Test Report issued under the responsibility of:

TÜVRheinland®

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. .....:	17042082 001
Date of issue .....:	2014-12-22
Total number of pages.....	28 pages
Applicant's name.....:	GlobTek, Inc.
Address .....:	186 Veterans Dr. Northvale, NJ 07647, USA
Test specification:	
Standard .....:	IEC 62133: 2012 (Second Edition)
Test procedure .....:	CB Scheme
Non-standard test method.....:	N/A
Test Report Form No.....:	IEC62133B
Test Report Form(s) Originator ....:	UL(Demko)
Master TRF.....:	Dated 2013-03

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.

Test item description .....:	LITHIUM IRON PHOSPHATE RECHARGEABLE BATTERY
Trade Mark .....:	INSURGICAL™
Manufacturer.....:	Same as applicant.
Address .....:	Same as applicant.
Model/Type reference .....:	BX1600F6779374SIPH3L
Ratings .....:	DC 13.2V, 1600mAh, 21.12Wh

Testing procedure and testing location:		
☒ CB Testing Laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.	
Testing location/ address .....:	3&4 F, Cybio Technology Building No. 1, Langshan No. 2 Road South, 5th Industrial Area, High-Tech Industry Park North, Nanshan District, 518057 Shenzhen, P.R. China	
☐ Associated CB Testing Laboratory:		
Testing location/ address .....:		
Tested by (name + signature).....:	Jacob Lu	Jacob Lu
Approved by (name + signature) .....:	Charlie Zeng	Charlie Zeng
☐ Testing procedure: TMP		
Testing location/ address .....:		
Tested by (name + signature).....:		
Approved by (name + signature) .....:		
☐ Testing procedure: WMT		
Testing location/ address .....:		
Tested by (name + signature).....:		
Witnessed by (name + signature) ....:		
Approved by (name + signature) .....:		
☐ Testing procedure: SMT		
Testing location/ address .....:		
Tested by (name + signature).....:		
Approved by (name + signature) .....:		
Supervised by (name + signature)...:		

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

Attachment 1: Photo documentation (5 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 Cell and Pack); cl.8.2.1 Continuous charging at constant voltage (Cells); cl.8.2.2 Moulded case stress (Battery); cl.8.3.1 External short circuit (Cell); cl.8.3.2 External short circuit (Battery); cl.8.3.3 Free fall (for Cell and Pack); 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.8.3.8 Transport tests (Cells); cl.8.3.9 Forced internal short (Cells) Charging method (For cell and battery pack): 1). Charging the battery with 0.5C constant current, then 14.6V constant voltage until current reduces to 0.03C at ambient 20°C ± 5° C for clause 8.2.2, 8.3.3, and 8.3.6; 2). Charging the cell with 0.5C constant current, then 3.65V constant voltage until current reduces to 0.03C at ambient 20°C ± 5° C for clause 8.2.1, 8.3.3, 8.3.7 and 8.3.8; 3). Charging procedure of clause 8.1.2 applied for clause 8.3.1, 8.3.2, 8.3.4, 8.3.5 and 8.3.9. Tests are made with the number of cells and batteries specified in IEC 62133: 2012 (Second Edition) Table 2.	**TÜV Rheinland (Shenzhen) Co., Ltd.** 3&4 F, Cybio Technology Building No. 1, Langshan No. 2 Road South, 5th Industrial Area, High-Tech Industry Park North, Nanshan District, 518057 Shenzhen, P.R. China

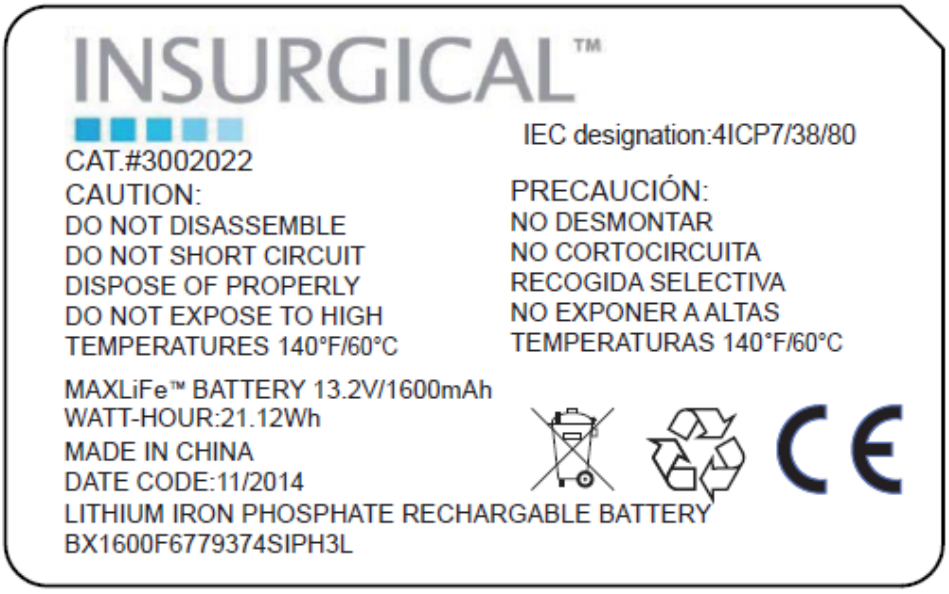
Summary of compliance with National Differences:

