



UN TEST REPORT

Report Number.....	SDI-UN-191015-01
Date of issue	2019.10.15
Test period	2019.10.01~2019.10.14
Testing Laboratory	Samsung SDI Co., Ltd
Address	467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Contact	+82-41-560-3114 / http://samsungsdi.co.kr/
Manufacturer's name	Samsung SDI Co., Ltd
Address	467, Beonyeong-ro, Seobuk-gu, Cheonan-si, Chungcheongnam-do, Korea
Contact	+82-41-560-3114 / http://samsungsdi.co.kr/
Test Standard.....	Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria, section 38.3 Sixth revised edition Amendment 1
Description.....	Lithium ion cell
Model Name	INR21700-50S1
Ratings	3.6V 5000mAh (18.00Wh)
Mass	Max 72.0g

Test Result

No.	Test item	Result	Remark
T-1	Altitude	PASS	
T-2	Thermal Cycling	PASS	
T-3	Vibration	PASS	
T-4	Shock	PASS	
T-5	External Short Circuit	PASS	
T-6	Impact / Crush	PASS	
T-7	Overcharge	N/A	Battery only
T-8	Forced Discharge	PASS	

	Name	Signature	Date
Reported by	An Jong Ho		2019.10.15
Approved by	Yoo Seung Woo		2019.10.15

T1	ALTITUDE SIMULATION TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.185	70.335	4.179	70.329	99.86	0.01
2	A	4.185	70.279	4.179	70.279	99.86	0.00
3	A	4.185	70.265	4.179	70.265	99.86	0.00
4	A	4.185	70.289	4.179	70.289	99.86	0.00
5	A	4.185	70.340	4.179	70.339	99.86	0.00
6	B	4.187	70.201	4.182	70.199	99.88	0.00
7	B	4.187	70.129	4.182	70.130	99.88	0.00
8	B	4.187	70.138	4.183	70.130	99.90	0.01
9	B	4.188	69.899	4.185	69.899	99.93	0.00
10	B	4.187	70.126	4.182	70.126	99.88	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T2	THERMAL TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.179	70.329	4.108	70.335	98.30	0.00
2	A	4.179	70.279	4.110	70.279	98.35	0.00
3	A	4.179	70.265	4.111	70.265	98.37	0.00
4	A	4.179	70.289	4.112	70.289	98.40	0.00
5	A	4.179	70.339	4.114	70.337	98.44	0.00
6	B	4.182	70.199	4.109	70.201	98.25	0.00
7	B	4.182	70.130	4.110	70.134	98.28	0.00
8	B	4.183	70.130	4.113	70.138	98.33	0.00
9	B	4.185	69.899	4.115	69.900	98.33	0.00
10	B	4.182	70.126	4.115	70.126	98.40	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T3	VIBRATION TEST	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.108	70.335	4.107	70.335	99.98	0.00
2	A	4.110	70.279	4.109	70.276	99.98	0.00
3	A	4.111	70.265	4.110	70.263	99.98	0.00
4	A	4.112	70.289	4.111	70.288	99.98	0.00
5	A	4.114	70.337	4.112	70.336	99.95	0.00
6	B	4.109	70.201	4.108	70.199	99.98	0.00
7	B	4.110	70.134	4.109	70.136	99.98	0.00
8	B	4.113	70.138	4.112	70.131	99.98	0.01
9	B	4.115	69.900	4.113	69.896	99.95	0.01
10	B	4.115	70.126	4.114	70.123	99.98	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T4	SHOCK	Results
Requirements	No mass loss, no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure.	<input checked="" type="checkbox"/> No leakage, <input checked="" type="checkbox"/> No venting, <input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture, <input checked="" type="checkbox"/> No fire, <input checked="" type="checkbox"/> No mass loss, (Less than 0.2%) <input checked="" type="checkbox"/> No voltage drop (Residual OCV not less than 90%) See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Weight Before Test(g)	Voltage After Test(V)	Weight After Test(g)	Residual OCV(%)	Percent of Weight Loss(%)
1	A	4.107	70.335	4.107	70.334	100.00	0.00
2	A	4.109	70.276	4.109	70.275	100.00	0.00
3	A	4.110	70.263	4.110	70.262	100.00	0.00
4	A	4.111	70.288	4.111	70.287	100.00	0.00
5	A	4.112	70.336	4.112	70.334	100.00	0.00
6	B	4.108	70.199	4.108	70.198	100.00	0.00
7	B	4.109	70.136	4.109	70.131	100.00	0.01
8	B	4.112	70.131	4.112	70.136	100.00	0.00
9	B	4.113	69.896	4.113	69.896	100.00	0.00
10	B	4.114	70.123	4.114	70.123	100.00	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

T5	EXTERNAL SHORT-CIRCUIT	Results
Requirements	External temperature does not exceed 170 °C and there is no disassembly, no rupture and no fire within six hours of this test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> No rupture <input checked="" type="checkbox"/> No fire. <input checked="" type="checkbox"/> External Temperature did not exceed 170 °C. see below table

Sample No.	Sample Condition	Maximum Temperature(°C)	Test result
1	A	102	O
2	A	106	O
3	A	108	O
4	A	120	O
5	A	114	O
6	B	106	O
7	B	115	O
8	B	117	O
9	B	108	O
10	B	112	O

