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. .....:	17056428 001
Date of issue .....:	2016-04-13
Total number of pages.....	25 pages
Applicant's name.....:	GlobTek, Inc.
Address .....:	186 Veterans Dr. Northvale, NJ 07647, USA
Test specification:	
Standard .....:	IEC 62133: 2012 (Second Edition)
Test procedure .....:	Test report
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.

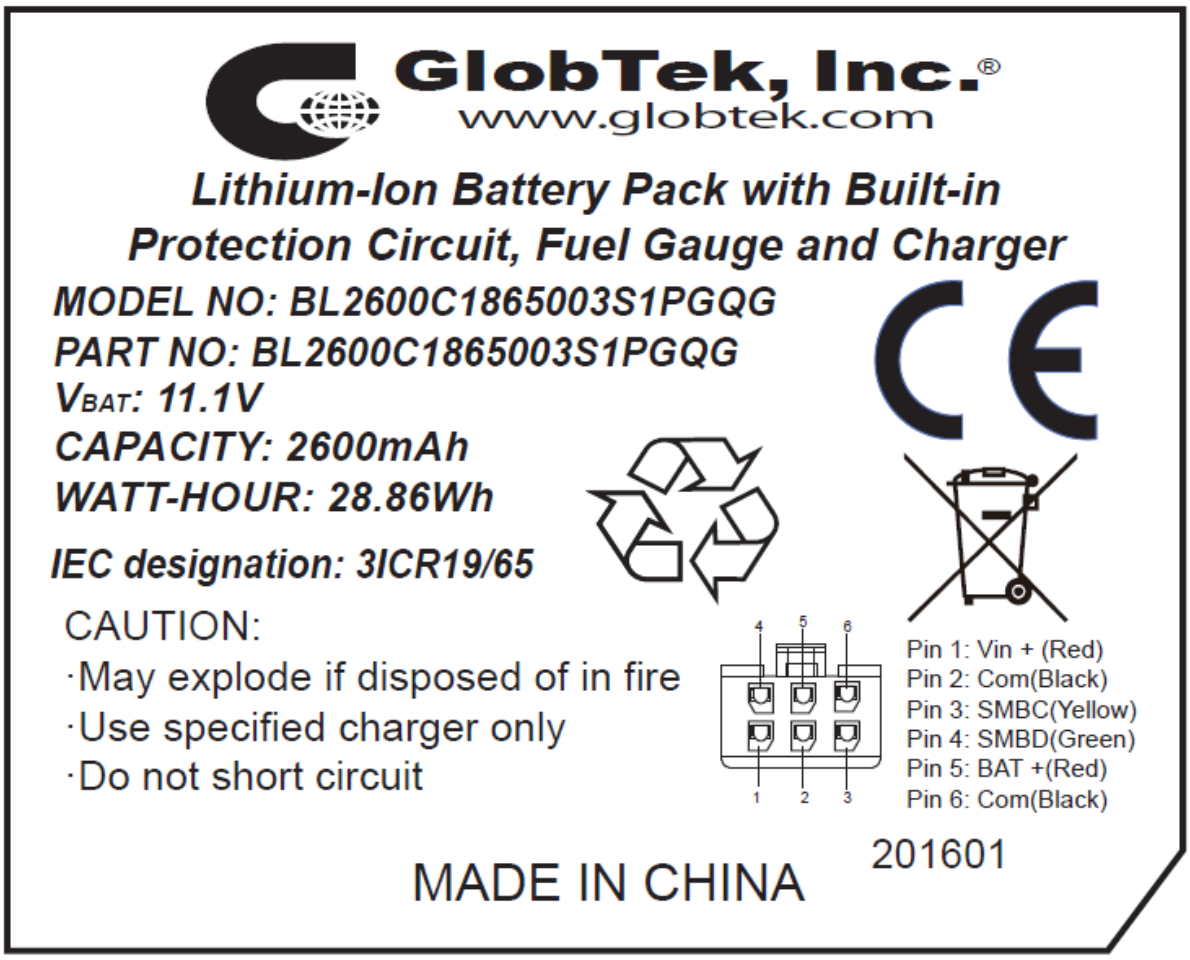
Test item description .....:	Lithium-Ion Battery Pack
Trade Mark .....:	GlobTek, Inc.
Manufacturer.....:	Same as applicant
Address……..:	Same as applicant
Model/Type reference .....:	BL2600C1865003S1PG*G(*=A, B, C, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9)
Ratings .....:	DC 11.1V, 2600mAh, 28.86Wh

