




문서번호	QAE-EF02-130107-PKL12L4A01	
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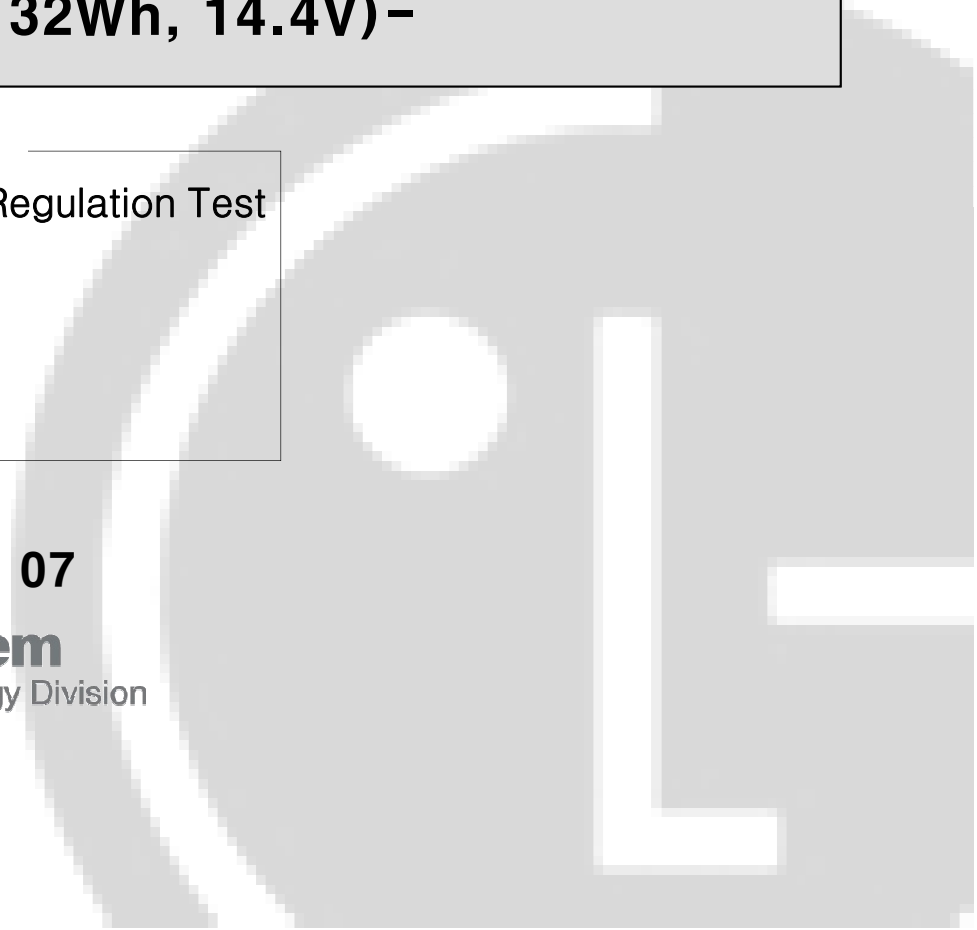
UN Test Report

- L12L4A01 (Nom. 32Wh, 14.4V) -

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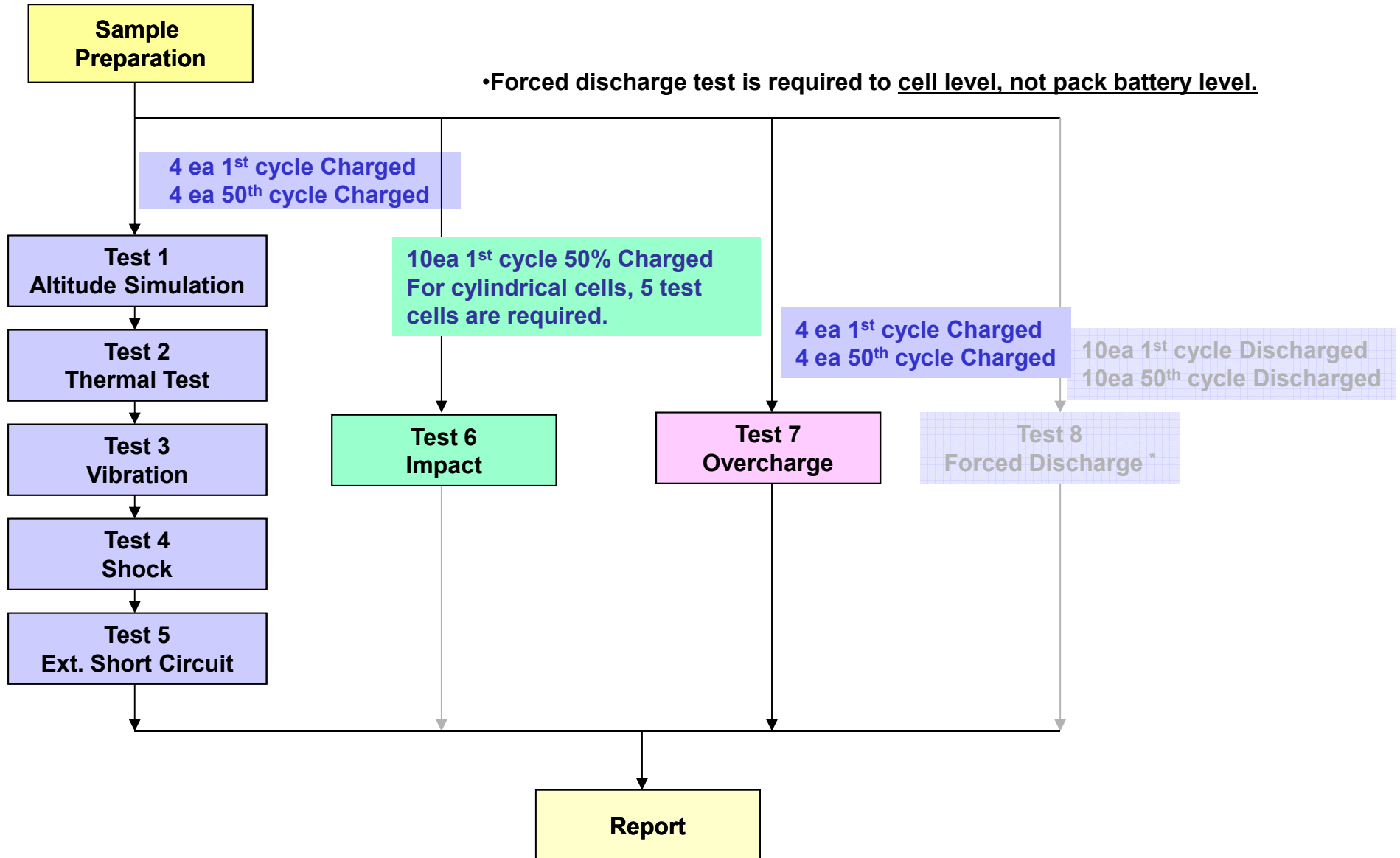
1. UN Transportation Regulation Test

