



UN TEST REPORT

Report Number.....	SDI-UN-181207-01
Date of issue.....	2018.12.07
Test period.....	2018.11.15 ~ 2018.12.04
Testing Laboratory	Samsung SDI Co., Ltd
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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-BA505ABU
Ratings	3.85V 3900mAh (15.02Wh)
Mass	55.60g

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	Ham hyung Woo		2018.12.7
Approved by	Kong Jong Pil		2018.12.7

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	55.519	4.346	55.518	100.00	0.00
2	A	4.353	55.416	4.353	55.416	100.00	0.00
3	A	4.349	55.499	4.348	55.497	99.98	0.00
4	A	4.358	55.773	4.358	55.773	100.00	0.00
5	A	4.351	55.498	4.351	55.498	100.00	0.00
6	B	4.355	55.586	4.355	55.584	100.00	0.00
7	B	4.356	55.582	4.356	55.583	100.00	0.00
8	B	4.350	55.513	4.350	55.513	100.00	0.00
9	B	4.354	55.706	4.352	55.704	99.95	0.00
10	B	4.353	55.787	4.352	55.787	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)

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	55.518	4.297	55.514	98.87	0.01
2	A	4.353	55.416	4.310	55.413	99.01	0.01
3	A	4.348	55.497	4.310	55.502	99.13	0.00
4	A	4.358	55.773	4.330	55.771	99.36	0.00
5	A	4.351	55.498	4.295	55.496	98.71	0.00
6	B	4.355	55.584	4.307	55.583	98.90	0.00
7	B	4.356	55.583	4.314	55.580	99.04	0.01
8	B	4.350	55.513	4.314	55.510	99.17	0.01
9	B	4.352	55.704	4.302	55.701	98.85	0.01
10	B	4.352	55.787	4.318	55.782	99.22	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	4.297	55.514	4.296	55.511	99.98	0.01
2	A	4.310	55.413	4.310	55.411	100.00	0.00
3	A	4.310	55.502	4.310	55.502	100.00	0.00
4	A	4.330	55.771	4.330	55.771	100.00	0.00
5	A	4.295	55.496	4.293	55.494	99.95	0.00
6	B	4.307	55.583	4.304	55.581	99.93	0.00
7	B	4.314	55.580	4.314	55.580	100.00	0.00
8	B	4.314	55.510	4.313	55.510	99.98	0.00
9	B	4.302	55.701	4.301	55.700	99.98	0.00
10	B	4.318	55.782	4.318	55.782	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	4.296	55.511	4.294	55.511	99.95	0.00
2	A	4.310	55.411	4.308	55.411	99.95	0.00
3	A	4.310	55.502	4.309	55.502	99.98	0.00
4	A	4.330	55.771	4.330	55.771	100.00	0.00
5	A	4.293	55.494	4.292	55.494	99.98	0.00
6	B	4.304	55.581	4.301	55.581	99.93	0.00
7	B	4.314	55.580	4.314	55.580	100.00	0.00
8	B	4.313	55.510	4.313	55.510	100.00	0.00
9	B	4.301	55.700	4.300	55.700	99.98	0.00
10	B	4.318	55.782	4.317	55.782	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	3.761	23	O
T6-2	C	3.762	23	O
T6-3	C	3.762	23	O
T6-4	C	3.763	23	O
T6-5	C	3.762	23	O
T6-6	D	3.763	23	O
T6-7	D	3.763	23	O
T6-8	D	3.762	23	O
T6-9	D	3.762	23	O
T6-10	D	3.762	23	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	4.351	O
T7-2	A	4.352	O
T7-3	A	4.352	O
T7-4	A	4.350	O
T7-5	B	4.353	O
T7-6	B	4.353	O
T7-7	B	4.351	O
T7-8	B	4.352	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 : 6.24A, 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:

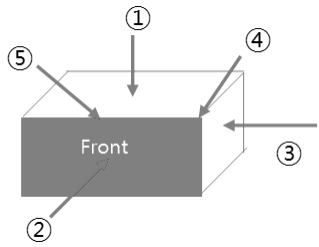
Sample Condition E : at first cycle, in fully discharged states (10 pcs)

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 : 3.9A, 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)
128	0.055	7.04

	Before Test	After Test
Weight (kg)	8.23	8.23
Test result		

Sample Photo

front	back
	

- End of Report -