

UN38.3 Test Summary

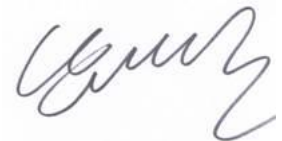
The following product has been evaluated according to the 5th revised edition of the UN Manual of Tests and Criteria.
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.




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Description		List of Test Completed	
Test Report Number	QAE-EF02-110923-PKL11L6F01	Test 1. Altitude Simulation	Pass
Date of test report	2011.09.23	Test 2. Thermal Test	Pass
Model name	L11L6F01	Test 3. Vibration	Pass
Type	Cylindrical	Test 4. Shock	Pass
Nominal voltage	11.1 V	Test 5. External Short Circuit	Pass
Capacity	62.0 Wh	Test 6. Impact	Pass
Weight	325.0 g	Test 7. Overcharge	Pass
Dimensions	203.80mm X 41.14mm X 20.20mm	Test 8. Forced Discharge	-

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UN Test Report

- L11L6F01 (Nom. 62Wh, 11.1V) -

목 차

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2011. 09. 23

1. UN Transportation Regulation Test

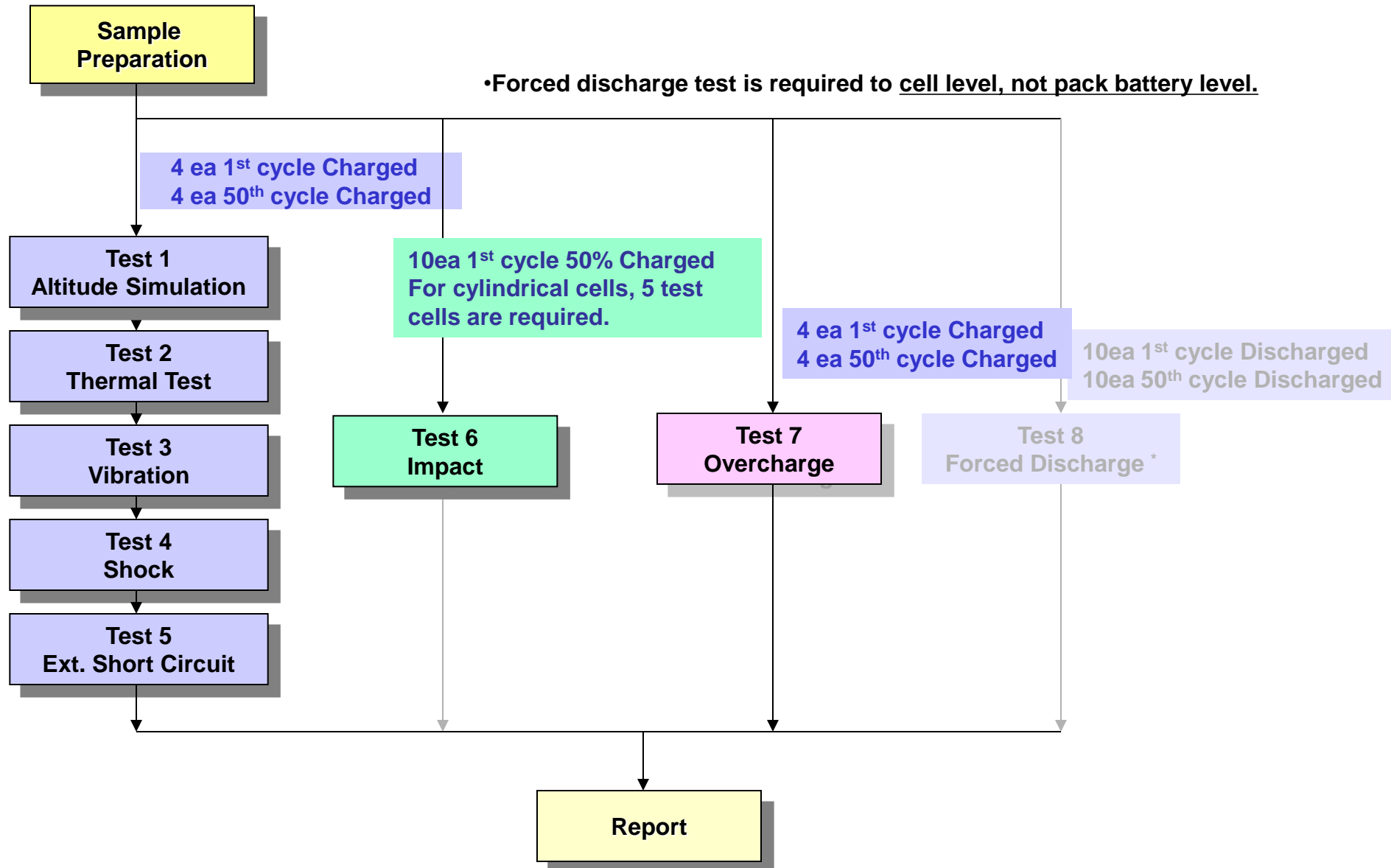
Rev.5

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> - Measuring mass before/ after each test (If M>5g, less than 0.1%) - Measuring voltage before/ after each test (more than 90%) - No leakage, no venting, no disassembly, no rupture, no fire
Test 2. Thermal Test	[75±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℃	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170℃)
Test 6. Impact	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	
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 V (min.) = 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	<ul style="list-style-type: none"> - No disassembly, no fire (after 7 days)
Test 8. Forced Discharge	Only for Cell, not battery.	<ul style="list-style-type: none"> - No disassembly, no fire (after 7 days)

* Tests through T1-T5 shall be conducted in sequence with the same battery.

