
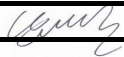



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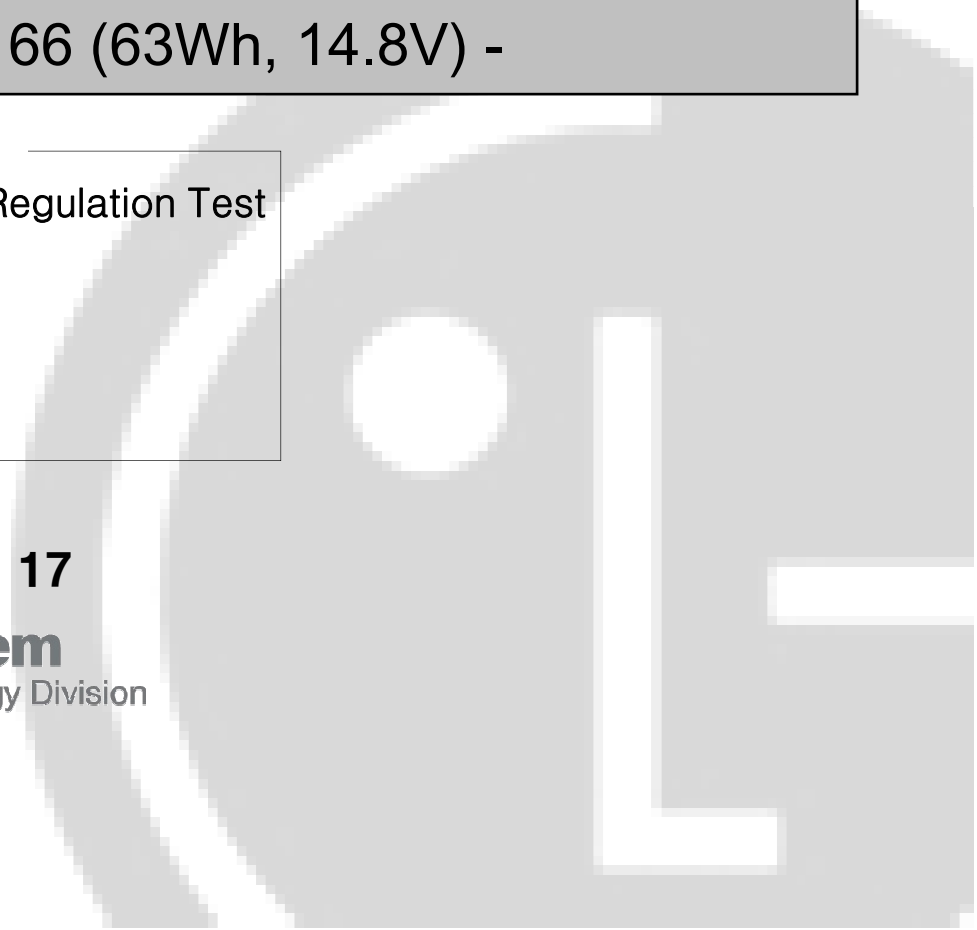
UN Test Report