BE, BY, CH, CN, DE, DK, FI, FR, GB, HU, JP, KR, NL, NO, SE, SG
BE=Belgium, BY=Belarus, CH=Switzerland, CN=China, DE=Germany, DK=Denmark, FI=Finland, FR=France, GB=United Kingdom, HU=Hungary, JP=Japan, KR=Republic of Korea, NL=The Netherlands, NO=Norway, SE=Sweden, SG=Singapore.

☒**The product fulfils the requirements of EN62133: 2013**

Copy of marking plates:

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.....:	
Classification of installation and use.....:	N/A
Supply connection.....:	DC Connector
Recommend charging method declared by the manufacturer ..... :	Charging the battery with 0.5C constant current, then 14.6V constant voltage until current reduces to 0.03C at ambient 20°C±5°C
Discharge current (0,2 I_t A) ..... :	320mA
Specified final voltage ..... :	9.2V
Chemistry ..... :	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....:	3.65V
Maximum charging current .....:	1.6A
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 .....:	2014-11-07
Date (s) of performance of tests .....:	2014-11-14 to 2014-11-27

General remarks:

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 testing laboratory.
"(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. GlobTek (Suzhou) Co., Ltd.
Building 4, No. 76, Jinling East Road, Suzhou Industrial Park, Jiangsu 215021, P.R. China

General product information:

This battery is constructed with four series connection lithium-ion cells, and has overcharge, over-discharge, over current and short-circuits proof circuit.

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
SR703880F	1600mAh	3.3V	800mA	800mA	1600mA	24.0A (Continuous) 40.0A (Pulse)	3.65V	2.0V

Continued: (Clause 8.1.2)

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
SR703880F	3.65V	80mA	0°C	45°C

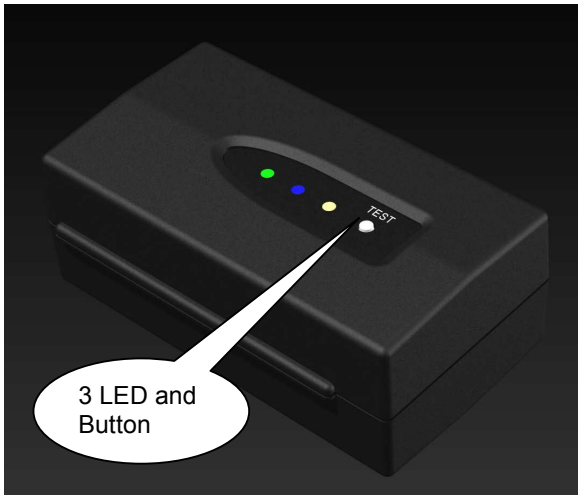
The main features of the battery pack are shown as below (clause 8.1.1):

