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Phylion Lithium-ion Cell

Product Specifications

Cell Model: IMP18/66/133(13)HA

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No.	Revision Dates	Items
1	2013-8-1	First release
2	2016-1-6	Company name changed

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1 Scope

This product specification is applied to the IMP18 / 66/133 (13) HA prismatic aluminum lithium-ion cell by Phylion Battery Co., Ltd.

Cells should be strictly tested in accordance with the method specified in this specification, if any question for test items or method, please contact Phylion.

2 Product type and model

2.1 Product Type: Prismatic aluminum lithium-ion cell

2.2 Model: IMP18/66/133(13)HA

3 Main technical parameters

Item		Nominal Value	Note
3.1	Capacity	13000mAh	0.5CmA (6500mA) discharge
3.2	Nominal Voltage	3.7V	0.5CmA (6500mA) discharge
3.3	Internal Resistance	≤6.0mΩ	
3.4	Discharge cut off voltage	2.70V	
3.5	Charge Current	6500mA	Standard charge (CC-CV 4.20V)
3.6	Max Charge Voltage	4.20V	
3.7	Max Charge Current	13000mA	1.0CmA, , </=30seconds
3.8	Max Discharge Current	26000mA	2.0CmA, </=30seconds
3.9	Weight	~ 320g	
3.10	Operating temp. & humidity range	Charge	-5~+45℃
		Discharge	-20~+60℃
3.11	Storage temp.	<1 month	During transport: 20℃ suggested
		>6 months	

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4 Product dimensions & Appearance																		
4.1 Dimension																		
Cell dimensions refer to "10 IMP18 / 66/133 (13) HA Dimensions illustration"																		
Thickness: 18mm max. (@ 25 ± 2 °C) Width: 66mm max.(@ 25 ± 2 °C) Height: 133mm max.(@ 25 ± 2 °C)																		
Note: Cells dimension may be slightly altered if storage or used at high temperatures.																		
4.2 Appearance																		
Cell surface should be clean, electrolyte leakage free, no visible scratches or mechanical damages, no distortion, no other cosmetic defects that effect cells functionality.																		
5 Performance																		
5.1 Test Standard Conditions																		
The tested cells must be less than one month from production dates, and have not been <= 5 times the charge/discharge cycles. Unless other specified such specification required test conditions: 25±2℃, 45% to 85% relative humidity. If other to be proved conditions that will not affect cells testing result, then test could also be done at: @15 ~ 30℃, 25% to 85%relative humidity.																		
5.2 Test Facilities Requirements																		
(1) Accuracy of dimension instrument measurements shall be >= 0.01mm.																		
(2) The accuracy of the multi-meter to measure voltage and current should be >= 0.5 level, resistance should be >= 10kΩ / V when measured voltage.																		
(3) Measure theory of resistance tester was AC impedance method (1kHz LCR).																		
(4) Accuracy of battery test system shall be ± 0.1% or more, constant voltage accuracy ± 0.5%, timing accuracy > ± 0.1%.																		
(5) The accuracy of temperature measurement instruments should > ± 0.5 °C.																		
5.3 Standard charge																		
0.5CmA(6000mA) 4.20V(CC-CV)																		
Current cut-off is 300mA, the total charging time is < 3.5 hours. To shorten test cycle time, stop charging when constant current < 500mA.																		
5.4 Storage Time																		
If no special requirements, the interval between charge and discharge is 60minutes.																		
5.5 Initial performance testing																		
<table><tr><th>Item</th><th>Test Method</th><th>Requirement</th></tr><tr><td>(1) Open circuit voltage</td><td>After standard charging, to measure open circuit voltage within 24 hours</td><td>≥4.15V</td></tr><tr><td>(2)AC internal resistance</td><td>After standard charging, @25±2℃ to check internal resistance with AC resistance measurement method.</td><td>≤6mΩ</td></tr><tr><td>(3) Nominal capacity test</td><td>After standard charging, storage for 30min, discharge to 2.70V @ 0.5CmA (6000mA), to test cell capacity (defined as C₂)</td><td>C₂≥12000mAh</td></tr></table>							Item	Test Method	Requirement	(1) Open circuit voltage	After standard charging, to measure open circuit voltage within 24 hours	≥4.15V	(2)AC internal resistance	After standard charging, @25±2℃ to check internal resistance with AC resistance measurement method.	≤6mΩ	(3) Nominal capacity test	After standard charging, storage for 30min, discharge to 2.70V @ 0.5CmA (6000mA), to test cell capacity (defined as C ₂)	C ₂ ≥12000mAh
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5.6 Electrical performance test**5.6.1 Discharge temp characteristics**

