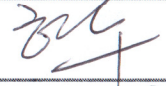
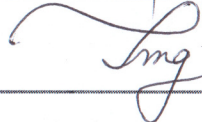


Model name : INR18650-20S

Revision 07

Executive Div.	Safety Center	Confidential	
	Name / Title	Signature	Date
Reported by	Ham hyung woo		2014.11.11
Approved by	Jung Min-kyu		2014. 11. 11

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

2013, Rev.5, Amend.2

Document No : SDI-UN-141111-01

SAMSUNG SDI
Energy Business Division



Product Information

- 1. Model name: INR18650-20S**
- 2. Product classification: Li-ion cylindrical cell**
- 3. Nominal voltage: 3.6V**
- 4. Rated capacity: 2000mAh**
- 5. Wh Capacity: 7.2Wh**
- 6. Weight of product: Max 47g**
- 7. Test Date: 2014.10.01 ~ 2014.10.27**
- 8. Test Location: SAMSUNG SDI Safety Center, 508 Sungsungdong, Cheonan
Chungcheongnamdo, 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	2014.10.01	2014.10.01	Pass
T2	Thermal test	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.2	2014.10.02	2014.10.08	Pass
T3	Vibration	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.3	2014.10.12	2014.10.12	Pass
T4	Shock	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.4	2014.10.18	2014.10.18	Pass
T5	External short circuit	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.5	2014.10.20	2014.10.20	Pass
T6	Impact/ Crush	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.6	2014.10.20	2014.10.20	Pass
T7	Overcharge	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.7	N/A	N/A	N/A
T8	Forced discharge	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.8	2014.10.20	2014.10.27	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 cell 100% SOC												
Initial							T1					
No.	Weight(g)	OCV(V)					Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result
1	45.763	4.16					45.762	4.16	0.00	100.00	O	Pass
2	45.763	4.16					45.763	4.16	0.00	100.00	O	Pass
3	45.659	4.16					45.657	4.16	0.00	100.00	O	Pass
4	45.691	4.16					45.693	4.16	0.00	100.00	O	Pass
5	45.668	4.16					45.668	4.16	0.00	100.00	O	Pass
6	45.701	4.16					45.704	4.16	-0.01	100.00	O	Pass
7	45.707	4.16					45.704	4.16	0.01	100.00	O	Pass
8	45.673	4.16					45.673	4.16	0.00	100.00	O	Pass
9	45.696	4.16					45.695	4.16	0.00	100.00	O	Pass
10	45.800	4.16					45.800	4.16	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	45.760	4.09	0.00	98.32	O	Pass	45.762	4.09	0.00	100.00	O	Pass
2	45.760	4.09	0.01	98.32	O	Pass	45.760	4.09	0.00	100.00	O	Pass
3	45.654	4.09	0.01	98.32	O	Pass	45.655	4.09	0.00	100.00	O	Pass
4	45.694	4.09	0.00	98.32	O	Pass	45.694	4.08	0.00	99.76	O	Pass
5	45.667	4.09	0.00	98.32	O	Pass	45.665	4.09	0.00	100.00	O	Pass
6	45.704	4.09	0.00	98.32	O	Pass	45.705	4.09	0.00	100.00	O	Pass
7	45.704	4.09	0.00	98.32	O	Pass	45.704	4.08	0.00	99.76	O	Pass
8	45.670	4.09	0.01	98.32	O	Pass	45.672	4.08	0.00	99.76	O	Pass
9	45.695	4.09	0.00	98.32	O	Pass	45.695	4.09	0.00	100.00	O	Pass
10	45.798	4.09	0.00	98.32	O	Pass	45.794	4.09	0.01	100.00	O	Pass
T4							T5					
No.	Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result	Max T(°C)	Appearance				Result
1	45.762	4.08	0.00	99.76	O	Pass	95	O				Pass
2	45.763	4.09	-0.01	100.00	O	Pass	91	O				Pass
3	45.655	4.09	0.00	100.00	O	Pass	75	O				Pass
4	45.695	4.08	0.00	100.00	O	Pass	95	O				Pass
5	45.665	4.09	0.00	100.00	O	Pass	83	O				Pass
6	45.707	4.09	0.00	100.00	O	Pass	93	O				Pass
7	45.702	4.08	0.00	100.00	O	Pass	99	O				Pass
8	45.672	4.08	0.00	100.00	O	Pass	85	O				Pass
9	45.694	4.09	0.00	100.00	O	Pass	81	O				Pass
10	45.797	4.09	-0.01	100.00	O	Pass	93	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°C, 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 greater than 18.0 mm in diameter

