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Approval Sheet for

Lithium and Iron Disulfide Battery

**Model: LFB-AA**

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## Specification Approval Sheet

Model: LFB-AA

| <b>Prepared By/Date</b> | <b>Checked By/Date</b> | <b>Approved By/Date</b> |
|-------------------------|------------------------|-------------------------|
|                         |                        |                         |

|                          | <b>Confirmation</b> | <b>Date</b> |
|--------------------------|---------------------|-------------|
| <b>Customer Approval</b> |                     |             |

Note: 1. Kindly please sign on the above and send it back to us if the sample is approved.  
2. Kindly please contact us as soon as possible if the sample isn't approved. Thanks!

# LFB-AA Product Specification

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## 1. Scope

This specification is suitable for the performance of the *Lithium and Iron Disulfide* battery.

## 2. Model

LFB-AA / IEC R6

## 3. Reference Document

Q/(GZ)PH001-2004: *Lithium and iron disulfide battery*

IEC60086-4: 2000 *Primary batteries-Part 4: Safety of lithium batteries*

## 4. Specification

| No. | Items                     | Specification              |
|-----|---------------------------|----------------------------|
| 1   | Nominal Voltage           | 1.5 V                      |
| 2   | Rated Capacity            | 2700 mAh @ 300mA discharge |
| 3   | Working Voltage           | 1.30V @ 200mA discharge    |
| 4   | Max. Discharge Current    | 2000 mA continuous         |
| 5   | Discharge Cut-off Voltage | 0.80V                      |
| 6   | Volume                    | 8.0 cubic centimeters      |
| 7   | Weight                    | Approx. 14.5 g             |
| 8   | Lithium Content           | Less than 1 gram per cell  |
| 9   | Dimensions                | Diameter: 14.0±0.5 mm      |
|     |                           | Height: 49.85±0.65 mm      |
| 10  | Operating Temp.           | -20 °C to 60 °C            |
| 11  | Storage Temp.             | -20 °C to 40 °C            |
| 12  | Storage Humidity          | ≤75 %                      |
| 13  | Shell Life                | 5 Years                    |

## 5. Test Conditions and Performance

### 5.1 Measuring Instrument or Apparatus

#### 5.1.1 Dimension Measuring Instrument

The dimension measurement shall be implemented by calipers with equal or more

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precision scale of 0.01 mm.

## 5.1.2 Voltmeter

Standard class specified in the national standard or more sensitive class having inner impedance more than  $10\text{ k}\Omega/V$ .

## 5.1.3 Ammeter

Standard class specified in the national standard or more sensitive class. Total external resistance including ammeter and wire is less than  $0.01\ \Omega$ .

## 5.2 Standard Test Conditions

Unless other defined, test and measurement shall be done under temperature of  $20\pm 5^{\circ}\text{C}$  and relative humidity of 45~85%. If it is judged that the test results are not affected by such conditions, the tests may be conducted at temperature 10~30 $^{\circ}\text{C}$  and humidity 25~85%RH.

## 5.3 Basic Characteristics

| No. | Item                   | Measuring Procedure   | Criteria                     |
|-----|------------------------|---|------------------------------|
| 1   | Open-Circuit Voltage   | The open-circuit voltage shall be measured by voltmeter.  | $\geq 1.72\text{ V}$         |
| 2   | Dimension              | Use calipers test cell's dimensions.  | As item 4.9                  |
| 3   | Rated Capacity         | The capacity means the discharge capacity of the cell, which is measured by continuously discharging with a current of 300 mA to 0.8V.                                    | $\geq 2700\text{ mAh}$       |
| 4   | External Short Circuit | Positive and negative of fresh battery are connected by a Cu wire. This short-circuit condition is continued for 1 day at room temperature ( $20\pm 2^{\circ}\text{C}$ ). | No leakage;<br>No explosion. |
| 5   | Forced Discharge       | Discharged to 0.8V at 1000mA;<br>And then the sample cell is forced discharged with 1000mA for 3 hours.   | No explosion;<br>No fire     |

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## 5.4 Mechanical Characteristics

| No. | Item      | Test Method  | Criteria  |
|-----|-----------|--|---|
| 1   | Impact    | A 15.8 mm diameter bar is vertically placed across the centre of the sample cell. A 9.1 kg mass is dropped from a height of 61cm onto the sample.                                | No explosion,<br>No fire  |
| 2   | Vibration | Freq: 10~55hz; Amp: 2mm;<br>Three directions; total 90 min   | No leakage,<br>No explosion, no fire<br>0.02V total maximum<br>OV changes |
| 3   | Crush     | A sample cell is to be crushed between two flat surfaces.<br>Force: 32mm diameter piston;<br>Max pressure: 17.2MPa;<br>Max force: 13KN; Released when the max pressure obtained. | No explosion,<br>No fire  |

