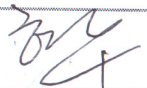
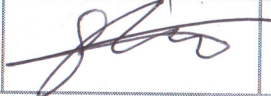


Model name : INR18650-20R

Revision 08

Executive Div.	Safety Center	Confidential	
	Name / Title	Signature	Date
Reported by	Ham hyung Woo		2015.6.30
Approved by	Lee Keun Sang		2015.6.30

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

2013, Rev.5, Amend.2

Document No : SDI-UN-150630-03

SAMSUNG SDI
Energy Business Division



Product Information

- 1. Model name: INR18650-20R**
- 2. Product classification: Li-ion cylindrical cell**
- 3. Nominal voltage: 3.6 V**
- 4. Rated capacity: 2000 mAh**
- 5. Wh Capacity: 7.2 Wh**
- 6. Weight of product: Max. 45.0 g**
- 7. Test Date: 2015/05/15 ~ 2015/06/12**
- 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	2015/05/15	2015/05/15	Pass
T2	Thermal test	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.2	2015/05/15	2015/05/21	Pass
T3	Vibration	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.3	2015/05/25	2015/05/25	Pass
T4	Shock	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.4	2015/05/27	2015/05/27	Pass
T5	External short circuit	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.5	2015/05/28	2015/05/28	Pass
T6	Impact/ Crush	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.6	2015/05/28	2015/05/28	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	2015/06/05	2015/06/12	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	42.560	4.15					42.561	4.15	0.00	100.00	O	Pass
2	42.309	4.15					42.309	4.15	0.00	100.00	O	Pass
3	42.380	4.15					42.381	4.15	0.00	100.00	O	Pass
4	42.375	4.15					42.375	4.15	0.00	100.00	O	Pass
5	42.602	4.15					42.604	4.15	0.00	100.00	O	Pass
6	42.660	4.15					42.660	4.15	0.00	100.00	O	Pass
7	42.561	4.15					42.562	4.15	0.00	100.00	O	Pass
8	42.593	4.15					42.591	4.15	0.00	100.00	O	Pass
9	42.665	4.15					42.665	4.15	0.00	100.00	O	Pass
10	42.473	4.15					42.473	4.15	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	42.559	4.09	0.00	98.55	O	Pass	42.558	4.09	0.00	100.00	O	Pass
2	42.306	4.09	0.01	98.55	O	Pass	42.307	4.09	0.00	100.00	O	Pass
3	42.378	4.09	0.01	98.55	O	Pass	42.378	4.09	0.00	100.00	O	Pass
4	42.376	4.09	0.00	98.55	O	Pass	42.376	4.09	0.00	100.00	O	Pass
5	42.604	4.09	0.00	98.55	O	Pass	42.605	4.09	0.00	100.00	O	Pass
6	42.664	4.09	-0.01	98.55	O	Pass	42.664	4.09	0.00	100.00	O	Pass
7	42.561	4.09	0.00	98.55	O	Pass	42.562	4.09	0.00	100.00	O	Pass
8	42.591	4.09	0.00	98.55	O	Pass	42.593	4.09	0.00	100.00	O	Pass
9	42.662	4.09	0.01	98.55	O	Pass	42.661	4.09	0.00	100.00	O	Pass
10	42.471	4.09	0.00	98.55	O	Pass	42.471	4.09	0.00	100.00	O	Pass
T4							T5					
No.	Weight(g)	OCV(V)	Mass Loss(%)	Residual OCV(%)	Appearance	Result	Max T(°C)	Appearance				Result
1	42.557	4.09	0.00	100.00	O	Pass	105	O				Pass
2	42.307	4.09	0.00	100.00	O	Pass	112	O				Pass
3	42.376	4.08	0.00	99.76	O	Pass	95	O				Pass
4	42.375	4.09	0.00	100.00	O	Pass	99	O				Pass
5	42.605	4.08	0.00	99.76	O	Pass	102	O				Pass
6	42.665	4.09	0.00	100.00	O	Pass	85	O				Pass
7	42.564	4.09	0.00	100.00	O	Pass	81	O				Pass
8	42.593	4.08	0.00	99.76	O	Pass	93	O				Pass
9	42.661	4.09	0.00	100.00	O	Pass	99	O				Pass
10	42.473	4.09	0.00	100.00	O	Pass	96	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 not less than 18.0 mm in diameter

