




문서번호	QDI-160615-B-AP16G8E	
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# UN38.3 Test Report

## - AP16G8E (Nom.30.3Wh, 3.80V) -

### 목 차

1. UN38.3 Test Condition
2. Test Result
3. Sample Image

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# 1. UN38.3 Test Condition

Rev.5 / Amd.2

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"> <li>- After OCV (%) ≥ 90%</li> <li>- No leakage, no venting, no disassembly, no rupture, no fire</li> <li>- Mass loss limit (leakage)                             <ol style="list-style-type: none"> <li>1) If M&lt;1g, less than 0.5%,</li> <li>2) If 1g≤M≤75g, less than 0.2%,</li> <li>3) If M&gt;75g, less than 0.1%)</li> </ol> </li> </ul>	<p>T1~T5 : Sequence Tests</p> <pre> graph TD     T1[Test 1 Altitude Simulation] --&gt; T2[Test 2 Thermal Test]     T2 --&gt; T3[Test 3 Vibration]     T3 --&gt; T4[Test 4 Shock]     T4 --&gt; 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 (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"> <li>- No disassembly, no rupture, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	<ul style="list-style-type: none"> <li>- No disassembly, no fire within 6 hours after the test</li> <li>- Max. Temp ≤ 170℃</li> </ul>	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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	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"> <li>- No disassembly, no fire within 7 days after the test</li> </ul>	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	4.322	145.77	4.321	145.77	99.98	0.000	Pass	4.270	145.76	98.82	0.007	Pass	4.267	145.76	99.93	0.000	Pass	4.266	145.75	99.98	0.007	Pass
2	4.325	145.05	4.323	145.05	99.95	0.000	Pass	4.273	145.05	98.84	0.000	Pass	4.271	145.04	99.95	0.007	Pass	4.270	145.03	99.98	0.007	Pass
3	4.321	145.33	4.320	145.33	99.98	0.000	Pass	4.270	145.33	98.84	0.000	Pass	4.268	145.33	99.95	0.000	Pass	4.267	145.33	99.98	0.000	Pass
4	4.322	145.91	4.321	145.90	99.98	0.007	Pass	4.273	145.90	98.89	0.000	Pass	4.272	145.89	99.98	0.007	Pass	4.270	145.88	99.95	0.007	Pass

B. 50th cycle fully charged state

5	4.307	145.44	4.303	145.44	99.91	0.000	Pass	4.252	145.44	98.81	0.000	Pass	4.250	145.44	99.95	0.000	Pass	4.248	145.43	99.95	0.007	Pass
6	4.309	145.77	4.307	145.76	99.95	0.007	Pass	4.258	145.75	98.86	0.007	Pass	4.257	145.74	99.98	0.007	Pass	4.256	145.74	99.98	0.000	Pass
7	4.314	145.11	4.313	145.11	99.98	0.000	Pass	4.264	145.11	98.86	0.000	Pass	4.262	145.10	99.95	0.007	Pass	4.261	145.10	99.98	0.000	Pass
8	4.307	145.95	4.305	145.95	99.95	0.000	Pass	4.255	145.95	98.84	0.000	Pass	4.251	145.95	99.91	0.000	Pass	4.247	145.94	99.91	0.007	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	4.266	55.31	Pass
2	4.270	56.89	Pass
3	4.267	55.28	Pass
4	4.270	55.54	Pass

B. 50th cycle fully charged state

5	4.248	56.42	Pass
6	4.256	56.64	Pass
7	4.261	55.32	Pass
8	4.247	55.16	Pass

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

A. 1st cycle fully charged state

9	4.292	24.12	Pass
10	4.291	24.36	Pass
11	4.290	24.22	Pass
12	4.299	24.32	Pass

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

B. 50th cycle fully charged state

13	4.277	25.43	Pass
14	4.271	24.73	Pass
15	4.279	26.00	Pass
16	4.272	26.09	Pass

# 2-3. T6/T8 Test Result (ICP289999L1)

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

A. 1st cycle 50% charged state

1	3.811	26.36	Pass
2	3.812	26.02	Pass
3	3.810	25.89	Pass
4	3.812	25.99	Pass
5	3.812	26.05	Pass

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

A. 1st cycle fully discharged state

6	3.281	84.43	Pass
7	3.276	87.04	Pass
8	3.281	90.89	Pass
9	3.284	91.00	Pass
10	3.282	83.36	Pass
11	3.280	83.45	Pass
12	3.277	84.11	Pass
13	3.281	87.38	Pass
14	3.279	87.53	Pass
15	3.281	86.65	Pass

B. 50th cycle fully discharged state

16	3.443	94.19	Pass
17	3.461	88.91	Pass
18	3.458	95.99	Pass
19	3.463	86.78	Pass
20	3.458	89.86	Pass
21	3.454	90.40	Pass
22	3.445	93.36	Pass
23	3.451	88.85	Pass
24	3.462	87.72	Pass
25	3.449	88.16	Pass

# 3. Sample Image

