




문서번호	QDI-160616-B-SB10K97580	
Prepared	남익현	
Reviewed	우민제	
Approved	남대호	

UN38.3 Test Report

- SB10K97580 (Nom.24Wh, 11.4V) -

목 차

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

2016. 06. 16

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 $1g \leq M \leq 75g$, 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	13.035	134.00	13.022	133.99	99.90	0.007	Pass	12.885	133.98	98.95	0.007	Pass	12.879	133.97	99.95	0.007	Pass	12.878	133.96	99.99	0.007	Pass
2	13.006	133.97	12.985	133.96	99.84	0.007	Pass	12.848	133.96	98.94	0.000	Pass	12.845	133.95	99.98	0.007	Pass	12.845	133.94	100.00	0.007	Pass
3	12.993	133.66	12.968	133.66	99.81	0.000	Pass	12.831	133.65	98.94	0.007	Pass	12.827	133.64	99.97	0.007	Pass	12.817	133.63	99.92	0.007	Pass
4	12.999	134.03	12.986	134.02	99.90	0.007	Pass	12.855	134.01	98.99	0.007	Pass	12.845	134.01	99.92	0.000	Pass	12.836	134.00	99.93	0.007	Pass

B. 50th cycle fully charged state

5	13.008	133.60	12.987	133.60	99.84	0.000	Pass	12.806	133.60	98.61	0.000	Pass	12.795	133.60	99.91	0.000	Pass	12.794	133.59	99.99	0.007	Pass
6	13.003	133.73	12.987	133.72	99.88	0.007	Pass	12.832	133.71	98.81	0.007	Pass	12.827	133.70	99.96	0.007	Pass	12.823	133.70	99.97	0.000	Pass
7	13.012	133.85	12.991	133.85	99.84	0.000	Pass	12.800	133.84	98.53	0.007	Pass	12.792	133.83	99.94	0.007	Pass	12.780	133.83	99.91	0.000	Pass
8	13.001	134.11	12.987	134.10	99.89	0.007	Pass	12.823	134.10	98.74	0.000	Pass	12.823	134.09	100.00	0.007	Pass	12.815	134.08	99.94	0.007	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	12.878	55.50	Pass
2	12.845	55.48	Pass
3	12.817	56.28	Pass
4	12.836	55.15	Pass

B. 50th cycle fully charged state

5	12.794	55.72	Pass
6	12.823	56.21	Pass
7	12.780	55.49	Pass
8	12.815	55.83	Pass

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

A. 1st cycle fully charged state

9	12.997	24.16	Pass
10	12.991	25.27	Pass
11	12.995	24.57	Pass
12	12.998	25.12	Pass

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

B. 50th cycle fully charged state

13	12.976	24.01	Pass
14	12.972	23.31	Pass
15	12.975	23.39	Pass
16	12.973	24.87	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

