Module 3: Product Description

Appendix 3.1.2-1: Testing report for battery cell - IEC 62133

In this appendix the following current Certificates with testing reports for the current manufacturers of the batteries in IQOS 3 System are provided:

1. Holder battery:
   - Supplier Zhangzhou Aucopo Energy Technology Co., Ltd.: Amended certificate and test report issued on 21 June 2018 and initial certificate and test report issued on 6 February 2017
   - Supplier (b) (4) Certificate and test report issued on 25 July 2018
2. Charger battery:
   - Supplier (b) (4) Certificate and test report issued on 8 January 2018
   - Supplier (b) (4) Amended certificate and test report issued on 14 August 2018 and initial certificate and test report issued on 14 February 2018
   - Supplier (b) (4) Amended certificate and test report issued on 24 May 2018 and initial certificate and test report issued on 3 April 2018

(b) (4)

Confidentiality Statement

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Ref. Certif. No.
JPTUV-078178-M1

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

SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

CB TEST CERTIFICATE

CERTIFICAT D'ESSAI OC

Product Produit	Rechargeable Lithium Ion Cell
Name and address of the applicant Nom et adresse du demandeur	Zhaozhou Aucopo Energy Technology Co.,ltd. (b) (4)
Name and address of the manufacturer Nom et adresse du fabricant	Zhaozhou Aucopo Energy Technology Co.,ltd. (b) (4)
Name and address of the factory Nom et adresse de l'usine	Zhaozhou Aucopo Energy Technology Co.,ltd. (b) (4)
Ratings and principal characteristics Valeurs nominales et caractéristiques principales	(b) (6)
Trademark (if any) Marque de fabrique (si elle existe)	Aucopo
Type of Manufacturer's Testing Laboratories used Type de programme du laboratoire d'essais constructeur	N/A
Model / Type Ref. Ref. de type	(b) (4)
Additional information (if necessary may also be reported on page 2) Les informations complémentaires (si nécessaire, peuvent être indiqués sur la 2ème page)	Re-issue of JPTUV-078178 dated 06.02.2017, due to first modification.
A sample of the product was tested and found to be in conformity with Un échantillon de ce produit a été essayé et a été considéré conforme à la	IEC 62133:2012 See Test Report for National Differences
As shown in the Test Report Ref. No. which forms part of this Certificate Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat	50069094 002

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme National de Certification

TÜVRheinland®

TÜV Rheinland Japan Ltd.
Global Technology Assessment Center
4-25-2 Kita-Yamata, Tsuzuki-ku
Yokohama 224-0021 Japan
Phone + 81 45 914-3888
Fax + 81 45 914-3354
Mail: info@jpn.tuv.com
Web: www.tuv.com

(b) (6)

Date: 21.06.2018

Signature: Dipl.-Ing. Univ. S. O. Steinke

(b) (6)

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. .....:	**50069094 002**
Date of issue .....:	2018-06-21
Total number of pages.....	10 pages
Applicant's name.....:	**Zhangzhou Aucopo Energy Technology Co., ltd.**
Address .....:	**(b) (4)**
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

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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 .....:	Rechargeable Lithium Ion Cell
Trade Mark .....:	Aucopo
Manufacturer.....:	Same as applicant
Model/Type reference .....:	**(b) (4)**
Ratings .....:	

Testing procedure and testing location:		
☒ CB Testing Laboratory:		(b) (4)
Testing location/ address .....:		
☐ Associated CB Testing Laboratory:		
Testing location/ address .....:		(b) (6)
Tested by (name + signature).....:		
Approved by (name + signature) .....:		
☐ 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):

N/A

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
cl.8.1 Charging procedure for test purposes (for Cell) cl.8.3.1 External short circuit (Cell) cl.8.3.4 Thermal abuse (Cells) cl.8.3.5 Crush (Cells) cl.8.3.9 Forced internal short circuit (Cells)	**(b) (4)**

Summary of compliance with National Differences:

BE, BY, CN, DE, DK, FI, FR, GB, HU, JP, KR, NL, NO, SA, SE, SG, SI, US

BE=Belgium, BY=Belarus, 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, SA=Saudi Arabia, SE=Sweden, SG=Singapore, SI=Slovenia, US=United States of America

☒ The product fulfils the requirements of EN 62133: 2013

Copy of marking plate

See the previous CB test report 50069094 001

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 .....: **Discharge current (0,2 I_t A) .....:** **Specified final voltage.....:**	**(b) (4)**
Chemistry .....:	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....: **Maximum charging current.....:** **Charging temperature upper limit.....:** **Charging temperature lower limit.....:**	**(b) (4)**
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 .....:	2018-06-01
Date (s) of performance of tests .....:	2018-06-01 to 2018-06-07

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) .....:	Same as applicant

General product information:

See the previous CB test report 50069094 001.

The main features of the cell 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
(b) (4)								

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
(b) (4)				

Description of change(s):

1. **(b) (4)**

For the above described change(s) the following was considered to be necessary:

Change	Testing	Comments	Result
1	-cl.8.3.1 External short circuit (Cell) -cl.8.3.4 Thermal abuse (Cells) -cl.8.3.5 Crush (Cells) -cl.8.3.9 Forced internal short circuit (Cells)	Details see following clauses and appended tables.	P

History of amendments and modifications:

Ref. No. 50069094 001, dated Feb. 06, 2017 (original test report).

Ref. No. 50069094 002, dated June 21, 2018 (1st modification).

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
8	**Specific requirements and tests (lithium systems)**		P
8.1	Charging procedures for test purposes	Complied.	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	**(b) (4)**	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	**(b) (4)**	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :		P
8.3	Reasonably foreseeable misuse		P
8.3.1	External short circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		P
	Results: No fire. No explosion..... :	(See Table 8.3.1)	P
8.3.4	Thermal abuse (cells)	Tested complied.	P
	The cells were held at 130°C ± 2°C for: - 10 minutes; or		P
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)		N/A
	Oven temperature (°C)..... :	130°C	—
	Gross mass of cell (g) ..... :	Small cell.	—
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained; or		N/A

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	- 10% of deformation has occurred compared to the initial dimension		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.5)	P
8.3.9	Design evaluation – Forced internal short circuit (cells)	Tested complied.	P
	The cells complied with national requirement for..... :	France, Japan, Republic of Korea and Switzerland.	—
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	800 N	P
	Results: No fire ..... :	(See Table 8.3.9)	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	(b) (4)	P
A.3.2	Upper limit charging voltage		P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	(b) (4)	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
A.4.2.2	Safety consideration when a different recommended temperature range is applied	(b) (4)	P
A.4.3	High temperature range		P
A.4.3.1	General		P
A.4.3.2	Explanation of safety viewpoint		P
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range		P
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range	(b) (4)	P
A.4.4	Low temperature range		P

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
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		P
A.5.5.1	Insertion of nickel particle to winding core		P
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		P
A.5.6	Insertion of nickel particle to prismatic cell		N/A

8.3.1	TABLE: External short circuit (cells)				P
Model	**Ambient, (°C)**	**OCV at start of test, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum case temperature rise ΔT, (°C)**	**Results**
Samples charged at charging temperature upper limit (b) (4)					
Cell #1	23.9	3.324	84.7	128.4	P
Cell #2	23.9	3.323	86.2	125.3	P
Cell #3	23.9	3.324	87.3	125.1	P
Cell #4	23.9	3.323	85.4	127.0	P
Cell #5	23.9	3.324	86.3	124.9	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 (b) (4)					
Cell #1	3.324	--	--	--	P
Cell #2	3.324	--	--	--	P
Cell #3	3.324	--	--	--	P
Cell #4	3.323	--	--	--	P
Cell #5	3.324	--	--	--	P
Note: A 13kN force was applied to the longitudinal axis of cylindrical cell. **Supplementary information:** - No fire, no explosion.					

8.3.9	TABLE: Forced internal short circuit (cells)					P
Model	**Chamber ambient, (°C)**	**OCV at start of test, (Vdc)**	**Particle location [1)]**	**Maximum applied pressure, (N)**	**Voltage drop, (mV)**	**Results**
Cell #1	45	3.325	1	800	20.6	P
Cell #2	45	3.324	1	800	19.7	P
Cell #3	45	3.324	1	800	23.2	P
Cell #4	45	3.323	2	800	24.7	P
Cell #5	45	3.324	2	800	21.3	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 --

IEC | IECEE CB SCHEME

Ref. Certif. No.

JPTUV-078178

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

SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

CB TEST CERTIFICATE

CERTIFICAT D'ESSAI OC

Product Produit	Rechargeable Lithium Ion Cell
Name and address of the applicant Nom et adresse du demandeur	Zhengzhou Aucopo Energy Technology Co.,ltd. (b) (4)
Name and address of the manufacturer Nom et adresse du fabricant	Zhengzhou Aucopo Energy Technology Co.,ltd. (b) (4)
Name and address of the factory Nom et adresse de l'usine	Zhengzhou Aucopo Energy Technology Co.,ltd. (b) (4)
Ratings and principal characteristics Valeurs nominales et caractéristiques principales	(b) (4)
Trademark (if any) Marque de fabrique (si elle existe)	Aucopo
Type of Manufacturer's Testing Laboratories used Type de programme du laboratoire d'essais constructeur	N/A
Model / Type Ref. Ref. de type	(b) (4)
Additional Information (if necessary may also be reported on page 2) Les informations complémentaires (si nécessaire, peuvent être indiqués sur la 2ème page)	
A sample of the product was tested and found to be in conformity with Un échantillon de ce produit a été essayé et a été considéré conforme à la	IEC 62133:2012 See Test Report for National Differences
As shown in the Test Report Ref. No. which forms part of this Certificate Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat	50069094 001

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme National de Certification

TÜVRheinland®

TÜV Rheinland Japan Ltd.
Global Technology Assessment Center
4-28-2 Kita-Yamata, Tsuzuki-ku
Yokohama 224-0021 Japan
Phone + 81 45 914-3888
Fax + 81 45 914-3354
Mail: info@jpn.tuv.com
Web: www.tuv.com

Date: 06.02.2017

Signature: (b) (6)

Dipl.-Ing. (FH) C. Padel

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. .....:	**50069094 001**
Date of issue .....:	2017-02-06
Total number of pages.....	26 pages
Applicant's name.....:	**Zhangzhou Aucopo Energy Technology Co.,ltd.**
Address .....:	**(b) (4)**
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

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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 .....:	Rechargeable Lithium Ion Cell
Trade Mark .....:	Aucopo
Manufacturer.....:	Same as applicant
Model/Type reference .....:	**(b) (6)**
Ratings .....:	

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).....:	(b) (6)	(b) (6)
Approved by (name + signature) .....:		
☐	**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 (1page)

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 (Cell) cl.8.2.1 Continuous charging at constant voltage (Cells) cl.8.3.1 External short circuit (Cell) cl.8.3.3 Free fall (Cell) cl.8.3.4 Thermal abuse (Cells) cl.8.3.5 Crush (Cells) cl.8.3.7 Forced discharge (Cells) cl.8.3.8 Transport tests cl.8.3.9 Forced internal short circuit (Cells) Tests are made with the number of cells specified in IEC 62133: 2012 (Second Edition) Table 2.	**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:

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 EN 62133: 2013

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

(b) (4)

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 .....: **Discharge current (0,2 I_t A) .....:** **Specified final voltage.....:**	**(b) (4)**
Chemistry .....:	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....: **Maximum charging current.....:** **Charging temperature upper limit.....:** **Charging temperature lower limit.....:**	**(b) (4)**
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 .....:	2017-01-04
Date (s) of performance of tests .....:	2017-01-04 to 2017-01-17

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) .....:	Same as applicant

General product information:

The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte and case. The positive and negative electrode plates are housed in the case in the state being separated by the separator.

The main features of the cell 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
(b) (4)								

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
(b) (4)				

Construction Unit(mm):

(b) (4)

Circuit diagram:

None, cell only.

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 surface 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		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	Explosion-proof safety valve for venting exists.	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		N/A
	Batteries are designed such that abnormal temperature rise conditions are prevented	Cell only.	N/A
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer		N/A
	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		N/A
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery	The "+" and "-" polarity explicitly marked on surface of the cell.	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	Complied.	P
	Terminal contacts are arranged to minimize the risk of short circuits	Complied.	P
5.6	Assembly of cells into batteries		N/A
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	Cell only.	N/A
	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		N/A
	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		N/A
	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		N/A
	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	Cell only.	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		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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion		N/A
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	**(b) (4)**	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		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)	Test complied.	P
	Results: No fire. No explosion..... :	(See Table 8.2.1)	P
8.2.2	Moulded case stress at high ambient temperature (battery)	No moulded case exists.	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
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	Test complied.	P
	Results: No fire. No explosion..... :	(See Table 8.3.1)	P
8.3.2	External short circuit (battery)		N/A
	The cells were tested until one of the following occurred: - 24 hours elapsed; or	Cell only.	N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N/A
	Results: No fire. No explosion..... :		N/A
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	Test 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	—
	Gross mass of cell (g) ..... :	Small cell.	—
	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	Test 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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :	(See Table 8.3.5)	P
8.3.6	Over-charging of battery		N/A
	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		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.6)	N/A
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	Test complied.	P
8.3.9	Design evaluation – Forced internal short circuit (cells)		P
	The cells complied with national requirement for..... :	France, Japan, Republic of Korea and Switzerland.	—
	The pressing was stopped upon: - A voltage drop of 50 mV has been detected; or		N/A
	- The pressing force of 800 N (cylindrical cells) or 400 N (prismatic cells) has been reached	800 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.		N/A
	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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
10.1	Cell marking		P
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	The cell is marked in accordance with IEC 61960, also see page 4.	P
10.2	Battery marking		N/A
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	Cell only.	N/A
	Batteries marked with an appropriate caution statement.		N/A
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.		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**		**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	**(b) (4)**	P
A.3.2	Upper limit charging voltage		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	**(b) (4)**	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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.2.2	Safety consideration when a different recommended temperature range is applied	(b) (4)	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	(b) (4)	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	(b) (4)	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		P
A.5.5.1	Insertion of nickel particle to winding core		P
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		P
A.5.6	Insertion of nickel particle to prismatic cell		N/A

TABLE: Critical components information					P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Cell	Zhangzhou Aucopo Energy Technology Co., ltd.	(b) (4)		IEC 62133: 2012	Tested with appliance
-Cathode	(b) (4)			--	--
-Anode				--	--
-Separator				--	--
-Separator (Alternative)				--	--
-Electrolyte				--	--
-Cap				--	--
-Cap (Alternative)				--	--
-Steel Can				--	--
-Steel Can (Alternative)				--	--

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)			P
Model	**Recommended charging voltage V_c, (Vdc)**	**Recommended charging current I_{rec}, (A)**	**OCV at start of test, (Vdc)**	**Results**
Cell #1	3.65	1.50	3.33	P
Cell #2	3.65	1.50	3.34	P
Cell #3	3.65	1.50	3.33	P
Cell #4	3.65	1.50	3.33	P
Cell #5	3.65	1.50	3.34	P

Supplementary information:

- 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, (mΩ)**	**Maximum case temperature rise ΔT, (°C)**	**Results**
Samples charged at charging temperature upper limit (45°C)					
Cell #1	20.3	3.32	78.8	122.5	P
Cell #2	20.3	3.32	79.8	107.0	P
Cell #3	20.3	3.32	80.2	112.5	P
Cell #4	20.3	3.33	82.8	107.4	P
Cell #5	20.3	3.36	83.8	116.5	P
Samples charged at charging temperature lower limit (-5°C)					
Cell #6	20.0	3.30	79.8	109.3	P
Cell #7	20.0	3.30	79.3	119.6	P
Cell #8	20.0	3.29	80.6	99.2	P
Cell #9	20.0	3.29	82.3	125.1	P
Cell #10	20.0	3.30	83.9	111.4	P

Supplementary information:

- No fire, no explosion.

8.3.2	TABLE: External short circuit (battery)				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					
Samples charged at charging temperature lower limit					

Supplementary information:

- No fire or explosion
- No leakage

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)					
Cell #1	3.33	--	--	--	P
Cell #2	3.33	--	--	--	P
Cell #3	3.32	--	--	--	P
Cell #4	3.33	--	--	--	P
Cell #5	3.35	--	--	--	P
Samples charged at charging temperature upper limit (-5°C)					
Cell #6	3.30	--	--	--	P
Cell #7	3.29	--	--	--	P
Cell #8	3.30	--	--	--	P
Cell #9	3.29	--	--	--	P
Cell #10	3.29	--	--	--	P

Supplementary information:

- A 13KN force was applied to the longitudinal axis of cylindrical cell.
- No fire, no explosion.

8.3.6	TABLE: Over-charging of battery				N/A
Constant charging current (A) .....:					—
Supply voltage (Vdc) .....:					—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum outer casing temperature, (°C)**	**Results**	

Supplementary information:

- No fire or explosion
- No leakage

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**
Cell #1	2.83	0.12	90	P
Cell #2	2.82	0.12	90	P
Cell #3	2.83	0.12	90	P
Cell #4	2.83	0.12	90	P
Cell #5	2.82	0.12	90	P

Supplementary information:

- 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, (mΩ)**	**Maximum case temperature rise ΔT, (°C)**	**Results**
Cell #1	55.2	3.30	84.5	117.9	P
Cell #2	55.2	3.30	86.3	116.3	P
Cell #3	55.2	3.31	81.2	128.0	P
Cell #4	55.2	3.32	82.5	118.7	P
Cell #5	55.2	3.31	82.9	127.9	P
Cell #6	55.8	3.31	83.4	121.0	P
Cell #7	55.8	3.32	84.7	121.6	P
Cell #8	55.8	3.31	86.2	115.0	P
Cell #9	55.8	3.30	81.3	126.5	P
Cell #10	55.8	3.31	83.8	125.2	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 excessive temperature rise
- No disassembly
- No rupture
- No fire

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**
Cell #1	45	3.33	1	802.2	22.3	P
Cell #2	45	3.34	1	803.6	21.3	P
Cell #3	45	3.36	1	807.3	19.6	P
Cell #4	45	3.33	2	806.2	22.8	P
Cell #5	45	3.33	2	804.8	21.7	P
Cell #6	10	3.29	1	803.7	23.7	P
Cell #7	10	3.30	1	804.7	23.6	P
Cell #8	10	3.31	1	805.5	24.8	P
Cell #9	10	3.30	2	806.2	25.7	P
Cell #10	10	3.29	2	806.6	28.0	P

Supplementary information:

[1)] Identify one of the following:

1: Nickel particle inserted between positive and negative (active material) coated area.

2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

- No fire

-- End of Report --

National Difference			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62133 (Ed 2.0)
SINGAPORE NATIONAL DIFFERENCES

Differences according to ..... :	Consumer Protection (Consumer Goods Safety Requirements) Regulations [CGSR] as detailed in Appendix F Additional Safety Requirements Imposed by SPRING Singapore as the Safety Authority
Attachment Form No. ..... :	SG_ND_IEC62133B
Attachment Originator ..... :	TÜV Rheinland (Shenzhen) Co., Ltd.
Master Attachment ..... :	Date 2015-08

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

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

Product: Rechargeable Lithium Ion Cell

Type Designation: LFP10370C1

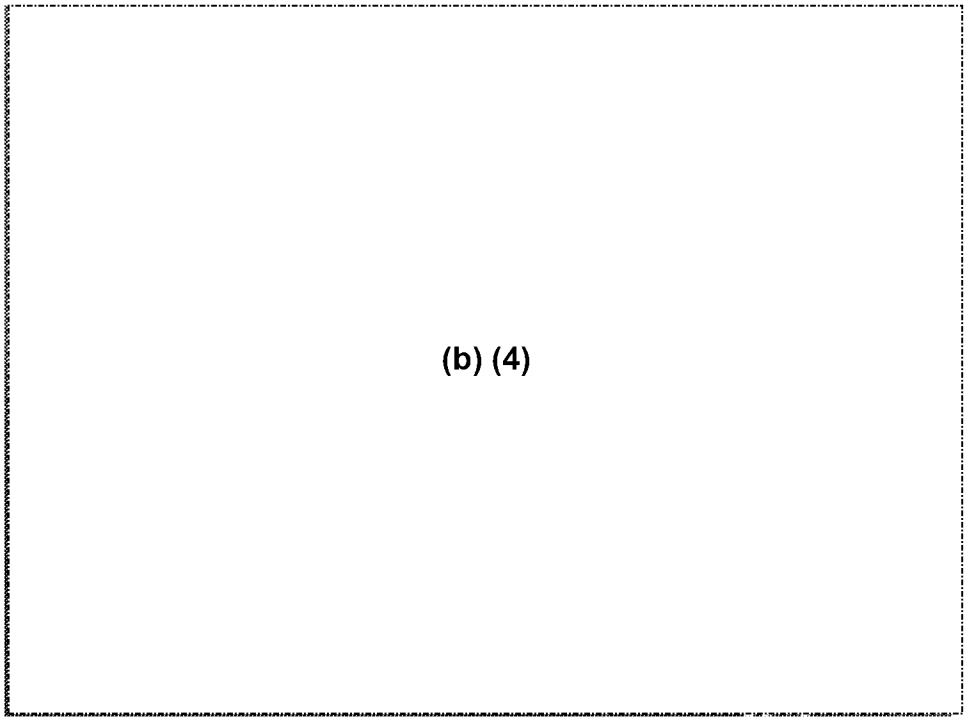


Figure 1 Front view of cell

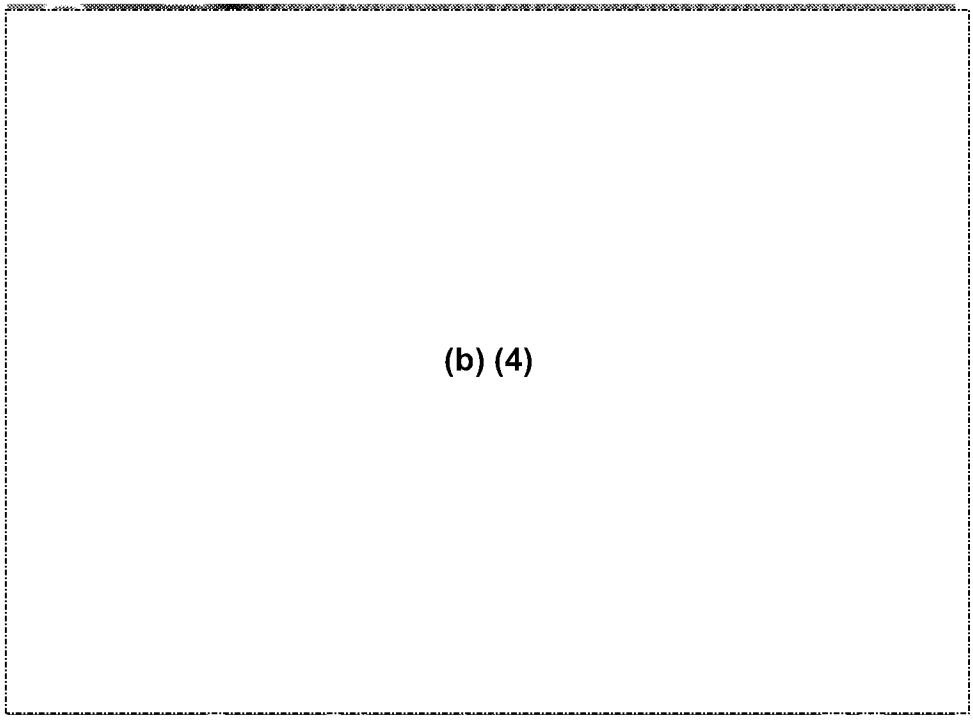


Figure 2 Back view of cell

IEC IECEE CB SCHEME

Ref. Certif. No.

