深圳市计量质量检测研究院
Shenzhen Academy of Metrology & Quality Inspection

中国认可 国际互认 检测 TESTING CNAS L0579

TEST REPORT
ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3
United Nations recommendations on the transport of dangerous goods manual of tests and criteria(Section 38.3: Lithium metal and lithium ion batteries)

Report Reference No.....:	WT203200218
Date of issue.....:	2020-03-16
Total number of pages.....:	11 pages
Applicant's name.....:	Hunan Times New Energy Technology Co., Ltd.
Address.....:	7/F, Comprehensive Building, Innovation Pioneer Park, High-tech Industrial Development Zone, Wuxi , Luxi , Hunan , China
Test specification:	
Standard .....:	ST/SG/AC.10/11/Rev.6/Amend.1 Section 38.3
Non-standard test method……..:	N/A
Test item description..... :	Rechargeable Lithium ion Cell
Trade Mark .....:	TIMES
Manufacturer.....:	Hunan Times New Energy Technology Co., Ltd.
Address.....:	7/F, Comprehensive Building, Innovation Pioneer Park, High-tech Industrial Development Zone, Wuxi , Luxi , Hunan , China
Model/Type reference.....:	1165110
Ratings.....:	10000mAh
Testing Laboratory……..:	Shenzhen Academy of Metrology and Quality Inspection
Testing location/ address……:	No.92,Longzhu Avenue, Nanshan District, Shenzhen, Guangdong, China
Tel……:	0086-755-86928965
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Tested by (name + signature).....:	Wen Cui	
Checked by (name + signature)…:	Yang Dongping	
Approved by (name + signature) .:	Lin Bin(Undersecretary)	

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投诉电话： 0755-86009898-31206（西丽 Xili） 0755-26941613（龙珠 Longzhu）

Complaint hotline：0755-27528392（龙华 Longhua）

Summary of testing:

Tests performed:

Test T.1: Altitude Simulation	Pass
Test T.2: Thermal Test	Pass
Test T.3: Vibration	Pass
Test T.4: Shock	Pass
Test T.5: External Short Circuit	Pass
Test T.6: Impact/Crush	Pass
Test T.7: Overcharge	N/A
Test T.8: Forced discharge	Pass

Operation condition:

Refer to General product information for details.

Testing location:

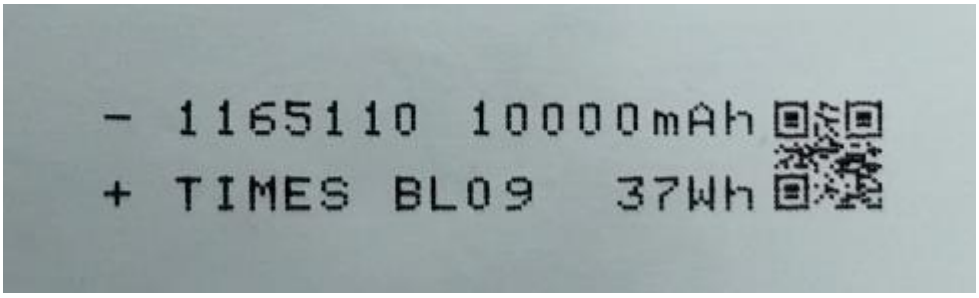
Shenzhen Academy of Metrology and Quality Inspection

Address: No.92,Longzhu Avenue, Nanshan District, Shenzhen, Guangdong, China

Summary of compliance with National Differences:

N/A

Copy of marking plate:



General product information

The cells and batteries have been tested and evaluated according to their specified working conditions (as given below), which are provided by client.

