

UN38.3 Test Report


Sample name : Li-ion Polymer Battery

Model : BL1200P4054481S1PCKC

Applicant : GlobTek, Inc.

Shenzhen LCS Compliance Testing Laboratory Ltd.

UN38.3 Test Report

Report reference No	LCS180314101ASA	
Tested by (+ signature)	Una Quan/Testing Engineer	<i>Una. Quan</i>
Checked by (+ signature)	Rick zhu/Project Supervisor	<i>Rick</i>
Approved by (+ signature)	Hart Qiu/Technical Manager	<i>Hart</i>
Contents.....	16pages	
Date of issue	2018.04.16	
Testing Laboratory Name	Shenzhen LCS Compliance Testing Laboratory Ltd.	
Address	1/F., Xingyuan Industrial Park, Tongda Road, Bao'an Avenue, Bao'an District, Shenzhen, Guangdong, China	
Applicant's Name	GlobTek, Inc.	
Address	186 Veterans Dr. Northvale, NJ 07647, USA	
Manufacturer	GlobTek (Suzhou) Co., Ltd	
Address	Building 4, No. 76 JinLing East Road, Suzhou Industrial Park, China	
Standard	Section 38.3 of the sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.6 Section 38.3)	
Test item description	Li-ion Polymer Battery	
Trade Mark		
Model/type reference	BL1200P4054481S1PCKC	
Ratings.....	3.7V ,1200mAh, 4.44Wh	

Classification.....:	Li-ion Battery
Type of Sample.....:	Prismatic

Details information of the battery and the cell built in the battery, as following:

Product	Cell	Battery
Model	HL-PL 404547	BL1200P4054481S1PCKC
Nominal voltage	3.7V	3.7V
Rated capacity	1200mAh	1200mAh
Charge method	0.2C CC(constant current) charge to 4.2V, then CV (constant voltage 4.2 V) charge till charge current decline to 0.01C	0.2C CC(constant current) charge to 4.2V, then CV (constant voltage 4.2 V) charge till charge current decline to 0.01C.
Max. Discharging Current	1.0C	1.0C
End of discharge voltage	3.0V	3.0V
Dimension	45.7*44.1*4.2(mm)	46.8*44.1*4.2(mm)
Weight	18.3g	20.2g

Possible test case verdicts:

Test case does not apply to the test object.....:	N/A
Test item does meet the requirement	P(ass)
Test item does not meet the requirement	F(ail)

Testing:

Date of sample received.....:	2018.03.14
-------------------------------	------------

Date(s) of performance of test.....:	2018.03.14~2018.03.28		
Version	Report No.	Revision Data	Summary
V1.0	LCS180314101ASA	/	Original Version
Test conclusion:			
TheLi-ion Polymer Batterysubmitted by GlobTek, Inc. are tested according to Section 38.3 of the Sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria(ST/SG/AC.10/11/Rev.6 Section 38.3).			
Test result: Pass			

I 、 CONCLUSION

Item	Sample Number	Standard	Conclusion
Altitude simulation	B01-B10	Section 38.3 of the Sixth Revised Edition of the Recommendations on the Transport of Dangerous Goods, Manual of Test and Criteria (ST/SG/AC.10/11/Rev.6 Section 38.3)	PASS
Thermal test			PASS
Vibration			PASS
Shock			PASS
External short circuit			PASS
Crush/ Impact	C01-C05		PASS
Overcharge	B11-B18		PASS
Forced discharge	C06-C25		PASS

Notes备注:

The conditions of the battery of sample No. B01 to B14 are at first cycle, in fully charged state;
 The conditions of the cells of sample No. C01 to C05 are at first cycle at 50% of the design rated capacity, in fully charged state;
 The conditions of the battery of sample No.B15 to B18 are full charged after fifty cycle;
 The conditions of the cells of sample No.C06 to C15 are at first cycle, in fully discharged state;
 The conditions of the cells of sample No.C16 to C25 are after fifty cycles ending in fully discharged state.

