




문서번호	QDI-160728-B-SB10K97586	
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UN38.3 Test Report

- SB10K97586 (Nom.57Wh, 11.58V) -

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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 $1g \leq M \leq 75g$, 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 1g) 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. General Information

1. Standard charge / discharge Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 5258 mA Voltage = 13.2 V	Current = 240 mA
Discharge	CC	Current = 956 mA	Voltage = 9.0 V

2. Cycle Condition

	Mode	Condition	End Condition
Charge	CC / CV	Current = 5258 mA Voltage = 13.2 V	Current = 240 mA
Discharge	CC	Current = 956 mA	Voltage = 9.0 V

3. Test Condition

	Mode	Condition
Test 7. Overcharge	CC / CV	Max. Charge Current = 5258 mA CC/CV 2Imax (10.516 A) 22V cut-off 24Hr
Test 8. Forced Discharge	CC	Max. Discharge Current = 4780 mA Duration Time = 60 min

3-1. 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	13.183	228.19	13.176	228.19	99.95	0.001	Pass	12.954	228.19	98.32	0.001	Pass	12.936	228.19	99.86	0.001	Pass	12.928	228.18	99.94	0.004	Pass
2	13.179	228.17	13.171	228.16	99.94	0.004	Pass	12.993	228.15	98.65	0.003	Pass	12.982	228.14	99.92	0.004	Pass	12.968	228.14	99.89	0.000	Pass
3	13.185	228.19	13.168	228.19	99.87	0.002	Pass	12.950	228.19	98.34	0.001	Pass	12.933	228.18	99.87	0.004	Pass	12.918	228.17	99.88	0.004	Pass
4	13.182	228.13	13.175	228.13	99.95	0.001	Pass	12.990	228.13	98.60	0.002	Pass	12.971	228.12	99.85	0.004	Pass	12.963	228.12	99.94	0.001	Pass

B. 50th cycle fully charged state

5	13.170	228.17	13.163	228.17	99.95	0.007	Pass	13.003	228.15	98.78	0.006	Pass	12.982	228.14	99.84	0.004	Pass	12.976	228.14	99.95	0.000	Pass
6	13.175	228.17	13.165	228.17	99.92	0.006	Pass	12.972	228.16	98.53	0.001	Pass	12.952	228.16	99.85	0.003	Pass	12.935	228.15	99.87	0.000	Pass
7	13.186	228.19	13.171	228.19	99.89	0.006	Pass	12.999	228.18	98.69	0.003	Pass	12.986	228.18	99.90	0.003	Pass	12.976	228.17	99.92	0.002	Pass
8	13.185	228.15	13.178	228.15	99.95	0.015	Pass	12.997	228.14	98.63	0.002	Pass	12.977	228.13	99.85	0.004	Pass	12.969	228.13	99.94	0.003	Pass

3-2. T5/T7 Test Result

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

A. 1st cycle fully charged state

1	12.928	51.58	Pass
2	12.968	52.65	Pass
3	12.918	51.75	Pass
4	12.963	51.31	Pass

B. 50th cycle fully charged state

5	12.976	52.36	Pass
6	12.935	52.27	Pass
7	12.976	51.87	Pass
8	12.969	51.64	Pass

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

A. 1st cycle fully charged state

9	13.140	25.81	Pass
10	13.141	26.04	Pass
11	13.146	25.62	Pass
12	13.145	24.89	Pass

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

B. 50th cycle fully charged state

13	13.121	24.72	Pass
14	13.126	25.49	Pass
15	13.127	26.09	Pass
16	13.126	24.96	Pass

3-3. T6/T8 Test Result (ICP583864L1)

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

A. 1st cycle 50% charged state

C-1	3.845	23.13	Pass
C-2	3.846	23.32	Pass
C-3	3.854	23.12	Pass
C-4	3.853	23.21	Pass
C-5	3.848	23.15	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	3.024	46.98	Pass
C-7	3.041	45.51	Pass
C-8	3.032	44.83	Pass
C-9	3.025	47.16	Pass
C-10	3.017	48.61	Pass
C-11	3.018	47.87	Pass
C-12	3.011	47.58	Pass
C-13	3.023	47.96	Pass
C-14	3.013	46.62	Pass
C-15	3.015	47.59	Pass

B. 50th cycle fully discharged state

C-16	3.117	44.76	Pass
C-17	3.123	45.30	Pass
C-18	3.121	44.54	Pass
C-19	3.109	44.53	Pass
C-20	3.143	45.75	Pass
C-21	3.116	45.75	Pass
C-22	3.124	46.72	Pass
C-23	3.120	45.34	Pass
C-24	3.118	44.96	Pass
C-25	3.115	46.77	Pass

4. Sample Image