JPTUV-089714

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

SYSTEME CEI D'ACCEPTATION MUTUELLE DE CERTIFICATS D ESSAIS DES EQUIPEMENTS ELECTRIQUES (IECEE) METHODE OC

CB TEST CERTIFICATE

CERTIFICAT D'ESSAI OC

Product Produit	RECHARGEABLE LITHIUM ION CELL
Name and address of the applicant Nom et adresse du demandeur	(b) (4)
Name and address of the manufacturer Nom et adresse du fabricant	(b) (4)
Name and address of the factory Nom et adresse de l'usine	(b) (4)
Ratings and principal characteristics Valeurs nominales et caractéristiques principales	(b) (4)
Trademark (if any) Marque de fabrique (si elle existe)	FULLRIVER
Type of Manufacturer's Testing Laboratories used Type de programme du laboratoire d'essais constructeur	N/A
Model / Type Ref. Ref. de type	(b) (4)
Additional information (if necessary may also be reported on page 2) Les informations complémentaires (si nécessaire, peuvent être indiqués sur la 2ème page)	
A sample of the product was tested and found to be in conformity with Un échantillon de ce produit a été essayé et a été considéré conforme à la	IEC 62133:2012 See Test Report for National Differences
As shown in the Test Report Ref. No. which forms part of this Certificate Comme indiqué dans le Rapport d'essais numéro de référence qui constitue partie de ce Certificat	60157369 C01

This CB Test Certificate is issued by the National Certification Body
Ce Certificat d'essai OC est établi par l'Organisme National de Certification

(b) (6)

TÜVRheinland®

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Date: 25.07.2019

Signature: Dipl.-Ing. Univ. S. O. Steinke

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. .....:	**50157369 001**
Date of issue .....:	2018-07-25
Total number of pages.....	25 pages
Applicant's name.....:	(b) (4)
Address .....:	(b) (4)
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

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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 .....:	RECHARGEABLE LITHIUM ION CELL
Trade Mark .....:	(b) (4)
Manufacturer.....:	(b) (4)
Model/Type reference .....:	(b) (4)
Ratings .....:	

Testing procedure and testing location:		
☒ CB Testing Laboratory:		
Testing location/ address .....:	(b) (4)	
☐ Associated CB Testing Laboratory:		
Testing location/ address .....:		
Tested by (name + signature).....:	(b) (6)	
Approved by (name + signature) .....:		
☐ 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 (2 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) cl.8.2.1 Continuous charging at constant voltage (Cells) cl.8.3.1 External short circuit (Cells) cl.8.3.3 Free fall (for Cell) cl.8.3.4 Thermal abuse (Cells) cl.8.3.5 Crush (Cells) cl.8.3.7 Forced discharge (Cells) cl.8.3.8 Transport tests cl.8.3.9 Forced internal short circuit (Cells) Tests are made with the number of cells specified in IEC 62133: 2012 (Second Edition) Table 2.	**(b) (4)**

Summary of compliance with National Differences:

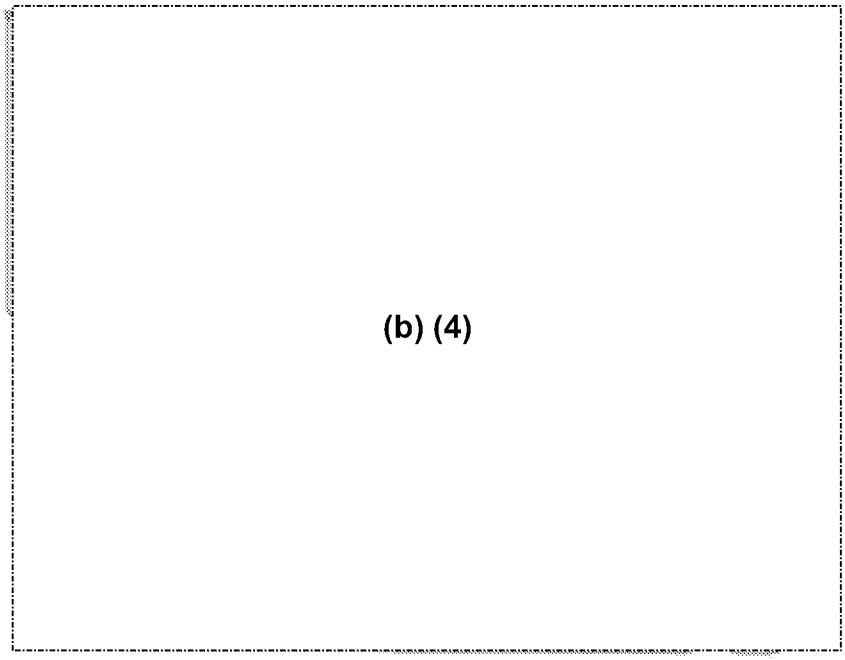
BE, BY, CN, DE, DK, FI, FR, GB, HU, JP, KR, NL, NO, SA, SE, SG, SI, US

BE=Belgium, BY=Belarus, 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, SA=Saudi Arabia, SE=Sweden, SG=Singapore, SI=Slovenia, US=United States of America

☒ The product fulfils the requirements of EN 62133: 2013

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.



Remark: Code1741, 17 represents for year 2017. 41 means the week.

Test item particulars.....:	
Classification of installation and use.....:	To be defined in final product
Supply connection.....:	Electrode tab
Recommend charging method declared by the manufacturer .....: **Discharge current (0,2 I_t A) .....:** **Specified final voltage .....:**	**(b) (4)**
Chemistry .....:	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....: **Maximum charging current.....:** **Charging temperature upper limit.....:** **Charging temperature lower limit.....:**	**(b) (4)**
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 .....:	2018-06-04
Date (s) of performance of tests .....:	2018-06-04 to 2018-06-20

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) .....:	Same as manufacturer

General product information:

The cell consists of the positive electrode plate, negative electrode plate, separator, electrolyte and case. The positive and negative electrode plates are housed in the case in the state being separated by the separator.

The main features of the cell 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
(b) (4)								

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

Model	Upper limit charge voltage	Taper-off current	Lower charge temperature	Upper charge temperature
(b) (4)				

Construction Unit(mm):

(b) (4)

Circuit diagram:

None, Cell only

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 surface 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		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	Explosion-proof safety valve for venting exists.	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	**Cell only.**	N/A
	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	See above.	N/A
	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 user manual.	N/A
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery	The "+" and "-" polarity explicitly marked on surface of the cell.	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	Complied.	P
	Terminal contacts are arranged to minimize the risk of short circuits	Complied.	P
5.6	Assembly of cells into batteries	Cell only.	N/A
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		N/A
	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		N/A
	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		N/A
	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	Cell only.	N/A
	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		N/A

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	(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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
7.2.4	Temperature cycling		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3	Reasonably foreseeable misuse		N/A
7.3.1	Incorrect installation cell		N/A
	The test was carried out using: - Four fully charged cells of the same brand, type, size and age connected in series, with one of them reversed; or		N/A
	- A stabilized dc power supply.		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.1)	N/A
7.3.2	External short circuit		N/A
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.2)	N/A
7.3.3	Free fall		N/A
	Results: No fire. No explosion.		N/A
7.3.4	Mechanical shock (crash hazard)		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3.5	Thermal abuse		N/A
	Oven temperature (°C)..... :		—
	Results: No fire. No explosion.		N/A
7.3.6	Crushing of cells		N/A
	The crushing force was released upon: - The maximum force of 13 kN± 1 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.6)	N/A
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

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	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	**(b) (4)**	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	**(b) (4)**	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)	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		P
8.3.1	External short circuit (cell)	Tested complied.	P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		P

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: No fire. No explosion..... :	(See Table 8.3.1)	P
8.3.2	External short circuit (battery)	Cell only.	N/A
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		N/A
	Results: No fire. No explosion..... :		N/A
8.3.3	Free fall	Tested complied.	P
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.4	Thermal abuse (cells)	Tested complied.	P
	The cells were held at 130°C ± 2°C for: - 10 minutes; or		P
	- 30 minutes for large cells (gross mass of more than 500 g as defined in IEC 62281)		N/A
	Oven temperature (°C)..... :	130°C	—
	Gross mass of cell (g) ..... :	Small cell, <500g	—
	Results: No fire. No explosion.	No fire. No explosion.	P
8.3.5	Crush (cells)	Tested complied.	P
	The crushing force was released upon: - The maximum force of 13 kN± 1 kN has been applied; or		P
	- An abrupt voltage drop of one-third of the original voltage has been obtained; or		N/A
	- 10% of deformation has occurred compared to the initial dimension		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.5)	P
8.3.6	Over-charging of battery	Cell only.	N/A
	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		N/A
	Results: No fire. No explosion..... :	(See Table 8.3.6)	N/A
8.3.7	Forced discharge (cells)	Tested complied.	P
	Results: No fire. No explosion..... :	(See Table 8.3.7)	P

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.8	Transport tests	Tested complied.	P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods		P
8.3.9	Design evaluation – Forced internal short circuit (cells)	Tested complied.	P
	The cells complied with national requirement for ..... :	France, Japan, Republic of Korea, 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	800 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.	Cell only.	N/A
	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		P
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	The cell is marked in accordance with IEC 61960, also see page 4.	P
10.2	Battery marking		N/A
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	Cell only.	N/A
	Batteries marked with an appropriate caution statement.		N/A
10.3	Other information		P

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
	Storage and disposal instructions marked on or supplied with the battery.	Information for storage and disposal instructions mentioned in manufacturer's specifications.	P
	Recommended charging instructions marked on or supplied with the battery.	Information for recommended charging instructions mentioned in manufacturer's specifications.	P
11	**Packaging**		P
	The materials and packaging design are chosen so as to prevent the development of unintentional electrical conduction, corrosion of the terminals and ingress of environmental contaminants.		P
Annex A	**Charging range of secondary lithium ion cells for safe use**		**P**
A.1	General		P
A.2	Safety of lithium-ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General	**(b) (4)**	P
A.3.2	Upper limit charging voltage		P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	**(b) (4)**	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
A.4.2.2	Safety consideration when a different recommended temperature range is applied	**(b) (4)**	P
A.4.3	High temperature range		P
A.4.3.1	General		P
A.4.3.2	Explanation of safety viewpoint		P
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range		P
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range	70°C applied.	P

IEC 62133: 2012			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.4	Low temperature range	**(b) (4)**	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		P
A.5.5.1	Insertion of nickel particle to winding core		P
A.5.5.2	Mark the position of nickel particle on the both end of winding core of the separator		P
A.5.6	Insertion of nickel particle to prismatic cell		N/A

TABLE: Critical components information					P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity[1)]**
Cell	(b) (4)		(b) (4)	--	Tested with appliance
-Anode				--	--
-Cathode				--	--
-Cathode (Alternative)				--	--
-Separator				--	--
-Separator (Alternative)				--	--
-Separator (Alternative)				--	--
-Electrolyte				--	--
-Steel Can				--	--
-Steel Can (Alternative)				--	--
-Steel Can (Alternative)				--	--
-Cap				--	--
-Cap (Alternative)				--	--
-Cap (Alternative)				--	--

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)			P
Model	**Recommended charging voltage V_c, (Vdc)**	**Recommended charging current I_{rec}, (mA)**	**OCV at start of test, (Vdc)**	**Results**
Cell #1	**(b) (4)**		3.42	P
Cell #2			3.41	P
Cell #3			3.41	P
Cell #4			3.41	P
Cell #5			3.41	P

Supplementary information:

- 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, (mΩ)**	**Maximum case temperature rise ~~ΔT,~~ (°C)**	**Results**
Samples charged at charging temperature upper limit (70°C)					
Cell #1	21.8	3.36	83.4	144.7	P
Cell #2	21.8	3.35	82.9	145.6	P
Cell #3	21.8	3.35	81.0	147.6	P
Cell #4	21.8	3.36	83.3	149.8	P
Cell #5	21.8	3.36	82.7	146.8	P
Samples charged at charging temperature lower limit (-5°C)					
Cell #6	21.9	3.33	82.3	145.6	P
Cell #7	21.9	3.33	84.4	146.7	P
Cell #8	21.9	3.33	83.8	142.0	P
Cell #9	21.9	3.33	83.6	146.6	P
Cell #10	21.9	3.33	84.1	137.2	P

Supplementary information:

- No fire, no explosion.

8.3.2	TABLE: External short circuit (battery)				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					
Samples charged at charging temperature lower limit					

Supplementary information:

- No fire or explosion
- No leakage

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 (70°C)					
Cell #1	3.36	--	--	--	P
Cell #2	3.36	--	--	--	P
Cell #3	3.36	--	--	--	P
Cell #4	3.36	--	--	--	P
Cell #5	3.35	--	--	--	P
Samples charged at charging temperature lower limit (-5°C)					
Cell #6	3.33	--	--	--	P
Cell #7	3.33	--	--	--	P
Cell #8	3.32	--	--	--	P
Cell #9	3.33	--	--	--	P
Cell #10	3.32	--	--	--	P

Note:

A 13KN force was applied to the wide side of the prismatic cell.

Supplementary information:

- No fire, no explosion.

8.3.6	TABLE: Over-charging of battery				N/A
Constant charging current (A) ..... :					—
Supply voltage (Vdc) ..... :					—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (mΩ)**	**Maximum outer casing temperature, (°C)**	**Results**	

Supplementary information:

- No fire or explosion
- No leakage

8.3.7	TABLE: Forced discharge (cells)			P
Model	**OCV before application of reverse charge, (Vdc)**	**Measured Reverse charge I_t, (mA)**	**Time for reversed charge, (minutes)**	**Results**
Cell #1	2.75	120	90	P
Cell #2	2.76	120	90	P
Cell #3	2.75	120	90	P
Cell #4	2.76	120	90	P
Cell #5	2.75	120	90	P

Supplementary information:

- No fire
- No explosion

8.3.9	TABLE: Forced internal short circuit (cells)					P
Model	**Chamber ambient, (°C)**	**OCV at start of test, (Vdc)**	**Particle location [1)]**	**Maximum applied pressure, (N)**	**Voltage drop, (mV)**	**Results**
Cell #1	45	3.36	1	800	8.5	P
Cell #2	45	3.36	1	800	7.5	P
Cell #3	45	3.36	1	800	9.5	P
Cell #4	45	3.36	1	800	7.6	P
Cell #5	45	3.35	1	800	6.8	P
Cell #6	10	3.32	1	800	5.9	P
Cell #7	10	3.33	1	800	9.2	P
Cell #8	10	3.33	1	800	2.5	P
Cell #9	10	3.33	1	800	3.8	P
Cell #10	10	3.33	1	800	5.8	P

Supplementary information:

[1)] Identify one of the following:

1: Nickel particle inserted between positive and negative (active material) coated area.

2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

- No fire

-- End of Report --

National Difference			
Consumer Goods	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62133 (Ed 2.0) SINGAPORE NATIONAL DIFFERENCES

Differences according to ..... :	Consumer Protection (Consumer Goods Safety Requirements) Regulations [CGSR] as detailed in Appendix F Additional Safety Requirements Imposed by SPRING Singapore as the Safety Authority
Attachment Form No. ..... :	SG_ND_IEC62133B
Attachment Originator..... :	TÜV Rheinland (Shenzhen) Co., Ltd.
Master Attachment..... :	Date 2015-08

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

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

Attachment 1 Photo Documentation

Product: RECHARGEABLE LITHIUM ION CELL

Type Desig

(b) (4)

Figure 1 Front view of cell

(b) (4)

Figure 2 Back view of cell

Attachment 1 Photo Documentation

Product: RECHARGEABLE LITHIUM ION CELL

Type De

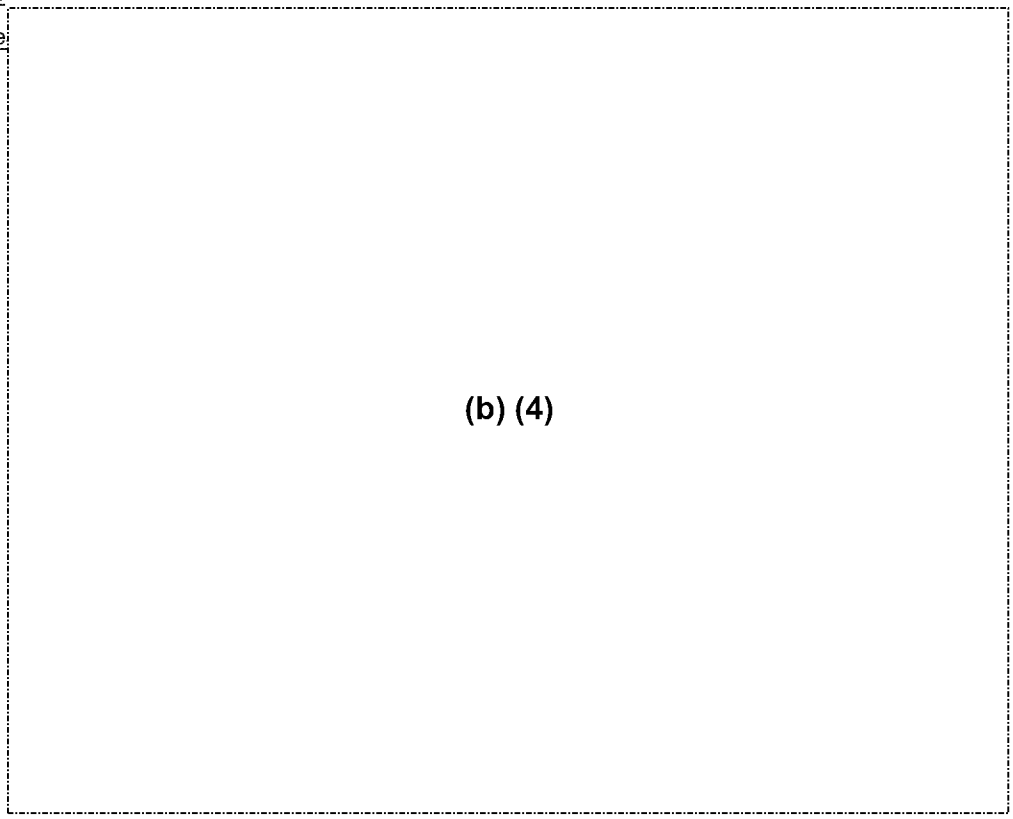


Figure 3 Inside view of cell

Ref. Certif. No.

DK-69718-UL

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

CB TEST CERTIFICATE

Product	Rechargeable Li-Ion Battery
Name and address of the applicant	(b) (4)
	(b) (4)
Name and address of the manufacturer	(b) (4)
	(b) (4)
Name and address of the factory Note: *When more than one factory, please report on page 2*	(b) (4) (b) (4) ☐ Additional Information on page 2
Ratings and principal characteristics	(b) (4)
Trademark (if any)	IQOS
Type of Customer's Testing Facility (CTF) Stage used	CTF Stage 3
Model / Type Ref.	(b) (4)
Additional information (if necessary may also be reported on page 2)	☒ Additional Information on page 2
A sample of the product was tested and found to be in conformity with	IEC 62133(ed.2)
As shown in the Test Report Ref. No. which forms part of this Certificate	BA-4788292288-A-1 issued on 2018-01-08

This CB Test Certificate is issued by the National Certification Body

☐ UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

For additional legal entity names see www.ul.com/ncbnames

Date: 2018-01-08

Signature: (b) (6)

Ref. Certif. No.

