	Document NO.: WI-FHF- CS-FBA223BL -A	Page 1of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018

# Ni-MH Battery Specification

## 镍氢电池产品承认书

Project Name 产品名称: Ni-MH battery

**CS-FBA223BL      3.6V/2000mAh**

Replace Model: **CS-FBA223BL**

<b>Authorized Signature &amp; Company Chop</b> 客户认可及签回


Rev:A1		
Prepared 制作	Checked 确认	Approved 核准

CAMERON SINO TECHNOLOGY LIMITED

Unit 6-7,11F, Ho Lik Centre,66A Sha Tsui Road,Tsuen  
WAN, Hong Kong


Tel: +852-2426 9811    3575 8109

Fax:+852 24262911

	Document NO.: WI-FHF- CS-FBA223BL -A	Page 2of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018

**TABLE OF CONTENTS 目录**

1. PREFACE 序言.....	3
2. TECHNICAL FEATURES 技术参数.....	4
3. TEST 测试.....	5
4. PROTECTION CAPABILITY TEST METHODAND REQUEST 保护性能检测与要求 .....	8
5. CELL 电芯.....	8
6. OUTLINE 外观尺寸.....	8
7. PACKING 包装.....	9

	Document NO.: WI-FHF- CS-FBA223BL -A	Page 3of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018

## 1. PREFACE

### 序 言

#### SCOPE (使用范围)

**Name (名称) :** Ni-MH battery (镍氢电池)

**Model (型号) :** CS-FBA223BL

**Spec (规格) :** 3.6V/2000mAh

**Edition (版本) :** A/1

This product approval sheet has 9 pages (include the first page)

本产品承认书共 9 页(含首页).

This product approval sheet includes technical features, testing method, external connection graph, packing and so on.

本产品承认书包含:技术参数,检测方式,外形尺寸图外部连接图,包装等.

Amendment on this product approval sheet content must depend on below condition:

本产品承认书所归属内容的修改必须依据以下条件:

1. Customer's request or agreement.

客户要求或同意.


2. Safety guarantee and no influence to machine which the battery used in.

安全保证且与电池使用机器不产生影响.

We can give mass production after the agreement of "battery approval sheet" and sample with the customer. Designed by **Cameron Sino** R&D team, this approval sheet will be the basis of test.

本《产品承认书》由我司开发部编制, 经由我司与客户签准《产品承认书》和样品后, 方可进行产品之量产, 并作为双方检测之依据。

## 2. Technical Features 技术参数


	Document NO.: WI-FHF- CS-FBA223BL -A	Page 4of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018

Item 项目	Rated performance 性能	Note 备注
1.1 Rated Voltage 额定电压	3.6V	
1.2 Discharge Cut-off Voltage 放电终止电压	2.4V	
1.3 Rated Capacity 额定容量	2000mAh	0.2C Discharge 0.2C 放电
1.6 Standard Charge Current 标准充电电流	400mA	0.2C
1.7 Quick Charge Current 快速充电电流	1000mA	0.5C
1.8 Max Discharge Current 最大放电电流	2000mA	-20°C - +55°C
1.9 Initial Internal Resistance 总内阻	≤200mΩ	AC 1kHz (AC Impedance) AC 1kHz 交流阻抗值
1.10 Weight Per Battery 单体电池重量	≤94.8g	Electronic scale (W/O Packing Materials) 电子秤(不含包装材料)
1.11 Battery Size 外型尺寸	L=60.70 (+0/-0.50mm) W=47.55 (+0/-0.50mm) H=18.00 (+0/-0.50mm)	Calipers 卡尺
1.12. Operating Temperature 工作温度范围	Charge 充电	0°C ~+45°C Humidity 65±20% 湿度 65±20%
	Discharge 放电	-20°C~+55°C Humidity 65±20% 湿度 65±20%
	Temperature protection 保护温度	99°C±5°C Humidity 65±20% 湿度 65±20%
1.13 Storage Temperature 贮存温度范围	Standing Storage (less than one year 长期贮存(1年内))	-20°C~+35°C Humidity 65±20% 湿度 65±20%
	Notes(说明): 1. Period of storage is counted from shipping date 贮存时间以出货日期为起始点计算;	

### 3. Test (测试)

#### 3.1 Testing Environment (测试条件) :

- 3.1.1 Test time should be no more than one month after receive the battery  
测试电池为用户收到后不超过1个月的产品.

