

UN38.3 Test Summary

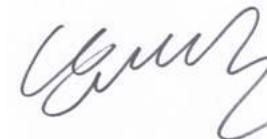
The following product has been evaluated according to the 5th revised edition of the UN Manual of Tests and Criteria.
We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.



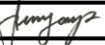
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Description		List of Test Completed	
Test Report Number	QAE-EF02-120719-PKL12L6E01	Test 1. Altitude Simulation	Pass
Date of test report	2012.07.19	Test 2. Thermal Test	Pass
Model name	L12L6E01	Test 3. Vibration	Pass
Type	Cylindrical	Test 4. Shock	Pass
Nominal voltage	11.1 V	Test 5. External Short Circuit	Pass
Capacity	62.0 Wh	Test 6. Impact	Pass
Weight	324.0 g	Test 7. Overcharge	Pass
Dimensions	271.70mm X 51.42mm X 20.76mm	Test 8. Forced Discharge	-

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UN Test Report

- L12L6E01 (Nom. 62Wh, 11.1V) -

목 차

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2012. 07. 19

1. UN Transportation Regulation Test

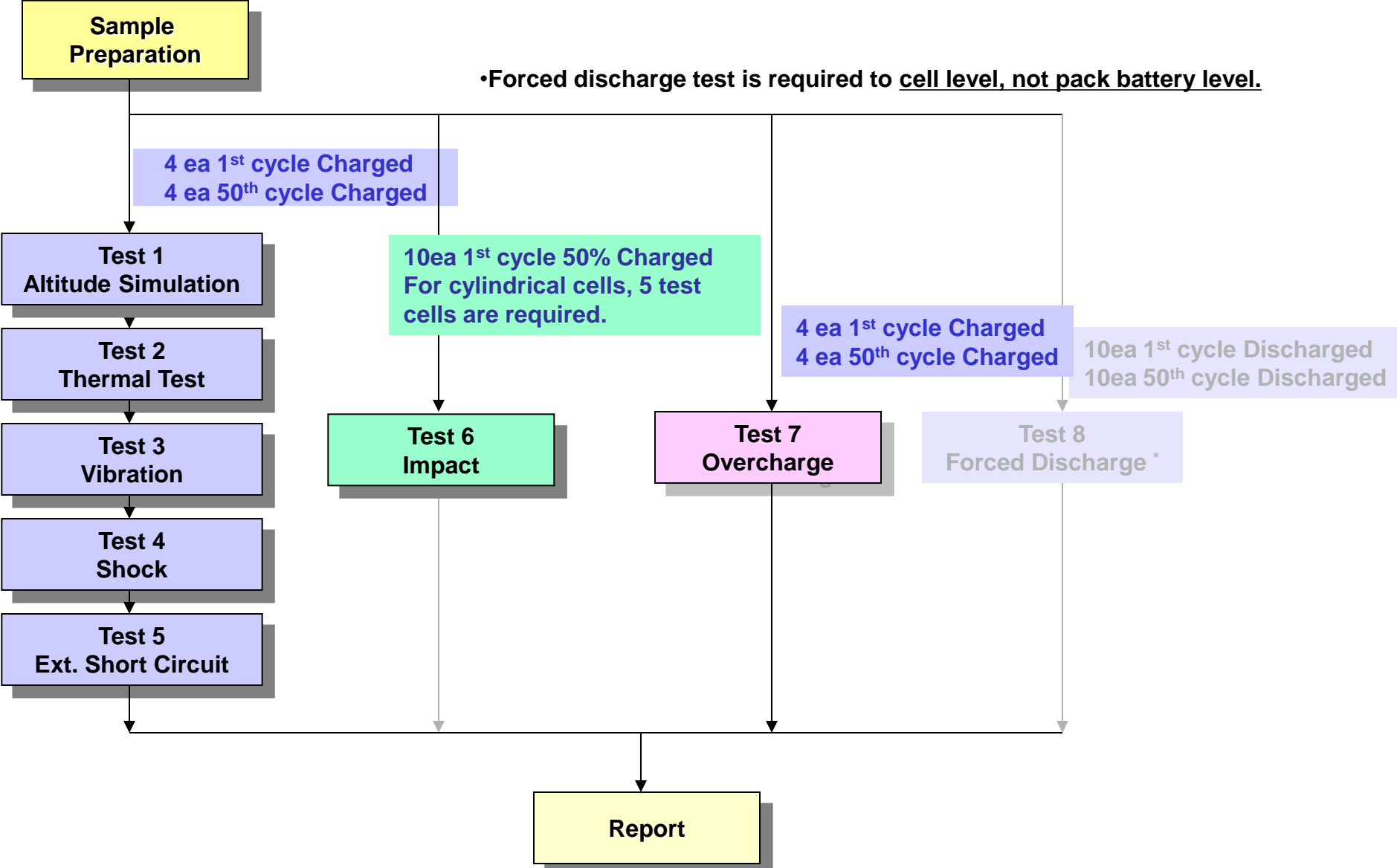
Rev.5

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℃	
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)	- No disassembly, no fire (after 7 days)
Test 8. Forced Discharge	Only for Cell, not battery.	- 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	12.839	324.18	12.837	324.16	99.98	0.006	Pass	12.721	324.16	99.10	0.000	Pass	12.720	324.13	99.99	0.009	Pass	12.718	324.08	99.98	0.015	Pass
	2	12.819	324.10	12.815	324.08	99.97	0.006	Pass	12.681	324.06	98.95	0.006	Pass	12.677	324.02	99.97	0.012	Pass	12.660	324.00	99.87	0.006	Pass
	3	12.861	324.39	12.858	324.33	99.98	0.018	Pass	12.730	324.32	99.00	0.003	Pass	12.728	324.32	99.98	0.000	Pass	12.703	324.31	99.80	0.003	Pass
	4	12.821	324.19	12.818	324.19	99.98	0.000	Pass	12.701	324.18	99.09	0.003	Pass	12.700	324.16	99.99	0.006	Pass	12.697	324.14	99.98	0.006	Pass
	Ave.	12.835	324.22	12.832	324.19	99.98	0.008	-	12.708	324.18	99.04	0.003	-	12.706	324.16	99.98	0.007	-	12.695	324.13	99.91	0.008	-

B. 50th cycle fully state

