PRODUCT SPECIFICATION

Alkaline AAA Size Battery
Model: AAA LR03

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Revision History

Revision	Date	Originator	Description
A0	2016-6-18		Original Release

Contents

PRODUCT SPECIFICATION 1
1. General Information 4
1.1 Scope 4
1.2 Production classification 4
1.3 Model type 4
2. Reference standards 4
2.1 National standards of People's Republic of China 4
2.2 EU's battery directive 4
3. Specification 4
4. Electrical Characteristic 5
4.1 Open circuit voltage and closed circuit voltage 5
4.2 Service output 6
5. Leakage resistance of batteries 6
6. Reliability/Safety Requirements 7
6.1 Reliability Test Requirements 7
6.2 Safety Test Requirements 7
7. Information of safety 8
7.1 Safety precautions during handling of batteries 8
7.2 Packaging 8
7.3 Display and storage 8
7.4 Transportation 8
7.5 Disposal 9
8.Instructions for use 9
9.Heavy metal content 9
10.Note 9

1. General Information

1.1 Scope

This specification defines the technical requirements for alkaline cell, Zn/MnO2, LR03/AAA Size(No mercury and Cadmium added) to be supplied to the Customer by Fujian Nanping Nanfu Battery Co.,Ltd.

1.2 Production classification

Alkaline Battery

1.3 Model type

ANSI:24A IEC:LR03 Size:AAA

2. Reference standards

2.1 International standards

IEC60086-1:2015——Primary batteries-part 1:General

IEC60086-2:2015——Primary batteries-part 2：Physical and technologic specifications

IEC60086-5:2016——Primary batteries-part 5：Safety of batteries with aqueous electrolyte

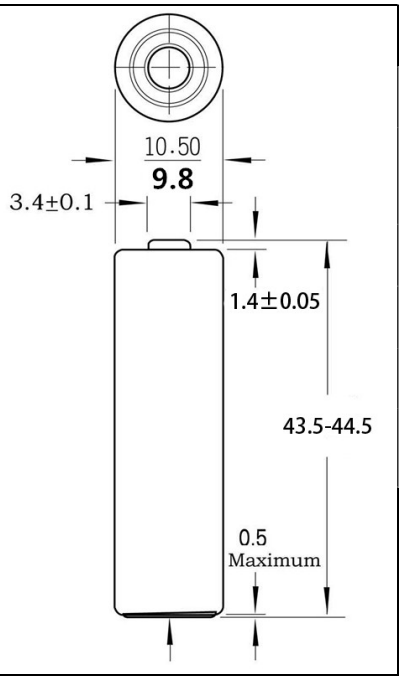
2.2 EU's battery directive

This product complies with EU's battery directive (2006/66/EC)

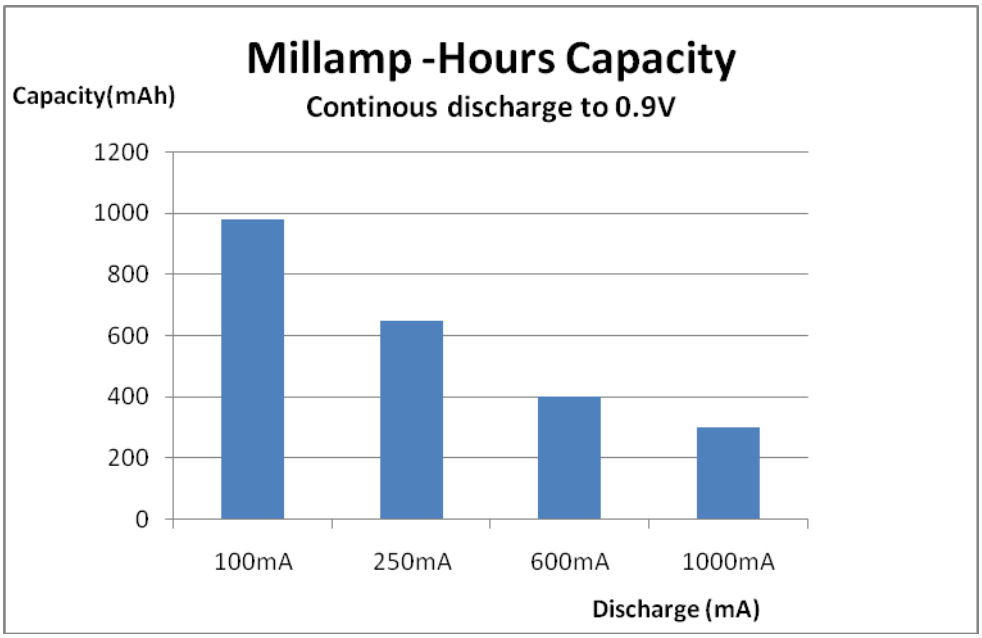
Packaging materials comply with EU's directive on packaging materials and waste (94/62/EC)

