



# UN TEST REPORT

## Test Summary

Report Number.....: SDI-UN-201028-01			
Date of issue.....: 2020.10.28			
Test period.....: 2020.10.05 ~ 2020.10.27			
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/ lian55.kim@samsung.com			
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/ lian55.kim@samsung.com			
Test Standard..... Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria, section 38.3 Sixth revised edition Amendment 1			
Physical description..... Cradle Battery			
Assembled Battery Testing Requirements..... Not Applicable			
Description..... Lithium ion battery (1S - 1P)			
Model Name..... EB-BR190ABY			
Ratings.....	3.85V	472mAh (1.81Wh)	Mass Max 8.19 g

**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	position	Signature	Date
Reported by	Hanhyungwoo	Engineer		2020.10.28
Approved by	Kim Jung Gil	Technical Engineer		2020.10.28

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	4.347	7.873	4.347	7.873	100.00	0.00
2	A	4.350	7.832	4.350	7.831	100.00	0.01
3	A	4.350	7.822	4.350	7.822	100.00	0.00
4	A	4.351	7.824	4.351	7.824	100.00	0.00
5	A	4.352	7.873	4.352	7.873	100.00	0.00
6	B	4.345	7.831	4.345	7.831	100.00	0.00
7	B	4.353	7.842	4.353	7.841	100.00	0.01
8	B	4.351	7.854	4.351	7.853	100.00	0.01
9	B	4.347	7.873	4.347	7.873	100.00	0.00
10	B	4.350	7.832	4.350	7.831	100.00	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)

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	4.347	7.873	4.274	7.872	98.32	0.01
2	A	4.350	7.831	4.279	7.831	98.37	0.00
3	A	4.350	7.822	4.264	7.822	98.02	0.00
4	A	4.351	7.824	4.282	7.824	98.41	0.00
5	A	4.352	7.873	4.272	7.873	98.16	0.00
6	B	4.345	7.831	4.268	7.831	98.23	0.00
7	B	4.353	7.841	4.267	7.840	98.02	0.01
8	B	4.351	7.853	4.284	7.853	98.46	0.00
9	B	4.347	7.873	4.274	7.872	98.32	0.01
10	B	4.350	7.831	4.279	7.831	98.37	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	4.274	7.872	4.271	7.872	99.93	0.00
2	A	4.279	7.831	4.274	7.831	99.88	0.00
3	A	4.264	7.822	4.261	7.822	99.93	0.00
4	A	4.282	7.824	4.280	7.824	99.95	0.00
5	A	4.272	7.873	4.259	7.873	99.70	0.00
6	B	4.268	7.831	4.246	7.831	99.48	0.00
7	B	4.267	7.840	4.265	7.840	99.95	0.00
8	B	4.284	7.853	4.278	7.854	99.86	0.00
9	B	4.274	7.872	4.271	7.872	99.93	0.00
10	B	4.279	7.831	4.274	7.831	99.88	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	4.271	7.872	4.269	7.872	99.95	0.00
2	A	4.274	7.831	4.272	7.831	99.95	0.00
3	A	4.261	7.822	4.261	7.822	100.00	0.00
4	A	4.280	7.824	4.280	7.823	100.00	0.01
5	A	4.259	7.873	4.259	7.873	100.00	0.00
6	B	4.246	7.831	4.246	7.831	100.00	0.00
7	B	4.265	7.840	4.263	7.840	99.95	0.00
8	B	4.278	7.854	4.278	7.854	100.00	0.00
9	B	4.271	7.872	4.269	7.872	99.95	0.00
10	B	4.274	7.831	4.272	7.831	99.95	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	56	O
4	A	57	O
5	A	57	O
6	B	56	O
7	B	56	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	3.773	23	O
T6-2	C	3.774	23	O
T6-3	C	3.773	24	O
T6-4	C	3.774	24	O
T6-5	C	3.773	24	O
T6-6	D	3.774	24	O
T6-7	D	3.773	23	O
T6-8	D	3.772	23	O
T6-9	D	3.774	23	O
T6-10	D	3.775	24	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	4.358	O
T7-2	A	4.360	O
T7-3	A	4.359	O
T7-4	A	4.362	O
T7-5	B	4.358	O
T7-6	B	4.354	O
T7-7	B	4.361	O
T7-8	B	4.358	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 : 0.756A, 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 : 0.472A, 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>	<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  See below photo

Battery Qty per box	Battery weight (kg)	Net weight per box (kg)
176	0.0078	1.37

	Before Test	After Test
Weight (kg)	3.02	3.02
Test result		

Sample Photo



- End of Report -