

Model name : INR21700-40T

Revision 09

Executive Div.	Safety Center	Confidential	
	Name / Title	Signature	Date
Reported by	SeoJongMin	<i>[Signature]</i>	2019 6.13
Approved by	Yoo Seung woo	<i>[Signature]</i>	2019 6.13

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

2015, Rev.6

Document No : SDI-UN-170613-01

SAMSUNG SDI
Energy Business Division



Product Information

- 1. Model name : INR21700-40T**
- 2. Product classification : Li-ion cylindrical cell**
- 3. Nominal voltage : 3.60 V**
- 4. Rated capacity : 4000 mAh**
- 5. Wh Capacity : 14.4 Wh**
- 6. Weight of product : Max 70.0 g**
- 7. Test Date : 2016.12.07 ~ 2016.12. 24**
- 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	2016/12/07	2016/12/07	Pass
T2	Thermal test	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.2	2016/12/08	2016/12/14	Pass
T3	Vibration	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.3	2016/12/20	2016/12/20	Pass
T4	Shock	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.4	2016/12/23	2016/12/23	Pass
T5	External short circuit	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.5	2016/12/24	2016/12/24	Pass
T6	Impact / Crush	UN Manual of Tests and Criteria, Part III, Subsection 38.3.4.6	2016/12/23	2016/12/23	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	2016/12/15	2016/12/22	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	66.994	4.15				66.994	4.15	0.00	100.00	O	PASS	
2	67.571	4.15				67.571	4.15	0.00	100.00	O	PASS	
3	66.965	4.15				66.966	4.15	0.00	100.00	O	PASS	
4	67.674	4.15				67.674	4.15	0.00	100.00	O	PASS	
5	67.063	4.15				67.065	4.15	0.00	100.00	O	PASS	
6	67.544	4.15				67.544	4.15	0.00	100.00	O	PASS	
7	67.410	4.15				67.412	4.15	0.00	100.00	O	PASS	
8	67.505	4.15				67.506	4.15	0.00	100.00	O	PASS	
9	67.461	4.15				67.461	4.15	0.00	100.00	O	PASS	
10	66.861	4.15				66.863	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	66.996	4.08	0.00	98.31	O	PASS	66.992	4.08	0.01	100.00	O	PASS
2	67.577	4.08	0.00	98.31	O	PASS	67.577	4.08	0.00	100.00	O	PASS
3	66.974	4.08	0.00	98.31	O	PASS	66.970	4.08	0.01	100.00	O	PASS
4	67.679	4.08	0.00	98.31	O	PASS	67.676	4.08	0.00	100.00	O	PASS
5	67.069	4.08	0.00	98.31	O	PASS	67.069	4.08	0.00	100.00	O	PASS
6	67.550	4.08	0.00	98.31	O	PASS	67.550	4.08	0.00	100.00	O	PASS
7	67.416	4.08	0.00	98.31	O	PASS	67.411	4.08	0.01	100.00	O	PASS
8	67.514	4.08	0.00	98.31	O	PASS	67.514	4.08	0.00	100.00	O	PASS
9	67.470	4.08	0.00	98.31	O	PASS	67.462	4.08	0.01	100.00	O	PASS
10	66.868	4.08	0.00	98.31	O	PASS	66.864	4.08	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	66.991	4.08	0.00	100.00	O	PASS	93	O			PASS	
2	67.574	4.08	0.00	100.00	O	PASS	103	O			PASS	
3	66.971	4.08	0.00	100.00	O	PASS	94	O			PASS	
4	67.675	4.08	0.00	100.00	O	PASS	105	O			PASS	
5	67.069	4.08	0.00	100.00	O	PASS	103	O			PASS	
6	67.552	4.08	0.00	100.00	O	PASS	105	O			PASS	
7	67.410	4.08	0.00	100.00	O	PASS	106	O			PASS	
8	67.514	4.08	0.00	100.00	O	PASS	99	O			PASS	
9	67.460	4.08	0.00	100.00	O	PASS	92	O			PASS	
10	66.862	4.08	0.00	100.00	O	PASS	106	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	3.72	21	0	Pass
2	3.72	21	0	Pass
3	3.72	21	0	Pass
4	3.72	21	0	Pass
5	3.72	21	0	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 : 25A
- Time interval : 10Min

Fresh cell 0% SOC				50 cycled cell 0% SOC		
No.	Max. tempe(°C)	Appearance	Result	Max. temp(°C)	Appearance	Result
1	111	0	Pass	103	0	Pass
2	113	0	Pass	104	0	Pass
3	102	0	Pass	96	0	Pass
4	109	0	Pass	107	0	Pass
5	110	0	Pass	106	0	Pass
6	106	0	Pass	106	0	Pass
7	110	0	Pass	109	0	Pass
8	111	0	Pass	103	0	Pass
9	111	0	Pass	101	0	Pass
10	109	0	Pass	102	0	Pass

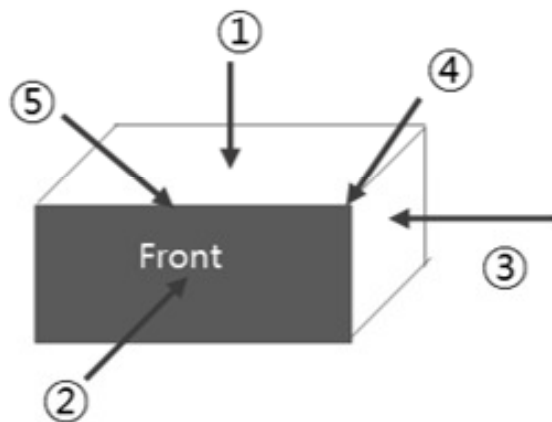
[Appearance] O-No Disassembly, No Fire / D-Disassembly / F-Fire
[Criteria] No disassembly and no fire within 7 days of the test

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	IATA Dangerous Goods Regulations	2016/12/22	2016/12/22	Pass
Total Judgment(Pass/Fail)					Pass

■ Test Method



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


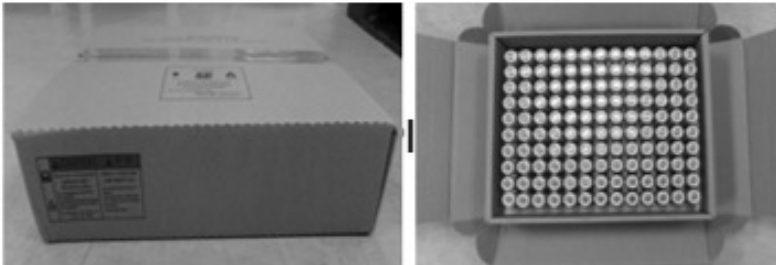
■ Sample Information

	Front	Back
Picture	 	

Cell Qty per box	Cell weight (kg)	Net weight per box (kg)
130	0.067	8.71

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

■ Test result

	Before Test	After Test
Weight (Kg)	8.80	8.80
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.	