Specification Approval Sheet

Name：Polymer Lithium-Ion Battery

Model： AKYGA LP503050

SPEC：3.7V / 780mAh

Specification Modification Records

Modification Time	Descriptions	Issued Date	Approved By
	Release 1	2024-12-18	

Content

1.Scope:

This specification describes the Product Specification of chargeable Polymer Lithium-Ion Battery produced by Akyga Battery.

Specification Approval sheet

1. Scope

The specification is suitable for the performance of Lithium-Polymer (LiPo) rechargeable battery produced by the Akyga Battery

2.Model: LP 503050

3.Specification

NO.	Items	Specifications
1	Charge voltage	4.2V
2	Nominal voltage	3.7V
3	Nominal capacity	780mAh 0.2C Discharge
4	Charge current	Standard Charging:：0.2C Rapid charge： 1.0C
5	Standard Charging method	0.2C CC（constant current）charge to 4.2V,then CV(constant voltage 4.2V)charge till charge current decline to ≤0. 02C
6	Max charge current	1.0C
7	Max discharge current	2.0C
8	Discharge cut-off voltage	2.75V
9	Operating temperature	Charging： 0℃~45℃ Discharging：-10℃~60℃
10	Storage temperature	0℃~ 45℃
11	PACK Weight	Approx：16g

4.Battery PACK Performance Criteria

4 .1、Basic Electrical Characteristics

No.	Items	Test Conditions	Criteria
4.1.1	0.2C5A Capacity	The time which is measured with discharge current of 0.2 C5A CC(constant current) and 2.75V cut-off voltage after the standard charged.	Discharge Time≥300min
4.1.2	0.5C5A Capacity	The time which is measured with discharge current of 0.5 C5A CC(constant current) and 2.75V cut-off voltage after the standard charged.	Discharge Time≥114min
4.1.3	1C5A Capacity	The time which is measured with discharge current of 1 C5A CC(constant current) and 2.75V cut-off voltage after the standard charged.	Discharge Time≥54min
4.1.4	Open Circuit Voltage	The voltage measured cut-off voltage after the standard charged at 23±2℃	Voltage≥4.15V
4.1.5	Cycle Life	Carry out 400 cycles (0.5 C5A charge(constant current and voltage) to 4.2V / 0.5 C5A discharge with 3.0V cut-off voltage) at 23± 2℃. initial capacity means the third discharged capacity.	400 Cycles Retention Capacity ≧ 80% Initial
4.1.6	High Temperature Performance	The time which is measured with discharge current of 0.2C5A CC(constant current) to cut-off voltage after stored at 55±2℃ for 2 hours at a full charged state.	Discharge Time≥5h

4.1.7	Low Temperature Performance	The time which is measured with discharge current of 0.2C5A CC(constant current) and to cut-off voltage after stored at -10±2℃ for 4h at a full charged state.	Discharge Time≥3h

4.2、Environment Characteristics

4.2.1	Constant Temperature and Humidity	The charged cells are stored in the following condition: 40 ± 2℃ and 95%RH for 2 days,then placed in 23± 2℃ temperature for 2 hours. Check its appearance prior to being dicharged to 3.0v cut-off voltage at a constant current of 0.2C5A, the discharge time is measured.	Discharge Time≥3h;No deformation,No corrosion, No leakage,No vent,No crack,No fire,No explosion.

4.3、Safety Characteristics

Test environment: cells should be tested in a environment with safty measures and standard fully charged and left to 24h

No.	Items	Test Conditions	Criteria
4.3.1	External short-circuit	After standard charged fully, the cell is to be short-circuited by connecting the positive and negative terminals of cell with a circuit load having a resistance load of 80±20mΩ.The temperature of the cell case is to be recorded during the test. When one of the following two situations happens, the test is to be terminated. a) The cell's case temperature has down to 20% lower than the peak. b) The cell's short-circuit time reaches 24h.The tests are to be conducted at 20±5℃(or 55±5℃).The cells are to reach equilibrium at 20±5℃(or 55±5℃) before the terminals are connected.	No fire, No explosion. Max. Temp.of cell surface should not exceed 150℃