II、 MAIN TEST EQUIPMENT

NO.	Instrument Name
LCS-S-224	Battery charge tester
LCS-S-218	Battery low press tester
LCS-S-222	Rapid temperature rise tester
LCS-S-213	Vibration tester
LCS-S-214	Vertical shock Tester
LCS-S-220	Battery external short-circuit tester
LCS-S-231	DC source
LCS-S-215	Battery crush tester
LCS-S-379	Scales
LCS-S-230	Digital multimeter
LCS-S-115	Temperature recorder
LCS-S-223	Free fall tester

III、 TEST METHOD AND DATA

Tests T.1 to T.5 shall be conducted in sequence on the same cell or battery. Tests T.6 and T.8 shall be conducted using not otherwise tested cells or batteries. Test T.7 may be conducted using undamaged batteries previously used in tests T.1 to T.5 for purposes of testing on cycled batteries.

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

In order to quantify the mass loss, the following procedure is provided.

$$\text{mass loss} = (M_1 - M_2) / M_1 \times 100\%$$

Where M_1 is the mass before the test and M_2 is the mass after the test, when mass loss does not exceed the values in Table below, it shall be considered as "no mass loss".

Mass M of cell or battery	Mass lost limited
$M < 1\text{g}$	0.5%
$1\text{g} \leq M \leq 75\text{g}$	0.2%
$M > 75\text{g}$	0.1%

Test T1: Altitude simulation

Test procedure:

Test cells and batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient

temperature (20 ± 5 °C).

Requirement :

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Data:

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Verdict#
	Mass(g)	Voltage(V)	Mass(g)	Voltage(V)			
B01	20.184	4.18	20.184	4.17	0.000	0.24	PASS
B02	20.185	4.18	20.184	4.18	0.005	0.00	PASS
B03	20.216	4.17	20.216	4.17	0.000	0.00	PASS
B04	20.184	4.18	20.183	4.17	0.005	0.24	PASS
B05	20.186	4.18	20.185	4.18	0.005	0.00	PASS
B06	20.215	4.17	20.215	4.17	0.000	0.00	PASS
B07	20.211	4.17	20.211	4.16	0.000	0.24	PASS
B08	20.204	4.18	20.204	4.18	0.000	0.00	PASS
B09	20.203	4.17	20.202	4.16	0.005	0.24	PASS
B10	20.191	4.18	20.191	4.18	0.000	0.00	PASS

#: No leakage, No venting, No disassembly No rupture and no fire

Test T.2: Thermal test

Test procedure

Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72 ± 2 °C, followed by storage for at least six hours at a test temperature equal to -40 ± 2 °C. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature (20 ± 5 °C). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

Requirement

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Data:

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Verdict#
	Mass(g)	Voltage(V)	Mass(g)	Voltage(V)			
B01	20.184	4.17	20.174	4.14	0.050	0.72	PASS/合格
B02	20.184	4.18	20.174	4.14	0.050	0.96	PASS/合格
B03	20.216	4.17	20.206	4.14	0.049	0.72	PASS/合格
B04	20.183	4.17	20.173	4.14	0.050	0.72	PASS/合格
B05	20.185	4.18	20.174	4.14	0.054	0.96	PASS/合格
B06	20.215	4.17	20.202	4.14	0.064	0.72	PASS/合格
B07	20.211	4.16	20.201	4.13	0.049	0.72	PASS/合格
B08	20.204	4.18	20.195	4.14	0.045	0.96	PASS/合格
B09	20.202	4.16	20.193	4.13	0.045	0.72	PASS/合格
B10	20.191	4.18	20.182	4.14	0.045	0.96	PASS/合格

#: No leakage, No venting, No disassembly No rupture and no fire

Test T.3: Vibration**Test procedure:**

1. Cells and batteries are firmly secured to the platform of the vibration machine
2. The vibration: a sinusoidal waveform with a logarithmic sweep between 7Hz and 200Hz and back to 7Hz traversed in 15 minutes
3. the logarithmic frequency sweep is as follows: from 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached, The amplitude is then maintained at 0,8mm (1,6 mm total excursion) and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50Hz), A peak acceleration of 8 gn is then maintained until the frequency is increased to 200 Hz
4. This cycle repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting position of the cell

Requirement

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire during the test and after the test and if the open circuit voltage of each test cell or battery directly after testing in its third perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Data:

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Verdict#
	Mass(g)	Voltage(V)	Mass(g)	Voltage(V)			
B01	20.174	4.14	20.174	4.14	0.000	0.00	PASS
B02	20.174	4.14	20.173	4.14	0.005	0.00	PASS
B03	20.206	4.14	20.205	4.13	0.005	0.24	PASS
B04	20.173	4.14	20.173	4.14	0.000	0.00	PASS
B05	20.174	4.14	20.173	4.13	0.005	0.24	PASS
B06	20.202	4.14	20.202	4.14	0.000	0.00	PASS
B07	20.201	4.13	20.201	4.12	0.000	0.24	PASS
B08	20.195	4.14	20.194	4.14	0.005	0.00	PASS
B09	20.193	4.13	20.193	4.13	0.000	0.00	PASS
B10	20.182	4.14	20.182	4.13	0.000	0.24	PASS