Testing procedure and testing location:		
☒ CB Testing Laboratory:	TÜV Rheinland (Shenzhen) Co., Ltd.	
Testing location/ address .....:	East of F/1, F/2~F/4, Building 1, Cybio Technology Building No. 6 Langshan No.2 Road, North Hi-tech Industry Park 518057 Shenzhen Nanshan District CHINA	
☐ Associated CB Testing Laboratory:		
Testing location/ address .....:		
Tested by (name + signature).....:	Jason Tang	Jason Tang
Approved by (name + signature) .....:	Jacob Lu	Jacob Lu
☐ 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):	
Summary of testing:	
Tests performed (name of test and test clause): cl.8.1 Charging procedure for test purposes (for Battery); cl.8.3.2 External short circuit (Battery); cl.8.3.3 Fee fall (Battery); cl 8.3.6 Over-charging of Battery Remark: The cell (ICR18650-26F) inside the battery is CB approved according to IEC 62133: 2012. (CB certificate No: DK-33809-UL, Report No: BA-13CA36829-A-1) The model BL2600C1865003S1PGQG was selected for testing and EUT passed all tests. Tests are made with the number of batteries specified in IEC 62133: 2012 Table 2.	**Testing location:** **TÜV Rheinland (Shenzhen) Co., Ltd.** East of F/1, F/2~F/4, Building 1, Cybio Technology Building No. 6 Langshan No.2 Road, North Hi-tech Industry Park 518057 Shenzhen Nanshan District CHINA
Summary of compliance with National Differences **List of countries addressed:** 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= Netherlands, NO=Norway, SE=Sweden, SG=Singapore. ☒ **The product fulfils the requirements of EN62133: 2013**	

Copy of marking plate:

The artwork below may only a draft. The use of certificate marks on a product mast be authorized by the respective NCBS that own these marks.



Remark: Labels of all models are identical except the type designation.

Test item particulars.....:	
Classification of installation and use.....:	To be defined in final product
Supply connection.....:	DC connector
Recommend charging method declared by the manufacturer ..... :	Charging the battery with 520mA constant current, then 12.6V constant voltage until current reduces to 52mA at ambient 20°C±5°C
Discharge current (0,2 I_t A) ..... :	520mA
Specified final voltage ..... :	9.0V
Chemistry ..... :	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....:	4.25V
Maximum charging current.....:	1300mA
Charging temperature upper limit.....:	45°C
Charging temperature lower limit.....:	10°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 .....:	Feb. 26, 2016
Date (s) of performance of tests.....:	Feb. 26, 2016 –Apr. 06, 2016

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 three lithium-ion cells in 3S1P, and has overcharge, over-discharge, over current and short-circuits proof circuit.
The cell (ICR18650-26F) inside the battery is CB approved according to IEC 62133: 2012. (CB certificate No: DK-33809-UL, Report No: BA-13CA36829-A-1)
The manufacturer declared that the battery would be produced in three factories. For each factory, all of the critical components (cell, PCB, IC, MOS, etc.) in the battery are identical. Detail see page 18, TABLE: Critical components information.

Model different:
The models are identical except the connectors type, see below:

Definition of variable for model BL2600C1865003S1PG*G, The "*" means the connector type, see below.

Variable:	Range of variable:	Content:
*	A, B, C, J, K, L, M, N, P, Q, R, T, U, V, 1, 2, 3, 4, 5, 6, 7, 8, 9	A = Strip + tin, B = Button, C = Contacts, J = 2p JST, K = 3p JST, L = 4p JST, M = 2p Molex, N = 3p Molex, P = 4p Molex, Q = 6 contacts Molex, R = Multiple connectors, T = 2p Tyco, U = 3p Tyco, V = 4p Tyco, 1 = 1p connector, 2 = 2p connector, 3 = 3p connector, 4 = 4p connector, 5 = 5p connector, 6 = 6p connector, 7 = 7p connector, 8 = 8p connector, 9 = 9p connector.

