



TEST REPORT UN38.3 TRANSPORT OF DANGEROUS GOODS - Lithium metal and lithium ion batteries		
Report Number..... : 20231027-4790940978		
Date of issue..... : 2023-10-27		
Total number of pages : 23		
Manufacturer's identification:		
Name : SharkNinja Operating LLC		
Address..... : 89 A Street, Suite 100, Needham, MA 02494, USA		
Phone number : 617-584-6773		
Email..... : wbirdsell@sharkninja.com		
Website : Sharkninja.com		
Test specification:		
Standard : ST/SG/AC.10/11/Rev.7/Amend.1		
Test procedure : Type Approved		
Non-standard test method : N/A		
Test item description:		
Trade Mark..... : Shark		
Manufacturer : SharkNinja Operating LLC		
Model/Type reference : FA200-2S2P		
Ratings : 7.2V, 4000mAh		
Testing procedure and testing location:		
Testing Laboratory:	UL-CCIC Company Limited Guangzhou Branch	
Address.....	Rm101, 201, 301, 401, Block B, Electronic Building, No.8, Nanyun Er Road, Huangpu District, Guangzhou, Guangdong, China	
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Tested by (name + title + signature)	Jessica Rowland / Handler	
Approved by (name + title + signature) ...	William E. Platts / Reviewer	

Summary of testing:	
Tests conducted and results:	
T.1 Altitude simulation	Pass;
T.2 Thermal test	Pass;
T.3 Vibration	Pass;
T.4 Shock	Pass;
T.5 External short circuit	Pass;
T.7 Overcharge	Pass;

Test item particulars: Chemistry : ☐ lithium metal / ☒ lithium ion Mass : 2.8kg (end product) / 320g (battery) Lithium content (for lithium metal) : N/A Wh capacity (for lithium ion) : 28.8 Wh Battery connection configuration (X-S/Y-P) : 2S/2P	
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 : 2023-08-30 Date (s) of performance of tests : 2023-09-13 to 2023-10-20	
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. Throughout this report a ☐ comma / ☒ point is used as the decimal separator.	
Name and address of factory (ies) : Ningbo Zhekai Electric Appliance Co., Ltd. Cixi Branch No. 610 Qiaotou Road, Shanglinhu Village, Qiaotou Town, Ningbo, Zhejiang Province	
General product information: Secondary Lithium ion Battery Pack has 2 parallel cells connected to 2 cells in series (2S/2P) and is contained in a fan.	

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.3	Assembled battery testing requirements		
38.3.3 (f)	The battery assembly has aggregate lithium content of not more than 500 g (lithium metal type) or with a Watt-hour rating of not more than 6 200 Wh (lithium ion type), and is assembled from batteries that have passed all applicable tests. One assembled battery in a fully charged state is tested under tests T.3, T.4 and T.5, and, in addition, test T.7 in the case of rechargeable battery.		N/A
38.3.3 (g)	Batteries that have passed all applicable tests are electrically connected to form a battery in which the aggregate lithium content is more than 500 g (lithium metal type) or with a Watt-hour rating of more than 6 200 Wh (lithium ion type). The assembled battery is not tested if the assembled battery is of a type that has been verified as preventing: (i) Overcharge; (ii) Short circuits; and (iii) Over discharge between the batteries.		N/A
38.3.4	Transport tests		Pass
38.3.4.1	Test T-1: Altitude simulation		Pass
	Cells or batteries are stored at a pressure of 11.6 kPa or less for at least 6 h at ambient temperature.		Pass
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.1	Pass
38.3.4.2	Test T-2: Thermal test		Pass
	Cells or batteries previously subjected to altitude simulation test.		Pass
	Cells or batteries are stored for at least 6 h at a test temperature of 72 ± 2 °C, followed by storage for at least 6 h at a test temperature of -40 ± 2 °C. Maximum time for transfer is 30 minutes. This procedure is repeated until 10 total cycles are complete, after which all test cells and batteries are to be stored for 24 hours at ambient temperature.		Pass
	For large cells or batteries the duration of exposure to the test temperatures is at least 12 h instead of 6 h.		N/A
	Storage for at least 24 h at ambient temperature.		Pass
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.2	Pass
38.3.4.3	Test T-3: Vibration		Pass
	Cells or batteries previously subjected to thermal test		Pass