DK-69718-UL

Additional Information:
Additionally evaluated to EN62133:2013.

Additional information (if necessary)

- ☐ UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
- ☒ UL (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
- ☐ UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
- ☐ UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

For full legal entity names see www.ul.com/ncbnames

Date: 2018-01-08

Signat

(b) (6)

Test Report issued under the responsibility of:

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. .....:	BA-4788292288-A-1
Date of issue .....:	2018-01-08
Total number of pages.....	24
Applicant's name.....:	(b) (4)
Address .....:	(b) (4)
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

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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 .....:	Rechargeable Li-Ion Battery
Trade Mark .....:	IQOS
Manufacturer.....:	(b) (4)
Model/Type reference .....:	(b) (4)
Ratings .....:	

Testing procedure and testing location:			
☐	**CB Testing Laboratory:**	Underwriters Laboratories Taiwan Co., Ltd.	
Testing location/ address .....:		260 Da-Yeh Road 112 Peitou Taipei City, Chinese Taipei	
☐	**Associated CB Testing Laboratory:**		
Testing location/ address .....:			
Tested by (name + signature) .....:			
Approved by (name + signature) .....:			
☐	**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 .....:		(b) (4)	
Tested by (name + signature) .....:		(b) (6)	
Approved by (name + signature) .....:			
Supervised by (name + signature) ..:			

List of Attachments (including a total number of pages in each attachment):
National Differences (0 pages)
Enclosures (13 pages)

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
8.1.2 – Charge (procedure 2) 8.2.2 – Moulded case stress 8.3.2 – External short circuit 8.3.3 – Free fall 8.3.6 – Overcharge	**(b) (4)**

Summary of compliance with National Differences
List of countries addressed: N/A

☒ **The product fulfils the requirements of IEC 62133:2012 and EN62133:2013.**

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

(b) (4)

Test item particulars.....:	
Classification of installation and use.....:	N/A
Supply connection.....:	N/A
Recommend charging method declaired by the manufacturer ..... :	CC / CV
Discharge current (0,2 I_t A) ..... :	(b) (4)
Specified final voltage..... :	
Chemistry ..... :	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per battery pack.....:	(b) (4)
Maximum charging current.....:	
Charging temperature upper limit.....:	
Charging temperature lower limit.....:	
Polymer cell electrolyte type ..... :	☐ gel polymer ..... ☐ solid polymer
Possible test case verdicts:	
- test case does not apply to the test object.....:	N/A
- test object does meet the requirement.....:	P (Pass)
- test object does not meet the requirement.....:	F (Fail)
Testing.....:	
Date of receipt of test item .....:	2017-11-27
Date (s) of performance of tests .....:	2017-12-11 to 2017-12-13

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) ..... :	(b) (4) (b) (4)

General product information:

Product Description:

Electronic components mounted on PWB with Li-ion cell (1 series 1 parallel), covered by Shrink Tube.

Model Differences:,

Model 1ICR19/66 is the marking of IEC 62133 requirement for the models (b) (4)

Cell source is UL 1642 approved, and also investigated to IEC 62133 2nd (CBTR: BA-4788187908-A-1 issued on 2017-10-13, CBTC: DK-67403-UL issued on 2017-10-17).

The battery pack is also investigated to EN 62133:2013.

IEC 62133			
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		N/A
	Insulation resistance (MΩ) ..... :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements		N/A
	Orientation of wiring maintains adequate creepage and clearance distances between conductors		P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse		P
5.3	Venting		P
	Battery cases and cells incorporate a pressure relief mechanism or are constructed so that they relieve excessive internal pressure at a value and rate that will preclude rupture, explosion and self-ignition		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	Regulating network, IC was used.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	Batteries follow cell's charging limits.	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	Battery charging instruction and spec were provided.	P
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery		N/A
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		P

IEC 62133			
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 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	Pack follow the recommendations in cell spec.	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	No selective discharge	N/A
	Protective circuit components are added as appropriate and consideration given to the end-device application	See Critical components information Table for details.	P
	When testing a battery, the manufacturer of the battery provides a test report confirming the compliance according to this standard	Cell was approved.	P
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.	Refer to Test item particulars in page 5.	P
	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

IEC 62133			
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	Refer to ISO 9001 certification	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	Lithium System	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.		P

7	**Specific requirements and tests (nickel systems)**		**N/A**
7.1	Charging procedure for test purposes		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) ..... :		—
	Results: No physical distortion of the battery casing resulting in exposure if internal components		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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)..... :		—
	Results: No fire. No explosion. No leakage.		N/A
7.3.8	Overcharge		N/A
	Results: No fire. No explosion..... :		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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		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	For battery pack, clause 8.3.2 was considered.	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		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	`	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)		N/A
	Results: No fire. No explosion..... :		N/A
8.2.2	Moulded case stress at high ambient temperature (battery)		P
	Oven temperature (°C) ..... :	70degC	—
	Results: No physical distortion of the battery casing resulting in exposure if internal components	No physical distortion	P
8.3	Reasonably foreseeable misuse		P
8.3.1	External short circuit (cell)	Considered in approved cell.	N/A
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :		N/A
8.3.2	External short circuit (battery)		P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		P
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		P
	Results: No fire. No explosion..... :	(See Table 8.3.2)	P
8.3.3	Free fall		P
	Results: No fire. No explosion.		P
8.3.4	Thermal abuse (cells)	Considered in approved cell.	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)	Considered in approved cell.	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
	Results: No fire. No explosion..... :	(See Table 8.3.6)	P
8.3.7	Forced discharge (cells)		N/A
	Results: No fire. No explosion..... :		N/A
8.3.8	Transport tests		P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	UN38.3 test report was provided.	P
8.3.9	Design evaluation – Forced internal short circuit (cells)		N/A
	The cells complied with national requirement for ..... :		—
	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.	Considered in approved cell.	N/A
	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.	Refer to Enclosure ID-08.	P
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product	Considered in end device	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.		N/A
10.2	Battery marking		P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	1ICR19/66	P
	Batteries marked with an appropriate caution statement.	See the copy of marking plate	P
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.	Disposal instruction marked on marking plate	P
	Recommended charging instructions marked on or supplied with the battery.		P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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.	Refer to Enclosure ID-07	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		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage		P
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	**(b) (4)**	P
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range	0 to 45°C	P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied	0 to 45°C	P
A.4.3	High temperature range		P
A.4.3.1	General	Upper limit Temperature:45°C	P
A.4.3.2	Explanation of safety viewpoint		P
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range	Tested with 45°C	P
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range		N/A
A.4.4	Low temperature range		P
A.4.4.1	General	Low limit Temperature: 0°C	P
A.4.4.2	Explanation of safety viewpoint		P
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	Lower limit 0°C. Test is conducted at 0 °C which is the applicable maximum range that can be charged.	P
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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Critical components information				P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Connectors and Receptacles (SEC, SELV)	Interchangeable	Interchangeable	(b) (4)	UL 94	UL
PCB	Interchangeable	Interchangeable		UL 796	UL
Battery cells (1S-1P)	(b) (4)			IEC 62133 2nd	UL,DEMKO (CBTC: DK-67403-UL, CBTR: BA-4788187908-A-1)
Protection IC			N/A	N/A	Tested in equipment.
Label	Interchangeable	Interchangeable	60 degree C if minimum surface temperature not specified.	UL 969	UL

Supplementary information: None.

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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:

- A: No fire or explosion
- B: No leakage
- C: Leakage
- D: Fire
- E: Explosion
- F: Bulge
- G: Others (please explain)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.1	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**
Samples charged at charging temperature upper limit:					
Samples charged at charging temperature lower limit:					

Supplementary information:

- A: No fire or explosion
- B: No leakage
- C: Leakage
- D: Fire
- E: Explosion
- F: Bulge
- G: Others (please explain)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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 (Tested: 45°C)					
(b) (4)	55.0	4.339	0.084	0.9	A, F
	55.0	4.339	0.080	0.7	A, F
	55.0	4.339	0.082	1.3	A, F
	55.0	4.339	0.082	0.7	A, F
	55.0	4.338	0.083	0.9	A, F
Samples charged at charging temperature lower limit: 0°C(Tested: 0°C)					
(b) (4)	55.0	4.274	0.082	0.5	A, F
	55.0	4.274	0.081	0.5	A, F
	55.0	4.273	0.080	1.2	A, F
	55.0	4.276	0.083	0.5	A, F
	55.0	4.273	0.084	0.6	A, F

Supplementary information:

A – No fire or Explosion

B – Fire

C – Explosion

D – The test was completed after 24 h

E – The test was completed after the pack casing cooled to 20% of the maximum temperature rise

F – The battery pack remains on test for an additional one hour after the current reaches a low end steady state condition.

- Others (please explain)

Note) The samples were conditioned at lower temperature limit of 0 degC which is the applicable maximum range that can be charged.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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					
Samples charged at charging temperature lower limit					

Supplementary information:

- A: No fire or explosion
- B: No leakage
- C: Leakage
- D: Fire
- E: Explosion
- F: Bulge
- G: Others (please explain)

Maximum forced was applied.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.6	TABLE: Over-charging of battery				P
Constant charging current (A) ..... :		6.0 A			—
Supply voltage (Vdc) ..... :		5.0 Vdc			—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum outer casing temperature, (°C)**	**Results**	
(b) (4)	3.468	--	26.2	A	
	3.456	--	27.0	A	
	3.438	--	27.9	A	
	3.425	--	29.0	A	
	3.456	--	27.2	A	

Supplementary information:

A - No fire or explosion
B - No leakage
C - Leakage

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

List of test equipment used

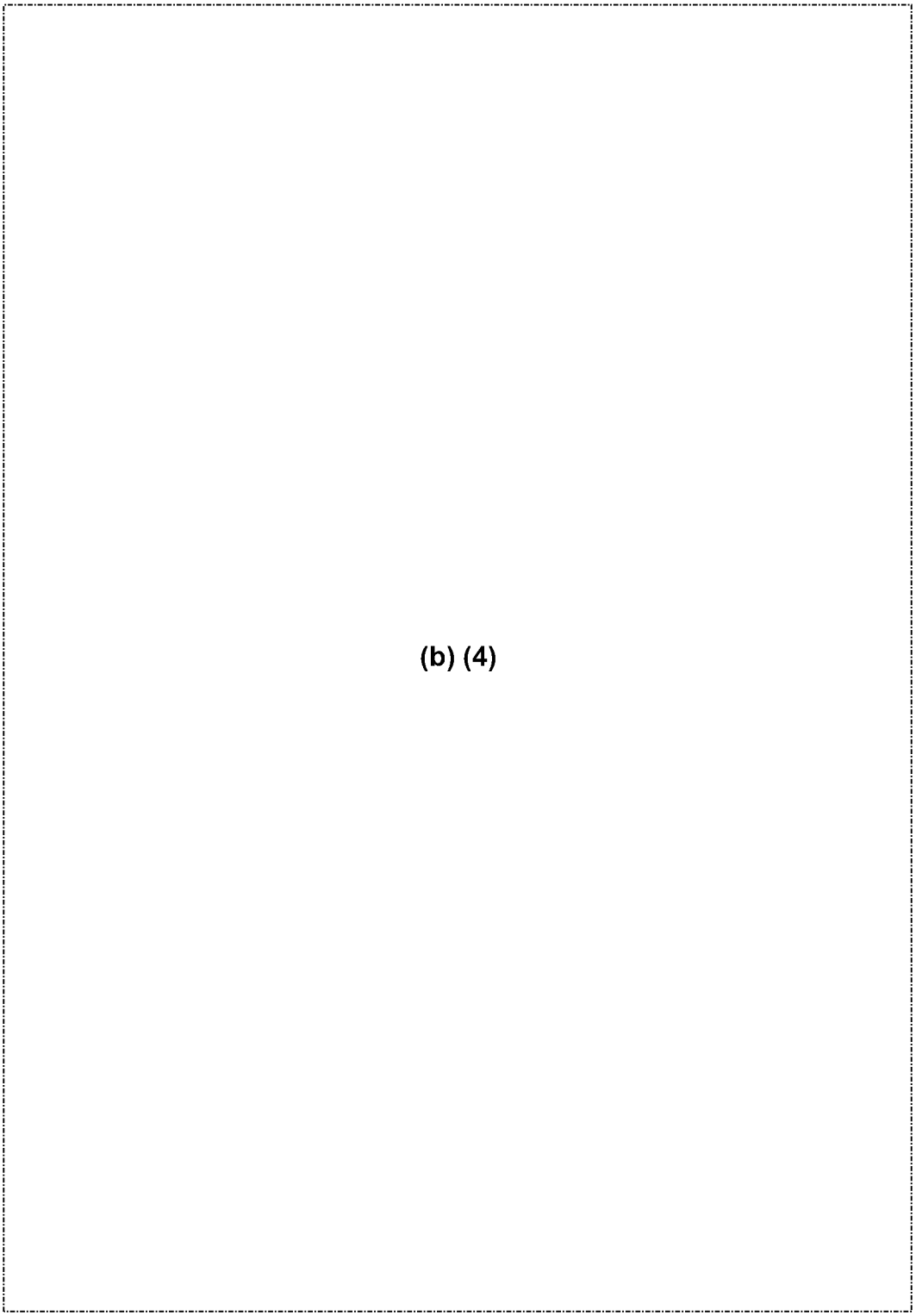
(Note: This is an example of the required attachment. Other forms with a different layout but containing similar information are also acceptable.)

Inst. ID No.	Instrument Type	Test Number +, Test Title or Conditioning	Function/Range	Last Cal. Date	Next Cal. Date
160044729-3	Netdaq	EXTERNAL SHORT CIRCUIT TEST, OVER-CHARGING OF BATTERY	0.001ºC, 0.001V / -45~220ºC 0~50V	2017-01-21	2018-01-21
160013062	Digital Multimeter	ALL TEST, VOLTAGE MEASUREMENT	0.001V, 0.001mohm / 0~1000V, 10Ω~10MΩ	2017-01-20	2018-01-20
912Q02R	Stop watch	CHARGE(PROCEDURE 2), MOULDED CASE STRESS AT HIGH AMBIENT TEMPERATURE TEST, FREE FALL, OVER-CHARGING OF BATTERY	1/100sec/ 0~9:59'99"	2017-01-24	2019-01-24
0064MHHM001	Charger	CHARGE(PROCEDURE 2), MOULDED CASE STRESS AT HIGH AMBIENT TEMPERATURE TEST, FREE FALL, OVER-CHARGING OF BATTERY	0.001V, 0.001A / 40V, 30A	2017-01-17	2018-01-17
N/A	Ruler	FREE FALL	Max. 2.0m	2017-01-20	2018-01-20
#1	Digital Thermometer	ALL TEST	0.01ºC / 0~30ºC, 70 % RH	2017-01-21	2018-01-21
160035720	Short Jig	EXTERNAL SHORT CIRCUIT TEST	N/A	N/A	N/A
160058455	Chamber	MOULDED CASE STRESS AT HIGH AMBIENT TEMPERATURE TEST	0.01℃ / -20~150℃	2017-01-17	2018-01-17
160058991	Chamber	CHARGE(PROCEDURE 2), EXTERNAL SHORT CIRCUIT TEST	0.01℃ / -25~150℃	2017-01-17	2018-01-17
#1	Thermal couple	OVER-CHARGING OF BATTERY	-45℃~220℃	2017-01-24	2018-01-24
040312430	Battery Hi Tester	EXTERNAL SHORT CIRCUIT TEST, RESISTANCE MEASUREMENT	30V, 10mΩ~10Ω	2017-01-20	2018-01-20

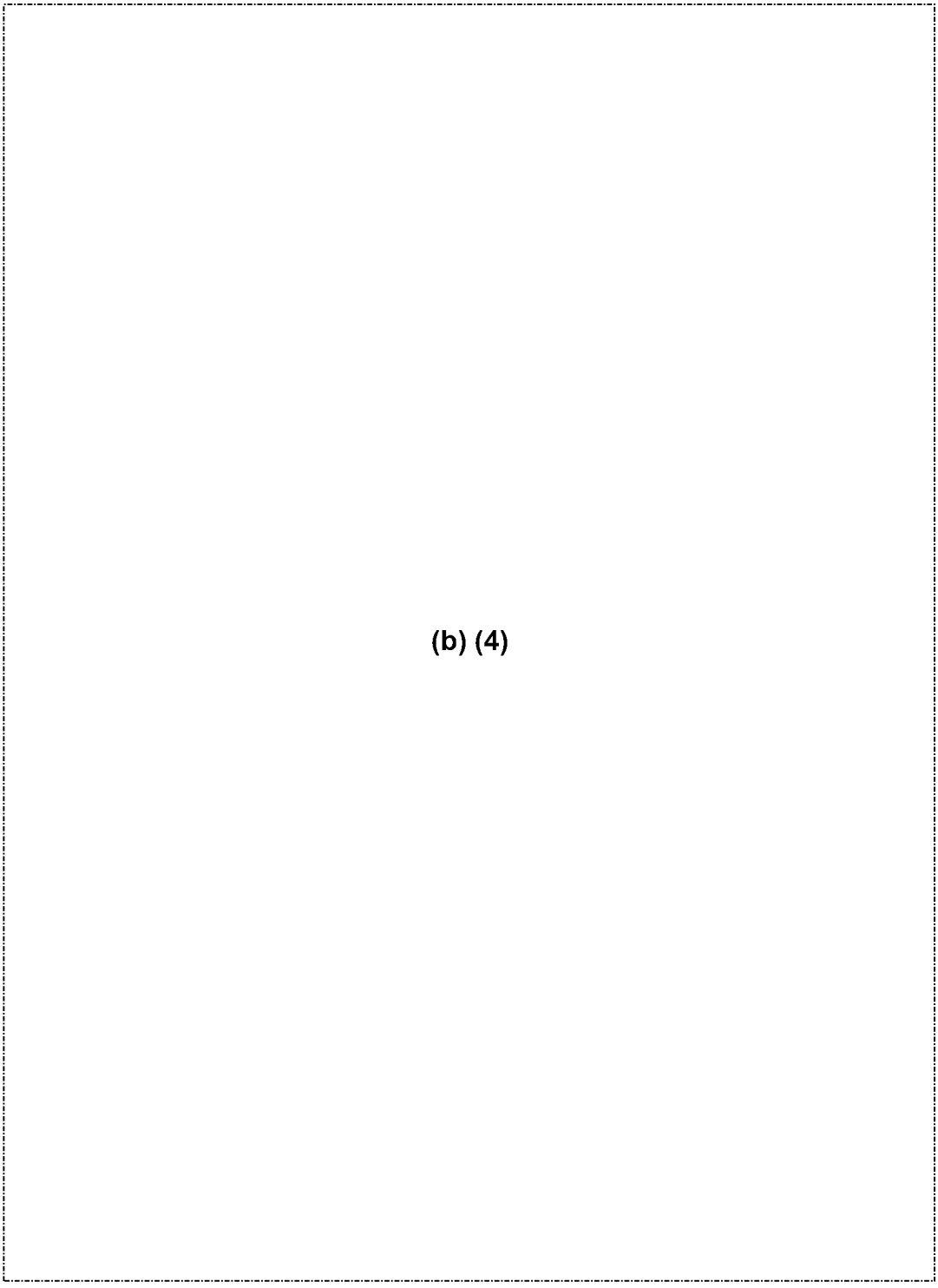
ENCLOSURE

Supplement Id	Description
01	Overall view
02	Internal view
03	PWB view
04	PWB layout
05-1~05-4	UN/DOT Test Result
06	Barcode information
07	Packaging Method
08-1~08-2	Safety Instruction
09	Specification

