

# 深圳市中美通用科技镍氢电池规格书

## General Electronics battery NIMH BATTERIES SPECIFICATIONS

MODEL NO: NI-MH 8xAA2200 9.6V

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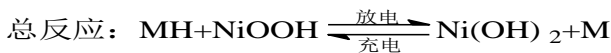
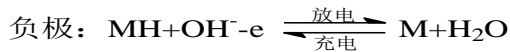
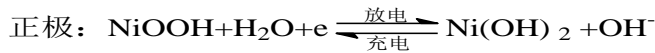
**1. Application**

This specification applies to the following GEB sealed Ni-MH batteries.

Model: AA2200mAh Application: Solar light etc.

**2. working principle**

The negative electrode of the GEB cylindrical nickel-cadmium battery is a hydrogen storage alloy, the positive electrode is nickel oxyhydroxide (NiOOH), and the electrolyte is a high-purity potassium hydroxide or sodium hydroxide (KOH or NaOH) aqueous solution. The flow reaction can be expressed by the following equation:



When the battery is discharged, protons (H+) migrate out of the negative hydrogen storage alloy (MH), and free electrons flow into the positive electrode through the external circuit. The nickel oxyhydroxide (NiOOH) on the positive electrode accepts the electrons transferred from the negative electrode and is reduced to nickel hydroxide (Ni(OH)2). Charging is the reverse reaction of discharging.

**3. Battery model:**

3.1 Type: GEB cylindrical sealed nickel hydrogen battery

3.2 Number: GEBMH016

3.3 Model: MHAA2200MAH

**4. Nominal standards**

4.1 Nominal Voltage:	1.2V
4.2 Nominal capacity:	2200mAh/0.2C <sub>5</sub> A
4.3 Battery weight:	29.5g (单体电池)
4.4 Standard charge:	220mA (0.1C <sub>5</sub> A) × 720min
4.5 Normal charge:	440mA (0.2C <sub>5</sub> A) × 360min
4.6 Rapid charge:	1100mA (0.5C <sub>5</sub> A) × 130min

(Controlled by --ΔV=10mV, charging time, and temperature of rechargeable battery)

4.7 Small current charge 66~110mA (0.03C<sub>5</sub>A~0.05C<sub>5</sub>A)

4.8 Operating temperature range (maximum relative humidity: 85%)

Standard charge: 0~+45°C

Rapid charge: 0~+40°C

Small current charge: 0~+45°C

Discharge: -18~+50°C

4.9 Storage temperature range (Maximum relative humidity: 85%)

Within one week: -18~+65°C

Within one month: -18~+55°C

Within six months: -18~+45°C

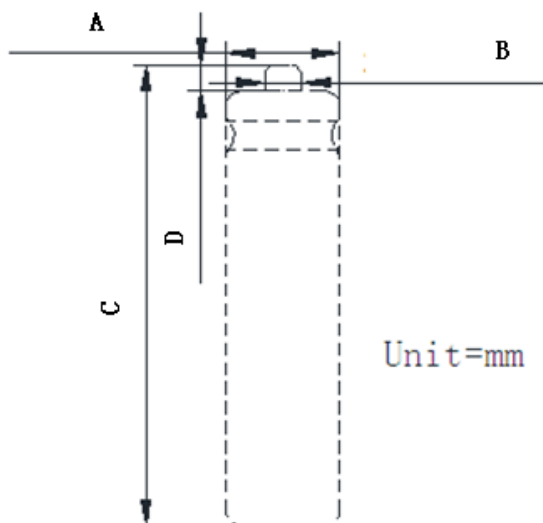
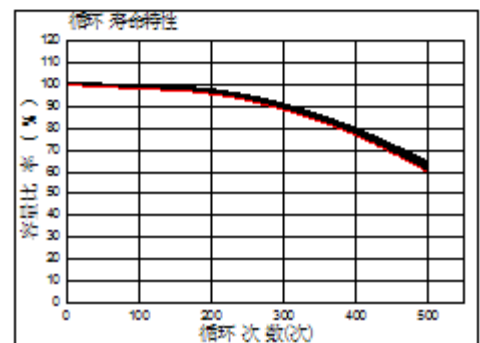
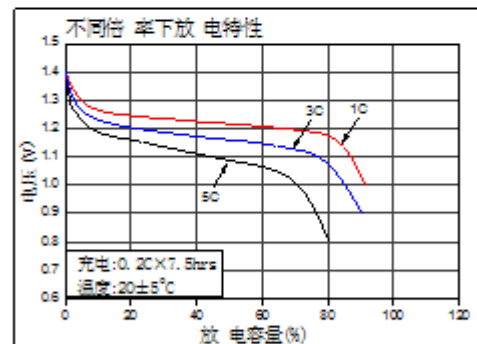
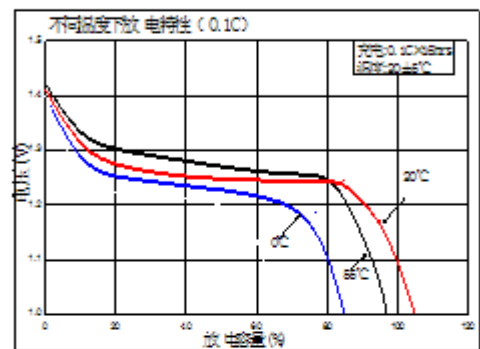
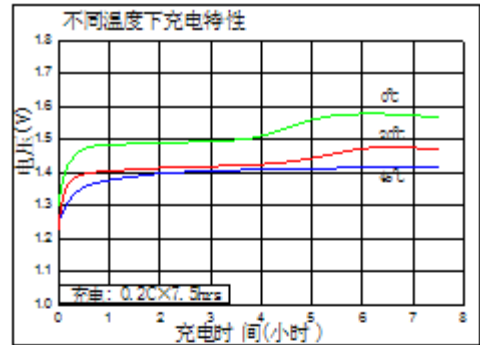
Within two years: -18~+30°C