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Cells or batteries are subjected to the following sinusoidal vibration with a logarithmic sweep: 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 and the frequency increased until a peak acceleration of 8 g _n occurs (approximately 50 Hz). A peak acceleration of 8 g _n is then maintained until the frequency is increased to 200 Hz.		Pass
	Large batteries are subjected to the following sinusoidal vibration with a logarithmic sweep: 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 and the frequency increased until a peak acceleration of 2 g _n occurs (approximately 25 Hz). A peak acceleration of 2 g _n is then maintained until the frequency is increased to 200 Hz.		N/A
	Cycle is repeated 12 times for a total of 3 h for each of three mutually perpendicular mounting positions. One of the directions is perpendicular to the terminal face.		Pass
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.3	Pass
38.3.4.4	Test T-4: Shock		Pass
	Cells or batteries previously subjected to vibration test.		Pass
	Cells or batteries are subjected to three shocks in each direction of three mutually perpendicular mounting positions of the cell or battery for a total of 18 shocks.		Pass
	Cells are subjected to half-sine shock of peak acceleration of 150 g _n and pulse duration of 6 ms.		N/A
	As an alternative, large cells are subjected to a half-sine shock of peak acceleration of 50 g _n and pulse duration of 11 ms.		N/A
	Small batteries are subjected to half-sine shock of peak acceleration of the smaller of the following and pulse duration of 6 ms: - 150 g_n; or - $\sqrt{(100850 / \text{mass in kg})}$ g_n		Pass
	Large batteries are subjected to half-sine shock of peak acceleration of the smaller of the following and pulse duration of 11 ms: - 50 g_n; or - $\sqrt{(30000 / \text{mass in kg})}$ g_n		N/A
	Results: no leakage, no venting, no short-circuit, no rupture, no explosion and no fire during this test.	See appended Table 38.3.4.4	Pass

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
38.3.4.5	Test T-5: External short-circuit		Pass
	Cells or batteries previously subjected to shock test.		Pass
	Cells or batteries are heated for a period of time necessary to reach a homogeneous stabilized temperature of 57 ± 4 °C, measured on the external case.		Pass
	Cells or batteries are subjected to a short-circuit condition with a total external resistance of less than 0.1 ohm at 57 ± 4 °C. Short-circuit condition is continued for at least 1 h after the cell or battery external case temperature has returned to 57 ± 4 °C, or in the case of the large batteries, has decreased by half of the maximum temperature increase observed during the test and remains below that value.		Pass
	The test sample is observed for a further 6 h.		Pass
	Results: no excessive temperature rise, no rupture, no explosion and no fire during this test and within the 6 h of observation.	See appended Table 38.3.4.5	Pass
38.3.4.6	Test T-6: Impact / crush		N/A
	The test is conducted using test cells or component cells that have not been previously subjected to other transport tests.		N/A
	Each test cell or component cell shall be subjected to one impact / crush only.		N/A
	Cylindrical cells not less than 18.0 mm in diameter are tested with impact test procedure.		N/A
	The cell is placed on a flat smooth surface. A stainless steel bar with a diameter of 15.8 ± 0.1 mm and a length of at least 60 mm or of the longest dimension of the cell, whichever is greater, is placed across the centre of the test sample. A mass of 9.1 ± 0.1 kg is dropped from a height of 61 ± 2.5 cm at the intersection of the bar and the test sample using a vertical sliding track or channel. The vertical track is oriented 90 degrees from the horizontal supporting surface.		N/A
	The test sample is impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the steel bar lying across the centre of the test sample.		N/A
	Prismatic, pouch, coin/button cells and cylindrical cells less than 18.0 mm in diameter are tested with crush test procedure.		N/A

