SPECIFICATIONS

NI-MH RECHARGEABLE BATTERY

(MODEL NO.): HIMAX-D6000mAh 24V

(FILE NO.): HNIMH20 6A00-1179

Specification Approved	PREPARED	Joan Li
	CHECKED	
	APPROVED	

Customer Approved	CHECKED	
	APPROVED	
	Please sign and return one copy to us	Seal the

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Content

1. Modified List

Product Modified Record List

Revision	Date	Mark	Modified Content	Approved
A0	2020-08-20		New	
A1	2020-12-17		Changed male terminal	
A2	2021-03-25		The current at the limit temperature is specified	
A3	2021-04-21		Added curve	

2. Scope:

This specification is applied to the reference battery in this Specification and manufactured by SHENZHEN HIMAX ELECTRONOCS CO,.LTD.

3. MODEL: HIMAX-D6000mAh 24V

4. APPEARANCE:

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

5. RATINGS:

The following items serve as basic indicators for evaluating batteries and can be tested as needed.

5.1 Ambient temperature:20±5℃， Relative Humidity : 65±20%

5.2 Testing Instrument or Apparatus：

Ammeters: IEC 51/IEC 485 stipulated grade 0.5 or above, total resistance less than 0.01Ω.
Impedance shall be measured by a sinusoidal alternating current method (1kHz LCR meter)

6. General Performance:

Item	Specification	Conditions
Standard charge	600 mA（0.1C）	ambient temperature of 20±5℃, Relative Humidity: 65±20%
	16 hrs	
Standard discharge	1200 mA (0.2C)	After standard charge, discharge cut-off voltage is 20.0V
Rapid Charge	3000mA（0.5C）	ambient temperature of 20±5℃, Relative Humidity: 65±20%
Rapid discharge	20A(10S)	After standard charge, discharge cut-off voltage is 18.0V
Trickle Charge	120～300 mA (0.02C～0.05C)	Ta=-10～45 ℃
Nominal Voltage	24 V	
Open circuit voltage	≥25 V	The open-circuit voltage shall be measured within 1hours after standard charge.
Nominal Capacity	6000 mAh	
Minimum Capacity	≥6000 mAh(0.2C)	Standard charge and Standard discharge
	≥5400 mAh(0.5C)	Standard charge and Rapid discharge
Internal Resistance	≤200mΩ	The internal resistance shall be measured within 1hours after standard charge.
Weight	Approx.2530g	
Charge-retention Rate	Charge retention rate ≥Nominal capacity 60%(3600mAh)	Storage for 28 days after standard charge, then Standard discharge @0.2C to 20.0V
Cycles Test	≥ 500 Cycles	IEC61951-2:2003（see note 2）

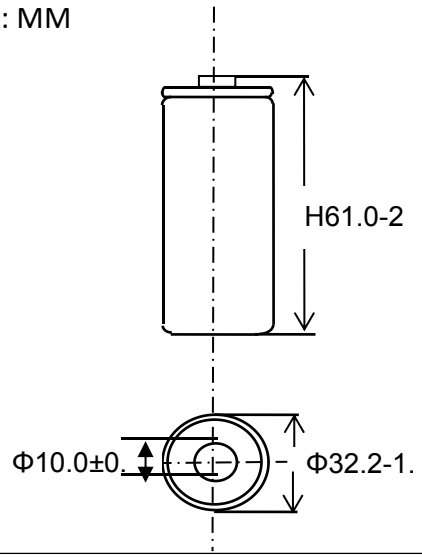
7. Environment Performance:

Item	Specification	Condition	Max. Current
Storage Temperature	Within 1 year	-20～25℃	/
	Within 6 months	-20～35℃	/
	Within 1 months	-20～45℃	/
	Within 1 week	-20～55℃	/
Operation Temperature	Charge	15-25℃	0.5C
	Charge	0～70℃	0.5C (At70℃)
	Discharge	0～70℃	3C (At70℃)
Constant humidity and hot performance	No damage	After standard charge storage at 33±3℃,90±5%R.H for 14 days.	