☐ Prismatic, Pouch, Cylindrical cells not more than 18.0 mm in diameter

■ Test procedure

☒ Impact

☐ Crush

Fresh Cell 50% SOC				
	Initial	T6		
No.	OCV(V)	Max Temp(°C)	Appearance	Result
1	3.69	85	○	Pass
2	3.69	91	○	Pass
3	3.69	93	○	Pass
4	3.69	59	○	Pass
5	3.69	92	○	Pass
[Appearance] O-No Disassembly, No Fire / D-Disassembly / F-Fire				
[Criteria] External temperature does not exceed 170°C, no disassembly, and no fire within 6 hours of this test.				

T-7) Over charge Test (Test Result: N/A)

■ Test condition: N/A

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

■ Test condition:

- Initial test current: 30A
- Time interval: 4min

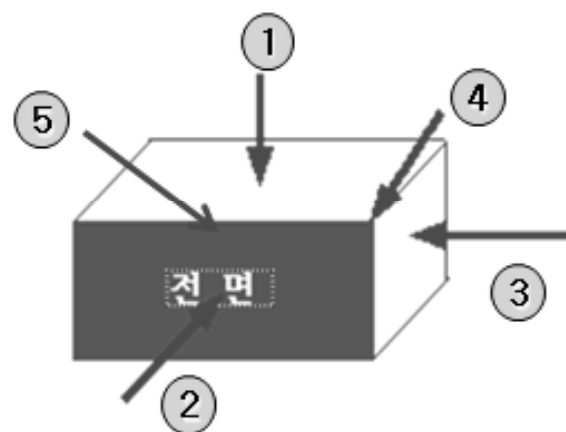
Fresh cell 0% SOC				50 cycled cell 0% SOC		
No.	Max. tempe(°C)	Appearance	Result	Max. temp(°C)	Appearance	Result
1	88	○	Pass	88	○	Pass
2	95	○	Pass	95	○	Pass
3	95	○	Pass	91	○	Pass
4	91	○	Pass	90	○	Pass
5	88	○	Pass	87	○	Pass
6	91	○	Pass	99	○	Pass
7	99	○	Pass	95	○	Pass
8	89	○	Pass	103	○	Pass
9	101	○	Pass	99	○	Pass
10	95	○	Pass	99	○	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

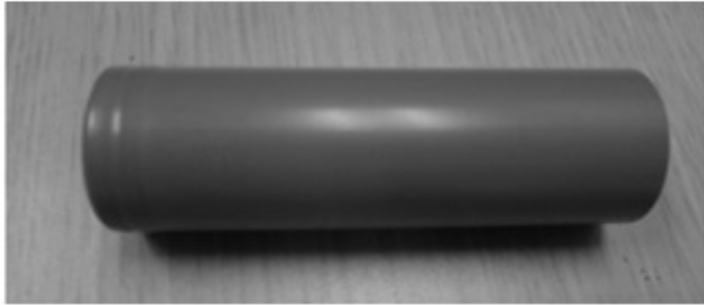
Test No.	Testitem	Relating Std.	Test begins on (YYYY/MM/DD)	Test Completed on (YYYY/MM/DD)	Judgment (Pass/Fail)
P1	Packaging Drop	2014 IATA Dangerous Goods Regulations 55 th Edition	2014.10.27	2014.10.27	Pass
Total Judgment(Pass/Fail)					Pass

