



## Certificate of Compliance

**Certificate Number:**

DOT-COC-P2016-REV5-13

**Issue Date:** 2016.4.1

The following product(s) have been evaluated and tested to ensure compliance with Amendments to the Fifth Revised Edition of the UN Manual of Tests and Criteria. Test data is on file with Lishen Battery Joint Stock Corp.

**Product Name:**

AMU516485SC

**Product Description**

Lithium Ion cell for use as a power source

**Part Numbers:**

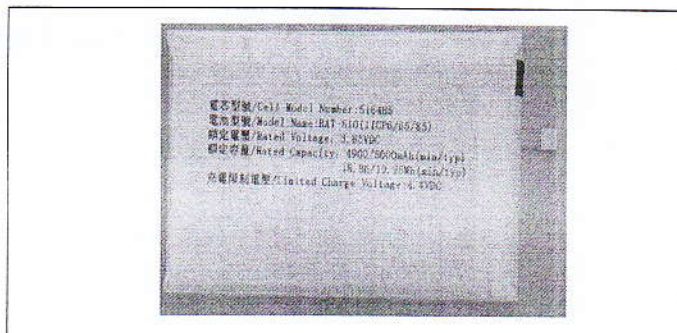
Sales Kit No: BAT-510

Internal Kit No: AMU516485SC

**Manufacturing Locations**

No.6 Lanyuan Road ,Huayuan Hi-Tech Industry Park,Tianjin 300384,China

**Photo of Product:**



**Associated Report Number(s)**

Tests sequence: 1. Altitude Simulation

2. Thermal Test

3. Vibration

4. Mechanical Shock

5. External Short Circuit

6. Crush (for cell)

7. Overcharge

8. Forced Discharge (for cell)



**Laboratory Service Request Form**  
**UN/DOT Testing: Rechargeable Li-ion Cell**

☒ INTERNAL (Lishen Designed or Manufactured)  
☐ EXTERNAL (Non-Lishen)

Lishen Lab Project No: \_\_\_\_\_  
Lishen Battery P/N: AMUS16485SC(5000mAh)  
Customer P/N: AMUS16485SC(5000mAh)  
Submitter's Name and Phone Number: 022-83718995 Xie Zhao

----- Critical Dates -----  
(Completed by Lishen Lab)  
Submitted: 2016.3.7  
Plan Start: 2016.3.7  
Promise: 2016.4.1

**COMMENTS**

AMUS16485SC(5000mAh) demand UN/DOT Section 38.3 Rev.5-Amendment 1& Amendment 2 Lithium Batteries requirement

**Recommendations on the Transport of Dangerous Goods, Manual of Tests and Criteria**  
**Amendments to the Fifth Edition**  
**Section 38.3 Lithium Batteries**

Sample Preparation/Labeling	
Charged	Discharged
50% Chg	
NI-N14	NI5-N24
N25-N29	
50X Cycled	
NI-N14	NI5-N24
N25-N29	

Mass of Cell	Minix
M1 < 1.0	0.5%
1 g < M < 175 g	0.2%
M > 175 g	0.1%

Minix = **0.2%**

Result: **Pass**

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Test 1 Altitude Simulation

11.6 kPa or less for 6 hours at 20 deg C

N1-N10

Before Test		After Test		Vmin		Mass Loss		Pass?	
Mass (g)		Voltage (V)		Mass (g)		Voltage (V)		90% V1	
M1		V1		M2		V2		V2-Vmin	
N 1	66.8235	4.360	66.8233	4.360	3.92	Pass	0.000%	Pass	
N 2	67.0186	4.360	67.0185	4.360	3.92	Pass	0.000%	Pass	
N 3	67.1023	4.360	67.1019	4.360	3.92	Pass	0.001%	Pass	
N 4	66.7864	4.360	66.7862	4.360	3.92	Pass	0.000%	Pass	
N 5	66.9231	4.360	66.9223	4.360	3.92	Pass	0.001%	Pass	
N 6	66.9183	4.360	66.9182	4.360	3.92	Pass	0.000%	Pass	
N 7	66.8954	4.360	66.8952	4.360	3.92	Pass	0.000%	Pass	
N 8	66.7594	4.360	66.7591	4.360	3.92	Pass	0.000%	Pass	
N 9	66.8265	4.360	66.8260	4.360	3.92	Pass	0.001%	Pass	
N 10	66.9207	4.360	66.9205	4.360	3.92	Pass	0.000%	Pass	
Note below if battery cell experienced leakage, venting, rupture, or fire. Enter "--" if no such findings.									
Pass?									

Technician Name

郑军

Audit Name

高勇峰

Equipment Listing	
Eq#	Description
9025244	真空试验箱
40118318	万用表
70102147	天平

Certificate Number: DOT-COC-P2016-REV5-13

Test 2 Thermal Test

N1-N10  
+72+/-2C 6 hrs, transitions 30 min max, -40C+/-2C 6 hrs, repeat 10X, store 24 hrs before evaluation

Before Test

Mass (g) Voltage (V)

After Test

Mass (g) Voltage (V)

Vmin Pass?

