Specification Approval Sheet

Name: Nickel Metal Hydride Battery

Model: 10320

SPEC: AA 1.2V 2500mAh

Approved By	Checkup	Make

Customer Confirmation	Signature	Date
	Company Name：	
	Stamp：	

1.BATTERY MODEL

10320

2.NOMINAL SPECIFICATION

2-1.Nominal voltage	1.2V
2-2.Nominal capacity*	2500mAh
2-3.Minimum capacity*	2400mAh
2-4.Charging**	
Standard charging	240mA for 16 hours
Quick charging	480mA for 7 hours
Rapid charging	1200mA for 2.4hours, –ΔV=5mV
2-5.End voltage of discharge	1.0V
2-6.Temperature (recommended)	
Standard charge	0~40^{o}C
Quick charge	10~40^{o}C
Rapid charge	10~30^{o}C
Discharge:	-10~50^{o}C
Storage: Less than 30 days	-20~50^{o}C
Less than 90 days	-20~40^{o}C
Less than 1 year	-20~30^{o}C
2-7.Relative humidity	45~85%
2-8.Weight	Approx. 29g
2-9.Dimensions	shown in the page 9

Note *: Discharge capacity when the battery unit is discharged at 460mA after being standard charged.
Five cycles are permitted for this test .The test shall be terminated at the end of the first cycle which meets the requirement.
**: Unless otherwise stated in these specifications, the battery unit should be discharged to 1.0V end voltage with 460mA before charging.

3. APPEARANCE

There shall be no practical damage such as conspicuous liquid electrolyte leakage, flow and dirt under conditions of storage or operation as specified herein.

4.ELECTRICAL CHARACTERISTICS

4-1.Testing conditions

The battery shall be evaluated within 1 month from the arrival date.

Unless otherwise stated in these specifications, the following test shall be carried out in an ambient temperature of 20±5°C, relative humidity of 65±20%.

4-2.Terminal voltage (O.C.V)

Open circuit voltage shall be a minimum voltage of 1.25V within 14 days after being standard charged

4-3. Internal resistance **(**IEC61951-2（2003）7.10.1**)**

Within 1 hour after being standard charged, the internal resistance is not greater than 35mΩ, as tested by 1000Hz AC source.

4-4.Capacity **(**IEC61951-2 **(**2003）7.2.1**)**

4-4-1.The battery unit shall be capable of supplying 460mA (0.2C) continuous discharge current for a minimum of 300 minutes to the 1.0V end voltage within 1 hour after being standard charged.

4-4-2.The battery unit shall be capable of supplying 1200mA (0.5C) continuous discharge current for a minimum of 110 minutes to the 1.0V end voltage within 1 hour after being standard charged.

4-4-3.The battery unit shall be capable of supplying 2400mA (1.0C) continuous discharge current for a minimum of 52 minutes to the 0.9V end voltage within 1 hour after being standard charged.

4-5.Temperature characteristics

4-5-1.Within 1 hour after standard charged at 40°C, the battery unit shall be discharged at 20°C, at a current of 480mA to 1.0V end voltage; discharge time shall be a minimum of 210 minutes.

4-5-2. Within 1 hour after standard charged at 20°C, the battery unit shall be discharged at 0°C, at a current of 480mA to 1.0V end voltage; discharge time shall be a minimum of 210 minutes.

4-6.Charge (capacity) retention **(**IEC61951-2（2003）7.3**)**

After standard charged battery unit is stored for 28 days at 20±2°C, the battery unit shall be discharged at 20°C, at a current of 480mA to 1.0V end voltage; discharge time shall be a minimum of 180 minutes.

4-7.Overcharge **(**IEC61951-2（2003）7.6.1**)**

Within 1 hour after charged at a current of 240mA for 48 hours, the battery unit shall be discharged at 20°C, at a current of 480mA to 1.0V end voltage, discharge time shall be a minimum of 300 minutes.

4-8.Endurance in cycles **(**IEC61951-2（2003）7.4.1.1**)**

Prior to the endurance in cycles test, the battery unit shall be discharged at 460mA to 1.0V end voltage. A battery unit shall be capable of 500 minimum cycles under the conditions as follows.

