



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: 081-150106-100
Date of issue: 2017-12-14
Total number of pages: 10

Applicant's name.....: Samsung SDI Co., Ltd.
Address: 467, Beonyeong-ro, Seobuk-gu, Cheonan-si,
Chungcheongnam-do 331-300, REPUBLIC OF KOREA

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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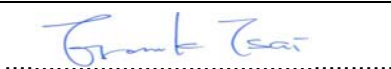
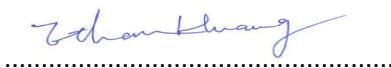
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Test item description: Lithium-ion Rechargeable Cell
Trade Mark: **SAMSUNG SDI**
Manufacturer.....: Same as applicant.
Model/Type reference: INR18650-35E+ / INR19/66
(+ - May have an optional single alphanumeric suffix.)
Ratings: 3.6 Vdc, **3400 mAh**



Testing procedure and testing location:		
<input checked="" type="checkbox"/>	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.
<input type="checkbox"/>	Associated CB Testing Laboratory:	N/A
Testing location/ address		N/A
Tested by (name + signature)		Mr. Frank Tsai 
Approved by (name + signature)		Mr. Ethan Huang 
<input type="checkbox"/>	Testing procedure: TMP	N/A
Testing location/ address		N/A
Tested by (name + signature)		
Approved by (name + signature)		
<input type="checkbox"/>	Testing procedure: WMT	N/A
Testing location/ address		N/A
Tested by (name + signature)		
Witnessed by (name + signature)		
Approved by (name + signature)		
<input type="checkbox"/>	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.: 081-150106-000 26 pages + 3 pages attachments	
Summary of testing:	
Tests performed (name of test and test clause): All test results were found satisfactory in accordance with IEC 62133: 2012 and EN 62133:2013 - 8.1 Charging procedures for test purposes (for cells and battery) - 8.1.1 First procedure. (for cells and battery) - 8.1.2 Second procedure (for cells and battery) - 8.3.1 External short circuit (cell) - 8.3.7 Force discharge (cell)	Testing location: 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 The product fulfils the requirements of IEC 62133:2012 / EN 62133:2013.	

Copy of marking plate:

SAMSUNG SDI	
Lithium-ion Rechargeable Cell	
Model	INR18650-35E+ / INR19/66
Rating	3.6 Vdc, 3400 mAh

Date of manufacture designation:



① Model

② Maker

③ Production Date Code

- 1st Digit : KC Certificate Mark

(1 : under 2400mAh, 2 : over 2400mAh)

- 2nd Digit : Year

- 3rd Digit : Month

- 4th Digit : Week



③ Production Date Code on cell surface

A 0 5 : 6 2 B 2 B 3

6 : Year (6: 2006, 7: 2007,...)

2 : Month (1: Jan., ... A: Oct., B: Nov., C: Dec.)

B : Date (1: 1st, 2: 2nd, ... A: 10th, B: 11th, ...)

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



Test item particulars.....:	
Classification of installation and use.....:	For use in portable applications.
Supply connection.....:	DC connector
Recommend charging method declared by the manufacturer	CC-CV or clause 8.1.2
Discharge current (0,2 I_t A)	680 mA
Specified final voltage	2.5 Vdc
Chemistry	<input type="checkbox"/> nickel systems <input checked="" type="checkbox"/> lithium systems
Recommend of charging limit for lithium system	
Upper limit charging voltage per cell.....:	4.2 Vdc
Maximum charging current	2000 mA
Charging temperature upper limit	45 °C
Charging temperature lower limit.....:	0 °C
Polymer cell electrolyte type	<input type="checkbox"/> gel polymer <input type="checkbox"/> 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	2017-11-24
Date (s) of performance of tests	2017-11-24 ~ 2017-12-07
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 <input type="checkbox"/> comma / <input checked="" type="checkbox"/> point is used as the decimal separator.	
Manufacturer's Declaration per sub-clause 4.2.5 of IEC62133B:	
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	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> Not applicable
When differences exist; they shall be identified in the General product information section.	



