




문서번호	QAE-EF02-150819-PKSB10J78991	
Prepared	남익현	
	장승현	
Reviewed	남대호	
	정규채	
Approved	김병수	

# UN Test Report

## - SB10J78991 (Nom.42Wh, 11.4V) -

### 목 차

1. UN Transportation Regulation Test
  2. Test Procedure
  3. Test Result
  4. Sample Image
- Appendix. Drop Test Report

2015. 08. 19

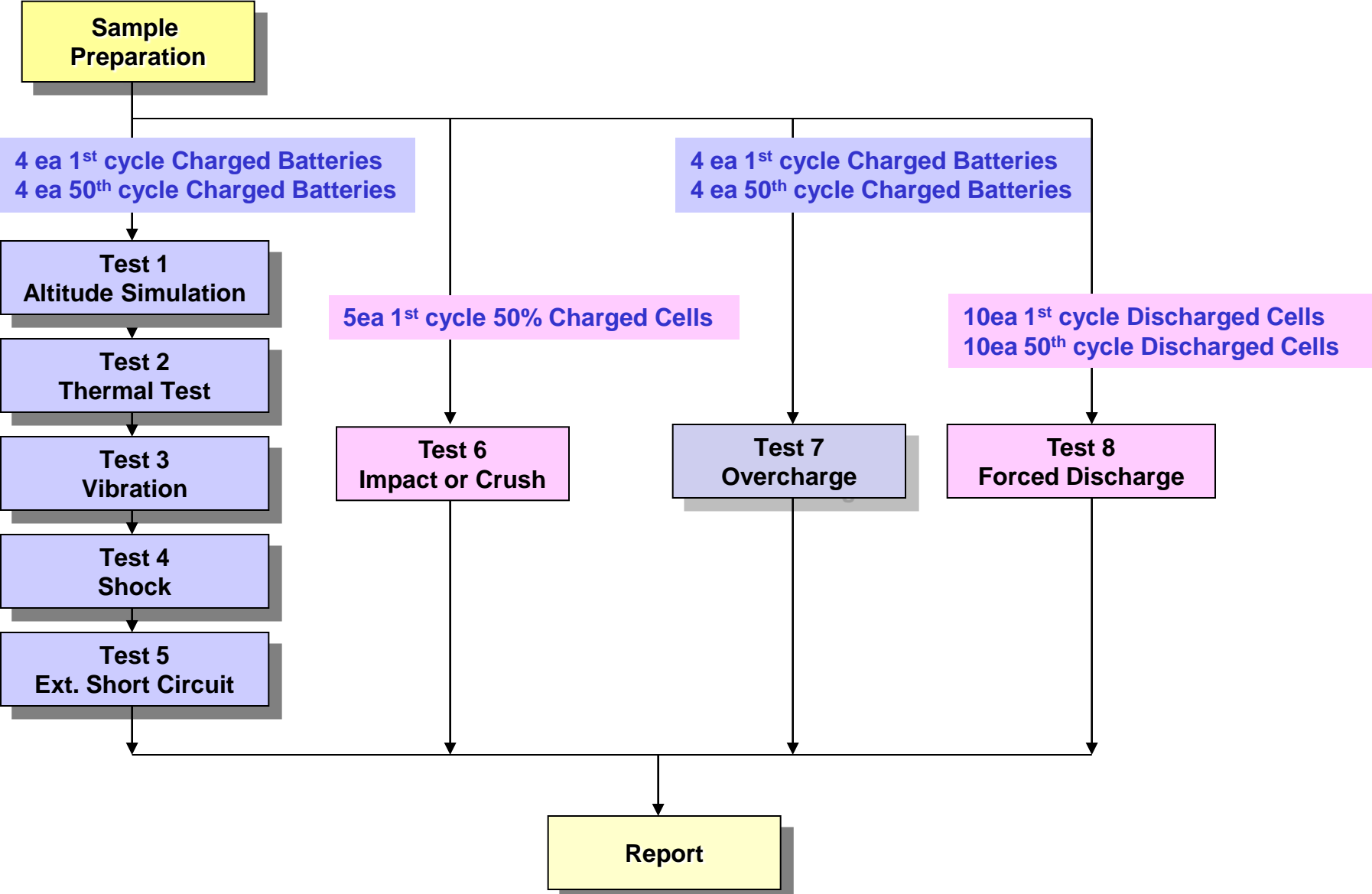
# 1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	- Measuring mass before/ after each test (If $M < 1g$ , less than 0.5%, If $1g \leq M \leq 75g$ , less than 0.2%, If $M > 75g$ , 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	[72±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 for cylindrical cells (> 18mm diameter)	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- No disassembly, no fire within 6 hours after the test - Temp. monitoring (max. 170℃)
Test 6. Crush for cylindrical cells (≤ 18mm diameter) for prismatic, pouch, coin/button cells	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation	
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 within 7 days after the test
Test 8. Forced Discharge	Discharge at max. discharge current (with 12V DC power supply), Duration time = rated capacity/initial test current	

\* Tests through T1-T5 shall be conducted in sequence with the same samples.

