

문서번호	QAE-EF02-130313-PKAP13B8K	
Prepared	김홍일	
	남익현	
	장승현	
Reviewed	남대호	
	이재승	
Approved	정준용	

SolutionPartner

UN Test Report

- AP13B8K (53Wh, 15.2V) -

목 차

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

2013. 03. 13

 **LG Chem**
Mobile Energy Division

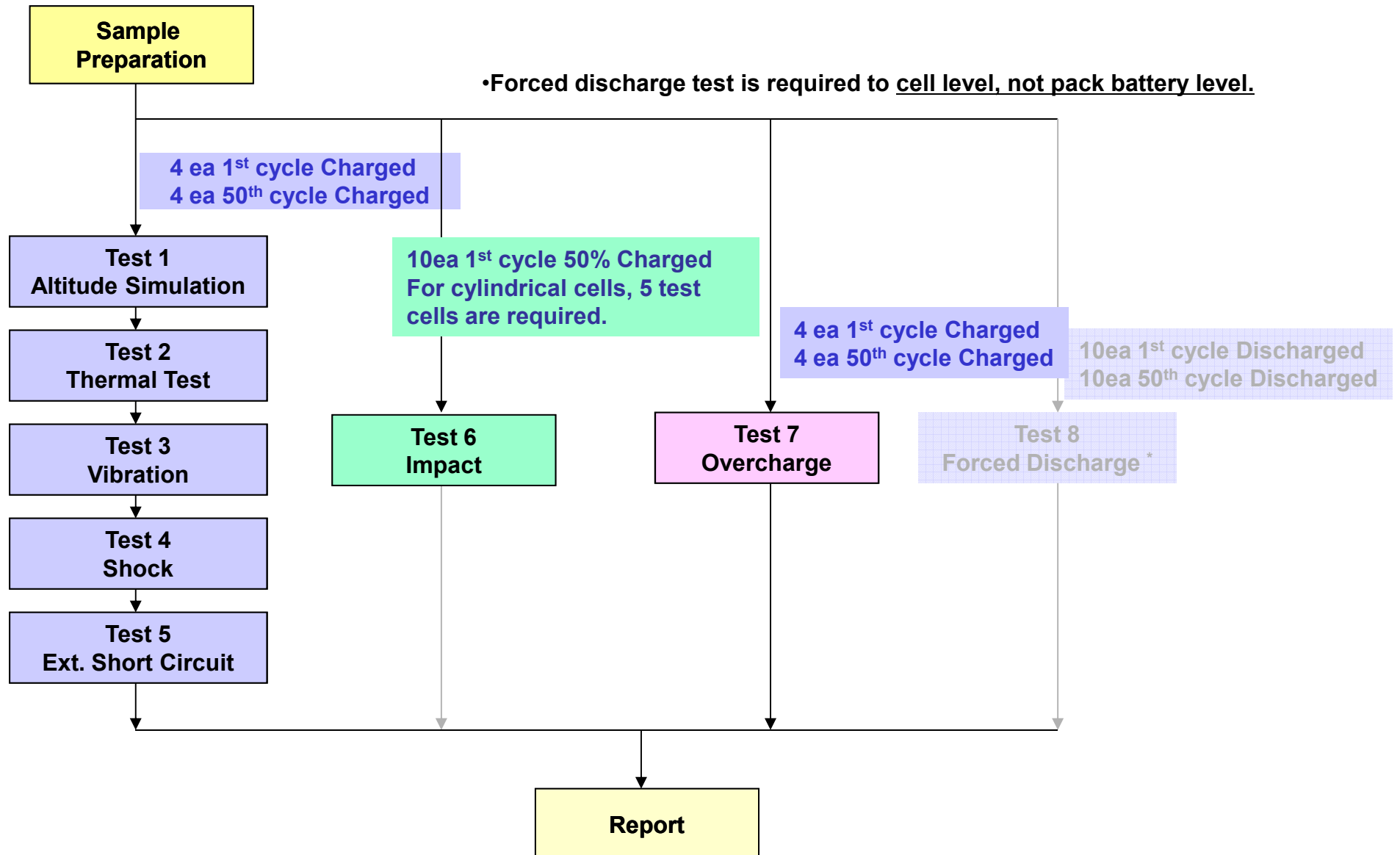
1. UN Transportation Regulation Test

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 10 cycle 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)	- 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	17.140	288.443	17.120	288.438	99.88	0.002	Pass	16.948	288.426	99.00	0.004	Pass	16.929	288.409	99.89	0.006	Pass	16.899	288.388	99.82	0.007	Pass
	2	17.146	288.319	17.124	288.304	99.87	0.005	Pass	16.960	288.296	99.05	0.003	Pass	16.927	288.275	99.81	0.007	Pass	16.893	288.250	99.80	0.009	Pass
	3	17.144	288.204	17.111	288.202	99.81	0.001	Pass	16.946	288.196	99.04	0.002	Pass	16.928	288.186	99.89	0.003	Pass	16.908	288.183	99.88	0.001	Pass
	4	17.142	288.378	17.120	288.362	99.87	0.005	Pass	16.959	288.349	99.06	0.005	Pass	16.942	288.342	99.90	0.002	Pass	16.911	288.323	99.82	0.007	Pass
	Ave.	17.143	288.336	17.118	288.327	99.86	0.003	-	16.954	288.317	99.04	0.003	-	16.932	288.303	99.87	0.005	-	16.903	288.286	99.83	0.006	-