Full charged @25±2 °C standard way, then cooled or heated to the test temperature in 30 minutes. Before discharging, the cell is stored at this temperature for 1 hour, the discharge current is 0.5CmA (6500mA), after one temperature test done, the cell is placed for 2h at room temperature and then was charged (@25±2 °C), requirements are as follows:

Discharge temperature	-20°C	25°C	55°C
Discharge Capacity	≥11700mAh	≥13000mAh	≥12350mAh
Discharge Time	≥108min	≥120min	≥114min

5.6.2 Cycling Performance

After standard charged, stored for 30min, discharge @ 1.0CmA to 2.7V, stored for 60min, repeat above steps cycles until cell discharge capacity ≤7800mAh for consecutive 3times, test temperature 25±2°C (the important parameters which affect battery cycle performance), required as follows

Cycle times ≥1500 times

5.6.3 Capacity Remaining Capability

Item		Test method	Requirement
Storage @ Room temperature	1	After standard charged, battery stored at 25±2°C environment for 28 days, test the discharge capacity at 0.2CmA (remaining capacity)	Remaining capacity≥11050mAh
	2	Cycle 3 times @ 0.5CmA, then test recovery capacity (Highest discharge capacity in 3 cycles)	Capacity Recovery≥11700mAh

5.6.4 Long-term Storage Performance

Tested cells should be within 3 months after production dates, ~50% SOC before storage, then placed in open circuit for 365 days, under 25±2°C ambient conditions @0.5CmA, cycle for 3 times, test recovery capacity (Highest capacity in three cycles), requirements as the following:

Capacity recovery≥11050mAh

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5.7 Mechanical features

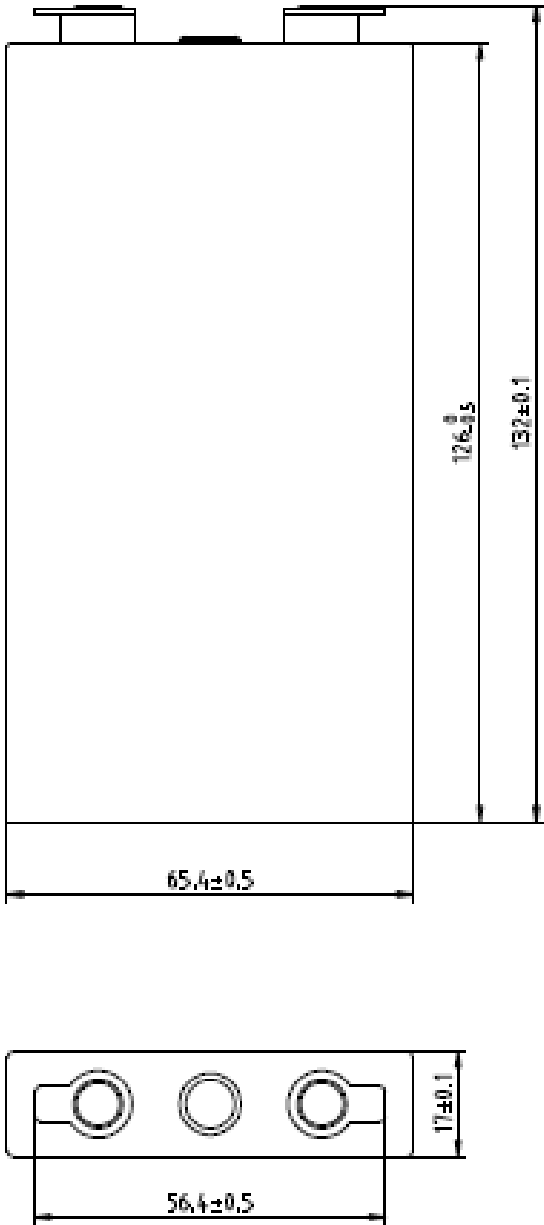
Items	Test method	Requirements
Vibration	After standard charging, mounting cells on vibration bench, test in X, Y, Z three vertical directions, @10 ~ 55Hz frequency @ 1Hz/min rate, vibration displacement @ 0.8mm, reciprocating @90min.	No obvious damage, leakage, smoke or explosion outside. ≥10800mAh discharge capacity @ 0.5C
Free Fall	After cell vibration test ,under the following conditions free drop test: --Drop height: 1.0m; --To undertake matter: 18 ~ 20mm thickness hardboard; --Drop direction: horizontal direction, once in both front and back side.	No obvious damage, leakage, smoke or explosion outside. ≥10800mAh discharge capacity @ 0.5C.