\* 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/Amd.2)

# 2. Test Procedure



# 3-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
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 charged state**

Charge	1	13.038	186.54	13.038	186.54	100.00	0.000	Pass	12.879	186.54	98.78	0.000	Pass	12.876	186.52	99.98	0.011	Pass	12.876	186.52	100.00	0.000	Pass
	2	13.033	186.57	13.033	186.57	100.00	0.000	Pass	12.883	186.56	98.85	0.005	Pass	12.880	186.54	99.98	0.011	Pass	12.876	186.54	99.97	0.000	Pass
	3	13.038	186.63	13.037	186.63	99.99	0.000	Pass	12.882	186.63	98.81	0.000	Pass	12.882	186.62	100.00	0.005	Pass	12.879	186.62	99.98	0.000	Pass
	4	13.042	186.60	13.037	186.59	99.96	0.005	Pass	12.884	186.58	98.83	0.005	Pass	12.878	186.56	99.95	0.011	Pass	12.873	186.56	99.96	0.000	Pass
	Ave.	13.038	186.59	13.036	186.58	99.99	0.001	-	12.882	186.58	98.82	0.003	-	12.879	186.56	99.98	0.009	-	12.876	186.56	99.98	0.000	-

**B. 50th cycle fully charged state**

Charge	5	13.033	186.73	13.032	186.73	99.99	0.000	Pass	12.878	186.71	98.82	0.011	Pass	12.877	186.69	99.99	0.011	Pass	12.871	186.69	99.95	0.000	Pass
	6	13.037	186.65	13.032	186.63	99.96	0.011	Pass	12.874	186.63	98.79	0.000	Pass	12.873	186.61	99.99	0.011	Pass	12.869	186.61	99.97	0.000	Pass
	7	13.037	186.70	13.036	186.69	99.99	0.005	Pass	12.889	186.69	98.87	0.000	Pass	12.885	186.69	99.97	0.000	Pass	12.884	186.68	99.99	0.005	Pass
	8	13.033	186.64	13.032	186.64	99.99	0.000	Pass	12.878	186.64	98.82	0.000	Pass	12.875	186.62	99.98	0.011	Pass	12.870	186.62	99.96	0.000	Pass
	Ave.	13.035	186.68	13.033	186.67	99.98	0.004	-	12.880	186.67	98.82	0.003	-	12.878	186.65	99.98	0.008	-	12.874	186.65	99.97	0.001	-

<b>Requirement</b>	<ul style="list-style-type: none"> <li>- Measuring mass before/after each test (If M&gt;75g, less than 0.1%, 1g≤M≤75, less than 0.2%, M&lt;1g, less than 0.5%)</li> <li>- Measuring voltage before/after each test (more than 90%, only charged samples)</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> </ul>
--------------------	--

# 3-2. T5/T7 Test Result

## EXT.Short Circuit (T5)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
--	-----	----------------	----------------	--------

### A. 1st cycle fully charged state

Charge	1	12.876	55.76	Pass
	2	12.876	55.76	Pass
	3	12.879	55.62	Pass
	4	12.873	55.68	Pass
	MAX.	12.879	55.76	-

## Test Condition

- 100mΩ ext. short-circuit at 55±2°C

## Over Charge (T7)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
--	-----	----------------	----------------	--------

### A. 1st cycle fully charged state

Charge	9	13.041	24.13	Pass
	10	13.037	24.53	Pass
	11	13.037	23.82	Pass
	12	13.040	24.50	Pass
	MAX.	13.041	24.53	-

## Test Condition

- Max. Charge Current : 3630mA  
 - CC/CV 2Imax(7260mA) 22V cut-off 24Hr

## EXT.Short Circuit (T5)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
--	-----	----------------	----------------	--------

### B. 50th cycle fully charged state

Charge	5	12.871	56.04	Pass
	6	12.869	55.77	Pass
	7	12.884	55.41	Pass
	8	12.870	55.97	Pass
	MAX.	12.884	56.04	-

## Requirement

- Temperature ≤ 170 (°C)  
 - No disassembly, no rupture, no fire within 6 hours after the test

## Over Charge (T7)

	NO.	Initial OCV(V)	Max. Temp (°C)	Result
--	-----	----------------	----------------	--------

### B. 50th cycle fully charged state

Charge	13	13.045	24.40	Pass
	14	13.048	24.34	Pass
	15	13.044	24.69	Pass
	16	13.045	24.67	Pass
	MAX.	13.048	24.69	-

## Requirement

- No disassembly, no fire within 7 day after the test

# 3-3. T6/T8 Test Result (ICP485490L1)

## Crush (T6)

Direction	NO.	Initial OCV(V)	Max. Temp (°C)	Result
-----------	-----	----------------	----------------	--------

### A. 1st cycle 50% charged state

Flat	C-1	3.849	23.44	Pass
	C-2	3.853	23.49	Pass
	C-3	3.847	23.38	Pass
	C-4	3.854	23.47	Pass
	C-5	3.850	23.43	Pass
<b>MAX.</b>		3.854	23.49	-

## Test Condition

- Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation

## Requirement

- Temperature ≤ 170 (°C)  
- No disassembly, no fire within 6 hours after the test

## Forced Discharge (T8)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
-----	----------------	----------------	--------

### A. 1st cycle fully discharged state

C-6	3.062	47.56	Pass
C-7	3.057	46.43	Pass
C-8	3.060	47.48	Pass
C-9	3.061	48.55	Pass
C-10	3.067	47.54	Pass
C-11	3.061	47.30	Pass
C-12	3.064	46.59	Pass
C-13	3.059	45.37	Pass
C-14	3.063	45.11	Pass
C-15	3.062	47.08	Pass
<b>MAX.</b>	3.067	48.55	-

### B. 50th cycle fully discharged state

C-16	3.115	43.46	Pass
C-17	3.117	46.52	Pass
C-18	3.121	46.80	Pass
C-19	3.130	43.24	Pass
C-20	3.127	44.67	Pass
C-21	3.113	47.32	Pass
C-22	3.125	43.17	Pass
C-23	3.118	44.28	Pass
C-24	3.117	45.14	Pass
C-25	3.124	44.30	Pass
<b>MAX.</b>	3.130	47.32	-

## Test Condition

- Discharge at max. discharge current  
(with 12V DC power supply) : 3630mA  
Duration time: rated capacity (60min)

## Requirement

- No disassembly, no fire within 7 days after the test

# 4. Sample Image

