Specification Approval Sheet

Name： Lithium Button Cell Li-MnO2 Battery

Model： AKYGA CR2050WT

SPEC：3.0V / 345mAh

Specification Modification Records

Modification Time	Descriptions	Issued Date	Approved By
	Release 1	2025-02-21	

Content

Specification Approval sheet

1. Scope

This specification applies to the following 3.0v lithium button cell CR2050HR made by Akyga Battery

This specification shall be attached to the technical and quality agreement of both parties after customer confirmation.

Category： Lithium-manganese dioxide battery
Model：CR2050

2. Features

Excellent high temperature resistance, continuous operation at 115℃. Especially in high temperature environment, it can show extremely excellent performance to meet the storage requirements of TPMS.。

Long-term exposure to high temperatures (80 ° C) still maintains good electrical characteristics

The battery has 100 cycles of hot and cold shock between -40 ° C and 115 ° C, and the battery still maintains good electrical characteristics and sealing performance.

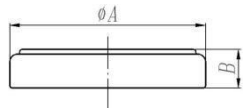
3. Product basic information

Table1： Product basic information

Electrochemical Systems	Lithium - manganese dioxide/organic electrolyte
Nominal Voltage	3V
Maximum continuous operating current	4mA
Maximum pulse operating current	10mA
Annual self-discharge rate	≤2%
Nominal Capacity At 25℃±2℃, the standard resistance 15kΩ is discharged to 2V	345mAh
Internal resistance(Ω)	≤20
（Guarantee）	（1year from manufacture date code ）
Operating Temperature Range	-40℃~115℃
Standard Weight	About4.2g
Appearance	clear and clean without deformation, corrosion and leakage

4.1 Outline Dimensional Drawing：

2 Table2（ Outline Dimensional Drawing）

	直径D（A）	20.0(-0.2)mm
	高度H（B）	5.0(-0.2)mm

4. Electrochemical characteristic index and detection method：

A test will be conducted commencing within one month after delivery

Table3 (characteristic index and detection method)

No	ITEM		TEST METHODS
1	Dimensions	D：20.0 (-0.2) mm H：5.0 (-0.2) mm	Using vernier caliper (accuracy ≥ 0.02) while avoiding short-circuit.One end of the caliper should be coated with an insulating material.
2	Off-load voltage	3.0~3.4V Initial period (within 60 days after production	Open circuit voltage measurement using DC voltmeter, It can measure from 0V to 4V. The accuracy of the voltmeter is reduced to ±1mV or more, and the input impedance is greater than 10MΩ
3	Internal resistance(Ω)	≤20	Measure the internal resistance with the resistance meter described herein after keeping the battery for 4 hours at least in measurement environment. Internal resistance shall conform to table 1-2 herein.
4	（h） Discharge duration	≥1638h Initial period (within 60 days after production)	Take 9pcs batteries and place them at 20 ° C ±2 ° C and RH60%±15% for more than 8 hours, and discharge them continuously with 15kΩ resistance to 2.0V under the same temperature and humidity conditions. The battery should be carried out within 60 days after production. Storage of batteries should be carried out within 14 days after the expiration of storage.
		≥1605h Storage period (within 365 days after production) ≥1605h	

5	Anti-leakage	NO deformation NO leakage	Appearance check after 100 cycles of thermal shock , Check the state of the leakage by the naked eye 30 cm away from them under the light of the 40 watt fluorescent lamp one meter above * This test should start from high temperature (115 ℃) position. * No humidifying to ambient temperature and humidity.

5. Safety performance test (electrical)

Table4: (UN38.3) Table 3: (Standard citation UN38.3)

Serial number	ITEM	Test method	Require
1	External short circuit	After the battery reaches temperature equilibrium at 55±2℃, it is subjected to a short circuit with the total resistance of the external circuit less than 0.1Ω at the same temperature, and the short circuit continues until the shell temperature drops to 55±2℃, and then continues for more than 1 hour. The battery needs to continue to be observed for 6h after the test is over.	No overheating, no cracking, no explosion, no fire
2	Forced discharge	At ambient temperature, connect the discharged battery to a 12V DC power source. The resistance is mediated, with the specified maximum continuous discharge current as the initial current. After the end of the forced discharge, observe the tested battery for 7d.	No explosion, no fire
3*	Abnormal charge	Each battery is reversely connected to the -DC power supply, with three times the specified discharge current Ic as the abnormal charging current.	No explosion, no fire

Note: the maximum charging current for CR2050HR battery is 10MA. It is recommended that abnormal charging shall prevail.