3. Specification

Nominal voltage	1.5Volt
Open circuit voltage	$1.5^{+0.18}_{-0}$ Volt
Nominal capacity※	1100mAh (Test condition:75Ω, continuous discharge, e.v= 0.9V).
Typical weight	12±1g
Terminals	flat
Storage temperature range	5~30℃
Working temperature range	Temperature of -20 ℃~ 54 ℃, humidity of 0% -75%
Shelf life	60Months（each battery will carry a manufacturing date code followed by month and year of manufacturing for domestic and expiry for export.）



※：Capacity varies from different mA, refers to the below chart for more info.



4. Electrical Characteristic

- Unless other stated, all measurements are to be performed at:20±2℃,55± 20% RH
- All samples are normalized for 8 hours at least at the above environment prior to measurement
- The digital voltmeter (DCM) is with the precision of 1mV (impendence ≥ 1 mΩ)
- The load resistance of the total circuit is accurate within±0.5% of the specified value

4.1 Open circuit voltage and closed circuit voltage (Load resistance 5Ω , 0.3S)

Voltage	OCV(V)	CCV(V)
Initial	1.50-1.68	1.40~1.50

4.2 Service output

Application	Test condition			Average duration at 20°C					
Load		Daily period	End voltage	Initial		Stored 1 year	Stored 3 years	Stored 5 years	unit
				nominal	typical				
Portable lighting	5.1 Ω	4m/h,8 h/d	0.9	3.8	4.0	3.5	3.2	2.9	h
Remote control	24 Ω	15s/m，8h/d	1	20.0	20.4	18.4	17.0	15.0	h
photoflash	600mA	10s/m，1h/d	0.9	280	300	258	238	210	pulse
Digital audio	50mA	1h/12h ,24h/d	0.9	19.5	20.6	17.9	16.6	14.6	h
toy	5.1 Ω	1h/d	0.8	3.5	4.1	3.2	3.0	2.6	h
--------	20 Ω	24h/d	0.9	17.0	18.1	15.6	14.5	12.8	h

5. Leakage resistance of batteries

Item	Over-discharge			High temperature		
LR03	Temperature and humidity	Method	Requirements	Temperature and humidity	Time	Requirements
	20±2℃ 55±20%	After measured discharge capacity, continue discharge until load voltage drop to less than 40% of original	No leakage and no deformation	60±2℃ 90±5%	20Days	No leakage

6. Reliability/Safety Requirements

6.1 Reliability Test Requirements

Test	Conditions	Sample	Requirements
Lot Capacity	Discharge continuously using a load resistance of 75 ohm (± 0.5%) to a closed circuit voltage of 0.9V.	9	≥1100mAh
Variable Frequency Vibration- IEC 60086-5	Simple harmonic, maximum excursion of 1.6 mm. Modulate frequency up and down at 1 Hz/min between 10 and 55 Hz. Test in 3 mutually perpendicular directions for 90 ± 5 minutes per direction	5	No leakage, No fire, No explosion
Low Temperature Storage	-20 ± 2°C for 24 hrs	5	
High Temperature Storage	55 ± 2°C for 100 hrs	5	
Corrosion Resistance	60 ± 2°C / 90± 5% RH for 7 days	**5**	
Drop Test -IEC 60086-5	Drop at 1 m height onto concrete 6 times, twice on each the battery's 3 axes.	5	
Storage after partial use	Discharge a fresh battery under IEC 60086-2 until the service life falls by 50%of MAD value, followed by storage at(45±5)℃for 30 days	5	
Transportation-shock	Half sine wave shock with 75 g_n in first 3 Milliseconds, and 125-175 g_n peak acceleration shock pulse, shock one time in three perpendicular directions g_n=9,80665m/s²	5	

