




문서번호	QAE-EF02-151224-B-L15L4A02	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

UN38.3 Test Report

- L15L4A02 (Nom. 32.0Wh, 14.4V) -

목 차

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

2015. 12. 24



* Lithium ion equivalent content = 2.502 g

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) <ul 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	16.749	207.80	16.735	207.78	99.91	0.010	Pass	16.487	207.76	98.52	0.010	Pass	16.481	207.76	99.96	0.000	Pass	16.471	207.76	99.94	0.000	Pass
2	16.746	208.06	16.742	208.05	99.98	0.005	Pass	16.495	208.04	98.52	0.005	Pass	16.489	208.02	99.97	0.010	Pass	16.482	208.02	99.96	0.000	Pass
3	16.743	208.26	16.740	208.25	99.98	0.005	Pass	16.496	208.23	98.54	0.010	Pass	16.483	208.22	99.92	0.005	Pass	16.474	208.21	99.94	0.005	Pass
4	16.744	208.27	16.730	208.26	99.91	0.005	Pass	16.485	208.25	98.54	0.005	Pass	16.476	208.25	99.95	0.000	Pass	16.464	208.23	99.93	0.010	Pass

B. 50th cycle fully charged state

5	16.747	208.27	16.734	208.25	99.92	0.010	Pass	16.493	208.24	98.56	0.005	Pass	16.489	208.23	99.97	0.005	Pass	16.488	208.22	99.99	0.005	Pass
6	16.741	208.71	16.732	208.70	99.95	0.005	Pass	16.484	208.68	98.52	0.010	Pass	16.475	208.68	99.95	0.000	Pass	16.462	208.68	99.92	0.000	Pass
7	16.747	208.33	16.742	208.32	99.97	0.005	Pass	16.495	208.31	98.52	0.005	Pass	16.484	208.31	99.93	0.000	Pass	16.479	208.30	99.97	0.005	Pass
8	16.743	208.35	16.732	208.33	99.93	0.010	Pass	16.495	208.33	98.58	0.000	Pass	16.481	208.33	99.91	0.000	Pass	16.475	208.32	99.96	0.005	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	16.471	55.90	Pass
2	16.482	55.66	Pass
3	16.474	55.66	Pass
4	16.464	56.53	Pass

B. 50th cycle fully charged state

5	16.488	56.26	Pass
6	16.462	56.99	Pass
7	16.479	55.49	Pass
8	16.475	55.90	Pass

Over Charge (T7)

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

A. 1st cycle fully charged state

9	16.745	26.17	Pass
10	16.743	25.89	Pass
11	16.743	25.01	Pass
12	16.745	26.77	Pass

Over Charge (T7)

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

B. 50th cycle fully charged state

13	16.542	26.78	Pass
14	16.556	27.32	Pass
15	16.548	26.55	Pass
16	16.557	25.19	Pass

2-3. T6/T8 Test Result (ICR18650S3)

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

A. 1st cycle 50% charged state

C-1	3.647	17.86	Pass
C-2	3.647	18.66	Pass
C-3	3.647	19.22	Pass
C-4	3.647	19.82	Pass
C-5	3.647	19.49	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	3.435	95.86	Pass
C-7	3.435	91.43	Pass
C-8	3.436	104.99	Pass
C-9	3.436	98.50	Pass
C-10	3.436	93.10	Pass
C-11	3.437	99.91	Pass
C-12	3.437	97.06	Pass
C-13	3.435	97.02	Pass
C-14	3.436	103.25	Pass
C-15	3.435	99.42	Pass

B. 50th cycle fully discharged state

C-16	3.435	94.44	Pass
C-17	3.436	93.95	Pass
C-18	3.436	98.90	Pass
C-19	3.435	102.69	Pass
C-20	3.436	95.74	Pass
C-21	3.436	95.66	Pass
C-22	3.436	93.42	Pass
C-23	3.437	98.34	Pass
C-24	3.437	96.99	Pass
C-25	3.436	100.33	Pass

3. Sample Image