#: No leakage, No venting, No disassembly No rupture and no fire

Test T4: Shock

Test procedure:

Test cells and batteries shall be secured to the testing machine by means of a rigid mount which will support all mounting surfaces of each test battery. Each cell or battery shall be subjected to a halfsine shock of peak acceleration of 150gn and pulse duration of 6 milliseconds. Each cell or battery shall be subjected to three shocks in the positive direction followed by three shocks in the negative direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks. However, large cells and large batteries shall be subjected to a half-sine shock of peak acceleration of 50gn and pulse duration of 11 milliseconds. Each cell or battery is subjected to three shocks in the positive direction followed by three shocks in the negative direction of each of three mutually perpendicular mounting positions of the cell for a total of 18 shocks.

Battery	Minimum peak acceleration	Pulse duration
Small batteries	150 g _n or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{100850}{\text{mass}^*}\right)}$ whichever is smaller	6 ms
Large batteries	50 g _n or result of formula $\text{Acceleration}(g_n) = \sqrt{\left(\frac{30000}{\text{mass}^*}\right)}$ whichever is smaller	11 ms

Requirement:

Cells and batteries meet this requirement if there is no leakage, no venting, no disassembly, no rupture and no fire and if the open circuit voltage of each test cell or battery after testing is not less than 90% of its voltage immediately prior to this procedure. The requirement relating to voltage is not applicable to test cells and batteries at fully discharged states.

Data:

No.	Pre-test		After test		Mass loss (%)	Voltage loss (%)	Verdict#
	Mass(g)	Voltage(V)	Mass(g)	Voltage(V)			
B01	20.174	4.14	20.173	4.14	0.005	0.00	PASS
B02	20.173	4.14	20.173	4.13	0.000	0.24	PASS
B03	20.205	4.13	20.204	4.13	0.005	0.00	PASS
B04	20.173	4.14	20.173	4.14	0.000	0.00	PASS
B05	20.173	4.13	20.172	4.12	0.005	0.24	PASS
B06	20.202	4.14	20.202	4.14	0.000	0.00	PASS
B07	20.201	4.12	20.201	4.11	0.000	0.24	PASS
B08	20.194	4.14	20.194	4.14	0.000	0.00	PASS
B09	20.193	4.13	20.192	4.12	0.005	0.24	PASS
B10	20.182	4.13	20.182	4.13	0.000	0.00	PASS

#: No leakage, No venting, No disassembly No rupture and no fire

Test T.5: External short circuit**Test procedure:**

The cell or battery to be tested shall be temperature stabilized so that its external case temperature reaches $57 \pm 4^\circ\text{C}$ and then the cell or battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at $57 \pm 4^\circ\text{C}$. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to $57 \pm 4^\circ\text{C}$.

Requirement:

Cells and batteries meet this requirement if their external temperature does not exceed 170°C and there is no disassembly, no rupture and no fire during the test and within six hours after the test.

Data:

No.	Peak temperature($^\circ\text{C}$)	No disassembly, No rupture and no fire
B01	58.3	PASS
B02	58.2	PASS
B03	57.9	PASS
B04	57.8	PASS
B05	58.1	PASS
B06	58.2	PASS
B07	58.3	PASS
B08	57.9	PASS
B09	57.8	PASS
B10	57.5	PASS

Test T.6: Impact (applicable to cylindrical cells not less than 18 mm in diameter) / Crush (applicable to prismatic, pouch, coin/button cells and cylindrical cells less than 18 mm in diameter)**Test procedure– Impact:**

The sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm \pm 0.1mm diameter, at least 6 cm long, or the longest dimension of the cell, whichever is greater, Type 316 stainless steel bar is to be placed across the Centre of the sample. A 9.1 kg \pm 0.1 kg mass is to be dropped from a height of 61 \pm 2.5 cm at the intersection of the bar and sample in a controlled manner using a near frictionless, vertical sliding track or channel with minimal drag on the falling mass. The vertical track or channel used to guide the falling mass shall be oriented 90 degrees from the horizontal supporting surface.