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	The cell is 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.		N/A
	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.		N/A
	The crushing is to be continued until one of the three conditions below is reached: - The applied force reaches 13 ± 0.78 kN; - The voltage of the cell drops by at least 100 mV; or - The cell is deformed by 50 % or more of its original thickness. As soon as one of the above conditions has been obtained, the pressure shall be released.		N/A
	The test sample is observed for a further 6 h.		N/A
	Results: no excessive temperature rise, no explosion and no fire during this test and within the 6 h of observation.	See appended Table 38.3.4.6	N/A
38.3.4.7	Test T-7: Overcharge		Pass
	The charge current of the battery is twice the manufacturer's recommended maximum continuous charge current.		Pass
	The manufacturer's recommended charge voltage is not more than 18 V. The minimum voltage of the test is the lesser of two times the maximum charge voltage of the battery or 22 V.		Pass
	The manufacturer's recommended charge voltage is more than 18 V. The voltage of the test is not less than 1.2 times the maximum charge voltage.		N/A
	The test is conducted at ambient temperature. The charging condition is maintained for at least 24 h.		Pass
	The test sample is observed for a further 7 days.		Pass
	Results: no explosion and no fire during this test and within the 7 days of observation.		Pass
38.3.4.8	Test T-8: Forced discharge		N/A
	Each cell is forced discharged at ambient temperature by connecting it in series with a 12 V direct current power supply at an initial current equal to the maximum continuous discharge current specified by the manufacturer. Time interval for discharging equals to rated capacity divided by the initial test current.		N/A
	The test sample is observed for a further 7 days.		N/A

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict
	Results: no explosion and no fire during this test, nor within the 7 days of observation.		N/A

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.1	TABLE: Altitude							Pass
Sample No.	Pre-condition	Mass before test (g)	Mass after test (g)	Mass loss (%)	Open circuit voltage before test (V)	Open circuit voltage after test (V)	Voltage remain (%)	Results
6404775-S1	C	2799.6	2799.0	0.021	8.328	8.316	99.856	A, B
6404761-S1	C	2794.4	2793.6	0.029	8.321	8.309	99.856	A, B
6291008-S1	C	2798.4	2797.5	0.032	8.331	8.316	99.820	A, B
6404759-S1	C	2801.4	2800.8	0.021	8.351	8.338	99.844	A, B
6404768-S1	D	2795.8	2795.2	0.021	8.355	8.344	99.868	A, B
6404762-S1	D	2796.1	2795.2	0.032	8.328	8.317	99.868	A, B
6404763-S1	D	2789.6	2788.9	0.025	8.329	8.319	99.880	A, B
6404769-S1	D	2799.4	2798.7	0.025	8.332	8.319	99.844	A, B

Supplementary information:

Precondition:

- A: Fully discharged state.
- B: Undischarged state.
- C: First cycle in fully charged state.
- D: After 25 cycles ending in fully charged state.

Results:

- A: No leakage, no venting, no short-circuit (voltage remain $\geq 90\%$), no rupture, no disassembly (explosion), and no fire.
- B: Other (please explain) This test was completed with the battery pack installed in the end product.

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.2	TABLE: Thermal Test							Pass
Sample No.	Pre-condition	Mass before test (g)	Mass after test (g)	Mass loss (%)	Open circuit voltage before test (V)	Open circuit voltage after test (V)	Voltage remain (%)	Results
6404775-S1	C	2799.0	2801.2	0	8.316	8.160	98.124	A, B
6404761-S1	C	2793.6	2795.6	0	8.309	8.146	98.038	A, B
6291008-S1	C	2797.5	2799.9	0	8.316	8.150	98.004	A, B
6404759-S1	C	2800.8	2803.2	0	8.338	8.164	97.913	A, B
6404768-S1	D	2795.2	2798.5	0	8.344	8.171	97.927	A, B
6404762-S1	D	2795.2	2798.0	0	8.317	8.158	98.088	A, B
6404763-S1	D	2788.9	2791.1	0	8.319	8.153	98.005	A, B
6404769-S1	D	2798.7	2801.3	0	8.319	8.152	97.993	A, B

Supplementary information:

Precondition:

- A: Fully discharged state.
- B: Undischarged state.
- C: First cycle in fully charged state.
- D: After 25 cycles ending in fully charged state.

