

문서번호	QAE-EF02-121128-PKASMPN45N1130	
Prepared	김홍일	
	남익현	<i>[Signature]</i>
	장승현	
Reviewed	남대호	<i>[Signature]</i>
	이재승	
Approved	정준용	<i>[Signature]</i>

SolutionPartner

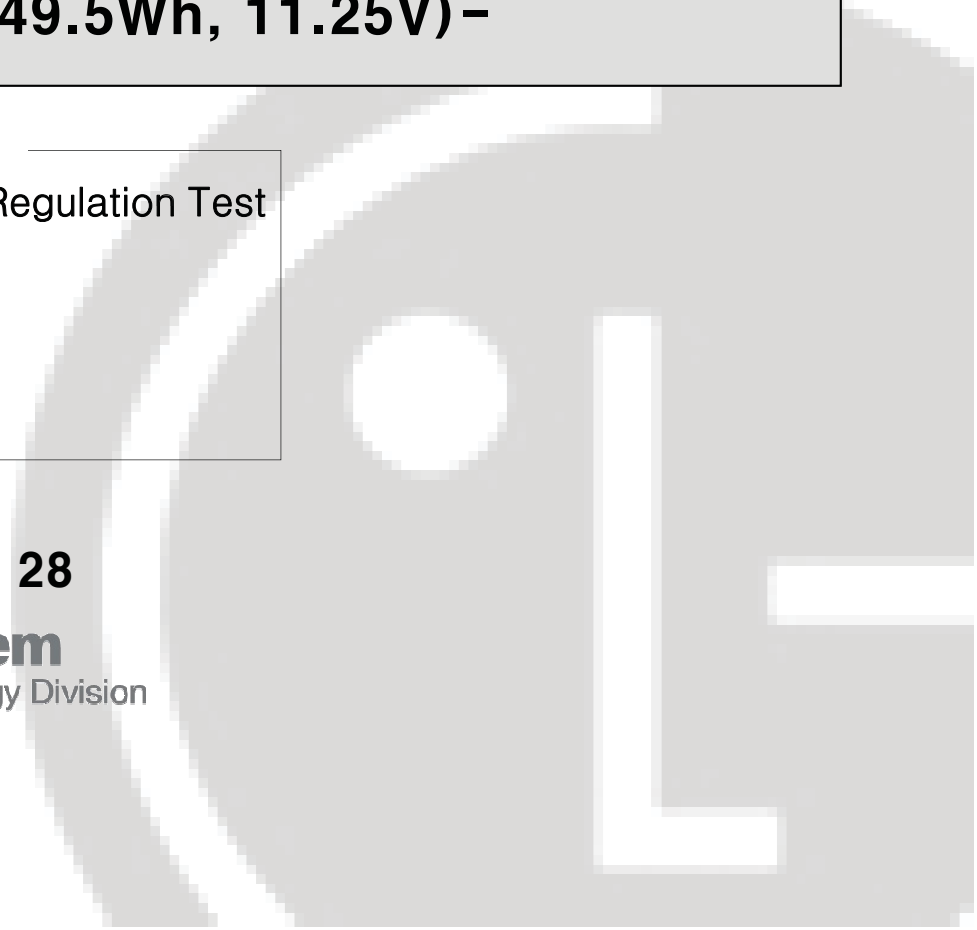
UN Test Report

- ASM P/N 45N1130 (49.5Wh, 11.25V) -

목 차

1. UN Transportation Regulation Test
2. Test Procedure
3. Test Result
4. Sample Image

2012. 11. 28



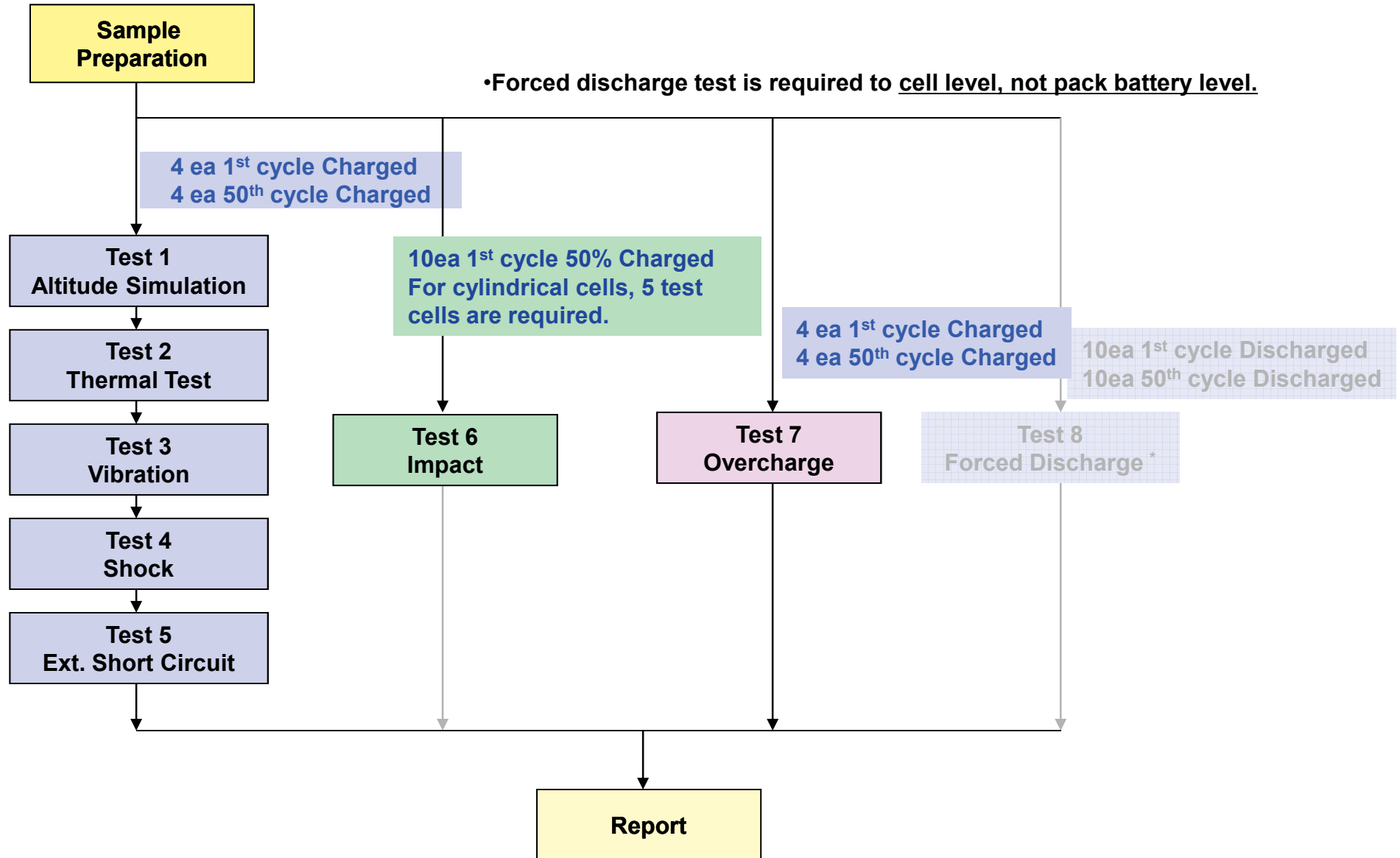
1. UN Transportation Regulation Test

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	12.558	312.642	12.540	312.621	99.86	0.007	Pass	12.416	312.608	99.01	0.004	Pass	12.402	312.592	99.89	0.005	Pass	12.387	312.568	99.88	0.008	Pass
	2	12.553	313.193	12.539	313.182	99.89	0.003	Pass	12.419	313.165	99.04	0.005	Pass	12.401	313.154	99.86	0.004	Pass	12.386	313.152	99.88	0.000	Pass
	3	12.542	313.484	12.518	313.468	99.81	0.005	Pass	12.397	313.443	99.03	0.008	Pass	12.374	313.427	99.82	0.005	Pass	12.354	313.425	99.84	0.001	Pass
	4	12.553	312.619	12.537	312.617	99.87	0.001	Pass	12.416	312.593	99.04	0.008	Pass	12.399	312.576	99.86	0.005	Pass	12.382	312.566	99.86	0.003	Pass
	Ave.	12.552	312.985	12.533	312.972	99.86	0.004	-	12.412	312.952	99.03	0.006	-	12.394	312.937	99.86	0.005	-	12.377	312.928	99.87	0.003	-

B. 50th cycle fully state

Charge	9	12.539	313.033	12.517	313.027	99.82	0.002	Pass	12.399	313.004	99.05	0.007	Pass	12.380	312.993	99.85	0.004	Pass	12.362	312.975	99.85	0.006	Pass
	10	12.522	313.296	12.500	313.290	99.82	0.002	Pass	12.377	313.272	99.02	0.006	Pass	12.360	313.258	99.86	0.004	Pass	12.346	313.246	99.89	0.004	Pass
