



UN TEST REPORT

Test Summary

Report Number.	SDI-UN-240102-02
Date of issue.....	2024-01-02
Test period	2020-12-10 ~ 2021-01-14
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/ sm90.yoo@samsung.com
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/ sm90.yoo@samsung.com
Test Standard	Recommendations on the Transport of Dangerous Goods: Manual of Tests and Criteria, section 38.3 Seventh revised edition
Physical description.....	Laptop Computer Battery
Assembled Battery Testing Requirements.....	Not Applicable
Description.....	Lithium ion battery (4S - 1P)
Model Name	AA-PBMN4VN
Ratings	15.44V 4340mAh (67.1Wh) Mass Max 264.18g

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	position	Signature	Date
Reported by	PARK DAE JUN	Engineer		2024.01.02
Approved by	Jung Min Kyu	Principal Engineer		2024.01.02

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	17.393	259.94	17.341	259.94	99.70	0.00
2	A	17.401	259.77	17.348	259.77	99.70	0.00
3	A	17.374	259.69	17.324	259.69	99.71	0.00
4	A	17.392	259.36	17.341	259.36	99.71	0.00
5	B	17.405	258.89	17.354	258.89	99.71	0.00
6	B	17.407	259.44	17.360	259.44	99.73	0.00
7	B	17.408	259.83	17.355	259.83	99.70	0.00
8	B	17.409	259.50	17.356	259.50	99.70	0.00

Supplementary Information:

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

Sample Condition B : after 25th 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	17.341	259.94	17.226	259.94	99.34	0.00
2	A	17.348	259.77	17.220	259.77	99.26	0.00
3	A	17.324	259.69	17.210	259.69	99.34	0.00
4	A	17.341	259.36	17.240	259.36	99.42	0.00
5	B	17.354	258.89	17.240	258.89	99.34	0.00
6	B	17.360	259.44	17.250	259.44	99.37	0.00
7	B	17.355	259.83	17.250	259.83	99.39	0.00
8	B	17.356	259.50	17.240	259.50	99.33	0.00

Supplementary Information:
 Sample Condition A : at first cycle, in fully charged states(4 pcs)
 Sample Condition B : after 25th 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	17.226	259.94	17.222	259.94	99.98	0.00
2	A	17.220	259.77	17.215	259.77	99.97	0.00
3	A	17.210	259.69	17.207	259.69	99.98	0.00
4	A	17.240	259.36	17.218	259.36	99.87	0.00
5	B	17.240	258.89	17.233	258.89	99.96	0.00
6	B	17.250	259.44	17.238	259.44	99.93	0.00
7	B	17.250	259.83	17.239	259.83	99.94	0.00
8	B	17.240	259.50	17.240	259.50	100.00	0.00

Supplementary Information:

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

Sample Condition B : after 25th 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	17.222	259.94	17.214	259.94	99.95	0.00
2	A	17.215	259.77	17.210	259.77	99.97	0.00
3	A	17.207	259.69	17.205	259.69	99.99	0.00
4	A	17.218	259.36	17.214	259.36	99.98	0.00
5	B	17.233	258.89	17.230	258.89	99.98	0.00
6	B	17.238	259.44	17.237	259.44	99.99	0.00
7	B	17.239	259.83	17.231	259.83	99.95	0.00
8	B	17.240	259.50	17.237	259.50	99.98	0.00

Supplementary Information:

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

Sample Condition B : after 25th 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	56.6	O
2	A	56.7	O
3	A	56.5	O
4	A	56.4	O
5	B	56.7	O
6	B	56.9	O
7	B	56.6	O
8	B	56.6	O

□ Supplementary Information:

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

Sample Condition B : after 25th 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	3.857	16.4	O
T6-2	C	3.860	17.7	O
T6-3	C	3.861	17.5	O
T6-4	C	3.862	17.7	O
T6-5	C	3.858	18.8	O
T6-6	D	3.860	19.2	O
T6-7	D	3.858	18.4	O
T6-8	D	3.859	19.2	O
T6-9	D	3.859	18.9	O
T6-10	D	3.862	18.7	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

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	17.380	O
T7-2	A	17.383	O
T7-3	A	17.354	O
T7-4	A	17.373	O
T7-5	B	17.358	O
T7-6	B	17.394	O
T7-7	B	17.344	O
T7-8	B	17.381	O

Supplementary Information:

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

Sample Condition B : after 25th cycles ending in fully charged states(4 pcs)

