

UN38.3 Test Summary

The following product has been evaluated according to the 4th revised edition Amendment2 of the UN Manual of Tests and Criteria.

We, LG Chem, Ltd., hereby certify that this battery meets the requirements of the regulation for transportation of lithium-ion cells, batteries and single cell batteries.

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Description		List of Test Completed	
Test Report Number	QAE-EF02-091013-ASM P/N 42T4814	Test 1. Altitude Simulation	Pass
Date of test report	2009.10.13	Test 2. Thermal Test	Pass
Model name	ASM P/N 42T4814	Test 3. Vibration	Pass
Type	Cylindrical	Test 4. Shock	Pass
Nominal voltage	11.25 V	Test 5. External Short Circuit	Pass
Capacity	63.0 Wh	Test 6. Impact	Pass
Weight	357.0 g	Test 7. Overcharge	Pass
Dimensions	207.0mm X 72.0mm X 20.1mm	Test 8. Forced Discharge	-

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“열정과 도전, 5020+”

UN Test Report

- ASM P/N 42T4814(Nom. 63Wh, 11.25V)-

목 차

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

2009. 10. 13

1. UN Transportation Regulation Test

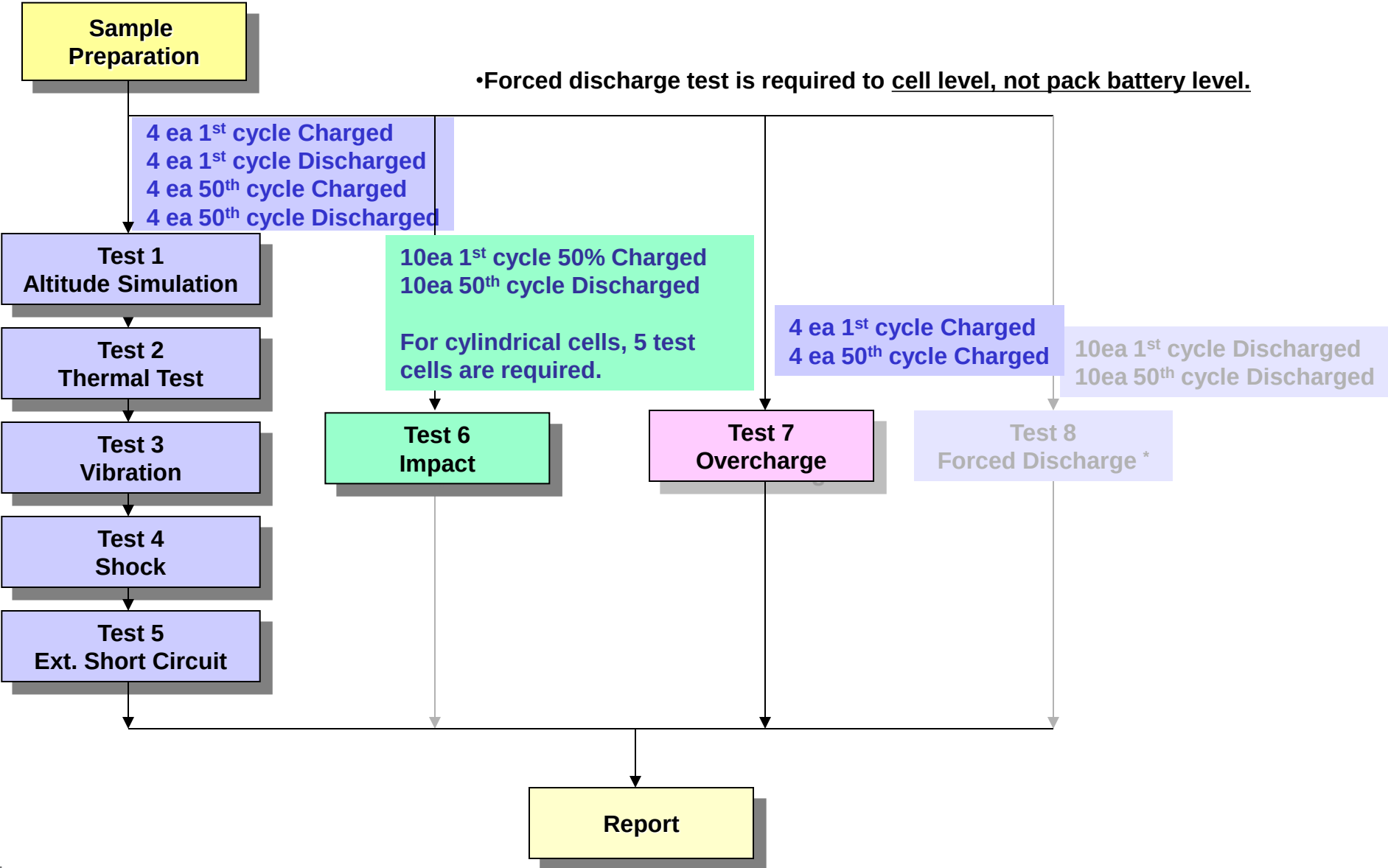
Rev.4 / Amd.2

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>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℃	- 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	12.851	355.32	12.843	355.30	99.94	0.006	Pass	12.646	355.20	98.47	0.028	Pass	12.602	355.17	99.65	0.008	Pass	12.601	355.17	99.99	0.000	Pass
	2	12.860	356.13	12.852	356.10	99.94	0.008	Pass	12.653	356.02	98.45	0.022	Pass	12.611	355.96	99.67	0.017	Pass	12.608	355.95	99.98	0.003	Pass
	3	12.836	356.32	12.831	356.30	99.96	0.006	Pass	12.640	356.21	98.51	0.025	Pass	12.597	356.15	99.66	0.017	Pass	12.595	356.13	99.98	0.006	Pass
	4	12.868	355.71	12.860	355.71	99.94	0.000	Pass	12.660	355.64	98.44	0.020	Pass	12.617	355.58	99.66	0.017	Pass	12.615	355.57	99.98	0.003	Pass
	Ave.	12.854	355.87	12.847	355.85	99.94	0.005	-	12.650	355.77	98.47	0.024	-	12.607	355.72	99.66	0.015	-	12.605	355.71	99.98	0.003	-
Dis charge	5	11.063	354.59	11.058	354.58	99.95	0.003	Pass	11.006	354.52	99.53	0.017	Pass	10.476	354.43	95.18	0.025	Pass	10.470	354.43	99.94	0.000	Pass
