
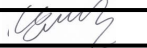
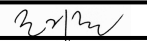


문서번호	QAE-EF02-090924-PKASMP/N42T4788, 4898	
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“ 열정과 도전, 5020+ ”

UN Test Report

- ASM P/N 42T4788, ASM P/N 42T4898 (Nom. 57Wh, 10.8V) -

목 차

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

2009. 09. 24



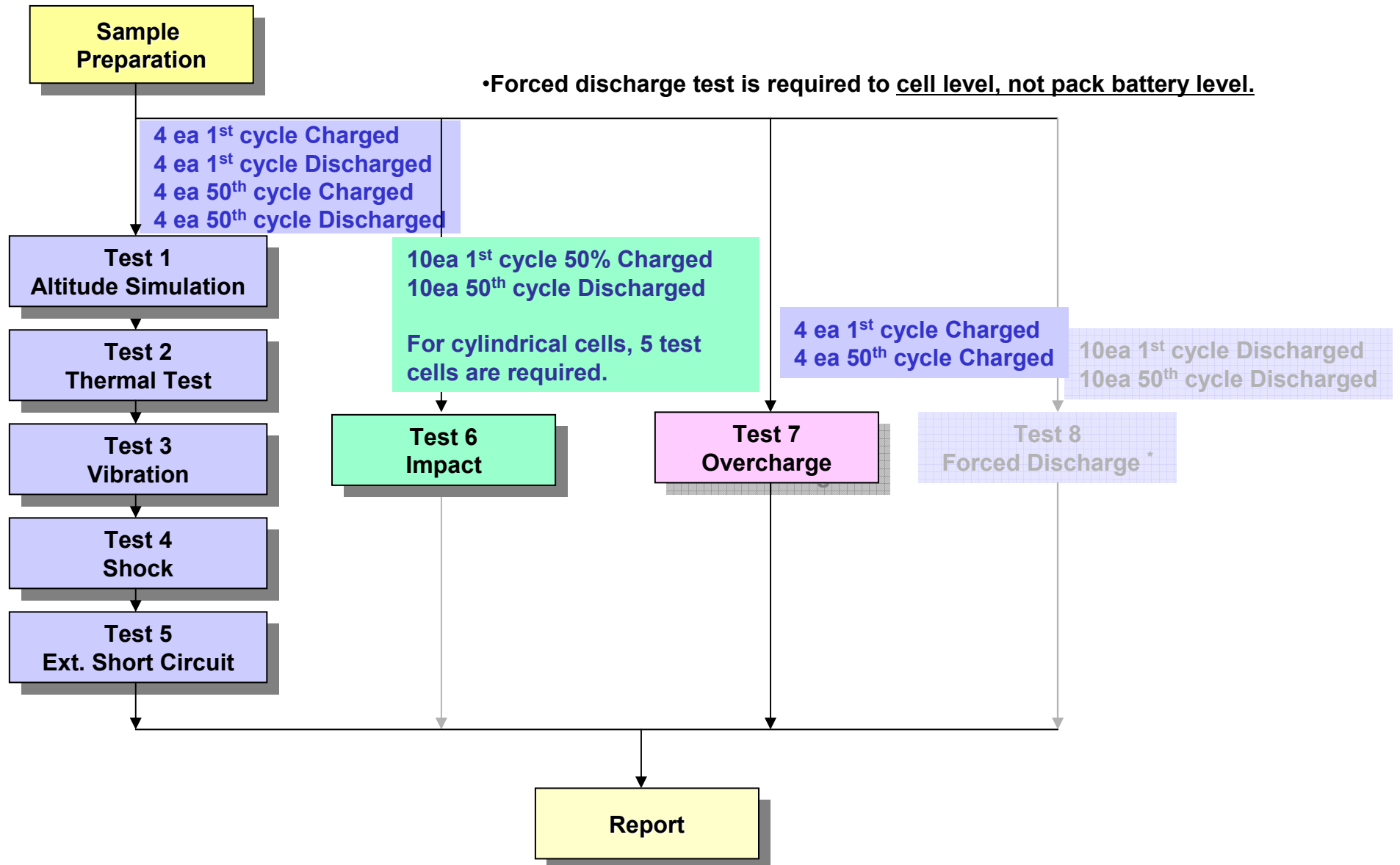
1. UN Transportation Regulation Test

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.10/27/Add.2)