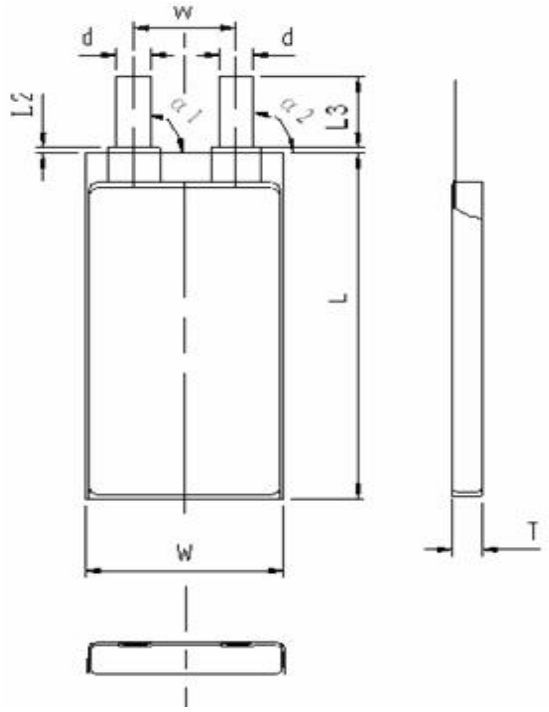
Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
BX1600F6779374SIPH3L	1600mAh	13.2V	800mA	800mA	1600mA	2.0A (Continuous) 35.0A (Pulse)	14.6V	9.2V

Continued: (Clause 8.1.2)

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
BX1600F6779374SIPH3L	14.6V	80mA	0°C	45°C

Construction:





Item	Dimension
T	49.0mm
W	62.0mm
L	109.0mm

Battery

Item	Dimension
T	Max. 7.0mm
W	Max. 38.0mm
L	Max. 80.0mm

Cell

IEC 62133: 2012			
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 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 creepage and clearance distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	Venting		N/A
	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	No venting mechanism exists in the pouch cell.	N/A
	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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Terminals have a clear polarity marking on the external surface of the battery	The positive and negative polarity is clear at battery surface.	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		P
	Terminal contacts are arranged to minimize the risk of short circuits		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		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

IEC 62133: 2012			
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		N/A
	- 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	Charging cell voltage: 3.65V, not exceed 3.65V specified in Clause 8.1.2, NOTE 1.	P
	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: 2008 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		N/A

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.2	Vibration		N/A
	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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	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
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	Complied.	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	The upper limit test temperature was 45°C; The lower limit test temperature was -5°C.	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :		P
	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	The upper limit charging voltage: 3.65V.	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :		P
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)		P
	Oven temperature (°C)..... :	70°C	—

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No physical distortion of the battery casing resulting in exposure if internal components		P
8.3	Reasonably foreseeable misuse		P
8.3.1	External short circuit (cell)		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		P
	Results: No fire. No explosion..... :	(See Table 8.3.1)	P
8.3.2	External short circuit (battery)		P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		P
	- 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		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.2)	P
8.3.3	Free fall		P
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.4	Thermal abuse (cells)		P
	The cells were held at 130°C ± 2°C for: - 10 minutes; or	Tested complied.	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	P
	Gross mass of cell (g) ..... :	Small cell.	P
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.5	Crush (cells)		P
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or	Tested complied.	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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.6	Over-charging of battery		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
	- Returned to ambient		P
	Results: No fire. No explosion..... :	(See Table 8.3.6)	P
8.3.7	Forced discharge (cells)		P
	Results: No fire. No explosion..... :	(See Table 8.3.7)	P
8.3.8	Transport tests		P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	T-1, T-2, T-3 and T-4 tested complied. No leakage, no venting, no short-circuit, no rupture, no explosion and no fire. T-5, See Table 8.3.8. T-6 tested also complied, refer to Clause 8.3.5.	P
8.3.9	Design evaluation – Forced internal short circuit (cells)	Tested complied.	P
	The cells complied with national requirement for .....:	France, Japan, 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	400 N	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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict

10	**Marking**		**P**
10.1	Cell marking		N/A
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	The final product is battery.	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
	Batteries marked with an appropriate caution statement.		P
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.	Information for 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	Charging voltage is 3.65V	P
A.3.2	Upper limit charging voltage	3.65V	P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint	Charging voltage is 3.65V.	P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	3.65V applied.	P
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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
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		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
A.4.3.4	Safety consideration when specifying new upper limit in 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 low temperature range		P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	-5°C applied.	P
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		N/A
A.5.5.1	Insertion of nickel particle to winding core		N/A
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		N/A
A.5.6	Insertion of nickel particle to prismatic cell		P

