CHARACTERISTICS

FOR

NICKEL-METAL HYDRIDE
RECHARGEABLE BATTERY PACK

MODEL Ni-MH AAA x 3

Nominal capacity: 900 mAh

SPECIFICATION

FOR
NICKEL-METAL HYDRIDE
RECHARGEABLE BATTERY PACKS

Model AAA x 3

Date November 27, 2019

Approval		
Master	**Check**	**Design**

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SPECIFICATION

Model		AAA x 3
Nominal Voltage		3.6 V
Nominal Capacity		900 mAh/0.2 CmA
Charge	Standard	0.1 CmA for 16 hrs.
	Rapid	0.5 CmA for 2.4hrs.(approx.) (With-ΔV, Temp., Time charging control)
	Trickle	0.03CmA (1 month)
Maximum Discharge Current		3.0 CmA
Discharge Cut-off Voltage		3.0 V
Cycle Life		500 cycles(condition as para 4-3)
Applicable Temperature	Standard Charge	0~+45℃
	Rapid Charge	0~+40℃
	Discharge	-20~+65℃
Storage	Within one year	-20℃~+35℃
	Within 3 months	-20℃~+45℃
	Within 1 month	-20℃~+55℃
Relative Humidity Range		65%±20%
Weight		Approx. 40 g

1. Scope of Application

This specification is applied to Nickel-Metal Hydride Rechargeable battery packs, AAA x 3.

2. General

(1) Type	: AAA x 3
(2) Nominal Voltage	: 3.6 V
(3) Nominal Capacity	: 900 mAh (0.1CmA for 16hrs/0.2CmA discharge)
(4) Standard Charge	: 0.1C mA x 16 hrs.
(5) Rapid Charge	: 0.5 CmA x 2.4 hrs.(Maximum)
	: (with-ΔV charging control,-ΔV=0~5mV/cell)
(6) Trickle Charge	: 0.03 CmA (1 month)
(7) Cycles Life	: 500 cycles
(8) Maximum Discharge Current	: 1.0 CmA
(9) Discharge Cut-off Voltage	: 3.0 V
(10) Applicable Temp. Range	
Standard Charge	: 0~+45℃
Rapid Charge	: 0~+40℃
Discharge	: -20~+65℃
(12) Storage	
Within one year	: -20~+35℃
Within 3 months	: -20~+45℃
Within 1 month	: -20~+55℃
(13) Applicable Relative Humidity Range	: 65%±20%
(14) Weight	: approx. 40 g

3. Construction and Design

The battery pack is consisted of three (3) Ni-MH AAA cells connected in series. One NTC MF58 103-395F-A and a ploy switch MHD260 is installed in each battery pack to ensure safety during charging and discharging. Equivalent connector to JST PHR-3 is used for total battery packs.

4. Electrical Characteristics

4-1. Terminal Voltage

Open circuit voltage (O.C.V.) shall be 3.75V (minimum) within two weeks at room temperature after full charge.

4-2. Capacity

The battery packs deliver 900 mAh capacity at 0.1CmA charge rate for 16 hrs, then 0.2CmA discharge rate to 3.0 V. The actual capacity depends on the operating temperature and the cycling conditions.

4-3. Cycle-life

The battery pack is capable of 500 cycles under the following conditions:

Cycle number	Charge	Rest	Discharge
1	0.10CmA for 16 hrs	0.5hr	0.25CmA for 2 hrs 20 min
2~48	0.25CmA for 3 hrs 10 min	0.5hr	0.25CmA for 2 hrs 20 min
49	0.25CmA for 3 hrs 10 min	0.5hr	0.25CmA to 1.0V/cell
50	0.10CmA for 16 hrs	1.0hr	0.20CmA to 1.0V/cell

50 cycles test as per above table is repeated. The discharge time of the 100th, 200th, 300th, 400th, 500th should be more than 3 hours respectively. After 500 cycles, the capacity is still over 80% of rated capacity. The actual cycle life depends on the operating temperature and cycling conditions.