Product name..... :	Rechargeable Lithium ion Cell
Battery/Cell type……..……..……..:	Rechargeable Lithium ion Cell
Weight……..……..:	About 172g
Capacity / Energy……..……..:	10000mAh / 37Wh
Nominal voltage……..……..:	3.7V
Charge voltage……..:	4.2V
Shape……..……..:	Pouch cell
Model……..:	1165110
Standard charge current……..:	0.2C
Max. charge current……..:	0.7C
Max. discharge current……..:	1C
Discharge cut-off voltage……..:	2.75 V

Possible test case verdicts:

- test case does not apply to the test object.....:	N/A
- test object does meet the requirement .....:	P (Pass)
- test object does not meet the requirement .....:	F (Fail)

Testing .....:

Date of receipt of test item .....:	2020-02-28
Date (s) of performance of tests .....:	2020-02-28 to 2020-03-16
Temperature……..:	（20~25）℃
Relative Humidity……..:	（34~59）%
Atmospheric pressure……..:	（101.1-102.5）kPa

General remarks:

The test results presented in this report relate only to the object tested.
This report shall not be reproduced, except in full, without the written approval of the Issuing testing laboratory.
"(see Enclosure #)" refers to additional information appended to the report.
"(see appended table)" refers to a table appended to the report.

Factory(ies)……..……..……..……:	Hunan Times New Energy Technology Co., Ltd.
Address……..:	Tai He Mei Industrial Park, High-tech Industrial Development Zone, Wuxi, Luxi, Hunan, China
Tel……..:	13510344310
Email……..:	zhangzhiqiang@timesenergy.cn
Web……..……..:	www.timesenergy.cn

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.1	**Test T.1: Altitude Simulation** 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℃). 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.	There is no leakage, no venting, no disassembly, no rupture, no fire and the open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. (test data see appended table 38.3.4.1）	P
38.3.4.2	**Test T.2: Thermal Test** Test cells and batteries are to be stored for at least six hours at a test temperature equal to 72℃±2℃, followed by storage for at least six hours at a test temperature equal to -40℃±2℃. 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℃). For large cells and batteries the duration of exposure to the test temperature extremes should be at least 12 hours. 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.	There is no leakage, no venting, no disassembly, no rupture, no fire and the open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. (test data see appended table 38.3.4.2）	P
38.3.4.3	**Test T.3: Vibration** Cells and batteries are firmly secured to the platform of the vibration machine without distorting the cells in such a manner as to faithfully transmit the vibration. The vibration shall be a sinusoidal waveform with a logarithmic sweep between 7 Hz and 200 Hz and back to 7 Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the cell. One of the directions of vibration must be perpendicular to the terminal face. The logarithmic frequency sweep shall differ for cells and batteries with a gross mass of not more than 12kg(cells and small batteries), and for batteries with a gross mass of more than 12kg (large batteries). For cells and small batteries: from 7 Hz a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm(1.6 mm total excursion) and the frequency increased until a peak acceleration of 8 g_n occurs (approximately 50Hz). A peak acceleration of 8 g_n is then maintained until the frequency is increased to 200 Hz. For large batteries: from 7 Hz to a peak acceleration of 1 g_n is maintained until 18 Hz is reached. The amplitude is then	There is no leakage, no venting, no disassembly, no rupture , no fire during the test and after the test and the open circuit voltage of each test cell after testing in its perpendicular mounting position is not less than 90% of its voltage immediately prior to this procedure. (test data see appended table 38.3.4.3）	P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	maintained at 0.8 mm(1.6 mm total excursion) and the frequency increased until a peak acceleration of 2 g_n occurs (approximately 25Hz). A peak acceleration of 2 g_n is then maintained until the frequency is increased to 200 Hz. 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 after testing in its 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.		
38.3.4.4	**Test T.4: Shock** 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 shall be subjected to a half-sine shock of peak acceleration of 150 g_n and pulse duration of 6 milliseconds. Alternatively, large cells may be subjected to a half-sine shock of peak acceleration of 50 gn and pulse duration of 11 milliseconds. Each battery shall be subjected to a half-sine shock of peak acceleration depending on the mass of the battery. The pulse duration shall be 6 milliseconds for small batteries and 11 milliseconds for large batteries. Each cell or battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of cell or battery for a total of 18 shocks. 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.	There is no leakage, no venting, no disassembly, no rupture ,no fire and the open circuit voltage of each test cell after testing is not less than 90% of its voltage immediately prior to this procedure. (test data see appended table 38.3.4.4）	P
38.3.4.5	**Test T.5: External Short Circuit** The cell or battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57℃±4℃, measured on the external case. This period of time depends on the size and design of the cell or battery and should be assessed and documented. If this assessment is not feasible, the exposure time shall be at least 6 hours for small cells and small batteries, and 12 hours for large cells and large batteries. Then the cell or battery at 57℃±4℃ shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm. This short circuit condition is continued for at least one hour after the cell or battery external case temperature has returned to 57℃±4℃, or in the case of the large batteries has decreased	There external temperature does not exceed 170℃ and there is no disassembly, no rupture and no fire during the test and within six hours after the test. (test data see appended table 38.3.4.5）	P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	by half of the maximum temperature increase observed during the test and remain below that value. The short circuit and cooling down phases shall be conducted at least at ambient temperature. Cells and batteries meet this requirement if there external temperature does not exceed 170℃ and there is no disassembly, no rupture and no fire during the test and within six hours after the test.		
38.3.4.6	**Test T.6: Impact/Crush**		
	Impact (applicable to cylindrical cells not less than 18 mm in diameter) The test sample cell or component cell is to be placed on a flat smooth surface. A 15.8mm±0.1mm diameter, at least 6cm 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±0.1kg mass is to be dropped from a height of 61cm±2.5cm 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 ± 0.1 mm diameter curved surface lying across the centre of the test sample. Each sample is to be subjected to only a single impact. Cells and component cells meet this requirement if their external temperature does not exceed 170℃ and there is no disassembly, no rupture and no fire during the test and within six hours after the test.	N/A	N/A
	Crush (applicable to prismatic, pouch, coin/button and cylindrical cells less than 18 mm in diameter) 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 13kN ± 0.78 kN; (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 100mV 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.	Their external temperature does not exceed 170℃and there is no disassembly ,no rupture and no fire during the test and within six hours after this test. (test data see appended table 38.3.4.6）	P