	TABLE: Critical components information				P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Plastic cover	FORMOSA CHEMICALS & FIBRE CORP PLASTICS DIV	ANC120	Min.V-0, Min.95°C	UL 94	UL E162823
PCB	KINGBOARD LAMINATES HOLDINGS LTD	KB-6160A	V-0, 130°C	UL 94	UL E123995
MOSFET	Altha and OMEGA	A0D403	VDS (V)=30V, ID=85A (VGS=20V), RDS(ON)<6mΩ (VGS=20V), RDS(ON)<7.6mΩ (VGS=10V)	--	Test with appliance.
Thermal link	NEC SCHOTT COMPONENTS CORP	SF91E	Min. 250V, Min. 10A, T: 94°C	EN 60691, UL 60691	VDE 40006568 UL E71747
PTC	CYG Wayon Circuit Protection Co., Ltd.	LP1410	Max. 20Vdc, 85°C, Ih: 14.1A, It: 26.2A, Imax: 100A.	EN 60738-1-1: 2006+A1 EN 60738-1-1: 2008	TUV R50168831
Wire	DONG GUAN SHENG PAI ELECTRIC WIRE & CABLE CO LTD	3239	Min. 26 AWG, Max. 200°C, 60000 Vdc, VW-1.	UL758	UL E347603
Cell	GlobTek, Inc.	SR703880F	3.3V, 1600mAh	IEC 62133: 2012	Test with appliance.
-Anode	Shanghai Shanshan Tech Co., Ltd.	MCP	Tap Density: ≥1.32g/cm^3, Surface Area: 1.0-1.6m^2/g, D50=13-15μm, D90≤25.0μm	--	--
-Anode (Alternative)	ChangSha HaiRong Electronic Materials Co., Ltd.	PRC30	Tap Density: ≥0.9g/cm^3, Surface Area: ≤2.5m^2/g, D10=5-9μm, D50=13-17μm, D90≤34.0μm	--	--
-Cathode	Formasa Energy & Material Technology Co., Ltd.	SFCM30050	TAP Density: 1.2-1.5g/cm^3, D50=2-6μm, Surface area: 6-9m^2/g	--	--
-Cathode (Alternative)	Advanced Lithium Electrochemistry (China ShangHai)Co., Ltd.	M121	TAP Density: 0.8-1.2g/cm^3, D50: 2-6μm, Surface aea: 11-15m^2/g	--	--

-Electrolyte	Guangzhou Tinci Materials Technology Co., Ltd.	TCE808	EC/DMC/EMC/$LiPF_6$	--	--
-Electrolyte (Alternative)	Beijing institute of chemical reagents	BLE8153	EC/DMC/EMC/$LiPF_6$	--	--
-Separator	UBE Industries Co., Ltd	UP3074	PP, PE; Size: 20μm, Max. 140°C	--	--
-Separator (Alternative)	SHENZHEN SENIOR TECHNOLOGY MATERIAL Co., Ltd.	SD2	PP, PE; Size: 20μm	--	--
Supplementary information: **[1] Provided evidence ensures the agreed level of compliance.**					

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: Not applied to this Li-ion battery.

- 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: Not applied to this Li-ion battery.

- 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 ± 5°C or 55°C ± 5°C)	OCV at start of test, (Vdc)	Resistance of circuit, (Ω)	Maximum case temperature rise ΔT, (°C)	Results

Supplementary information: Not applied to this Li-ion battery.

- 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: Not applied to this Li-ion battery.

- 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: Not applied to this Li-ion battery.

- 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: Not applied to this Li-ion battery.

- 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}, (A)	OCV at start of test, (Vdc)	Results
1	3.65	0.8	3.35	P
2	3.65	0.8	3.36	P
3	3.65	0.8	3.35	P
4	3.65	0.8	3.35	P
5	3.65	0.8	3.34	P

Supplementary information: No fire or explosion, no leakage.

- No fire
- No explosion
- No leakage

8.3.1	TABLE: External short circuit (cells)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum case temperature rise ΔT, ~~(°C)~~**	**Results**
Samples charged at charging temperature upper limit (45°C)					
1	21.5	3.34	0.08	61.2	P
2	21.5	3.37	0.08	62.2	P
3	21.5	3.40	0.08	61.6	P
4	21.5	3.40	0.08	58.9	P
5	21.5	3.39	0.08	58.1	P
Samples charged at charging temperature lower limit (-5°C)					
1	22.8	3.33	0.08	47.2	P
2	22.8	3.33	0.08	56.8	P
3	22.8	3.33	0.08	65.3	P
4	22.8	3.33	0.08	53.3	P
5	22.8	3.33	0.08	54.2	P
Supplementary information: No fire, no explosion. - 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, (Ω)**	**Maximum case temperature rise ΔT, ~~(°C)~~**	**Results**
Test samples from factory: GlobTek (Suzhou) Co., Ltd.					
Samples charged at charging temperature upper limit (45°C)					
1	55.4	13.33	0.08	4.7	P
2	55.4	13.37	0.08	6.2	P
3	55.4	13.34	0.08	5.4	P
4	55.4	13.33	0.08	4.9	P
5	55.4	13.36	0.08	1.8	P
Samples charged at charging temperature lower limit (-5°C)					
1	55.4	13.33	0.08	0.5	P
2	55.4	13.31	0.08	0.4	P
3	55.4	13.30	0.08	0.4	P
4	55.4	13.32	0.08	0.5	P
5	55.4	13.33	0.08	0.4	P

