




문서번호	QDI-160616-B-SB10K979577	
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UN38.3 Test Report

- SB10K97577 (Nom.24Wh, 11.4V) -

목 차

1. UN38.3 Test Condition
2. Test Result
3. Sample Image

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1. UN38.3 Test Condition

Rev.5 / Amd.2

Test item	Test Condition	Requirements	Etc.
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> - After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) <ol style="list-style-type: none"> 1) If M<1g, less than 0.5%, 2) If 1g≤M≤75g, less than 0.2%, 3) If M>75g, less than 0.1%) 	<p>T1~T5 : Sequence Tests</p> <pre> graph TD T1[Test 1 Altitude Simulation] --> T2[Test 2 Thermal Test] T2 --> T3[Test 3 Vibration] T3 --> T4[Test 4 Shock] T4 --> T5[Test 5 Ext. Short Circuit] </pre>
Test 2. Thermal Test	[72±2℃,6hr ↔ -40±2℃,6hr, interval max. 30min] x 10cycle Storing at 20±5℃ for 24h		
Test 3. Vibration	[7Hz↔200Hz↔7Hz, in 15min] x 12 times x 3 direction 1) sinusoidal waveform with a logarithmic sweep 2) 7Hz 18Hz (maintaining 1gn) app. 50Hz (until 8gn) 200Hz (maintaining 8gn), 1.6mm total excursion		
Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 (±x, y, z), direction x 3 cycle		
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃		
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> - No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	for cylindrical cells (not less than 18mm diameter)
Test 6. Crush	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation		for cylindrical cells (less than 18mm diameter) for prismatic, pouch, coin/button cells
Test 7. Overcharge	Current = Manufacturer's recommended max. continuous charge current X 2 Voltage 1.If charge voltage ≤ 18V, V (min.) = 2 x (max. charge voltage) or 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Only for Single Cell Battery / Battery
Test 8. Forced Discharge	Discharge at max. discharge current (connecting in series with 12V DC power supply), Duration time = rated capacity/initial test current	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Resistance of Electric Loader 1/Ω = (max. discharge current) / (12 + Initial OCV)

2-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
NO.	OCV	Mass (g)	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully charged state

1	13.030	107.12	13.005	107.11	99.81	0.009	Pass	12.869	107.11	98.95	0.000	Pass	12.865	107.10	99.97	0.009	Pass	12.855	107.09	99.92	0.009	Pass
2	13.004	107.53	12.978	107.53	99.80	0.000	Pass	12.836	107.52	98.91	0.009	Pass	12.827	107.51	99.93	0.009	Pass	12.820	107.51	99.95	0.000	Pass
3	12.990	107.44	12.974	107.44	99.88	0.002	Pass	12.837	107.43	98.94	0.007	Pass	12.833	107.43	99.97	0.000	Pass	12.827	107.42	99.95	0.009	Pass
4	13.001	106.80	12.983	106.80	99.86	0.005	Pass	12.850	106.79	98.98	0.005	Pass	12.838	106.78	99.91	0.009	Pass	12.831	106.78	99.95	0.000	Pass

B. 50th cycle fully charged state

5	13.016	107.37	12.999	107.36	99.87	0.009	Pass	12.825	107.35	98.66	0.009	Pass	12.815	107.35	99.92	0.000	Pass	12.802	107.35	99.90	0.000	Pass
6	13.006	107.47	12.982	107.47	99.82	0.000	Pass	12.827	107.47	98.81	0.000	Pass	12.818	107.46	99.93	0.009	Pass	12.816	107.46	99.98	0.000	Pass
7	13.015	107.19	12.995	107.19	99.85	0.000	Pass	12.805	107.18	98.54	0.009	Pass	12.801	107.17	99.97	0.009	Pass	12.789	107.16	99.91	0.009	Pass
8	13.001	107.53	12.985	107.52	99.88	0.009	Pass	12.822	107.51	98.74	0.009	Pass	12.810	107.51	99.91	0.000	Pass	12.798	107.50	99.91	0.009	Pass

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully charged state

1	12.855	54.75	Pass
2	12.820	56.47	Pass
3	12.827	55.68	Pass
4	12.831	56.42	Pass

B. 50th cycle fully charged state

5	12.802	54.99	Pass
6	12.816	55.13	Pass
7	12.789	56.54	Pass
8	12.798	55.49	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully charged state

9	12.990	24.10	Pass
10	12.995	24.61	Pass
11	12.998	23.85	Pass
12	12.999	25.26	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

B. 50th cycle fully charged state

13	12.973	24.83	Pass
14	12.979	24.11	Pass
15	12.979	23.97	Pass
16	12.972	24.11	Pass

2-3. T6/T8 Test Result (ICR18650E1)

Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

C-1	3.852	23.49	Pass
C-2	3.853	23.43	Pass
C-3	3.849	23.49	Pass
C-4	3.851	23.47	Pass
C-5	3.849	23.37	Pass

Forced Discharge (T8)							
NO.	Initial OCV(V)	Max. Temp (°C)	Result	NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully discharged state

C-6	3.018	46.33	Pass
C-7	3.009	47.62	Pass
C-8	3.006	46.45	Pass
C-9	3.021	47.62	Pass
C-10	3.011	46.38	Pass
C-11	3.012	46.78	Pass
C-12	3.016	47.83	Pass
C-13	3.010	45.98	Pass
C-14	3.012	46.44	Pass
C-15	3.006	47.01	Pass

B. 50th cycle fully discharged state

C-16	3.121	44.35	Pass
C-17	3.117	47.36	Pass
C-18	3.118	46.35	Pass
C-19	3.131	43.68	Pass
C-20	3.129	44.96	Pass
C-21	3.116	47.46	Pass
C-22	3.127	43.95	Pass
C-23	3.131	46.86	Pass
C-24	3.118	47.68	Pass
C-25	3.127	46.39	Pass

3. Sample Image