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Each test cell or component cell is to be subjected to one crush only. The test sample shall be observed for further 6h. The test shall be conducted using test cells or component cells that have not previously been subjected to other tests. Cells and component cells meet this requirement if their external temperature does not exceed 170℃ and there is no disassembly, no rupture and no fire during the test and within six hours after the test.		
38.3.4.7	**Test T.7: 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 22 V. (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. Rechargeable batteries meet this requirement if there is no disassembly and no fire during the test and within seven days after this test.	N/A	N/A
38.3.4.8	**Test T.8: Forced discharge** 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). Primary or rechargeable cells meet this requirement if there is no disassembly and no fire during the test and within seven days after this test.	There is no disassembly and no fire during the test and within seven days after this test. (test data see appended table 38.3.4.8）	P

38.3.4.1	TABLE: T.1 Altitude Simulation					P
	Mass			OCV		
No.	M1(g)	M2(g)	Mass loss(%)	OCV1(V)	OCV2(V)	OCV loss(%)
C1#	172.14	172.14	0.00	4.18	4.18	0.00
C2#	172.34	172.34	0.00	4.17	4.16	0.24
C3#	171.65	171.65	0.00	4.17	4.16	0.24
C4#	169.83	169.83	0.00	4.16	4.16	0.00
C5#	170.89	170.89	0.00	4.17	4.16	0.24
C6#	171.70	171.70	0.00	4.17	4.17	0.00
C7#	171.13	171.13	0.00	4.16	4.16	0.00
C8#	169.66	169.66	0.00	4.16	4.16	0.00
C9#	171.64	171.64	0.00	4.16	4.15	0.24
C10#	170.55	170.55	0.00	4.16	4.16	0.00
Remark:1. Mass loss (%)=(M1-M2)/M1*100% (Where M1 is the mass before the test and M2 is the mass after the test). 2. OCV loss (%)=(OCV1- OCV 2)/ OCV 1*100% (Where OCV 1 is the voltage before the test and OCV 2 is the voltage after the test). 3. Five cells (C1#~ C5#) at first cycle in fully charged states and five cells (C6#~ C10#) after 25 cycles ending in fully charged states are used.						

