ingestion given on the immediate package	Small batteries not intended for direct sale in consumer-replaceable application.	P
9.4	**Other information**		P
	Storage and disposal instructions	Information for storage and disposal instructions mentioned in manufacturer’s specifications.	P
	Recommended charging instructions	Information for storage and disposal instructions mentioned in manufacturer’s specifications.	P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
10	**PACKAGING AND TRANSPORT**		P
	Packaging for coin cells not small enough to fit within the limits of the ingestion gauge of Figure 3	Not coin cells	N/A
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants		P
ANNEX A	**CHARGING AND DISCHARGING 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	3.8V	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	3.8V 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 declared by client is: 0-45°C	P
A.4.3	High temperature range	Not higher than the temperature range 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 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	Charging low temperature declared by client is: 0°C.	P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in the low temperature range		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	No documents provided by manufacturer explaining the lower limit exceed 10°C, -5°C applied for testing in this report for safety considerations.	P
A.4.5	Scope of the application of charging current		P
A.4.6	Consideration of discharge		P
A.4.6.1	General		P
A.4.6.2	Final discharge voltage and explanation of safety viewpoint	Cell specified final voltage 2.3V, not exceed 2.3V specified by cell manufacturer.	P
A.4.6.3	Discharge current and temperature range		P
A.4.6.4	Scope of application of the discharging 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
A.5.3	Disassembly of charged cell		P
A.5.4	Shape of nickel particle		P
A.5.5	Insertion of nickel particle in cylindrical cell		P
A.5.5.1	Insertion of nickel particle in winding core		P
A.5.5.2	Marking the position of the nickel particle on both ends of the winding core of the separator		P
A.5.6	Insertion of nickel particle in prismatic cell		N/A
A.6	**Experimental procedure of the forced internal short-circuit test**		P
A.6.1	Material and tools for preparation of nickel particle		P
A.6.2	Example of a nickel particle preparation procedure		P
A.6.3	Positioning (or placement) of a nickel particle		P
A.6.4	Damaged separator precaution		P
A.6.5	Caution for rewinding separator and electrode		P
A.6.6	Insulation film for preventing short-circuit		P
A.6.7	Caution when disassembling a cell		P
A.6.8	Protective equipment for safety		P
A.6.9	Caution in the case of fire during disassembling		P
A.6.10	Caution for the disassembling process and pressing the electrode core		P
A.6.11	Recommended specifications for the pressing device		P

IEC 62133-2			
Clause	Requirement + Test	Result - Remark	Verdict
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..... :	(See appended table D.2)	N/A
	Coin cells with an internal resistance of less than or equal to 3 Ω are subjected to the testing according to Clause 6 and Table 1		N/A
	Coin cells with an internal resistance greater than 3 Ω require no further testing		N/A
ANNEX E	**PACKAGING AND TRANSPORT**		**P**
ANNEX F	**COMPONENT STANDARDS REFERENCES**		N/A

	TABLE: Critical components information				P
Object / part No.	**Manufacturer / trademark**	**Type / model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
PCB	FUJIAN LIHAO ELECTRONIC TECHNOLOGY CO LTD	L-40F	V-0, 130°C, min. Thickness: 0.63mm	UL 94 UL 796	UL E193288
PCB (Alternative)	Interchangeable	Interchangeable	V-0, 130ºC	UL 94 UL 796	UL approved
Fuse	SEA&LAND	SL805125	I_{Hold}=1.25A, V_{max}=6.0V	--	Tested with appliance
Cell	HUNAN HUAHUI NEW ENERGY CO LTD	HFC1340-1S	3.2V, 320mAh, 1.024Wh	IEC 62133-2: 2017	Tested with appliance
-Positive electrode	QingDao QianYun High Tech New Material Co., Ltd	L * W * H=411 (±2) * 32.5 (±0.2) * 0.124 (±0.002) mm	D50: 13~16μm, $LiFePO_4$, Super-P, PVDF, KS-6, Al Foil	--	--
-Negative electrode	Henan Zhongping Han Bo New Energy Co., Ltd	L * W * H =436 (±2) * 33.0 (±0.2) * 0.083 (±0.002) mm	D50: 8~12μm, Graphite, HN-302, Super-P, Cu Foil	--	--
-Separator	Foshan Donghang Optic-Electric Technology Co., Ltd	20um PP	Thickness: 18~22μm, Length * width: 800mm * 33.5mm, Polypropylene, Shutdown temperature: 153ºC	--	--
-Electrolyte	CAPCHEM Technology Co., Ltd.	HE-102	12.5±0.5ms/cm, $LiPF_6$, EC, EMC	--	--

Supplementary information:

[1)] Provided evidence ensures the agreed level of compliance.