4-4. Overcharge

(1) The battery packs are charged at 0.5 CmA for 3 hours. After charging, the packs show no change in the cell appearance, no leakage, and no fire or explosion.

(2) The battery packs are charged at less than 0.03 CmA for a long term (over one month). After charging, the packs show no change in the cell appearance, no leakage, and no fire or explosion.

4-5. Self Discharge

(1) After one month storage of a fully charged battery pack at room temperature (25°C), the capacity of battery pack has 70% of rated capacity, 0.2 CmA discharge to 3.0 V.

(2) After one week storage of a fully charged battery pack at 45°C, the capacity of battery pack has 70% of rated capacity, 0.2 CmA discharge to 3.0 V.

4-6. Welding strength of the nickel terminals

Welding strength of nickel terminals is tested in perpendicular direction. The welding strengths are over 1 kgf.

4-7. Vibration Test

Cells are tested as follows:

(1) Amplitude	: 3.6mm peak to peak
(2) Frequency	: 1000cpm
(3) Direction and time	: Arbitrary direction continuously for 1 hour.
(4) Performance	: The cell shall be normality in appearance and no leakage.

4.8 Shock Test

Cells are tested as follows:

(1) Dropping Distance	: 0.45m (spontaneous dropping)
(2) Shock board	: Made of hard wood (Thickness: over 10mm)
(3) Dropping Time	: Arbitrary direction for 3 times.
(4) Performance	: The cell shall be normality in appearance and no leakage.

5. Safety Requirement for User

Please keep in mind the following points when operating, designing, or manufacturing your equipment.

1. Avoid short-circuiting of the battery pack. Do not connect the positive and the negative terminals with a wire or other metal items, as this will cause a large flow of current through the battery pack. It may damage the cells in the pack.

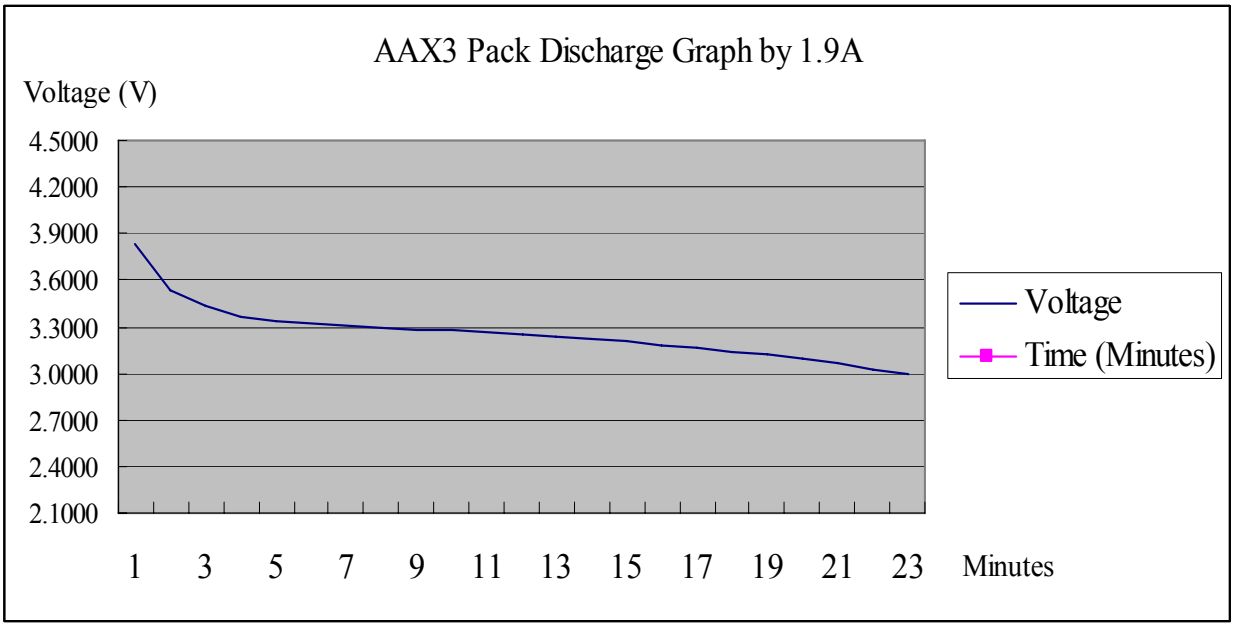
2. Do not attempt to take battery pack apart or subject to pressure or impact. The parts of the pack will be damaged, when the cells in the pack have ruptured, heat may be generated or fire may result. The alkaline electrolyte may harm the skin or eyes or damage clothing upon contact.