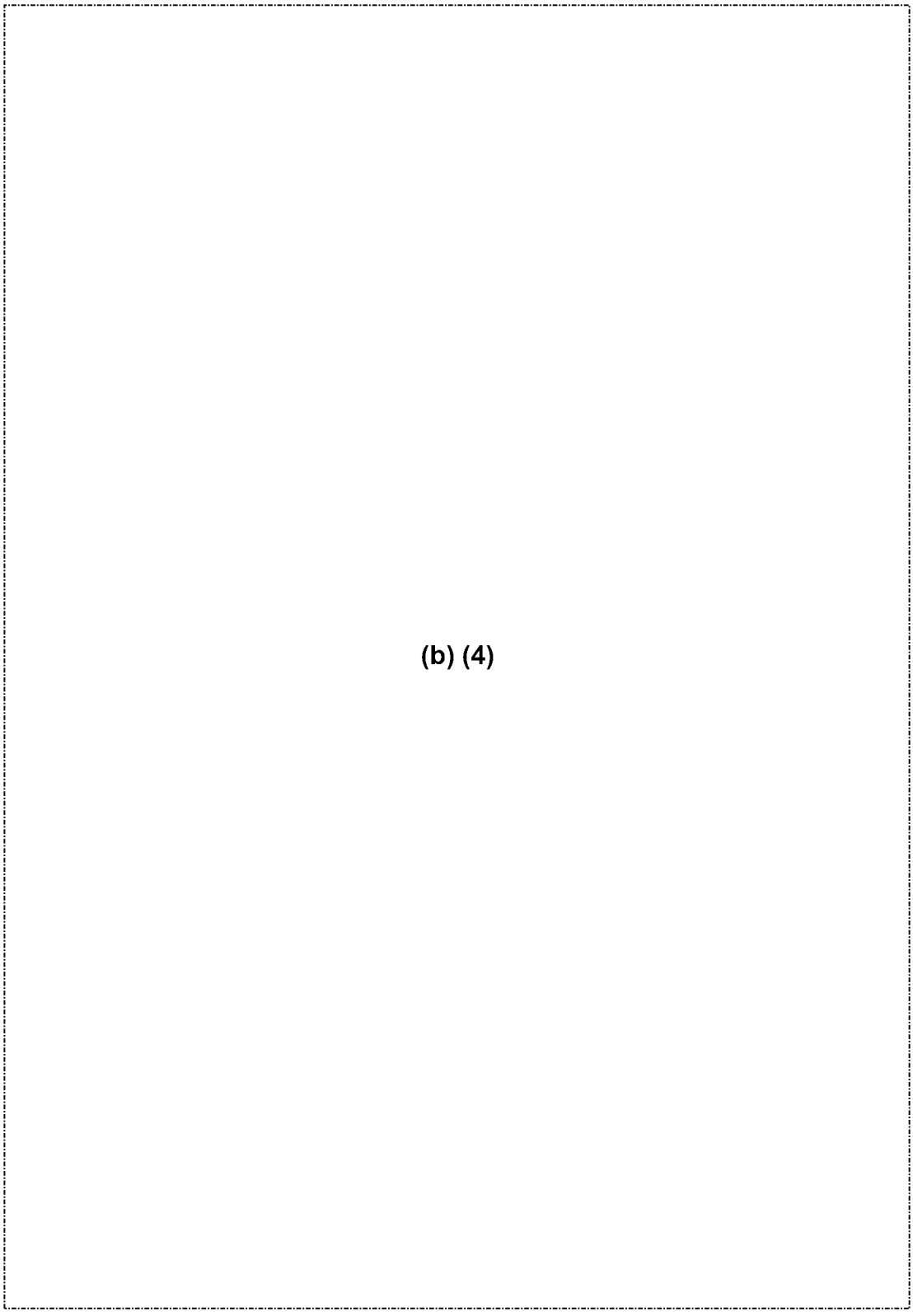
ID 01



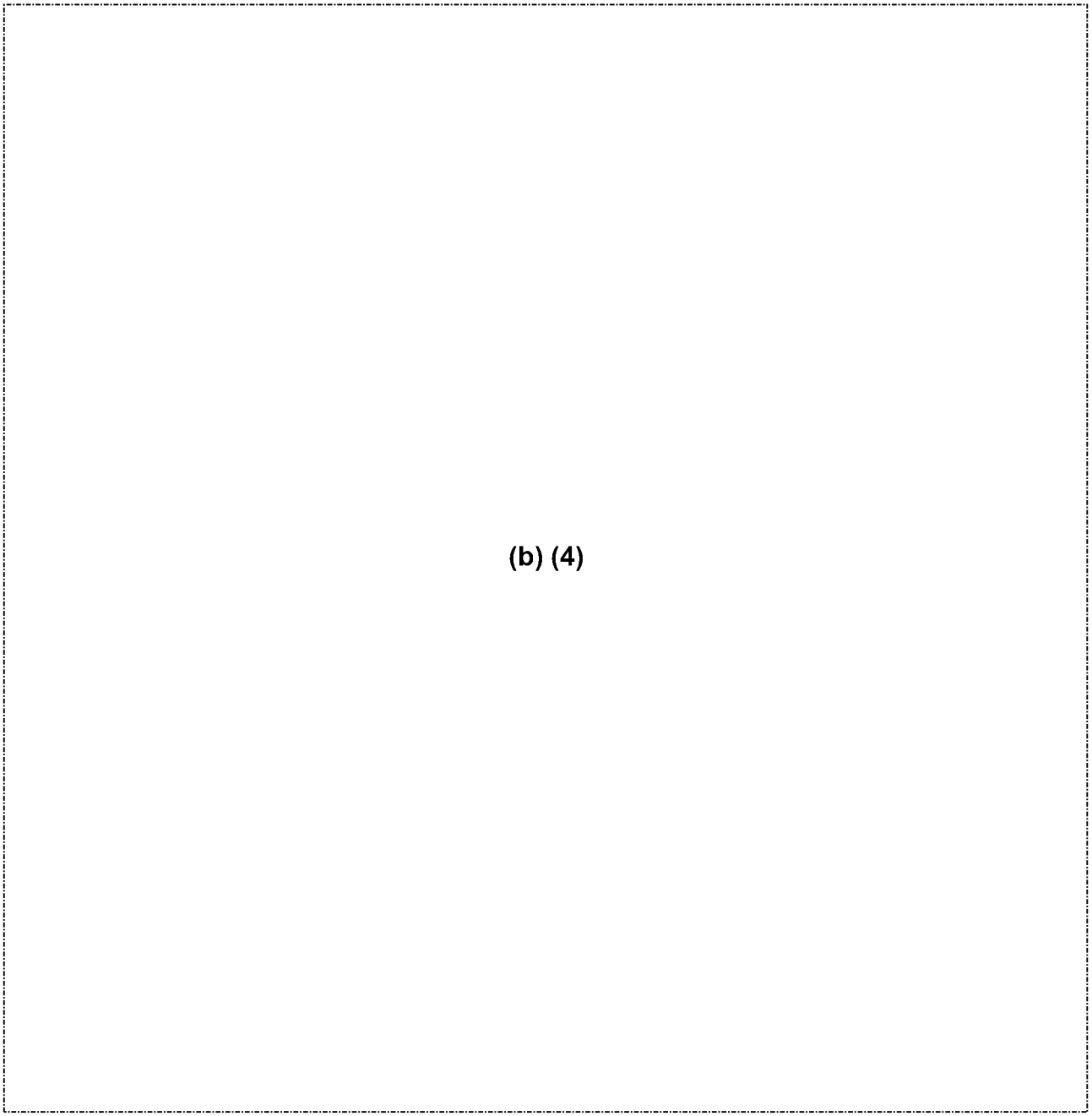
ID 02



ID 03



ID 04



ID 05-1

(b) (4)

ID 05-2

(b) (4)

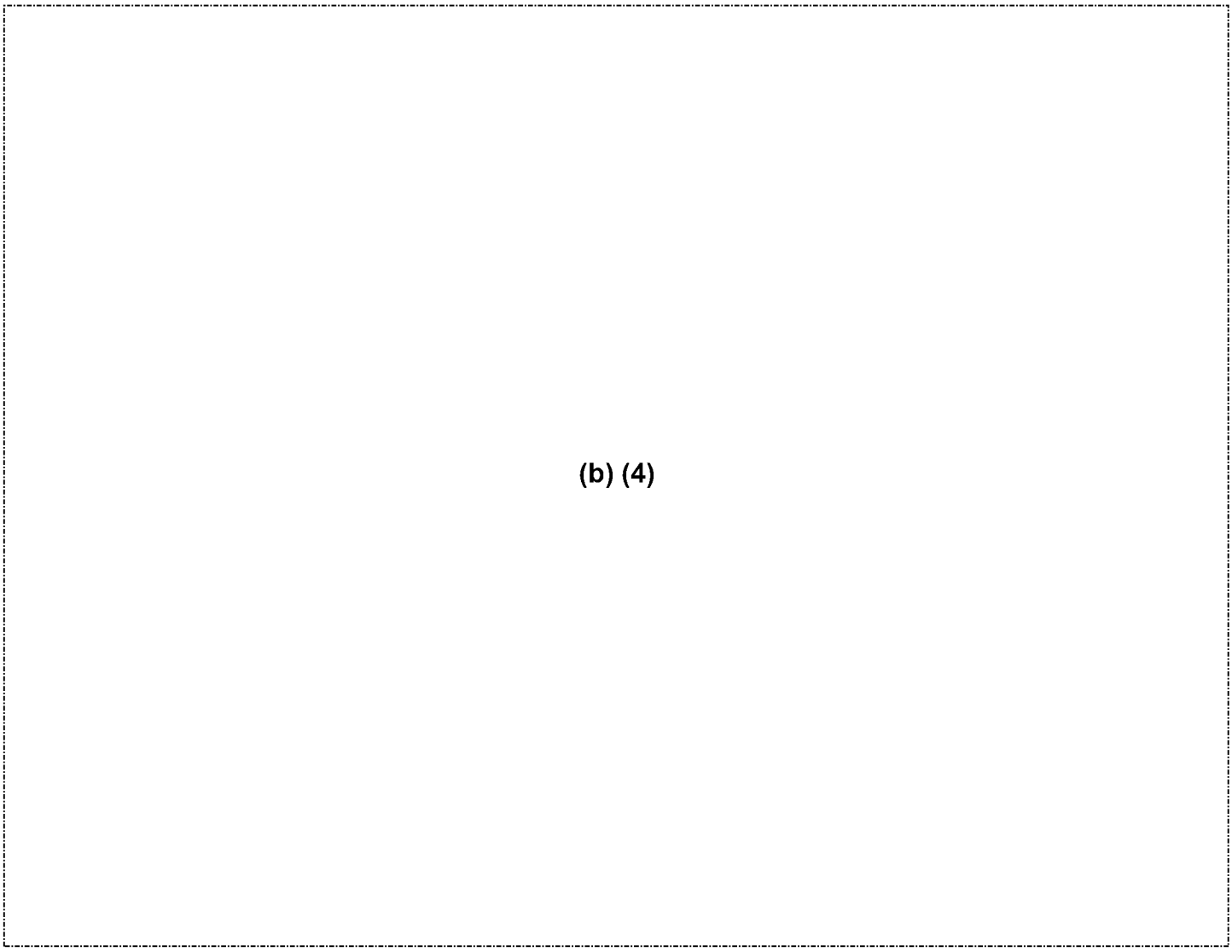
ID 05-3

(b) (4)

ID-05-4

(b) (4)

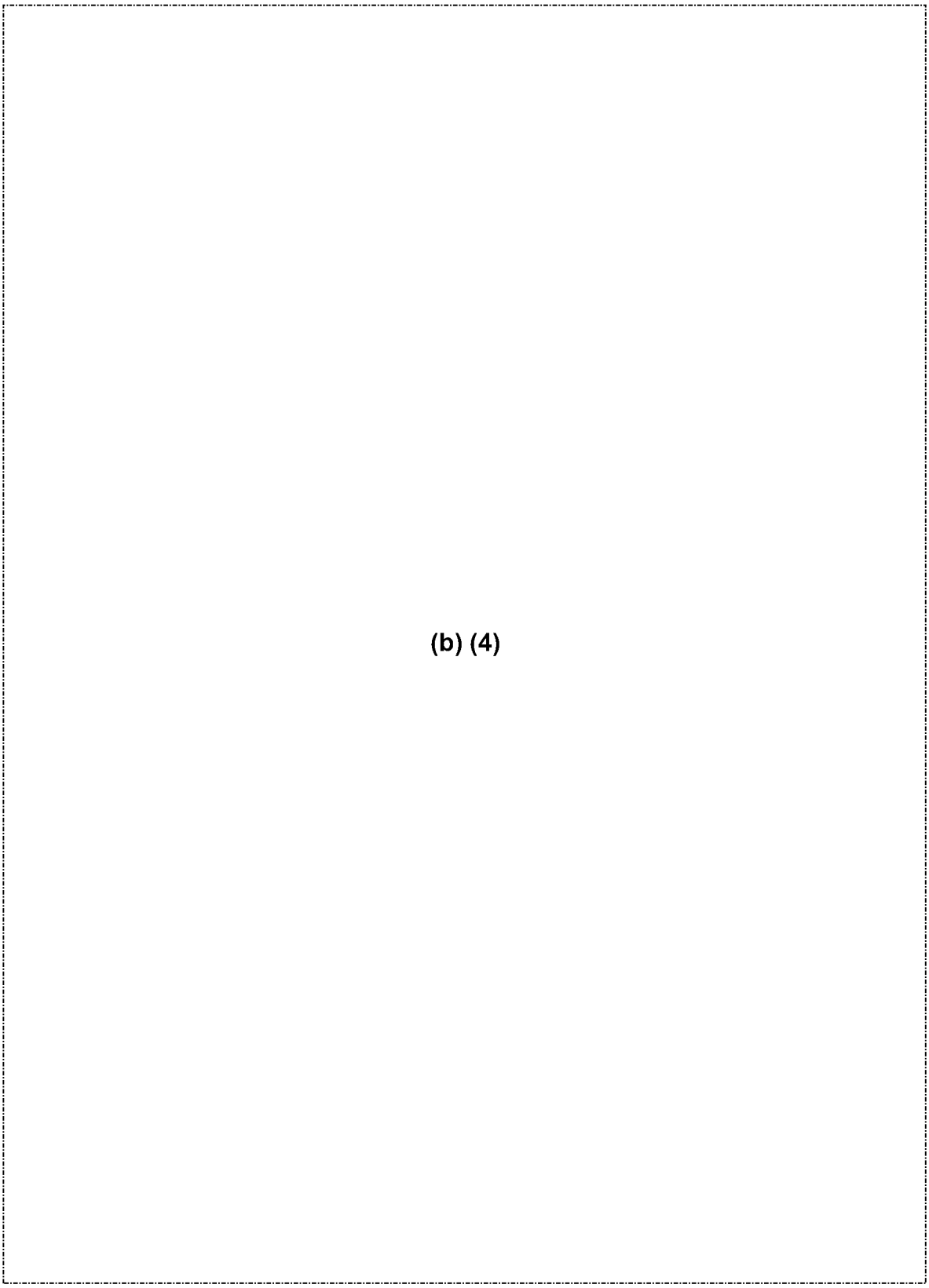
ID 06



ID 07

(b) (4)

ID 08



ID 09

(b) (4)

Ref. Certif. No.

DK-70703-M1-UL

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

CB TEST CERTIFICATE

Product	Rechargeable Li-ion Battery Pack
Name and address of the applicant	(b) (4) (b) (4)
Name and address of the manufacturer	(b) (4)
Name and address of the factory Note: *When more than one factory, please report on page 2*	(b) (4) (b) (4) ☒ Additional Information on page 2
Ratings and principal characteristics	(b) (4)
Trademark (if any)	(b) (4)
Type of Customer's Testing Facility (CTF) Stage used	
Model / Type Ref.	(b) (4)
Additional information (if necessary may also be reported on page 2)	Additionally evaluated to EN 62133:2013. ☒ Additional Information on page 2
A sample of the product was tested and found to be in conformity with	IEC 62133:2012
As shown in the Test Report Ref. No. which forms part of this Certificate	HCT-BA-1808-CB002 issued on 2018-08-14

This CB Test Certificate is issued by the National Certification Body

☐ UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

For additional legal entity names see www.ul.com/ncbnames

Date: 2018-08-14
Original Issue Date: 2018-02-14

Signature: (b) (6)

	Ref. Certif. No.
	DK-70703-M1-UL

Factories:

(b) (4)

Additional Information:
The original report was modified to include the following changes/additions:
- Change charging voltage.
- Change the Marking plate.

Additional information (if necessary)

- ☐ UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
- ☒ UL (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
- ☐ UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
- ☐ UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

For full legal entity names see www.ul.com/ncbnames

Date: 2018-08-14
Original Issue Date: 2018-02-14

Signature

(b) (6)

Test Report issued under the responsibility of:

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..... :	**HCT-BA-1808-CB002**
Date of issue..... :	**2018-08-14**
Total number of pages ..... :	12 pages
Name of Testing Laboratory preparing the Report ..... :	**(b) (4)**
Applicant's name ..... :	**(b) (4)**
Address..... :	
Test specification:	
Standard ..... :	IEC 62133:2012
Test procedure ..... :	CB Scheme
Non-standard test method ..... :	N/A
Test Report Form No. ..... :	IEC62133C
Test Report Form(s) Originator .... :	UL (Demko)
Master TRF ..... :	2018-07-27

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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.

Disclaimer: This document is controlled and has been released electronically.
Only the version on the IECEE Website is the current document version

Test item description ..... :	Rechargeable Li-ion Battery Pack
Trade Mark ..... :	(b) (4)
Manufacturer..... :	
Model/Type reference ..... :	(b) (4)
Ratings ..... :	
Responsible Testing Laboratory (as applicable), testing procedure and testing location(s):	
☒ CB Testing Laboratory:	
Testing location/ address..... :	(b) (4)
Tested by (name, function, signature) ..... :	(b) (6)
Approved by (name, function, signature)...:	
☐ 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): **Enclosures (24 Pages)**	
Summary of testing:	
Tests performed (name of test and test clause): 8.3.2 External short circuit (battery)	**Testing location:** **(b) (4)**
Summary of compliance with National Differences (List of countries addressed): ☒ **The product fulfils the requirements of IEC 62133:2012 and EN 62133:2013.**	

Copy of marking plate:

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

(b) (4)

Test item particulars:	
Recommend charging method declaired by the manufacturer :	CC/CV
Discharge current (0,2 I_t A) :	(b) (4)
Specified final voltage :	
Chemistry :	☐ nickel systems ..... ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell :	(b) (4)
Maximum charging current :	
Charging temperature upper limit :	
Charging temperature lower limit :	
Polymer cell electrolyte type :	☐ gel polymer ..... ☐ solid polymer
Possible test case verdicts:	
- test case does not apply to the test object :	N/A
- test object does meet the requirement :	P (Pass)
- test object does not meet the requirement :	F (Fail)
Testing :	
Date of receipt of test item :	2018-07-20
Date (s) of performance of tests :	2018-07-20 to 2018-08-06

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) : (b) (4)

(b) (4)

(b) (4)

(b) (4)

General product information and other remarks:

1. Electronic components mounted on PWB with a 1S1P Rechargeable Li-ion cells.

2. Battery cell.
Model: (b) (4) is tested according to IEC 62133(2nd).

3. The designation 1ICR19/65 is the marking of IEC 62133 requirement for the model. (b) (4)

Amendment-1 / HCT-BA-1804-CB001
This Report was deemed to administrative amend, due to Addition of factory(ies).

- Name and address of the Factory(ies)
(b) (4) (b) (4)
(b) (4)

- This test report shall be read in conjunction with the original CBTR HCT-BA-1802-CB001 with CBTC DK-70703-UL.

Amendment-2 / HCT-BA-1808-CB002
-This Report was deemed to technical amend, due to Change charging voltage from (b) (4)
-Change the Marking plate.

-This test report shall be read in conjunction with the Original CBTR HCT-BA-1802-CB001 and Amendment-1 CBTR HCT-BA-1804-CB001 with CBTC DK-70703-UL and CBTC DK-70703-A1-UL.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
4	**Parameter measurement tolerances**		**P**
	Parameter measurement tolerances		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		P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.		P
8	**Specific requirements and tests (lithium systems)**		**P**
8.1	Charging procedures for test purposes		P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2		N/A
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	**(b) (4)**	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	**(b) (4)**	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :		P
8.3.2	External short circuit (battery)		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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		P
	Results: No fire. No explosion..... :	(See Table 8.3.2)	

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.		N/A
10.2	Battery marking		P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	1ICR19/65	P
	Batteries marked with an appropriate caution statement.	See the copy of marking plate	P
10.3	Other information		P
	Storage and disposal instructions marked on or supplied with the battery.		P
	Recommended charging instructions marked on or supplied with the battery.		P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Critical components information				P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Cylindrical, Rechargeable Li-ion Cell	(b) (4)	(b) (4)	(b) (4)	IEC 62133(2nd)	UL Demko (DK-34408-A3-UL)
Tubing (Insulation tape)		MU		UL 224	UL
PCB		(b) (4)		UL 796	UL
Alt.	Interchangeable	Interchangeable		UL 796	UL
Enclosure (Top, Bottom)	(b) (4)			UL 94	UL
Wire				UL 758	UL
Connector	Interchangeable	Interchangeable		UL 1977	UL
Protection IC (U1)	(b) (4)			N/A	N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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 (b) (4)					
(b) (4)	55.65	4.298	0.089	0.10	No fire or explosion
	55.65	4.299	0.090	0.35	No fire or explosion
	55.65	4.30	0.088	0.25	No fire or explosion
	55.65	4.30	0.089	0.20	No fire or explosion
	55.65	4.301	0.089	0.05	No fire or explosion
Samples charged at charging temperature lower limit (b) (4)					
RS-CHN-PMI-02 (ESC-6)	55.70	4.146	0.085	0	No fire or explosion
RS-CHN-PMI-02 (ESC-7)	55.70	4.146	0.087	0	No fire or explosion
RS-CHN-PMI-02 (ESC-8)	55.70	4.145	0.085	0.15	No fire or explosion
RS-CHN-PMI-02 (ESC-9)	55.70	4.147	0.093	0	No fire or explosion
RS-CHN-PMI-02 (ESC-10)	55.70	4.146	0.093	0.05	No fire or explosion

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

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

Enclosures

Type	Description
Miscellaneous	Specifications of battery
Photographs	Overall view, parts and PCM side
Test report for transport	UN manual of testes and criteria, Section 38.3

Specifications of battery

2. Production Specification

2-1. Scope

This specification shall be applied to (b) (4) Model STD type Lithium Ion Battery manufactured by (b) (4)

2-1-1. General Specification

No.	Item	Description	Spec
1	Battery Cell	(b) (4)	
2	Charge	Standard Charge Voltage Max Charge Voltage Standard Charge Current Cut-off Current	(b) (4)
3	Standard Discharge	Discharge Current Discharge Cut-off Voltage	
4	Nominal Voltage	Normal Discharge Average Run Voltage	
5	Capacity	Standard Discharge Capacity	
6	Max. Charge Current	Max. Current of Consecutively Charge	
7	Max. Discharge Current	To 2.400V, Max. Consecutive Discharge Current	
8	Max Discharge Power		
9	Operating Temperature	Normal or Rating Charge Normal or Rating Discharge	
10	Cell Dimension	Height Diameter	
11	Cell Weight	Net Weight	
12	Storage Temperature	Temperature Range	
13	Current Consumption	Battery pack module current consumption	
14	PTC	Tyco / Electronics PSR-26039 (included in Cell)	

Photographs

(b) (4)

(b) (4)

(b) (4)

Photographs

(b) (4)

UN manual of testes and criteria, Section 38.3

Test Report issued under the responsibility of:

TEST REPORT **UN38.3** **TRANSPORT OF DANGEROUS GOODS - Lithium metal and lithium ion batteries**	
Report Number ..... : 4788546056-A-1 **Date of issue** ..... : 2018-08-14 **Total number of pages** 14	
Applicant's name	(b) (4)
Address	(b) (4)
Test specification: **Standard** ..... : ST/SG/AC.10/11/Rev.6 **Test procedure** ..... : Type Approved **Non-standard test method** ..... : N/A	
Test item description ..... : Rechargeable Li-ion Battery **Trade Mark**	(b) (4)
Manufacturer	(b) (4)
Model/Type reference ..... **Ratings**	(b) (4)
Testing procedure and testing location:	
Testing Laboratory: **Testing location/ address**	(b) (4)
Tested by (name + signature) ..... **Witnessed by (name + signature)** ..... **Approved by (name + signature)**	(b) (6)

IEC-62281-AALC-MiscForm-2002 Form Issued: 2016-04-27
Form Page 1 Form Revised:

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Summary of testing:	
Tests performed (name of test and test clause): **Original** T.1: ALTITUDE SIMULATION T.2: THERMAL TEST T.3: VIBRATION T.4: SHOCK T.5: EXTERNAL SHORT CIRCUIT T.7: OVERCHARGE	**(b) (4)**
Amendment1 T.7: OVERCHARGE	

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Test item particulars ..... :	
Battery type designation ..... :	Rechargeable Li-ion Battery
Weight of cell or battery ..... :	Approx. 50g
Lithium equivalent content ..... :	N/A
Nominal energy ..... :	N/A
Number of series connected cells ..... :	1ea
EODV..... :	(b) (4)
Manufacturer of the packaging ..... :	N/A
Description of the packaging design type ..... :	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 .....:	Original, Amendment1
Date of receipt of test item.....:	2018-01-02, 2018-07-23
Date (s) of performance of tests.....:	2018-01-17 to 2018-01-31, 2018-08-06 to 2018-08-07

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.

