함형우 / HWOO.HAM / 품질)소형개발QA그룹 / 179147140 / 2017-12-05 10:37:48

Model name : EB-BG960ABE

Revision 09

Executive Div.	Safety Center	Confidential

	Name / Title	Signature	Date
Reported by	Ham Hyung Woo		2017. 12. 5
Approved by	Yoo Seung Woo		2017. 12. 6

Test report; UN Manual of Tests and Criteria, Part III, Subsection 38.3

2015, Rev.6

Document No : SDI-UN-171205-01

SAMSUNG SDI
Energy Business Division

SAMSUNG SDI

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Product Information

1. Model name: EB-BG960ABE

2. Product classification: Li rechargeable battery pack (1S-1P)

3. Nominal voltage: 3.85 V

4. Rated capacity: 3000 mAh

5. Wh Capacity: 11.55 Wh

6. Weight of product: 42.5 g

7. Test Date: 2017.07.24 ~ 2017.08.17

8. Test Location: SAMSUNG SDI Safety Center, 467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea

Test summary

Test No.	Test item	Relating Std.	Test begins on (YYYY/MM/DD)	Test Completed on (YYYY/MM/DD)	Judgment (Pass/Fail)
T1	Altitude simulation	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.1	2017/07/24	2017/07/24	Pass
T2	Thermal test	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.2	2017/07/25	2017/07/31	Pass
T3	Vibration	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.3	2017/08/02	2017/08/02	Pass
T4	Shock	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.4	2017/08/04	2017/08/04	Pass
T5	External short circuit	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.5	2017/08/07	2017/08/07	Pass
T6	Impact / Crush	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.6	2017/08/07	2017/08/07	Pass
T7	Overcharge	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.7	2017/08/09	2017/08/17	Pass
T8	Forced discharge	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.8	2017/08/10	2017/08/17	Pass
Total Judgment(Pass/Fail)					Pass

■ Tests T-1 through T-5 shall be conducted in sequence with the same cell/pack/single cell battery.
■ For test 6, test should be conducted for Li-ion cells or component cell contained in a battery.
■ T7 shall be performed only for Li-ion rechargeable battery or rechargeable single cell battery not cell.
■ T8 should be conducted for Li-ion cells or component cell contained in a battery.

T-1~T-5) Transportation Test (Test Result: Pass)

Fresh pack 100% SOC												
Initial							T1					
No.	Weight(g)	OCV(V)					Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result
1	42.269	4.32					42.266	4.32	0.01	100.00	O	PASS
2	42.226	4.32					42.226	4.32	0.00	100.00	O	PASS
3	42.286	4.32					42.286	4.32	0.00	100.00	O	PASS
4	42.242	4.32					42.240	4.32	0.00	100.00	O	PASS
5	42.268	4.32					42.268	4.32	0.00	100.00	O	PASS
6	42.226	4.32					42.225	4.32	0.00	100.00	O	PASS
7	42.253	4.32					42.251	4.32	0.00	100.00	O	PASS
8	42.287	4.32					42.287	4.32	0.00	100.00	O	PASS
9	42.279	4.32					42.279	4.32	0.00	100.00	O	PASS
10	42.267	4.32					42.266	4.32	0.00	100.00	O	PASS
T2							T3					
No.	Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result	Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result
1	42.259	4.25	0.02	98.38	O	PASS	42.258	4.25	0.00	100.00	O	PASS
2	42.218	4.25	0.02	98.38	O	PASS	42.217	4.25	0.00	100.00	O	PASS
3	42.280	4.25	0.01	98.38	O	PASS	42.280	4.25	0.00	100.00	O	PASS
4	42.235	4.25	0.01	98.38	O	PASS	42.235	4.25	0.00	100.00	O	PASS
5	42.258	4.25	0.02	98.38	O	PASS	42.259	4.25	0.00	100.00	O	PASS
6	42.221	4.25	0.01	98.38	O	PASS	42.223	4.25	0.00	100.00	O	PASS
7	42.243	4.25	0.02	98.38	O	PASS	42.243	4.25	0.00	100.00	O	PASS
8	42.281	4.25	0.01	98.38	O	PASS	42.281	4.25	0.00	100.00	O	PASS
9	42.272	4.25	0.02	98.38	O	PASS	42.275	4.25	0.00	100.00	O	PASS
10	42.258	4.25	0.02	98.38	O	PASS	42.259	4.25	0.00	100.00	O	PASS
T4							T5					
No.	Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result	Max T(℃)	Appearance				Result
1	42.257	4.25	0.00	100.00	O	PASS	57	O				PASS
2	42.215	4.25	0.00	100.00	O	PASS	57	O				PASS
3	42.280	4.25	0.00	100.00	O	PASS	56	O				PASS
4	42.234	4.25	0.00	100.00	O	PASS	57	O				PASS
5	42.256	4.25	0.00	100.00	O	PASS	58	O				PASS
6	42.223	4.25	0.00	100.00	O	PASS	57	O				PASS
7	42.243	4.25	0.00	100.00	O	PASS	57	O				PASS
8	42.283	4.25	0.00	100.00	O	PASS	58	O				PASS
9	42.274	4.25	0.00	100.00	O	PASS	58	O				PASS
10	42.259	4.25	0.00	100.00	O	PASS	57	O				PASS
[Appearance] O-No Leakage, No Venting, No Disassembly, No Rupture, No Fire / L-Leakage / V-Venting / D-Disassembly / R-Rupture / F-Fire												
[Criteria] T1~T4: No Leakage / No Venting / No Disassembly / No Rupture / No Fire / Residual OCV not less than 90% T5: External temperature does not exceed 170℃, no disassembly, no rupture, and no fire within 6 hours of this test												