8. Safe Characteristic:

Item	Specification	Condition
Over-charge	No leakage nor explosion Capacity≥100%	After discharge @0.2C to 20V ,standard charge at first, then charging at 0.1C for 48 hrs,finally test the Capacity with 0.2CmAh discharge condition.
Over-discharge	80%。No leakage nor explosion Capacity≥4800mAh	0.2C discharge to 20V, connect the battery with a 1Ω electric resistance, after 24 hrs, then test the Capacity with Standard discharge Conditions.
Vibration Test	Voltage variety: ≤0.03V/cell Internal impedance: ≤5 mΩ/cell	Charging at 0.1C current for 16hrs; placed 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	Voltage variety: ≤0.03V/cell Internal impedance: ≤5 mΩ/cell	Charging at 0.1C current for 16hrs, placed for 24 hrs, check the battery before and after fall down; 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	At 20±5℃,discharging to 0.0V at 0.2I_tA constant current,then increase current to 1.0I_tA,discharging at 20±5℃ for 60 min.
External Short Circuit	No fire and no explosion	At 20±5℃, The cells are fully charged with standard charging method and standby at least 1hour. Positive and negative terminal connect with wire (more than 0.75mm^2) to cause short circuit until its voltage is lower than 0.1V or cell temperature on the surface is back to room temperature ±10℃.

9. Specifications of single cell:

Type	Nickel-Metal Hydride cylindrical single cell		unit: MM 
Model	D6000mAh 1.2V		
Dimensions	Diameter	32.2-1.0mm	
	Height	61.0-2.0mm	

10. Characteristic of charge/discharge:

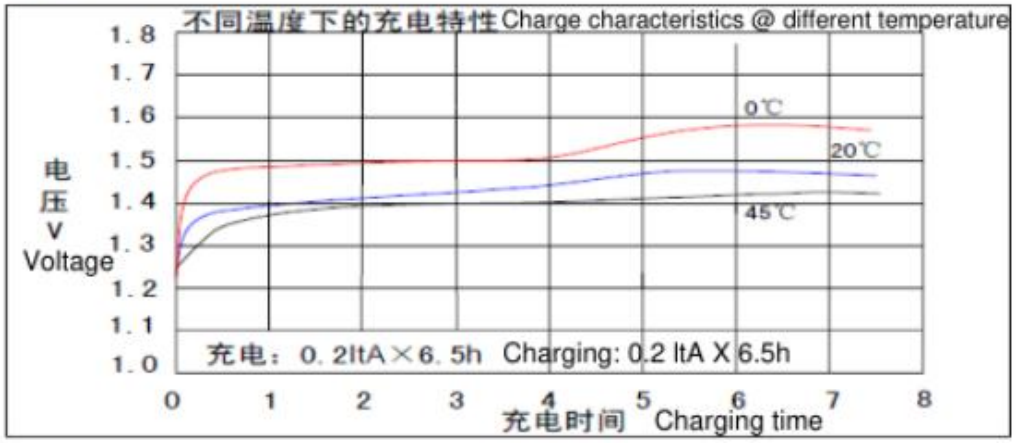
Note 1: Standard charge and Standard discharge.

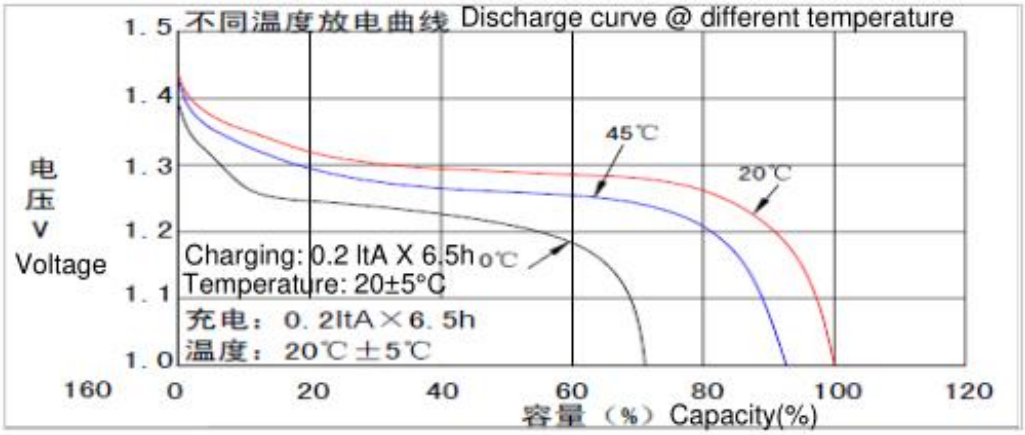
Note 2: (1) Ambient temperature: 20±5℃, Relative Humidity: 65±20%