38.3.4.2	TABLE: T.2 Thermal test					P
	Mass			OCV		
No.	M1(g)	M2(g)	Mass loss(%)	OCV1(V)	OCV2(V)	OCV loss(%)
C1#	172.14	172.14	0.00	4.18	4.07	2.60
C2#	172.34	172.34	0.00	4.16	4.06	2.40
C3#	171.65	171.65	0.00	4.16	4.06	2.40
C4#	169.83	169.81	0.01	4.16	4.07	2.16
C5#	170.89	170.89	0.00	4.16	4.06	2.40
C6#	171.70	171.70	0.00	4.17	4.07	2.40
C7#	171.13	171.13	0.00	4.16	4.05	2.64
C8#	169.66	169.66	0.00	4.16	4.06	2.40
C9#	171.64	171.64	0.00	4.15	4.05	2.41
C10#	170.55	170.53	0.01	4.16	4.07	2.16
Remark:1. Mass loss (%)=(M1-M2)/M1*100% (Where M1 is the mass before the test and M2 is the mass after the test). 2. OCV loss (%)=(OCV1- OCV 2)/ OCV 1*100% (Where OCV 1 is the voltage before the test and OCV 2 is the voltage after the test). 3. Five cells (C1#~ C5#) at first cycle in fully charged states and five cells (C6#~ C10#) after 25 cycles ending in fully charged states are used.						

38.3.4.3	TABLE: T.3 Vibration					P
	Mass			OCV		
No.	M1(g)	M2(g)	Mass loss(%)	OCV1(V)	OCV2(V)	OCV loss(%)
C1#	172.14	172.14	0.00	4.07	4.06	0.25
C2#	172.34	172.34	0.00	4.06	4.06	0.00
C3#	171.65	171.63	0.01	4.06	4.06	0.00
C4#	169.81	169.81	0.00	4.07	4.06	0.25
C5#	170.89	170.88	0.01	4.06	4.05	0.25
C6#	171.70	171.70	0.00	4.07	4.07	0.00
C7#	171.13	171.13	0.00	4.05	4.05	0.00
C8#	169.66	169.63	0.02	4.06	4.06	0.00
C9#	171.64	171.62	0.01	4.05	4.05	0.00
C10#	170.53	170.53	0.00	4.07	4.06	0.25
Remark::1. Mass loss (%)=(M1-M2)/M1*100% (Where M1 is the mass before the test and M2 is the mass after the test). 2. OCV loss (%)=(OCV1- OCV 2)/ OCV 1*100% (Where OCV 1 is the voltage before the test and OCV 2 is the voltage after the test). 3. Five cells (C1#~ C5#) at first cycle in fully charged states and five cells (C6#~ C10#) after 25 cycles ending in fully charged states are used.						

38.3.4.4	TABLE: T.4 Shock					P
	Mass			OCV		
No.	M1(g)	M2(g)	Mass loss(%)	OCV1(V)	OCV2(V)	OCV loss(%)
C1#	172.14	172.14	0.00	4.06	4.06	0.00
C2#	172.34	172.34	0.00	4.06	4.06	0.00
C3#	171.63	171.60	0.02	4.06	4.06	0.00
C4#	169.81	169.77	0.02	4.06	4.06	0.00
C5#	170.88	170.88	0.00	4.05	4.07	0.49
C6#	171.70	171.70	0.00	4.07	4.06	0.25
C7#	171.13	171.11	0.01	4.05	4.05	0.00
C8#	169.63	169.63	0.00	4.06	4.05	0.25
C9#	171.62	171.62	0.00	4.05	4.05	0.00
C10#	170.53	170.53	0.00	4.06	4.06	0.00
Remark:1. Mass loss (%)=(M1-M2)/M1*100% (Where M1 is the mass before the test and M2 is the mass after the test). 2. OCV loss (%)=(OCV1- OCV 2)/ OCV 1*100% (Where OCV 1 is the voltage before the test and OCV 2 is the voltage after the test). 3. Five cells (C1#~ C5#) at first cycle in fully charged states and five cells (C6#~ C10#) after 25 cycles ending in fully charged states are used.						

38.3.4.5	TABLE: T.5 External short circuit				P
No.	external temperature (℃)	No.	external temperature (℃)	No.	external temperature (℃)
C1#	102.0	C5#	99.3	C9#	100.5
C2#	101.1	C6#	100.4	C10#	102.3
C3#	105.2	C7#	107.2	---	---
C4#	103.0	C8#	107.3	---	---
Remark: Five cells (C1# ~ C5#) at first cycle in fully charged states and five cells (C6#~ C10#) after 25 cycles ending in fully charged states are used.					