* We declare that the above-mentioned test is the result of being checked according to UN Test
(Manual of Test and Criteria ST/SG/AC.10/11/Rev.5)

2. Test Procedure



3-1. T1-T4 Test Result

Before				Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
	Pack NO.	OCV	Mass	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully state

Charge	1	12.592	323.83	12.579	323.82	99.90	0.003	Pass	12.466	323.81	99.10	0.003	Pass	12.461	323.80	99.96	0.003	Pass	12.460	323.80	99.99	0.000	Pass
	2	12.598	323.81	12.570	323.80	99.78	0.003	Pass	12.461	323.79	99.13	0.003	Pass	12.448	323.79	99.90	0.000	Pass	12.447	323.78	99.99	0.003	Pass
	3	12.502	323.80	12.501	323.79	99.99	0.003	Pass	12.478	323.79	99.82	0.000	Pass	12.469	323.77	99.93	0.006	Pass	12.466	323.77	99.98	0.000	Pass
	4	12.565	323.83	12.545	323.82	99.84	0.003	Pass	12.440	323.82	99.16	0.000	Pass	12.430	323.81	99.92	0.003	Pass	12.428	323.80	99.98	0.003	Pass
	Ave.	12.564	323.82	12.549	323.81	99.88	0.003	-	12.461	323.80	99.30	0.002	-	12.452	323.79	99.93	0.003	-	12.450	323.79	99.99	0.002	-

B. 50th cycle fully state

Charge	5	12.584	323.80	12.580	323.80	99.97	0.000	Pass	12.471	323.79	99.13	0.003	Pass	12.458	323.78	99.90	0.003	Pass	12.446	323.78	99.90	0.000	Pass
	6	12.559	323.84	12.539	323.83	99.84	0.003	Pass	12.419	323.82	99.04	0.003	Pass	12.410	323.82	99.93	0.000	Pass	12.408	323.81	99.98	0.003	Pass
	7	12.593	323.83	12.583	323.83	99.92	0.000	Pass	12.473	323.82	99.13	0.003	Pass	12.463	323.81	99.92	0.003	Pass	12.462	323.81	99.99	0.000	Pass
	8	12.501	323.80	12.500	323.79	99.99	0.003	Pass	12.490	323.78	99.92	0.003	Pass	12.484	323.78	99.95	0.000	Pass	12.483	323.78	99.99	0.000	Pass
	Ave.	12.559	323.82	12.551	323.81	99.93	0.002	-	12.463	323.80	99.31	0.003	-	12.454	323.80	99.92	0.002	-	12.450	323.80	99.97	0.001	-

Requirement

- Measuring mass before/after each test (If M>5g, less than 0.1%)
- Measuring voltage before/after each test (more than 90%, only charged samples)
- No leakage, no venting, no disassembly, no rupture, no fire

3-2. T5/T7 Test Result

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

A. 1st cycle fully state

Charge	1	12.460	55.90	Pass
	2	12.447	54.89	Pass
	3	12.466	55.78	Pass
	4	12.428	55.08	Pass
	MAX.	12.466	55.90	-

Test Condition	
- 100mΩ ext. short-circuit at 55±2 °C	

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

A. 1st cycle fully state

Charge	9	12.532	25.10	Pass
	10	12.572	25.03	Pass
	11	12.522	24.85	Pass
	12	12.521	25.13	Pass
	MAX.	12.572	25.13	-

Test Condition	
- Max. Charge Current : 4400 mA - CC/CV 2Imax(8800mA) 22V cut-off 24Hr	

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

B. 50th cycle fully state

Charge	5	12.446	55.93	Pass
	6	12.408	55.77	Pass
	7	12.462	55.04	Pass
	8	12.483	54.98	Pass
	MAX.	12.483	55.93	-

Requirement	
- Temperature < 170 (°C) - No disassembly, no rupture, no fire within 6 hours	

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

B. 50th cycle fully state

Charge	13	12.564	24.91	Pass
	14	12.564	24.75	Pass
	15	12.553	25.03	Pass
	16	12.552	25.09	Pass
	MAX.	12.564	25.09	-

Requirement	
- No disassembly, no fire within 7 day	

3-3. T6 Test Result (ICR18650C2)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
C-1	3.807	25.43	Pass
C-2	3.807	108.50	Pass
C-3	3.806	24.36	Pass
C-4	3.806	24.79	Pass
C-5	3.806	114.39	Pass
MAX.	3.807	114.39	-
Test Condition			
- Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height			
Requirement			
- Temperature < 170 (°C) - No disassembly, no rupture, no fire within 6 hours			

4. Sample Image

