



## ER251020

### 1 Scope

This technology specification covers the Lithium battery, Model ER251020 produced by Guangzhou Markyn Battery Co., Ltd.

### 2 Characteristics

- 2.1 High voltage (3.6V)
- 2.2 Avoid of charging under great current
- 2.3 Low self-discharge rate
- 2.4 Wide using temperature range ( $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$ )
- 2.5 Stable operating voltage
- 2.6 Excellent leakage resistance
- 2.7 High safety characteristics

### 3 Applications

- 3.1 Instrumentation(such as calorimeters, automatic meter readers, data loggers etc)
- 3.2 Computer Batteries
- 3.3 Telecommunications
- 3.4 Industrial Control Equipment
- 3.5 Security system
- 3.6 Search and rescue
- 3.7 Monitoring system
- 3.8 other field

### 4 Parameter

- 4.1 Nominal voltage: 3.6V
- 4.2 Capacity

Nominal capacity: 17Ah(Constant discharge at 2mA current to 2.0V end-voltage at the temperature of  $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$  )

- 4.3 Discharge current
  - 4.3.1 Max. Constant current: 150mA
  - 4.3.2 Max Pulse current: 300mA

4.4 Nominal weight: 100g

4.5 Temperature characteristic

4.5.1 Operating temperature range:  $-55^{\circ}\text{C} \sim +85^{\circ}\text{C}$

4.5.2 Temperature characteristics: see table 1 please:

table 1 Temperature characteristics table

Project	Condition	Test temperature	Characteristics		
Off-load voltage		$23^{\circ}\text{C} \pm 3^{\circ}\text{C}$	3.65V or more		
		$-30^{\circ}\text{C} \pm 3^{\circ}\text{C}$	3.65V or more		
		$60^{\circ}\text{C} \pm 3^{\circ}\text{C}$	3.65V or more		
On-load voltage	100 $\Omega$ /5 Sec	$23^{\circ}\text{C} \pm 3^{\circ}\text{C}$	3.25V or more		
		$60^{\circ}\text{C} \pm 3^{\circ}\text{C}$	3.25V or more		
Capacity output	Continuously discharged to end-voltage 2.0V	$23^{\circ}\text{C} \pm 3^{\circ}\text{C}$	2mA	Typical	17Ah
				Minimum	14Ah
			250mA	Typical	7.5Ah
				Minimum	7.0Ah

**Note:** If a battery's storage time is more than six months, the load voltage may be delay and below the required normal value. Activate the battery before test or use them. And then the battery voltage should meet the required (or upward trend and meet the required within five seconds).

## 5 Test

### 5.1 Dimensions:

Dimensions shall be measured with instruments specified in subparagraph 6.3

The result must conform to 7.1

### 5.2 Open circuit voltage:

The samples shall be kept standing open for 24 hours or longer at a temperature of  $25^{\circ}\text{C} \pm 15^{\circ}\text{C}$ , and the voltage between both terminals at a temperature of  $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$  shall be measured with a voltmeter specified in subparagraph 6.3. The result must conform to table 1.

### 5.3 Load voltage:

The samples shall be kept standing open for 24 hours or longer at a temperature of  $25^{\circ}\text{C} \pm 15^{\circ}\text{C}$ , and the voltage between both terminals at a temperature of  $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$  shall be measured with a voltmeter specified in subparagraph 6.3 while a exactitude resistance value 100 $\Omega$  (including resistance throughout external circuits) is connected between both terminals. The result must conform to table 1.

### 5.4 Capacity output:

The samples shall be kept for 24 hours or longer at a temperature of  $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$ , and shall then be continuously discharged at  $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$  under 2mA current to 2.0V end-voltage. The result must conform to table 1.

### 5.5 Leakage characteristics:

The samples shall be stored for 7 days or more at a temperature of  $70^{\circ}\text{C}\pm 2^{\circ}\text{C}$  and a relative humidity of  $70\%\pm 2\%\text{RH}$ , then take a view of them at a temperature of  $25^{\circ}\text{C}\pm 15^{\circ}\text{C}$ , a relative humidity of  $65\%\pm 20\%\text{RH}$ , there must be no leakage cells.

### 5.6 Terminals:

The terminals have a nicer conductivity. There is no rust or leakage within the term of recommend use.

### 5.7 Appearance:

The appearance of batteries shall be inspected by visual means. The superficies of the cells are clean. The mark is clear. The batteries shall have no deformation, dent, stain or camber.

## 6 Condition of testing

### 6.1 Initial Test:

Means the test begin in one month after the cell produced.

### 6.2 Temperature、 humidity:

As for as there is no special requirement, testing should be placed under normal temperature  $25^{\circ}\text{C}\pm 15^{\circ}\text{C}$  and Relative humidity of  $65\%\pm 20\%\text{RH}$ .

