

## **UN TEST REPORT**

Report Number. .... SDI-UN-P181019-01
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Test period ..... 2018. 07. 05 ~ 2018. 08. 09
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Manufacturer's name ..... Samsung SDI Co., Ltd
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Test Standard ..... Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria, section 38.3 Sixth revised edition
Description..... Lithium ion battery ( 3S - 1P )
Model Name ..... HSTNN-UB7R(6HMCE)
Ratings ..... 11.55 V      3750 mAh    ( 45 Wh)
Mass ..... Max 300 g

**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	Component cell
T-7	Overcharge	PASS	
T-8	Forced Discharge	PASS	Component cell

	Name	Signature	Date
Reported by			
Approved by			

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	12.66	172.80	12.65	172.80	99.92	0.00
2	A	12.67	172.60	12.67	172.60	100.00	0.00
3	A	12.62	172.90	12.61	172.90	99.92	0.00
4	A	12.66	172.80	12.66	172.80	100.00	0.00
5	B	12.66	172.80	12.66	172.80	100.00	0.00
6	B	12.65	172.80	12.65	172.80	100.00	0.00
7	B	12.61	172.90	12.61	172.90	100.00	0.00
8	B	12.64	173.10	12.64	173.10	100.00	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 50th cycles ending in fully charged states(4 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	12.65	172.80	12.42	172.80	98.18	0.00
2	A	12.67	172.60	12.42	172.60	98.03	0.00
3	A	12.61	172.90	12.43	172.90	98.57	0.00
4	A	12.66	172.80	12.42	172.80	98.10	0.00
5	B	12.66	172.80	12.43	172.80	98.18	0.00
6	B	12.65	172.80	12.42	172.80	98.18	0.00
7	B	12.61	172.90	12.40	172.90	98.33	0.00
8	B	12.64	173.10	12.42	173.10	98.26	0.00

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 50th cycles ending in fully charged states(4 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	12.42	172.80	12.42	172.80	100.00	0.00
2	A	12.42	172.60	12.42	172.60	100.00	0.00
3	A	12.43	172.90	12.41	172.90	99.84	0.00
4	A	12.42	172.80	12.42	172.80	100.00	0.00
5	B	12.43	172.80	12.43	172.80	100.00	0.00
6	B	12.42	172.80	12.42	172.80	100.00	0.00
7	B	12.40	172.90	12.40	172.90	100.00	0.00
8	B	12.42	173.10	12.42	173.10	100.00	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 50th cycles ending in fully charged states(4 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	12.42	172.80	12.42	172.80	100.00	0.00
2	A	12.42	172.60	12.42	172.60	100.00	0.00
3	A	12.41	172.90	12.40	172.90	99.92	0.00
4	A	12.42	172.80	12.42	172.80	100.00	0.00
5	B	12.43	172.80	12.42	172.80	99.92	0.00
6	B	12.42	172.80	12.42	172.80	100.00	0.00
7	B	12.40	172.90	12.40	172.90	100.00	0.00
8	B	12.42	173.10	12.41	173.10	99.92	0.00

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 50th cycles ending in fully charged states(4 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	58	O
2	A	58	O
3	A	58	O
4	A	58	O
5	B	58	O
6	B	58	O
7	B	58	O
8	B	58	O

□ Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 50th cycles ending in fully charged states(4 pcs)

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

T6	<input type="checkbox"/> Impact / <input checked="" 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	3.812	26	O
T6-2	C	3.818	26	O
T6-3	C	3.814	27	O
T6-4	C	3.815	27	O
T6-5	C	3.815	26	O

Supplementary Information:

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

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

T7	OVERCHARGE	Results
Requirements	Rechargeable batteries 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	Voltage Before Test(V)	Test result
T7-1	A	12.24	O
T7-2	A	12.24	O
T7-3	A	12.25	O
T7-4	A	12.24	O
T7-5	B	12.26	O
T7-6	B	12.27	O
T7-7	B	12.23	O
T7-8	B	12.26	O

Supplementary Information:

Sample Condition A : at first cycle, in fully charged states(4 pcs)

Sample Condition B : after 50th cycles ending in fully charged states(4 pcs)

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

Test Conditions

Charge voltage : 22 V, Charge current : 9.6 A, Test time : 24 Hr



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

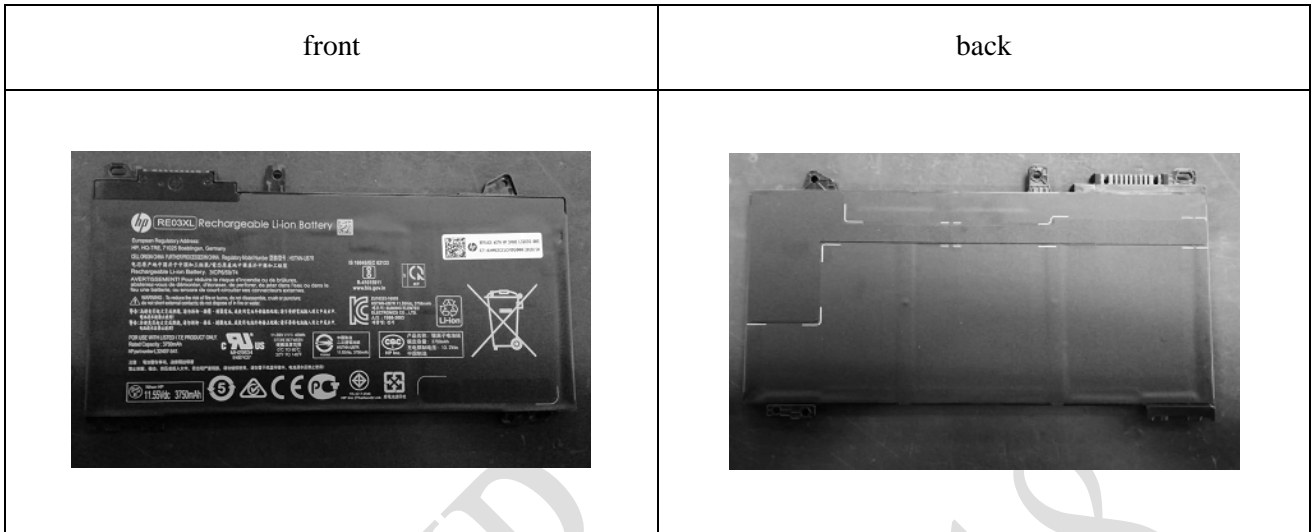
Supplementary Information:  
 Sample Condition E : at first cycle, in fully discharged states (10 pcs)  
 Sample Condition F : after 50th cycles ending in fully discharged states(10 pcs)  
 Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire  
 Test Conditions  
 Initial test current : 3.814 A,      Test duration : 1 Hr

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>

Battery Qty per box	Battery weight (kg)	Net weight per box (kg)
45	0.1784	8.028

	Before Test	After Test
Weight (kg)	9.494	9.494
Test result		

Sample Photo



- End of Report -