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NI-MH BATTERIES SPECIFICATIONS

(MODEL NO.): FP-MH-AAA1150A 1.2V

(FILE NO.): LTT13-AS1-07-01-MH001

(CUSTOMER NO.): \_\_\_\_\_

(PREPARED BY):	_____
(CHECKED BY):	_____
(APPROVED BY):	_____
(CONFIRMED BY):	_____

## (SPECIFICATIONS)

### 1. (Scope)

This specification is applied to the reference battery in this Specification and manufactured by Shenzhen LTT Co., Ltd.

2、(MODEL): FP-MH-AAA1150A 1.2V

### 3、(APPEARANCE)

The cell / battery shall be free from cracks, scars, breakage, rust, discoloration, leakage and deformation.

### 4、(RATINGS)

Table below can be taken as the basic guideline of evaluation the battery quality.

4.1 (ambient temperature) $20\pm 5^{\circ}\text{C}$ , (Relative Humidity):  $65\pm 20\%$

4.2 (Testing facility must conform to the condition):

: IEC 51/IEC 485 0.5 0.01  $\Omega$

Ampere meter: IEC 51/IEC 485 stipulated grade 0.5 or above, including the down-lead resistance totally less than 0.01 $\Omega$

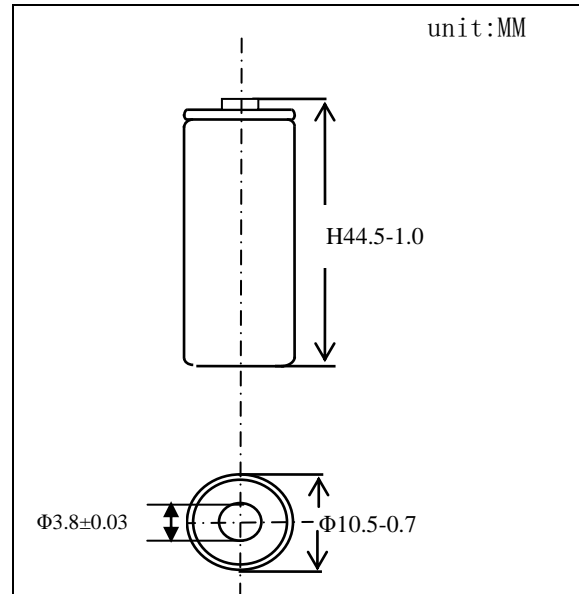
Resistance tester: AC 1 KHz sine wave 4 terminals testing equipment

Item	Specification	Conditions
Standard charge	<u>100</u> mA (0.1C)	$20\pm 5^{\circ}\text{C}$ , $65\pm 20\%$ ambient temperature of $20\pm 5^{\circ}\text{C}$ , Relative Humidity: $65\pm 20\%$
	<u>16</u> hrs	
Standard discharge	<u>200</u> mA (0.2C)	1.0V standard charge, the final voltage is 1.0V
Rapid Charge	<u>500mA</u> (0.5C)	$-\Delta V=5\sim 10\text{mV}$ $20\pm 5^{\circ}\text{C}$ , : $65\pm 20\%$ ambient temperature of $20\pm 5^{\circ}\text{C}$ , Relative Humidity: $65\pm 20\%$
Rapid discharge	<u>500mA</u> (0.5C)	1.0V standard charge, the final voltage is 1.0V
Trickle Charge	<u>20~50</u> mA (0.02C~0.05C)	$T_a=-10\sim 45^{\circ}\text{C}$
Storage Temperature	Within 1 year	$-20\sim 25^{\circ}\text{C}$
	Within 6 months	$-20\sim 35^{\circ}\text{C}$
	Within 1 months	$-20\sim 45^{\circ}\text{C}$
	Within 1 week	$-20\sim 55^{\circ}\text{C}$
Operation Temperature	Standard charge	$15\sim 25^{\circ}\text{C}$
	Fast Charge	$0\sim 45^{\circ}\text{C}$
	Discharge	$-20\sim 65^{\circ}\text{C}$
Nominal Voltage	<u>1.2</u> V	
Open circuit voltage	$\geq 1.25\text{V}$	1hrs Within 1 hr after standard charge
Rated Capacity	<u>1150</u> mAh	
Minimum Capacity	$\geq 1150$ mAh(0.2C)	. Standard charge and Standard discharge
	$\geq 1000$ mAh(0.5C)	. Standard charge and Rapid discharge
Internal Impedance	$\leq 35\text{m}\Omega$	, — Within 1 hr after standard charge
Weight	<u>14</u> g	Approx: <u>14</u> g