7.2.1	TABLE: Continuous charging at constant voltage (cells)			P
Sample no.	**Recommended charging voltage Vc (Vdc)**	**Recommended charging current I_{rec} (A)**	**OCV before test (Vdc)**	**Results**
Cell #1	3.80	0.32	3.42	P
Cell #2	3.80	0.32	3.41	P
Cell #3	3.80	0.32	3.42	P
Cell #4	3.80	0.32	3.41	P
Cell #5	3.80	0.32	3.42	P
Supplementary information: - No fire or explosion - No leakage				

7.3.1	TABLE: External short-circuit (cell)				P
Sample no.	**Ambient T (°C)**	**OCV before test (Vdc)**	**Resistance of circuit (mΩ)**	**Maximum case temperature ~~rise ΔT~~ (°C)**	**Results**
Samples charged at charging temperature upper limit (45°C)					
Cell #1	56.9	3.42	81	132.6	P
Cell #2	56.9	3.43	78	120.6	P
Cell #3	56.9	3.42	80	133.8	P
Cell #4	56.9	3.43	83	129.6	P
Cell #5	56.9	3.42	77	127.7	P
Samples charged at charging temperature lower limit (-5°C)					
Cell #6	56.9	3.32	77	121.0	P
Cell #7	56.9	3.33	80	130.9	P
Cell #8	56.9	3.32	84	128.5	P
Cell #9	56.9	3.33	79	136.5	P
Cell #10	56.9	3.32	81	133.3	P
Supplementary information: - No fire or explosion					

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~~ (°C)**	**Component single fault condition**	**Results**
Battery #1	22.8	3.37	76	129.5	Short Fuse	P
Battery #2	22.8	3.38	81	134.1	Short Fuse	P
Battery #3	22.8	3.37	82	128.6	Short Fuse	P
Battery #4	22.8	3.38	76	131.4	Short Fuse	P
Battery #5	22.8	3.37	80	23.2	--	P
Supplementary information: - No fire or explosion						

7.3.5	TABLE: Crush (cells)			P
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 (45°C)				
Cell #1	3.42	3.01	12.97	P
Cell #2	3.43	2.05	12.95	P
Cell #3	3.42	1.35	12.89	P
Cell #4	3.43	0.47	13.25	P
Cell #5	3.42	2.88	13.17	P
Samples charged at charging temperature lower limit (-5°C)				
Cell #6	3.33	2.34	12.88	P
Cell #7	3.32	3.01	13.49	P
Cell #8	3.33	1.46	13.17	P
Cell #9	3.32	0.68	12.82	P
Cell #10	3.33	2.97	13.16	P
Note: **A 13kN force applied at the longitudinal side of cylindrical cells.** **Supplementary information:** - No fire or explosion				

7.3.6	TABLE: Over-charging of battery				P
Constant charging current (A) ..... :		0.64			—
Supply voltage (Vdc) ..... :		5.32			—
Sample no.	**OCV before charging (Vdc)**	**Total charging time (minute)**	**Maximum outer case temperature (°C)**	**Results**	
Battery #1	2.94	150	27.2	P	
Battery #2	2.95	150	27.7	P	
Battery #3	2.93	150	27.0	P	
Battery #4	2.91	150	27.6	P	
Battery #5	2.95	150	29.4	P	
Supplementary information: - No fire or explosion					