4.3.2	Overcharge	The cell is to be charged with a current of 3C5A CC and CV(constant current and constant voltage) and 4.6V cut-off voltage after discharging to 3.0V. When one of the following two situations happens, the test is to be terminated. a) The cell is to be charged continuously for 7h and the larger value in charging time that manufacturer has defined; b) The cell's case temperature has down to 20% lower than the peak.	No fire, No explosion
4.3.3	Forced discharge	The cell is to be discharged for 90min with a current of 1C5A after being discharged fully.	No fire、 No explosion.
4.3.4	Low pressure	The cell charged standard is to be placed in vacuum chamber with 20 ± 5℃ at a full charged state, then reduce the pressure to 11.6KPa, and keep 6h.	No leakage, No fire No explosion.
4.3.5	Temperature cycling	The cell charged standard is to be placed in a test chamber and subjected to the following cycles: (a)Raining the chamber-temperature to85 ± 2℃ within 30min and maintaining this temperature for 4h. b) Reducing the chamber-temperature to-40± 2℃ within 30min and maintaining this temperature for 6h.c) Repeating the sequence of a) to b) for a further 9cycles.d) After the10th cycle, recovering the temperature to 20±5℃.	No leakage, No fire No explosion.

4.3.6	Vibration	After charged standard, the cell is firmly secured to the platform of the vibration machine without distorting and to be subjected to harmonic motion with an amplitude of 0.8mm(excursion 1.6mm) 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 there mutually perpendicular mounting。The logarithmic sweep way:form 7 Hz a peak acceleration of 1 gn is maintained until 18 Hz is reached. The amplitude is then maintained at 0.8 mm (1.6mm total excursion)and the frequency increased until a peak acceleration of 8 gn occurs (approximately 50 Hz).A peak acceleration of 8 gn occurs is then maintained until the frequency is increased to 200 Hz	No leakage, No fire, No explosion.
4.3.7	Acceleration shock	After fully charged standard, the cell is to be secured to the testing machine by means of a rigid mount which supports all mounting surfaces of the cell. For each shock the cell is to be accelerated in such a manner that during the initial 3ms the minimum average acceleration is 75gn, and the peak acceleration shall be 150±23gn white pulse time is 6±1ms .The shocks are to be applied in each of three mutually perpendicular directions. Each direction of cell shall be subjected to a total of three shocks of equal magnitude.	No leakage, No fire No explosion

4.3.8	Drop	Mesuring resistance、open voltage and thickness of cell after fully charged standard, then cell should be fallen from a height of 1000mm onto a flat surface of concrete for 6 panels and each panel for 1 time, then mesure resistance 、voltage and thickness.	No fire No explosion
4.3.9	Extrusion	After fully charged standard, the cell is to be placed in two planes. Perpendicular to the extrusion direction of the plate, squeezing force of 13.0kN ± 0.2kN is applied between the two plates. Once the pressure reaches the maximum to stop the extrusion experiment. During the test the cell can not be short-circuit.	No fire No explosion
4.3.10	Impact	After a standard charged, a cell is to be placed on the flat surface. A 15.8±0.2mm diameter bar is to be placed across the center of the cell. A 9.1±0.1Kg hammer is to be dropped from a height of 610±25mm onto the cell and observe for 6h.	No fire No explosion
4.3.11	Thermal abuse	The standard charged cell is to be heated in a circulating air oven,the temperature of the oven is to be raised at a rate of 5±2℃/min to 130±2℃ and remain for 30 minutes at that temperature.	No fire No explosion

4.3.12	Fuel projectile	After a standard charged, the cell is placed retested tooling steel online. If the cell is to be placed on a steel wire screen that covers a 102mm diameter hole in the center of a platform table. If the cell will drop during the test, you can use a single metal wire to fixed the sample cell to the steel wire screen; if such a situation does not happen, you can not bundle the cell. The cell is to be heated till happen the following cases. a) The cell explodes; b) The cell has ignited and burned out; c)The cell has been heated for 30min, but neither fire nor explodes.	Parts or as a whole of cell shall not penetrate the aluminum network.

