

UN TEST REPORT

Report Number.	: SDI-UN-191022-02
Date of issue.....	: 2019.10.22
Test period	: 2019.09.19 ~ 2019.10.14
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-BA715ABY
Ratings	3.85V 4370mAh (16.83Wh)
Mass	61.5g

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	
T-7	Overcharge	PASS	
T-8	Forced Discharge	PASS	

	Name	Signature	Date
Reported by	Ham hyungwon		2019. 10. 22
Approved by	Yoo Seung Woo		2019. 10. 22

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	4.360	61.726	4.360	61.724	100.00	0.00
2	A	4.361	61.669	4.360	61.669	99.98	0.00
3	A	4.362	61.601	4.362	61.600	100.00	0.00
4	A	4.363	61.754	4.362	61.753	99.98	0.00
5	A	4.362	61.608	4.362	61.608	100.00	0.00
6	B	4.364	61.780	4.362	61.780	99.95	0.00
7	B	4.362	61.747	4.361	61.745	99.98	0.00
8	B	4.359	61.589	4.357	61.588	99.95	0.00
9	B	4.361	61.647	4.361	61.647	100.00	0.00
10	B	4.361	61.693	4.360	61.693	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	4.360	61.724	4.268	61.720	97.89	0.01
2	A	4.360	61.669	4.269	61.667	97.91	0.00
3	A	4.362	61.600	4.273	61.596	97.96	0.01
4	A	4.362	61.753	4.272	61.751	97.94	0.00
5	A	4.362	61.608	4.274	61.603	97.98	0.01
6	B	4.362	61.780	4.275	61.773	98.01	0.01
7	B	4.361	61.745	4.270	61.743	97.91	0.00
8	B	4.357	61.588	4.269	61.586	97.98	0.00
9	B	4.361	61.647	4.270	61.642	97.91	0.01
10	B	4.360	61.693	4.272	61.690	97.98	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)

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	4.268	61.720	4.266	61.721	99.95	0.00
2	A	4.269	61.667	4.267	61.664	99.95	0.00
3	A	4.273	61.596	4.271	61.594	99.95	0.00
4	A	4.272	61.751	4.270	61.751	99.95	0.00
5	A	4.274	61.603	4.271	61.601	99.93	0.00
6	B	4.275	61.773	4.271	61.771	99.91	0.00
7	B	4.270	61.743	4.265	61.743	99.88	0.00
8	B	4.269	61.586	4.265	61.584	99.91	0.00
9	B	4.270	61.642	4.265	61.641	99.88	0.00
10	B	4.272	61.690	4.271	61.690	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)

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	4.266	61.721	4.264	61.721	99.95	0.00
2	A	4.267	61.664	4.265	61.663	99.95	0.00
3	A	4.271	61.594	4.265	61.594	99.86	0.00
4	A	4.270	61.751	4.266	61.750	99.91	0.00
5	A	4.271	61.601	4.268	61.601	99.93	0.00
6	B	4.271	61.771	4.265	61.771	99.86	0.00
7	B	4.265	61.743	4.261	61.741	99.91	0.00
8	B	4.265	61.584	4.262	61.584	99.93	0.00
9	B	4.265	61.641	4.263	61.640	99.95	0.00
10	B	4.271	61.690	4.265	61.690	99.86	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	3.774	22	O
T6-2	C	3.774	22	O
T6-3	C	3.773	22	O
T6-4	C	3.774	22	O
T6-5	C	3.772	22	O
T6-6	D	3.771	22	O
T6-7	D	3.774	22	O
T6-8	D	3.774	22	O
T6-9	D	3.773	22	O
T6-10	D	3.774	22	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	4.364	O
T7-2	A	4.363	O
T7-3	A	4.364	O
T7-4	A	4.363	O
T7-5	B	4.362	O
T7-6	B	4.362	O
T7-7	B	4.363	O
T7-8	B	4.362	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 : 11.362A, 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:

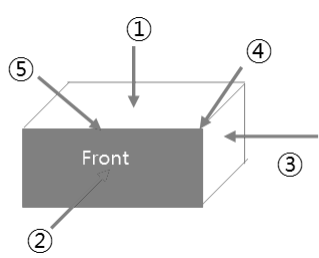
Sample Condition E : at first cycle, in fully discharged states (10 pcs)

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 : 4.37A, 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)
136	0.061	8.29

	Before Test	After Test
Weight (kg)	10.67	10.67
Test result		

Sample Photo



- End of Report -