7.3.7	TABLE: Forced discharge (cells)			P
Sample no.	**OCV before application of reverse charge (Vdc)**	**Measured reverse charge I_t (A)**	**Lower limit discharge voltage (Vdc)**	**Results**
Cell #1	2.93	0.32	2.3	P
Cell #2	2.90	0.32	2.3	P
Cell #3	2.95	0.32	2.3	P
Cell #4	2.94	0.32	2.3	P
Cell #5	2.94	0.32	2.3	P
Supplementary information: - No fire or explosion				

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**
Battery #1	3.42	3.42	10.938	10.935	P
Battery #2	3.42	3.42	10.902	10.900	P
Battery #3	3.43	3.43	10.788	10.785	P
Supplementary information: - No fire or explosion - No rupture - No leakage - No venting					

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**
Battery #1	3.43	3.43	10.689	10.688	P
Battery #2	3.42	3.42	10.887	10.885	P
Battery #3	3.42	3.42	10.874	10.872	P

Supplementary information:

- No fire or explosion
- No rupture
- No leakage
- No venting

7.3.9	TABLE: Forced internal short circuit (cells)				P
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 (45°C)					
Cell #1	45	3.42	1	800	P
Cell #2	45	3.43	1	800	P
Cell #3	45	3.42	1	800	P
Cell #4	45	3.43	1	800	P
Cell #5	45	3.42	1	800	P
Samples charged at charging temperature lower limit (-5°C)					
Cell #6	10	3.32	1	800	P
Cell #7	10	3.33	1	800	P
Cell #8	10	3.32	1	800	P
Cell #9	10	3.33	1	800	P
Cell #10	10	3.32	1	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 or explosion

D.2	TABLE: Internal AC resistance for coin cells			
Sample no.	**Ambient T (°C)**	**Store time (h)**	**Resistance Rac (Ω)**	**Results [1)]**

Supplementary information:

[1)] Coin cells with internal resistance less than or equal to 3 Ω, see test result on corresponding tables

--End of Report--

Attachment 1
50236892 001

Produkte
Products

	Eq. No.	Name	Manufacturer	Model No.	Date of Calibration	Date of next Calibration
☒	ATS-016	Tapeline	JiangHua	JH-1046A.X	2018/8/22	2019/8/21
☒	ATS-022	Digital multimeter	FLUKE	115C	2018/8/22	2019/8/21
☒	ATS-029	Low Resistance measure meter	HIOKI	3541	2018/8/22	2019/8/21
☒	ATS-032	Humidity conditioning	Minch	MCU-800L	2018/8/22	2019/8/21
☒	ATS-060	Hybrid Recorder	Rongxin	TWC-2A	2018/12/26	2019/12/25
☒	ATS-061	Hybrid Recorder	Rongxin	TWC-2A	2018/12/26	2019/12/25
☒	ATS-098	Humidity conditioning	Minch	MCU-150L	2018/12/26	2019/12/25
☒	ATS-101	DC Source	QJ	QJ6030S	2018/12/26	2019/12/25
☒	ATS-102	DC Source	QJ	QJ6030S	2018/12/26	2019/12/25
☒	ATS-103	DC Source	QJ	QJ6030S	2018/12/26	2019/12/25
☒	ATS-104	DC Source	QJ	QJ6030S	2018/12/26	2019/12/25
☒	ATS-105	DC Source	QJ	QJ6030S	2018/12/26	2019/12/25
☒	ATS-107	Thermal abuse chamber	BELL	BE-101-1A	2018/12/26	2019/12/25
☒	ATS-110	Test machine for forced internal short circuit of cells	BELL	BE-6045W	2018/12/26	2019/12/25
☒	ATS-111	Crush tester	BELL	BE-6045T	2018/12/26	2019/12/25
☒	ATS-114	Battery Testing System	NEWARE	CT-4008-5V6A-S1	2018/12/26	2019/12/25
☒	ATS-115	Battery Testing System	NEWARE	CT-4008-5V6A-S1	2018/12/26	2019/12/25
☒	ATS-116	Battery Testing System	NEWARE	CT-4008-5V10A-A	2018/12/26	2019/12/25
☒	ATS-117	Battery Testing System	NEWARE	CT-4008-5V10A-A	2018/12/26	2019/12/25
☒	ATS-118	Battery Testing System	NEWARE	CT-4008-20V6A-A	2018/12/26	2019/12/25
☒	ATS-119	Battery Testing System	NEWARE	CT-4008-5V6A-S1	2018/12/26	2019/12/25
☒	ATS-120	Battery Testing System	NEWARE	CT-4008-5V6A-S1	2018/12/26	2019/12/25
☒	ATS-121	Battery Testing System	NEWARE	CT-4008-5V6A-S1	2018/12/26	2019/12/25
☒	ATS-122	Shock tester	LABTONE	SKT30	2018/12/26	2019/12/25
☒	ATS-123	Electromagnetic vibration tester	EMIC	F-600BD/FA-E04	2018/12/26	2019/12/25
☒	ATS-124	Electronic scales	JM	JM-A	2018/12/26	2019/12/25
☐	ATS-125	Single wing drop tester	BELL	BF-F-315S	2018/12/26	2019/12/25
☒	ATS-126	Humidity Meter	HECHUANG	HTC-1	2018/12/26	2019/12/25
☒	ATS-127	Humidity Meter	HECHUANG	HTC-1	2018/12/26	2019/12/25
☒	ATS-191	Thermal abuse chamber	BELL	BE-101-1A	2019/5/20	2019/5/19
☒	ATS-215	Ingestion gauge	Angui	Figure 3	2018/12/26	2019/12/25
☒	ATS-225	Glove box	Etelux	Lab2000	2018/5/28	2019/5/27
☒	ATS-248	Hybrid Recorder	Rongxin	TWC-2A	2018/12/26	2019/12/25
☒	ATS-249	Hybrid Recorder	Rongxin	TWC-2A	2018/12/26	2019/12/25