Name and address of factory (ies)..... (b) (4)

(b) (4)

(b) (4)

General product information:

- Report Summary

All applicable tests according to the referenced standard(s) have been carried out.

- Product Description

Electronic components mounted on PWB with 1-series, 1-parallel certified Li-ion cell and covered by plastic enclosure.

- Additional Information

The lithium-ion cell source, Samsung SDI Co Ltd, type ICR18650-30++ was UL 1642 approved component.

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Amendment1 / 4788545055-A-1
- Change max. charge voltage from (b) (4)
- T.7 Overcharge test conducted only.
- Add factory information (b) (4)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4	**Transport tests**		
38.3.4.1	Test T-1: Altitude simulation		P
	Cells or batteries are stored at a pressure of 11.6 kPa or less for at least 6 h at ambient temperature.		P
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.1	P
38.3.4.2	Test T-2: Thermal test		P
	Cells or batteries previously subjected to altitude simulation test.		P
	Cells or batteries are stored for at least 6 h at a test temperature of 72 ± 2 °C, followed by storage for at least 6 h at a test temperature of -40 ± 2 °C. Maximum time for transfer is 30 minutes. This procedure is repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature.		P
	For large cells or batteries the duration of exposure to the test temperatures is at least 12 h instead of 6 h.		N/A
	Storage for at least 24 h at ambient temperature.		P
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.2	P
38.3.4.3	Test T-3: Vibration		P
	Cells or batteries previously subjected to thermal test		P
	Cells or batteries are subjected to the following sinusoidal vibration with a logarithmic sweep: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm and the frequency increased until a peak acceleration of 8 g_n occurs (approximately 50 Hz). A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200 Hz.		P
	Large batteries are subjected to the following sinusoidal vibration with a logarithmic sweep: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm and the frequency increased until a peak acceleration of 2 g_n occurs (approximately 25 Hz). A peak acceleration of 2 g_n is then maintained until the frequency is increased to 200 Hz.		N/A
	Cycle is repeated 12 times for a total of 3 h for each of three mutually perpendicular mounting positions. One of the directions is perpendicular to the terminal face.		P
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.3	P

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.4	Test T-4: Shock		P
	Cells or batteries previously subjected to vibration test.		P
	Cells or batteries are subjected to three shocks in each direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.		P
	Cells are subjected to half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 ms.		N/A
	As an alternative, large cells are subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 ms.		N/A
	Small batteries are subjected to half-sine shock of peak acceleration of the smaller of the following and pulse duration of 6 ms: - 150 g_n; or - $\sqrt{(100/\text{mass in kg})}$ g_n		P
	Large batteries are subjected to half-sine shock of peak acceleration of the smaller of the following and pulse duration of 11 ms: - 50 g_n; or - $\sqrt{(30/\text{mass in kg})}$ g_n		N/A
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.4	P
38.3.4.5	Test T-5: External short-circuit		
	Cells or batteries previously subjected to shock test.		P
	Cells or batteries are heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case.		P
	Cells or batteries are subjected to a short-circuit condition with a total external resistance of less than 0.1 ohm at 57 ± 4 °C. Short-circuit condition is continued for at least 1 h after the cell or battery external case temperature has returned to 57 ± 4 °C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value.		P
	The test sample is observed for a further 6 h.		P
	Results: no excessive temperature rise, no rupture, no explosion and no fire during this test and within the 6 h of observation.	See appended Table 38.3.4.5	P
38.3.4.6	Test T-6: Impact / crush	Considered in battery cell.	N/A
	The test is conducted using test cells or component cells that have not been previously subjected to other transport tests.		N/A

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Clause	Requirement + Test	Result - Remark	Verdict
	Each test cell or component cell shall be subjected to one impact / crush only.		N/A
	Cylindrical cells not less than 18.0 mm in diameter are tested with impact test procedure.		N/A
	The cell is placed on a flat smooth surface. A stainless steel bar with a diameter of 15.8 ± 0.1 mm and a length of at least 60 mm or of the longest dimension of the cell, whichever is greater, is placed across the centre of the test sample. A mass of 9.1 ± 0.1 kg is dropped from a height of 61 ± 2.5 cm at the intersection of the bar and the test sample using a vertical sliding track or channel. The vertical track is oriented 90 degrees from the horizontal supporting surface.		N/A
	The test sample is impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the steel bar lying across the centre of the test sample.		N/A
	Prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter are tested with crush test procedure.		N/A
	The cell is crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact.		N/A
	A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.		N/A
	The crushing is to be continued until one of the three conditions below is reached: - The applied force reaches 13 ± 0.78 kN; - The voltage of the cell drops by at least 100 mV; or - The cell is deformed by 50 % or more of its original thickness. As soon as one of the above conditions has been obtained, the pressure shall be released.		N/A
	The test sample is observed for a further 6 h.		N/A
	Results: no excessive temperature rise, no explosion and no fire during this test and within the 6 h of observation.		N/A
38.3.4.7	Test T-7: Overcharge		P
	The charge current of the battery is twice the manufacturer's recommended maximum continuous charge current.	**(b) (4)**	P

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer's recommended charge voltage is not more than 18 V. The minimum voltage of the test is the lesser of two times the maximum charge voltage of the battery or 22 V.	**(b) (4)**	P
	The manufacturer's recommended charge voltage is more than 18 V. The voltage of the test is not less than 1.2 times the maximum charge voltage.		N/A
	The test is conducted at ambient temperature. The charging condition is maintained for at least 24 h.		P
	The test sample is observed for a further 7 days.		P
	Results: no explosion and no fire during this test and within the 7 days of observation.		P
38.3.4.8	Test T.8: Forced discharge	Considered in battery cell	N/A
	Each cell is forced discharged at ambient temperature by connecting it in series with a 12 V direct current power supply at an initial current equal to the maximum continuous discharge current specified by the manufacturer. Time interval for discharging equals to rated capacity divided by the initial test current.		N/A
	The test sample is observed for a further 7 days.		N/A
	Results: no explosion and no fire during this test, nor within the 7 days of observation.		N/A

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.1	**TABLE: Altitude**							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.137	49.650	4.137	49.650	0.00	100.00	A
2	C	4.138	49.624	4.137	49.624	0.00	99.98	A
3	C	4.138	49.481	4.137	49.478	0.01	99.98	A
4	C	4.135	49.585	4.135	49.583	0.00	100.00	A
5	D	4.149	49.550	4.148	49.550	0.00	99.98	A
6	D	4.145	49.535	4.144	49.535	0.00	99.98	A
7	D	4.145	49.535	4.145	49.535	0.00	100.00	A
8	D	4.148	49.501	4.147	49.499	0.00	99.98	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.2	TABLE: Thermal Test							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.137	49.650	4.114	49.639	0.02	99.44	A
2	C	4.137	49.624	4.114	49.610	0.03	99.44	A
3	C	4.137	49.478	4.113	49.474	0.01	99.42	A
4	C	4.135	49.583	4.112	49.579	0.01	99.44	A
5	D	4.148	49.550	4.123	49.541	0.02	99.40	A
6	D	4.144	49.535	4.119	49.529	0.01	99.40	A
7	D	4.145	49.535	4.120	49.527	0.02	99.40	A
8	D	4.147	49.499	4.122	49.495	0.01	99.40	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.3	**TABLE: Vibration**							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.114	49.639	4.113	49.639	0.00	99.98	A
2	C	4.114	49.610	4.113	49.610	0.00	99.98	A
3	C	4.113	49.474	4.112	49.472	0.00	99.98	A
4	C	4.112	49.579	4.111	49.578	0.00	99.98	A
5	D	4.123	49.541	4.122	49.540	0.00	99.98	A
6	D	4.119	49.529	4.118	49.528	0.00	99.98	A
7	D	4.120	49.527	4.119	49.527	0.00	99.98	A
8	D	4.122	49.495	4.121	49.492	0.01	99.98	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.4	TABLE: Shock							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.113	49.639	4.112	49.638	0.00	0.00	A
2	C	4.113	49.610	4.112	49.610	0.00	0.00	A
3	C	4.112	49.472	4.111	49.472	0.00	0.00	A
4	C	4.111	49.578	4.110	49.576	0.00	0.00	A
5	D	4.122	49.540	4.121	49.540	0.00	0.00	A
6	D	4.118	49.528	4.117	49.527	0.00	0.00	A
7	D	4.119	49.527	4.117	49.526	0.00	0.00	A
8	D	4.121	49.492	4.120	49.492	0.00	0.00	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.5	**TABLE: External short-circuit**					P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Open circuit voltage after test (V)	Maximum case temperature (°C)	Total external resistance (Ω)	Results
1	C	4.112	--	57.80	--	A
2	C	4.112	--	58.05	--	A
3	C	4.111	--	57.90	--	A
4	C	4.110	--	57.75	--	A
5	D	4.121	--	57.85	--	A
6	D	4.117	--	58.15	--	A
7	D	4.117	--	57.95	--	A
8	D	4.120	--	57.80	--	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No excessive temperature rise (above 170°C), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.7	**TABLE: Overcharge**					P
Sample No.	Precondition	Open circuit voltage before test (V)	Maximum charging current (mA)	Maximum charging voltage (V)	Total charging time (h)	Results
1cycle-1	A	--	540	8.7	24	A
1cycle-2	A	--	390	8.7	24	A
1cycle-3	A	--	2226	8.7	24	A
1cycle-4	A	--	1193	8.7	24	A
50cycle-1	B	--	894	8.7	24	A
50cycle-2	B	--	916	8.7	24	A
50cycle-3	B	--	1503	8.7	24	A
50cycle-4	B	--	2025	8.7	24	A

Supplementary information:

Precondition:

A: First cycle in fully charged state.
B: After 50 cycles ending in fully charged state.
C: After 25 cycles ending in fully charged state.

Results:

A: No disassembly (explosion), and no fire.
B: Other (please explain)

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ENCLOSURE

Supplement Id	Description
01	Overall view
02	Specification
03	Charging protection design for battery pack
04	Packaging Method

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ID-01

(b) (4)

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ID-02

2-1-1. General Specification

No.	Item	Description	Spec
1	Battery Cell	**(b) (4)**	
2	Charge	Standard Charge Voltage Max Charge Voltage Standard Charge Current Cut-off Current	**(b) (4)**
3	Standard Discharge	Discharge Current Discharge Cut-off Voltage	
4	Nominal Voltage	Normal Discharge Average Run Voltage	
5	Capacity	Standard Discharge Capacity	
6	Max. Charge Current	Max. Current of Consecutively Charge	
7	Max. Discharge Current	To 2.400V, Max. Consecutive Discharge Current	
8	Max Discharge Power		
9	Operating Temperature	Normal or Rating Charge Normal or Rating Discharge	
10	Cell Dimension	Height Diameter	
11	Cell Weight	Net Weight	
12	Storage Temperature	Temperature Range	
13	Current Consumption	Battery pack module current consumption	
14	PTC	Tyco / Electronics PSR-36039 (included in Cell)	

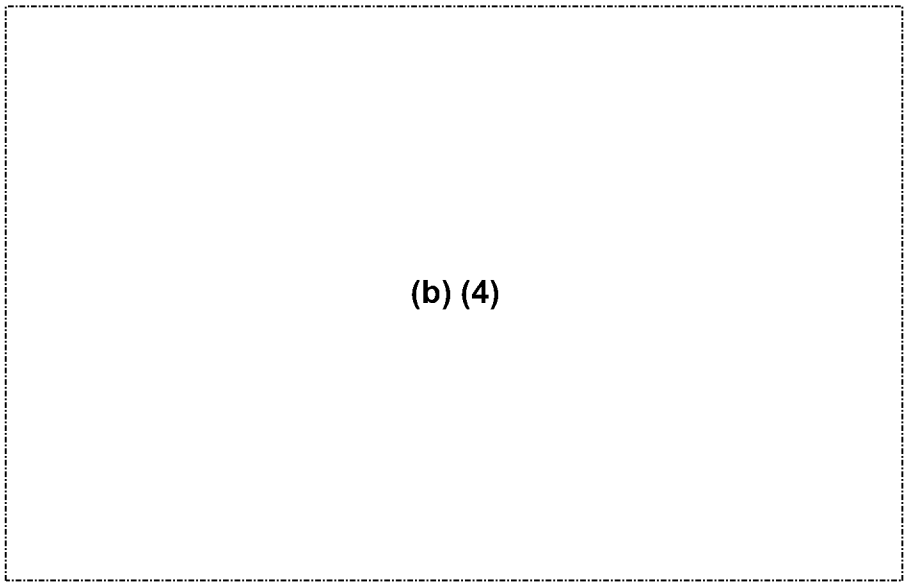
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UN manual of testes and criteria, Section 38.3

ID-03

8. Circuit Diagram



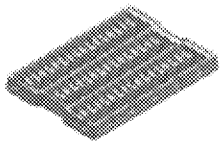
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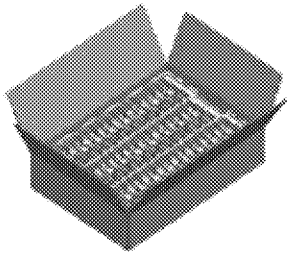
UN manual of testes and criteria, Section 38.3

ID-04

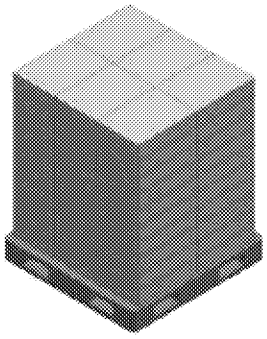
12. Packing (Unit : mm) TBD



Tray
484 X 346 X 21.75
Battery Pack
50ea



Master Box
Tray X 4
494 X 356 X 103
Battery Pack
200ea



Pallet
Master Box X 60
10 Stack Loading
Battery Pack
12,000ea

1 Tray = 50ea Battery Packs
1 Master Box = 4 Tray (200ea Battery Packs)
1 Pallet = 60 Master Boxes (12,000ea Battery Packs)

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Ref. Certif. No.

DK-70703-UL

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

CB TEST CERTIFICATE

Product	Rechargeable Li-ion Battery Pack
Name and address of the applicant	(b) (4)
Name and address of the manufacturer	(b) (4)
Name and address of the factory Note: *When more than one factory, please report on page 2*	(b) (4) ☐ Additional Information on page 2
Ratings and principal characteristics	(b) (4)
Trademark (if any)	(b) (4)
Type of Customer's Testing Facility (CTF) Stage used	
Model / Type Ref.	RS-CHN-PMI-02, 1ICR19/65
Additional information (if necessary may also be reported on page 2)	Additionally evaluated to EN 62133:2013. ☐ Additional Information on page 2
A sample of the product was tested and found to be in conformity with	IEC 62133(ed.2)
As shown in the Test Report Ref. No. which forms part of this Certificate	HCT-BA-1802-CB001 issued on 2018-02-14

This CB Test Certificate is issued by the National Certification Body

☐ UL (US), 333 Pfingsten Rd IL 60062, Northbrook, USA
☒ UL (Demko), Borupvang 5A DK-2750 Ballerup, DENMARK
☐ UL (JP), Marunouchi Trust Tower Main Building 6F, 1-8-3 Marunouchi, Chiyoda-ku, Tokyo 100-0005, JAPAN
☐ UL (CA), 7 Underwriters Road, Toronto, M1R 3B4 Ontario, CANADA

legal entity names see www.ul.com/ncbnames

Date: 2018-02-14

Signature: (b) (6)

Test Report issued under the responsibility of:

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. ..... :	HCT-BA-1802-CB001
Date of issue ..... :	2018-02-14
Total number of pages	25 pages
Applicant's name ..... :	(b) (4)
Address ..... :	(b) (4)
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

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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 ..... :	Rechargeable Li-ion Battery Pack
Trade Mark ..... :	(b) (4)
Manufacturer ..... :	Same as applicant
Model/Type reference ..... :	(b) (4)
Ratings ..... :	

Testing procedure and testing location:	
☒ **CB Testing Laboratory:**	(b) (4)
Testing location/ address .....:	
☐ **Associated CB Testing Laboratory:**	
Testing location/ address .....:	
Tested by (name, function + signature) ... :	(b) (6)
Approved by (name, function + signature) :	
☐ **Testing procedure: TMP**	
Testing location/ address .....:	(b) (4)
Tested by (name + signature) .....:	(b) (6)
Approved by (name + signature) .....:	
☐ **Testing procedure: WMT**	(b) (4)
Testing location/ address .....:	
Tested by (name + signature) .....:	(b) (6)
Witnessed by (name + signature) ....:	
Approved by (name + signature) .....:	
☐ **Testing procedure: SMT**	(b) (4)
Testing location/ address .....:	
Tested by (name + signature) .....:	(b) (6)
Approved by (name + signature) .....:	
Supervised by (name + signature)...:	

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

Enclosures : 27 pages

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
8.2.2 – Moulded case stress 8.3.2 – External short circuit 8.3.3 – Free fall 8.3.6 – Overcharge	**(b) (4)**

Summary of compliance with National Differences

List of countries addressed: N/A

☒ **The product fulfils the requirements of IEC 62133:2012 and EN 62133:2013**

Copy of marking plate

The artwork below may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

(b) (4)

Test item particulars:	
Classification of installation and use:	N/A
Supply connection:	N/A
Recommend charging method declared by the manufacturer:	CC / CV
Discharge current (0,2 I_t A):	(b) (4)
Specified final voltage:	
Chemistry:	☐ nickel systems ☒ lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell:	(b) (4)
Maximum charging current:	
Charging temperature upper limit:	
Charging temperature lower limit:	
Polymer cell electrolyte type:	☐ gel polymer ☐ solid polymer
Possible test case verdicts:	
- test case does not apply to the test object:	N/A
- test object does meet the requirement:	P (Pass)
- test object does not meet the requirement:	F (Fail)
Testing:	
Date of receipt of test item:	2018-01-10
Date (s) of performance of tests:	2018-01-10 to 2018-02-01

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) ..... :	(b) (4) (b) (4)

General product information:

1. Electronic components mounted on PWB with a 1S1P Rechargeable Li-ion cells.

2. Battery cell
   Model: (b) (4) s tested according to IEC 62133(2nd).

3. The designation 1ICR19/65 is the marking of IEC 62133 requirement for the model, RS-CHN-PMI-02

IEC 62133			
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		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		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		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		P
	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 associated chargers are designed to maintain charging within the temperature, voltage and current limits specified		P
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery	Key type connector	N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current		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	1S1P	N/A
	Each battery has an independent control and protection		P
	Manufacturers of cells make recommendations about current, voltage and temperature limits so that the battery manufacturer/designer may ensure proper design and assembly		N/A
	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.		P
	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

IEC 62133			
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	Refer to the ISO 9001 certification.	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	Lithium System	P
	Unless noted otherwise in the test methods, testing was conducted in an ambient of 20°C ± 5°C.		P
7	**Specific requirements and tests (nickel systems)**		**N/A**
7.1	Charging procedure for test purposes		N/A
7.2	Intended use		N/A
7.2.1	Continuous low-rate charging (cells)		N/A
	Results: No fire. No explosion	(See Table 7.2.1)	N/A
7.2.2	Vibration		N/A
	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)..... :		—