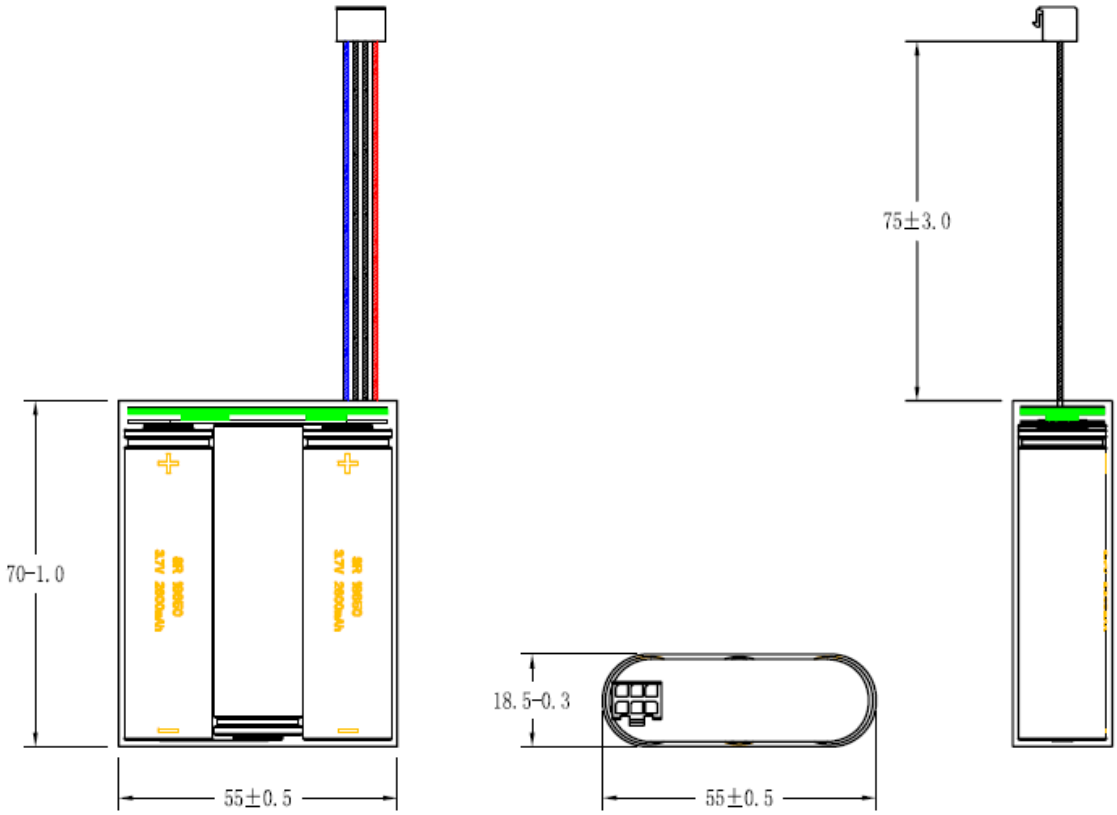
The main features of the Battery pack are shown as below (clause 8.1.1):

Model	Nominal capacity	Nominal voltage	Nominal Charge Current	Nominal Discharge Current	Maximum Charge Current	Maximum Discharge Current	Maximum Charge Voltage	Cut-off Voltage
BL2600C1865003S1PG*G	2600mAh	11.1V	520mA	1300mA	1300mA	2600mA	12.6V	9.0V