*) Initial calibration or verification only

Statement of Uncertainty

Unless otherwise specified, combined measurement uncertainty for values stated in the test report is as stated below:

Voltage measurement:		±1.50% (true rms value)
		±1.20% (DC voltage)
Current measurement:		±1.56% (true rms value)
		±1.40% (DC current)
Touch current (below 30 mA)		±2.04%
Power	- less than 1 W	±20 mW
	- below 3 kW	±0.53%
	- 3 kW and more	±0.58%
Power factor		±0.01
Frequency		±0.06%
Resistance	- between 100 mΩ and 1 MΩ	±1.25%
	- another values	±2.05%
Temperature	- below 100°C	±1.25°C (without thermocouple; for thermocouple add 2°C)
	- between 100 and 500°C	±1.45°C (without thermocouple; for thermocouple add 2°C)
Time	- below 20 s	±0.74%
	- more than 20 s (manual meas.)	±0.2 s
Linear dimensions	- less than 1 mm	±0.01 mm
	- from 1 to 25 mm	±0.05 mm
	- more than 25 mm	±0.30%
Mass	- below 5 kg	±2%
	- 5 kg and more	±1%
Force		±1%
Torque		±3%
Angles		±12’
Relative humidity		±5%
Air pressure (barometric)		±0.2 kPa
Pressure		±3.34%
Flow		±1.5%

Values stated in this document represent the worst case for equipment which is in possession of the laboratory and setups commonly used for testing.

For units or cases not specified in this document the evaluation of uncertainty shall be made upon request on individual basis.

The reported combined uncertainty is stated as standard uncertainty of reported value multiplied by coverage factor k = 2, which for normal distribution corresponds to a coverage probability of approximately 95%.

