



UN TEST REPORT**Test Summary**

Report Number.:	SDI-UN-240102-08
Date of issue.....:	2024.01.02
Test period	2022.06.06 ~ 2022.06.22
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	Manual of Tests and Criteria, section 38.3 Seventh revised edition Amendment 1
Physical description.....	Laptop computer battery
Assembled Battery Testing Requirements.....	Not Applicable
Description.....	Lithium ion battery (4S - 1 P)
Model Name	AA-PBKN4MR (Mars3 4C)
Ratings	15.52V 4762mAh (74.0 Wh) Mass Max 270.30

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	17.462	265.77	17.461	265.769	99.99	0.00
2	A	17.453	265.44	17.448	265.432	99.97	0.00
3	A	17.465	265.16	17.462	265.151	99.98	0.00
4	A	17.348	264.83	17.343	264.819	99.97	0.00
5	B	17.459	264.71	17.457	264.689	99.99	0.01
6	B	17.465	264.84	17.462	264.835	99.98	0.00
7	B	17.455	264.55	17.451	264.529	99.98	0.01
8	B	17.443	265.89	17.438	265.879	99.97	0.00
<input type="checkbox"/> 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	17.461	265.77	17.346	265.77	99.34	0.00
2	A	17.448	265.43	17.276	265.42	99.01	0.00
3	A	17.462	265.15	17.274	265.15	98.92	0.00
4	A	17.343	264.82	17.143	264.81	98.85	0.00
5	B	17.457	264.69	17.237	264.68	98.74	0.00
6	B	17.462	264.84	17.187	264.83	98.43	0.00
7	B	17.451	264.53	17.166	264.52	98.37	0.00
8	B	17.438	265.88	17.229	265.88	98.80	0.00
<input type="checkbox"/> 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	17.461	265.77	17.346	265.77	99.34	0.00
2	A	17.448	265.43	17.276	265.42	99.01	0.00
3	A	17.462	265.15	17.274	265.15	98.92	0.00
4	A	17.343	264.82	17.143	264.81	98.85	0.00
5	B	17.457	264.69	17.237	264.68	98.74	0.00
6	B	17.462	264.84	17.187	264.83	98.43	0.00
7	B	17.451	264.53	17.166	264.52	98.37	0.00
8	B	17.438	265.88	17.229	265.88	98.80	0.00
<input type="checkbox"/> 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	17.336	265.75	17.335	265.73	99.99	0.01
2	A	17.256	265.41	17.246	265.40	99.94	0.00
3	A	17.265	265.15	17.254	265.15	99.94	0.00
4	A	17.133	264.81	17.132	264.80	99.99	0.00
5	B	17.229	264.67	17.219	264.66	99.94	0.00
6	B	17.177	264.82	17.173	264.80	99.98	0.00
7	B	17.157	264.52	17.148	264.50	99.95	0.01
8	B	17.210	265.88	17.202	265.87	99.95	0.00
<input type="checkbox"/> 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	58.4	O
2	A	58.2	O
3	A	58.6	O
4	A	58.5	O
5	B	58.1	O
6	B	57.9	O
7	B	58.1	O
8	B	58.2	O
<div> <input type="checkbox"/> Supplementary Information: </div> <div> 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 </div>			

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℃ 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℃, <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(℃)	Test result
T6-1	C	3.870	20.7	O
T6-2	C	3.870	19.0	O
T6-3	C	3.869	19.0	O
T6-4	C	3.869	19.0	O
T6-5	C	3.872	19.2	O
T6-6	D	3.873	19.0	O
T6-7	D	3.873	18.8	O
T6-8	D	3.875	19.0	O
T6-9	D	3.872	18.8	O
T6-10	D	3.871	19.1	O
<input type="checkbox"/> 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	17.458	O
T7-2	A	17.463	O
T7-3	A	17.452	O
T7-4	A	17.461	O
T7-5	B	17.442	O
T7-6	B	17.448	O
T7-7	B	17.443	O
T7-8	B	17.457	O
<div> <input type="checkbox"/> Supplementary Information: </div> <div> 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 </div> <div> <input type="checkbox"/> Test Conditions </div> <div> Charge voltage : 22 V, Charge current : 13.382 A, Test time : 24 Hr </div>			

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:

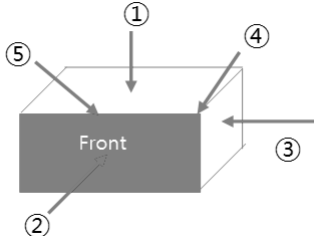
Sample Condition E : at first cycle, in fully discharged states (10 pcs)

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

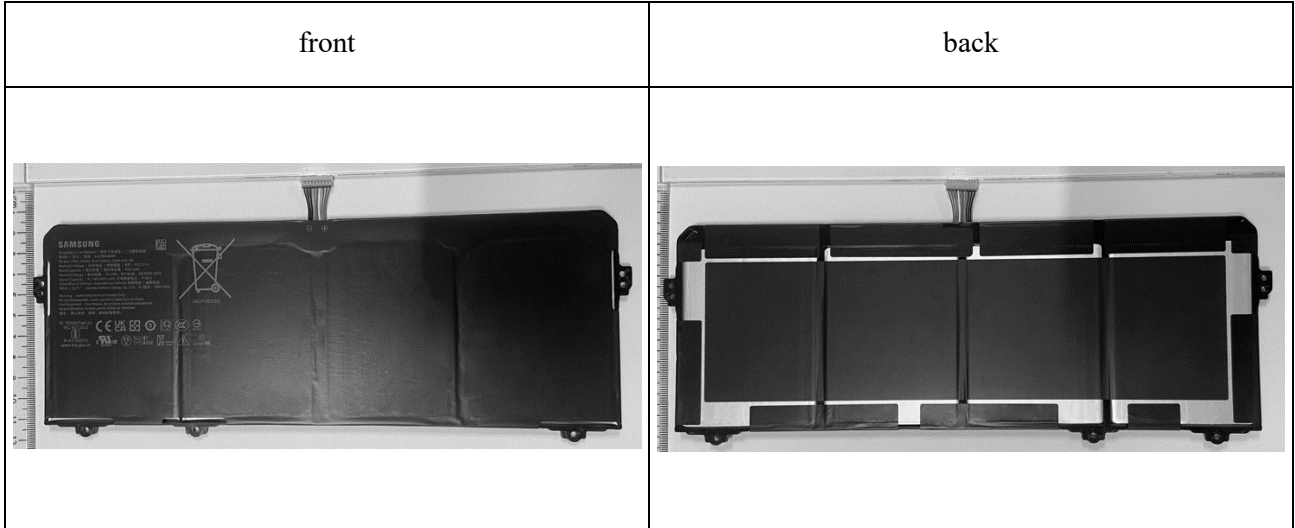
Initial test current : 4.86 A, Test duration : 1 Hr

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)
32	0.266	8.51

	Before Test	After Test
Weight (kg)	10.41	10.41
Test result		

Sample Photo



- End of Report -