38.3.4.6	TABLE: T.6 Crush				P
No.	external temperature (℃)	OCV before test (V)	No.	external temperature (℃)	OCV before test (V)
C11#	24.7	4.01	C16#	25.5	3.99
C12#	25.2	3.99	C17#	25.9	4.01
C13#	25.4	3.98	C18#	24.9	4.00
C14#	23.9	3.99	C19#	25.7	3.98
C15#	24.7	3.98	C20#	24.4	4.01
Remark: Five cells (C11# ~ C15#) at first cycle at 50% of the design rated capacity and five cells (C16#~ C20#) after 25 cycles at 50% of the design rated capacity are used.					

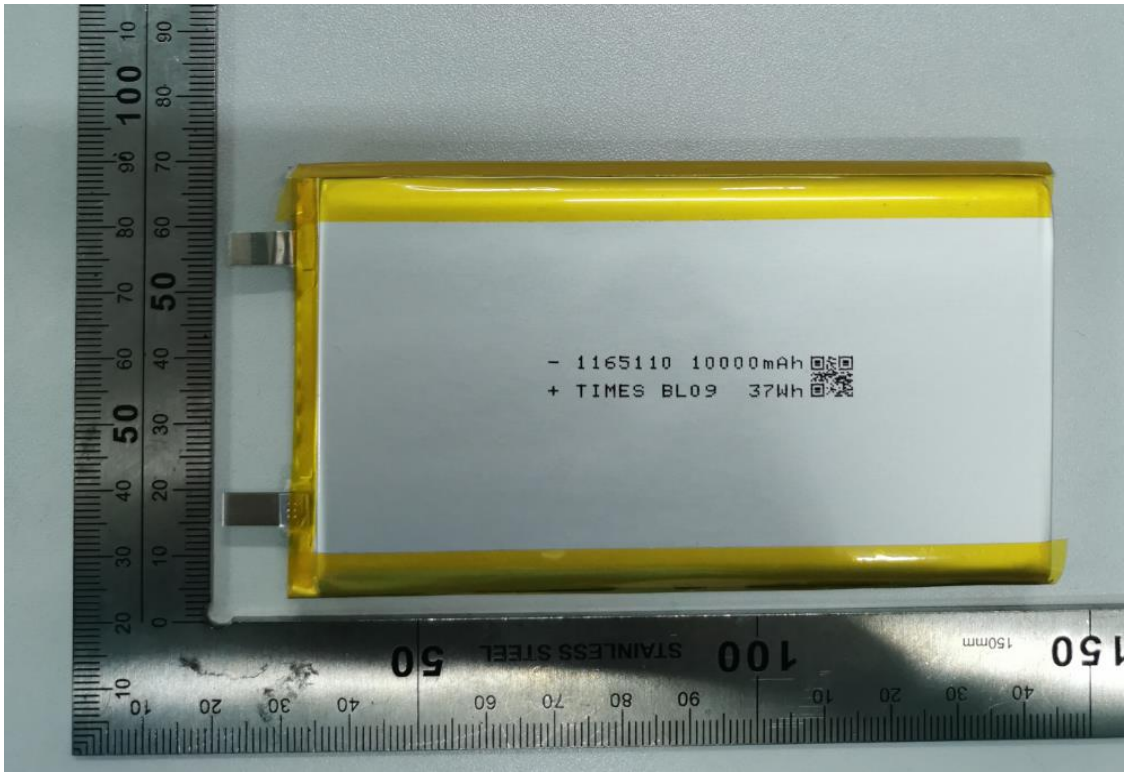
38.3.4.7	TABLE: T.7 Overcharge								N/A
No.									
OCV before test(V)									
Remark:									

