



**SAMSUNG SDI**

Ver.00

## UN TEST REPORT

Report Number .....	SDI-UN-181002-03
Date of issue .....	2018.10.02
Test period .....	2018.09.13 ~ 2018.10.01
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 ( 1 S- 1 P)
Model Name .....	EB-BG970ABU
Ratings .....	3.85V 3000mAh (11.55 Wh)
Mass .....	42.674g

**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	Hamhyung Woo		2018.10.2
Approved by	Hong Junb P.1		2018.10.2

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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"/> voltage drop (Less than 10%)  See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Percent of Voltage Drop(%)	Percent of Weight Loss(%)
1	A	4.359	42.746	4.358	42.745	100.0	0.00
2	A	4.360	42.657	4.360	42.657	100.0	0.00
3	A	4.362	42.715	4.361	42.715	100.0	0.00
4	A	4.360	42.673	4.360	42.672	100.0	0.00
5	A	4.356	42.703	4.356	42.703	100.0	0.00
6	B	4.337	42.619	4.336	42.619	100.0	0.00
7	B	4.339	42.779	4.339	42.778	100.0	0.00
8	B	4.336	42.604	4.336	42.602	100.0	0.00
9	B	4.337	42.717	4.337	42.717	100.0	0.00
10	B	4.336	42.755	4.336	42.755	100.0	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"/> Voltage drop (Less than 10%)  See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Percent of Voltage Drop(%)	Percent of Weight Loss(%)
1	A	4.358	42.745	4.278	42.742	98.2	0.01
2	A	4.360	42.657	4.280	42.654	98.2	0.01
3	A	4.361	42.715	4.280	42.715	98.1	0.00
4	A	4.360	42.672	4.280	42.670	98.2	0.00
5	A	4.356	42.703	4.275	42.700	98.1	0.01
6	B	4.336	42.619	4.257	42.619	98.2	0.00
7	B	4.339	42.778	4.259	42.778	98.2	0.00
8	B	4.336	42.602	4.258	42.600	98.2	0.00
9	B	4.337	42.717	4.257	42.714	98.2	0.01
10	B	4.336	42.755	4.256	42.755	98.2	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"/> voltage drop (Less than 10%)  See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Percent of Voltage Drop(%)	Percent of Weight Loss(%)
1	A	4.278	42.742	4.277	42.741	100.0	0.00
2	A	4.280	42.654	4.280	42.654	100.0	0.00
3	A	4.280	42.715	4.280	42.715	100.0	0.00
4	A	4.280	42.670	4.280	42.670	100.0	0.00
5	A	4.275	42.700	4.274	42.700	100.0	0.00
6	B	4.257	42.619	4.255	42.618	100.0	0.00
7	B	4.259	42.778	4.259	42.778	100.0	0.00
8	B	4.258	42.600	4.258	42.600	100.0	0.00
9	B	4.257	42.714	4.257	42.712	100.0	0.00
10	B	4.256	42.755	4.256	42.755	100.0	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"/> voltage drop (Less than 10%)  See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Percent of Voltage Drop(%)	Percent of Weight Loss(%)
1	A	4.277	42.741	4.276	42.741	100.0	0.00
2	A	4.280	42.654	4.280	42.652	100.0	0.00
3	A	4.280	42.715	4.280	42.715	100.0	0.00
4	A	4.280	42.670	4.280	42.670	100.0	0.00
5	A	4.274	42.700	4.272	42.700	100.0	0.00
6	B	4.255	42.618	4.255	42.617	100.0	0.00
7	B	4.259	42.778	4.257	42.779	100.0	0.00
8	B	4.258	42.600	4.258	42.600	100.0	0.00
9	B	4.257	42.712	4.255	42.712	100.0	0.00
10	B	4.256	42.755	4.256	42.754	100.0	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	3.772	23	O
T6-2	C	3.772	23	O
T6-3	C	3.772	24	O
T6-4	C	3.772	24	O
T6-5	C	3.772	23	O
T6-6	D	3.771	24	O
T6-7	D	3.771	24	O
T6-8	D	3.771	24	O
T6-9	D	3.771	25	O
T6-10	D	3.771	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	4.359	O
T7-2	A	4.359	O
T7-3	A	4.361	O
T7-4	A	4.359	O
T7-5	B	4.341	O
T7-6	B	4.341	O
T7-7	B	4.341	O
T7-8	B	4.340	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

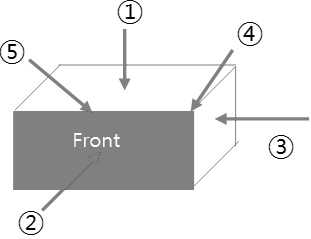
Charge voltage : 8.8V, Charge current : 4.8A, Test time : 24Hr





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	D	O	T8-11	E	O
T8-2	D	O	T8-12	E	O
T8-3	D	O	T8-13	E	O
T8-4	D	O	T8-14	E	O
T8-5	D	O	T8-15	E	O
T8-6	D	O	T8-16	E	O
T8-7	D	O	T8-17	E	O
T8-8	D	O	T8-18	E	O
T8-9	D	O	T8-19	E	O
T8-10	D	O	T8-20	E	O

<input checked="" type="checkbox"/> Supplementary Information: Sample Condition D : at first cycle, in fully discharged states (10 pcs) Sample Condition E : after 25th cycles ending in fully discharged states(10 pcs)  Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire  <input checked="" type="checkbox"/> Test Conditions Initial test current : 3A, Test duration : 1Hr
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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)
180	0.042	7.56

	Before Test	After Test
Weight (kg)	8.74	8.74
Test result		



Sample Photo

front	back
	

- End of Report -