IEC 62133			
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..... :	(See Table 7.3.1)	N/A
7.3.2	External short circuit		N/A
	The cells or batteries were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.2)	N/A
7.3.3	Free fall		N/A
	Results: No fire. No explosion.		N/A
7.3.4	Mechanical shock (crash hazard)		N/A
	Results: No fire. No explosion. No leakage.		N/A
7.3.5	Thermal abuse		N/A
	Oven temperature (°C)..... :		—
	Results: No fire. No explosion.		N/A
7.3.6	Crushing of cells		N/A
	The crushing force was released upon: - The maximum force of 13 kN ± 1 kN has been applied; or		N/A
	- An abrupt voltage drop of one-third of the original voltage has been obtained		N/A
	The cell is prismatic type and a second set of samples was tested, rotated 90° around longitudinal axis compared to the first set		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.6)	N/A
7.3.7	Low pressure		N/A
	Chamber pressure (kPa)..... :		—

IEC 62133			
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..... :	(See Table 7.3.8)	N/A
7.3.9	Forced discharge		N/A
	Results: No fire. No explosion..... :	(See Table 7.3.9)	N/A

8	**Specific requirements and tests (lithium systems)**		**P**
8.1	Charging procedures for test purposes		P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2		P
8.1.2	Second procedure: This charging procedure applied to the tests of 8.3.1, 8.3.2, 8.3.4, 8.3.5, and 8.3.9		P
	If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit	**(b) (4)**	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		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)		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)		P
	Oven temperature (°C)..... :	(70±2) °C	—
	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)		N/A
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A

IEC 62133			
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)		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
	In case of rapid decline in short circuit current, the battery pack remained on test for an additional one hour after the current reached a low end steady state condition		P
	Results: No fire. No explosion..... :	(See Table 8.3.2)	P
8.3.3	Free fall		P
	Results: No fire. No explosion.		P
8.3.4	Thermal abuse (cells)		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)		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..... :	(See Table 8.3.5)	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
	Results: No fire. No explosion..... :	(See Table 8.3.6)	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
8.3.7	Forced discharge (cells)	(See Table 8.3.7)	N/A
	Results: No fire. No explosion..... :		N/A
8.3.8	Transport tests		P
	Manufacturer's documentation provided to show compliance with UN Recommendations on Transport of Dangerous Goods	See the enclosure Test report for transport.	P
8.3.9	Design evaluation – Forced internal short circuit (cells)		N/A
	The cells complied with national requirement for .....:		—
	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 ..... :	(See Table 8.3.9)	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.		N/A
	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.		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.		N/A
10.2	Battery marking		P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	1ICR19/65	P
	Batteries marked with an appropriate caution statement.	See the copy of marking plate	P
10.3	Other information		P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	Storage and disposal instructions marked on or supplied with the battery.		P
	Recommended charging instructions marked on or supplied with the battery.		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.	See the enclosure package instructions	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		P
A.3	Consideration on charging voltage		P
A.3.1	General		P
A.3.2	Upper limit charging voltage		N/A
A.3.2.1	General		P
A.3.2.2	Explanation of safety viewpoint		P
A.3.2.3	Safety requirements, when different upper limit charging voltage is applied	**(b) (4)**	P
A.4	Consideration of temperature and charging current		P
A.4.1	General		P
A.4.2	Recommended temperature range		P
A.4.2.1	General		P
A.4.2.2	Safety consideration when a different recommended temperature range is applied		P
A.4.3	High temperature range		P
A.4.3.1	General		P
A.4.3.2	Explanation of safety viewpoint		P
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range	high temperature: 45 °C	P
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range		N/A
A.4.4	Low temperature range		P
A.4.4.1	General		P
A.4.4.2	Explanation of safety viewpoint		P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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	lower temperature: -5 °C	P
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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

	TABLE: Critical components information				P
Object/part no.	**Manufacturer/ trademark**	**Type/model**	**Technical data**	**Standard**	**Mark(s) of conformity [1)]**
Cylindrical, Rechargeable Li-ion Cell	(b) (4)		(b) (4)	IEC 62133(2nd)	UL Demko (DK-34408-A3-UL)
Tubing (Insulation tape)				UL 224	UL
PCB				UL 796	UL
Alt.	Interchangeable	Interchangeable		UL 796	UL
Enclosure (Top, Bottom)	(b) (4)			UL 94	UL
Wire				UL 758	UL
Connector	Interchangeable	Interchangeable		UL 1977	UL
Protection IC (U1)	(b) (4)			N/A	N/A

Supplementary information:

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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 ± 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:

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.1	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**
Samples charged at charging temperature upper limit °C					
Samples charged at charging temperature lower limit °C					

Supplementary information:

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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					
(b) (4)	55.65	4.17	97.60	0	No fire or explosion
	55.65	4.17	96.70	0	No fire or explosion
	55.65	4.17	95.40	0	No fire or explosion
	55.65	4.17	96.80	0.25	No fire or explosion
	55.65	4.17	97.20	0	No fire or explosion
Samples charged at charging temperature lower limit -5 °C					
(b) (4)	55.65	4.01	81.10	0.10	No fire or explosion
	55.65	4.01	88.80	0.35	No fire or explosion
	55.65	4.01	84.80	0.25	No fire or explosion
	55.65	4.00	84.90	0.20	No fire or explosion
	55.65	4.01	88.70	0.20	No fire or explosion

Supplementary information:

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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					
Samples charged at charging temperature lower limit °C					

Supplementary information:

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

8.3.6	TABLE: Over-charging of battery		P
Constant charging current (A).....:		5.80	—
Supply voltage (Vdc).....:		5.0	—

Model	OCV before charging, (Vdc)	Resistance of circuit, (Ω)	Maximum outer casing temperature, (°C)	Results
(b) (4)	3.43	N/A	22.95	No fire or explosion
	3.44	N/A	21.98	No fire or explosion
	3.46	N/A	21.94	No fire or explosion
	3.43	N/A	22.01	No fire or explosion
	3.44	N/A	22.05	No fire or explosion

Supplementary information:

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

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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

Supplementary information:

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

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)**	**Results**

Supplementary information:

[1)] Identify one of the following:

1: Nickel particle inserted between positive and negative (active material) coated area.

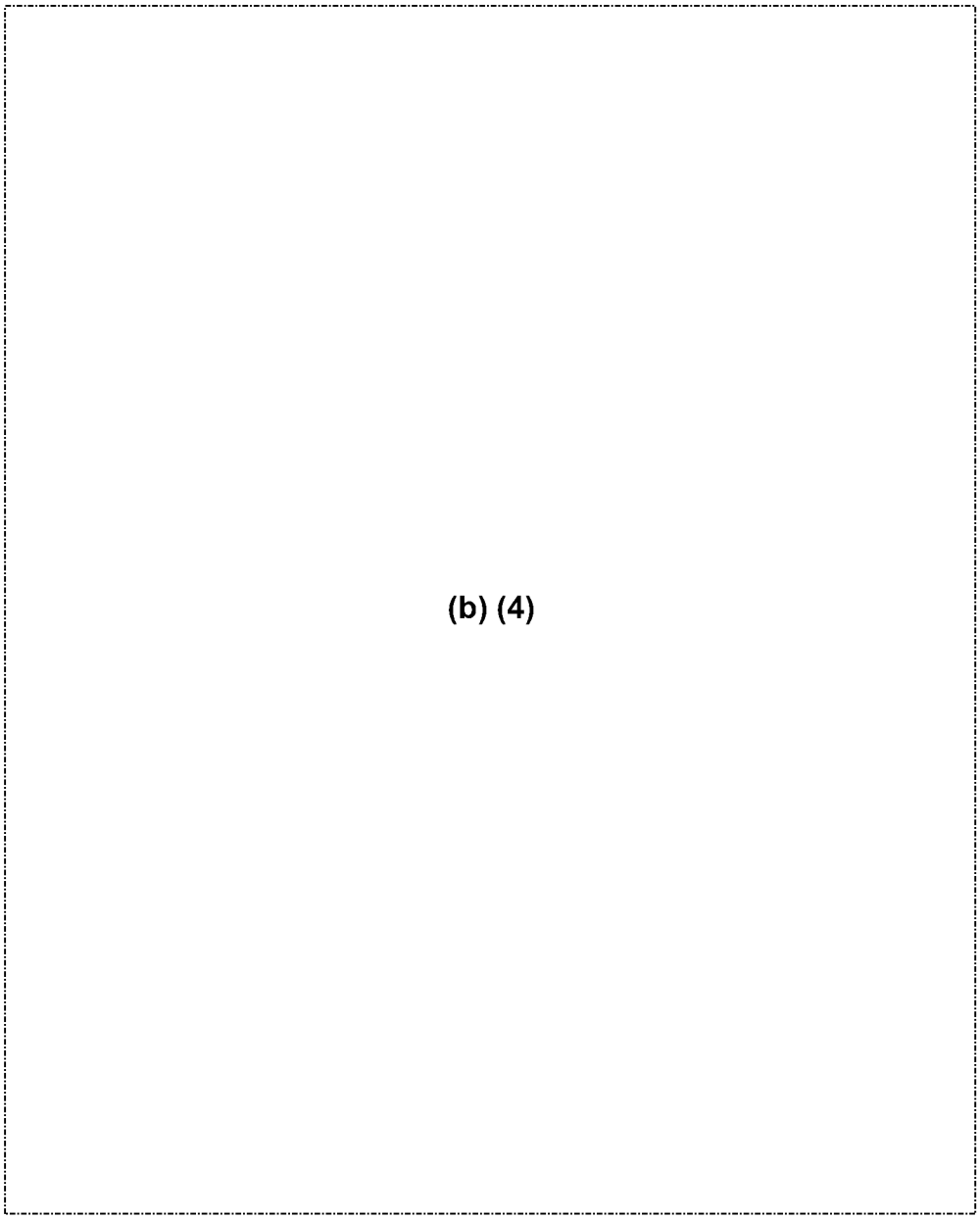
2: Nickel particle inserted between positive aluminium foil and negative active material coated area.

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

Enclosures

Type	Description
Diagrams	Circuit diagram of PCM
Instructions	Recommendations to equipment manufacturers and battery assemblers and the end-users
Miscellaneous	Package instructions
Miscellaneous	Specifications of battery
Miscellaneous	Quality management system certificate
Photographs	Overall view, parts and PCM side
Test report for transport	UN manual of testes and criteria, Section 38.3

Circuit diagram of PCM



Recommendations to equipment manufacturers and battery assemblers and the end-users

10. Recommendation about Li-ion Battery

1. Recommendation about Li-ion Battery

1) Handling Matters

<Warning>

If the battery pack is mishandled, the battery pack can burst, cause a fire or even chemical burns. Observe the following cautions.

a) Do not disassemble.

b) Do not crush and do not expose the battery pack to any shock or force such as hammering, dropping or stepping on it.

c) Do not short circuit and do not allow metal objects to come into contact with the battery terminals.

d) Do not expose to high temperature above 60°C (140°F) such as in direct sunlight or in a car parked in the sun.

e) Do not incinerate or dispose of in fire.

f) Do not handle damaged or leaking lithium ion batteries.

g) Keep the battery pack out of the reach of small children.

h) Keep the battery pack dry.

i) Dispose of used battery packs promptly as described in the instructions.

j) Do not heat the product (or battery) or expose it to heat

(e.g. inside a vehicle during the summer). There is a danger of explosion or fire

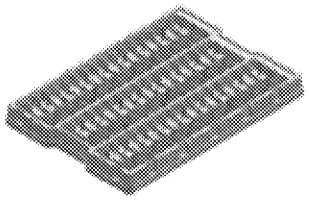
2. Disposal Guidelines

a) Dispose of worn-out batteries properly. There is a danger of fire or explosion.

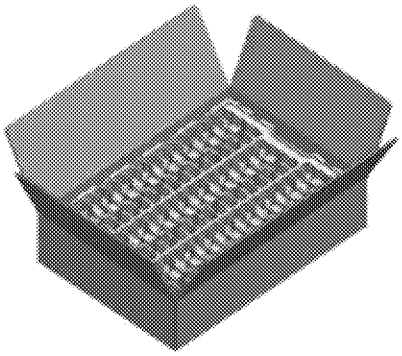
b) The battery disposal method may differ depending on your country and region.

Dispose of the used battery in an appropriate way

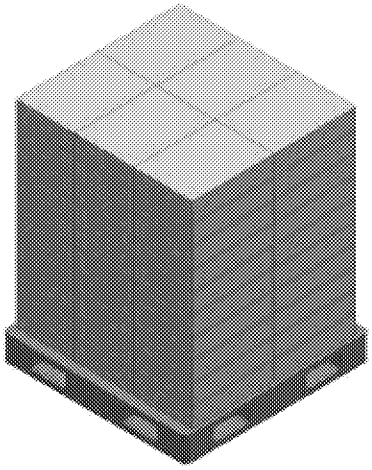
Package instructions



Tray
484 X 346 X 21.75
Battery Pack
50ea



Master Box
Tray X 4
494 X 356 X 103
Battery Pack
200ea



Pallet
Master Box X 60
10 Stack Loading
Battery Pack
12,000ea

1 Tray = 50ea Battery Packs
1 Master Box = 4 Tray (200ea Battery Packs)
1 Pallet = 60 Master Boxes (12,000ea Battery Packs)

Specifications of battery

2. Production Specification

2-1. Scope

This specification shall be applied t (b) (4) STD type Lithium Ion Battery manufactured by

2-1-1. General Specification

No.	Item	Description	Spec
1	Battery Cell	(b) (4)	
2	Standard Charge	Charge Voltage Charge Current Cut-off Current	(b) (4)
3	Standard Discharge	Discharge Current Discharge Cut-off Voltage	
4	Nominal Voltage	Normal Discharge Average Run Voltage	
5	Capacity	Standard Discharge Capacity	
6	Max. Charge Current	Max. Current of Consecutively Charge	
7	Max. Discharge Current	To 2.400V, Max. Consecutive Discharge Current	
8	Max Discharge Power		
9	Operating Temperature	Normal or Rating Charge Normal or Rating Discharge	
10	Cell Dimension	Height Diameter	
11	Cell Weight	Net Weight	
12	Storage Temperature	Temperature Range	
13	Current Consumption	Battery pack module current consumption	
14	PTC	Tyco / Electronics PSR-26039 (Included in Cell)	

Quality management system certificate

(b) (4)

Certificate No: RAQ1457

Certificate of Registration

QUALITY MANAGEMENT SYSTEM

This is to certify that
the quality management system of

(b) (4)

Has been found to confirm to the Quality Management System Standards:

KS Q ISO 9001:2015 / ISO 9001:2015

This Certificate is valid for the following product or service ranges:

Design, Development and Manufacture of Battery Pack

Issue Date: Jan. 25. 2018

Certification Date : Jan. 20. 2017 Valid Date : Jan. 19. 2020

(b) (4)

KAB

Authorized By

(b) (6)

(b) (4)

Photographs

(b) (4)

Photographs

(b) (4)

Photographs

(b) (4)

UN manual of testes and criteria, Section 38.3

Test Report issued under the responsibility of:

TEST REPORT **UN38.3** **TRANSPORT OF DANGEROUS GOODS - Lithium metal and lithium ion batteries**	
Report Number	: 4788301153-A-1
Date of issue	: 2018-02-12
Total number of pages	13
Applicant's name	(b) (4)
Address	(b) (4)
Test specification:	
Standard	ST/SG/AC.10/11/Rev 6
Test procedure	Type Approved
Non-standard test method	N/A
Test item description	Rechargeable Li-ion Battery
Trade Mark	(b) (4)
Manufacturer	(b) (4)
Model/Type reference	(b) (4)
Ratings	
Testing procedure and testing location:	
Testing Laboratory:	(b) (4)
Testing location/ address	
Tested by (name + signature)	(b) (6)
Approved by (name + signature)	

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Summary of testing:	
Tests performed (name of test and test clause): T.1: ALTITUDE SIMULATION T.2: THERMAL TEST T.3: VIBRATION T.4: SHOCK T.5: EXTERNAL SHORT CIRCUIT T.7: OVERCHARGE	**Testing location:** **(b) (4)**

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Test item particulars ..... :	
Battery type designation ..... :	Rechargeable Li-ion Battery
Weight of cell or battery ..... :	Approx. 50g
Lithium equivalent content ..... :	N/A
Nominal energy ..... :	N/A
Number of series connected cells ..... :	1ea
EODV ..... :	(b) (4)
Manufacturer of the packaging ..... :	N/A
Description of the packaging design type ..... :	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 ..... :	2018-01-02
Date (s) of performance of tests ..... :	2018-01-17 to 2018-01-31

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.

Name and address of factory (ies) ..... (b) (4)

(b) (4)

General product information:

- Report Summary
All applicable tests according to the referenced standard(s) have been carried out.

- Product Description
Electronic components mounted on PWB with 1-series, 1-parallel certified Li-ion cell and covered by plastic enclosure.

- Additional Information
The lithium-ion cell source, Samsung SDI Co Ltd, type ICR18650-30H was UL 1642 approved component.

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4	**Transport tests**		
38.3.4.1	Test T-1: Altitude simulation		P
	Cells or batteries are stored at a pressure of 11.6 kPa or less for at least 6 h at ambient temperature.		P
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.1	P
38.3.4.2	Test T-2: Thermal test		P
	Cells or batteries previously subjected to altitude simulation test.		P
	Cells or batteries are stored for at least 6 h at a test temperature of 72 ± 2 °C, followed by storage for at least 6 h at a test temperature of -40 ± 2 °C. Maximum time for transfer is 30 minutes. This procedure is repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature.		P
	For large cells or batteries the duration of exposure to the test temperatures is at least 12 h instead of 6 h.		N/A
	Storage for at least 24 h at ambient temperature.		P
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.2	P
38.3.4.3	Test T-3: Vibration		P
	Cells or batteries previously subjected to thermal test.		P
	Cells or batteries are subjected to the following sinusoidal vibration with a logarithmic sweep: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm and the frequency increased until a peak acceleration of 8 g_n occurs (approximately 50 Hz). A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200 Hz.		P
	Large batteries are subjected to the following sinusoidal vibration with a logarithmic sweep: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm and the frequency increased until a peak acceleration of 2 g_n occurs (approximately 25 Hz). A peak acceleration of 2 g_n is then maintained until the frequency is increased to 200 Hz.		N/A
	Cycle is repeated 12 times for a total of 3 h for each of three mutually perpendicular mounting positions. One of the directions is perpendicular to the terminal face.		P
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.3	P

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.4	Test T-4: Shock		P
	Cells or batteries previously subjected to vibration test.		P
	Cells or batteries are subjected to three shocks in each direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.		P
	Cells are subjected to half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 ms.		N/A
	As an alternative, large cells are subjected to a half-sine shock of peak acceleration of 50 g_n and pulse duration of 11 ms.		N/A
	Small batteries are subjected to half-sine shock of peak acceleration of the smaller of the following and pulse duration of 6 ms: - 150 g_n; or - $\sqrt{(100850 / \text{mass in kg})}\ g_n$		P
	Large batteries are subjected to half-sine shock of peak acceleration of the smaller of the following and pulse duration of 11 ms: - 50 g_n; or - $\sqrt{(30000 / \text{mass in kg})}\ g_n$		N/A
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.4	P
38.3.4.5	Test T-5: External short-circuit		
	Cells or batteries previously subjected to shock test.		P
	Cells or batteries are heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case.		P
	Cells or batteries are subjected to a short-circuit condition with a total external resistance of less than 0.1 ohm at 57 ± 4 °C. Short-circuit condition is continued for at least 1 h after the cell or battery external case temperature has returned to 57 ± 4 °C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value.		P
	The test sample is observed for a further 6 h.		P
	Results: no excessive temperature rise, no rupture, no explosion and no fire during this test and within the 6 h of observation.	See appended Table 38.3.4.5	P
38.3.4.6	Test T-6: Impact / crush	Considered in battery cell.	N/A
	The test is conducted using test cells or component cells that have not been previously subjected to other transport tests.		N/A

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Each test cell or component cell shall be subjected to one impact / crush only.		N/A
	Cylindrical cells not less than 18.0 mm in diameter are tested with impact test procedure.		N/A
	The cell is placed on a flat smooth surface. A stainless steel bar with a diameter of 15.8 ± 0.1 mm and a length of at least 60 mm or of the longest dimension of the cell, whichever is greater, is placed across the centre of the test sample. A mass of 9.1 ± 0.1 kg is dropped from a height of 61 ± 2.5 cm at the intersection of the bar and the test sample using a vertical sliding track or channel. The vertical track is oriented 90 degrees from the horizontal supporting surface.		N/A
	The test sample is impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the steel bar lying across the centre of the test sample.		N/A
	Prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter are tested with crush test procedure.		N/A
	The cell is crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact.		N/A
	A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.		N/A
	The crushing is to be continued until one of the three conditions below is reached: - The applied force reaches 13 ± 0.78 kN; - The voltage of the cell drops by at least 100 mV; or - The cell is deformed by 50 % or more of its original thickness. As soon as one of the above conditions has been obtained, the pressure shall be released.		N/A
	The test sample is observed for a further 6 h.		N/A
	Results: no excessive temperature rise, no explosion and no fire during this test and within the 6 h of observation.		N/A
38.3.4.7	Test T-7: Overcharge		P
	The charge current of the battery is twice the manufacturer's recommended maximum continuous charge current.	**(b) (4)**	P

