

# 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.




Manufacture's contact information	LG Chem, Ltd. 128 Yeoui-Daero, Yeongdeungpo-gu, SEOUL, 150-721, REPUBLIC OF KOREA Telephone : +86-10-7742-5427      E-mail : kkammy@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
Test Laboratory information	LG Chem, Ltd. / RESEARCH PARK 188 Munjiro, Yuseong-gu, Daejeon, 305-738, REPUBLIC OF KOREA Telephone : +82-10-3099-3724      E-mail : juhongpark@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
	LG Chem (Nanjing) I&E Materials Co., Ltd NO.17 Hengyi Road, Nanjing Economic & Technological Development Zone, Nanjing, Jiangsu, China Telephone : +86-025-85603000-8288      E-mail : xuyuannj@lgchem.com      Website : <a href="http://www.lgchem.com">www.lgchem.com</a>		
Description		List of Test Completed	
Test Report Number	QAE-EF02-151224-B-L15L3A02	Test 1. Altitude Simulation	Pass
Date of test report	2015.12.24	Test 2. Thermal Test	Pass
Model name	L15L3A02	Test 3. Vibration	Pass
Type	Cylindrical	Test 4. Shock	Pass
Nominal voltage	10.8 V	Test 5. External Short Circuit	Pass
Capacity	24.0 Wh	Test 6. Impact or Crush	Pass
Weight	164.0 g	Test 7. Overcharge	Pass
Dimensions	268.60mm X 25.70mm X 20.50mm	Test 8. Forced Discharge	Pass

Reviewed By: Joohong Park  
 IT & New Application Part Leader  
 Global Standard Certification Team  
 LG Chem, Ltd.  
 E-mail: juhongpark@lgchem.com



Approved By: DaeHo Nam  
 Team Leader  
 Global Standard Certification Team  
 LG Chem, Ltd.  
 E-mail: kkammy@lgchem.com



문서번호	QAE-EF02-151224-B-L15L3A02	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	박해나	
Approved	김병수	

# UN38.3 Test Report

## - L15L3A02 (Nom. 24.0Wh, 10.8V) -

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2015. 12. 24



\* Lithium ion equivalent content = 1.877 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"> <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 <math>M &lt; 1g</math>, less than 0.5%,</li> <li>2) If <math>1g \leq M \leq 75g</math>, less than 0.2%,</li> <li>3) If <math>M &gt; 75g</math>, 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 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"> <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	12.554	163.00	12.552	162.990	99.98	0.006	Pass	12.372	162.98	98.57	0.006	Pass	12.368	162.97	99.97	0.006	Pass	12.362	162.96	99.95	0.006	Pass
2	12.558	163.28	12.547	163.280	99.91	0.000	Pass	12.362	163.26	98.53	0.012	Pass	12.354	163.26	99.94	0.000	Pass	12.348	163.25	99.95	0.006	Pass
3	12.554	163.10	12.542	163.100	99.90	0.000	Pass	12.359	163.09	98.54	0.006	Pass	12.359	163.08	100.00	0.006	Pass	12.347	163.07	99.90	0.006	Pass
4	12.557	163.08	12.545	163.070	99.90	0.006	Pass	12.359	163.06	98.52	0.006	Pass	12.347	163.06	99.90	0.000	Pass	12.338	163.06	99.93	0.000	Pass

## B. 50th cycle fully charged state

5	12.551	163.64	12.540	163.63	99.91	0.006	Pass	12.356	163.63	98.53	0.000	Pass	12.356	163.63	100.00	0.000	Pass	12.355	163.63	99.99	0.000	Pass
6	12.557	163.43	12.557	163.42	100.00	0.006	Pass	12.379	163.41	98.58	0.006	Pass	12.374	163.41	99.96	0.000	Pass	12.362	163.40	99.90	0.006	Pass
7	12.558	163.70	12.548	163.70	99.92	0.000	Pass	12.369	163.69	98.57	0.006	Pass	12.362	163.69	99.94	0.000	Pass	12.355	163.67	99.94	0.012	Pass
8	12.557	163.85	12.552	163.85	99.96	0.000	Pass	12.374	163.83	98.58	0.012	Pass	12.370	163.83	99.97	0.000	Pass	12.367	163.82	99.98	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	12.362	56.70	Pass
2	12.348	56.72	Pass
3	12.347	55.83	Pass
4	12.338	56.04	Pass

### B. 50th cycle fully charged state

5	12.355	55.96	Pass
6	12.362	56.07	Pass
7	12.355	56.97	Pass
8	12.367	56.46	Pass

## Over Charge (T7)

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

9	12.542	24.82	Pass
10	12.541	25.77	Pass
11	12.540	24.74	Pass
12	12.541	24.36	Pass

## Over Charge (T7)

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

13	12.527	25.29	Pass
14	12.520	25.50	Pass
15	12.520	25.86	Pass
16	12.528	25.27	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