Test samples from factory: CTE Energy Co., Ltd.					
Samples charged at charging temperature upper limit (45°C)					
1	55.4	13.33	0.08	4.7	P
2	55.4	13.37	0.08	6.2	P
3	55.4	13.34	0.08	5.4	P
4	55.4	13.33	0.08	4.9	P
5	55.4	13.36	0.08	1.8	P
Samples charged at charging temperature lower limit (-5°C)					
1	55.4	13.33	0.08	0.5	P
2	55.4	13.31	0.08	0.4	P
3	55.4	13.30	0.08	0.4	P
4	55.4	13.32	0.08	0.5	P
5	55.4	13.33	0.08	0.4	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)					
1	3.39	3.39	--	--	P
2	3.40	3.39	--	--	P
3	3.40	3.40	--	--	P
4	3.40	3.40	--	--	P
5	3.38	3.35	--	--	P
Note: A 13kN force applied at the wide side of prismatic cells. No voltage abrupt drop occurred. Supplementary information: No fire, no explosion. - No fire - No explosion					

8.3.6	TABLE: Over-charging of battery				P
Constant charging current (A).....:		3.2			—
Supply voltage (Vdc).....:		20			—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum outer casing temperature, (°C)**	**Results**	
Test samples from factory: GlobTek (Suzhou) Co., Ltd.					
1	12.03	80	26.7	P	
2	12.07	80	29.0	P	
3	12.09	80	29.0	P	
4	12.03	80	29.6	P	
5	12.12	80	31.2	P	
Test samples from factory: CTE Energy Co., Ltd.					
1	12.03	80	26.7	P	
2	12.07	80	29.0	P	
3	12.09	80	29.0	P	
4	12.03	80	29.6	P	
5	12.12	80	31.2	P	
Supplementary information: no fire, no explosion. - 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**
1	2.77	1.6	90	P
2	2.78	1.6	90	P
3	2.75	1.6	90	P
4	2.74	1.6	90	P
5	2.76	1.6	90	P
Supplementary information: no fire, no explosion. - No fire - No explosion				

8.3.8 T-5	TABLE: External short circuit (cells)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum case temperature rise ΔT, ~~(°C)~~**	**Results**
1	55.7	3.33	0.08	44.9	P
2	55.7	3.33	0.08	46.2	P
3	55.7	3.34	0.08	46.5	P
4	55.7	3.33	0.08	39.3	P
5	55.7	3.33	0.08	32.5	P
6	55.7	3.33	0.08	24.5	P
7	55.7	3.33	0.08	40.7	P
8	55.7	3.34	0.08	47.7	P
9	55.7	3.33	0.08	40.7	P
10	55.7	3.33	0.08	46.6	P

Supplementary information:

The external short-circuit test of 10 pcs samples performed after the test of Altitude, Thermal cycling, Vibration and Shock in sequence.

- 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)**	**Voltage drop, (mV)**	**Results**
Samples charged at charging temperature lower limit (-5°C)						
1	10	3.33	1	400	1	P
2	10	3.32	1	400	5	P
3	10	3.32	1	400	2	P
4	10	3.33	1	400	0	P
5	10	3.31	1	400	3	P
Samples charged at charging temperature upper limit (45°C)						
6	45	3.40	1	400	0	P
7	45	3.39	1	400	0	P
8	45	3.39	1	400	2	P
9	45	3.37	1	400	3	P
10	45	3.36	1	400	7	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 --