Charge	5	12.733	324.06	12.732	324.06	99.99	0.000	Pass	12.610	324.05	99.04	0.003	Pass	12.603	324.04	99.94	0.003	Pass	12.601	324.03	99.98	0.003	Pass
	6	12.736	324.30	12.734	324.29	99.98	0.003	Pass	12.614	324.27	99.06	0.006	Pass	12.611	324.22	99.98	0.015	Pass	12.601	324.21	99.92	0.003	Pass
	7	12.729	323.99	12.728	323.93	99.99	0.019	Pass	12.612	323.93	99.09	0.000	Pass	12.610	323.92	99.98	0.003	Pass	12.608	323.91	99.98	0.003	Pass
	8	12.751	324.04	12.749	324.04	99.98	0.000	Pass	12.619	324.03	98.98	0.003	Pass	12.616	324.02	99.98	0.003	Pass	12.614	324.02	99.98	0.000	Pass
	Ave.	12.737	324.10	12.736	324.08	99.99	0.005	-	12.614	324.07	99.04	0.003	-	12.610	324.05	99.97	0.006	-	12.606	324.04	99.97	0.002	-

Requirement	<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%, only charged samples) - No leakage, no venting, no disassembly, no rupture, no fire
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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	12.718	57.21	Pass
	2	12.660	56.38	Pass
	3	12.703	56.58	Pass
	4	12.697	56.18	Pass
	MAX.	12.718	57.21	-

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	12.872	25.31	Pass
	10	12.832	25.59	Pass
	11	12.832	24.41	Pass
	12	12.863	24.29	Pass
	MAX.	12.872	25.59	-

Test Condition
- Max. Charge Current : 4200 mA - CC/CV 2I _{max} (8400mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	5	12.601	56.53	Pass
	6	12.601	55.71	Pass
	7	12.608	56.48	Pass
	8	12.614	56.28	Pass
	MAX.	12.614	56.53	-

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	12.887	24.89	Pass
	14	12.883	25.41	Pass
	15	12.814	25.32	Pass
	16	12.893	25.53	Pass
	MAX.	12.893	25.53	-

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	-
B. 50th cycle fully discharge state			
C-6	3.351	24.83	Pass
C-7	3.362	46.43	Pass
C-8	3.387	49.26	Pass
C-9	3.369	49.90	Pass
C-10	3.353	47.55	Pass
MAX.	3.387	49.90	-
Test Condition			
- Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height			
Requirement			
<ul style="list-style-type: none"> - Temperature < 170 (°C) - No disassembly, no rupture, no fire within 6 hours 			

4. Sample Image