Results:

- A: No leakage, no venting, no short-circuit (voltage remain $\geq 90\%$), no rupture, no disassembly (explosion), and no fire.
- B: Other (please explain) This test was completed with the battery pack installed in the end product.

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.3	TABLE: Vibration							Pass
Sample No.	Pre-condition	Mass before test (g)	Mass after test (g)	Mass loss (%)	Open circuit voltage before test (V)	Open circuit voltage after test (V)	Voltage remain (%)	Results
6404775-S1	C	323.25	323.22	0.009	8.085	8.111	100	A, B
6404761-S1	C	319.59	319.54	0.016	8.067	8.092	100	A, B
6291008-S1	C	323.48	323.44	0.012	8.083	8.112	100	A, B
6404759-S1	C	323.73	323.74	0.000	8.068	8.098	100	A, B
6404768-S1	D	322.65	322.63	0.006	8.090	8.111	100	A, B
6404762-S1	D	322.55	322.54	0.003	8.074	8.099	100	A, B
6404763-S1	D	322.87	322.85	0.006	8.080	8.103	100	A, B
6404769-S1	D	322.23	322.21	0.006	8.080	8.109	100	A, B

Supplementary information:

Precondition:

- A: Fully discharged state.
- B: Undischarged state.
- C: First cycle in fully charged state.
- D: After 25 cycles ending in fully charged state.

Results:

- A: No leakage, no venting, no short-circuit (voltage remain $\geq 90\%$), no rupture, no disassembly (explosion), and no fire.
- B: Other (please explain) After T.2 test, battery samples were removed from end product and remaining tests were done only on battery samples. Samples were still compliant with tests but weight was reduced for tests T.3 – T.5.

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.5	TABLE: External short-circuit				Pass
Sample No.	Pre-condition	Open circuit voltage before test (V)	Maximum case temperature (°C)	Total external resistance (mΩ)	Results
6404775-S1	C	8.111	57.1	84.1	A
6404761-S1	C	8.091	57.3	90.5	A
6291008-S1	C	8.111	56.8	89.9	A
6404759-S1	C	8.098	57.0	79.3	A
6404768-S1	D	8.110	56.7	85.6	A
6404762-S1	D	8.096	56.9	87.0	A
6404763-S1	D	8.102	56.9	89.3	A
6404769-S1	D	8.108	57.2	95.2	A

Supplementary information:

Precondition:

- A: Fully discharged state.
- B: Undischarged state.
- C: First cycle in fully charged state.
- D: After 25 cycles ending in fully charged state.

Results:

- A: No excessive temperature rise (above 170°C), no rupture, no disassembly (explosion), and no fire.
- B: Other (please explain)

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.6a	TABLE: Impact			N/A
Sample No.	Precondition	Open circuit voltage before test (V)	Maximum case temperature (°C)	Results
Supplementary information: Precondition: A: Undischarged. B: Fully discharged. C: First cycle in one-half discharged state. D: After 25 cycles in one-half discharged state. Results: A: No excessive temperature rise (above 170°C), no disassembly (explosion), and no fire. B: Other (please explain)				

38.3.4.6b	TABLE: Crush			N/A
Sample No.	Precondition	Open circuit voltage before test (V)	Maximum case temperature (°C)	Results
Supplementary information: Precondition: A: Undischarged. B: Fully discharged. C: First cycle in one-half discharged state. D: After 25 cycles in one-half discharged state. Results: A: No excessive temperature rise (above 170°C), no disassembly (explosion), and no fire. B: Other (please explain)				