	11	12.536	313.267	12.512	313.246	99.81	0.007	Pass	12.390	313.234	99.02	0.004	Pass	12.368	313.223	99.83	0.003	Pass	12.344	313.210	99.81	0.004	Pass
	12	12.527	313.206	12.511	313.186	99.87	0.006	Pass	12.396	313.184	99.08	0.001	Pass	12.383	313.181	99.90	0.001	Pass	12.360	313.169	99.81	0.004	Pass
	Ave.	12.531	313.200	12.510	313.187	99.83	0.004	-	12.390	313.173	99.04	0.004	-	12.373	310.633	99.86	0.003	-	12.353	313.150	99.84	0.004	-

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
--------------------	---

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	12.387	55.50	Pass
	2	12.386	55.23	Pass
	3	12.354	56.76	Pass
	4	12.382	56.35	Pass
	MAX.	12.387	56.76	-

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	17	12.513	27.19	Pass
	18	12.519	26.02	Pass
	19	12.589	26.57	Pass
	20	12.572	26.68	Pass
	MAX.	12.589	27.19	-

Test Condition
- Max. Charge Current : 2800mA - CC/CV 2Imax(5600mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	9	12.362	55.56	Pass
	10	12.346	55.45	Pass
	11	12.344	56.23	Pass
	12	12.360	55.14	Pass
	MAX.	12.362	56.23	-

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	21	12.560	25.36	Pass
	22	12.568	26.80	Pass
	23	12.498	26.56	Pass
	24	12.558	26.28	Pass
	MAX.	12.568	26.80	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICR18650S4)

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

A. 1st cycle 50% charge state

11	3.833	121.15	Pass
12	3.832	116.65	Pass
13	3.833	118.77	Pass
14	3.832	119.52	Pass
15	3.832	119.33	Pass
MAX.	3.833	121.15	-

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

