


UN38.3 Test Summary

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Description		List of Test Completed	
Item / Type	Lithium ion Battery / Pouch	Revised edition	Revision 6 Amendment 1
Test Report Number	QDI-210113-B-SH077064P8S1 (RESU 10H Prime BMA)	Test 1. Altitude Simulation	Pass
Date of test report	2021. 01. 13	Test 2. Thermal Test	Pass
Model name	SH077064P8S1(RESU 10H Prime BMA)	Test 3. Vibration	Pass
Nominal voltage	77.07 V	Test 4. Shock	Pass
Capacity / Energy	64.1 Ah / 4.935 kWh	Test 5. External Short Circuit	Pass
Weight	Max 42.0 kg	Test 6. Crush	Pass
Dimensions	147.0(L)*490.0(W)*532.1(H) mm	Test 7. Overcharge	Not applicable
Reference to assembled battery testing requirements	SH077064P8S2	Test 8. Forced Discharge	Pass

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Document Number	QDI-210113-B-SH077064P8S1 (RESU 10H Prime BMA)	
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UN38.3 Test Report

- SH077064P8S1 (RESU 10H Prime BMA)
- (64.1Ah, 77.07V) -

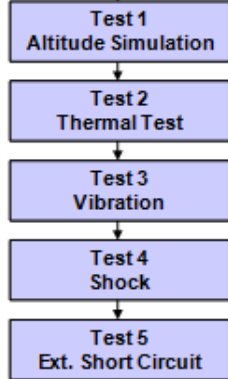
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2021. 01. 13

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°C	- After OCV (%) ≥ 90% - No leakage, no venting, no disassembly, no rupture, no fire - Mass loss limit (leakage) 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%	T1-T5 : Sequence Tests 
Test 2. Thermal Test	[72±2°C, 12hr ↔ -40±2°C, 12hr, interval max. 30min] x 10cycle , Storing at 20±5°C 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. 25Hz (until 2gn) 200Hz (maintaining 2gn), 1.6mm total excursion		
Test 4. Shock	Half sine shock 1) Peak acceleration : 50gn or $\sqrt{\frac{30000}{Mass(kg)}}gn$ 2) Pulse duration : 11msec 3) 6 direction (±x, y, z) x 3 cycle		
Test 5. External Short Circuit	1) Samples to be heated to 57±4°C in chamber (Measured on external case) 2) Less than 0.1Ω, ext. short-circuit at 57±4°C 3) 1hr continue after returning to 57±4°C If this assessment is not feasible, the exposure time shall be at least 12hours		
Test 6. Impact	Φ=15.8±0.1mm bar, 9.1±0.1kg mass, 61±2.5cm height	- No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170°C	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 8. Forced Discharge	Discharge at max. discharge current (connecting in series with 12V DC power supply), Duration time = rated capacity/initial test current	- No disassembly, no fire within 7 days after the test	Resistance of Electric Loader $1/\Omega = (\text{max. discharge current}) / (12 + \text{Initial OCV})$

- Tests through T1-T5 shall be conducted in sequence with the same battery.
- Large battery means a lithium metal battery or lithium ion battery with a gross mass of more than 12 kg.

2-1. Test Result_T1~T4

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

A. 1st cycle, fully charged state

1	86.60	41.20	86.58	41.20	99.98	0.00	Pass	86.54	41.20	99.95	0.00	Pass	86.54	41.20	100.00	0.00	Pass	86.54	41.20	100.00	0.00	Pass
2	86.60	41.00	86.58	41.00	99.98	0.00	Pass	86.53	41.00	99.94	0.00	Pass	86.53	41.00	100.00	0.00	Pass	86.53	41.00	100.00	0.00	Pass

B. 25th cycle, fully charged state

3	86.56	41.24	86.55	41.24	99.99	0.00	Pass	86.50	41.24	99.94	0.00	Pass	86.50	41.24	100.00	0.00	Pass	86.50	41.24	100.00	0.00	Pass
4	86.54	40.98	86.54	40.98	100.00	0.00	Pass	86.49	40.98	99.94	0.00	Pass	86.49	40.98	100.00	0.00	Pass	86.49	40.98	100.00	0.00	Pass

2-2. Test Result_T5

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

A. 1st cycle, fully charged state

1	86.54	56.15	Pass
2	86.53	56.55	Pass

B. 25th cycle, fully charged state

3	86.50	56.55	Pass
4	86.49	57.15	Pass

2-3. Test Result_T6&T8 (JH5)

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

A. 1st cycle, 50% charged state

11	3.689	26.90	Pass
12	3.686	25.90	Pass
13	3.689	25.70	Pass
14	3.687	25.70	Pass
15	3.689	23.10	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

21	3.451	67.90	Pass
22	3.451	76.10	Pass
23	3.450	72.30	Pass
24	3.450	67.30	Pass
25	3.453	70.80	Pass
26	3.453	70.80	Pass
27	3.453	67.80	Pass
28	3.452	71.60	Pass
29	3.451	75.70	Pass
30	3.452	73.80	Pass

B. 25th cycle, fully discharged state

31	3.417	71.80	Pass
32	3.418	73.70	Pass
33	3.416	72.60	Pass
34	3.400	74.50	Pass
35	3.414	71.60	Pass
36	3.413	71.00	Pass
37	3.409	76.10	Pass
38	3.405	71.80	Pass
39	3.406	69.50	Pass
40	3.401	68.50	Pass

3. Sample Image

