




문서번호	QAE-EF02-151109-SB-GV40	
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UN38.3 Test Report

- GV40 (Min.12.5Wh, 3.8V) -

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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"> - After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) <ol 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 (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	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	4.382	52.074	4.381	52.072	99.98	0.004	Pass	4.322	52.067	98.65	0.010	Pass	4.321	52.062	99.98	0.010	Pass	4.321	52.061	100.00	0.002	Pass
2	4.358	52.702	4.357	52.699	99.98	0.006	Pass	4.299	52.697	98.67	0.004	Pass	4.298	52.691	99.98	0.011	Pass	4.298	52.689	100.00	0.004	Pass
3	4.360	52.088	4.359	52.087	99.98	0.002	Pass	4.305	52.081	98.76	0.012	Pass	4.305	52.078	100.00	0.006	Pass	4.304	52.077	99.98	0.002	Pass
4	4.344	52.593	4.343	52.591	99.98	0.004	Pass	4.291	52.590	98.80	0.002	Pass	4.291	52.588	100.00	0.004	Pass	4.291	52.586	100.00	0.004	Pass
5	4.361	52.839	4.360	52.837	99.98	0.004	Pass	4.306	52.835	98.76	0.004	Pass	4.306	52.832	100.00	0.006	Pass	4.306	52.829	100.00	0.006	Pass
6	4.355	52.663	4.355	52.662	100.00	0.002	Pass	4.305	52.656	98.85	0.011	Pass	4.303	52.652	99.95	0.008	Pass	4.301	52.649	99.95	0.006	Pass
7	4.368	52.203	4.368	52.201	100.00	0.004	Pass	4.318	52.197	98.86	0.008	Pass	4.318	52.192	100.00	0.010	Pass	4.318	52.191	100.00	0.002	Pass
8	4.364	52.723	4.364	52.722	100.00	0.002	Pass	4.313	52.722	98.83	0.000	Pass	4.312	52.719	99.98	0.006	Pass	4.312	52.717	100.00	0.004	Pass
9	4.355	52.351	4.354	52.348	99.98	0.006	Pass	4.297	52.346	98.69	0.004	Pass	4.296	52.341	99.98	0.010	Pass	4.294	52.340	99.95	0.002	Pass
10	4.343	52.127	4.343	52.126	100.00	0.002	Pass	4.284	52.123	98.64	0.006	Pass	4.283	52.120	99.98	0.006	Pass	4.283	52.118	100.00	0.004	Pass

2-2. T5/T7 Test Result

EXT.Short Circuit (T5)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

1	4.321	53.15	Pass
2	4.298	51.90	Pass
3	4.304	54.22	Pass
4	4.291	53.22	Pass
5	4.306	52.18	Pass
6	4.301	54.88	Pass
7	4.318	53.71	Pass
8	4.312	54.23	Pass
9	4.294	53.02	Pass
10	4.283	54.09	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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A. 1st cycle fully charged state

11	4.316	23.12	Pass
12	4.359	24.25	Pass
13	4.360	23.60	Pass
14	4.361	23.22	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 50th cycle fully charged state

15	4.362	23.65	Pass
16	4.361	24.66	Pass
17	4.363	21.45	Pass
18	4.361	22.21	Pass

2-3. T6/T8 Test Result (ICP4556674L1)

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

A. 1st cycle 50% charged state

C-1	3.883	23.21	Pass
C-2	3.882	23.04	Pass
C-3	3.884	23.51	Pass
C-4	3.882	23.74	Pass
C-5	3.881	24.17	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

C-6	3.015	45.21	Pass
C-7	3.008	47.65	Pass
C-8	3.010	48.23	Pass
C-9	3.013	47.11	Pass
C-10	3.018	49.05	Pass
C-11	3.007	47.36	Pass
C-12	3.011	45.57	Pass
C-13	3.018	46.66	Pass
C-14	3.019	47.28	Pass
C-15	3.014	47.30	Pass

B. 50th cycle fully discharged state

C-16	3.112	47.21	Pass
C-17	3.127	45.68	Pass
C-18	3.118	46.25	Pass
C-19	3.124	46.98	Pass
C-20	3.120	47.04	Pass
C-21	3.121	45.55	Pass
C-22	3.117	46.88	Pass
C-23	3.123	49.68	Pass
C-24	3.121	48.99	Pass
C-25	3.128	45.08	Pass

3. Sample Image