UN 38.3			
Clause	Requirement + Test	Result - Remark	Verdict

38.3.4.7	TABLE: Overcharge					Pass
Sample No.	Precondition	Open circuit voltage before test (V)	Maximum charging current (mA)	Maximum charging voltage (V)	Total charging time (h)	Results
6404765-S1	A	8.331	1400	16.8	24	A
6404774-S1	A	8.331	1400	16.8	24	A
6404772-S1	A	8.335	1400	16.8	24	A
6404770-S1	A	8.329	1400	16.8	24	A
6404766-S1	B	8.331	1400	16.8	24	A
6404764-S1	B	8.330	1400	16.8	24	A
6404767-S1	B	8.334	1400	16.8	24	A
6404771-S1	B	8.329	1400	16.8	24	A

Supplementary information:

Precondition:

A: First cycle in fully charged state.

B: After 25 cycles ending in fully charged state.

Results:

A: No disassembly (explosion), and no fire.

B: Other (please explain)

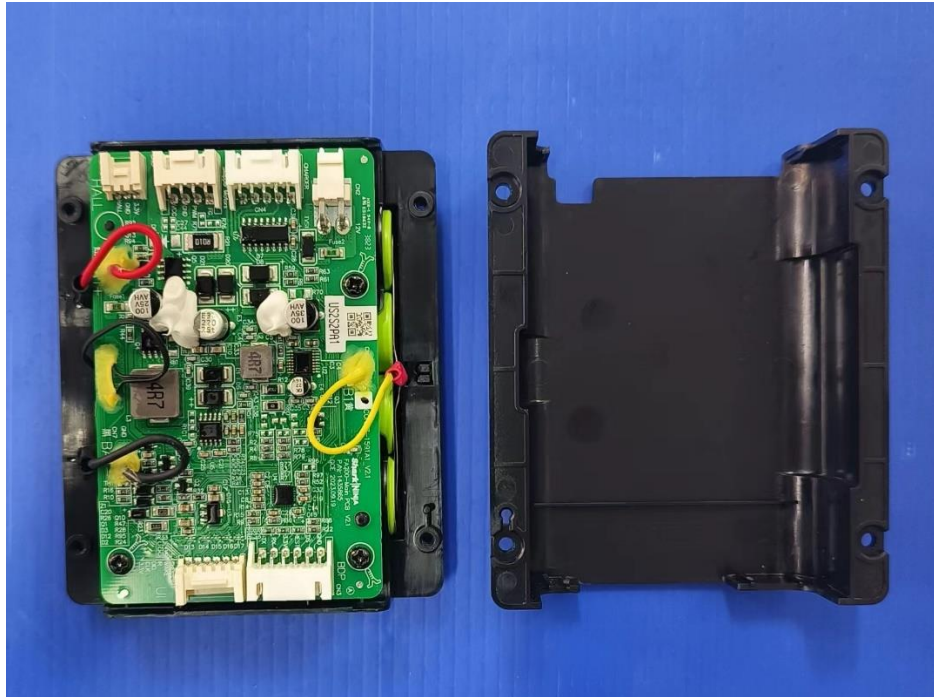
ENCLOSURE

Supplement Id	Description
01	Overall view of entire product
02	Internal view of battery pack
03	Exploded View of battery pack
04	Specification
05	Packaging Method

