

# UN38.3 Test Summary

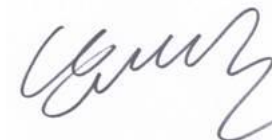
The following product has been evaluated according to the 5th revised edition Amendment 2 of the UN Manual of Tests and Criteria.  
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.




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Description		List of Test Completed	
Test Report Number	QAE-EF02-151124-B-L15L2PB2	Test 1. Altitude Simulation	Pass
Date of test report	2015.11.24	Test 2. Thermal Test	Pass
Model name	L15L2PB2	Test 3. Vibration	Pass
Type	Pouch	Test 4. Shock	Pass
Nominal voltage	7.6 V	Test 5. External Short Circuit	Pass
Capacity	30.0 Wh	Test 6. Impact or Crush	Pass
Weight	156.0 g	Test 7. Overcharge	Pass
Dimensions	204.30mm X 57.00mm X 6.60mm	Test 8. Forced Discharge	Pass

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# UN38.3 Test Report

## - L15L2PB2 (Nom.30Wh, 7.6V)-

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2015. 11. 24

# 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"> <li>- After OCV (%) ≥ 90%</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> <li>- Mass loss limit (leakage)                             <ol style="list-style-type: none"> <li>1) If M&lt;1g, less than 0.5%,</li> <li>2) If 1g≤M≤75g, less than 0.2%,</li> <li>3) If M&gt;75g, less than 0.1%)</li> </ol> </li> </ul>	<p>T1~T5 : Sequence Tests</p> <pre> graph TD     T1[Test 1 Altitude Simulation] --&gt; T2[Test 2 Thermal Test]     T2 --&gt; T3[Test 3 Vibration]     T3 --&gt; T4[Test 4 Shock]     T4 --&gt; 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"> <li>- No disassembly, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	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	8.666	155.38	8.664	155.38	99.98	0.000	Pass	8.560	155.37	98.80	0.006	Pass	8.557	155.37	99.96	0.000	Pass	8.554	155.37	99.96	0.000	Pass
2	8.656	155.76	8.653	155.76	99.97	0.000	Pass	8.539	155.75	98.68	0.006	Pass	8.536	155.73	99.96	0.013	Pass	8.532	155.72	99.95	0.006	Pass
3	8.667	155.47	8.665	155.47	99.98	0.000	Pass	8.561	155.47	98.80	0.000	Pass	8.561	155.46	100.00	0.006	Pass	8.559	155.46	99.98	0.000	Pass
4	8.653	155.44	8.653	155.44	100.00	0.000	Pass	8.553	155.43	98.84	0.006	Pass	8.549	155.41	99.95	0.013	Pass	8.548	155.41	99.99	0.000	Pass

## B. 50th cycle fully charged state

5	8.659	155.38	8.659	155.37	100.00	0.006	Pass	8.554	155.36	98.79	0.006	Pass	8.550	155.34	99.95	0.013	Pass	8.547	155.34	99.96	0.000	Pass
6	8.654	155.29	8.651	155.29	99.97	0.000	Pass	8.546	155.28	98.79	0.006	Pass	8.543	155.27	99.96	0.006	Pass	8.539	155.26	99.95	0.006	Pass
7	8.656	155.33	8.653	155.33	99.97	0.000	Pass	8.540	155.31	98.69	0.013	Pass	8.540	155.29	100.00	0.013	Pass	8.537	155.29	99.96	0.000	Pass
8	8.650	155.52	8.647	155.52	99.97	0.000	Pass	8.548	155.50	98.86	0.013	Pass	8.545	155.49	99.96	0.006	Pass	8.542	155.49	99.96	0.000	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	8.554	55.04	Pass
2	8.532	55.21	Pass
3	8.559	54.63	Pass
4	8.548	56.29	Pass

## B. 50th cycle fully charged state

5	8.547	56.00	Pass
6	8.539	55.10	Pass
7	8.537	55.19	Pass
8	8.542	55.72	Pass

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

## A. 1st cycle fully charged state

9	8.650	25.83	Pass
10	8.645	24.73	Pass
11	8.643	25.10	Pass
12	8.646	24.56	Pass

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

## B. 50th cycle fully charged state

13	8.621	26.04	Pass
14	8.629	25.15	Pass
15	8.627	25.73	Pass
16	8.621	25.37	Pass

# 2-3. T6/T8 Test Result (ICP595490L2)

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

## A. 1st cycle 50% charged state

C-1	3.876	23.25	Pass
C-2	3.874	23.56	Pass
C-3	3.871	23.53	Pass
C-4	3.872	23.44	Pass
C-5	3.878	23.49	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	3.013	46.75	Pass
C-7	3.011	46.78	Pass
C-8	3.010	45.55	Pass
C-9	3.014	46.43	Pass
C-10	3.007	47.37	Pass
C-11	3.013	46.68	Pass
C-12	3.017	46.57	Pass
C-13	3.007	47.53	Pass
C-14	3.008	46.66	Pass
C-15	3.016	45.41	Pass

## B. 50th cycle fully discharged state

C-16	3.114	44.75	Pass
C-17	3.124	44.34	Pass
C-18	3.121	43.87	Pass
C-19	3.119	44.27	Pass
C-20	3.118	45.87	Pass
C-21	3.128	45.99	Pass
C-22	3.121	46.84	Pass
C-23	3.119	44.93	Pass
C-24	3.117	44.98	Pass
C-25	3.120	43.78	Pass

# 3. Sample Image