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(5 pcs)

Sample Condition B : after 25th cycles ending in fully charged states(5 pcs)

Test result : O-No Disassembly, No Rupture, No Fire / D-Disassembly / R-Rupture / F-Fire

T6	<input checked="" type="checkbox"/> Impact / <input type="checkbox"/> Crush	Results
Requirements	Cells and component cells meet this requirement if their external temperature does not exceed 170°C and there is no disassembly and no fire during the test and within six hours after this test.	<input checked="" type="checkbox"/> External temperature did not exceed 170°C, <input checked="" type="checkbox"/> no disassembly, <input checked="" type="checkbox"/> no fire during test and within 6 hours after test See below table

Sample No.	Sample Condition	Voltage Before Test(V)	Maximum Temperature(°C)	Test result
T6-1	C	3.720	26	O
T6-2	C	3.772	26	O
T6-3	C	3.720	26	O
T6-4	C	3.721	26	O
T6-5	C	3.721	26	O
T6-6	D	3.758	26	O
T6-7	D	3.760	26	O
T6-8	D	3.764	25	O
T6-9	D	3.755	26	O
T6-10	D	3.756	26	O

Supplementary Information:

Sample Condition C : at first cycle, in 50% charged states(5 pcs)

Sample Condition D : at 25th cycle, in 50% charged states(5 pcs)

Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

T8	FORCED DISCHARGE	Results
Requirements	Rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.	<input checked="" type="checkbox"/> No disassembly, <input checked="" type="checkbox"/> no rupture, <input checked="" type="checkbox"/> no fire during the test and within seven days after the test. See below table

Sample No.	Sample Condition	Test result	Sample No.	Sample Condition	Test result
T8-1	E	O	T8-11	F	O
T8-2	E	O	T8-12	F	O
T8-3	E	O	T8-13	F	O
T8-4	E	O	T8-14	F	O
T8-5	E	O	T8-15	F	O
T8-6	E	O	T8-16	F	O
T8-7	E	O	T8-17	F	O
T8-8	E	O	T8-18	F	O
T8-9	E	O	T8-19	F	O
T8-10	E	O	T8-20	F	O

Supplementary Information:

Sample Condition E : at first cycle, in fully discharged states (10 pcs)

Sample Condition F : after 25th cycles ending in fully discharged states(10 pcs)

Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

Test Conditions

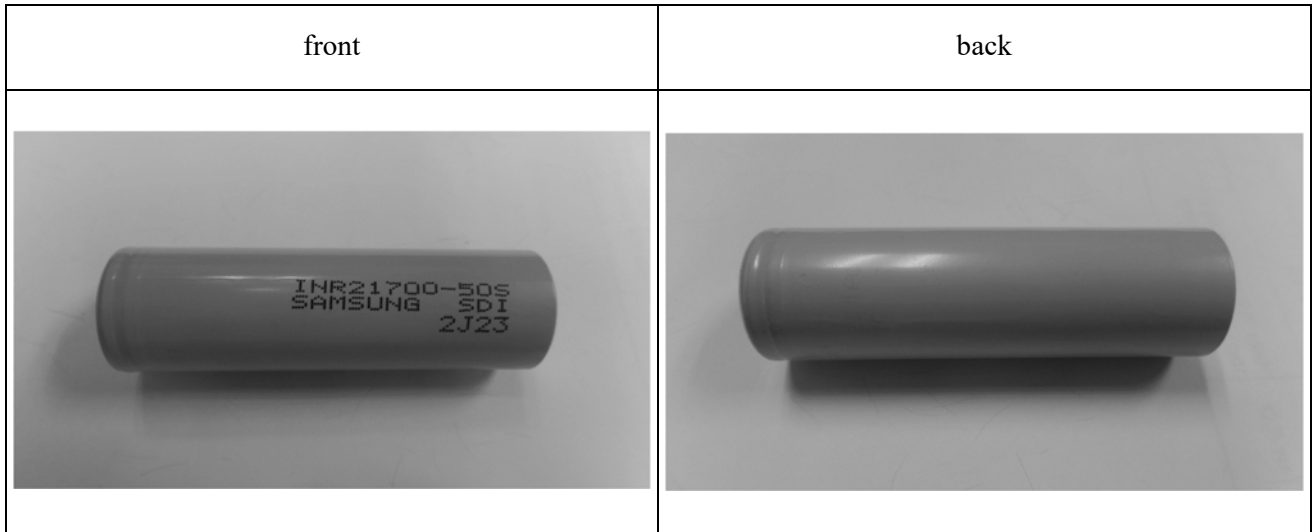
Initial test current : 25A, Test duration : 12min

P1	Package Drop Test	Results
Procedure	<p>IATA Dangerous Goods Regulations Each package must be capable of withstanding a 1.2m drop test in any orientation</p>	<p><input checked="" type="checkbox"/> Without damage to cells or batteries contained therein, <input checked="" type="checkbox"/> Without shifting of the contents so as to allow battery to battery(or Cell to cell) contact. <input checked="" type="checkbox"/> Without release of contents</p> <p>See below photo</p>

Cell Qty per box	Cell weight (kg)	Net weight per box (kg)
130	0.070	9.10

	Before Test	After Test
Weight (kg)	9.73	9.73
Test result		

Sample Photo



- End of Report -