6.2 Safety Test Requirements

Test	Conditions	Sample	Requirements
High temperature exposure	70 +/- 2 °C for 8 weeks	5	No leakage, No fire, No explosion
Thermal Cycling Shock-IEC 60086-5	Repeat the following temperature cycle 10 times: • Heat to +70°C within 30 minutes, hold for 4 hours. • Cool to +20°C within 30 minutes, hold for 2 hours. • Cool to -20°C within 30 minutes, hold for 4 hours. • Heat to +20°C within 30 minutes After the 10th cycle store batteries for 7 days	5	
Short Circuit-IEC 60086-5	Connect positive and negative terminals using circuitry with a resistance of less than 0.1 Ohm. Discharge for 24 hours.	5	No fire, No explosion
Over Discharge Test	Discharge one fresh battery under IEC 60086-2, with highest MAD value until on-load voltage falls to (n x 0.6v)"n" is the number of cells. Then, connect 3 fresh batteries of the same brand, type and origin in series. Continue discharge until voltage falls to four times (n x 0.6v). The value of the resistor shall be approximately four times the lowest value from the resistive load IEC60086-2.The final value of the resistor shall be the nearest value to that prescribed in 6.4 of IEC 60086-1	20	
Safety Vent Test	Put 4 fresh batteries in a series ring connection with one battery with reversed polarity for 1 day. Remove batteries from circuit and observe for 7 days. Safety vent shall operate.	20	No fire, No explosion

7. Information of safety

7.1 Safety precautions during handling of batteries

- Insert batteries correctly with regard to the polarities(+ & -)of battery and the equipment
- Do not short-circuit batteries
- Do not charge batteries
- Do not force discharge batteries
- Do not mix old and new batteries or batteries of different types or brands
- Exhausted batteries should be immediately removed from equipment and properly disposed
- Do not heat batteries
- Do not weld or solder directly to batteries
- Do not dismantle batteries
- Do not deform batteries
- Do not dispose of batteries in fire
- Keep batteries out of the reach of children
- Do not allow children to replace batteries without adult supervision
- Do not encapsulate or modify batteries
- Store unused batteries in their original packaging away from metal object. If already unpacked, do not mix or jumble batteries.
- Remove batteries from equipment if it is note to be used for an extended period of time unless it is for emergency purposes.

7.2 Packaging

The packaging shall be adequate to avoid mechanical damage during transport, handling and stacking. The materials and packaging design shall be chosen so as to prevent the development of unintentional electrical contact, corrosion of the terminals and some protection from the environment.

7.3 Display and storage

- Batteries shall be stored in well-ventilated, dry and cool conditions
- Battery cartons should not be piled up in several layers(or should not exceed a specified height)
- When batteries are stored in warehouses or displayed in retail stores, they should not be exposed to direct sun rays for a long time or placed in areas where they get wet by rain
- Do not mix unpacked batteries so as to avoid mechanical damage and/or short-circuit among each other
- Do not keep batteries at relative humidity of 75% or above
- Do not keep batteries at temperature of 45℃ or above

7.4 Transportation

When loaded for transportation, battery packages should be so arranged to minimize the risk of falling e.g.one from the top of another. They should not be stacked so high that damage to the lower packages occurs, Protection from inclement weather should be provided.

7.5 Disposal

- Do not dismantle batteries
- Do not dispose of batteries in fire except under conditions of controlled incineration
- Primary batteries may be disposed of via the communal refuse arrangements, provided that no local rules to the contrary exist
- Where there is provision for the collection of used batteries, the following should be considered:
  a) Store collected batteries in a non-conductive container.
  b) Store collected batteries in a well-ventilated area. Since some used batteries may still contain a residual charge, they could be short circuited, charged or force discharged and thereby evolve hydrogen gas. If collection containers and storage areas are not properly ventilated, hydrogen gas can build up an explosion in the presence of an ignition source.
  c) Do not mix collected batteries with other materials. Since some used batteries may still contain a residual charge, they could be short circuited, charged or force discharged. The subsequent possible heat generation can ignite flammable wastes such as oily rags, paper or wood and can cause a fire.
  d) Consider protecting used battery terminals, particularly those batteries with high voltage, to preclude short circuits, charging and force discharging, for instance, by means of covering battery terminals with insulating tape.
  e) Failure to observe these recommendations may result in leakage, fire, and/or explosion.

8.Instructions for use

- Always select the correct size and grade of battery most suitable for the intended use. Information provided with the equipment to assist correct battery selection should be retained for reference.
- Replace all batteries of a set at the same time.
- Clean the battery contacts and also those of the equipment prior to battery installation.
- Ensure that the batteries all installed correctly with regard to polarity.
- Remove batteries from equipment which is not to be used for an extended period of time.
- Remove exhausted batteries promptly.

9.Heavy metal content

Mercury(Hg) content should be less than 1PPM
Cadmium (Cd) content should be less than 2 PPM
Lead (Pb) content should be less than 15 PPM

10.Note

Any other items do not list in here please refer to IEC 60086 standard.