

Specification Approval Sheet

- Name : Lithium Polymer Battery
- Model: AKYGA LP802070
- SPEC: 3.7V / 1100mAh

Specification Modification Records

Modification Time	Descriptions	Issued Date	Approved By
	Release 1	2023-01-17	

Content

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This document describes the Product Specification of the Lithium-Polymer (LIP) rechargeable battery cell supplied by Akyga.

2.Model: LP802070

3.Specification

NO.	Items	Specifications
1	Charge voltage	4.2V
2	Nominal voltage	3.7V
3	Nominal capacity	1100mAh @ 0.2C Discharge
4	Charge current	Standard Charging::0.2CRapid charge:0.5C
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 $\leq 0.02C$
6	Charging time	Standard Charging:6.0hours(Ref.)Rapid charge:2.5hours(Ref.)
7	Max. charge current	1C
8	Max. discharge current	1C
9	Discharge cut-off voltage	2.75V
10	Operating temperature	Charging: 0°C~60°C Discharging: -10°C~85°C
11	Storage temperature	-20°C~ 85°C (
12	Cell Dimension	Length70.5mm MaxWidth20.3mm MaxThickness8.0mm Max



4.Battery Cell Performance Criteria

4.1 Electrical characteristics

NO.	Items	Test Method and Condition	Criteria
1	Standard Charge	Charging the cell initially with constant current at 0.2C and then with constant voltage at 4.2V till charge current declines to 0.01C	
2	Rated Capacity	The capacity means the discharge capacity of the cell, which is measured with discharge current of 0.2C with3.0V cut-off voltage after standard charge.	≥1100mAh
3	Cycle Life	Test condition: Charge:0.5C to 4.2V Discharge:0.5C to 3.0V 80% or more of 1 st cycle capacity at 0.5C discharge of Operation	≥300
4	Self-discharge	After the standard charging, storied the cells under the condition as No.4.4 for 30 days, then measured the capacity with 0.2C till 3.0V	Residual capacity >85%
5	Initial impedance	Internal resistance measured at AC 1KHz after 50% charge	≤50m
6	Cell Voltage 电芯电压	As of shipment.	3.95~4.00V
7	Temperature Characteristics	1. According to item 4.1.1, at 20 ± 5 °C. 2. Capacity comparison at each temperature, measured with constant discharge current 0.2C with 3.0V cut-off. Percentage as an index of the capacity compared with 100% at 20 ± 5 °C.	-10°C: ≥60% 0°C: ≥75% 20°C: ≥98% 60°C: ≥95% 85°C: ≥85%
8	Storage Characteristics	 According to item 4.1.1, at 20±5°C. The battery shall be stored at 83±2°C for 100 hours and rested at room temperature for 1 hour then measured with constant discharge current 0.5C with 3.0V cut-off. 	Retained Capacity ≥80%



4.2 Mechanical characteristics

NO.	Items	Test Method and Condition	Criteria
1	Vibration Test	With full charging, fixed the cell to vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz a 55Hz, the excursion of the vibration is 1.6mm.The cell shall be vibrated for 30 minutes per axis of XYZ axes.	No leakage No fire No smoke Voltage remains 4.0V above
2	Drop Test	The cell is to be dropped from a height of meter twice onto wood ground	No fire, no leakage.

4.3 Safety Characteristics

NO.	Items	Test Method and Condition	Criteria	
1	Overcharge test	No explosion, no fire	Discharge : 1C to 3.0V Charge : 3C to 4.6V When the temperature falls 10°C lower than the peak ,Stop testing	
2	Short-circuit test	No explosion, no fire	After Standard Charging, Short circuit the positive and negative, and the resistance of copper wire is not more than $75m\Omega$, When the temperature falls 10° C lower than the peak ,Stop testing	
3	Thermal test	No explosion, no fire	Put cell into an hot box, test condition: Temperature Rate : 5±2°C /min Ending temperature :130°C±2°C Keep temperature for 30 minutes , Then stop testing	
Note: Above testing of safe characteristics must be with protective equipment.				

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.

4.5 Standard environmental test condition

Unless otherwise specified, all tests stated in this Product Specification are conducted at below condition: Temperature: 23 ± 5 °C Humidity: $65\pm 20\%$ RH

5.Storage and Others

a) Long Time Storage

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

b) Others

Any matters that this specification does not cover should be conferred between the customer and manufacturer.



