

UN38.3 Test Summary

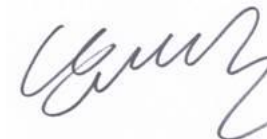
The following product has been evaluated according to the 5th revised edition Amendment 2 of the UN Manual of Tests and Criteria.
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.




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Description		List of Test Completed	
Test Report Number	QAE-EF02-151102-B-L15L2PB1	Test 1. Altitude Simulation	Pass
Date of test report	2015.11.02	Test 2. Thermal Test	Pass
Model name	L15L2PB1	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	35.0 Wh	Test 6. Impact or Crush	Pass
Weight	160.0 g	Test 7. Overcharge	Pass
Dimensions	202.00mm X 112.00mm X 6.70mm	Test 8. Forced Discharge	Pass

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문서번호	QAE-EF02-151102-B-L15L2PB1	
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UN38.3 Test Report

- L15L2PB1 (Nom.35Wh, 7.6V)-

목 차

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2015. 11. 02

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)

2-1. 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	8.676	160.36	8.674	160.35	99.98	0.006	Pass	8.561	160.34	98.70	0.006	Pass	8.557	160.34	99.95	0.000	Pass	8.554	160.34	99.96	0.000	Pass
2	8.656	160.82	8.656	160.82	100.00	0.000	Pass	8.545	160.82	98.72	0.000	Pass	8.545	160.81	100.00	0.006	Pass	8.541	160.81	99.95	0.000	Pass
3	8.647	160.11	8.644	160.10	99.97	0.006	Pass	8.532	160.09	98.70	0.006	Pass	8.528	160.09	99.95	0.000	Pass	8.526	160.09	99.98	0.000	Pass
4	8.653	160.74	8.651	160.73	99.98	0.006	Pass	8.547	160.72	98.80	0.006	Pass	8.544	160.71	99.96	0.006	Pass	8.541	160.71	99.96	0.000	Pass

B. 50th cycle fully charged state

5	8.659	160.61	8.659	160.61	100.00	0.000	Pass	8.559	160.59	98.85	0.012	Pass	8.556	160.58	99.96	0.006	Pass	8.556	160.58	100.00	0.000	Pass
6	8.654	160.72	8.651	160.71	99.97	0.006	Pass	8.544	160.70	98.76	0.006	Pass	8.544	160.69	100.00	0.006	Pass	8.541	160.69	99.96	0.000	Pass
7	8.656	160.48	8.652	160.48	99.95	0.000	Pass	8.542	160.46	98.73	0.012	Pass	8.542	160.46	100.00	0.000	Pass	8.539	160.46	99.96	0.000	Pass
8	8.650	160.65	8.648	160.64	99.98	0.006	Pass	8.535	160.64	98.69	0.000	Pass	8.532	160.64	99.96	0.000	Pass	8.532	160.63	100.00	0.006	Pass

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

1	8.554	56.44	Pass
2	8.541	55.90	Pass
3	8.526	56.61	Pass
4	8.541	55.90	Pass

B. 50th cycle fully charged state

5	8.556	57.09	Pass
6	8.541	56.07	Pass
7	8.539	56.63	Pass
8	8.532	56.86	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

9	8.662	23.21	Pass
10	8.666	23.49	Pass
11	8.661	22.98	Pass
12	8.655	23.58	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully charged state

13	8.653	23.69	Pass
14	8.653	22.92	Pass
15	8.658	22.64	Pass
16	8.662	22.66	Pass

2-3. T6/T8 Test Result (ICP595490A1)

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

A. 1st cycle 50% charged state

C-1	3.822	20.45	Pass
C-2	3.823	20.52	Pass
C-3	3.823	21.43	Pass
C-4	3.824	20.80	Pass
C-5	3.824	22.09	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	3.221	103.92	Pass
C-7	3.218	116.05	Pass
C-8	3.230	105.14	Pass
C-9	3.219	98.71	Pass
C-10	3.231	113.00	Pass
C-11	3.221	94.48	Pass
C-12	3.212	103.91	Pass
C-13	3.208	105.73	Pass
C-14	3.248	97.84	Pass
C-15	3.256	99.20	Pass

B. 50th cycle fully discharged state

C-16	3.314	85.24	Pass
C-17	3.309	98.81	Pass
C-18	3.320	106.37	Pass
C-19	3.331	103.76	Pass
C-20	3.316	73.64	Pass
C-21	3.318	105.77	Pass
C-22	3.312	103.81	Pass
C-23	3.313	87.25	Pass
C-24	3.316	89.89	Pass
C-25	3.313	94.44	Pass