	6	11.066	355.22	11.059	355.22	99.94	0.000	Pass	11.008	355.17	99.54	0.014	Pass	10.502	355.06	95.40	0.031	Pass	10.500	355.06	99.98	0.000	Pass
	7	11.061	355.19	11.056	355.19	99.95	0.000	Pass	11.007	355.11	99.56	0.023	Pass	10.506	355.03	95.45	0.023	Pass	10.500	355.02	99.94	0.003	Pass
	8	11.059	357.22	11.055	357.21	99.96	0.003	Pass	11.008	357.05	99.57	0.045	Pass	10.501	357.03	95.39	0.006	Pass	10.498	357.02	99.97	0.003	Pass
	Ave.	11.062	355.56	11.057	355.550	99.95	0.001	-	11.007	355.46	99.55	0.025	-	10.496	355.39	95.36	0.021	-	10.492	355.38	99.96	0.001	-

B. 50th cycle fully state

Charge	9	12.831	356.86	12.824	356.86	99.95	0.000	Pass	12.636	356.86	98.53	0.000	Pass	12.594	356.76	99.67	0.028	Pass	12.592	356.74	99.98	0.006	Pass
	10	12.833	354.57	12.825	354.57	99.94	0.000	Pass	12.634	354.54	98.51	0.008	Pass	12.595	354.47	99.69	0.020	Pass	12.593	354.46	99.98	0.003	Pass
	11	12.871	356.25	12.863	356.23	99.94	0.006	Pass	12.659	356.15	98.41	0.022	Pass	12.618	356.08	99.68	0.020	Pass	12.615	356.08	99.98	0.000	Pass
	12	12.872	359.07	12.864	359.07	99.94	0.000	Pass	12.667	358.90	98.47	0.047	Pass	12.622	358.86	99.64	0.011	Pass	12.620	358.86	99.98	0.000	Pass
	Ave.	12.852	356.69	12.844	356.68	99.94	0.001	-	12.649	356.61	98.48	0.020	-	12.607	356.54	99.67	0.020	-	12.605	356.54	99.98	0.002	-
Dis charge	13	11.054	355.84	11.049	355.81	99.95	0.008	Pass	11.004	355.69	99.59	0.034	Pass	10.515	355.67	95.56	0.006	Pass	10.514	355.67	99.99	0.000	Pass
	14	11.064	355.73	11.056	355.73	99.93	0.000	Pass	11.004	355.62	99.53	0.031	Pass	10.502	355.57	95.44	0.014	Pass	10.499	355.56	99.97	0.003	Pass
	15	11.065	356.70	11.060	356.67	99.95	0.008	Pass	11.009	356.53	99.54	0.039	Pass	10.505	356.49	95.42	0.011	Pass	10.501	356.48	99.96	0.003	Pass
	16	11.053	356.86	11.048	356.82	99.95	0.011	Pass	10.999	356.66	99.56	0.045	Pass	10.510	356.63	95.55	0.008	Pass	10.497	356.61	99.88	0.006	Pass
	Ave.	11.059	356.28	11.053	356.26	99.95	0.007	-	11.004	356.13	99.55	0.037	-	10.508	356.09	95.49	0.010	-	10.503	356.08	99.95	0.003	-

