함형우 / HWOO.HAM / 품질)소형개발QA그룹 / 1791471140 / 2018-04-20 10:32:51

Model name : EB-BN965ABU

Revision 10

Executive Div.	Safety Center	Confidential	
	Name / Title	**Signature**	**Date**
Reported by	Ham hyung Woo		2018.4.20
Approved by	Yoo Sang Wo		2018.4.20

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

2015, Rev.6

Document No : SDI-UN-180420-01

SAMSUNG SDI
Energy Business Division

본 정보는 삼성SDI 정보자산 관리책임자의 허가없이 출력,배포,반출을 할 수 없으며, 위규시 관련법령에 의거하여 인사상 불이익을 받을 수 있습니다.

Product Information

1. Model name: EB-BN965ABU

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

3. Nominal voltage: 3.85 V

4. Rated capacity: 4000 mAh

5. Wh Capacity: 15.40 Wh

6. Weight of product: 55.40 g

7. Test Date: 2018.03.27 ~ 2018.04.17

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	2018/03/27	2018/03/27	Pass
T2	Thermal test	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.2	2018/03/28	2018/04/03	Pass
T3	Vibration	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.3	2018/04/05	2018/04/05	Pass
T4	Shock	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.4	2018/04/06	2018/04/06	Pass
T5	External short circuit	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.5	2018/04/09	2018/04/09	Pass
T6	Impact / Crush	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.6	2018/04/09	2018/04/09	Pass
T7	Overcharge	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.7	2018/04/09	2018/04/17	Pass
T8	Forced discharge	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.8	2018/04/10	2018/04/17	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	55.270	4.358					55.267	4.356	0.01	100.0	O	Pass
2	55.350	4.358					55.345	4.356	0.01	100.0	O	Pass
3	55.343	4.356					55.343	4.354	0.00	100.0	O	Pass
4	55.282	4.357					55.275	4.355	0.01	100.0	O	Pass
5	55.183	4.356					55.185	4.354	0.00	100.0	O	Pass
6	55.206	4.355					55.202	4.353	0.01	100.0	O	Pass
7	55.302	4.357					55.301	4.355	0.00	100.0	O	Pass
8	55.280	4.358					55.281	4.355	0.00	99.9	O	Pass
9	55.176	4.355					55.173	4.353	0.01	100.0	O	Pass
10	55.318	4.356					55.314	4.355	0.01	100.0	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	55.265	4.279	0.00	98.2	O	Pass	55.263	4.278	0.00	100.0	O	Pass
2	55.341	4.280	0.01	98.3	O	Pass	55.336	4.279	0.01	100.0	O	Pass
3	55.331	4.277	0.02	98.2	O	Pass	55.328	4.276	0.01	100.0	O	Pass
4	55.270	4.280	0.01	98.3	O	Pass	55.259	4.279	0.02	100.0	O	Pass
5	55.183	4.280	0.00	98.3	O	Pass	55.177	4.279	0.01	100.0	O	Pass
6	55.199	4.275	0.01	98.2	O	Pass	55.191	4.274	0.01	100.0	O	Pass
7	55.298	4.278	0.01	98.2	O	Pass	55.294	4.277	0.01	100.0	O	Pass
8	55.277	4.277	0.01	98.2	O	Pass	55.276	4.276	0.00	100.0	O	Pass
9	55.172	4.274	0.00	98.2	O	Pass	55.172	4.274	0.00	100.0	O	Pass
10	55.316	4.278	0.00	98.2	O	Pass	55.306	4.277	0.02	100.0	O	Pass
T4							T5					
No.	Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result	Max T(℃)	Appearance				Result
1	55.264	4.277	0.00	100.0	O	Pass	57	O				Pass
2	55.336	4.278	0.00	100.0	O	Pass	57	O				Pass
3	55.328	4.276	0.00	100.0	O	Pass	57	O				Pass
4	55.258	4.279	0.00	100.0	O	Pass	56	O				Pass
5	55.177	4.279	0.00	100.0	O	Pass	57	O				Pass
6	55.192	4.272	0.00	100.0	O	Pass	57	O				Pass
7	55.292	4.277	0.00	100.0	O	Pass	57	O				Pass
8	55.276	4.275	0.00	100.0	O	Pass	57	O				Pass
9	55.171	4.273	0.00	100.0	O	Pass	57	O				Pass
10	55.306	4.277	0.00	100.0	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
T6-1	3.752	23	O	Pass
T6-2	3.751	23	O	Pass
T6-3	3.752	22	O	Pass
T6-4	3.753	23	O	Pass
T6-5	3.752	22	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 / 6.16A / 24Hr

Fresh pack 100% SOC			50 cycled pack 100% SOC		
No.	Appearance	Result	No.	Appearance	Result
T7-1	O	Pass	T7-5	O	Pass
T7-2	O	Pass	T7-6	O	Pass
T7-3	O	Pass	T7-7	O	Pass
T7-4	O	Pass	T7-8	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: 4A
- Time interval: 1Hr

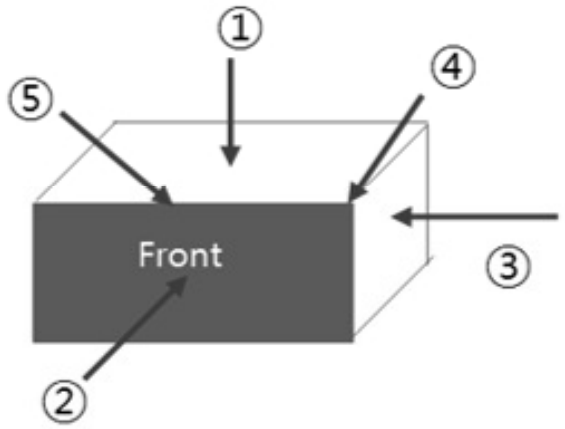
Fresh pack 0% SOC				50 cycled pack 0% SOC			
No.	Max. tempe(℃)	Appearance	Result	No.	Max. temp(℃)	Appearance	Result
T8-1	26	O	Pass	T8-11	25	O	Pass
T8-2	27	O	Pass	T8-12	25	O	Pass
T8-3	25	O	Pass	T8-13	26	O	Pass
T8-4	26	O	Pass	T8-14	24	O	Pass
T8-5	26	O	Pass	T8-15	25	O	Pass
T8-6	26	O	Pass	T8-16	24	O	Pass
T8-7	26	O	Pass	T8-17	27	O	Pass
T8-8	24	O	Pass	T8-18	25	O	Pass
T8-9	24	O	Pass	T8-19	25	O	Pass
T8-10	26	O	Pass	T8-20	26	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	2018/04/17	2018/04/17	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)
150	0.055	8.25

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

■ **Test result**

	Before Test	After Test
Weight (Kg)	9.58	9.58
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.	