(90% V1) V2-Vmin

Mass Loss Pass?

100% (M1-M2)/M1 M1<Mmax

Pass?

Note below if battery cell experienced leakage, venting, rupture, or fire  
Enter "—" if no such findings.

	M1	V1
N 1	66.8233	4.360
N 2	67.0185	4.360
N 3	67.1019	4.360
N 4	66.7862	4.360
N 5	66.9223	4.360
N 6	66.9182	4.360
N 7	66.8952	4.360
N 8	66.7581	4.360
N 9	66.8260	4.360
N 10	66.9205	4.360

	M2	V2
N 1	66.7972	4.260
N 2	66.9910	4.250
N 3	67.0717	4.250
N 4	66.7521	4.260
N 5	66.8935	4.240
N 6	66.8927	4.230
N 7	66.8671	4.240
N 8	66.7283	4.250
N 9	66.7965	4.250
N 10	66.8850	4.240

3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass
3.92	Pass

0.039%	Pass
0.041%	Pass
0.045%	Pass
0.051%	Pass
0.043%	Pass
0.039%	Pass
0.042%	Pass
0.046%	Pass
0.044%	Pass
0.053%	Pass

	Pass?
N 1	Pass
N 2	Pass
N 3	Pass
N 4	Pass
N 5	Pass
N 6	Pass
N 7	Pass
N 8	Pass
N 9	Pass
N 10	Pass

Technician Name

郑华

Audit Name

高永峰

Equipment Listing

Equip#	Description
9046119	高低温冲击试验箱
70102147	天平
40118318	万用表



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Test 3: Vibration

VI-M10

Bi-directional Logarithmic Sine Sweep, 7-200-7 Hz in 15 min; Control at 16 (7-18 Hz), 1.6mm (18-50 Hz), 86 (50-200 Hz).  
Repeat 12 cycles for a total of 3 hrs for each of three plates.

Before Test

Mass (g) Voltage (V)

	M1	V1
N 1	66.7972	4.250
N 2	66.9910	4.250
N 3	67.0717	4.250
N 4	66.7621	4.250
N 5	66.8935	4.240
N 6	66.8927	4.230
N 7	66.8671	4.240
N 8	66.7283	4.250
N 9	66.7963	4.250
N 10	66.8850	4.240

After Test

Mass (g) Voltage (V)

	M2	V2
N 1	66.7983	4.250
N 2	66.9903	4.250
N 3	67.0713	4.250
N 4	66.7619	4.250
N 5	66.8931	4.240
N 6	66.8922	4.230
N 7	66.8665	4.240
N 8	66.7276	4.250
N 9	66.7962	4.250
N 10	66.8843	4.240

Umin (90% V1)

Pass? V2-Vmin

	Umin	Pass?
N 1	3.83	Pass
N 2	3.83	Pass
N 3	3.83	Pass
N 4	3.83	Pass
N 5	3.82	Pass
N 6	3.81	Pass
N 7	3.82	Pass
N 8	3.83	Pass
N 9	3.83	Pass
N 10	3.82	Pass

Mass Loss 100% (M1-M2)/M1

Pass? M1-Mmax

	Mass Loss	Pass?
N 1	0.000%	Pass
N 2	0.001%	Pass
N 3	0.000%	Pass
N 4	0.000%	Pass
N 5	0.001%	Pass
N 6	0.001%	Pass
N 7	0.001%	Pass
N 8	0.001%	Pass
N 9	0.000%	Pass
N 10	0.001%	Pass

Pass?

Note below if battery cell experienced leakage, venting, rupture, or fire.  
Enter "-" if no such findings.

	Pass?
N 1	---
N 2	---
N 3	---
N 4	---
N 5	---
N 6	---
N 7	---
N 8	---
N 9	---
N 10	---

Technician Name

郭凡

Audit Name

高勇峰

Equipment Listing

Eq#	Description
21503003	电动式振动试验台
70102147	天平
40118318	万用表

Certificate Number: DOT-COC-P2016-REV5-13

Test 4 Shock N1-N10

Half-Sine, 1300g, 6 ms, 3 shocks in 6 mutually perpendicular axis for a total of 18 shocks.