The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm \pm 0.1mm diameter curved surface lying across the Centre of the test sample. Each sample is to be subjected to only a single impact.

Test Procedure– Crush:

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 three options below is reached.

(a) The applied force reaches 13 KN \pm 0.78 KN;

Example: The force shall be applied by a hydraulic ram with a 32 mm diameter piston until a pressure of 17 MPa is reached on the hydraulic ram.

(b) The voltage of the cell drops by at least 100 mV; or

(c) The cell is deformed by 50% or more of its original thickness.

Once the maximum pressure has been obtained, the voltage drops by 100 mV or more, or the cell is deformed by at least 50% of its original thickness, the pressure shall be released.

A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. For cylindrical cells, the crush force shall be applied perpendicular to the longitudinal axis.

Requirement:

Cells and component cells meet this requirement if their external temperature does not exceed 170 °C and there is no disassembly and no fire during the test and within six hours after this test.

Data (Crush) :

No.	Peak temperature(°C)	No disassembly,No fire
C01	26.4	PASS
C02	26.2	PASS
C03	26.3	PASS
C04	26.2	PASS
C05	26.5	PASS

Test T.7: Overcharge

Test procedure:

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 during the test and within seven days after the test.

Data:

No.	No disassembly, No fire
B11	PASS
B12	PASS
B13	PASS
B14	PASS
B15	PASS
B16	PASS
B17	PASS
B18	PASS

Test T.8: Forced discharge (for cell)

Test procedure

Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12V D.C. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.

The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere).

Requirement

Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after the test.

Data:

No.	No disassembly and no fire
C06	PASS
C07	PASS
C08	PASS
C09	PASS
C10	PASS
C11	PASS
C12	PASS
C13	PASS
C14	PASS
C15	PASS
C16	PASS
C17	PASS
C18	PASS
C19	PASS
C20	PASS
C21	PASS
C22	PASS
C23	PASS
C24	PASS
C25	PASS