- ASM P/N: 45N1166 (63Wh, 14.8V) -

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2012. 12. 17



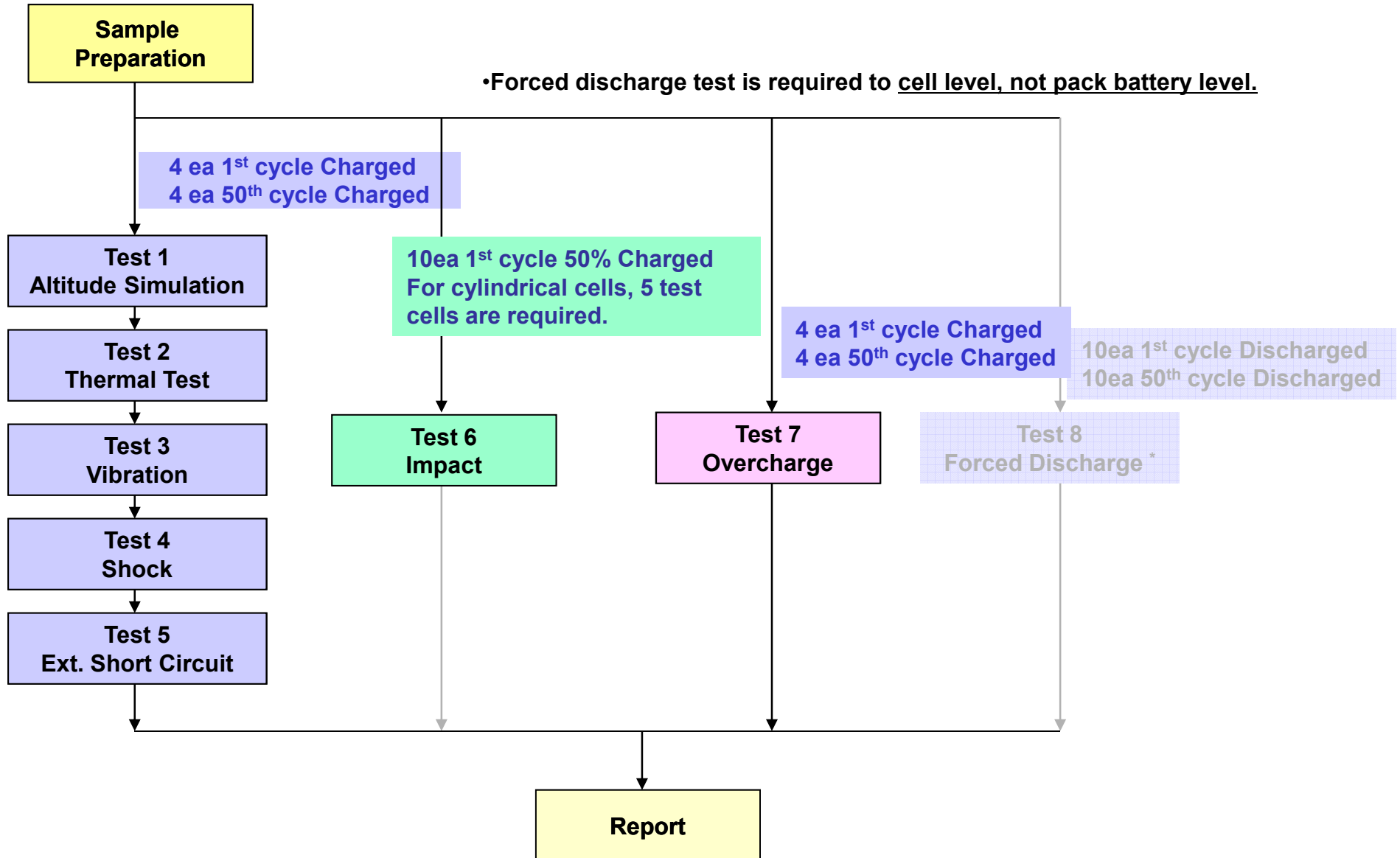
1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure) 11.6kPa for 6hr at 20+/-5°C	<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°C, 6hr ↔ -40±2°C, 6hr, interval max. 30min] x 10 cycle Storing at 20±5°C 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°C 1hr continue after returning at 55±2°C	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire (after 6 hours) - Temp. monitoring (max. 170°C)
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	16.747	336.177	16.722	336.173	99.85	0.001	Pass	16.559	336.159	99.03	0.004	Pass	16.536	336.136	99.87	0.007	Pass	16.519	336.127	99.89	0.003	Pass
	2	16.744	336.523	16.718	336.503	99.84	0.006	Pass	16.564	336.489	99.08	0.004	Pass	16.546	336.473	99.89	0.005	Pass	16.526	336.459	99.88	0.004	Pass
	3	16.747	336.303	16.716	336.298	99.81	0.001	Pass	16.549	336.282	99.00	0.005	Pass	16.524	336.260	99.85	0.007	Pass	16.496	336.253	99.83	0.002	Pass
	4	16.745	336.708	16.713	336.688	99.81	0.006	Pass	16.560	336.679	99.08	0.002	Pass	16.532	336.672	99.83	0.002	Pass	16.501	336.668	99.81	0.001	Pass
	Ave.	16.746	336.428	16.717	336.415	99.83	0.004	-	16.558	336.402	99.05	0.004	-	16.534	336.385	99.86	0.005	-	16.510	336.377	99.86	0.003	-

B. 50th cycle fully state

Charge	9	16.738	336.699	16.715	336.696	99.86	0.001	Pass	16.560	336.687	99.08	0.003	Pass	16.539	336.662	99.87	0.007	Pass	16.508	336.660	99.81	0.001	Pass
	10	16.741	336.654	16.714	336.641	99.84	0.004	Pass	16.549	336.623	99.01	0.005	Pass	16.516	336.603	99.81	0.006	Pass	16.490	336.603	99.84	0.000	Pass
	11	16.741	336.983	16.709	336.959	99.81	0.007	Pass	16.545	336.946	99.02	0.004	Pass	16.518	336.926	99.84	0.006	Pass	16.497	336.905	99.88	0.006	Pass
	12	16.728	336.131	16.702	336.114	99.84	0.005	Pass	16.546	336.114	99.07	0.000	Pass	16.517	336.089	99.82	0.007	Pass	16.485	336.081	99.81	0.002	Pass
	Ave.	16.737	336.617	16.710	336.603	99.84	0.004	-	16.550	336.593	99.04	0.003	-	16.523	310.633	99.83	0.007	-	16.495	336.562	99.83	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	16.519	55.65	Pass
	2	16.526	55.31	Pass
	3	16.496	55.92	Pass
	4	16.501	55.99	Pass
	MAX.	16.526	55.99	-

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	16.706	25.85	Pass
	10	16.749	25.24	Pass
	11	16.750	25.97	Pass
	12	16.725	25.65	Pass
	MAX.	16.750	25.97	-

Test Condition
- Max. Charge Current : 2125 mA - CC/CV 2Imax(4250mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	5	16.508	54.87	Pass
	6	16.490	54.85	Pass
	7	16.497	54.66	Pass
	8	16.485	54.61	Pass
	MAX.	16.508	54.87	-

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	16.750	25.55	Pass
	14	16.735	25.64	Pass
	15	16.753	25.36	Pass
	16	16.709	25.78	Pass
	MAX.	16.753	25.78	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICP616484L1)

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

A. 1st cycle 50% charged state

Direction

Flat	1	3.791	62.34	Pass
	2	3.792	62.12	Pass
	3	3.791	70.91	Pass
	4	3.791	69.31	Pass
	5	3.791	63.10	Pass
Vertical	6	3.788	88.13	Pass
	7	3.791	92.63	Pass
	8	3.789	111.12	Pass
	9	3.790	99.31	Pass
	10	3.791	106.31	Pass
MAX.		3.792	111.12	-

Test Condition

- $\Phi=15.8\text{mm}$ bar, 9.1kg mass, $61 \pm 2.5\text{cm}$ height

Requirement

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

4. Sample Image