### 6.3 Test facility:

6.3.1 Outer micrometers: Instruments which tolerance shall be  $\pm 0.02\text{mm}$  or below and those having equal or better accuracy shall be used.

6.3.2 DC voltmeters: Precision is 0.25 rate or better and the input resistor shall be  $10\text{M}\Omega$  or more.

6.3.3 Exactitude resistance: Relative error is 0.5% or below.

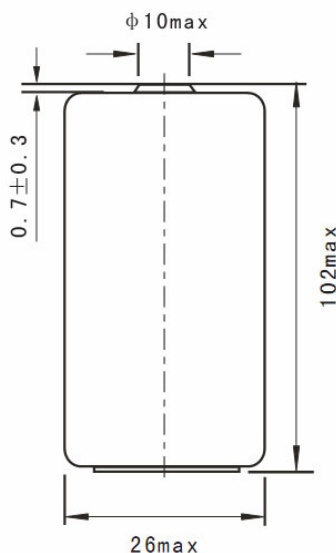
6.3.4 Resistance box: Relative error is 0.5% or below.

6.3.5 Constant temperature and humidity box : Tolerance shall be  $\pm 1.5^{\circ}\text{C}$  or below.

6.3.6 Battery program control test system: Tolerance shall be  $\pm 0.3\%$  or below.

## 7 Mark

### 7.1 Outer dimensions



7.2 Battery type: ER251020

7.3 Brand of battery:

7.4 Nominal voltage: 3.6V

7.5 Polarity: + , -

7.6 Producing date

7.7 Plant:

7.8 Caution

## 8 Inspection rules

8.1 Deliver inspection: Depending on GB2828

Table 2

Number	Test	Item	IL	AQL
1	Dimensions	5.1	S-2	1.5
2	Appearance	5.7	II	1.5
3	Terminals	5.6	II	1.5
4	On-load voltage	5.3	II	1.0
5	Off-load voltage	5.2	II	1.0

8.2 Routine inspection: Depending on GB2829.

8.3 Inspection for service output

8.3.1 6 samples shall be tested for service output

8.3.2 If the average value is equal to or more than the value of table 1, and if the number of batteries showing a value less than 90% of the value of table 1 is 0. The batteries are considered to conform to the requirement.

8.3.3 the value of table 1, or if the number of batteries showing a value less than 90% is 1 or more, the test shall be repeated with other 6 pieces. At the second test, if the average value is equal to or more than the value of table 1, and if the number of batteries showing a value less than 80% of the value of table 1 is 0, these batteries are considered to conform to the requirement.

8.3.4 At above second test, if the average value is less than the value of table 1, or if the number of batteries showing a value less than 80% of the value of table 1 is 1 or more, the batteries are considered not to conform to the requirement.

## 9 Warner

## 9.1 Caution

9.1.1 Never short the positive and negative terminals of the battery. Short-circuiting may cause battery discharge under great current and heat generation from the battery or explosion.

9.1.2 Never throw the battery into fire and heat battery. Above 100°C environment may cause gasket distortion and leakage, fire or explosion.

9.1.3 Never solder the body of the battery directly for long time. Solder the body of the battery directly may cause heat generation from the battery or explosion and leakage.

### 9.1.4 Never charge

Charging may cause gas evolution or internal short-circuiting, followed by fire or explosion.

### 9.1.5 Never over-discharge

Force-discharging by external power source or other batteries connected in a series may cause explosion/ leakage/ heat generation or expend.

### 9.1.6 Never dissemble

Dissemble of the battery can cause battery distortion followed by exposing

### 9.1.7 Never use old and new batteries together

Using old and new batteries together may load to charging or over-discharging because of the differences in voltage or capacity, followed by explosion/ leakage/ heat generation or expend.

### 9.1.8 Never reverse the positive and negative terminals when mounting the battery

The improper connection of the battery may lead to short-circuiting, charging or forced-discharging, followed by heat generation or explosion.

### 9.1.9 Never swallowed by mistake

Keep the batteries away from children. If batteries are swallowed by mistake, immediately contact a doctor.

### 9.1.10 Never throw away battery random.

ER251020 is environmentalist product. Please disposition accordance with appropriate federal, state and local regulations.

## 9.2 Notice

9.2.1 Never throw the battery into water.

9.2.2 Storing the battery in dry and aeration Environment. Never irradiated directly and caught in rain.

9.2.3 Stop using the battery when leakage, heat generation expend occur.

9.2.4 Before design and use the battery, read the manual and contact our technical dep, please.

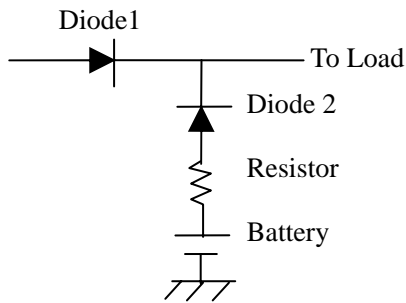
## 9.3 Design of memory backup circuit.