Cycle	Charge	Rest	Discharge
1	240mA for 16hours	None	600mA×140minutes
2~48	600mA for 190minutes	None	600mA×140minutes
49	600mA for 190minutes	None	600mA to 1.0V
50	240mA for 16hours	1h to 4h	480mA to 1.0V
Cycles 1 to 50 shall be repeated until the discharge time on any 50th cycle becomes less than 3 hours. At this stage, repeat 50th cycle, if the discharge time is less than 3 hours again the test is terminated. Note: If battery unit voltage drops below 1.0V, discharge shall be discontinued.			

4-9.Safety

4-9-1.Continuous low-rate charging **(**IEC62133（2002）4.2.1**)**

After standard charged battery unit is charged at 69mA~120mA for 28 days, no fire or no explosion.

4-9-2.Forced discharge **(**IEC62133（2002）4.3.10**)**

The discharged battery unit is subjected to a reverse charge at 2400mA for 90 minutes, no fire or no explosion.

4-10.Vibration **(**IEC62133（2002）4.2.2**)**

The battery unit shall be no fire, no leakage or no explosion, when it is tested under the following conditions after being standard charged.

Frequency	10~55Hz
Amplitude	0.76mm
Rate of frequency variety	1 Hz/minute
Duration	90 minutes /axis (axis: X、Y、Z) 270 minutes in all

5. ENVIRONMENTAL PROTECTION REQUIREMENT

5-1.The requirement on Hazardous Substances in the materials should comply with HIGHPOWER'S criterion on HSF.

5-2.The requirement on Hazardous Substances in the Products should comply with 2006/66/EC and HIGHPOWER'S criterion on HSF.

6. TRANSPORT

6-1.To ensure battery safety during delivery, SOC (state of charge) must be below 35%, inside temperature of container could not be over 35^{o}C. Product holder should be responsible for any possible loss during delivery if above conditions cannot be met completely.

6-2.Inside temperature of container must be below 20^{o}C if any client requires SOC (state of charge) above 35%, the distance between battery master cartons should be not less than 10cm in container, and coercive air cross ventilation system is required in container to ensure even temperature for each master carton. Product holder should be responsible for any possibly accidental loss if above conditions cannot be met completely

7. PRECAUTION

Please keep in mind the following points when designing and manufacturing equipment. Please insert in your instruction manual. To prevent equipment malfunctions from affecting the batteries, be sure to use protection devices for electrical circuits and batteries.

⚠ Danger!

- Failure to carefully observe the following procedures and precautions can result in leakage of battery fluid (electrolyte), heat generation, explosion, fire and serious personal injury!
- Never dispose of TENERGY batteries in a fire or heat them.
- Do not connect the (+) positive and (-) negative terminals of TENERGY batteries together with electrically conductive materials, including lead wires. Do not transport or store TENERGY batteries with their uncovered terminals or connected with a metal necklace or other electrically conductive material. When carrying or storing batteries, use a special case.
- Only charge TENERGY batteries using those specific chargers that satisfy HIGHPOWER'S specifications. Only charge batteries under the conditions specified by HIGHPOWER.
- Never disassemble TENERGY batteries. Doing so may cause an internal or external short circuit or result in exposed material of battery reacting chemically with the air. It may also cause heat generation, explosion and fire. Also, this is dangerous as it may cause splashing of alkaline fluid

- Never solder lead wires directly on to TENERGY batteries.
- The (+) positive and (-) negative terminals of TENERGY batteries are predetermined. Do not force the terminals to connect to a charger or equipment. If the terminals cannot be easily connected to the charger or the equipment, check if the (+) and (-) terminals are incorrectly positioned.
- The gas release vent which release internal gas is located in the (+) positive terminal of the TENERGY battery. For this reason, never deform this section or cover or obstruct its gas release structure.
- Do not directly connect TENERGY batteries to a direct power source or the cigarette lighter socket in a car.
- Do not use TENERGY batteries in any equipment other than those specified by HIGHPOWER.
- TENERGY batteries contain a strong colorless alkaline solution (electrolyte). The alkaline solution is extremely corrosive and will cause skin damage. If any fluid from a TENERGY battery comes in contact with user's eyes, they should immediately flush their eyes and wash them thoroughly with clean water from the tap or another source and consult a doctor urgently. The strong alkaline solution can damage eyes and lead to permanent loss of eyesight.
- When TENERGY batteries are to be incorporated in equipment or housed within a case, avoid air-tight structures, as this may lead to the equipment or the case being damaged or may be harmful to users.