B. 50th cycle fully state

Charge	9	17.149	288.422	17.118	288.401	99.82	0.007	Pass	16.960	288.384	99.08	0.006	Pass	16.936	288.380	99.86	0.001	Pass	16.916	288.361	99.88	0.007	Pass
	10	17.136	288.101	17.118	288.083	99.90	0.006	Pass	16.957	288.062	99.06	0.008	Pass	16.931	288.057	99.84	0.002	Pass	16.911	288.056	99.89	0.000	Pass
	11	17.142	288.590	17.123	288.569	99.89	0.007	Pass	16.957	288.547	99.03	0.008	Pass	16.928	288.524	99.83	0.008	Pass	16.909	288.500	99.89	0.009	Pass
	12	17.131	288.271	17.113	288.255	99.90	0.006	Pass	16.943	288.231	99.00	0.008	Pass	16.921	288.217	99.87	0.005	Pass	16.891	288.195	99.82	0.008	Pass
	Ave.	17.139	288.346	17.118	288.327	99.88	0.007	-	16.954	288.306	99.04	0.007	-	16.929	310.633	99.85	0.004	-	16.907	288.278	99.87	0.006	-

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	16.899	57.05	Pass
	2	16.893	55.19	Pass
	3	16.908	55.93	Pass
	4	16.911	55.88	Pass
	MAX.	16.911	57.05	-

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	17.134	25.65	Pass
	18	17.100	25.98	Pass
	19	17.170	25.74	Pass
	20	17.165	25.16	Pass
	MAX.	17.170	25.98	-

Test Condition				
- Max. Charge Current :2300mA - CC/CV 2Imax(4600mA) 22V cut-off 24Hr				

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

B. 50th cycle fully state

Charge	9	16.916	54.37	Pass
	10	16.911	54.73	Pass
	11	16.909	54.95	Pass
	12	16.891	54.42	Pass
	MAX.	16.916	54.95	-

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	17.177	25.32	Pass
	22	17.139	25.46	Pass
	23	17.081	25.56	Pass
	24	17.082	25.58	Pass
	MAX.	17.177	25.58	-

Requirement				
- No disassembly, no fire within 7 day				

3-3. T6 Test Result (ICP546080L1)

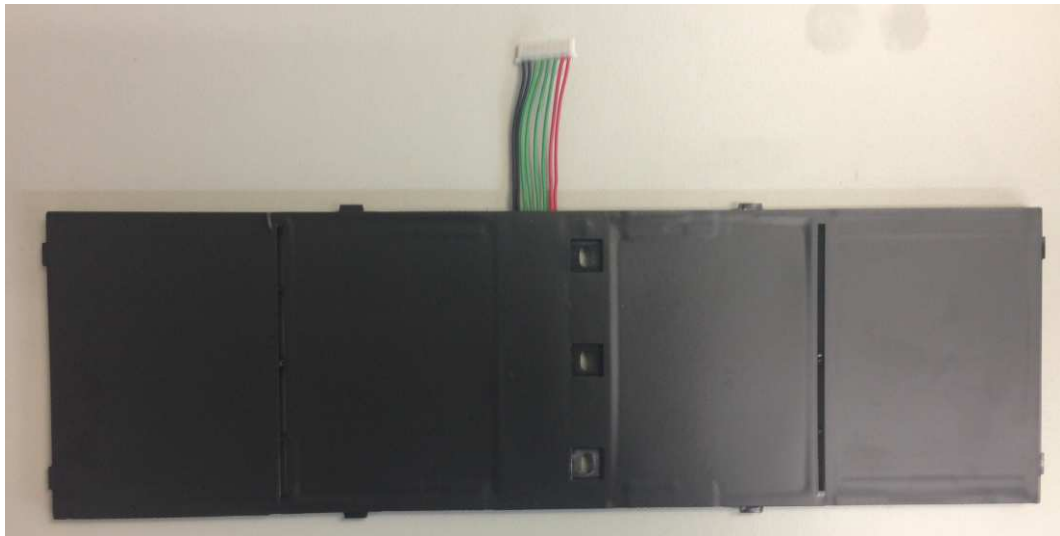
Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

1	3.776	111.71	Pass
2	3.777	113.34	Pass
3	3.776	108.71	Pass
4	3.776	112.29	Pass
5	3.776	110.56	Pass
6	3.777	129.77	Pass
7	3.776	120.43	Pass
8	3.776	128.22	Pass
9	3.776	126.13	Pass
10	3.776	121.48	Pass
MAX.	3.777	129.77	-

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



보조 1. 1.2m Drop Test Report

A. Test Result

No	Name of Test Items	Standard requirement or The Clause Number of Standard	Test Result		Conclusion
1	1.2m Drop Test	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 th) special provisions 188	Face	The package is not cracked, the contents are not damaged and not shifted.	Passed
			Edge	The package is not cracked, the contents are not damaged and not shifted.	
			Angle	The package is not cracked, the contents are not damaged and not shifted.	
2	Gross Weight Measure	* UNITED NATIONS "Recommendations on the TRANSPORT OF DANGEROUS GOODS" Model Regulations(16 th) special provisions 188	0.64kg		Passed

B. Sample Description

Dimensions	24.6*13.8*3.6cm	Net Weight of Batteries	0.57kg	Battery Type	Rechargeable Li-ion Battery
Gross weight	0.6kg	Battery number	2PCS / 1Carton	** Description	Use the air PE bag

C. Image After Test



* Recommendations on the transport of dangerous goods as below
Each 4package of cells or batteries, or the completed package must be capable of withstanding a 1.2 m drop test in any orientation without:

- 1) damage to cells or batteries contained therein
- 2) shifting of the contents so as to allow battery to battery (or cell to cell) contact
- 3) release of contents.

** Description: Description about the protection of short-circuit