IV、THE PHOTO OF SAMPLE

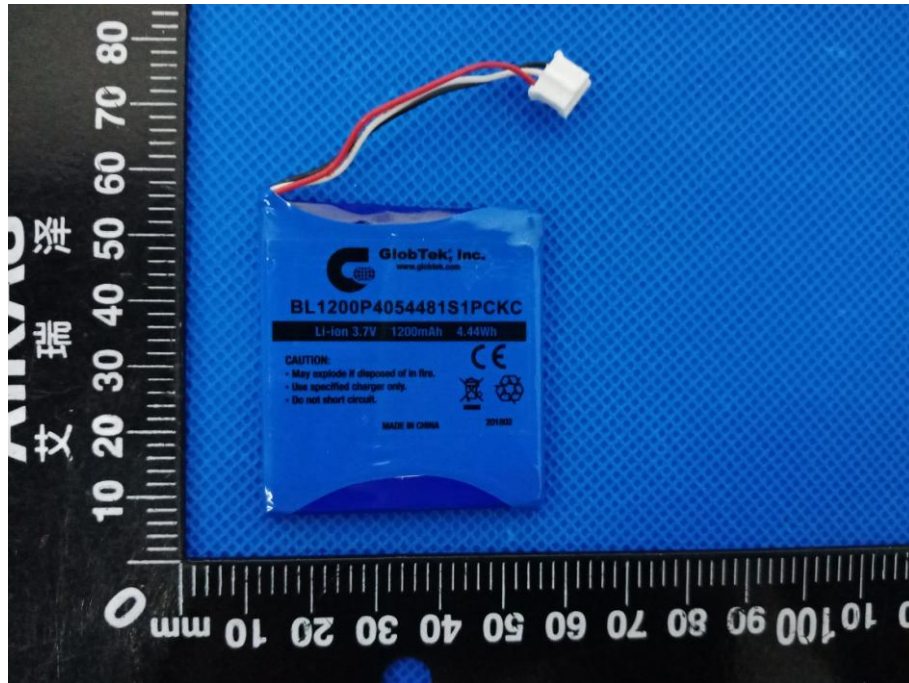


Figure 1

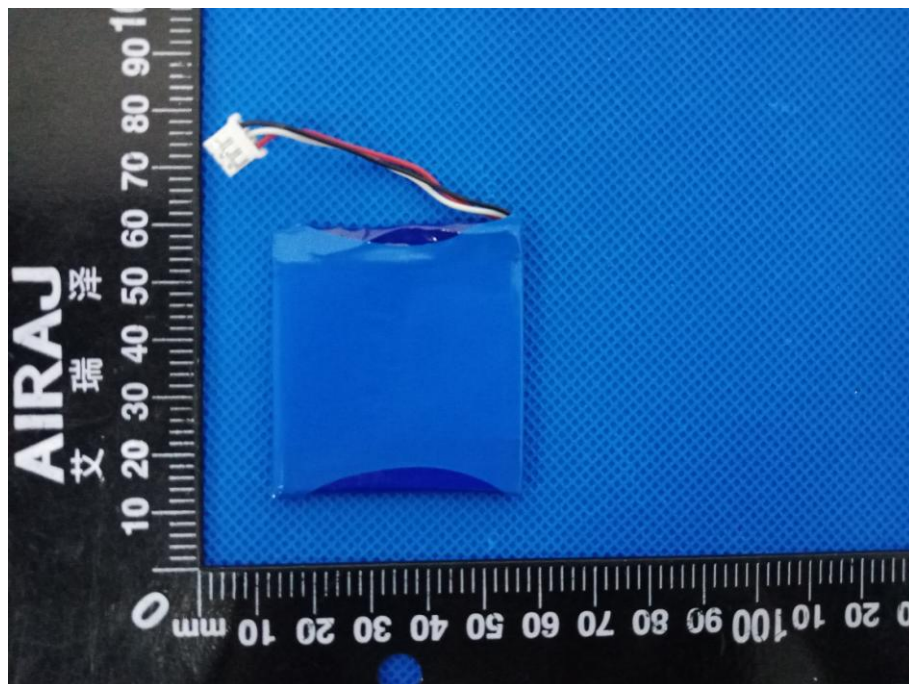


Figure 2

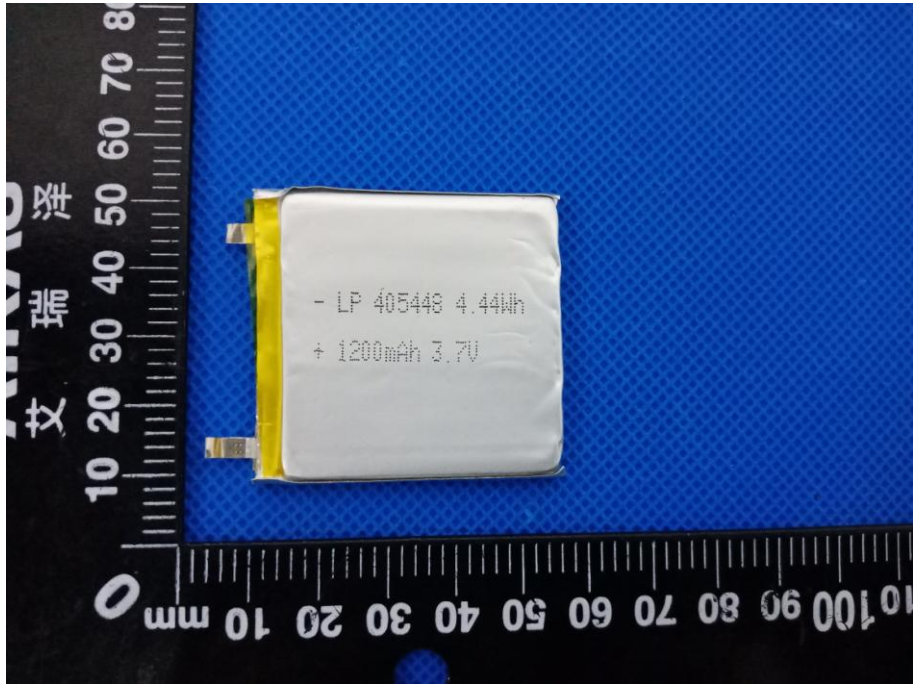


Figure 3



Figure 4

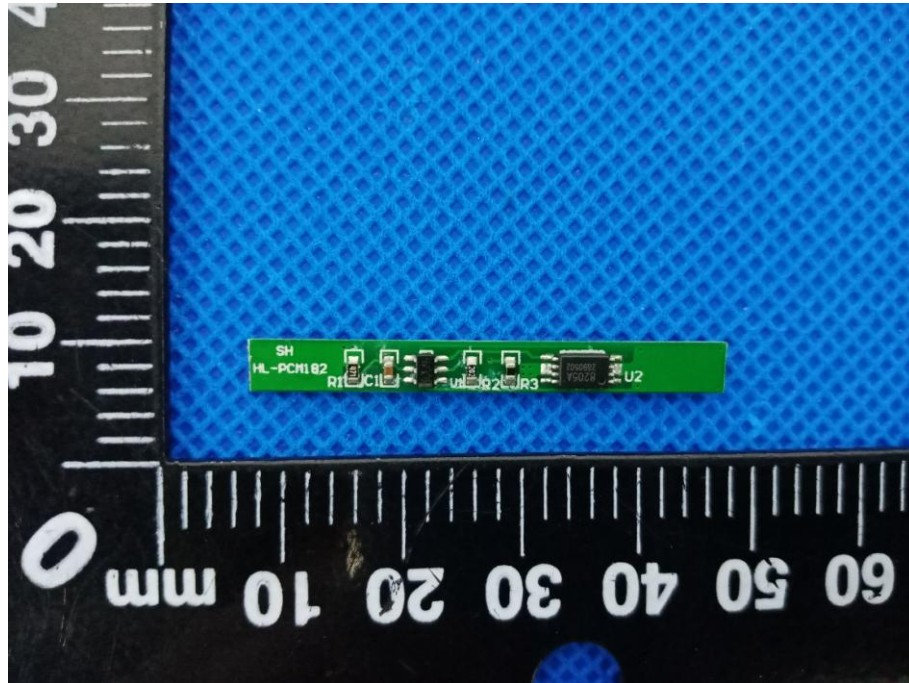


Figure 5

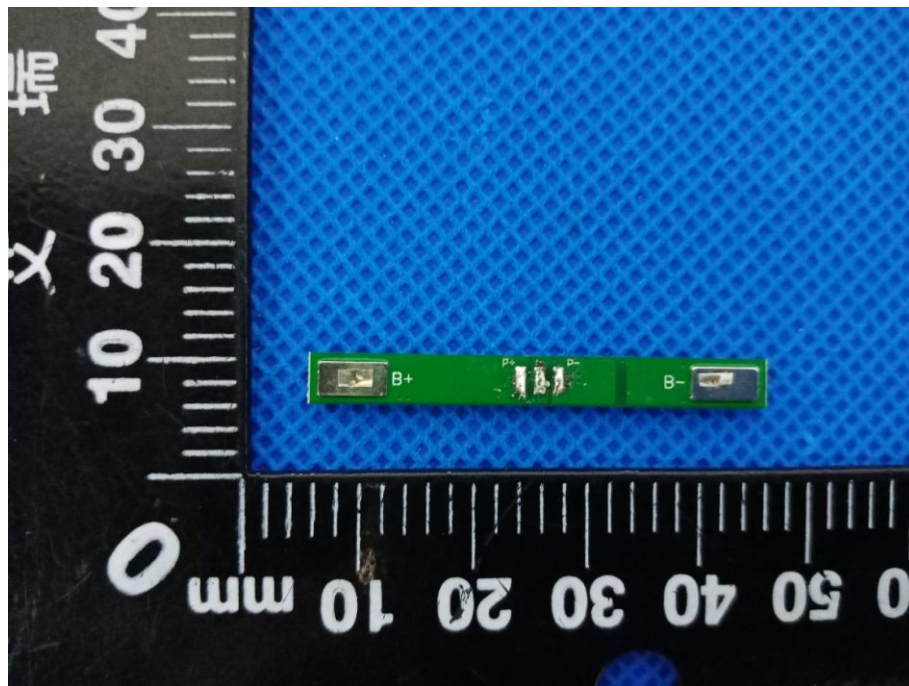


Figure 6

Important Notice

1. The test report is invalid without the official stamp of LCS.
2. The test report is invalid without the signatures of Ratifier, Reviewer and Testing engineer.
3. Nobody is allowed to partly photocopy this test report without written permission of LCS.
4. The report is invalid when anything of following happens – illegal transfer, reproduce, embezzlement, imposture, modification or tampering in any media form.
5. Product information and customer information provided by the applicant, we are not responsible for its authenticity
6. The test report is valid for the tested samples only.
7. The Chinese contents in this report are only for reference.
8. Objections to the test report must be submitted to LCS within 15 days.

End of report