	Document NO.: WI-FHF- CS-FBA223BL -A	Page 5of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018

### 3.1.2 Testing Environment (测试环境):

Temperature (温度): 15°C--25°C

Relative Humidity(相对湿度): 45%--85%

Atmospheric Pressure(大气压力): 76kPa--106kPa

### 3.2 Testing Instrument (测试工具):

3.2.1 Voltage meter 0.5 grade or more regulated by IEC 51/IEC 485, more than 10K Ω /V internal resistance

电压计 IEC 51/IEC 485 所规定的 0.5 级或以上, 内阻大于 10K Ω /V

3.2.2 Current meter 0.5 grade or more regulated by IEC 51/IEC 485, include wire resistance less than 0.01 Ω.

电流计 IEC 51/IEC 485 所规定的 0.5 级或以上, 包括引线总电阻小于 0.01 Ω.

3.2.3 Calipers Definition 0.02mm

卡尺 精确度 0.02mm

3.2.4 Internal Resistance Meter AC 1KHz 4 terminal measure setting.

内阻仪 交流 1KHz 4 端子测量装置.

3.2.5 Load Resistance Include external circuitry, allowed resistance figure error is ±5%.

负载电阻 包括外部线路, 电阻值允许误差为±5%.

3.2.6 Finished Battery Product Testing Machine


成品电池测试仪

### 3.3 . Test method and request (检测方法 with 要求)

Item 项目	Test Method 检测方法	Request 要求
1 Appearance 外观	By sight: 30CM vertically 目测: 垂直 30CM	Case appearance should be smooth w/o nick, burr and other mechanical damage. Exposed metallic part should not be Oxidized. Case should not be distorted. 外壳表面应平整无划痕、毛刺及其他机械损伤, 外露金属部分不应有氧化现象、胶壳不能变形.
2 Insulation Resistance 绝缘电阻	Test the external packing of battery and insulation between poles using insulation-meter 用兆欧表测量电池外包装及电极之间的绝缘度	More than 10M Ω 大于 10M Ω
3 Internal Resistance	AC testing method. In half capacity condition, using AC 1kHz testing method to measure the internal resistance figure	≅ 200m Ω



	内阻	between poles in battery connector. 交流测试法,半容量状态下,使用 AC 1kHz 检测方法,测量电池接口处正负极之间的内阻.	
4	Discharging 放电平台	1) Use nominal capacity charging method full charge the battery. 按标称容量充电方法将电池充饱电. 2) 1C constant current discharge to 2.4V 1C 恒流放电至 2.4V 的时间.	Discharging time $\geq 90$ min 放电时间 $\geq 90$ min
5	High temperature Resistant Capability 抗高温性能	Put full-charged battery in $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ thermostat for 2h, then use 1C discharge to 2.4V 将充饱电的电池置入 $55^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 恒温箱中存放 2h 后,并以 1C 放电至 2.4V	1) After test, 1C capacity should be $\geq 35$ min, internal resistance should be no more than 120% of internal resistance before test. 实验后的 1C 容量应为 $\geq 90$ min, 内阻应 $\leq$ 实验前 120%. 2) Case appearance should not be distorted and crack. 电池外观应无变形、无爆裂
6	Low temperature Resistant Capability 抗低温性能	1) Use nominal capacity charging method full charge the battery. 按标称容量充电方法将电池充饱电. 2). Put full-charged battery in $-25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ chest freezer for 24h, then use 0.2C discharge to 2.4V 将充饱电的电池置放在 $-20^{\circ}\text{C} \pm 2^{\circ}\text{C}$ 冷冻柜中 24h 后,并以 0.2C 放电至 2.4V	1) After test, 1C capacity should be no less than 70% of it before test, internal resistance should be no more than 150% of internal resistance before test. 实验后的 1C 容量应为 $\geq$ 实验前 70%, 内阻应为 $\leq$ 实验前 150%. 2) Case appearance should not be distorted and crack. 电池外观应无变形、无爆裂,
7	Cycle Life 循环寿命	After 300 cycles of complete charge and discharge at 1C current, and record the capacity 将电池以 1C 的电流对电池充放电做 300 次循环,并记录容量。	Battery should not explode smoke, burn or burst. 1C charge and discharge cycle life should more than 300 times 电池不能有爆炸,冒烟,燃烧,变形等现象. 1C 充放电循环寿命应 $\geq 300$ 次。
8	Fall Proof Capability 抗跌落性能	Hang the battery in one meter high in the air. Let the cells fall down by six sides 将电池悬空在 1 米高处,将电芯自由跌 (Anode and Cathode side, crosswise sides) 1 time each, all together 6 times. 落 6 面 (正负极面, 横向面) 各 1 次, 共 6 次。	1) Battery should not be leak, smoke and burst. 电池应不漏液、不冒烟、不爆炸 2) After test, 1C capacity should be no less than 95% of it before test. Internal resistance discrepancy should be no more than $3\text{m}\Omega$ . 实验后的 1C 容量 $\geq$ 实验前 95%, 内阻相差不超过 $3\text{m}\Omega$ 。