⚠ Warning!

- Do not apply water, seawater or other oxidizing reagents to TENERGY batteries, as this can cause rust and heat generation. If a battery becomes rusted, the gas release vent may no longer operate, and can result in explosion.
- Do not over-charge TENERGY batteries by exceeding the predetermined charging period specified by the battery charger's instructions or indicator. If TENERGY batteries are not fully charged after the battery charger's predetermined charging period has clasped, stop the charging process. Prolonged charging may cause leakage of battery fluid, heat generation, and explosion. Be sure to handle recharged batteries carefully as they may be not.
- TENERGY batteries contain a strong colorless alkaline solution (electrolyte).If the skin or clothing comes in contact with fluid from a TENERGY battery; thoroughly wash the area immediately with clean water from the tap or another source. Battery fluid can irritate the skin.
- Do not connect more than 21 TENERGY batteries in series, as this may cause electrical shocks, leakage of battery fluid and heat generation.

- Do not remove the outer tube from a battery or damage it. Doing so will expose the battery to the risk of a short circuit, and may cause leakage of battery fluid, heat generation, explosion and fire.
- If TENERGY batteries leak fluid, change color, change shape, or change in any other way, do not use them, otherwise they may cause heat generation, explosion and fire.
- Keep TENERGY batteries and the equipment using them out of the reach of babies and small children, in order to avoid accidental swallowing of the batteries. In the event the batteries are swallowed, consult a doctor immediately.
- When the operating time of a TENERGY battery becomes much shorter than its initial operating time even after recharged, it should be replaced to a new battery as its battery life has ended.

⚠ CAUTION!

- Do not strike or drop TENERGY batteries.
- Store TENERGY batteries out of the reach of babies and small children. When charging or using a battery, do not let babies or small children remove the battery from the charger or the equipment being used.
- Be sure to charge TENERGY batteries within a temperature range of 0 to 40 deg C (degrees Celsius)
- Be sure to use the recommended charging method for TENERGY batteries read the battery charger's instruction manual carefully
- Do not use or store battery at high temperature, such as in strong direct sunlight, in cars during hot weather, or directly in front of a heater. This may cause leakage of battery fluid. It could also impair performance and shorten operating life of TENERGY batteries
- Be sure to turn off the equipment after use of TENERGY batteries, otherwise may result in leakage of battery fluid
- After removed from equipment, store TENERGY batteries in a dry place and within the recommended storage temperature range. This will help preserve the batteries' performance and durability and minimize the possibility of leakage of battery fluid or corrosion. (HIGHPOWER recommends the storage temperature range from -20 to +30deg.(for longer service life).
- Storage batteries should be charged one time every four months under the storage temperature of 30℃ and below, every three months under 40℃and below, and every one month under 50℃and below
- After long term storage, there is a possibility that the battery could not be fully charged. In order to fully charge it, please charge and discharge battery for a few times.

- Do not use old and new batteries mixed together, or batteries at different charge levels. Do not use the TENERGY battery mixed with a dry cell or other batteries of different capacity, type, or brand name. This may cause leakage of battery fluid and heat generation.

- If the TENERGY battery terminals become dirty, clean up them with a soft dry cloth prior to use. Dirt on the terminals can result in poor contact with the equipment, loss of power, or inability to charge.

8. WARRANTY

HIGHPOWER will be responsible for replacing the battery against any defects or poor workmanship for six months from the date of shipping.

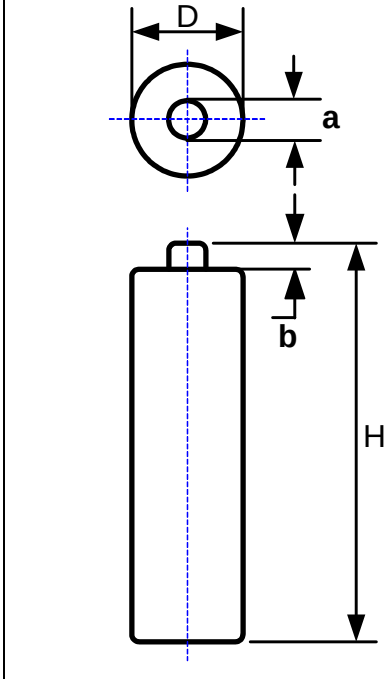
Any other problems caused by malfunction of the equipment or misuse of the battery are not under this warranty.