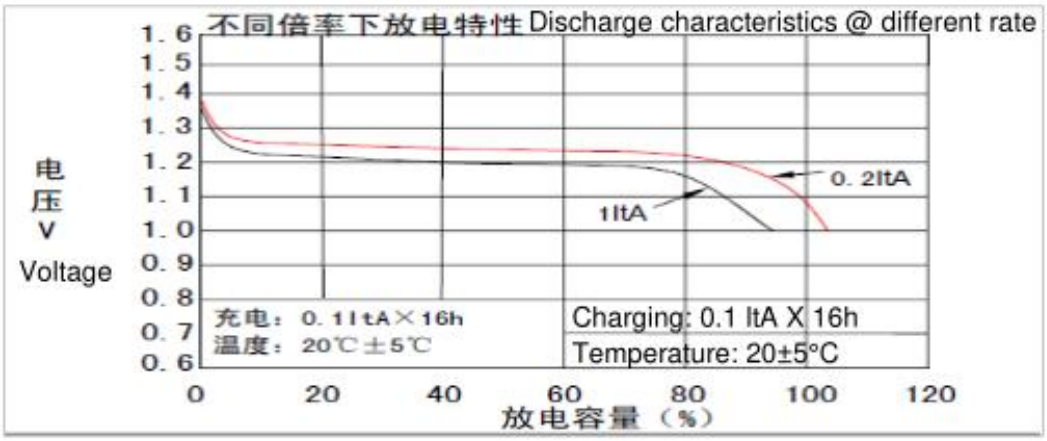
(2) Life test method of IEC61951-2:2003 ：

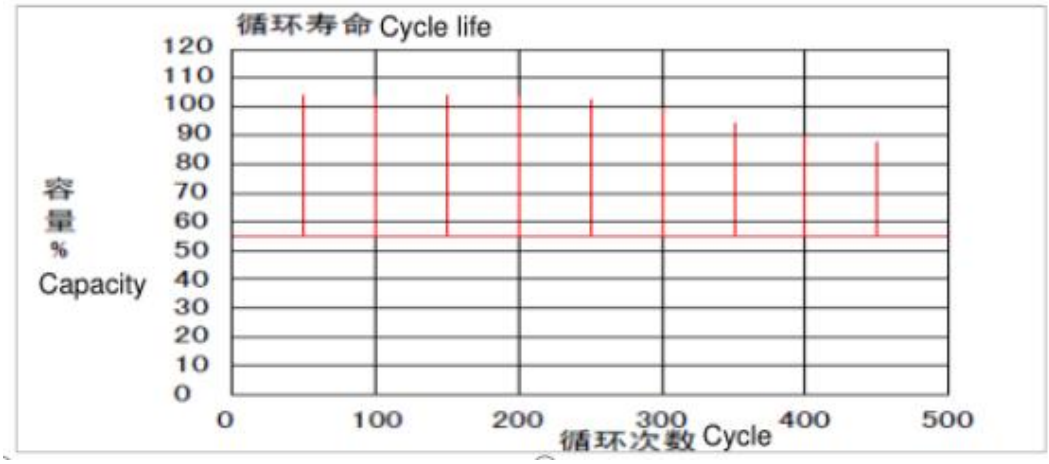
Cycle Number	Charge	Stand in charged condition	Discharge
1	0.1C×16hrs	None	0.25C×2hrs 20min
2~48	0.2C×3hrs 10min	None	0.25C×2hrs 20min
49	0.25C×3hrs 10min	None	0.25C to 20.0V/set
50	0.1C×16hrs	1～4hrs	0.20C to 20.0V/set
Cycles 1 to 50 shall be repeated until the discharge duration on any 50th cycle become less than 3h.At this stage, a repeat capacity measurement as specified for 50 shall be carried out.			