### 9.3.1 Condition

The on-load voltage fall with the temperature of environment falling.

9.3.2 The end-voltage of the battery.

The mean memory backup circuit is follow:



- $V_B$ : working voltage of battery
- $V_{D2}$ : voltage dropping of working diode
- $I$ : working current
- $R$ : protect resistance

The min working voltage must conform to formula:

$$V_B - V_{D2} - I \times R > \text{the min memory backup voltage}$$

### 9.3.3 Diode

ER batteries can't be charged. A diode must be used to reduce the charging current when charging occur. The charging capacity must less than the 3% of normal capacity.

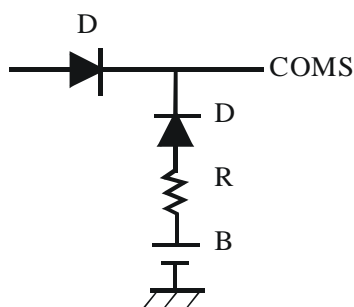
### 9.3.4 protect resistance

The protect resistance is to control the countercurrent when diode abate. The max abnormal charging current of ER251020 produced in our company is 10mA for 48hr. The protect resistance must conform to formula:

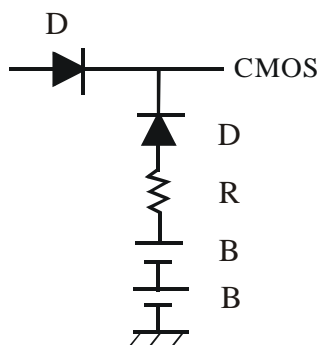
voltage of main source voltage of battery  $\leq R(\text{protect resistance}) \times \text{the allowed max abnormal charging current}$

### 9.3.5 The circuit as follow:

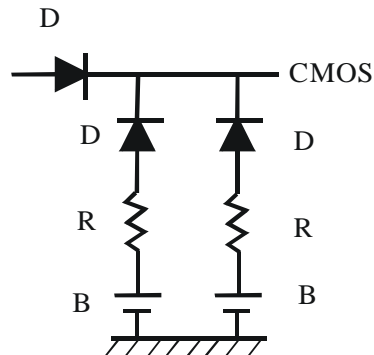
① single battery is used(3V):



② 2 batteries used in series(6V):



③2 batteries used parallel connection(3V):



9.3.6 Lay of battery

9.3.6.1 Never vibration at high and drop the battery when transport, etc.

9.3.6.2 Storage

Storing the battery in dry and aeration Environment. Never irradiated directly. Please store the batteries at the temperature of  $10^{\circ}\text{C} \sim 30^{\circ}\text{C}$ ,

Humidity of 60%RH or less. High temperature and humidity would make the characters of battery fall.

9.3.6.3 Design

Heating the battery is dangerous. The battery must be faraway from pyridoxine. the temperature of environment must below  $100^{\circ}\text{C}$ .

9.3.7.1 Never solder the body of the battery directly. When soldering the battery directly to equipment, soldering must be done by tabs or leads only.

Even then, the soldering temperature must be below  $350^{\circ}\text{C}$ , 3 sec or  $250^{\circ}\text{C}$ , 10 sec. High temperature and long time may cause heat gathered. It's dangerous.

9.3.7.2 Tabs can be solder directly to the battery body by welder. The parameters of the welder must be turn up **before** manufacturing to escape battery perforation, voltage changing and temperature over  $65^{\circ}\text{C}$  within battery, etc.

9.3.7.3 Other solder method must test before using.

9.3.8 Cleaning and drying

9.3.8.1 Washing the battery with electric cleaning liquid may cause discharging or short circuit.

9.3.8.2 Dry at temperature above  $100^{\circ}\text{C}$  may cause gasket distortion and leakage, fire or explosion.

9.3.9 ER batteries must be replaced by technology, the battery may be replaced in some product, but follow item must be notice when designing. The product must be designed to prevent reverse polarity installation of the cell, or if the cell is reversed, the short or open-circuiting of any protective component, one component at a time, shall not result in forced-discharge of the cell.

9.3.9.1 There is following statements on the equipment: Only ER251020 is used, using mix with

other type battery is dangerous. Please read the manual carefully.

9.3.9.2 The instrument manual must including the method of replace battery . There is following statements: wrong using of the battery may cause fire, explosion.. Don't disassemble, heat, crush, the battery. Keep battery out of reach of children. Replace as quickly as possible.

9.3.9.3 There is following statements on the smallest package: Don't disassemble, heat, crush, the battery. Keep battery out of reach of children.