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

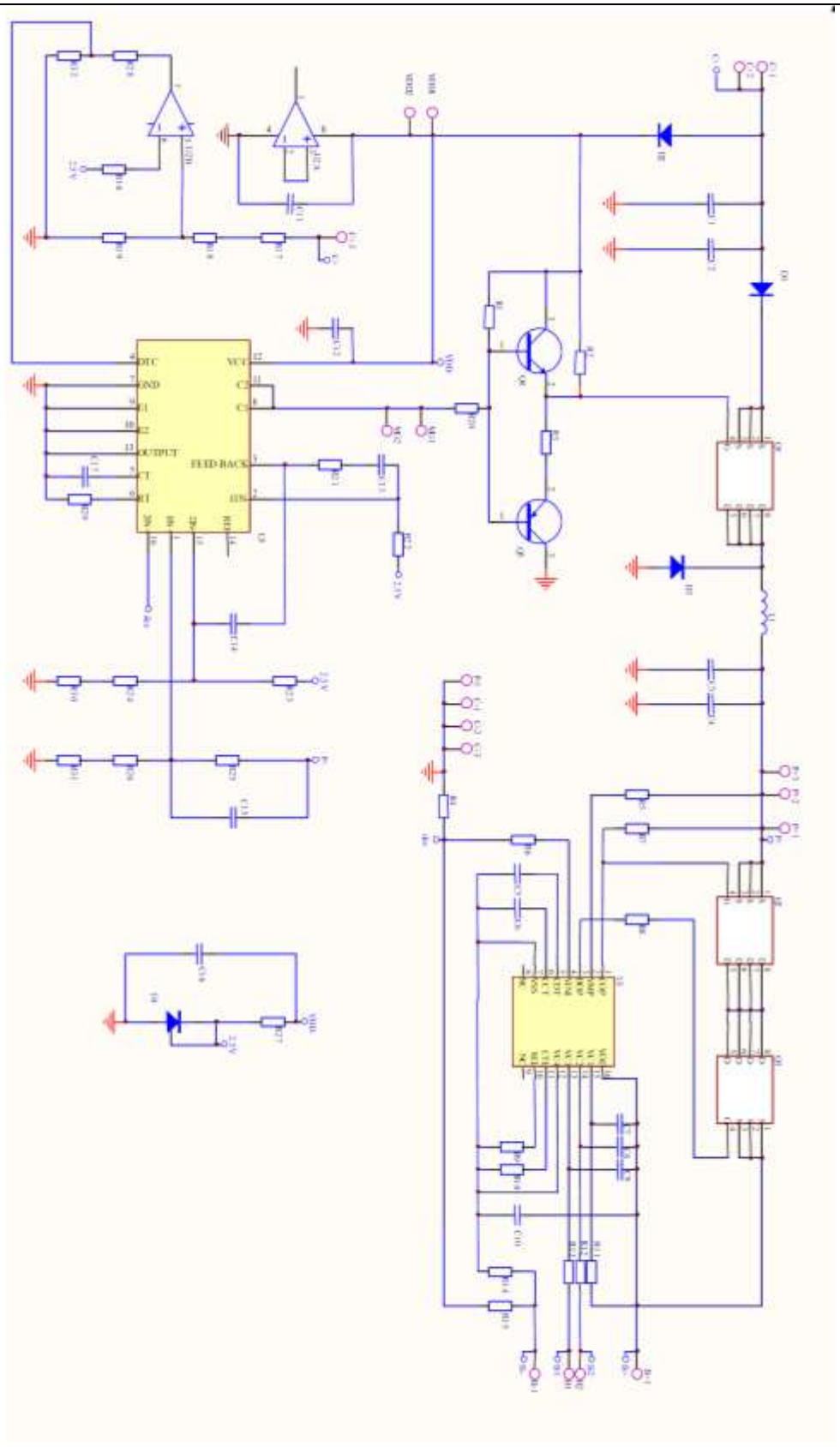
Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
BL2600C1865003S1PG*G	12.75V	130mA	10°C	45°C

Construction:



Battery (Unit: mm)

Circuit diagram:



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	Complied	P
	Orientation of wiring maintains adequate creepage and clearance distances between conductors	Complied	P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse	Complied	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 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, over discharge, over current and short-circuit proof circuit used in this battery.	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
	Terminals have a clear polarity marking on the external surface of the battery	DC connector used and reverse charge can be prevented.	P

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Complied.	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	3S1P	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
	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	Charging voltage for each cell: 4.2V, not exceed 4.25V specified in Clause 8.1.2, Table 4.	P

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	- 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: 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
7.2.2	Vibration		N/A
	Results: No fire. No explosion. No leakage		N/A
7.2.3	Moulded case stress at high ambient temperature		N/A
	Oven temperature (°C) .....:		—

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	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..... :		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..... :		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..... :		N/A
7.3.7	Low pressure		N/A
	Chamber pressure (kPa)..... :		—

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion. No leakage.		N/A
7.3.8	Overcharge		N/A
	Results: No fire. No explosion..... :		N/A
7.3.9	Forced discharge		N/A
	Results: No fire. No explosion..... :		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	Complied.	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 10°C.	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		N/A
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :		N/A
8.2	Intended use		N/A
8.2.1	Continuous charging at constant voltage (cells)	CB approved cell used	N/A
	Results: No fire. No explosion..... :	(See Table 8.2.1)	N/A
8.2.2	Moulded case stress at high ambient temperature (battery)	No moulded case exists.	N/A
	Oven temperature (°C) ..... :		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A
8.3	Reasonably foreseeable misuse	See below	P
8.3.1	External short circuit (cell)	CB approved cell used	N/A
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.1)	N/A
8.3.2	External short circuit (battery)	Tested complied	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	Tested complied	P
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.4	Thermal abuse (cells)	CB approved cell used	N/A
	The cells were held at 130°C ± 2°C for: - 10 minutes; or		N/A
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)		N/A
	Oven temperature (°C)..... :		—
	Gross mass of cell (g) ..... :		—
	Results: No fire. No explosion.		N/A
8.3.5	Crush (cells)	CB approved cell used	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; or		N/A
	- 10% of deformation has occurred compared to the initial dimension		N/A
	Results: No fire. No explosion..... :		N/A
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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :	(See Table 8.3.6)	P
8.3.7	Forced discharge (cells)	CB approved cell used	N/A
	Results: No fire. No explosion..... :		N/A
8.3.8	Transport tests	CB approved cell used	N/A
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods		N/A
8.3.9	Design evaluation – Forced internal short circuit (cells)	CB approved cell used and this test has passed	N/A
	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		N/A
	Results: No fire ..... :		N/A
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		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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Batteries marked with an appropriate caution statement.		P
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.		N/A
	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**		N/A
A.1	General	CB approved cell used	N/A
A.2	Safety of lithium-ion secondary battery		N/A
A.3	Consideration on charging voltage		N/A
A.3.1	General		N/A
A.3.2	Upper limit charging voltage		N/A
A.3.2.1	General		N/A
A.3.2.2	Explanation of safety viewpoint		N/A
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied		N/A
A.4	Consideration of temperature and charging current		N/A
A.4.1	General		N/A
A.4.2	Recommended temperature range		N/A
A.4.2.1	General		N/A
A.4.2.2	Safety consideration when a different recommended temperature range is applied		N/A
A.4.3	High temperature range		N/A
A.4.3.1	General		N/A
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