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
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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	24.700	55.62	Pass
	2	35.600	54.77	Pass
	3	29.600	54.93	Pass
	4	40.800	55.47	Pass
	MAX.	40.800	55.62	-
Dis charge	5	38.800	55.68	Pass
	6	41.200	54.86	Pass
	7	28.600	55.14	Pass
	8	21.400	55.57	Pass
	MAX.	41.200	55.68	-

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	12.810	24.15	Pass
	18	12.818	24.26	Pass
	19	12.837	23.46	Pass
	20	12.821	24.27	Pass
	MAX.	12.837	24.27	-

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	24.700	55.69	Pass
	10	35.600	54.92	Pass
	11	29.600	55.12	Pass
	12	40.800	55.56	Pass
	MAX.	40.800	55.69	-
Dis charge	13	38.800	55.58	Pass
	14	41.200	54.88	Pass
	15	28.600	55.13	Pass
	16	21.400	55.64	Pass
	MAX.	41.200	55.64	-

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	12.814	24.03	Pass
	22	12.809	23.73	Pass
	23	12.807	24.15	Pass
	24	12.815	23.84	Pass
	MAX.	12.815	24.15	-

Requirement	
- No disassembly, no fire within 7 day	

3-3. T6 Test Result (ICR18650C1)

Impact (T6)			
Pack NO.	Initial OCV(V)	Max. Temp (°C)	Result
A. 1st cycle 50% charge state			
21	3.762	25.22	Pass
22	3.789	58.71	Pass
23	3.759	61.80	Pass
24	3.772	54.30	Pass
25	3.732	25.54	Pass
MAX.	3.780	61.80	-
B. 50th cycle fully discharge state			
26	3.545	52.13	Pass
27	3.512	25.74	Pass
28	3.551	50.12	Pass
29	3.472	55.25	Pass
30	3.507	25.50	Pass
MAX.	3.563	55.25	-
Test Condition			
- Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height			
Requirement			
- Temperature < 170 (°C) - No disassembly, no rupture, no fire within 6 hours			