Product: Li-ion Battery

Type Designation: HFC1340-1S

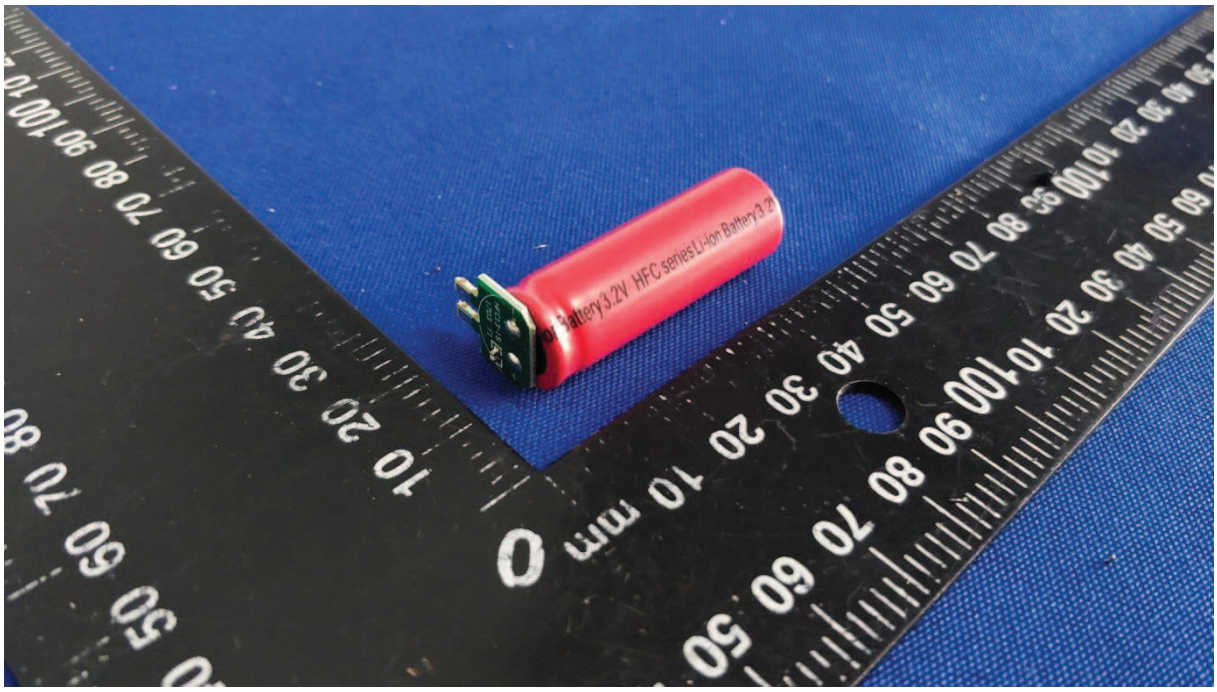


Figure 1 Front view of battery