Name and address of factory (ies)..... :

- 1) Samsung SDI Co., Ltd. (ID No.: 89164)
467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do 331-300,
REPUBLIC OF KOREA
- 2) SAMSUNG SDI ENERGY MALAYSIA SDN BHD (ID No.: 81509)
LOT 635 & 660, KAWASAN PERINDUSTRIAN TUANKU JAAFAR, SUNGAI GADUT,
71450 DARUL KHUSUS, MALAYSIA
- 3) Tianjin Samsung SDI Co.,Ltd (ID No.: 75639)
Yat-sen Scientific Industrial Park, 301726 Tianjin, PEOPLE'S REPUBLIC OF CHINA

Report No. <081-150106-100>

The modification for this report is to:

- 1. Modify Nominal capacity from 3480 mAh change to 3400 mAh, see page 2 and page 7 bold type for details.
- 2. Modify Optimum charge current from 3400 mA change to 2000 mA, see page 7 bold type for details.
- 3. Modify End voltage from 2.65 Vdc change to 2.5 Vdc, see page 7 bold type for details.

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

S/N	Clause/Testing	Remark/Comments	Verdict
1.	Clause 8	Specific requirements and tests (lithium systems)	P
2.	Table 8.3.1	External short circuit (cell)	P
3.	Table 8.3.7	Forced discharge (cells)	P

General product information:

This equipment is a Lithium-ion Rechargeable Cell for use in the portable applications.

The maximum ambient temperature specified as 45 °C.

Details information of the Lithium-ion rechargeable cell are as follows:

Product name	Lithium-ion Rechargeable Cell
Type/model	INR18650-35E+ / INR19/66
Nominal voltage (Vdc)	3.6
Nominal capacity (mAh)	3400
Maximum Charge Voltage (Vdc)	4.2
Optimum charge current (mA)	2000
Maximum discharge current (mA)	8000
End voltage (Vdc)	2.5
Weight (kg)	Approx. 0.05 max.

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

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: 680 mA Charge voltage / current: 4.2 Vdc / 2000 mA	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 8.3.1, 8.3.4, 8.3.5 and 8.3.9.	P
	If a cell's specified upper and/or lower charging temperature exceeds values for the upper and/or lower limit test temperatures of Table 4, the cells were charged at the specified values plus 5 °C for the upper limit and minus 5 °C for the lower limit	The cell 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		N/A
	A valid rationale was provided to ensure the safety of the cell (see Figure A.1)		N/A

8.3.1	TABLE: External short circuit (cell)					P
Model	Ambient, (°C)	OCV at start of test, (Vdc)	Resistance of circuit, (mΩ)	Maximum case temperature rise ΔT, (°C)	Results	
Samples charged at charging temperature upper limit (Charge at 50 °C)						
INR18650-35E+ / INR19/66	19.7	4.225	63	91.3	No fire or explosion	
INR18650-35E+ / INR19/66	19.7	4.231	68	92.4	No fire or explosion	
INR18650-35E+ / INR19/66	19.7	4.227	84	94.6	No fire or explosion	
INR18650-35E+ / INR19/66	19.7	4.226	77	91.9	No fire or explosion	
INR18650-35E+ / INR19/66	19.7	4.227	78	92.6	No fire or explosion	
Samples charged at charging temperature lower limit (Charge at -5 °C)						
INR18650-35E+ / INR19/66	19.8	4.119	68	81.3	No fire or explosion	
INR18650-35E+ / INR19/66	19.8	4.12	84	100.6	No fire or explosion	
INR18650-35E+ / INR19/66	19.8	4.108	77	107.5	No fire or explosion	
INR18650-35E+ / INR19/66	19.8	4.113	78	102.2	No fire or explosion	
INR18650-35E+ / INR19/66	19.8	4.117	63	101.1	No fire or explosion	
Supplementary information: - No fire or explosion - No leakage - Leakage - Fire - Explosion - Bulge - Others (please explain): The test was completed after the pack casing cooled to 20% of the maximum temperature rise.						



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	
INR18650-35E+ / INR19/66	2.532	3.4	90	No fire or explosion	
INR18650-35E+ / INR19/66	2.533	3.4	90	No fire or explosion	
INR18650-35E+ / INR19/66	2.533	3.4	90	No fire or explosion	
INR18650-35E+ / INR19/66	2.533	3.4	90	No fire or explosion	
INR18650-35E+ / INR19/66	2.534	3.4	90	No fire or explosion	

Supplementary information:

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