T-6) Impact/Crush Test (Test Result: Pass)

■ Cell type

[ ] Cylindrical cells not less than 18.0 mm in diameter

[X] Prismatic, Pouch, Cylindrical cells less than 18.0 mm in diameter

■ Test procedure

[ ] Impact

[X] Crush

Fresh pack 50% SOC				
	Initial	T6		
No.	OCV(V)	Max Temp(℃)	Appearance	Result
1	3.96	23	O	Pass
2	3.96	23	O	Pass
3	3.96	23	O	Pass
4	3.96	23	O	Pass
5	3.96	23	O	Pass
[Appearance] O-No Disassembly, No Fire / D-Disassembly / F-Fire				
[Criteria] External temperature does not exceed 170℃, no disassembly, and no fire within 6 hours of this test.				

T-7) Over charge Test (Test Result: Pass)

■ Test condition: 8.8V / 4.8A / 24Hr

Fresh pack 100% SOC			50 cycled pack 100% SOC	
No.	Appearance	Result	Appearance	Result
1	O	PASS	O	PASS
2	O	PASS	O	PASS
3	O	PASS	O	PASS
4	O	PASS	O	PASS
[Appearance] O-No Disassembly, No Fire / D-Disassembly / F-Fire				
[Criteria] No disassembly and no fire within 7 days of the test				

T-8) Forced discharge Test (Test Result: Pass)

■ Test condition:

- Initial test current: 3A
- Time interval: 60Min

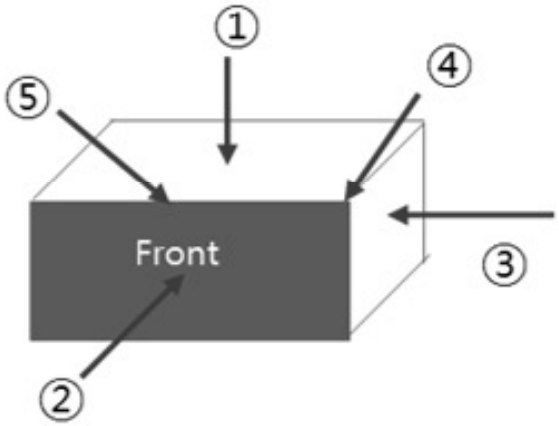
Fresh pack 0% SOC				50 cycled pack 0% SOC		
No.	Max. tempe(℃)	Appearance	Result	Max. temp(℃)	Appearance	Result
1	29	O	Pass	29	O	Pass
2	31	O	Pass	30	O	Pass
3	29	O	Pass	31	O	Pass
4	28	O	Pass	31	O	Pass
5	31	O	Pass	28	O	Pass
6	28	O	Pass	31	O	Pass
7	28	O	Pass	31	O	Pass
8	31	O	Pass	33	O	Pass
9	32	O	Pass	25	O	Pass
10	29	O	Pass	32	O	Pass
[Appearance] O-No Disassembly, No Fire / D-Disassembly / F-Fire						
[Criteria] No disassembly and no fire within 7 days of the test						

Annex 1 - 1.2m Packaging Drop Test

■ Test Summary

Test No.	Test item	Relating Std.	Test begins on (YYYY/MM/DD)	Test Completed on (YYYY/MM/DD)	Judgment (Pass/Fail)
P1	Packaging Drop	IATA Dangerous Goods Regulations	2017/08/17	2017/08/17	Pass
Total Judgment(Pass/Fail)					Pass

■ Test Method



P-1 1.2m Packaging Drop Test (Test Result: Pass)

■ Sample Information

	Front	Back
Picture		

Cell Qty per box	Cell weight (kg)	Net weight per box (kg)
180	0.042	7.56

P-1 1.2m Packaging Drop Test (Test Result: Pass)

■ **Test result**

	Before Test	After Test
Weight (Kg)	8.10	8.10
Test Result		
Remark	Outer packaging is damaged but samples inside the package remain intact and no damage, no shifting, no release of contents for samples inside the package.	
Criteria	- Without damage to cells or batteries contained therein. - Without shifting of the contents so as to allow battery to battery(or Cell to cell) contact. - Without release of contents.	