ID 01



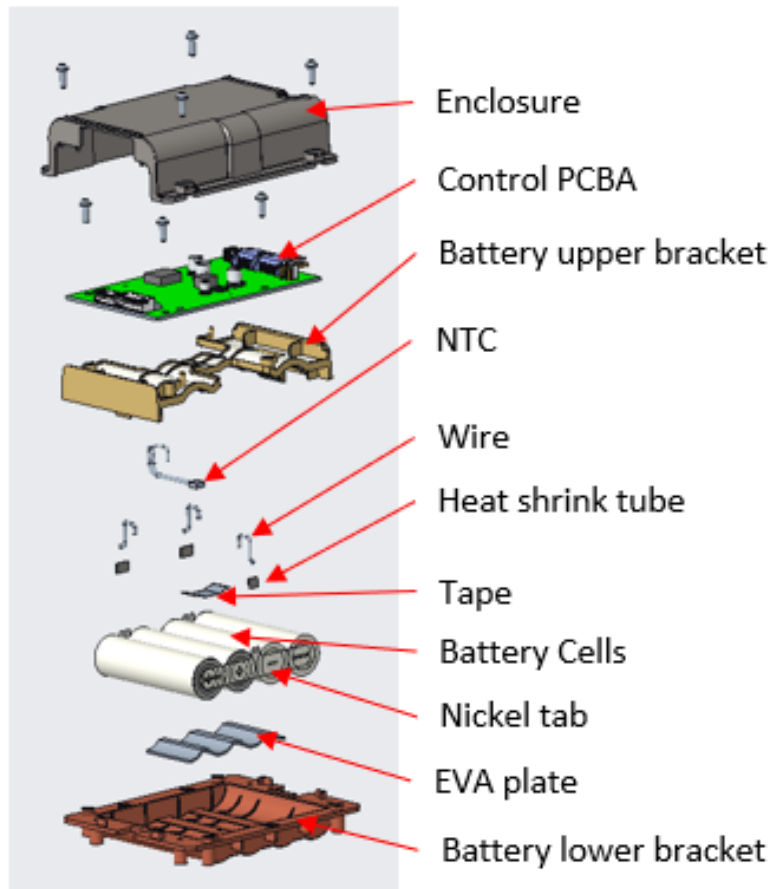
ID 02



ID 03



Exploded drawing



2、描述(SCOPE):

A 本规格书仅适用于 FA200-2S2P 机型锂离子电池包产品性能指标。

B 本规格书描述的内容包含电源板和电芯。

3、电池包特性 (Battery character) :

项目 ITEM	参数 specification	
电池包型号 Battery pack model	FA200-2S2P	
电芯型号 Single battery model	Sun Power INR18650-2000(20P)	
电芯组合 Cell assembling	2S2P	
标称电压 Rated Voltage	7.2V	
标称容量 Nominal Capacity	4000mAh	
电池内阻 Internal impedance	$\leq 20\text{m}\Omega(\text{AC } 1\text{kHz})$	
最大电芯压差 Max. cell voltage difference2	$\leq 5\text{mV}$	电芯配对要求: (此标准不做为配对组合后的成品

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最大电芯内阻差 Max. cell internal impedance difference	$\leq 2.5\text{m}\Omega$	检验标准) Cells matching requirement: (this standard is not as a product inspection standard after the pack)
容量差 Capacity difference	$\leq 20\text{mAh}$	
充电截止电压 end-of charge voltage	8.4V	
放电截止电压 Discharger cut-off voltage	5.5V	
最大充电电压 Max. charge voltage	16V	
最小充电电压 Min. charge voltage	9.5V	
最大持续充电电流 Maximum continuous charging current	700mA (Adapter output current)	
充电低温保护 Charge Low Temperature Protection	$3 \pm 3^\circ\text{C}$	
放电高温保护 Discharge High Temperature Protection	$67 \pm 3^\circ\text{C}$	
放电低温保护 Discharge Low Temperature Protection	$-17 \pm 3^\circ\text{C}$	
充电温度范围: Charging temperature range	$3 \sim 42^\circ\text{C}$	
储藏温度 Storage temperature	$-10^\circ\text{C} \sim 45^\circ\text{C}$, 相对湿度(Relative humidity): 0%~95%	
其他 Others	所有材料要求符合 ROHS. All material must meet ROHS requirement.	
电池包重量 Pack Weight	约 280g	

ID 05