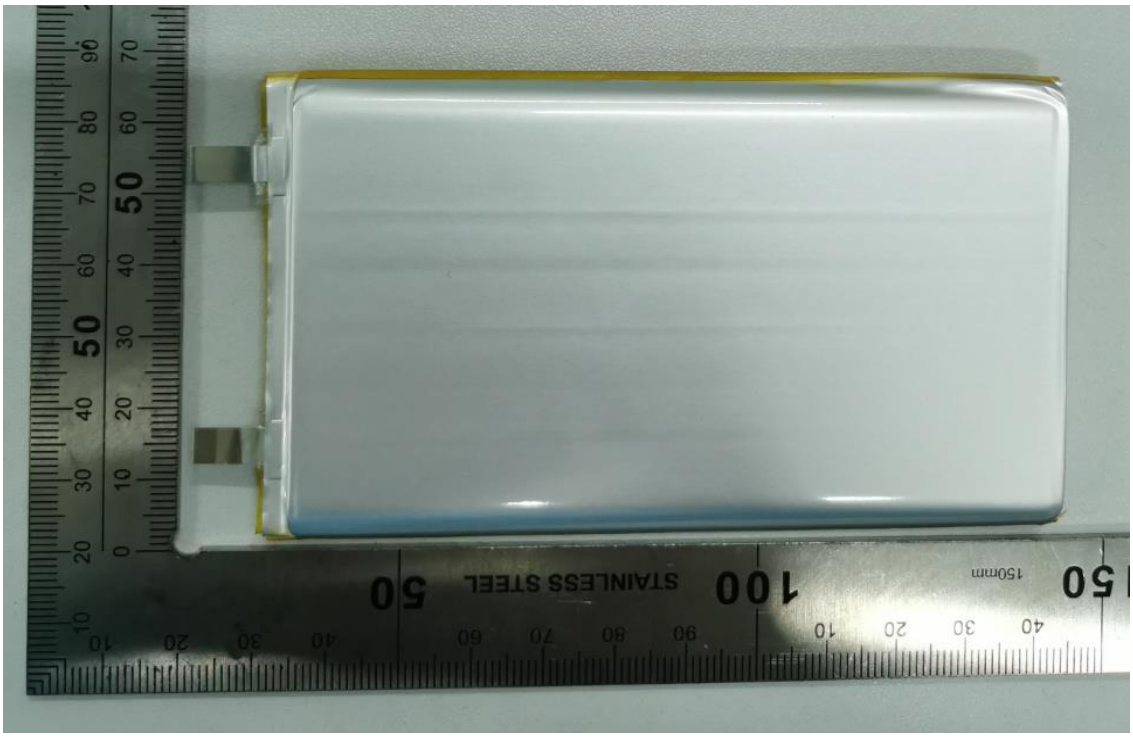
38.3.4.8	TABLE: T.8 Forced discharge								P
No.	C21#	C22#	C23#	C24#	C25#	C26#	C27#	C28#	C29#	C30#
OCV before test(V)	3.30	3.29	3.27	3.27	3.31	3.28	3.29	3.22	3. 24	3.28
No.	C31#	C32#	C33#	C34#	C35#	C36#	C37#	C38#	C39#	C40#
OCV before test(V)	3.29	3.24	3.27	3.27	3.31	3.29	3.30	3.23	3. 25	3.27
Remark:Ten cells (C21#~ C30#) at first cycle in fully discharged states and ten cells (C31#~ C40#) after 25 cycles ending in fully discharged states are used.										

List of test equipment used:

No.	Equipment	Model No.	Valid until
SB13860	Battery performance testing system	CT-4008-5V6A-S1	Aug.05, 2020
SB13861	Battery performance testing system	CT-4008-5V6A-S1	Aug.05, 2020
SB13141	Battery performance testing system2	BTS-15V10A	Aug.05, 2020
SB13142	Battery performance testing system2	BTS-15V10A	Aug.05, 2020
SB0120	Electronic scales	C500	Oct.19,2020
SB6690	Battery high temperature chamber	GGW-0150	Aug.26, 2020
SB6689	Altitude simulation test of the low pressure test unit	ZK-200	May.24, 2020
SB11804	High and low temperature impact test chamber	GDW/JB-1000	Feb.11,2021
SB12639	Digital vibration test system	GX-600-ZD	Jul.10, 2020
SB13132	Battery Mechanical Stress Tester/Impact Tester	GX-5099-30NE	Setp.23, 2020
SB6687	High-temperature short-circuit test chamber	DGW	May.15, 2020
SB6682	Impact test system	DGZ	Oct.27,2020
SB6684	Crush test system	DGY	Nov.10,2020
SB7570	Temperature recorder	LR8400-21	Jul. 01, 2020

Photos





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