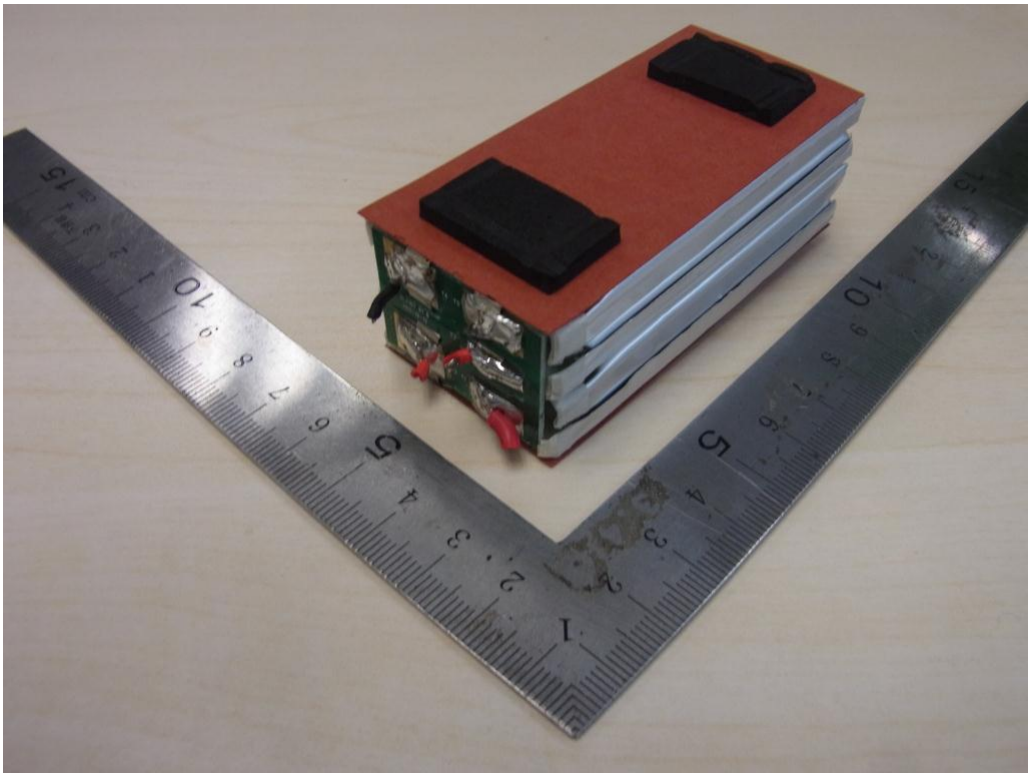
Type Designation: BX1600F6779374SIPH3L
Report Number: 17042082 001

Battery Pack

Battery Pack

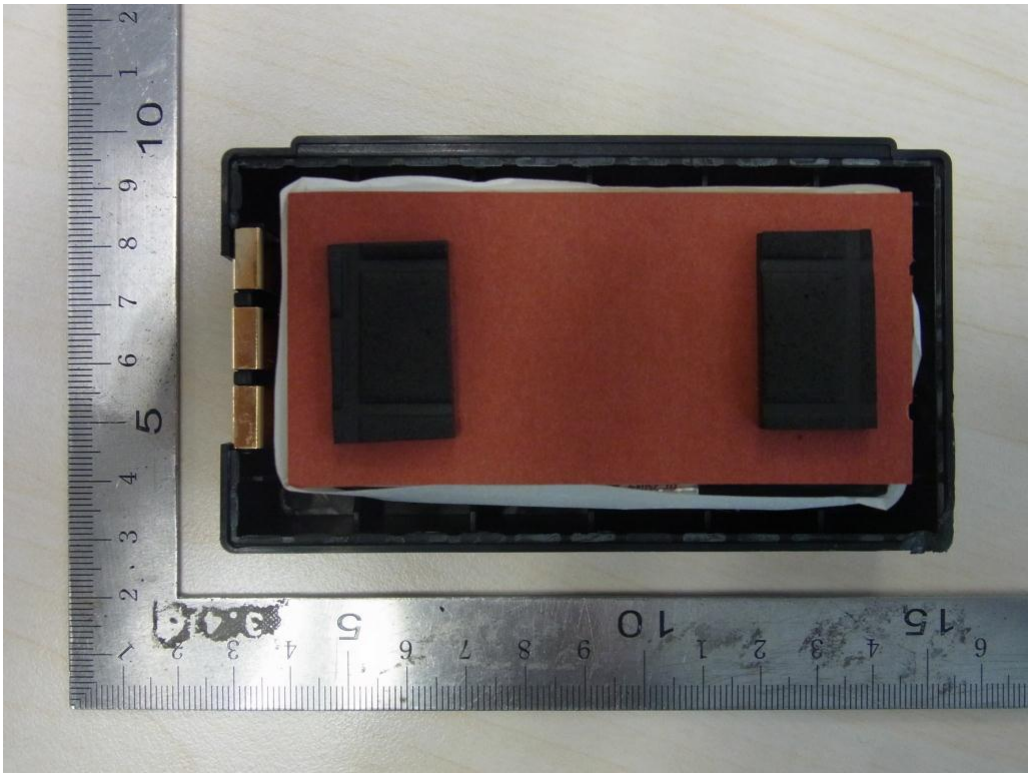
Type Designation: BX1600F6779374SIPH3L
Report Number: 17042082 001

