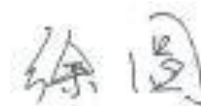


UN38.3 Test Summary

The following product has been evaluated according to the 6th revised edition Amendment 1 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.

Manufacture's contact information	LG Chem, Ltd. 128 Yeoui-Daero, Yeongdeungpo-gu, SEOUL, 150-721, REPUBLIC OF KOREA Telephone : +86-10-7742-5427 E-mail : kkammy@lgchem.com Website : www.lgchem.com		
Test Laboratory information	LG Chem, Ltd. / RESEARCH PARK 188 Munjiro, Yuseong-gu, Daejeon, 305-738, REPUBLIC OF KOREA Telephone : +82-10-3099-3724 E-mail : juhongpark@lgchem.com Website : www.lgchem.com		
	LG Chem (Nanjing) I&E Materials Co., Ltd NO.17 Hengyi Road, Nanjing Economic & Technological Development Zone, Nanjing, Jiangsu, China Telephone : +86-025-85603000-8288 E-mail : xuyuannj@lgchem.com Website : www.lgchem.com		
Description		List of Test Completed	
Test Report Number	QDI-191014-SB-EB-BG988ABY L	Test 1. Altitude Simulation	Pass
Date of test report	2019.10.14	Test 2. Thermal Test	Pass
Model name	EB-BG988ABY L	Test 3. Vibration	Pass
Type	Pouch (Lithium ion battery)	Test 4. Shock	Pass
Nominal voltage	3.86 V	Test 5. External Short Circuit	Pass
Capacity	4855mAh (18.74Wh)	Test 6. Impact or Crush	Pass
Weight	68.663g	Test 7. Overcharge	Pass
Dimensions	74.71mmX63.03mmX5mm	Test 8. Forced Discharge	Pass

Approved By: Yuan Xu
 Part Leader
 Cyl NPI&CE lab part DQA Team
 LG Chem, Ltd.
 E-mail: xuyuannj@lgchem.com



Document Number	QDI-191014-SB-EB-BG988ABY L	
Prepared	qianjunli	钱俊丽
Approved	Xuyuan	徐园

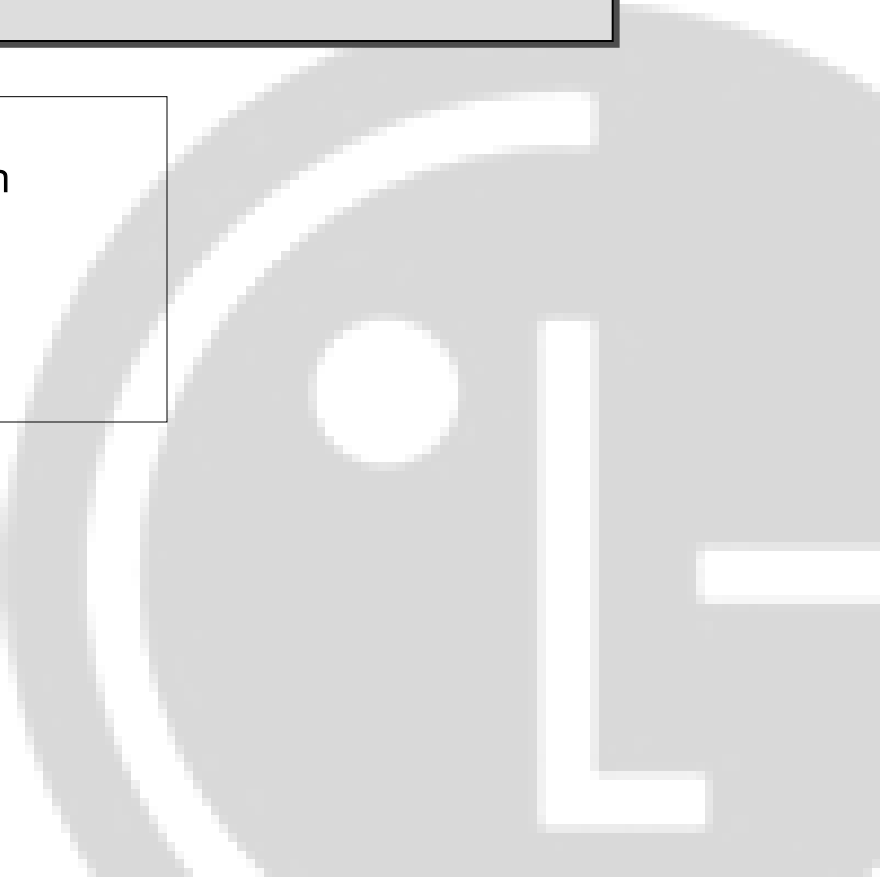
UN38.3 Test Report

EB-BG988ABY L (Rated Capacity 4855mAh, 3.86V)