型号(Type): NI-MH 8×AA2200 9.6V

单颗电池规格 Specifications of single cell

标称电压 Nominal voltage		1.2V		
容量(mAh) capacity		0.2C <sup>[1]</sup> 放电 discharge	0.5C <sup>[2]</sup> 放电 discharge	
	最小 Minimum	2200	2000	
直径 Diameter		14.5+0 -0.5 mm		
高度 Height		50+0.5 -0.5 mm		
重量 <sup>[3]</sup> Weight		About 29g		
内阻 Internal Impedance (1000Hz.)		≤30mΩ (充电后 after charge)		
充电 Charge	标准 standard	0.1 C <sub>5</sub> A		
	快速 rapid	0.5C <sub>5</sub> A		
	涓流 Small current	最大 Max	0.05C <sub>5</sub> A	
		最小 Min	0.03C <sub>5</sub> A	
环境温度 Ambient temperature	充电 charge	标准 <sup>[4]</sup> standard	0°C~45°C	
		快速 <sup>[5]</sup> Rapid	0°C~40°C	
	放电 <sup>[6]</sup> Discharge		-18°C~50°C	
	贮存 Storage	六个月 Six months	-18°C~45°C	
两年 Two years		-18°C~30°C		

Characteristic curve



Type	Size code	Size standard (mm)
body battery outer diameter	A	14.2±0.05
External diameter of taps	B	7.0±0.1 (flat top) 4.8±0.1 (button top)
Cell Whole height	C	49.5 ±0.3 (flat top) 50.3 ±0.3 (button top)
Height of top head	D	0.8±0.1 (flat top) 1.5 ±0.1 (button top)

**Remark:**

- [1] Charge at 0.2C for 6 hours at 20°C, put it aside for 1 hour, discharge at 0.2C to 1.0V/piece
- [2] Charge at 0.2C for 6 hours at 20°C, put it aside for 1 hour, discharge at 0.5C to 1.0V/piece.
- [3] Weight is for reference only
- [4] 0.2Ccharge 6hours.
- [5] 0.4Ccharge 3hours、-ΔV=15mV、TOC=45°C
- [6] 0.5C discharge to 1.0V/piece

**6. Battery performance**

6.1 Test Conditions

The following test conditions are applicable to new batteries (within one month after shipment). Before charging, the battery should be discharged with 0.2C<sub>5</sub>A constant current under the test conditions until the final voltage is 1.0V/pc;

Test Condition:

Temperature : +20±5°C

Humidity : 45%~85%

Attention: Standard charging method: 220mA (0.1C<sub>5</sub>A) Charge 12 hours.

Normal charging method: 440 mA (0.2C<sub>5</sub>A) charge 6 hours

Standard discharge method: 440mA (0.2C<sub>5</sub>A) discharge to 1.0V/piece

6.2 Test methods and standards

Test item	Unit	criterion	Condition	Remark
Capacity	mAh	2200	Standard charge/Standard discharge	Allow three cycles
Open circuit voltage	Volt/Piece	≥1.2		AQL II =0.65%
Shipping voltage	Volt/Piece	≥1..30	1 hour after standard charging	
Internal resistance	mΩ	≤30	0.2C <sub>5</sub> A standard charge for 360 minutes, 1 hour interval, use LCR meter (AC 1KHz) to measure internal resistance	
0.2C <sub>5</sub> A discharge	minute	≥300	Charge with standard charging method before discharging	Cutoff voltage 1.0V/piece