Battery Pack

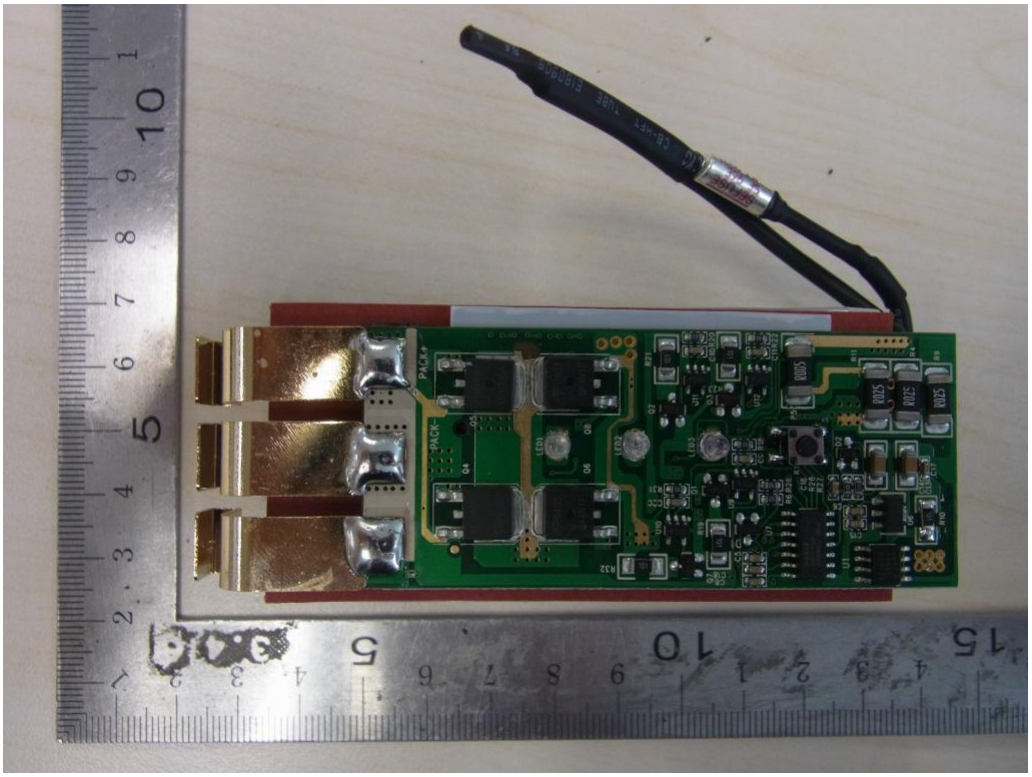


Internal of battery pack

Type Designation: BX1600F6779374SIPH3L
Report Number: 17042082 001

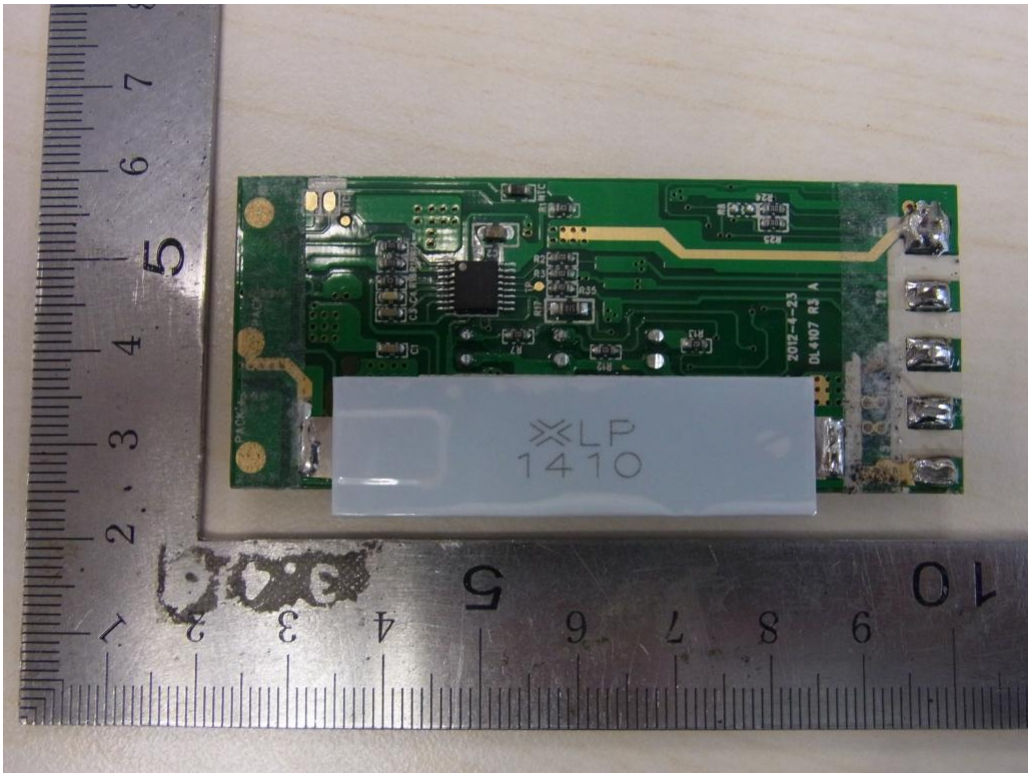


Internal of battery pack