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

2019. 10. 14



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℃		T1~T5 : Sequence Tests <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	<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% 	
Test 4. Shock	Half sine shock 1) Peak acceleration - For cells & single cell batteries : 150gn - For batteries (whichever is smaller) : 150gn or 1gn 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		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	<ul style="list-style-type: none"> - No disassembly, no fire within 6 hours after the test - Max. Temp ≤ 170℃ 	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	4.3640	68.332	4.3625	68.330	99.97	0.003	Pass	4.2817	68.319	98.15	0.016	Pass	4.2813	68.323	99.99	0.000	Pass	4.2814	68.322	100.00	0.001	Pass
2	4.3585	68.343	4.3572	68.338	99.97	0.007	Pass	4.2794	68.328	98.21	0.015	Pass	4.2788	68.330	99.99	0.000	Pass	4.2789	68.330	100.00	0.000	Pass
3	4.3595	68.663	4.3581	68.658	99.97	0.007	Pass	4.2782	68.649	98.17	0.013	Pass	4.2775	68.650	99.98	0.00	Pass	4.2775	68.649	100.00	0.001	Pass
4	4.3600	68.507	4.3588	68.501	99.97	0.009	Pass	4.2784	68.492	98.16	0.013	Pass	4.2780	68.494	99.99	0.000	Pass	4.2780	68.494	100.00	0.000	Pass
5	4.3631	68.321	4.3618	68.316	99.97	0.007	Pass	4.2808	68.307	98.14	0.013	Pass	4.2803	68.309	99.99	0.000	Pass	4.2803	68.310	100.00	0.000	Pass

B. 25th cycle fully charged state

6	4.3728	68.587	4.3723	68.583	99.99	0.006	Pass	4.2974	68.575	98.29	0.012	Pass	4.2969	68.577	99.99	0.000	Pass	4.2971	68.575	100.00	0.003	Pass
7	4.3732	68.815	4.3725	68.812	99.98	0.004	Pass	4.2978	68.802	98.29	0.015	Pass	4.2971	68.804	99.98	0.000	Pass	4.2973	68.805	100.00	0.000	Pass
8	4.3738	68.361	4.3730	68.357	99.98	0.006	Pass	4.2966	68.346	98.25	0.016	Pass	4.2961	68.347	99.99	0.000	Pass	4.2961	68.347	100.00	0.000	Pass
9	4.3753	68.827	4.3748	68.823	99.99	0.006	Pass	4.2963	68.816	98.21	0.010	Pass	4.2954	68.818	99.98	0.000	Pass	4.2956	68.817	100.00	0.001	Pass
10	4.3712	68.485	4.3706	68.478	99.99	0.010	Pass	4.2945	68.472	98.26	0.009	Pass	4.2940	68.474	99.99	0.000	Pass	4.2942	68.473	100.00	0.001	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	4.2814	58.32	Pass
2	4.2789	58.30	Pass
3	4.2775	57.78	Pass
4	4.2780	57.74	Pass
5	4.2803	56.97	Pass

B. 25th cycle fully charged state

6	4.2971	58.21	Pass
7	4.2973	58.26	Pass
8	4.2961	57.82	Pass
9	4.2956	57.72	Pass
10	4.2942	57.72	Pass

Over Charge (T7)

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

11	4.3570	25.00	Pass
12	4.3628	25.40	Pass
13	4.3598	24.60	Pass
14	4.3628	25.00	Pass

Over Charge (T7)

NO.	Initial OCV(V)	Max. Temp (°C)	Result
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B. 25th cycle fully charged state

15	4.3737	24.40	Pass
16	4.3733	24.70	Pass
17	4.3752	24.50	Pass
18	4.3696	24.40	Pass

2-3. T6/T8 Test Result (P616474A1)

Cell Document Number	QDI-191013-C-P616474A1
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Crush (T6)			
NO.	Initial OCV(V)	Max. Temp (°C)	Result

A. 1st cycle 50% charged state

C-1	3.8574	23.09	Pass
C-2	3.8566	23.93	Pass
C-3	3.8570	22.98	Pass
C-4	3.8568	23.22	Pass
C-5	3.8568	22.66	Pass

B. 25st cycle 50% charged state

C-6	3.8766	23.12	Pass
C-7	3.8758	22.57	Pass
C-8	3.8766	22.57	Pass
C-9	3.8781	22.68	Pass
C-10	3.8804	22.86	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	3.4124	64.18	Pass
C-7	3.4096	65.44	Pass
C-8	3.3864	65.75	Pass
C-9	3.3967	62.98	Pass
C-10	3.4031	64.97	Pass
C-11	3.4052	63.43	Pass
C-12	3.4068	64.31	Pass
C-13	3.4088	67.56	Pass
C-14	3.4058	64.82	Pass
C-15	3.4292	66.30	Pass

B. 25th cycle fully discharged state

C-16	3.3874	68.87	Pass
C-17	3.3808	64.51	Pass
C-18	3.3760	66.14	Pass
C-19	3.3865	63.17	Pass
C-20	3.3825	62.83	Pass
C-21	3.3845	67.28	Pass
C-22	3.3901	65.30	Pass
C-23	3.3856	60.45	Pass
C-24	3.3800	63.97	Pass
C-25	3.3917	64.91	Pass

3. Sample Image