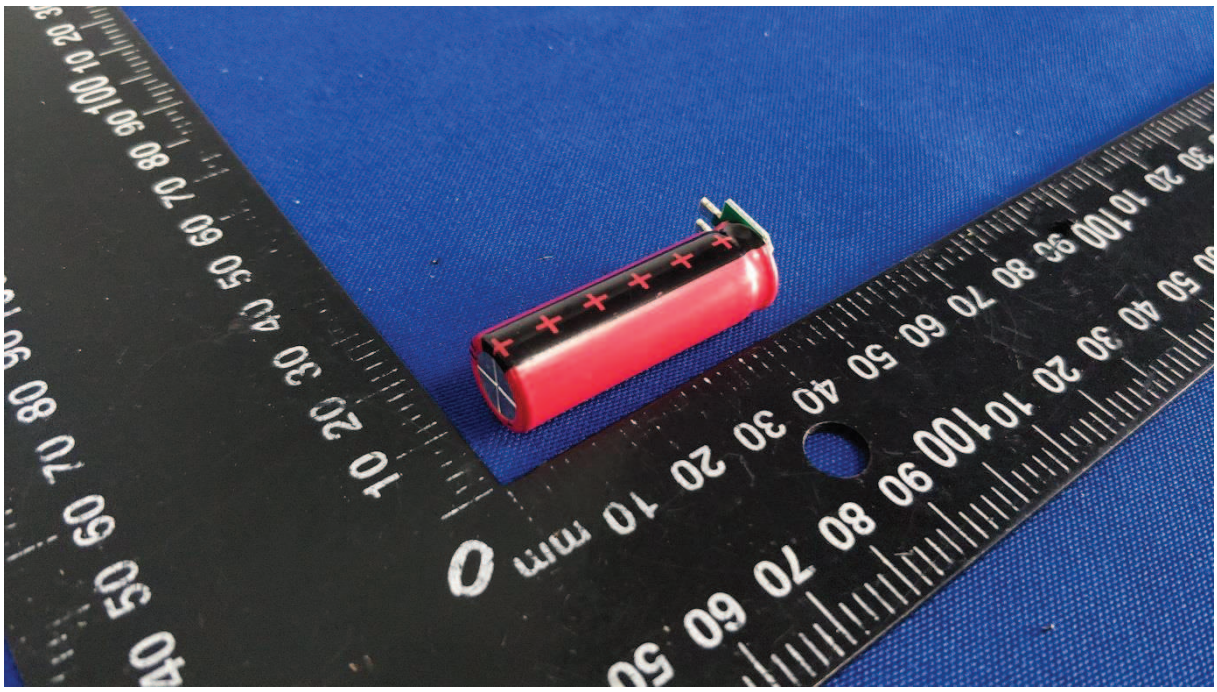


Figure 2 Back view of battery

Product: Li-ion Battery

Type Designation: HFC1340-1S

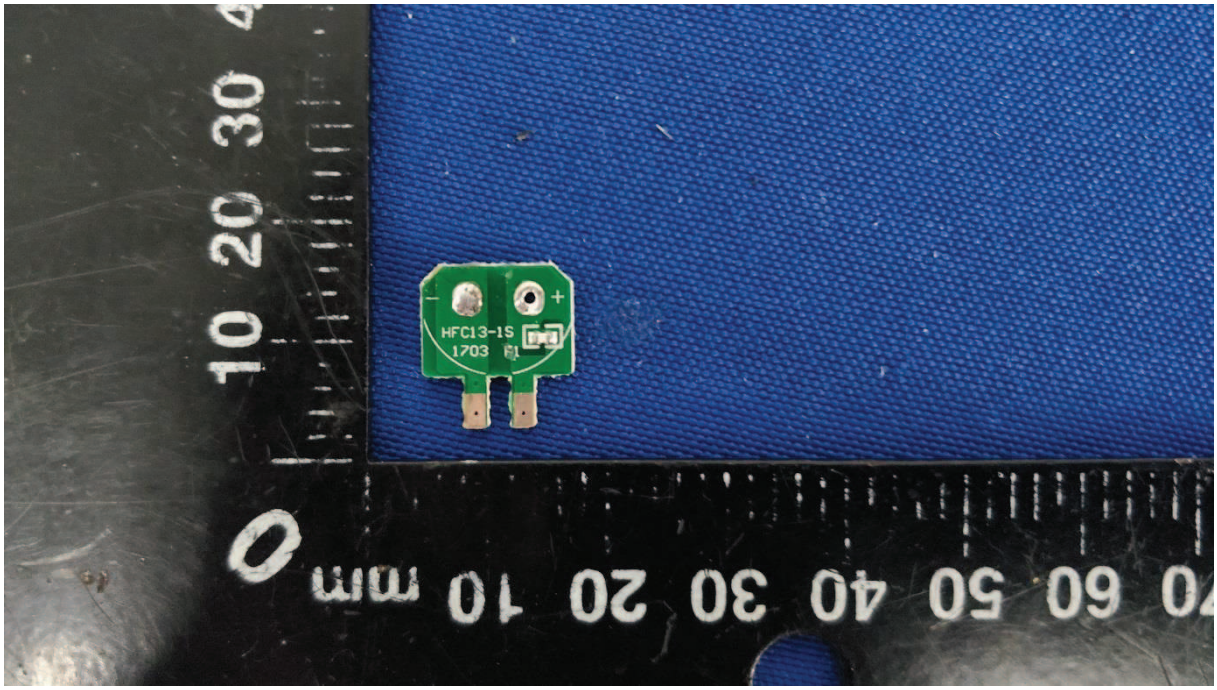