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

Test Conditions

Charge voltage : 22V, Charge current : 11.284A, Test time : 24Hr

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:

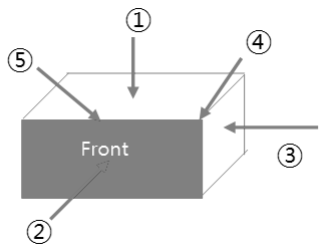
Sample Condition E : at first cycle, in fully discharged states (10 pcs)

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

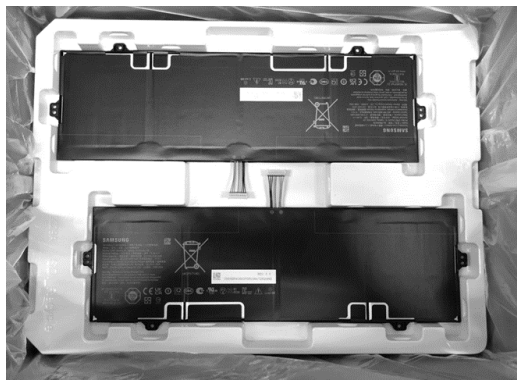
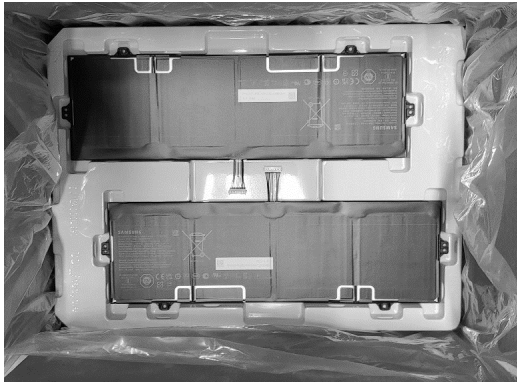
Test result : O-No Disassembly, No Fire / D-Disassembly / F-Fire

Test Conditions

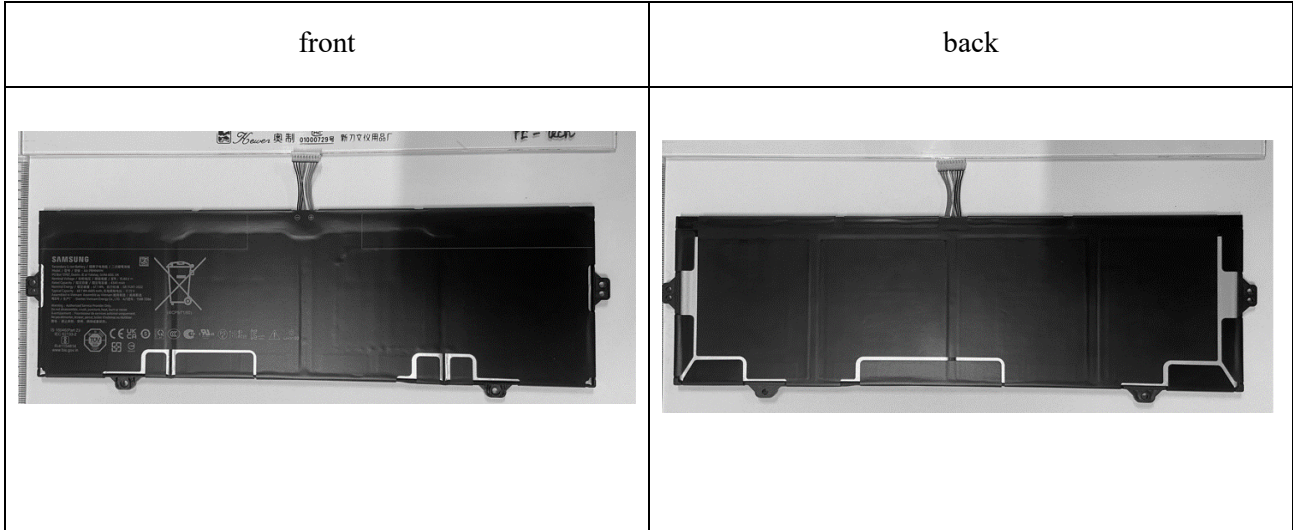
Initial test current : 5.30A, Test duration : 50min

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)
34	0.259	8.80

	Before Test	After Test
Weight (kg)	10.60	10.60
Test result		

Sample Photo



- End of Report -