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	The manufacturer's recommended charge voltage is not more than 18 V. The minimum voltage of the test is the lesser of two times the maximum charge voltage of the battery or 22 V	**(b) (4)**	P
	The manufacturer's recommended charge voltage is more than 18 V. The voltage of the test is not less than 1.2 times the maximum charge voltage.		N/A
	The test is conducted at ambient temperature. The charging condition is maintained for at least 24 h.		P
	The test sample is observed for a further 7 days.		P
	Results: no explosion and no fire during this test and within the 7 days of observation.		P
38.3.4.8	Test T-8: Forced discharge	Considered in battery cell.	N/A
	Each cell is forced discharged at ambient temperature by connecting it in series with a 12 V direct current power supply at an initial current equal to the maximum continuous discharge current specified by the manufacturer. Time interval for discharging equals to rated capacity divided by the initial test current.		N/A
	The test sample is observed for a further 7 days.		N/A
	Results: no explosion and no fire during this test, nor within the 7 days of observation.		N/A

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.1	**TABLE: Altitude**							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.137	49.650	4.137	49.650	0.00	100.00	A
2	C	4.138	49.624	4.137	49.624	0.00	99.98	A
3	C	4.138	49.481	4.137	49.478	0.01	99.98	A
4	C	4.135	49.585	4.135	49.583	0.00	100.00	A
5	D	4.149	49.550	4.148	49.550	0.00	99.98	A
6	D	4.145	49.535	4.144	49.535	0.00	99.98	A
7	D	4.145	49.535	4.145	49.535	0.00	100.00	A
8	D	4.148	49.501	4.147	49.499	0.00	99.98	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.2	**TABLE: Thermal Test**							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.137	49.650	4.114	49.639	0.02	99.44	A
2	C	4.137	49.624	4.114	49.610	0.03	99.44	A
3	C	4.137	49.478	4.113	49.474	0.01	99.42	A
4	C	4.135	49.583	4.112	49.579	0.01	99.44	A
5	D	4.148	49.550	4.123	49.541	0.02	99.40	A
6	D	4.144	49.535	4.119	49.529	0.01	99.40	A
7	D	4.145	49.535	4.120	49.527	0.02	99.40	A
8	D	4.147	49.499	4.122	49.495	0.01	99.40	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.3	**TABLE: Vibration**							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.114	49.639	4.113	49.639	0.00	99.98	A
2	C	4.114	49.610	4.113	49.610	0.00	99.98	A
3	C	4.113	49.474	4.112	49.472	0.00	99.98	A
4	C	4.112	49.579	4.111	49.578	0.00	99.98	A
5	D	4.123	49.541	4.122	49.540	0.00	99.98	A
6	D	4.119	49.529	4.118	49.528	0.00	99.98	A
7	D	4.120	49.527	4.119	49.527	0.00	99.98	A
8	D	4.122	49.495	4.121	49.492	0.01	99.98	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.4	TABLE: Shock							P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Mass before test (g)	Open circuit voltage after test (V)	Mass after test (g)	Mass loss (%)	Voltage remain (%)	Results
1	C	4.113	49.639	4.112	49.638	0.00	0.00	A
2	C	4.113	49.610	4.112	49.610	0.00	0.00	A
3	C	4.112	49.472	4.111	49.472	0.00	0.00	A
4	C	4.111	49.578	4.110	49.576	0.00	0.00	A
5	D	4.122	49.540	4.121	49.540	0.00	0.00	A
6	D	4.118	49.528	4.117	49.527	0.00	0.00	A
7	D	4.119	49.527	4.117	49.526	0.00	0.00	A
8	D	4.121	49.492	4.120	49.492	0.00	0.00	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No leakage, no venting, no short-circuit (voltage not remain 90%), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN manual of testes and criteria, Section 38.3

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.5	TABLE: External short-circuit					P
Sample No.	Pre-condition	Open circuit voltage before test (V)	Open circuit voltage after test (V)	Maximum case temperature (°C)	Total external resistance (Ω)	Results
1	C	4.112	--	57.80	--	A
2	C	4.112	--	58.05	--	A
3	C	4.111	--	57.90	--	A
4	C	4.110	--	57.75	--	A
5	D	4.121	--	57.85	--	A
6	D	4.117	--	58.15	--	A
7	D	4.117	--	57.95	--	A
8	D	4.120	--	57.80	--	A

Supplementary information:

Precondition:

A: Fully discharged state.
B: Undischarged state.
C: First cycle in fully charged state.
D: After 50 cycles ending in fully charged state.
E: After 25 cycles ending in fully charged state.

Results:

A: No excessive temperature rise (above 170°C), no rupture, no disassembly (explosion), and no fire.
B: Other (please explain)

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UN manual of testes and criteria, Section 38.3

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.7	TABLE: Overcharge					P
Sample No.	Precondition	Open circuit voltage before test (V)	Maximum charging current (mA)	Maximum charging voltage (V)	Total charging time (h)	Results
9	A	--	9.3	8.4	24	A
10	A	--	11.1	8.4	24	A
11	A	--	5784.9	8.4	24	A
12	A	--	16.6	8.4	24	A
13	B	--	0.0	8.4	24	A
14	B	--	11.1	8.4	24	A
15	B	--	166.7	8.4	24	A
16	B	--	5791.4	8.4	24	A

Supplementary information:

Precondition:

A: First cycle in fully charged state.
B: After 50 cycles ending in fully charged state.
C: After 25 cycles ending in fully charged state.

Results:

A: No disassembly (explosion), and no fire.
B: Other (please explain)

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UN manual of testes and criteria, Section 38.3

ENCLOSURE

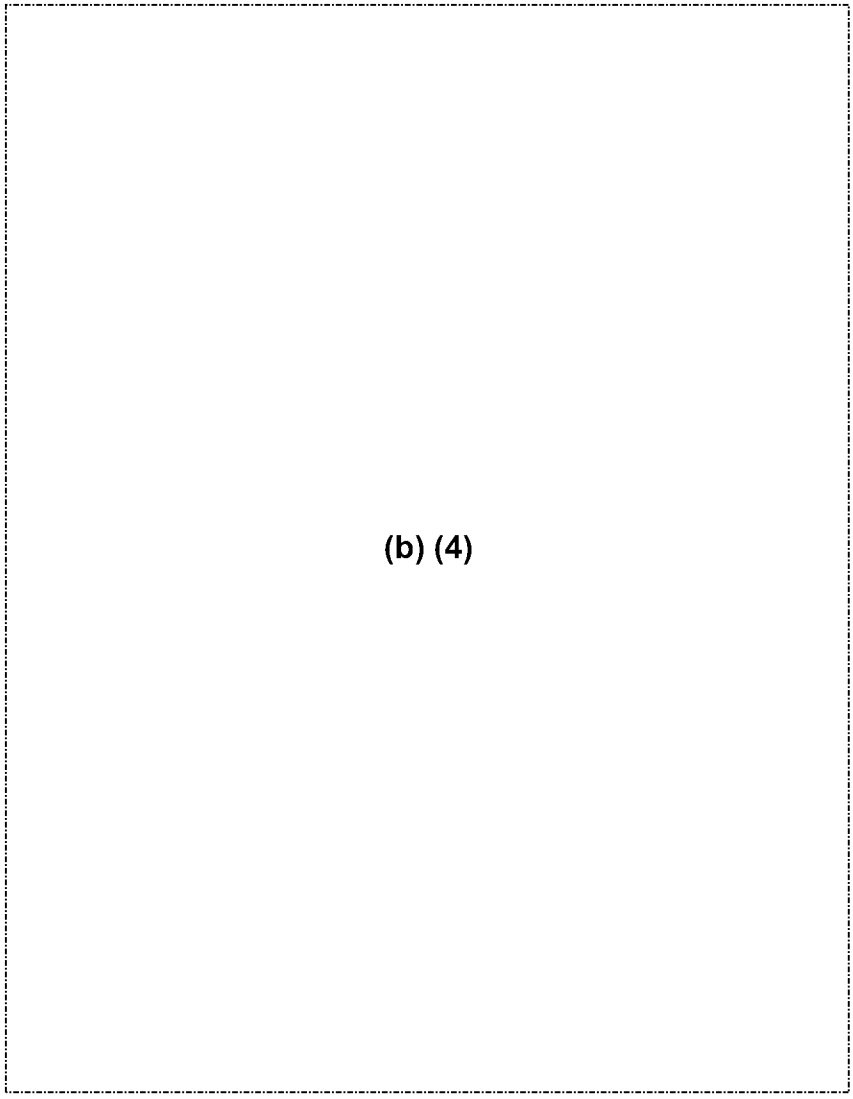
Supplement Id	Description
01	Overall view
02	Specification
03	Charging protection design for battery pack
04	Packaging Method

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UN manual of testes and criteria, Section 38.3

ID-01



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UN manual of testes and criteria, Section 38.3

ID-02

2-1-1. General Specification

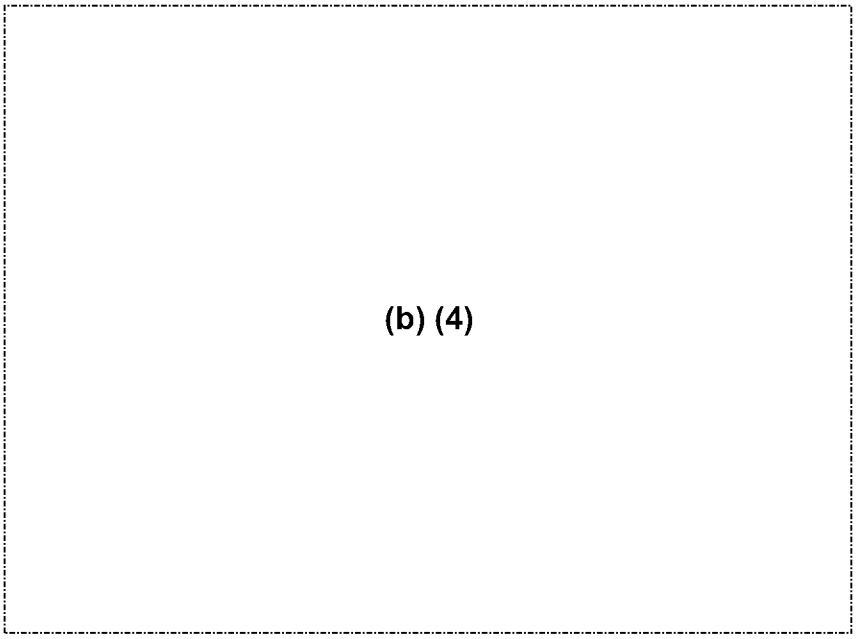
No.	Item	Description	Spec
1	Battery Cell	(b) (4)	
2	Standard Charge	Charge Voltage Charge Current Cut-off Current	(b) (4)
3	Standard Discharge	Discharge Current Discharge Cut-off Voltage	
4	Nominal Voltage	Normal Discharge Average Run Voltage	
5	Capacity	Standard Discharge Capacity	
6	Max. Charge Current	Max. Current of Consecutively Charge	
7	Max. Discharge Current	To 2.400V, Max. Consecutive Discharge Current	
8	Max Discharge Power		
9	Operating Temperature	Normal or Rating Charge Normal or Rating Discharge	
10	Cell Dimension	Height Diameter	
11	Cell Weight	Net Weight	
12	Storage Temperature	Temperature Range	
13	Current Consumption	Battery pack module current consumption	
14	PTC	Tyco / Electronics PSR-26038 (Included in Cell)	

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UN manual of testes and criteria, Section 38.3

ID-03



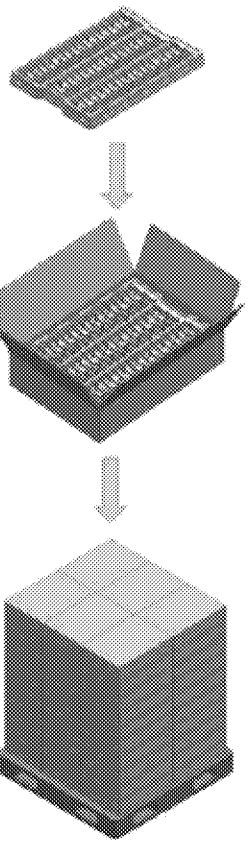
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UN manual of testes and criteria, Section 38.3

ID-04

13. Packing (Unit : mm) TBD



Tray
484 X 346 X 21.75
Battery Pack
50ea

Master Box
Tray X 4
494 X 356 X 103
Battery Pack
200ea

Pallet
Master Box X 60
10 Stack Loading
Battery Pack
12,000ea

1 Tray = 50ea Battery Packs
1 Master Box = 4 Tray (200ea Battery Packs)
1 Pallet = 60 Master Boxes (12,000ea Battery Packs)

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Ref. Certif. No.

SG PSB-BT-00702M1

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

CB TEST CERTIFICATE

Product	Battery Packs (Rechargeable Li-ion Battery (Li-ion rechargeable))
Name and address of the applicant	(b) (4)
Name and address of the manufacturer	(b) (4)
Name and address of the factory	(b) (4) (b) (4)
Ratings and principal characteristics	Rated voltage: Rated capacity: (b) (4)
Trade mark (if any)	See appendix
Model/type Ref.	(b) (4)
Additional information (if necessary)	CertificateSG PSB-BT-00702 issued2018-04-03 is replaced by this version due to technical changes.
A sample of the product was tested and found to be in conformity with	IEC 62133:2012
as shown in the Test Report Ref. No. which forms part of this certificate	TÜV SÜD PSB Pte Ltd 081-180350-100

This CB Test Certificate is issued by the National Certification Body

Date, 2018-05-24
CBS 18 05 90200 018

(b) (6)

TÜV SÜD PSB Pte Ltd · 1 Science Park Drive · Singapore 118221

PSB Singapore

CB-1.03.06

Appendix to CB Certificate

Brief description of the test sample:

- This equipment is a Rechargeable Li-ion Battery (Li-ion rechargeable) for use in the portable applications.

The trademark is as below:

IQOS

Date: 2018-05-24 Signatur (b) (6)

TÜV SÜD PSB Singapore

Test Report issued under the responsibility of:

NCB TÜV SÜD PSB Pte Ltd
1 Science Park Drive,
Singapore 118221

PSB Singapore

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. .....:	081-180350-100
Date of issue .....:	2018-05-24
Total number of pages.....	13
Applicant's name.....:	(b) (4)
Address .....:	
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

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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 .....:	Rechargeable Li-ion Battery (Li-ion rechargeable)
Trade Mark .....:	IQOS
Manufacturer.....:	Same as applicant.
Model/Type reference .....:	(b) (4)
Ratings .....:	

Testing procedure and testing location:			
☒	**CB Testing Laboratory:**	TÜV SÜD Asia Ltd. Taiwan Branch	
Testing location/ address .....:		7F., No.37, Sec. 2, Zhongyang S., Rd., Beitou District, Taipei City, 11270, TAIWAN.	
☐	**Associated CB Testing Laboratory:**	N/A	
Testing location/ address .....:		N/A	
Tested by (name + signature) .....:		**(b) (6)**	
Approved by (name + signature) .....:			
☐	**Testing procedure: TMP**	N/A	
Testing location/ address .....:		N/A	
Tested by (name + signature) .....:			
Approved by (name + signature) .....:			
☐	**Testing procedure: WMT**	N/A	
Testing location/ address .....:		N/A	
Tested by (name + signature) .....:			
Witnessed by (name + signature)....:			
Approved by (name + signature) .....:			
☐	**Testing procedure: SMT**	N/A	
Testing location/ address .....:		N/A	
Tested by (name + signature) .....:			
Approved by (name + signature) .....:			
Supervised by (name + signature) ..:			

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

Original Test Report No.: 081-180350-000 24 pages + 8 pages attachments

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All test results were found satisfactory in accordance with IEC 62133: 2012 and EN 62133:2013 - 8.1 Charging procedures for test purposes (battery) - 8.1.1 First procedure (battery) - 8.1.2 Second procedure (battery) - 8.3.2 External short circuit (battery) - 8.3.6 Over-charging of battery (battery)	All tests as described in Test Case and Measurement Sections were performed at the laboratory described on page 2.

Summary of compliance with National Differences

N/A

Copy of marking plate:

(b) (4)

The artwork above may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

Test item particulars.....:

Classification of installation and use.....: For use in portable applications.

Supply connection.....: DC connector

Recommend charging method declaired by the manufacturer ..... : CC-CV or clause 8.1.2

Discharge current (0,2 I_t A) ..... : (b) (4)

Specified final voltage..... :

Chemistry ..... : ☐ nickel systems ..... ☒ lithium systems

Recommend of charging limit for lithium system

Upper limit charging voltage per cell.....: (b) (4)

Maximum charging current .....:

Charging temperature upper limit .....:

Charging temperature lower limit.....:

Polymer cell electrolyte type ..... : ☐ gel polymer ..... ☐ solid polymer

Possible test case verdicts:

- test case does not apply to the test object.....: N/A

- test object does meet the requirement.....: P (Pass)

- test object does not meet the requirement.....: F (Fail)

Testing.....:

Date of receipt of test item .....: 2018-05-10

Date (s) of performance of tests .....: 2018-05-10 to 2018-05-17

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.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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).....:

(b) (4)

(b) (4)

Report No. <081-180305-100>

The modifications for this report are to:

(b) (4)

For the above described modifications the following Clause/Testing were considered to be necessary:

S/N	Clause/Testing	Remark/Comments	Verdict
1.	Clause 5.6.2	Design recommendation for lithium systems only	P
2.	Clause 8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2	P
3.	Clause 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
4.	Clause Annex A	Charging range of secondary lithium ion cells for safe use	P
5.	--	Critical components information	P
6.	Table 8.3.2	External short circuit (battery)	P
7.	Table 8.3.6	Over-charging of battery	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

General product information:

This equipment is a Rechargeable Li-ion Battery (Li-ion rechargeable) for use in the portable applications.

The maximum ambient temperature specified as 45 °C for charging condition and 60 °C for discharge condition.

Details information of the Rechargeable Li-ion Battery (Li-ion rechargeable) are as follows:

Type/model	(b) (4)
Battery Cell Configuration	
Nominal voltage (Vdc)	
Nominal capacity (mAh, Wh)	
Maximum Charge Voltage (Vdc)	
Optimum charge current (A)	
End voltage (Vdc)	
Weight (kg)	

The final evaluation of the battery must be conducted in the end product for which the battery will be used.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
5.6.2	Design recommendation for lithium systems only	See below.	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.	(b) (4)	P
	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	(b) (4)	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	(b) (4)	P
8	**Specific requirements and tests (lithium systems)**		**P**
8.1	Charging procedures for test purposes		P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2	Discharge current (0.2 I_t A) **See page 6 for details.** The charging procedure using the method as per the manufacture's specification.	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	Considered in 8.3.2.	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	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	**(b) (4)**	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :	Checked by above method.	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	(b) (4)	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :	Checked by above method.	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

Annex A	**Charging range of secondary lithium ion cells for safe use**		**P**
A.1	General		P
A.2	Safety of lithium-ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General		P
A.3.2	Upper limit charging voltage		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	**(b) (6)**	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
A.4.2.2	Safety consideration when a different recommended temperature range is applied	**(b) (4)**	P
A.4.3	High temperature range	Charging high temperature tested at temperature 50 °C.	P
A.4.3.1	General	See below.	P
A.4.3.2	Explanation of safety viewpoint	Considered.	P
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range	Meet the sub-clause 8.2 to 8.3 requirements.	P
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range	See above.	P
A.4.4	Low temperature range	**(b) (4)**	P
A.4.4.1	General	See below.	P
A.4.4.2	Explanation of safety viewpoint	Considered.	P
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range	Meet the sub-clause 8.2 to 8.3 requirements.	P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	See above.	P
A.4.5	Scope of the application of charging current		P
A.5	Sample preparation		N/A
A.5.1	General		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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)]**
Li-ion Cell (single cell)	(b) (4)		(b) (4)	IEC62133: 2012	CB by DEKRA (NL-47899)
PWB	Interchangeable	Interchangeable		UL796	UL
Protection IC (IC1)	(b) (4)			--	--
MOSFET (Q1)				--	--
Supplementary information: **1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.**					

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 (Charge at 50 °C)					
(b) (4)	55.1	4.31	0.082	0.3	No Fire, No Explosion
	55.1	4.31	0.082	0.2	No Fire, No Explosion
	55.1	4.32	0.078	0.1	No Fire, No Explosion
	55.1	4.32	0.078	0.3	No Fire, No Explosion
	55.1	4.31	0.084	0.3	No Fire, No Explosion
Samples charged at charging temperature lower limit (Charge at -5 °C)					
(b) (4)	55.0	4.27	0.082	0.4	No Fire, No Explosion
	55.0	4.29	0.082	0.4	No Fire, No Explosion
	55.0	4.28	0.078	0.5	No Fire, No Explosion
	55.0	4.27	0.078	0.5	No Fire, No Explosion
	55.0	4.29	0.084	0.3	No Fire, No Explosion

Supplementary information:

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

8.3.6	TABLE: Over-charging of battery			P
Constant charging current (A).....:		5.8 A		—
Supply voltage (Vdc).....:		5		—

Model	OCV before charging, (Vdc)	Resistance of circuit, (Ω)	Maximum outer casing temperature, (°C)	Results
(b) (4)	3.32	--	46.3	No Fire, No Explosion
	3.33	--	45.1	No Fire, No Explosion
	3.32	--	46.3	No Fire, No Explosion
	3.32	--	46.8	No Fire, No Explosion
	3.32	--	49.5	No Fire, No Explosion

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain) Ambient: 22.8 °C

IEC	IECEE CB SCHEME	Ref. Certif. No.
		SG PSB-BT-00702

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

CB TEST CERTIFICATE

Product	Battery Packs (Rechargeable Li-ion Battery (Li-ion rechargeable))
Name and address of the applicant	(b) (4)
Name and address of the manufacturer	(b) (4)
Name and address of the factory	(b) (4) (b) (4)
Ratings and principal characteristics	Rated voltage: Rated capacity: (b) (4)
Trade mark (if any)	See appendix
Model/type Ref.	(b) (4)
Additional information (if necessary)	
A sample of the product was tested and found to be in conformity with	IEC 62133:2012
as shown in the Test Report Ref. No. which forms part of this certificate	TÜV SÜD PSB Pte Ltd 081-180350-000

This CB Test Certificate is issued by the National Certification Body

Date, 2018-04-03
CBS 18 03 90200 017

(b) (6)

TÜV SÜD PSB Pte Ltd · 1 Science Park Drive · Singapore 118221

PSB Singapore

CB-1 03.66

	Ref. Certif. No.
IEC IECEE CB SCHEME	SG PSB-BT-00702

Appendix to CB Certificate

Brief description of the test sample:

- This equipment is a Rechargeable Li-ion Battery (Li-ion rechargeable) for use in the portable applications.