特征曲线 Characteristics curve

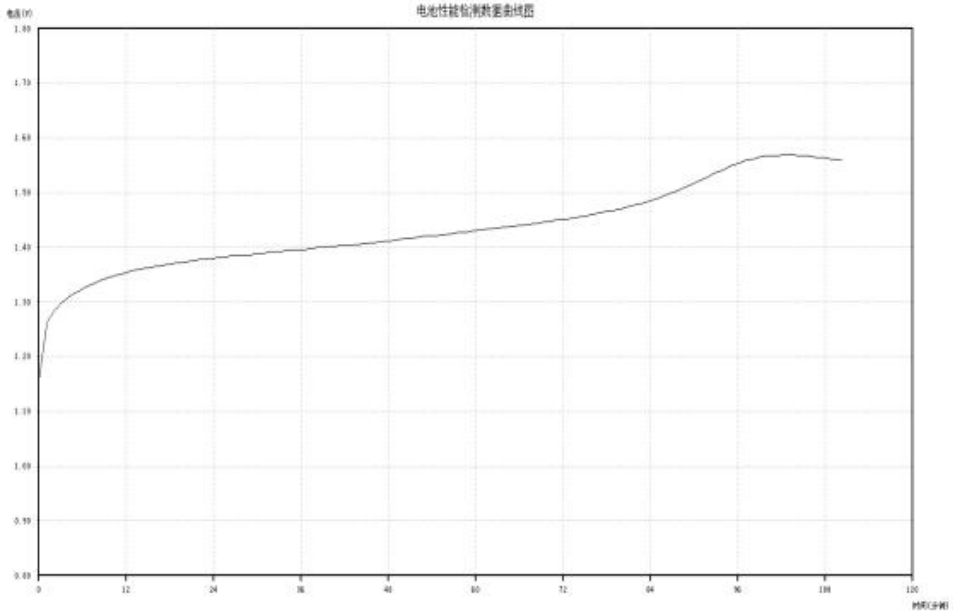




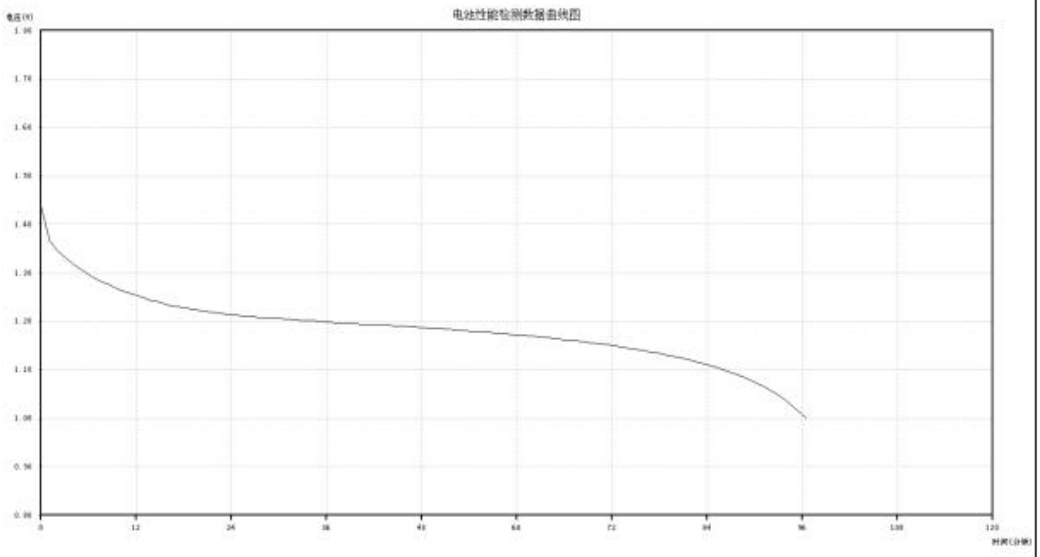




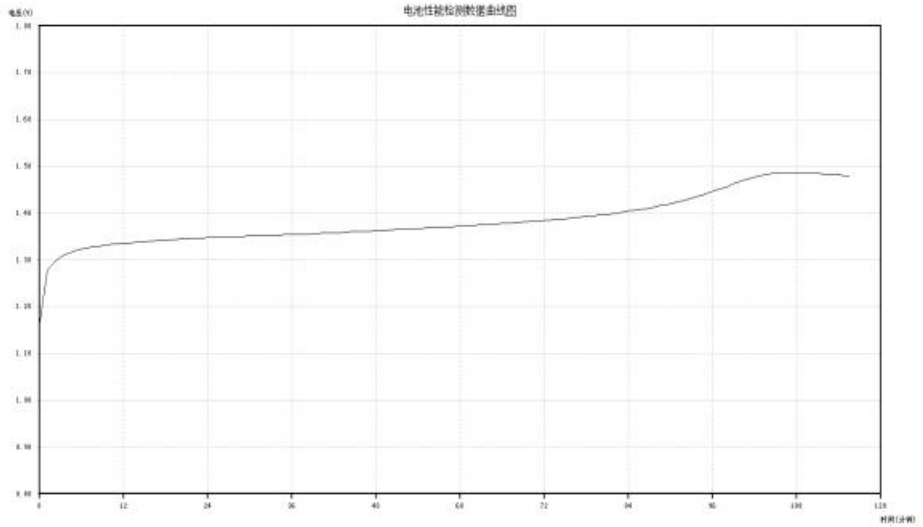
0.5C Charge at 0℃			
Cut-off Voltage	Time	Capacity	Current
1.559V	110.3mins	5512.0mAh	3A