■ Test Method

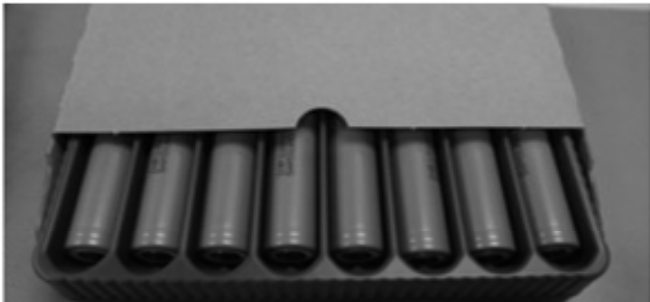
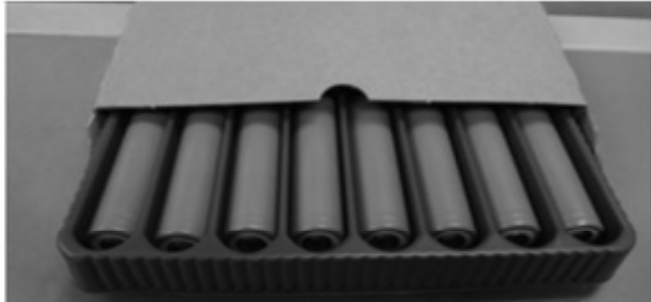


P-1 1.2m Packaging Drop Test (Test Result: Pass)

■ Sample Picture

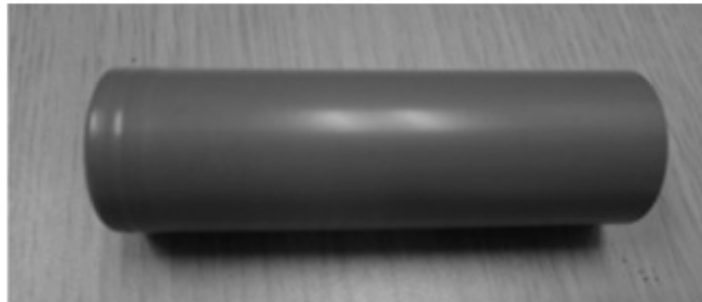
	Front	Back
Sample Picture		

■ Test result

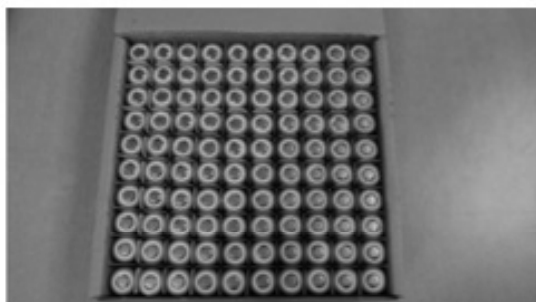
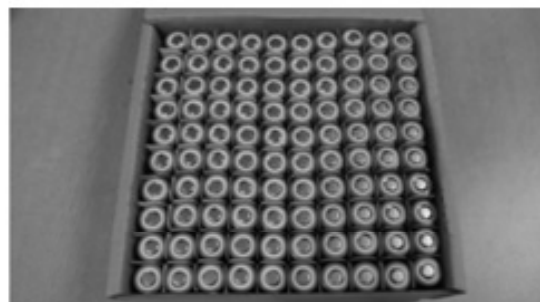
	Before Test	After Test
Weight (Kg)	0.42	0.42
Test Result		
Remark	Outer packaging is damaged but samples inside the package remain intact and no damage, no shifting, no release of contents for samples inside the package.	
Criteria	- Without damage to cells or batteries contained therein. - Without shifting of the contents so as to allow battery to battery(or Cell to cell) contact. - Without release of contents.	

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

■ Sample Picture

	Front	Back
Sample Picture		

■ Test result

	Before Test	After Test
Weight (Kg)	4.76	4.76
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.	