Charge-retention Rate	60% (600mAh) Rate of Charge-retention $\geq 60$ % of Rated Capacity (600mAh)	28 0.2C 1.0V Storage a period of 28 days after standard charge, then Standard discharge (0.2C) to 1.0V
Cycles Test	$\geq 500$ Cycles	IEC61951-2:2003 (see note 2)
Constant humidity and hot performance	No damage	33 $\pm$ 3 14 天。 Full charge the battery at current 0.1C, 33 $\pm$ 3 $^{\circ}$ C, 80 $\pm$ 5%R.H., storage 14 days.
Over-charge	No leakage nor explosion Capacity $\geq 100\%$	0.2CmA 1.0V, 0.1CmA 48, 0.2CmA。 0.2C discharge to 1.0V, 0.1C charge for 48 hrs, then test the Capacity with Standard discharge Conditions
Over-discharge	80%。 No leakage nor explosion Capacity $\geq 800$ mAh	0.2CmA 1.0V, 6 $\Omega$ , 24。 0.2C discharge to 1.0V, Combine the battery with a 6 $\Omega$ electric resistance, after stored for a period of 24 hrs, then test the Capacity with Standard discharge Conditions
Vibration Test	$\leq 0.03$ V/: $\leq 5$ m $\Omega$ / Voltage variety: $\leq 0.03$ V/cell Internal impedance: $\leq 5$ m $\Omega$ /cell	0.1C 16 24: 1.5mm, 3000CPM 60 Charge at current 0.1C for 15hrs; place for 24 hrs, check the battery before and after vibration. Vibration condition: Swing: 1.5mm, Frequency: 3000CPM, Vibrate for 1hr to any direction.
Drop Test	: $\leq 0.03$ V/: $\leq 5$ m $\Omega$	0.1C 16, 24 1.5m (10mm)。 Charge at current 0.1C for 15hrs, place for 24 hrs, check the battery before and after fall down test; Impact condition: Fall down from height 1.5m to any direction on the hard-wood board( Thickness:10mm), test for 3 times
Safety	No disrupt or burst, explosion, but leakage of electrolyte and deformation are acceptable	20 $\pm$ 5 0.2I <sub>A</sub> 0.0V, 1.0I <sub>A</sub> 60。 The battery shall undergo a forced discharge in an ambient temperature of 20 $\pm$ 5 $^{\circ}$ C, at a constant current of 0.2I <sub>A</sub> , to a final voltage of 0V. the current shall then be increased to 1.0I <sub>A</sub> and the forced discharge continued in the same ambient temperature of 20 $\pm$ 5 $^{\circ}$ C, for 60 min.

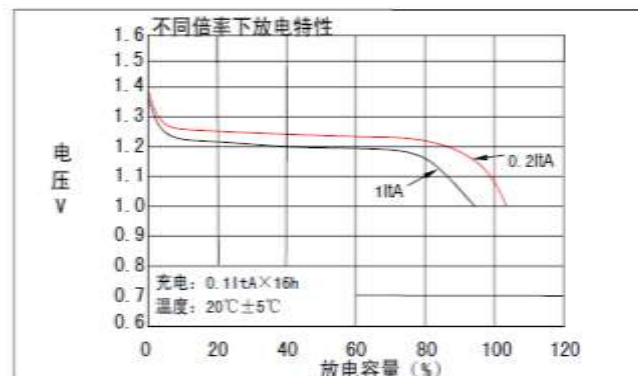
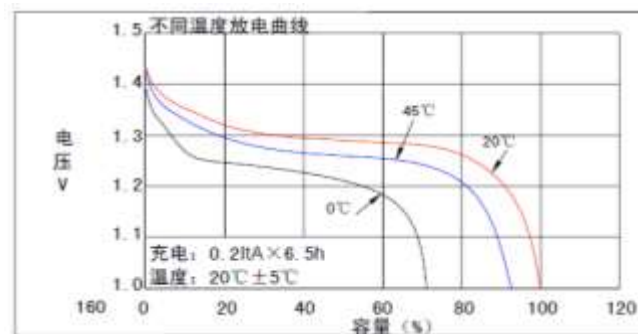
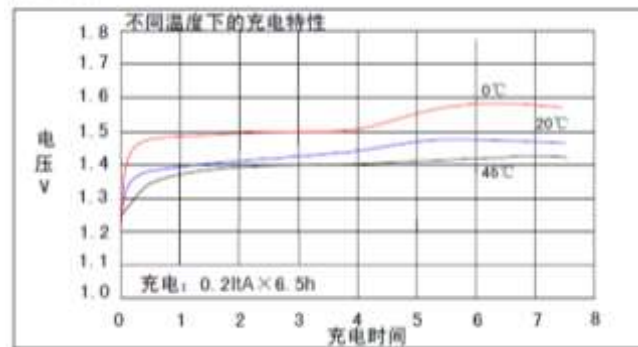
Specifications of single cell