5.8 Safety test

Items	Test methods	Requirements
Heavy impact	Cell placed in the impact bench, 1pcs 10kg weight hammer free fall from a height of 1m, to impact the cell which has been fixed in the test jig (the largest surface of cell should be perpendicular with the test bench)	No fire or explosion
Short Circuit	Place the cell connected with a thermocouple in a fume cupboard, short-circuiting its “+”/“-”(short circuit cable total resistance <100mΩ), during the test monitoring cell temp change , when temp. dropped to about 10 °C lower than the peak, stop test .	No fire or explosion
Compression	Place the fully charged cell in the middle of two extruded flat, gradually increasing the pressure to 13 kN ± 1kN, Extruding prismatic cell wide face and narrow face, each cell can only accept one time compression. Once the pressure reaches the maximum or cell voltage drops dramatically into 1/3 of initial voltage , stop compression.	No fire or explosion
Forced discharge	Discharge cell @0.5CmA constant current discharge to the cell cut off voltage, then @ 1.0CmA reverse charge such single cell ,required charging time is > 90min	No fire or explosion
Thermal shock	Put cell in hot cabin, increase cabin temperature into 130±2°C at (5±2°C)/min rate, and keep for 10min.	No fire or explosion
Over Charge	@3CmA constant current @ 10V limit to charge a fully charged cell with a constant current stabilized voltage supply, stop such test until cell explore, fire, or charge time reach 90min.	No fire or explosion

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6 Using Guide Carefully read the following precautions to ensure proper use lithium-ion cells or packs. Phylion Battery Co., Ltd. shall not be responsible for any problems arising from violations of the following precautions. Danger! Failure to read the following instructions may cause leakage, explosion or fire; --Do not put the battery or cell into water or get it wet; --Do not use or store the battery or cell near the heat source (like fire or heater); --Please use the original charger; --Do not reverse the positive and negative; --Do not connect the battery or cell directly to a wall adapter or car cigarette lighter socket; --Do not put battery or cell into fire or heat; --Prohibit short circuit "+" /" - " by wire or other metal objects, prohibit necklaces, hairpins or other metal objects together with battery or cell for transport or storage; --Forbid striking, throwing or subjecting the battery or cell to avoid mechanical shock; --Forbid using nails or other sharp objects piercing the battery or cell case, no hammering or stampeding --Forbid directly welding the battery or cell terminals; --Forbid disassembling the battery or cell in any way. --Forbid charging the battery or cell under fire or extreme heat conditions; Warning Failure to read the following instructions may cause leakage, explosion or fire. --Prohibit the battery or cell into a microwave oven or pressure vessel. --Prohibit using with primary batteries or cells (such as dry batteries) or different capacity, type, variety battery combinations --If the battery or cell gives off peculiar smell, heat, deformation, discoloration, or appear any other abnormal phenomenon are not allow to use; if the battery is being used or charging, should immediately stop using and remove from electrical appliances or charger; --Battery or cell should be kept out of reach of children to prevent misusing; --If the battery or cell leaks or emits an odor, immediately remove it from near open flames; --Electrolyte leakage may cause a fire or explosion; --If the battery or cell leaks electrolyte gets into your eyes, do not rub, rinse with water, seek medical attention immediately. If not promptly treated, the eyes will be hurt. Attention --Do not use the battery in extremely hot environment such as direct sunlight or in a car in a hot day. Otherwise, the battery will overheat, catch fire (light), this will affect battery performance and shorten battery life. --Only using battery under the following conditions, otherwise it will reduce battery performance or shorten battery life. It may cause overheating, explosion or fire outrange such temperature. working environment: Charge: -5°C~45°C Discharge: -20°C~60°C Store for 30 days: -20°C~45°C Store for 90 days: -20°C~35°C						
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--Children should be taught to use battery properly and close attention should be given to ensure proper use. --In case cell electrolyte leakage on skin or cloths, must be used with flowing water to wash the affected, otherwise, may skin inflammation. --Use battery using manual for proper assembling and disassembling. --In case long time no use, remove battery and put in cool, dry area, otherwise, battery may get rusted and performance worsens. --In case dusty battery connectors, clean with dry cloth before using to avoid not good connection, which may cause wasted power or cannot be charged or discharged.						
7 Warranty One year after Phylion factory delivery. Phylion is responsible for swapping in case of cell quality problems in such one year. And problem due to customers’ misuse will be exempted from this.						
8 Cells Status when factory delivery @ ~50% SOC, with 3.85~3.95V.						
9 Spec Future Modification Phylion reserves right to modify such spec and with further notice to customers later.						
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10 IMP18/66/133(13)HA Cell Dimension						
 The technical drawing illustrates the dimensions of the IMP18/66/133(13)HA battery cell. The front view shows a rectangular cell with a width of 65.4 ± 0.5 mm and a height of 126.4 ± 0.5 mm. The side view shows a height of 137 ± 0.1 mm. The top view shows a width of 56.4 ± 0.5 mm and a height of 17 ± 0.1 mm. The cell has two terminals on the top and three terminals on the bottom.						
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