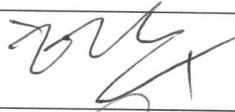



UN TEST REPORT

Report Number.....	SDI-UN-190214-01
Date of issue.....	2019.02.14
Test period.....	2019.01.07 ~ 2019.01.30
Testing Laboratory	Samsung SDI Co., Ltd
Address.....	467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Contact	+82-41-560-3114 / http://samsungsdi.co.kr/
Manufacturer's name	Samsung SDI Co., Ltd
Address.....	467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Contact	+82-41-560-3114 / http://samsungsdi.co.kr/
Test Standard.....	Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria, section 38.3 Sixth revised edition Amendment 1
Description.....	Lithium ion battery (1S - 1P)
Model Name.....	EB-BA405ABE
Ratings	3.85V 3020mAh (11.63Wh)
Mass	42.60g

Test Result

No.	Test item	Result	Remark
T-1	Altitude	PASS	
T-2	Thermal Cycling	PASS	
T-3	Vibration	PASS	
T-4	Shock	PASS	
T-5	External Short Circuit	PASS	
T-6	Impact / Crush	PASS	Component cell
T-7	Overcharge	PASS	
T-8	Forced Discharge	PASS	Component cell

	Name	Signature	Date
Reported by	Han hyung woo		2019. 2. 14
Approved by	Nong Jons P:1		2019. 2. 14

Report Number:SDI-UN-190214-01

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T1	ALTITUDE SIMULATION TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.346	42.792	4.346	42.794	100.00	0.00
2	A	4.343	42.703	4.343	42.703	100.00	0.00
3	A	4.344	42.781	4.344	42.781	100.00	0.00
4	A	4.339	42.883	4.339	42.883	100.00	0.00
5	A	4.344	42.718	4.344	42.715	100.00	0.01
6	B	4.343	42.783	4.343	42.783	100.00	0.00
7	B	4.346	42.916	4.346	42.916	100.00	0.00
8	B	4.347	42.843	4.347	42.842	100.00	0.00
9	B	4.344	42.722	4.344	42.722	100.00	0.00
10	B	4.343	42.773	4.343	42.771	100.00	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T2	THERMAL TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.346	42.794	4.266	42.790	98.16	0.00
2	A	4.343	42.703	4.263	42.700	98.16	0.01
3	A	4.344	42.781	4.263	42.781	98.14	0.00
4	A	4.339	42.883	4.258	42.880	98.13	0.01
5	A	4.344	42.715	4.264	42.710	98.16	0.01
6	B	4.343	42.783	4.263	42.783	98.16	0.00
7	B	4.346	42.916	4.267	42.911	98.18	0.01
8	B	4.347	42.842	4.266	42.841	98.14	0.00
9	B	4.344	42.722	4.264	42.722	98.16	0.00
10	B	4.343	42.771	4.261	42.767	98.11	0.01

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T3	VIBRATION TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.266	42.790	4.264	42.792	99.95	0.00
2	A	4.263	42.700	4.263	42.700	100.00	0.00
3	A	4.263	42.781	4.263	42.781	100.00	0.00
4	A	4.258	42.880	4.257	42.881	99.98	0.00
5	A	4.264	42.710	4.261	42.711	99.93	0.00
6	B	4.263	42.783	4.263	42.783	100.00	0.00
7	B	4.267	42.911	4.266	42.911	99.98	0.00
8	B	4.266	42.841	4.265	42.840	99.98	0.00
9	B	4.264	42.722	4.264	42.722	100.00	0.00
10	B	4.261	42.767	4.261	42.767	100.00	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T4	SHOCK	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.264	42.792	4.264	42.790	100.00	0.00
2	A	4.263	42.700	4.263	42.700	100.00	0.00
3	A	4.263	42.781	4.262	42.780	99.98	0.00
4	A	4.257	42.881	4.256	42.881	99.98	0.00
5	A	4.261	42.711	4.261	42.711	100.00	0.00
6	B	4.263	42.783	4.263	42.782	100.00	0.00
7	B	4.266	42.911	4.266	42.911	100.00	0.00
8	B	4.265	42.840	4.264	42.842	99.98	0.00
9	B	4.264	42.722	4.262	42.722	99.95	0.00
10	B	4.261	42.767	4.260	42.766	99.98	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T5	EXTERNAL SHORT-CIRCUIT	Results
Requirements	External temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture <input checked="" type="checkbox"/> No fire. <input checked="" type="checkbox"/> External Temperature did not exceed 170 °C. see below table