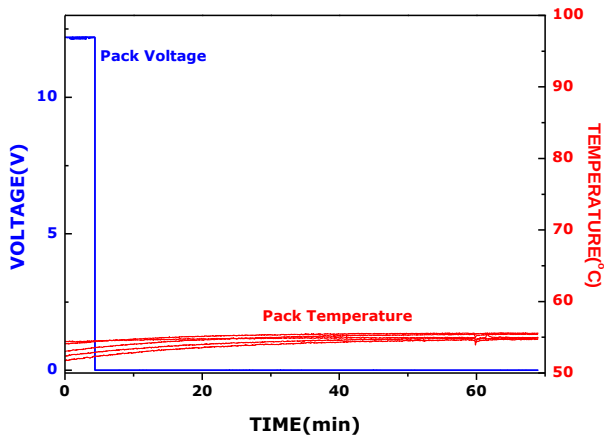
4. Sample Image



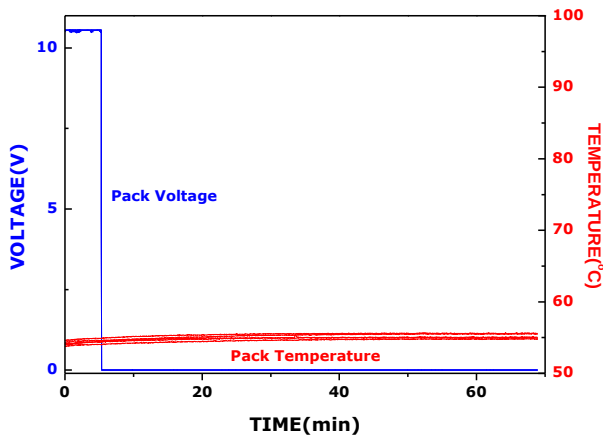
4-1. EXT.Short Circuit Test

A. 1st cycle fully state

1st Cycle Charge

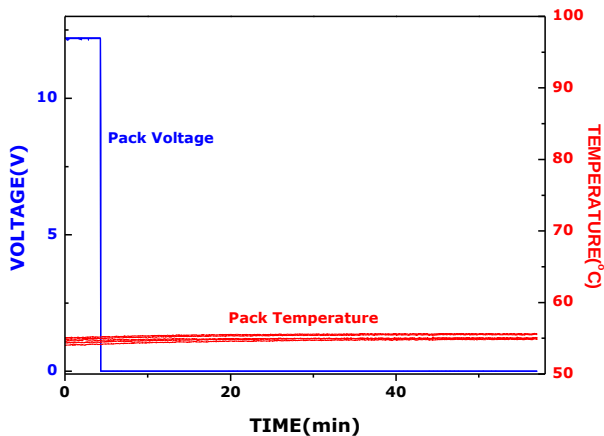


1st Cycle Discharge

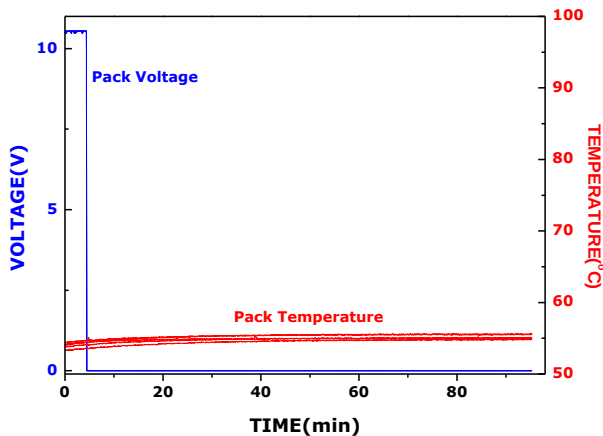


B. 50th cycle fully state

50th Cycle Charge



50th Cycle Discharge



4-1. EXT.Short Circuit Test

A. 1st cycle fully state

1st Cycle Charge



1st Cycle Discharge



B. 50th cycle fully state

50th Cycle Charge

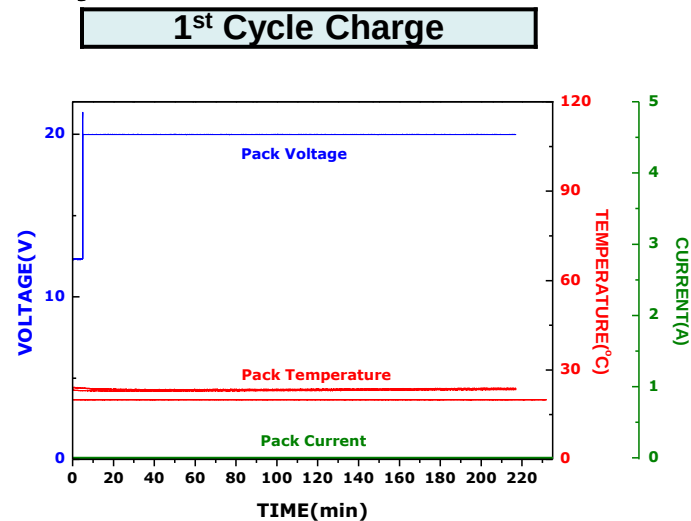


50th Cycle Discharge



4-2. Over Charge Test

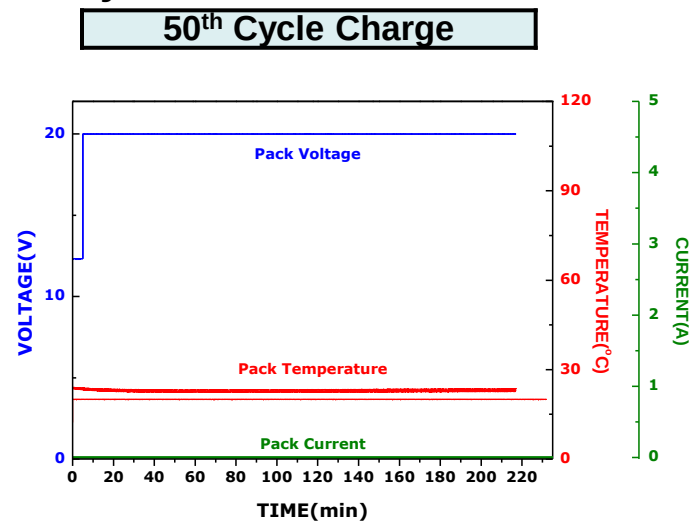
A. 1st cycle fully state



1st Cycle Discharge



B. 50th cycle fully state



50th Cycle Discharge