Prismatic, Pouch, Cylindrical cells less 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	3.65	74	0	Pass
2	3.65	119	0	Pass
3	3.65	120	0	Pass
4	3.65	113	0	Pass
5	3.65	108	0	Pass
[Appearance] 0-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: 20 A

- Time interval: 6 MIN

Fresh cell 0% SOC				50 cycled cell 0% SOC		
No.	Max. tempe(°C)	Appearance	Result	Max. temp(°C)	Appearance	Result
1	110	0	Pass	105	0	Pass
2	105	0	Pass	106	0	Pass
3	95	0	Pass	103	0	Pass
4	93	0	Pass	112	0	Pass
5	99	0	Pass	105	0	Pass
6	105	0	Pass	95	0	Pass
7	108	0	Pass	95	0	Pass
8	91	0	Pass	93	0	Pass
9	91	0	Pass	91	0	Pass
10	99	0	Pass	98	0	Pass

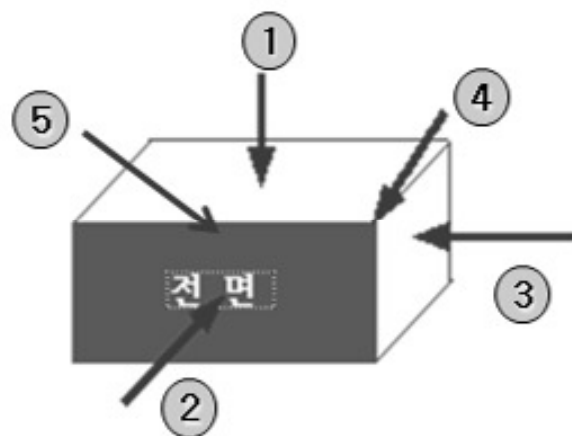
[Appearance] O-No Disassembly, No Fire / D-Disassembly / F-Fire
[Criteria] No disassembly and no fire within 7 days of the test

Annex 1 - 1.2m Packaging Drop Test

■ Test Summary


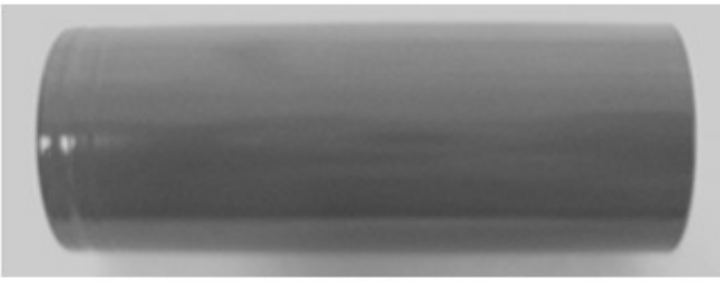
Test No.	Test item	Relating Std.	Test begins on (YYYY/MM/DD)	Test Completed on (YYYY/MM/DD)	Judgment (Pass/Fail)
P1	Packaging Drop	2015 IATA Dangerous Goods Regulations 56 th Edition	2015/06/12	2015/06/12	Pass
Total Judgment(Pass/Fail)					Pass

■ Test Method


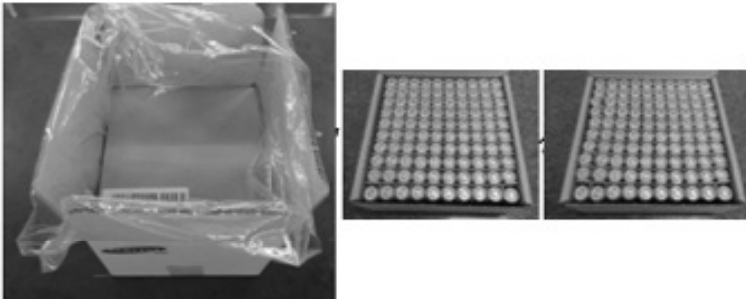


P-1 1.2m Packaging Drop Test (Test Result: Pass)

■ Sample Picture

	Front	Back
Sample Picture		

■ Test result

	Before Test	After Test
Weight (Kg)	9.00	9.00
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	<ul style="list-style-type: none"> - 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. 	