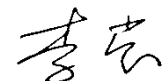


UN38.3 Test Summary

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Description		List of Test Completed	
Cell/Battery Type (Physical Description)	Lithium Ion battery pack (Pouch)	Revised edition	Revision 6 Amendment 1
Test Report Number	QDI-200217-B-AP19B8M	Test 1. Altitude Simulation	Pass
Date of test report	2020.02.17	Test 2. Thermal Test	Pass
Model name	AP19B8M	Test 3. Vibration	Pass
Nominal voltage (V)	11.61 V	Test 4. Shock	Pass
Capacity (Nominal Wh)	55.97 Wh	Test 5. External Short Circuit	Pass
Weight (g)	214.97 g	Test 6. Impact or Crush	Pass
Dimensions (mm)	261.00mmX88.40mmX5.50mm	Test 7. Overcharge	Pass
Reference to assembled battery testing requirements	Not applicable	Test 8. Forced Discharge	Pass

Approved By: Ying Li
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Document Number	QDI-200217-B-AP19B8M	
Prepared	Jie Ma	
Approved	Ying Li	

UN38.3 Test Report

– AP19B8M (Nom. 55.97Wh, 11.61V) –

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2020. 02. 17

1. UN38.3 Test Condition

Rev.6 Amendment 1

Test item	Test Condition	Requirements	Etc.
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	<ul style="list-style-type: none"> - After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) <ul style="list-style-type: none"> 1) If M<1g, less than 0.5%, 2) If 1g≤M≤75g, less than 0.2%, 3) If M>75g, less than 0.1%) 	<p>T1~T5 : Sequence Tests</p> <pre> graph TD T1[Test 1 Altitude Simulation] --> T2[Test 2 Thermal Test] T2 --> T3[Test 3 Vibration] T3 --> T4[Test 4 Shock] T4 --> T5[Test 5 Ext. Short Circuit] </pre>
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 1) Peak acceleration - For cells & single cell batteries : 150gn - For batteries (whichever is smaller) : 150gn or $\sqrt{\frac{100850}{Mass(kg)}} gn$ 2) Pulse duration : 6msec 3) 6 direction (±x, y, z) x 3 cycle		
Test 5. External Short Circuit	1) Samples to be heated to 57±4℃ in chamber (Measured on external case) 2) Less than 0.1Ω, ext. short-circuit at 57±4℃ 3) 1hr continue after returning to 57±4℃	<ul style="list-style-type: none"> - No disassembly, no rupture, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> - No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	for cylindrical cells (not less than 18mm diameter)
Test 6. Crush	Crushing rate :1.5cm/s, until 13kN±0.78kN or 100mV drop or 50% deformation		for cylindrical cells (less than 18mm diameter) for prismatic, pouch, coin/button cells
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 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Only for Single Cell Battery / Battery
Test 8. Forced Discharge	Discharge at max. discharge current (connecting in series with 12V DC power supply), Duration time = rated capacity/initial test current	<ul style="list-style-type: none"> - No disassembly, no fire within 7 days after the test 	Resistance of Electric Loader 1/Ω = (max. discharge current) / (12 + Initial OCV)

2-1. T1-T4 Test Result

Before			Altitude (T1)					Thermal (T2)					Vibration (T3)					Shock (T4)				
NO.	OCV	Mass (g)	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result	After OCV (V)	Mass (g)	After OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully charged state

1	12.8185	214.97	12.8116	214.96	99.95	0.005	Pass	12.4241	214.86	96.98	0.047	Pass	12.4262	214.88	100.00	0.000	Pass	12.4215	214.90	99.96	0.000	Pass
2	12.8279	214.85	12.8199	214.85	99.94	0.000	Pass	12.4246	214.75	96.92	0.047	Pass	12.4277	214.77	100.00	0.000	Pass	12.4203	214.78	99.94	0.000	Pass
3	12.8232	214.82	12.8150	214.82	99.94	0.000	Pass	12.4184	214.74	96.91	0.037	Pass	12.4217	214.73	100.00	0.005	Pass	12.4128	214.75	99.93	0.000	Pass
4	12.8198	214.76	12.8116	214.75	99.94	0.005	Pass	12.4125	214.67	96.88	0.037	Pass	12.4154	214.66	100.00	0.005	Pass	12.4066	214.66	99.93	0.000	Pass

B. 25th cycle fully charged state

5	12.8650	215.19	12.8537	215.18	99.91	0.005	Pass	12.4443	215.11	96.81	0.033	Pass	12.4471	215.13	100.00	0.000	Pass	12.4391	215.12	99.94	0.005	Pass
6	12.8568	214.92	12.8458	214.90	99.91	0.009	Pass	12.4423	214.81	96.86	0.042	Pass	12.4455	214.84	100.00	0.000	Pass	12.4392	214.83	99.95	0.005	Pass
7	12.8633	214.87	12.8537	214.86	99.93	0.005	Pass	12.4440	214.77	96.81	0.042	Pass	12.4474	214.78	100.00	0.000	Pass	12.4387	214.80	99.93	0.000	Pass
8	12.8559	215.17	12.8458	215.17	99.92	0.000	Pass	12.4437	215.07	96.87	0.046	Pass	12.4490	215.08	100.00	0.000	Pass	12.4391	215.11	99.92	0.000	Pass

2-2. T5/T7 Test Result

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

A. 1st cycle fully charged state

1	12.4215	58.46	Pass
2	12.4203	58.51	Pass
3	12.4128	58.18	Pass
4	12.4066	58.17	Pass

B. 25th cycle fully charged state

5	12.4391	58.49	Pass
6	12.4392	58.52	Pass
7	12.4387	58.03	Pass
8	12.4391	58.12	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle fully charged state

9	12.8232	24.62	Pass
10	12.8209	25.86	Pass
11	12.8246	25.62	Pass
12	12.8204	24.32	Pass

Over Charge (T7)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

B. 25th cycle fully charged state

13	12.8575	25.59	Pass
14	12.8629	25.62	Pass
15	12.8602	25.39	Pass
16	12.8590	25.56	Pass

2-3. T6/T8 Test Result (P498170B1)

Cell Document Number	QDI-200203-C-P498170B1
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Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (℃)	Result

Forced Discharge (T8)							
NO.	Initial OCV(V)	Max. Temp (℃)	Result	NO.	Initial OCV(V)	Max. Temp (℃)	Result

A. 1st cycle 50% charged state

11	3.8655	24.73	Pass
12	3.8654	25.23	Pass
13	3.8668	24.61	Pass
14	3.8661	24.75	Pass
15	3.8666	25.20	Pass

A. 1st cycle fully discharged state

B. 25th cycle fully discharged state

21	3.3765	79.81	Pass		3.4876	76.46	Pass
22	3.3725	85.72	Pass		3.4891	80.48	Pass
23	3.3728	76.58	Pass		3.4797	81.50	Pass
24	3.3759	81.01	Pass		3.4873	78.79	Pass
25	3.3750	76.88	Pass		3.4838	87.27	Pass
26	3.3739	86.85	Pass		3.4815	76.62	Pass
27	3.3725	76.86	Pass		3.4826	77.87	Pass
28	3.3751	80.08	Pass		3.4266	82.57	Pass
29	3.4241	78.08	Pass		3.4288	90.42	Pass
30	3.4255	74.81	Pass		3.4266	80.76	Pass

B. 25th cycle 50% charged state

16	3.8822	25.98	Pass
17	3.8867	25.38	Pass
18	3.8828	24.22	Pass
19	3.8843	25.05	Pass
20	3.8812	24.79	Pass

3. Sample Image