Figure 3 Component view of PCB

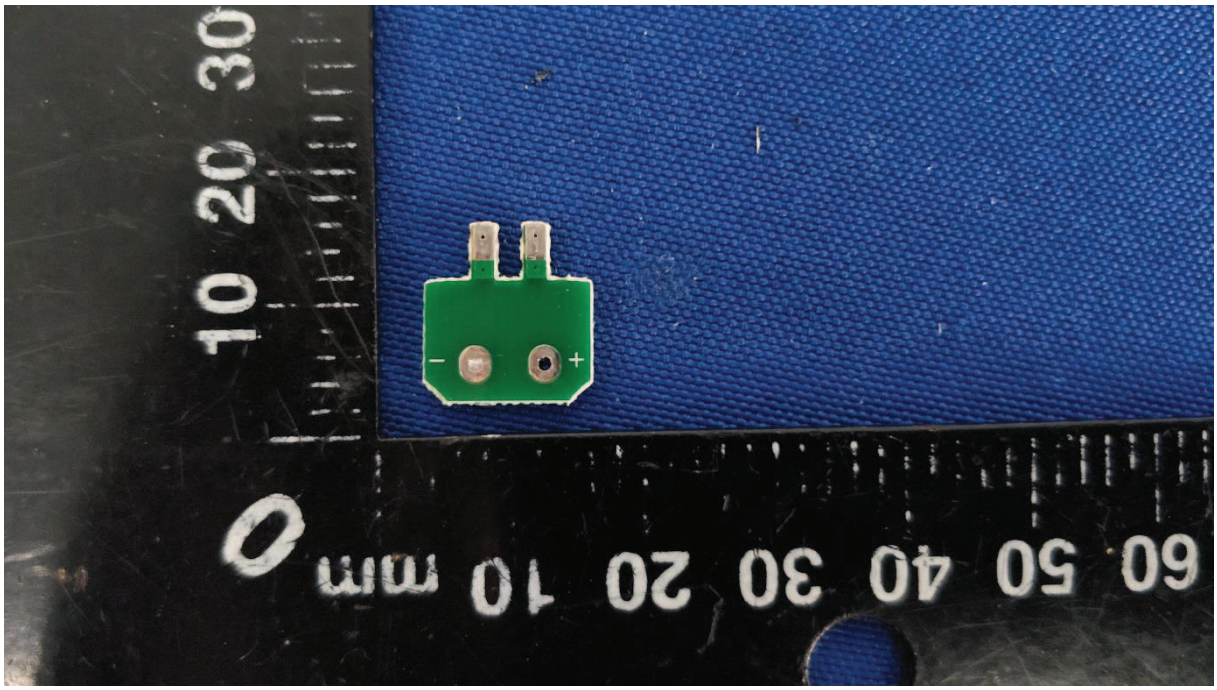


Figure 4 Trace view of PCB

Product: Li-ion Battery

Type Designation: HFC1340-1S