6.

Environment security performance testing (Critical Test Parameter)

Environmental tests refer to UL1642 standard /UN38.3/ Market demand

Table5

No	ITEM	Test method	Request
1	High altitude simulation	The test cells were placed at a pressure of 11.6 kpa or lower and at a temperature of 20 ° C ± 2 ° C for at least 6 H.	No quality loss, no leakage, no leakage, no short circuit, no rupture, no explosion, no fire
2	Low Temperature Endurance Test	The product is tested with a stable temperature of （- 40 ºC ） for a period of 7 day' s (168hours).	No quality loss, no leakage, no short circuit, no explosion,
3	High Temperature Endurance Test	The product is tested with a stable temperature of +115 ºC for a period of 7 day's (168hours)	No quality loss, no leakage, no leakage, no short circuit, no rupture, no explosion, no fire
4	Endurance Test	The test shall be done as per below Total Test Duration: 2000 hr ; Test Cycle Duration: 6 hours Number of Test Cycle ('N' Cycle): 334 Minimum Temperature (Tmin): (-) 40 Degree C ;Maximum Temperature (Tmax): (+) 120 Degree C Rate of Temperature Change (TChange): ≥ 4 °C / min (average over a period of not more than 5 °C / min)	No quality loss, no fire, no explosion, no leakage, , no short circuit, no rupture、no fire

7. (Mechanical test)

Table 5 The standard is UL1642 /GB8897.4 IEC 60068-2-64 /IEC 60068-2-27

<table>
<tr>
<td>5</td>
<td>Vibration</td>
<td>Test is based on standard IEC 60068-2-64 as per below parameter
Time per axis : 8 Hours (Total duration is 24 Hours) ; No. of Axis : 3 (X, Y, Z)
<table>
<tr><th>Frequency (Hz)</th><th>PSD ((m/s²)²/Hz)</th><th>RMS Acceleration (m/s²)</th></tr>
<tr><td>20</td><td>200</td><td rowspan="6">107.3 m/s²</td></tr>
<tr><td>40</td><td>200</td></tr>
<tr><td>300</td><td>0.5</td></tr>
<tr><td>800</td><td>0.5</td></tr>
<tr><td>1000</td><td>3</td></tr>
<tr><td>2000</td><td>3</td></tr>
</table>
</td>
<td>No quality loss, no leakage, no leakage, no short circuit, no rupture, no explosion, no fire</td>
</tr>
<tr>
<td>6</td>
<td>Mechanical Shock</td>
<td>Test is based on IEC 60068-2-27 Standard
Shock Form (Pulse Shapes) : Half-sinusoidal ; Shock Pulse Duration (nominal) : 11ms
Acceleration; 500 m/s² ; Total number of shocks/axis: 20 (10 positive + 10 negative)</td>
<td>No quality loss, no leakage, no leakage, no short circuit, no rupture, no explosion, no fire</td>
</tr>
<tr>
<td>7</td>
<td>Vehicle Testing at High Speed</td>
<td>Sensor mounted in wheel and speed of the vehicle shall be 130 KMPH</td>
<td>Not hot, not explosive, not on fire</td>
</tr>
<tr>
<td>8</td>
<td>Squeeze</td>
<td>By applying pressure through bench tongs or hydraulic cylinders with round pistons, the inspected cell or cell is squeezed between two planes, starting at the initial contact point, continuous extrusion at a speed of about 1.5 cm/s until the extrusion pressure reaches about 13 kn and the pressure is released immediately.</td>
<td>Not hot, not explosive, not on fire</td>
</tr>
</table>

Description:Deformation: the occurrence of deformation should be reported with the reason for it
Drainage: If electrolyte leaks out at the drain port without the drain catch being opened, it shall be judged as a leak.

8. B8897.1

Capacity test (in accordance with GB8897.1 standard performance test implementation)：

Each volumetric testing is 8pcs batteries

The average discharge time of the battery is not less than the specified value in Table 2, and the number of batteries that are less than 95% of the standard value is not greater than 1, the capacity of the battery is judged to be qualified.

When the average discharge capacity is lower than the standard value in Table 2 or the number of batteries lower than 95% of the standard value is greater than 1, re-take 8 samples for test, if the average discharge capacity is not lower than the standard value in Table 2 and the number of batteries lower than 95% of the standard value is not greater than 1, it is judged that the capacity of the battery is qualified.