4.4 Visual inspection

There shall be no such defect as scratch, flaw, crack, and leakage, which may adversely affect commercial value of the cell.

4.5Standard environmental test condition

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition:

Temperature：23±5℃

Humidity: 65±20%RH

5.Storage and Others

a) Long Time Storage

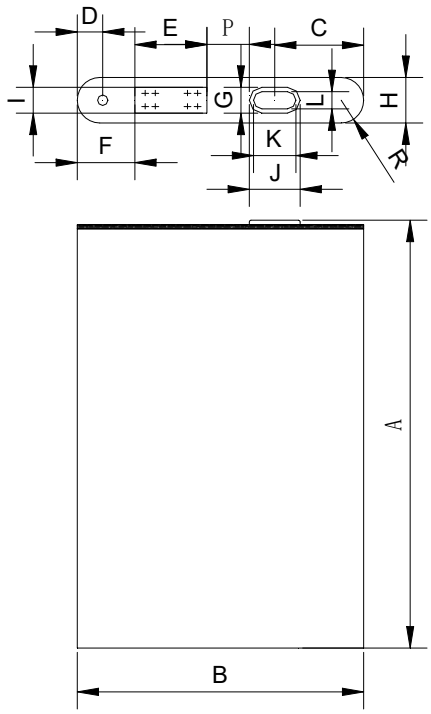
If the Cell is stored for a long time, the cell's storage should be 3.6~3.9V and the cell is to be stored in a condition as No.4.4。

b) Others

Any matters that this specification does not cover should be conferred between the customer and Akyga Battery

6.Pack Drawing

6.1 Sketch Map & Size of the Cell



NO.	Items	Size（mm）	Tolerance（mm）
A	Height	49.75	±0.25
B	Width	29.80	±0.10
H	Thickness	5.00	+0.30 -0.00
D	Edge distance of aperture	3.00	±0.05
C	Edge distance of cathode terminal	10.50	±0.05
I	Ni-clad-Al strip’s width	3.00	±0.10
E	Ni-clad-Al strip’s length	8.50	±0.30
F	Edge distance of Ni-clad-Al strip	6.80	±0.40
J	Rivet Length(out)	6.00	+0.10

			-0.20
G	Rivet Width(out)	3.00	+0.20
			-0.10
K	Rivet Length(in)	5.00	±0.05
L	Rivet Width(in)	2.00	±0.05

Appendix

Handling Precautions and Guideline
For LIP(Lithium-Ion Polymer)Rechargeable Batteries

Preface

This document of' Handling Precautions and Guideline LIP Rechargeable Batteries shall be applied to the battery cells manufactured by Akyga Battery

Note(1):

The customer is requested to contact Akyga Battery in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions

Note(2):

Akyga Battery will take no responsibility for any accident when the cell is used under other conditions than those described in this Document.

Akyga Battery will inform, in a written form, the customer of improvement(s) regarding proper use and handing of the cell, if it is deemed necessary.

1. Charging

1.1 Charging current:

Charging current should be less than maximum charge current specified in the Product Specification. Charging with higher current than recommended value may cause damage to cell electrical, mechanical and safety performance and could lead to heat generation or leakage.

1.2 Charging voltage:

Charging shall be done by voltage less than that specified in the Product Specification (4.2V/cell). Charging beyond 4.25V, which is the absolute maximum voltage, must be strictly prohibited. The charger shall be designed to comply with this condition.

It is very dangerous that charging with higher voltage than maximum voltage may cause damage to the cell electrical, mechanical safety performance and could lead to heat generation or leakage.

1.3 Charging temperature:

The cell shall be charged within 0℃~45℃ range in the Product Specification.