	Document NO.: WI-FHF- CS-FBA223BL -A	Page 7of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018

9	Capacity Retention 电荷保持能力	<p>1) In environmental temperature <math>20^{\circ}\text{C} \pm 5^{\circ}\text{C}</math> condition, Use nominal capacity charging method full charge the battery 在环境温度 <math>20^{\circ}\text{C} \pm 5^{\circ}\text{C}</math> 条件下, 按标称容量充电方法将电池充电</p> <p>2) Lay the battery opened circuit 28D, then use 0.2C discharge it to cut off voltage 将电池开路搁置 28D, 再以 0.2C 放电至终止电压</p>	<p>0.2C discharging time should no less than 3.20H. 0.2C 放电时间应不低于 3.20H.</p>
10	Constant Temperature and Humidity Proof Capability 抗恒定湿热性能	<p>Lay the battery in temperature <math>40 \pm 2^{\circ}\text{C}</math> and humidity 90% ~ 95% environmental chambers for 48h. Then lay the battery in environmental temperature <math>20 \pm 5^{\circ}\text{C}</math> condition for 2h. Later discharge it in 1C and record the capacity. 将电池放入 <math>40^{\circ}\text{C} \pm 2^{\circ}\text{C}</math>, 相对湿度为 90% ~ 95% 的恒温恒湿箱中搁置 48h 后, 将电池取出在环境温度 <math>20^{\circ}\text{C} \pm 5^{\circ}\text{C}</math> 的条件下搁置 2h, 以 1C 放电, 并记录容量。</p>	<p>1) Battery appearance should not be obvious nick, leak, smoke and burst. 电池外观应无明显变形锈蚀、冒烟或爆炸。</p> <p>2) 1C discharging capacity should no less than 93min. Internal resistance discrepancy should be no more than <math>3\text{m}\Omega</math>. 1C 放电容量应 <math>\geq 93\text{min}</math>, 内阻相差不超过 <math>3\text{m}\Omega</math>。</p>


3.4. Shipping Voltage (Inspection before shipment):  $\geq 3.6\text{V}$

出货空载电压(出货前检测):  $\geq 3.6\text{V}$

#### 4. Protection Capability Test Method and Request

##### 保护性能检测与要求

Item 项目	Test Method 检测方法	Request 要求
1 Overcharge Test 过充测试	<p>Apply 2 times than rated battery voltage and a 2C charge current on the battery for 8hs. 用恒压源持续加载 8hs, 恒流恒压源电压设定为 2 倍电池标称电压, 电流设定为 2C 的外接电流</p>	<p>Battery could not be burst, burn, leak and smoke 电池应不爆炸、不打火、不冒烟或漏液</p>
2 Over discharge Test 过放测试	<p>Discharge the battery at 1C to cut off voltage, then discharge with loading <math>30\Omega</math> for 24hs. 以 1C 放电至终止电压后外接 <math>30\Omega</math> 负载放电 24H</p>	<p>Battery could not be burst, burn, leak and smoke 电池应不爆炸, 不打火, 不冒烟或漏液</p>

	Document NO.: WI-FHF- CS-FBA223BL -A	Page 8of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018

3	Pack Short-circuit Protection 短路保护	<p>1) The battery is charged to rated capacity. 按标称容量充电方法将电池充饱电.</p> <p>2) The battery is to be short-circuited by connecting the positive and negative terminals of the battery with thermocouple having a maximum resistance load of 0.3Ω 将接有热电偶的电池置于通风橱中, 将电池正负极用 0.3Ω 电阻器持续短路。</p>	<p>Battery could not be burst, burn, leak and smoke After charging. 电池应不爆炸、不起火、不冒烟或漏液;</p>
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## 5. Cell (电芯)

- 1) Chem: Ni-MH Cell  
类别: 镍氢电芯
- 2) Spec: AA\*3/3.6V/2000mAh (GRP) 格瑞普 (3S1P) 3串1并
- 3) 规格: AA\*3/3.6V/2000mAh (GRP) 格瑞普 (3S1P) 3串1并