Sample No.	Sample Condition	Maximum Temperature(°C)	Test result
1	A	57	O
2	A	57	O
3	A	57	O
4	A	57	O
5	A	57	O
6	B	57	O
7	B	57	O
8	B	57	O
9	B	57	O
10	B	57	O

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

Test result : O-No Disassembly, No Rupture, No Fire / D-Disassembly / R-Rupture / F-Fire

T6	<input type="checkbox"/> Impact / <input checked="" type="checkbox"/> Crush	Results
Requirements	Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test.	<input checked="" type="checkbox"/> External temperature did not exceed 170°C, <input checked="" type="checkbox"/> no disassembly, <input checked="" type="checkbox"/> no fire during test and within 6 hours after test See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Maximum Temperature(°C)	Test result
T6-1	C	3.775	21	O
T6-2	C	3.775	21	O
T6-3	C	3.775	21	O
T6-4	C	3.773	21	O
T6-5	C	3.774	21	O
T6-6	D	3.779	21	O
T6-7	D	3.776	21	O
T6-8	D	3.772	21	O
T6-9	D	3.773	21	O
T6-10	D	3.773	21	O

Supplementary Information:

Sample Condition C : at first cycle, in 50% charged states(5 pcs)

Sample Condition D : at 25th cycle, in 50% charged states(5 pcs)

Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

T7	OVERCHARGE	Results
Requirements	Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> no rupture, <input checked="" type="checkbox"/> no fire during the test and within seven days after the test. See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Test result
T7-1	A	4.346	O
T7-2	A	4.342	O
T7-3	A	4.346	O
T7-4	A	4.342	O
T7-5	B	4.346	O
T7-6	B	4.342	O
T7-7	B	4.346	O
T7-8	B	4.344	O

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(4 pcs)

Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

Test Conditions

Charge voltage : 8.8V, Charge current : 7.852A, Test time : 24Hr

T8	FORCED DISCHARGE	Results
Requirements	Rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> no rupture, <input checked="" type="checkbox"/> no fire during the test and within seven days after the test. See below table

Sample No.	Sample Condition	Test result	Sample No.	Sample Condition	Test result
T8-1	E	O	T8-11	F	O
T8-2	E	O	T8-12	F	O
T8-3	E	O	T8-13	F	O
T8-4	E	O	T8-14	F	O
T8-5	E	O	T8-15	F	O
T8-6	E	O	T8-16	F	O
T8-7	E	O	T8-17	F	O
T8-8	E	O	T8-18	F	O
T8-9	E	O	T8-19	F	O
T8-10	E	O	T8-20	F	O

Supplementary Information:

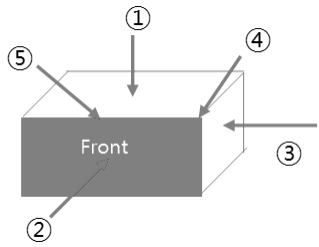
Sample Condition E : at first cycle, in fully discharged states (10 pcs)

Sample Condition F : after 25th cycles ending in fully discharged states(10 pcs)



Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

Test Conditions



Initial test current : 3.02A, Test duration : 1Hr

P1	Package Drop Test	Results
Procedure	<p>IATA Dangerous Goods Regulations Each package must be capable of withstanding a 1.2m drop test in any orientation</p> 	<p><input checked="" type="checkbox"/> Without damage to cells or batteries contained therein, <input checked="" type="checkbox"/> Without shifting of the contents so as to allow battery to battery(or Cell to cell) contact. <input checked="" type="checkbox"/> Without release of contents</p> <p>See below photo</p>

Battery Qty per box	Battery weight (kg)	Net weight per box (kg)
140	0.042	5.88

	Before Test	After Test
Weight (kg)	7.51	7.51
Test result		

Sample Photo

front	back
	

- End of Report -