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	11.999	332.38	11.997	332.38	99.98	0.000	Pass	11.876	332.38	98.99	0.000	Pass	11.855	332.30	99.82	0.024	Pass	11.855	332.30	100.00	0.000	Pass
	2	11.967	332.49	11.965	332.48	99.98	0.003	Pass	11.871	332.48	99.21	0.000	Pass	11.871	332.42	100.00	0.018	Pass	11.871	332.42	100.00	0.000	Pass
	3	11.959	331.45	11.958	331.44	99.99	0.003	Pass	11.900	331.44	99.51	0.000	Pass	11.846	331.37	99.55	0.021	Pass	11.846	331.37	100.00	0.000	Pass
	4	11.995	332.02	11.994	332.02	99.99	0.000	Pass	11.874	332.02	99.00	0.000	Pass	11.853	331.95	99.82	0.021	Pass	11.853	331.95	100.00	0.000	Pass
	Ave.	11.980	332.09	11.979	332.08	99.99	0.002	-	11.880	332.08	99.18	0.000	-	11.856	332.01	99.80	0.021	-	11.856	332.01	100.00	0.000	-
Dis charge	5	10.268	332.01	-	332.00	-	0.003	Pass	-	332.00	-	0.000	Pass	-	331.95	-	0.015	Pass	-	331.95	-	0.000	Pass
	6	10.236	332.11	-	332.11	-	0.000	Pass	-	332.11	-	0.000	Pass	-	332.07	-	0.012	Pass	-	332.07	-	0.000	Pass
	7	10.269	332.04	-	332.03	-	0.003	Pass	-	332.03	-	0.000	Pass	-	331.98	-	0.015	Pass	-	331.98	-	0.000	Pass
	8	10.260	331.38	-	331.37	-	0.003	Pass	-	331.37	-	0.000	Pass	-	331.32	-	0.015	Pass	-	331.32	-	0.000	Pass
	Ave.	10.258	331.89	-	331.878	-	0.002	-	-	331.88	-	0.000	-	-	331.83	-	0.014	-	-	331.83	-	0.000	-

B. 50th cycle fully state

Charge	9	11.991	331.88	11.990	331.85	99.99	0.009	Pass	11.867	331.85	98.97	0.000	Pass	11.845	331.82	99.81	0.009	Pass	11.845	331.82	100.00	0.000	Pass
	10	11.982	331.97	11.982	331.95	100.00	0.006	Pass	11.895	331.95	99.27	0.000	Pass	11.877	331.91	99.85	0.012	Pass	11.877	331.91	100.00	0.000	Pass
	11	11.957	332.39	11.957	332.37	100.00	0.006	Pass	11.870	332.37	99.27	0.000	Pass	11.850	332.33	99.83	0.012	Pass	11.850	332.33	100.00	0.000	Pass
	12	11.952	331.94	11.952	331.91	100.00	0.009	Pass	11.862	331.91	99.25	0.000	Pass	11.841	331.87	99.82	0.012	Pass	11.841	331.87	100.00	0.000	Pass
	Ave.	11.971	332.05	11.970	332.02	100.00	0.008	-	11.874	332.02	99.19	0.000	-	11.853	331.98	99.83	0.011	-	11.853	331.98	100.00	0.000	-
Dis charge	13	10.738	332.74	-	332.72	-	0.006	Pass	-	332.72	-	0.000	Pass	-	332.68	-	0.012	Pass	-	332.68	-	0.000	Pass
	14	10.267	332.14	-	332.11	-	0.009	Pass	-	332.11	-	0.000	Pass	-	332.07	-	0.012	Pass	-	332.07	-	0.000	Pass
	15	10.268	332.14	-	332.12	-	0.006	Pass	-	332.12	-	0.000	Pass	-	332.08	-	0.012	Pass	-	332.08	-	0.000	Pass
	16	10.732	332.21	-	332.19	-	0.006	Pass	-	332.19	-	0.000	Pass	-	332.15	-	0.012	Pass	-	332.15	-	0.000	Pass
	Ave.	10.501	332.31	-	332.29	-	0.007	-	-	332.29	-	0.000	-	-	332.25	-	0.012	-	-	332.25	-	0.000	-

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	11.855	55.48	Pass
	2	11.871	54.28	Pass
	3	11.846	53.56	Pass
	4	11.853	55.64	Pass
	MAX.	11.871	55.64	-
Dis charge	5	-	55.56	Pass
	6	-	54.73	Pass
	7	-	54.99	Pass
	8	-	55.44	Pass
	MAX.	-	55.56	-

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	11.958	23.87	Pass
	18	11.950	23.72	Pass
	19	11.949	23.53	Pass
	20	11.953	23.46	Pass
	MAX.	11.958	23.87	-

Test Condition
- Max. Charge Current : 3900mA - CC/CV 2Imax(7800mA) 22V cut-off 24Hr

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

B. 50th cycle fully state

Charge	9	11.845	55.56	Pass
	10	11.877	54.41	Pass
	11	11.850	53.86	Pass
	12	11.841	55.76	Pass
	MAX.	11.877	55.76	-
Dis charge	13	-	55.70	Pass
	14	-	54.92	Pass
	15	-	55.16	Pass
	16	-	55.55	Pass
	MAX.	-	55.70	-

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	11.949	24.00	Pass
	22	11.938	23.84	Pass
	23	11.948	24.38	Pass
	24	11.949	23.88	Pass
	MAX.	11.949	24.38	-

Requirement
- No disassembly, no fire within 7 day

3-3. T6 Test Result (ICR18650B3)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
21	3.790	97.01	Pass
22	3.790	94.99	Pass
23	3.788	104.17	Pass
24	3.788	79.75	Pass
25	3.790	80.07	Pass
MAX.	3.790	104.17	-
B. 50th cycle fully discharge state			
26	3.540	60.91	Pass
27	3.528	67.65	Pass
28	3.530	55.19	Pass
29	3.542	65.72	Pass
30	3.535	62.93	Pass
MAX.	3.542	67.65	-
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