If the average discharge capacity in the second test is lower than the standard value in Table 2 or the number of cells lower than 95% of the standard value is greater than 1, it is judged that the capacity of the battery is unqualified and the second test will not be conducted.

9 Acceptance regulations

Each shipment quantity shall be one inspection batch. 。

The delivery inspection adopts GB2828.1 Normal Inspection One Sampling Programme, and the inspection items, inspection level (IL) and acceptance quality limit (AQL) are implemented according to the following table.

Table7 sampling scheme

NO.	Test Item	IL	AQL
1	Overall Dimensions	II	1.0
2	OCV	I	0.25
3	Appearance and extremes		1.0

10. Warnings

10.1 It is forbidden to swallow

10.2

Keep the battery away from infants and children to prevent them from swallowing. If they have swallowed the battery, consult a doctor immediately

10.3 t is forbidden to recharge

Not being able to charge the battery from any other source can lead to the generation of gases and internal short circuits that can cause the battery to distort, leak, overheat, explode or catch fire.

10.4 Do not place in a fire environment

Leaving the battery in an fire environment causes the lithium metal to melt.

10 5 Disassembly of batteries is strictly prohibited

Do not disassemble the battery, otherwise it will cause damage to the battery seal ring or diaphragm paper, and make the battery deformation leakage overheating explosion or fire.

10.6

Do not install the positive and negative electrodes of the battery in reverse

Improperly installed batteries can cause them to short-circuit to charge or force them to discharge which can cause them to distort, leak, overheat, explode or catch fire.

10.7

Do not short-circuit the positive and negative electrodes. Do not carry or store the battery with metal objects or it will cause the battery to distort, leak, overheat, explode or catch fire.

10.8 Do not use different batteries together

Due to different battery characteristics, using different batteries together, such as different types of new and old or different manufacturers, can cause the battery to distort, leak, overheat, explode or catch fir.

10.9

Do not weld terminal pins or wires directly on the battery

Heating during welding can lead to the melting of lithium or damage to the insulation material in the battery which can cause the battery to be deformed, leaked, overheating, explosion or fire.For welding, please contact Akyga or a professional welder。

11. Notes

11.1

Do not seriously shake the battery, drop or step on the battery,It may cause the battery to distort, leak, overheat, explode or catch fire

11.2

When installing the battery, please be careful not to let the battery come into contact with metal objects that may short-circuit the battery

11.3

Follow the instructions for selecting and using the appropriate battery

11.4

Do not use or place batteries in hot places, such as in direct sunlight, or in cars in hot weather, as this can cause batteries to distort, leak, overheat, explode or catch fire

11.5

Do not let the battery and water contact or placed in a humid environment, or the battery will rust, or deformation of the battery leakage overheating explosion or fire.

Battery voltage may be below target due to poor contact, so maintain contact pressure above 2N to ensure proper contact resistance

11.7

If you have any other questions, please contact battery for consultation

12. Storage environment

The storage environment should be clean, cool, dry and ventilated, not close to the high temperature and high humidity, the ambient temperature is 0-30,RH no more than 75%.

13. Marking and packaging

13.1 极 Positive sign of battery 1Figure 1

<table>
<tr><td colspan="2">Brand</td></tr>
<tr><td>Anodal side</td><td> 
Cathode side</td></tr>
</table>

13.2 Spraying the code

If the customer needs, please spray 2 bits of code on the negative surface of the battery according to the international IEC standard :**. The front digit is 0~9 for the corresponding year, the back digit is 1~9 for January ~ September, and X Y Z for October ~ December.Different jet code can also be customized.

8 Table 8

31	Indicates January 2013 production;	3X	Indicates October 2013 production;
3Y	Indicates November 2013 production;	3Z	Indicates December 2013 production.

Different coding methods can also be customised.

13 3 Packaging

Every 20 batteries are put into a PVC tray, then 10 plates (a total of 200 batteries) are packaged with transparent film,20 small packages are packed into the box, and 12 small packages (a total of 2400 batteries) are placed in an outer box

Figure 2（ Actual packaging diagram）

* if the battery needs to be processed into welded foot, the packaging will be adjusted according to the specific shape of the product

As the technical parameters of the product are updated and adjusted, the specification will be updated at any time. Please contact Akyga battery for the latest version of the specification

14 Discharge curve

Figure 1 Discharge curves at different temperatures