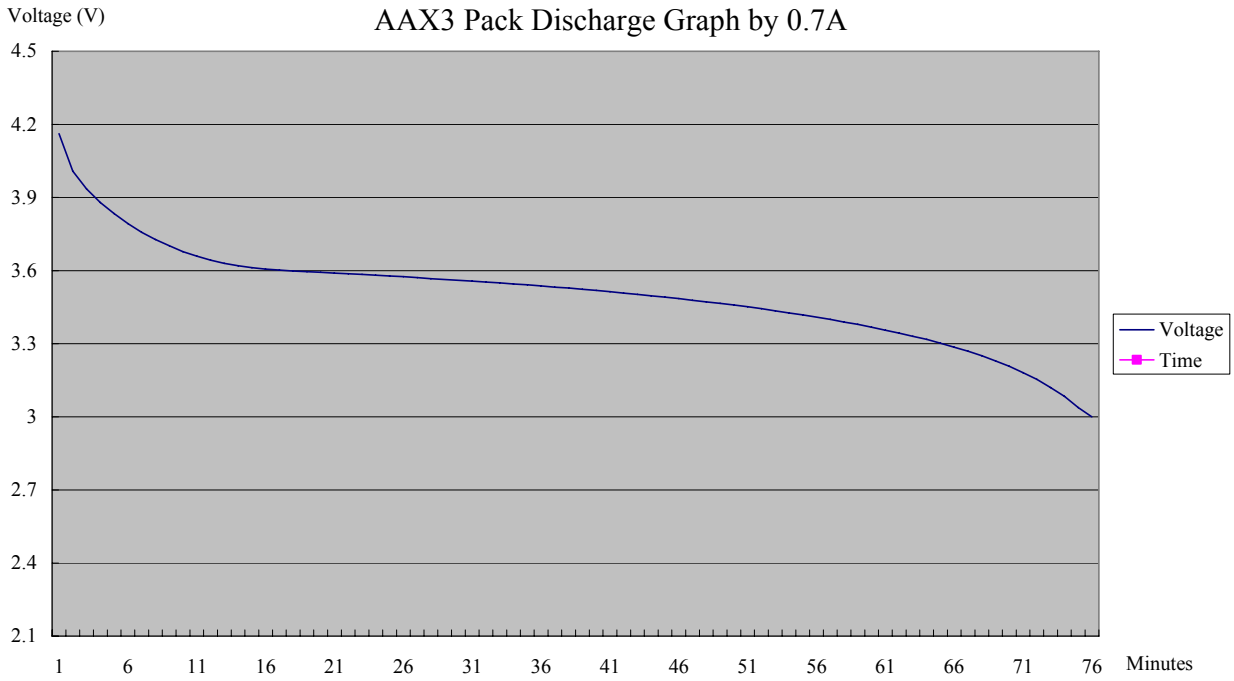
3. Do not heat or incinerate the battery pack. The battery may swell or rupture and it may explode or release alkaline electrolyte.