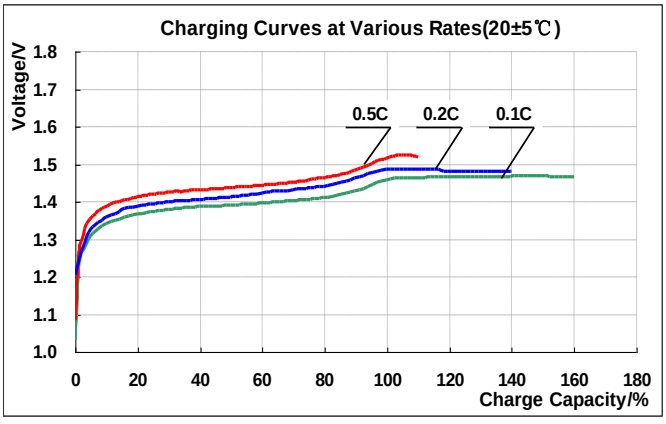
Notice: To assure safety, please consult to the HIGHPOWER technical staff for your applications including electrical specifications, mechanical designs, protective devices and any special specification.

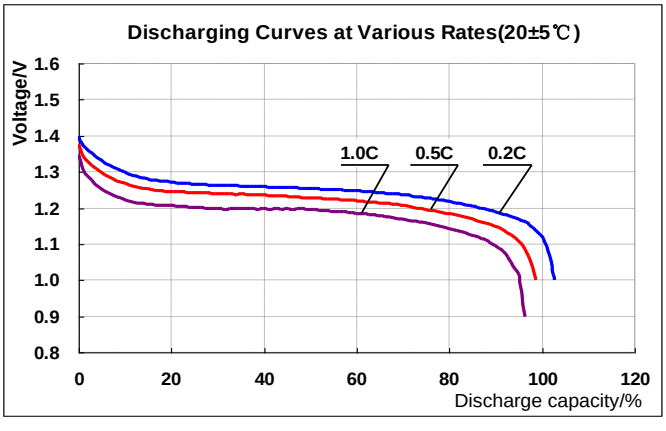
HIGHPOWER reserve the right to alter or amend the design, model and specification without prior notice.

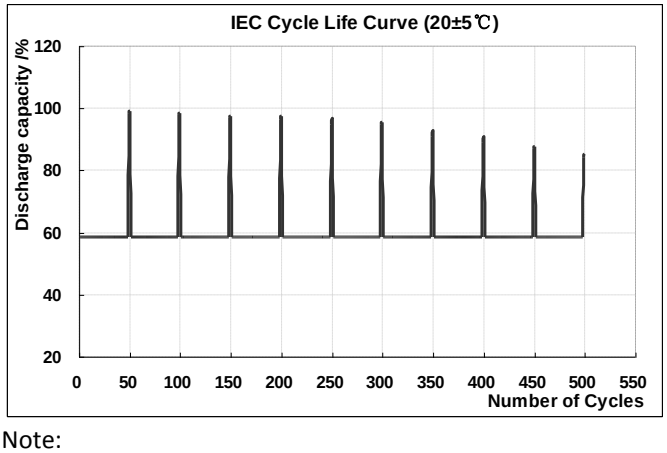
Nominal voltage (V)			1.2
Capacity* (mAh)		Nominal	2500
		Minimum	2400
Charging**		Standard	240mA×16hours
		Quick	480mA×7hours
		Rapid	1200mA×2.4hours -ΔV=5mV
Temperature recommended (^{o}C)		Standard charge	0~40
		Quick charge	10~40
		Rapid charge	10~30
		Discharge	-10~50
		Storage	-20~30
Internal resistance			≤35mΩ
End voltage of discharge			1.0V
Charge (capacity) retention			≥60%
Weight			Approx. 29g
Dimensions With tube (mm)	D	Diameter	$14.5^{+0}_{-0.7}$
	H	Height	$50.5^{+0}_{-1.5}$
	a	Top diameter	4.6-5.5
	b	Top height	1.0（Minimum）

Drawing









Note:
*: Discharge capacity when the battery unit is discharged at 480mA to the 1.0V end voltage after being charged at 240mA for 16 hours
**: Please discharge to the 1.0V end voltage with 480mA before charging the battery unit.

The data sheet is for reference only and should not be used as a basis for product described guarantee or warranty.