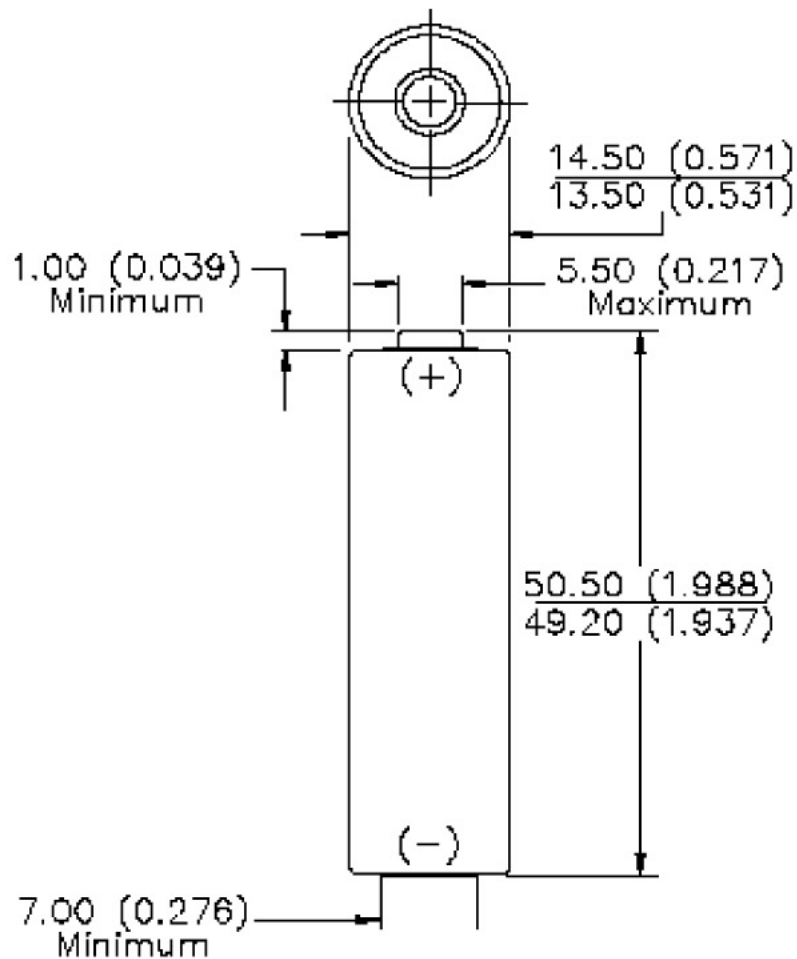
## 5.5 Environmental test

| No. | Item         | Test Conditions  | Criteria                                |
|-----|--------------|--|---|
| 1   | Thermal test | Fresh batteries, store at 70 deg. C for 4hs; 20 deg. C for 2hs; -20 deg. C for 4hs; 20 deg. C for 2hs. All cycled 5 times  | No leakage<br>No explosion;<br>No fire  |
| 2   | Heating test | Fresh battery is heated in an oven. The rate of temperature raised: $5 \pm 2^{\circ}\text{C}$ per minute; Max. temperature $150 \pm 2^{\circ}\text{C}$ remaining for 10 minutes. | No explosion;<br>No fire                |
| 3   | Drop test    | Fresh batteries; Height: 1m, 6 times; Each direction two times; Concrete floor   | No leakage;<br>No explosion;<br>No fire |

5.6 Visual inspection

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

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



## **7. Cautions in use**

To ensure proper use of the battery please read the manual carefully before using it.

### **. Handling**

- Do not expose to, dispose of the battery in fire.
- Do not put the battery in a charger or equipment with wrong terminals connected.
- Avoid shorting the battery
- Avoid excessive physical shock or vibration.
- Do not disassemble or deform the battery.
- Do not immerse in water.
- Do not use the battery mixed with used or other different make, type, model batteries.
- Keep out of the reach of children.

### **. Storage**

- Store the battery in a cool, dry and well-ventilated area.

### **. Disposal**

- Regulations vary for different countries.
- Dispose of in accordance with local regulations.

## **8. Battery operation instruction**

### **8.1 Discharging current**

The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat.

### **8.2 Electric discharge temperature**

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated.

### 8.3 Storing the Batteries

The battery should store in the product specification book stipulation temperature range. If has surpasses above for six months the long time storage, the discharge capacity will decrease sharply.

## **9. Period of Warranty**

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as discharge, ambient temperature, are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. Please change the battery in time.

## **10. Other Chemical Reaction**

The period of warranty is one year from the date of shipment. Great Power guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers' abuse and misuse.

## **11. Note**

Any other items which are not covered in this specification shall be agreed by both parties.