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6. Drawing (all unit in mm, not in scale)



Items	Description	Dimension and Spec
А	Tab length	5.0mm±1.0mm
В		7.0mm±2.0mm
С	Tab width	2.0mm±0.1mm
Т	Cell thickness	8.0mm(Max)
W	Cell width	20.3mm(Max)
L	Cell length	70.5mm(Max)
D	Sealing length	2.5±0.5mm
Е		0.2mm~2mm





6. Shipping Drawing



7. Pack parts list

No	Name	Type or Specification	Qty	Unit	Remark
7.1	Cell	LP802070-1100mAh 3.7V	1	PCS	
7.2	Capacity	SMD-0603/0.1uF-20%/+80% 16V	1	PCS	
7.3	Resistance	SMD-0603/330Ω±5%	1	PCS	
7.4	Resistance	SMD-0603/470Ω±5%	1	PCS	
7.5	MOSFET	TSSOP-6/8205	1	PCS	
7.6	IC	SOT-23-6/DAA	1	PCS	
7.7	PCB	JZX-1437	1	PCS	
7.8	Wire	UL1571 24#(red ,black)	2	PCS	
7.9	Connector	JST SHR-02V-S (positive)	1	PCS	



8. Protection circuit

8.1 PCM Standard

Item	Name	Term	Min	Typical	Max	Units
	Over charge detection voltage		4.255	4.28	4.305	V
	Overcharge detection delay time		/	/	500	mS
Voltage	Over charge release voltage		4.055	4.08	4.105	V
	Over discharge detection voltage		2.95	3.0	3.05	V
	Over discharge detection delay time		/	/	173	mS
	Over discharge release voltage		2.9	3.0	3.1	V
Current	Operation of current consumption		/	/	7	μΑ
	Over discharge current detection		1	/	3	Α
	Over discharge current detection delay time		5	/	20	mS
	Short circuit protection		ОК			
	Short circuiting detection delay time		220	320	380	us
NTC		/				
ID		/				
0V battery charge function		Available				
Resistance ' PCB Resistance		≤60				mΩ

8.2 Application Circuit



8.2 PCB Layout





Appendix

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

Preface

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

Note(1):

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

Note(2):

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

Note(3):

Akyga 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.



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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 $0\,{}^\circ\!\mathrm{C}{\sim}60\,{}^\circ\!\mathrm{C}$ 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 $-10^{\circ}C \sim 85^{\circ}C$ 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 2.8V 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 2.8V 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. Protection Circuit Module(PCM)

The cell/battery pack shall be with a PCM that can protect cell/battery pack properly.

PCM shall have functions of (1) overcharging prevention, (2) over-discharging prevention, and (3) over current prevention to maintain safety and prevent significant deterioration of cell performance.

The over current can occur by external short circuit

3.1 Overcharging prohibition:

Overcharging prevention function shall stop charging if any one of the cells of the battery pack reaches 4.25V.



3.2 Over-discharge prohibition:

Over-discharging prevention function shall work to avoid further drop in cell voltage of 2.3V or less per cell in any cel of the battery pack. It is recommended that the dissipation current of PCM shall be minimized to 0.5uA or less with the over-discharge prevention.

The protection function shall monitor each bank of the battery pack and control the current all the time.

4. Storage

The cell shall be storied within $-20^{\circ}C \sim 85^{\circ}C$ range environmental condition. If the cell has to be storied for a long time (Over 3 months),the environmental condition should be: Temperature: $23\pm5^{\circ}C$ Humidity: $65\pm20\%$ RH The voltage for a long time storage shall be 3 6V~3 9V range

5. 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

5.1 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



5.2 Sealed edge

Sealing edge is very flimsy.

• Don't bend or fold sealing edge

5.3 Folding edge

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

• Don't open or deform folding edge

5.4 Tabs

The battery tabs are not so stubborn especially for aluminum tab.

• Don't bend tab.

5.5 Mechanical shock

• Don't Fall, hit, bend battery body

5.6 Short

Short terminals of battery is strictly prohibited, it may damage battery.

6. Notice Designing Battery Pack

- 6.1 Pack design
- Battery pack should have sufficient strength and battery should be protected from mechanical shock



6.2 PCM design

- The overcharge threshold voltage should not be exceed 4.25V
- The over-discharge threshold voltage should not be lower than 2.3V
- The PCM should have short protection function built inside

7. Notice for Assembling Battery Pack

7.1 Tab connection

- Ultrasonic welding or spot welding is recommended to connect battery with PCM or other parts.
- If apply manual solder method to connect tab with PCM, below notice is very important to ensure battery performance.
- a) The solder iron should be temperature controlled and ESD safe
- b) Soldering temperature should not exceed 350° C
- c) Soldering time should not be longer than 3s
- d) Soldering time should not exceed 5 times Keep battery tab cold down before next time soldering.
- e) Directly heat cell body is strictly prohibited, Battery may be damaged by heat above approx.100°C

7.2 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.



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8. Others

8.1 Prevention of short circuit within a battery pack

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

8.2 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.

8.3 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.

8.4 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.

8.5 Battery cells replacement

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



8.6 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