The trademark is as below:

IQOS

Date, 2018-04-03 Signatur (b) (6)

TÜV SÜD PSB Singapore

Test Report issued under the responsibility of:

NCB TÜV SÜD PSB Pte Ltd
1 Science Park Drive,
Singapore 118221

PSB Singapore

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. .....:	081-180350-000
Date of issue .....:	2018-03-29
Total number of pages.....	24

Applicant's name.....:	(b) (4)
Address .....:	

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

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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 .....:	Rechargeable Li-ion Battery (Li-ion rechargeable)
Trade Mark .....:	IQOS
Manufacturer.....:	Same as applicant.
Model/Type reference .....:	(b) (4)
Ratings .....:	

Testing procedure and testing location:			
☒	**CB Testing Laboratory:**	TÜV SÜD Asia Ltd. Taiwan Branch	
Testing location/ address .....:		7F., No.37, Sec. 2, Zhongyang S., Rd., Beitou District, Taipei City, 11270, TAIWAN.	
☐	**Associated CB Testing Laboratory:**	N/A	
Testing location/ address .....:		N/A	
Tested by (name + signature) .....:		**(b) (6)**	
Approved by (name + signature) .....:			
☐	**Testing procedure: TMP**	N/A	
Testing location/ address .....:		N/A	
Tested by (name + signature) .....:			
Approved by (name + signature) .....:			
☐	**Testing procedure: WMT**	N/A	
Testing location/ address .....:		N/A	
Tested by (name + signature) .....:			
Witnessed by (name + signature)....:			
Approved by (name + signature) .....:			
☐	**Testing procedure: SMT**	N/A	
Testing location/ address .....:		N/A	
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 No. 1	National Differences	4	pages
Attachment No. 2	Photo	4	pages

Summary of testing:

Tests performed (name of test and test clause):	**Testing location:**
All test results were found satisfactory in accordance with IEC 62133: 2012 and EN 62133:2013 - 8.1 Charging procedures for test purposes (battery) - 8.1.1 First procedure (battery) - 8.1.2 Second procedure (battery) - 8.2.2 Moulded case stress at high ambient temperature (battery) - 8.3.2 External short circuit (battery) - 8.3.3 Free fall (battery) - 8.3.6 Over-charging of battery (battery)	All tests as described in Test Case and Measurement Sections were performed at the laboratory described on page 2.

Summary of compliance with National Differences

Canada (CA), Singapore (SG).

Copy of marking plate:

(b) (4)

The artwork above may be only a draft. The use of certification marks on a product must be authorized by the respective NCBs that own these marks.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

Test item particulars.....:

Classification of installation and use.....: For use in portable applications.

Supply connection.....: DC connector

Recommend charging method declared by the manufacturer ..... :

Discharge current (0,2 I_t A) ..... :

Specified final voltage ..... :

(b) (4)

Chemistry ..... : ☐ nickel systems ..... ☒ lithium systems

Recommend of charging limit for lithium system

Upper limit charging voltage per cell.....:

Maximum charging current .....:

Charging temperature upper limit.....:

Charging temperature lower limit.....:

(b) (4)

Polymer cell electrolyte type ..... : ☐ gel polymer ..... ☐ solid polymer

Possible test case verdicts:

- test case does not apply to the test object.....: N/A

- test object does meet the requirement.....: P (Pass)

- test object does not meet the requirement.....: F (Fail)

Testing.....:

Date of receipt of test item .....: 2018-03-14

Date (s) of performance of tests.....: 2018-03-14 to 2018-03-28

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.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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)..... :

(b) (4)

(b) (4)

General product information:

This equipment is a Rechargeable Li-ion Battery (Li-ion rechargeable) for use in the portable applications.

The maximum ambient temperature specified as 45 °C for charging condition and 60 °C for discharge condition.

Details information of the Rechargeable Li-ion Battery (Li-ion rechargeable) are as follows:

Type/model	**(b) (4)**
Battery Cell Configuration	
Nominal voltage (Vdc)	
Nominal capacity (mAh, Wh)	
Maximum Charge Voltage (Vdc)	
Optimum charge current (A)	
End voltage (Vdc)	
Weight (kg)	

The final evaluation of the battery must be conducted in the end product for which the battery will be used.

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

4	**Parameter measurement tolerances**		**P**
	Parameter measurement tolerances	Both normal and foreseeable misuses are evaluated in the report. All control and measure values were within the tolerances.	P

5	**General safety considerations**		**P**
5.1	General	Considered.	P
5.2	Insulation and wiring	See below.	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 provide metal case exists. (excluding electrical contacts)	N/A
	Insulation resistance (MΩ) ..... :		—
	Internal wiring and insulation are sufficient to withstand maximum anticipated current, voltage and temperature requirements	See test of clause 6.	P
	Orientation of wiring maintains adequate creepage and clearance distances between conductors	See test of clause 6.	P
	Mechanical integrity of internal connections accommodates reasonably foreseeable misuse	See test of clause 6.	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	For the battery pack, the pressure relief mechanism along the cell's of vent cap assembly, release the pressure during the abnormal operation.	P
	Encapsulation used to support cells within an outer casing does not cause the battery to overheat during normal operation nor inhibit pressure relief	Considered and evaluated for the batteries.	P
5.4	Temperature/voltage/current management		P
	Batteries are designed such that abnormal temperature rise conditions are prevented	MOSFET and protection IC are provided.	P
	Batteries are designed to be within temperature, voltage and current limits specified by the cell manufacturer	MOSFET and protection IC are provided.	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 Battery Pack specification.	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
5.5	Terminal contacts		P
	Terminals have a clear polarity marking on the external surface of the battery	Special battery connector designation to prevent short circuit.	N/A
	The size and shape of the terminal contacts ensure that they can carry the maximum anticipated current	Maximum anticipated current can carry.	P
	External terminal contact surfaces are formed from conductive materials with good mechanical strength and corrosion resistance	The external terminal contact surfaces complied with the requirements.	P
	Terminal contacts are arranged to minimize the risk of short circuits	Special battery connector designation to prevent short circuit. Proper spacing was maintained to prevent the short circuit.	P
5.6	Assembly of cells into batteries	Single battery cell.	N/A
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		N/A
	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		N/A
	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		N/A
	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	See below.	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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	- Charging voltage of the cell does not exceed the different upper limit of the charging voltage determined through Clause 8.1.2, NOTE 1.	**(b) (4)**	P
	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	**(b) (4)**	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	**(b) (4)**	P
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	The manufacturer has ISO 9001:2008 certificate and such quality plan.	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.	Considered and evaluated for the batteries.	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

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)..... :		—
	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

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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)..... :		—
	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		P
8.1.1	First procedure: This charging procedure applied to tests other than those specified in 8.1.2	Discharge current (0.2 I_t A) See page 5 for details. The charging procedure using the method as per the manufacture's specification.	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	Considered in 8.3.2.	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 Battery use charged at upper limit temp. 50 °C and lower limit temp. -5 °C.	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :	Checked by above method.	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	**(b) (4)**	P
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1) ..... :	Checked by above method.	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
8.2	Intended use	See below.	P
8.2.1	Continuous charging at constant voltage (cells)	Certified cell used.	N/A
	Results: No fire. No explosion..... :		N/A
8.2.2	Moulded case stress at high ambient temperature (battery)	See below.	P
	Oven temperature (°C)..... :	The batteries were fully charged and tested in the conditions of 70.0 °C for 7 h.	—
	Results: No physical distortion of the battery casing resulting in exposure if internal components	No physical distortion of battery case resulting in exposure of internal components.	P
8.3	Reasonably foreseeable misuse		N/A
8.3.1	External short circuit (cell)	Certified cell used.	N/A
	The cells were tested until one of the following occurred: - 24 hours elapsed; or		N/A
	- The case temperature declined by 20% of the maximum temperature rise		N/A
	Results: No fire. No explosion..... :		N/A
8.3.2	External short circuit (battery)	See below.	P
	The cells were tested until one of the following occurred: - 24 hours elapsed; or	The batteries were fully charged and subjected to a short circuit test.	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	The batteries were fully charged and tested for this condition.	P
	Results: No fire. No explosion.	No fire, no explosion to the apparatus after the test.	P
8.3.4	Thermal abuse (cells)	Certified 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)..... :		—

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	Gross mass of cell (g) ..... :		—
	Results: No fire. No explosion.		N/A
8.3.5	Crush (cells)	Certified 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
	Results: No fire. No explosion..... :	(See Table 8.3.6)	P
8.3.7	Forced discharge (cells)	Certified cell used.	N/A
	Results: No fire. No explosion..... :		N/A
8.3.8	Transport tests	Certified 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)	It must be considered when marketing in France, Japan, Korea and Switzerland.	N/A
	The cells complied with national requirement for ..... :		—
	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 specification.	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 specification.	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
	Systems analyses performed by device manufacturers to ensure that a particular battery design prevents hazards from occurring during use of a product	To be evaluated in final systems.	N/A
	As appropriate, information relating to hazard avoidance resulting from a system analysis is provided to the end user ..... :	To be evaluated in final systems.	N/A
10	**Marking**		**P**
10.1	Cell marking	See below.	N/A
	Cells marked as specified in the applicable cell standards: IEC 61951-1, IEC 61951-2 or IEC 61960.	Cells used in the manufacture of a battery and need not be marked.	N/A
10.2	Battery marking	See below.	P
	Batteries marked in accordance with the requirements for the cells from which they are assembled.	Batteries of lithium system are marked in accordance with IEC 61960. See Copy of Marking Plate item in the beginning of this report.	P
	Batteries marked with an appropriate caution statement.	Caution text provided is closed to the battery.	P
10.3	Other information	See below.	P
	Storage and disposal instructions marked on or supplied with the battery.	Information for safety mentioned in manufacturer's specification.	P
	Recommended charging instructions marked on or supplied with the battery.	Information for safety mentioned in manufacturer's specification.	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.	The proper packaging description is provided in the product specification, which can avoid the mechanical damage during the transport, handling, and stacking.	P

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict

Annex A	**Charging range of secondary lithium ion cells for safe use**		**P**
A.1	General		P
A.2	Safety of lithium-ion secondary battery	Complied.	P
A.3	Consideration on charging voltage	Complied.	P
A.3.1	General		P
A.3.2	Upper limit charging voltage		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	**(b) (4)**	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
A.4.2.2	Safety consideration when a different recommended temperature range is applied	**(b) (4)**	P
A.4.3	High temperature range	Charging high temperature tested at temperature 50 °C.	P
A.4.3.1	General	See below.	P
A.4.3.2	Explanation of safety viewpoint	Considered.	P
A.4.3.3	Safety considerations when specifying charging conditions in high temperature range	Meet the sub-clause 8.2 to 8.3 requirements.	P
A.4.3.4	Safety consideration when specifying new upper limit in high temperature range	See above.	P
A.4.4	Low temperature range	**(b) (4)**	P
A.4.4.1	General	See below.	P
A.4.4.2	Explanation of safety viewpoint	Considered.	P
A.4.4.3	Safety considerations, when specifying charging conditions in low temperature range	Meet the sub-clause 8.2 to 8.3 requirements.	P
A.4.4.4	Safety considerations when specifying a new lower limit in the low temperature range	See above.	P
A.4.5	Scope of the application of charging current		P
A.5	Sample preparation		N/A
A.5.1	General		N/A

IEC 62133			
Clause	Requirement + Test	Result - Remark	Verdict
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)]**
Li-ion Cell (single cell)	(b) (4)		(b) (4)	IEC62133: 2012	CB by DEKRA (NL-47899)
PWB	Interchangeable	Interchangeable		UL796	UL
Protection IC (IC1)	(b) (4)			--	--
MOSFET (Q1)				--	--
Supplementary information: **1) Provided evidence ensures the agreed level of compliance. See OD-CB2039.**					

7.2.1	TABLE: Continuous low rate charge (cells)				N/A
Model	**Recommended charging method, (CC, CV, or CC/CV)**	**Recommended charging voltage V_c, (Vdc)**	**Recommended charging current I_{rec}, (A)**	**OCV at start of test, (Vdc)**	**Results**
--	--	--	--	--	--

Supplementary information:

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

7.2.2	TABLE: Vibration		N/A
Model	**OCV at start of test, (Vdc)**	**Results**	
--	--	--	

Supplementary information:

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

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

Supplementary information:

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

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

Supplementary information:

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

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

Supplementary information:

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

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

Supplementary information:

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

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

Supplementary information:

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

8.2.1	TABLE: Continuous charging at constant voltage (cells)			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
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

Certified cell used.

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					
--	--	--	--	--	--
Samples charged at charging temperature lower limit (Charge at -5 °C)					
--	--	--	--	--	--

Supplementary information:

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

Certified cell used.

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 (Charge at 50 °C)					
(b) (4)	54.5	4.23	0.078	0.1	No Fire, No Explosion
	54.5	4.23	0.078	0	No Fire, No Explosion
	54.5	4.23	0.083	0	No Fire, No Explosion
	54.5	4.23	0.083	0.1	No Fire, No Explosion
	54.5	4.23	0.083	0.2	No Fire, No Explosion
Samples charged at charging temperature lower limit (Charge at -5 °C)					
(b) (4)	54.5	4.23	0.078	0.2	No Fire, No Explosion
	54.5	4.23	0.078	0.1	No Fire, No Explosion
	54.5	4.23	0.083	0.1	No Fire, No Explosion
	54.5	4.23	0.083	0.2	No Fire, No Explosion
	54.5	4.23	0.083	0.3	No Fire, No Explosion

Supplementary information:

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

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					
--	--	--	--	--	--
Samples charged at charging temperature lower limit					
--	--	--	--	--	--

Supplementary information:

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

Certified cell used.

8.3.6	TABLE: Over-charging of battery				P
Constant charging current (A).....:		4.6 A			—
Supply voltage (Vdc).....:		5			—
Model	**OCV before charging, (Vdc)**	**Resistance of circuit, (Ω)**	**Maximum outer casing temperature, (°C)**	**Results**	
(b) (4)	3.38	--	51.1	No Fire, No Explosion	
	3.36	--	46.0	No Fire, No Explosion	
	3.36	--	50.6	No Fire, No Explosion	
	3.38	--	38.2	No Fire, No Explosion	
	3.37	--	49.1	No Fire, No Explosion	

Supplementary information:

- No fire or explosion
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain) Ambient: 22.8 °C

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**	
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Supplementary information:

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

Certified cell used.

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)**	**Results**
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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
- No leakage
- Leakage
- Fire
- Explosion
- Bulge
- Others (please explain)

IEC 62133 ATTACHMENT NO.1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62133
CANADA NATIONAL DIFFERENCES

(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)

Differences according to ..... : CAN/CSA-E62133:13

1	*[Add the following]* This Standard covers secondary cells and batteries that are intended to be installed or used in accordance with CSA C22.1, *Canadian Electrical Code, Part I.*	Equipment in compliance with IEC 62133. Overall acceptance has to be evaluated during the national approval process.	N/A
2	**2 Normative references** *[Add the following]* Where reference is made to CSA Group publications, such reference shall be considered to refer to the latest edition and all amendments published to that edition. This Standard refers to the following publications, and the years shown indicate the latest editions available at the time of printing: **CSA Group** C22.1-12 Canadian Electrical Code, Part I CAN/CSA-C22.2 No. 0-10 General requirements — Canadian Electrical Code, Part II C22.2 No. 0.15-01 (R2012) Adhesive labels CAN/CSA-C22.2 No. 0.17-00 (R2013) Evaluation of properties of polymeric materials C22.2 No. 39-12 Fuseholder assemblies C22.2 No. 127-09 Equipment and lead wires CAN/CSA-C22.2 No. 198.1-06 (R2010) Extruded insulating tubing C22.2 No. 235-04 (R2013) Supplementary protectors Certification Informs, Component Acceptance Service No. 53 (January 2013) Positive temperature coefficient (PTC) thermistors	Add.	N/A
3A	*[Add the following clause]* **3A General requirements** General requirements applicable to these products are provided in CAN/CSA-C22.2 No. 0.	Add.	N/A

IEC 62133 ATTACHMENT NO.1			
Clause	Requirement + Test	Result - Remark	Verdict
5	**5 General safety considerations** **5.1 General** *[Add the following at the end of Clause 5.1]* All safety components shall be suitable for use in accordance with the applicable CSA Group Standards where available. Examples of such components and subassemblies are as follows: a) wiring in accordance with CSA C22.2 No. 127; b) insulation tubing in accordance with CAN/CSA-C22.2 No. 198.1; c) protection devices such as fuses in accordance with CSA C22.2 No. 235, and PTC thermistors in accordance with CSA Component Acceptance Service No. 53; d) fuseholders in accordance with CSA C22.2 No. 39; and e) printed wiring boards and outer plastic enclosures shall be flammability rated a minimum of V-1 in accordance with CAN/CSA-C22.2 No. 0.17.	Critical components are complied with relevant IEC standards for correct application and use. For others, shall be evaluated during the national approval.	N/A
10	**10 Marking** **10.1 Cell marking** *[Add the following after the first paragraph]* Cell marking shall also include the model or type number. Cautions and warnings shall be in English and French in accordance with CAN/CSA-C22.2 No. 0. If external labels are used, they shall be a suitable type in accordance with CSA C22.2 No. 0.15. **10.2 Battery marking** *[Add the following after the first paragraph]* Cautions and warnings shall be in English and French in accordance with CAN/CSA-C22.2 No. 0. If external labels are used, they shall be a suitable type in accordance with CSA C22.2 No. 0.15.	Compliance shall be evaluated during the national approval.	N/A

IEC 62133 ATTACHMENT NO.1			
Clause	Requirement + Test	Result - Remark	Verdict

ATTACHMENT TO TEST REPORT IEC 62133
SINGAPORE NATIONAL DIFFERENCES

(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)

Differences according to ..... : Cir 2015-01

1	**Portable power banks[1] shall comply with the requirements of the following safety standards:** **1.1 IEC 62133:2012** *Secondary cells and batteries containing alkaline or non-acid electrolytes – Safety requirements for portable sealed secondary cells, and for batteries made from them, for use in portable applications; and* **1.2 IEC 60950-1:2005+A1:2009+A2:2013** *Information technology equipment – Safety – Part 1: General requirements* OR 1.3 Any other industry standard specific to power banks *Note[1]: A "portable power bank" is defined as any portable energy-storage device containing secondary batteries with charging circuitry, which is used to charge portable consumer electronic devices via DC output of up to 5 volts.* *The following products do not fall within the above definition:* • *Products with AC input* • *Products with jump starter function* • *Rechargeable batteries and their chargers, sold as separate products* • *Higher capacity power packs intended for charging high power industrial devices* • *Uninterruptible Power Supply (UPS) systems*	The equipment is not a portable power bank.	N/A

IEC 62133 ATTACHMENT NO.1			
Clause	Requirement + Test	Result - Remark	Verdict
2	**Portable power banks shall be supplied with the following safety information:** 2.1 'Minimum Instructions for use' as specified below 2.2 Instructions on how to charge the portable power bank 2.3 Information on the minimum and maximum operating temperatures of the portable power bank **Minimum Instructions[2] for Use for Portable Power Banks** to be provided with portable power banks to the customer a) The power bank will generate heat when charging. Always charge in a well ventilated area. Do not charge under pillows, blankets or on flammable surfaces. b) Keep the power bank away from heat sources, direct sunlight, combustible gas, humidity, water or other liquids. c) Do not disassemble, open, microwave, incinerate, paint or insert foreign objects into the power bank. d) Do not subject the power bank to mechanical shock such as crushing, bending, puncturing or shredding. Avoid dropping or placing heavy object on the power bank. e) Do not short-circuit the power bank or store it in a receptacle where it may be short-circuited by other metallic or conductive objects. f) Do not operate the power bank if it has been wet or otherwise damaged, to prevent against electric shock, explosion and/or injury. Contact the dealer or authorized agent. g) Power bank usage by children should be supervised. h) Please read the operating instructions (including charging instructions and information on the minimum and maximum operating temperatures), supplied with this power bank. *Note[2]: The requirements listed above are the minimum requirements. Please include other information relevant to the specific product as may be deemed necessary.*		N/A

Attachment No. 2

PSB Singapore

Type Designation: (b) (4)

Report Number: 081-180350-000

(b) (4)

Attachment No. 2

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