1.4 Prohibition of reverse charging:

Reverse charging is prohibited. The cell shall be connected correctly. The polarity has to be confirmed before wiring, In case of the cell is connected improperly, the cell cannot be charged. Simultaneously, the reverse charging may cause damaging to the cell which may lead to degradation of cell performance and damage the cell safety, and could cause heat generation or leakage.

2. Discharging

2.1 Discharging current

The cell shall be discharged at less than the maximum discharge current specified in the Product Specification. High discharging current may reduce the discharging capacity significantly or cause over-heat.

2.2 Discharging temperature

The cell shall be discharged within -10℃~60℃ range specified in the Product Specification.

2.3 Over-discharging:

It should be noted that the cell would be at over-discharged state by its self-discharge characteristics in case the cell is not used for long time. In order to prevent over-discharging, the cell shall be charged periodically to maintain between 3.6V and 3.9V.

Over-discharging may causes loss of cell performance, characteristics, or battery functions.

The charger shall be equipped with a device to prevent further discharging exceeding a cut-off voyage specified in the Product Specification. Also the charger shall be equipped with a device to control the recharging procedures as follows:

The cell battery pack shall start with a low current (0.01C) for 15-30 minutes, i.e.-charging, before rapid charging starts. The rapid charging shall be started after the (individual) cell voltage has been reached above 3V within 15-30 minutes that can be determined with the use of an appropriate timer for pre-charging. In case the (individual) cell voltage does not rise to 3V within the pre-charging time, then the charger shall have functions to stop further charging and display the cell/pack is at abnormal state.

3. Storage

The cell shall be storied within 0℃~45℃ range environmental condition.

If the cell has to be storied for a long time (Over 3 months),the environmental condition should be:

Temperature: 23±5℃

Humidity: 65±20%RH

The voltage for a long time storage shall be 3.6V~3.9V range.

4. Handling of Cells

Since the battery is packed in soft package, to ensure its better performance, it's very important to carefully handle the battery

4.1 Soft Aluminum foil

The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles.

- Don't strike battery with any sharp edge parts
- Trim your nail or wear glove before taking battery
- Clean worktable to make sure no any sharp particle

4.2 Folding edge

The folding edge is form in battery process and passed all hermetic test

- Don't open or deform folding edge

4.3 Mechanical shock

- Don't Fall hit bend battery body

5. Notice Designing Battery Pack

5.1 Pack design

- Battery pack should have sufficient strength and battery should be protected from mechanical shock
- No Sharp edge components should be inside the pack containing the battery.

6. Notice for Assembling Battery Pack

6.1 Cell fixing

- The battery should be fixed to the battery pack by its large surface area.
- No cell movement in the battery pack should be allowed.

7. Others

7.1 Prevention of short circuit within a battery pack

Enough insulation layers between wiring and the cells shall be used to maintain extra safety protection.

7.2 Prohibition of disassembly

1）Never disassemble the cells

The disassembling may generate internal short circuit in the cell, which may cause gassing, firing, or other problems.

2）Electrolyte is harmful

LIP battery should not have liquid from electrolyte flowing, but in case the electrolyte come into contact with the skin, or eyes, physicians shall flush the electrolyte immediately with fresh water and medical advice is to be sought.

7.3 Prohibition of dumping of cells into fire

Never incinerate nor dispose the cells in fire. These may cause firing of the cells, which is very dangerous and is prohibited.

7.4 Prohibition of cells immersion into liquid such as water

The cells shall never be soaked with liquids such as water, seawater drinks such as soft drinks, juices coffee or others.

7.5 Battery cells replacement

The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user.

7.6 Prohibition of use of damaged cells

The cells might be damaged during shipping by shock. If any abnormal features of the cells are found such as damages in a plastic envelop of the cell, deformation of the cell package, smelling of electrolyte, electrolyte leakage and others, the cells shall never be used any more.

The cells with a smell of the electrolyte or a leakage shall be placed away from fire to avoid firing.