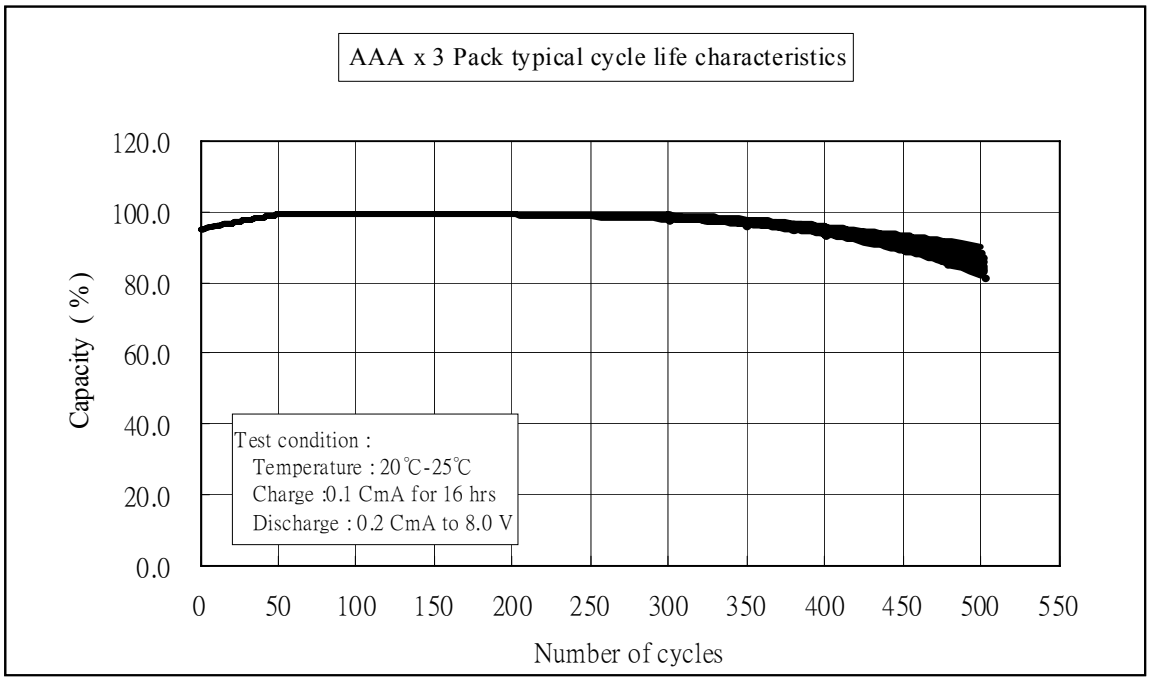
4. Do not solder directly to the battery. It may damage the battery.

5. If any abnormally or problem is found while using the battery pack, stop its use, and bring it to your local dealer. Please do not attempt to fix or take the battery pack apart. It may cause dangerous to you.

6. Charge the battery only with a specified charger or with a charger that meets our specified conditions. Charging under other conditions can cause overcharging and loss of charging control, and can cause the battery to leak, overheat, burst, or catch fire.


AAX3 Pack Discharge Graph by 1.9A
Voltage (V)
4.5000
4.2000
3.9000
3.6000
3.3000
3.0000
2.7000
2.4000
2.1000
1
3
5
7
9
11
13
15
17
19
21
23
Minutes
Voltage
Time (Minutes)


AAX3 Pack Discharge Graph by 0.7A
Voltage (V)
4.5
4.2
3.9
3.6
3.3
3
2.7
2.4
2.1
1
6
11
16
21
26
31
36
41
46
51
56
61
66
71
76
Minutes
Voltage
Time


AAA x 3 Pack typical cycle life characteristics
120.0
100.0
80.0
60.0
40.0
20.0
0.0
Capacity (%)
Test condition :
Temperature : 20℃-25℃
Charge :0.1 CmA for 16 hrs
Discharge : 0.2 CmA to 8.0 V
0
50
100
150
200
250
300
350
400
450
500
550
Number of cycles