Overcharge	minute	≥300 No leakage, no deformation	0.10.1C <sub>5</sub> A charge for 48 hours, put it aside for 1~4 hours, 0.2C <sub>5</sub> A to 1.0V/piece.	Cut-off voltage 1.0V/piece
Charge retention Room temperature	mAh	≥(70%CN)	Stored for 28 days after standard charging, standard discharge	Ambient temperature 20±2℃
Charge retention fast	mAh	≥(70%CN)	Store for 4 days after standard charge, standard discharge	Ambient temperature 45±2℃
Cycle life	time	≥500	I	Reference
Leak test		No leakage Not deformed	400mA (0.2 C <sub>5</sub> A) fully charged, then stored for 14 days	Ambient temperature 20±5℃

**Remark: Cycle life**

Before the cycle life test, the battery should be discharged with a constant current of 0.2ItA to a termination voltage of 1.0V//only, and then the following life tests should be carried out at an ambient temperature of 20±5℃, except for specific batteries.

Cycle times	Charge	Shelving charged state	Dischareg
1	0.1ItA Charge 16h	/	0.25ItA discharge 2 hours 20 minutes
2—48	0.25ItA Charge 3h10min <sup>a</sup>	/	0.25ItA discharge 2 hours 20 minutes
49	0.25ItA Charge 3h10min	/	0.25ItA discharge to 1.0V
50	0.1ItA Charge 16h	1 to 4h	0.2ItA discharge to 1.0V

a If the voltage drops to 1.0V, the discharge stops

b After 50 cycles of discharge are completed, there is sufficient open-circuit shelving time to start 51 cycles exactly two weeks apart, and use the same procedure for the 100th, 150, 200, 250, 300, and 350 cycles.

Cycles 1 to 50 are repeated until the discharge time of any 50th cycle is less than 3h when the final voltage is 1.0V. At this time, repeat the capacity test for the 50th cycle as required. If the discharge time is still less than 3h, the life test End.

The number of cycles reached at the end of the test should not be less than 350.

**6.3 Storage**

Under the test conditions, the battery is discharged at a constant current of 0.2C to 1.0V/pc. After 12 months in an open circuit state, it can immediately undergo a 0.2-0.5C charge-discharge cycle (this cycle allows 5 times), and the battery is discharged at 0.2C The capacity is not less than 80% of the initial capacity.

**6.4 Vibration test**

The battery was subjected to a vibration test under the conditions of an amplitude of 4mm (0.158 inch) and a frequency of 1000 cycles per minute, and the battery performance remained normal.

**6.5 Drop test**

Falling freely from a height of 450mm (17.716 inches) onto the oak board, the electrical performance of the battery should remain normal.

## 6.6 Safety performance

### 6.6.1 Over discharge

External resistance makes the battery over-discharge for 24 hours (external resistance ( $m\Omega$ ) =  $1.2V \times n \times 1000 / 2C5A$ ), and the battery does not leak or deform.

### 6.6.2 Safety valve

Test Method: Discharge the battery 0.2C5A to 0V, then increase the discharge current to 1.0C5A, and keep it for 1 hour. The battery will not rupture or explode, and allow leakage and deformation.

## 7 Other:

7.1 It is recommended that the termination voltage of the battery is 1.0V/piece;

7.2 If the battery discharge end voltage is above 1.1V, the battery capacity cannot be used effectively;

7.3 If the battery discharge end voltage is below 1.0V, the battery will be over-discharged or reverse-charged.

## 8 Advice

8.1 Avoid reverse polarity charging.

8.2 Do not burn or damage the battery, otherwise the battery will explode or release harmful gas.

8.3 Avoid direct welding on the battery or battery pack.

8.4 Avoid mixing new and old batteries, otherwise it will cause over-discharge.

8.5 Stop using when noise, high temperature or liquid leakage occurs.

8.6 When the power is insufficient, stop using it to avoid over-discharge.

8.7 When the battery is not in use, it should be separated from the electrical appliance.

8.8 Do not put the battery in water (sea water) or fire.

8.9 Don't try to disassemble or press or hit the battery, it is easy to generate heat or fire, the lye is harmful to the eyes and skin, and will damage the clothes.

8.10 Keep away from children. Once swallowed by children, you should immediately see a doctor.

8.11 Short circuit, overcharge or improper charging method will damage the battery.

8.12 Store in a cool and dry place.

8.13 Use a suitable charger.

8.14 Do not use  $-\Delta V$  control within 5 minutes of starting charging

8.15 This specification will become effective after confirmation by both parties.

8.16 Do not reprint without permission.

8.17 The company has the right to revise this specification without notifying the user.

8.18 If necessary, please consult with General Electronics Technology Co., Ltd.