## 6. OUTLINE (外观尺寸):

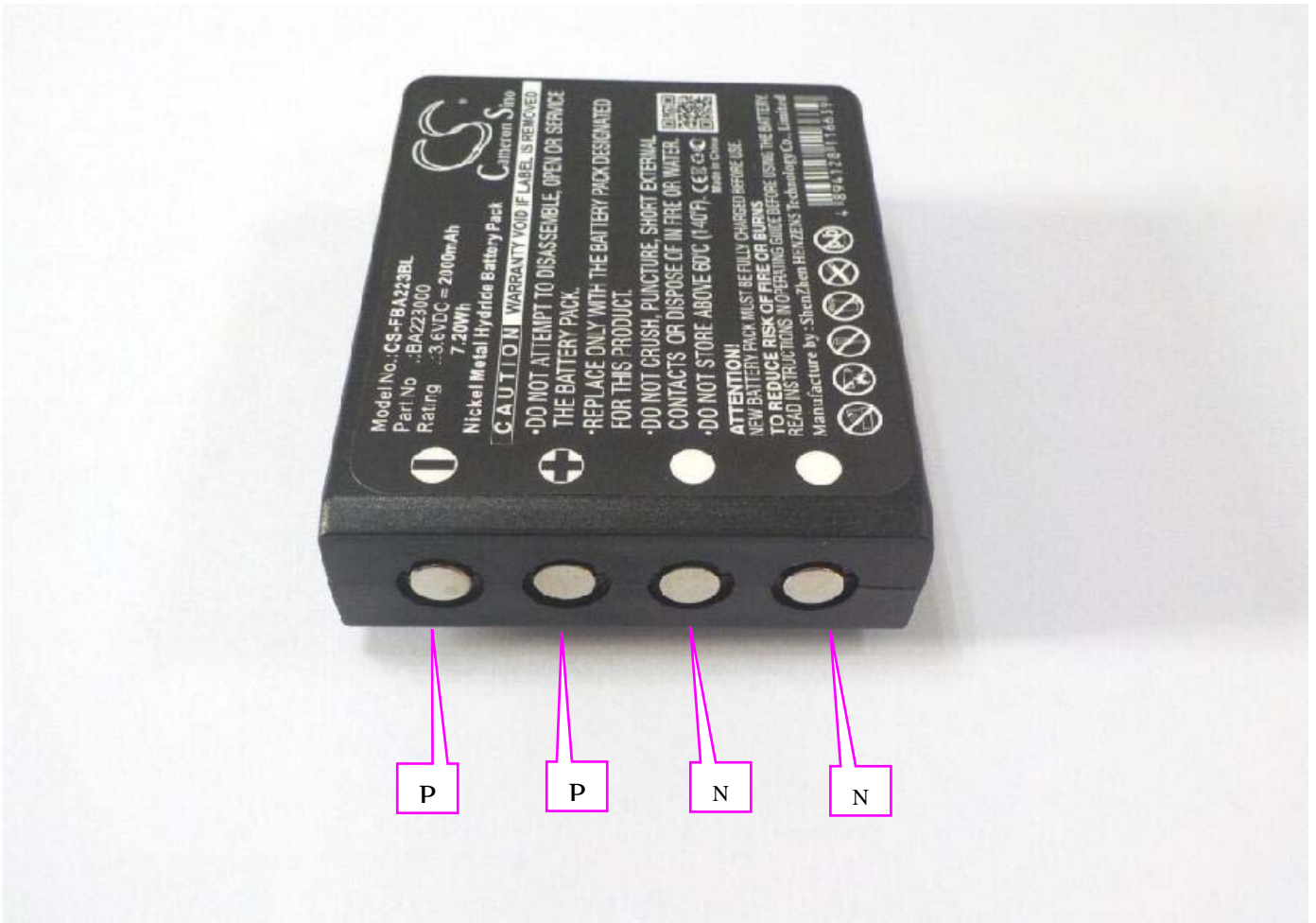
L=60.70 (+0/-0.50mm)

W=47.55 (+0/-0.50mm)

H=18.00 (+0/-0.50mm)



	Document NO.: WI-FHF- CS-FBA223BL -A	Page 9of 9
	MODEL: CS-FBA223BL	REV : A/1 Date : 11 Jan 2018



**P-** 是充放电负极

**P+** 是充放电正极

**NC** 是空角

## 7. Packing (包装)

Packing method, as the customer required.

包装方法按客户要求包装。