TYPE	Nickel-Metal Hydride cylindrical single cell	
MODEL	LTT- AAAJ1150mAh 1.2V	
Dimensions	diameter	10.5-0.7mm
	Height	44.5-1.0mm



(characteristic of charge/discharge):

特征曲线



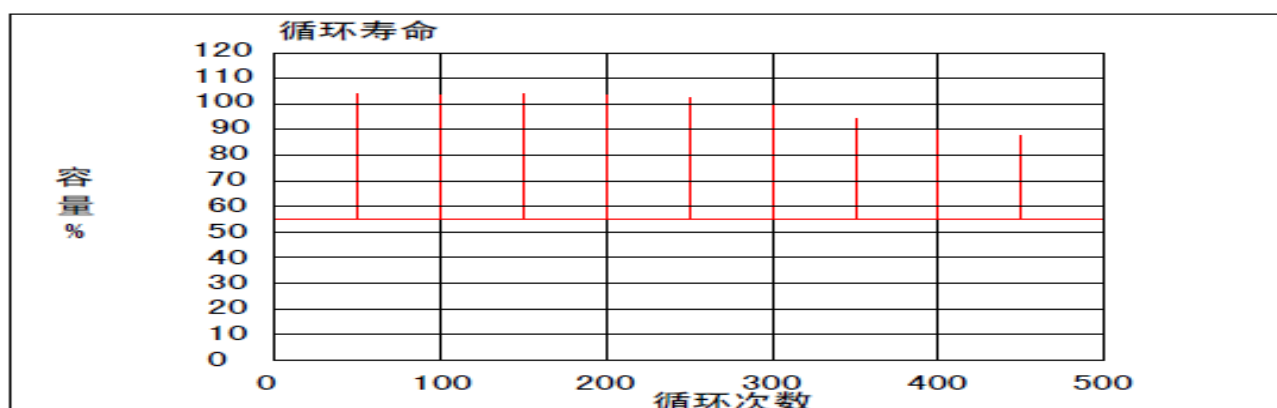
Note 1.: Standard charge and Standard discharge

Note 2:

- (1). ambient temperature:  $20\pm 5^{\circ}\text{C}$ , Relative Humidity:  $65\pm 20\%$
- (2). IEC (Life test method of IEC61951-2:2003) :

Cycle Number	Charge	Stand in charged condition	Discharge
1	0.1C×16hrs	None	0.25C×2hrs 20min
2~48	0.25C×3hrs 10min	None	0.25C×2hrs 20min
49	0.25C×3hrs 10min	None	0.25C to <u>1.0V</u> / cell
50	0.1C×16hrs	1~4hr	0.20C to <u>1.0V</u> /cell

1 - 50 Cycles 1 to 50 shall be repeated until the discharge duration on any 50<sup>th</sup> cycle become less than 3h. At this stage, a repeat capacity measurement as specified for 50 shall be carried out



(Cautions) :

Batteries should be charged prior to use.

When using a new battery for the first time or after long term storage, please fully charge the battery Before use.

For charging methods please reference to our specifications.

Use the correct charger for Ni-Cd or Ni-MH batteries.

Do not reverse charge batteries.

Do not short circuit batteries, permanent damage to batteries may result.

Do not incinerate or mutilate batteries, may burst or release toxic material.

Do not subject batteries to adverse condition such as extreme temperature, deep cycling and excessive Overcharge / overdischarge.

Store batteries in a cool dry place.

Do not mix VIGORPOWER batteries with other battery brands or batteries of a different chemistry such as Alkaline and zinc carbon.

Do not mix new batteries in use with semi-used batteries, overdischarge may occur.

Avoid batteries being used in an airtight compartment. Ventilation should be provided inside the battery compartment; otherwise batteries may generate hydrogen gas, which could cause an explosion if exposed to an ignition source.

When connecting a battery pack to a charger, ensure correct polarity.

If find any noise, excessive temperature or leakage from a battery, please stop its use.

When the battery is hot, please do not touch it and handle it, until it has cooled down.

Do not remove the outer sleeve from a battery pack nor cut into its housing.

When find battery power down during use, please switch off the device to avoid overdischarge.

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When not using a battery, disconnect it from the device.

Unplug a battery by holding the connector itself and not by pulling at its cord.

After use, if the battery is hot, before recharging it, allow it to cool in a well-ventilated place out of direct sunlight.

Never put a battery into water or seawater.

During long term storage, battery should be charged and discharged once every 3 months.

Do not attempt to take batteries apart or subject them to pressure or impact. Heat may be generated or fire may result. The alkaline electrolyte is harmful to eyes and skin, and it may damage clothing upon contact.

Keep away from children. If swallowed, contact a physician at once.