IEC 62133: 2012			
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		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		N/A
A.5	Sample preparation		N/A
A.5.1	General		N/A
A.5.2	Insertion procedure for nickel particle to generate internal short		N/A
	The insertion procedure carried out at 20°C±5°C and under -25 °C of dew point		N/A
A.5.3	Disassembly of charged cell		N/A
A.5.4	Shape of nickel particle		N/A
A.5.5	Insertion of nickel particle 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		N/A

	TABLE: Critical components information				P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Cell	SAMSUNG SDI CO LTD	ICR18650-26F	3.7V Rated: 2600mAh	IEC 62133: 2012	CB Certificate No: DK-33809-UL
MOSFET (Q2, Q1, Q3)	AOS	A04407A	V_{DS}=-30V I_D=-12A	--	Tested with appliance
IC (U1)	SII	S-8254AANFT-TB-S	V_{CU}=4.250± 0.025V V_{DL}=2.50± 0.080V V_{CL}=4.150±0.050V	--	Tested with appliance
PCB	Interchangeable	Interchangeable	V-0, 130°C	UL 796	UL approved
Lead wire	Interchangeable	Interchangeable	80°C, VW-1, 300V, Min.20AWG	UL 758	UL approved
Plastic of DC connector(Only for the models with connector)	Interchangeable	Interchangeable	V-1, 80°C	UL 94	UL approved
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:

- 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)	N/A

Model	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

8.3.1	TABLE: External short circuit (cell)	N/A

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 (°C)					
Samples charged at charging temperature lower limit (°C)					

Supplementary information:

- No fire or 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**
Samples charged at charging temperature upper limit (45°C)					
#1	55.4	12.41	0.071	0.6	P
#2	55.6	12.39	0.071	0.3	P
#3	53.8	12.42	0.071	1.5	P
#4	54.6	12.39	0.071	0.9	P
#5	54.4	12.43	0.071	1.1	P
Samples charged at charging temperature lower limit (10°C)					
#6	55.6	12.40	0.071	0.7	P
#7	55.9	12.42	0.071	0.5	P
#8	55.0	12.40	0.071	0.9	P
#9	55.0	12.39	0.071	0.9	P
#10	55.7	13.28	0.071	0.2	P

Supplementary information:

- No fire
- No Explosion

8.3.5	TABLE: Crush				N/A
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 (°C)					

Note:

Supplementary information:

- No fire or explosion

8.3.6	TABLE: Over-charging of battery				P
Constant charging current (A) .....:		5.2			—
Supply voltage (Vdc) .....:		15			—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum outer casing temperature, (°C)**	**Results**	
#11	9.28	0.018	43.1	P	
#12	9.29	0.019	42.4	P	
#13	9.27	0.018	42.2	P	
#14	9.26	0.017	39.9	P	
#15	9.23	0.017	35.3	P	

Supplementary information:

- No fire
- No Explosion

8.3.7	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

8.3.8 T-5	TABLE: External short circuit (cell)				N/A
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum case temperature ~~rise ΔT,~~ (°C)**	**Results**

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 excessive temperature rise, no rupture, no explosion and no fire

8.3.9	TABLE: Forced internal short circuit (cells)					N/A
Model	**Chamber ambient, (°C)**	**OCV at start of test, (Vdc)**	**Particle location [1)]**	**Maximum applied pressure, (N)**	**Voltage drop, (mV)**	**Results**

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 --