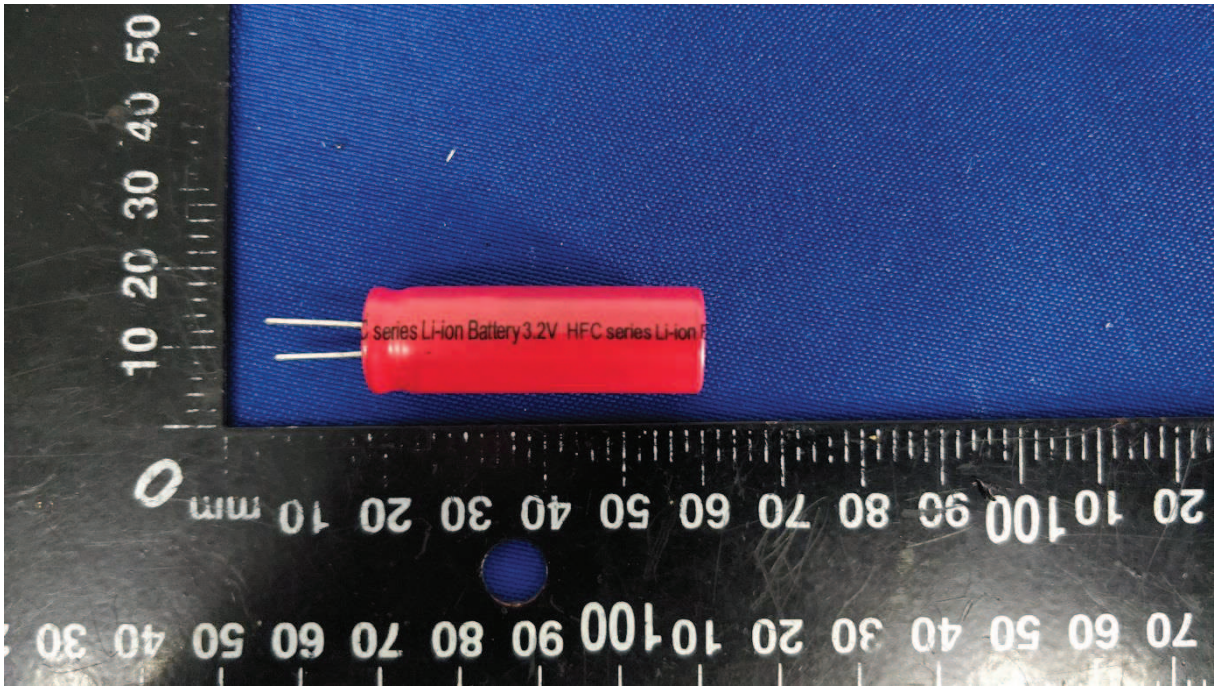


Figure 5 Side view of cell

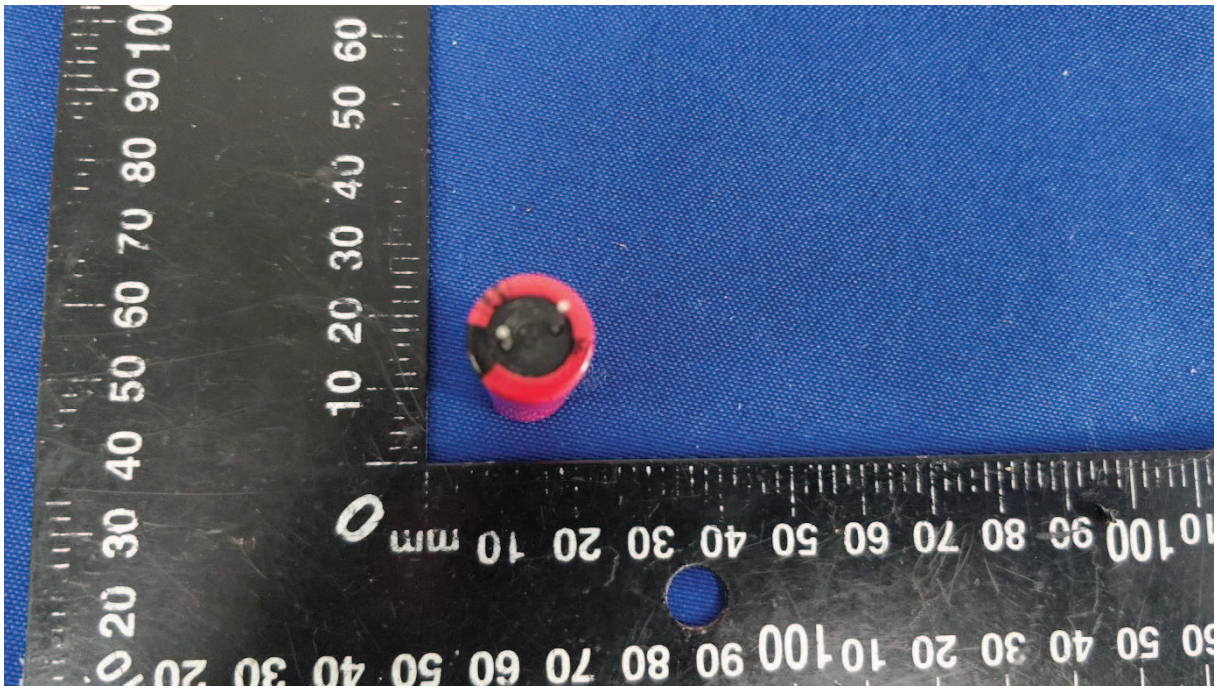


Figure 6 Top view of cell