PCB of Battery

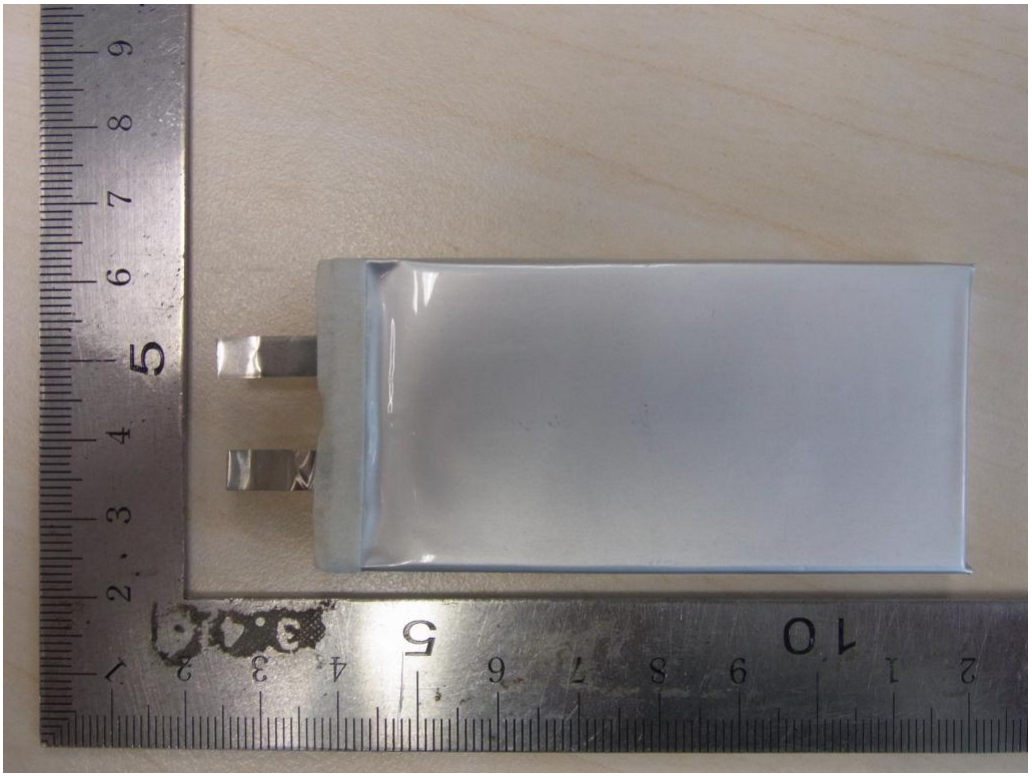
Type Designation: BX1600F6779374SIPH3L
Report Number: 17042082 001



PCB of Battery

Cell

Type Designation: BX1600F6779374SIPH3L
Report Number: 17042082 001



Cell