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	16.610	205.343	16.609	205.340	99.99	0.001	Pass	16.429	205.338	98.92	0.001	Pass	16.419	205.334	99.94	0.002	Pass	16.417	205.332	99.99	0.001	Pass
	2	16.611	205.347	16.610	205.342	99.99	0.002	Pass	16.420	205.341	98.86	0.000	Pass	16.420	205.338	100.00	0.001	Pass	16.414	205.336	99.96	0.001	Pass
	3	16.621	205.355	16.618	205.350	99.98	0.002	Pass	16.427	205.342	98.85	0.004	Pass	16.420	205.338	99.96	0.002	Pass	16.414	205.337	99.96	0.000	Pass
	4	16.611	205.351	16.608	205.351	99.98	0.000	Pass	16.412	205.343	98.82	0.004	Pass	16.411	205.338	99.99	0.002	Pass	16.411	205.337	100.00	0.000	Pass
	Ave.	16.613	205.349	16.611	205.346	99.99	0.002	-	16.422	205.341	98.86	0.002	-	16.418	205.337	99.97	0.002	-	16.414	205.336	99.98	0.001	-

B. 50th cycle fully state

Charge	9	16.571	205.111	16.569	205.109	99.99	0.001	Pass	16.379	205.104	98.85	0.002	Pass	16.364	205.091	99.91	0.006	Pass	16.341	205.083	99.86	0.004	Pass
	10	16.571	205.144	16.567	205.139	99.98	0.002	Pass	16.392	205.132	98.94	0.003	Pass	16.385	205.130	99.96	0.001	Pass	16.372	205.126	99.92	0.002	Pass
	11	16.571	205.148	16.571	205.143	100.00	0.002	Pass	16.377	205.141	98.83	0.001	Pass	16.358	205.139	99.88	0.001	Pass	16.354	205.131	99.98	0.004	Pass
	12	16.570	205.144	16.569	205.141	99.99	0.001	Pass	16.376	205.131	98.84	0.005	Pass	16.357	205.128	99.88	0.001	Pass	16.353	205.120	99.98	0.004	Pass
	Ave.	16.571	205.137	16.569	205.133	99.99	0.002	-	16.381	205.127	98.87	0.003	-	16.366	310.633	99.91	0.002	-	16.355	205.115	99.93	0.003	-

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	16.417	55.20	Pass
	2	16.414	55.39	Pass
	3	16.414	55.83	Pass
	4	16.411	55.80	Pass
	MAX.	16.417	55.83	-

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	16.610	25.32	Pass
	18	16.612	24.99	Pass
	19	16.611	25.32	Pass
	20	16.631	25.12	Pass
	MAX.	16.631	25.32	-

Test Condition
- Max. Charge Current : 2080 mA - CC/CV 2Imax(4160mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	9	16.341	54.67	Pass
	10	16.372	57.32	Pass
	11	16.354	54.62	Pass
	12	16.353	55.31	Pass
	MAX.	16.372	57.32	-

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	16.571	25.89	Pass
	22	16.571	25.99	Pass
	23	16.589	26.53	Pass
	24	16.590	26.03	Pass
	MAX.	16.590	26.53	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICR18650S3)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
C-1	3.677	25.53	Pass
C-2	3.676	25.51	Pass
C-3	3.678	24.71	Pass
C-4	3.675	25.28	Pass
C-5	3.679	24.61	Pass
MAX.	3.679	25.53	-
B. 50th cycle fully discharge state			
C-6	3.458	25.24	Pass
C-7	3.459	25.57	Pass
C-8	3.458	24.95	Pass
C-9	3.459	25.13	Pass
C-10	3.461	24.72	Pass
MAX.	3.461	25.57	-
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