Before Test				After Test				Vmin		Pass?		Mass Loss		Pass?		Pass?
Mass (g)		Voltage (V)		Mass (g)		Voltage (V)		(90% V1)		V2>Vmin		100%*(M1-M2)/M1		ML<=max		
M1	V1	M2	V2	ML												
N 1	66.7969	4.250	66.7966	4.250	3.83	Pass	0.000%	Pass	0.000%	Pass	---	---	---	---	---	
N 2	66.9903	4.250	66.9901	4.250	3.83	Pass	0.000%	Pass	0.000%	Pass	---	---	---	---	---	
N 3	67.0715	4.250	67.0712	4.250	3.83	Pass	0.000%	Pass	0.000%	Pass	---	---	---	---	---	
N 4	66.7519	4.250	66.7515	4.250	3.83	Pass	0.001%	Pass	0.001%	Pass	---	---	---	---	---	
N 5	66.8931	4.240	66.8929	4.240	3.82	Pass	0.000%	Pass	0.000%	Pass	---	---	---	---	---	
N 6	66.8922	4.230	66.8922	4.230	3.81	Pass	0.000%	Pass	0.000%	Pass	---	---	---	---	---	
N 7	66.8665	4.240	66.8667	4.240	3.82	Pass	0.000%	Pass	0.000%	Pass	---	---	---	---	---	
N 8	66.7276	4.250	66.7276	4.250	3.83	Pass	0.000%	Pass	0.001%	Pass	---	---	---	---	---	
N 9	66.7962	4.250	66.7965	4.250	3.83	Pass	-0.001%	Pass	---	---	---	---	---	---	---	
N 10	66.8813	4.240	66.8813	4.240	3.82	Pass	0.000%	Pass	---	---	---	---	---	---	---	

Technician Name 郭平

Audit Name 高明峰

Equipment Listing	
Eq#	Description
21503003	机械冲击试验台
70102147	天平
40118318	万用表

Certificate Number: DOT-COC-P2016-REV5-13

Test 5 External Short Circuit

Thermally stabilized to external case temp of 55+/- 2C; max 0.1 ohm short applied and held for at least 1 hr after external case temperature returns to 55+/- 2C; observed for additional 6 hrs.

NI-V10

Did case temperature exceed 170 deg C?

(C)

Y 1	55	2
Y 2	55	
Y 3	55	
Y 4	55	
N 5	55	
N 6	55	
N 7	55	
N 8	55	
N 9	55	
N 10	55	

Was there any disassembly or fire during the test and within six hours after this test?

	no
	no
	no
	no
	no
	no
	no
	no
	no
	no

Technician Name 郑厚

Audit Name 高勇峰

Equipment Listing	
EQ#	Description
9025516	短路试验系统
9025517	短路试验系统
9025523	短路试验系统

Certificate Number: DOT-COC-P2016-REV5-13

Test 6 Crush V25-V29

A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the applied force reaches 13 kN  $\pm$  0.78 kN.

Did case temperature exceed 170 deg (°C)?

N 25	24
N 26	24
N 27	25
N 28	25
N 29	25

Was there any disassembly or fire during the test and within six hours after this test?

	no
	no
	no
	no
	no

Equipment Listing

Eq#	Description
9022002	拆机试验台
70506005	Agilent34970A数据采集系统

Technician Name

郑军

Audit Name

高勇峰

20130625



Test 7

N11-N14, C1-C4

## Overcharge

The charge current shall be twice the manufacturer's recommended maximum continuous charge current. The minimum voltage of the test shall be as follows:

- (a) when the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V
- (b) when the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.

**Requirement:** Rechargeable batteries meet this requirement if there is no disassembly and no fire within seven days of the test.

Was there any disassembly or fire during the test and within seven days after the test?

N 11	no
N 12	no
N 13	no
N 14	no
C 1	no
C 2	no
C 3	no
C 4	no

Technician Name 郑里

Audit Name 高勇峰

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Test 8	Forced Discharge	N15-N24, C5-C14
1	1	1
2	1	1
3	1	1
4	1	1
5	1	1
6	1	1
7	1	1
8	1	1
9	1	1
10	1	1
11	1	1
12	1	1
13	1	1
14	1	1
15	1	1
16	1	1
17	1	1
18	1	1
19	1	1
20	1	1
21	1	1
22	1	1
23	1	1
24	1	1
25	1	1
26	1	1
27	1	1
28	1	1
29	1	1
30	1	1
31	1	1
32	1	1
33	1	1
34	1	1
35	1	1
36	1	1
37	1	1
38	1	1
39	1	1
40	1	1
41	1	1
42	1	1
43	1	1
44	1	1
45	1	1
46	1	1
47	1	1
48	1	1
49	1	1
50	1	1
51	1	1
52	1	1
53	1	1
54	1	1
55	1	1
56	1	1
57	1	1
58	1	1
59	1	1
60	1	1
61	1	1
62	1	1
63	1	1
64	1	1
65	1	1
66	1	1
67	1	1
68	1	1
69	1	1
70	1	1
71	1	1
72	1	1
73	1	1
74	1	1
75	1	1
76	1	1
77	1	1
78	1	1
79	1	1
80	1	1
81	1	1
82	1	1
83	1	1
84	1	1
85	1	1
86	1	1
87	1	1
88	1	1
89	1	1
90	1	1
91	1	1
92	1	1
93	1	1
94	1	1
95	1	1
96	1	1
97	1	1
98	1	1
99	1	1
100	1	1

Was there any disassembly or fire during the test and within seven days after the test?

N 15	no
N 16	no
N 17	no
N 18	no
N 19	no
N 20	no
N 21	no
N 22	no
N 23	no
N 24	no
C 5	no
C 6	no
C 7	no
C 8	no
C 9	no
C 10	no
C 11	no
C 12	no
C 13	no
C 14	no

鄭三

高勇峰

[illegible]