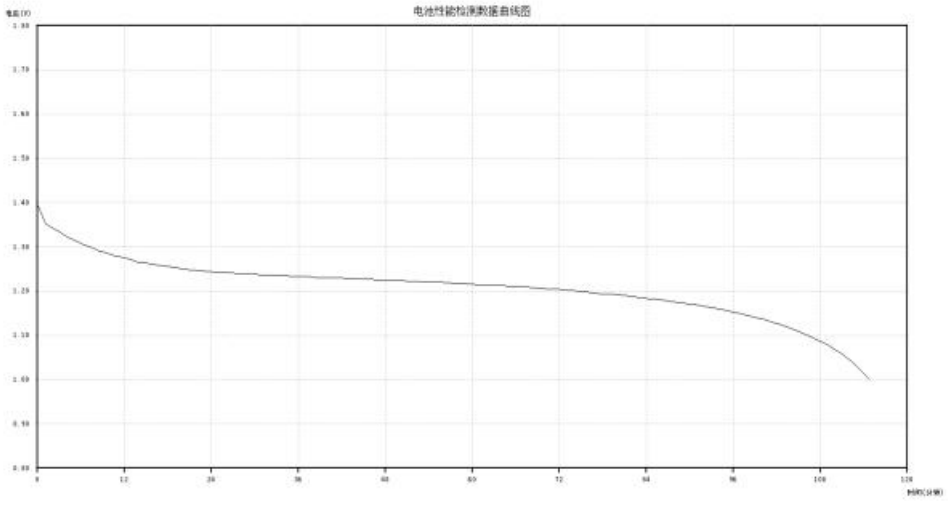
0.5C Disharge at 0℃			
Cut-off Voltage	Time	Capacity	Current
0.999V	96.6mins	4835.9mAh	3A



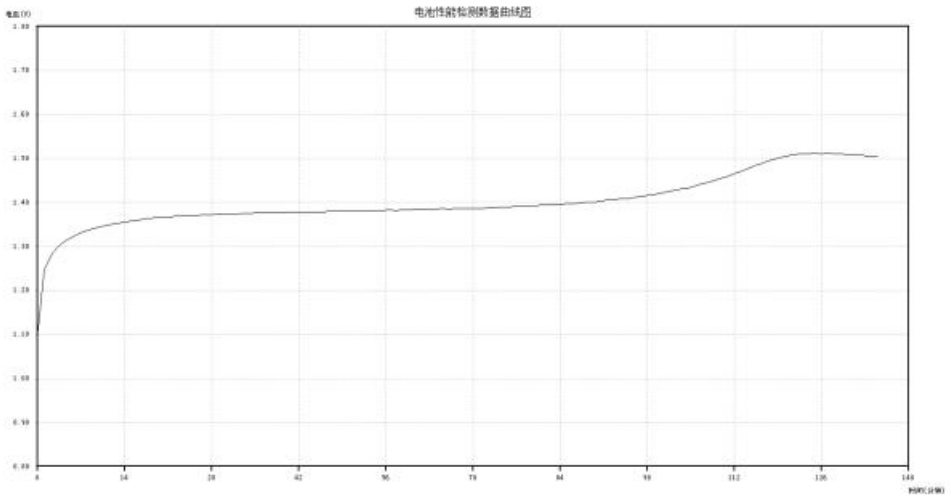
0.5C Charge at 25℃			
Cut-off Voltage	Time	Capacity	Current
1.505V	135mins	6748.5mAh	3A



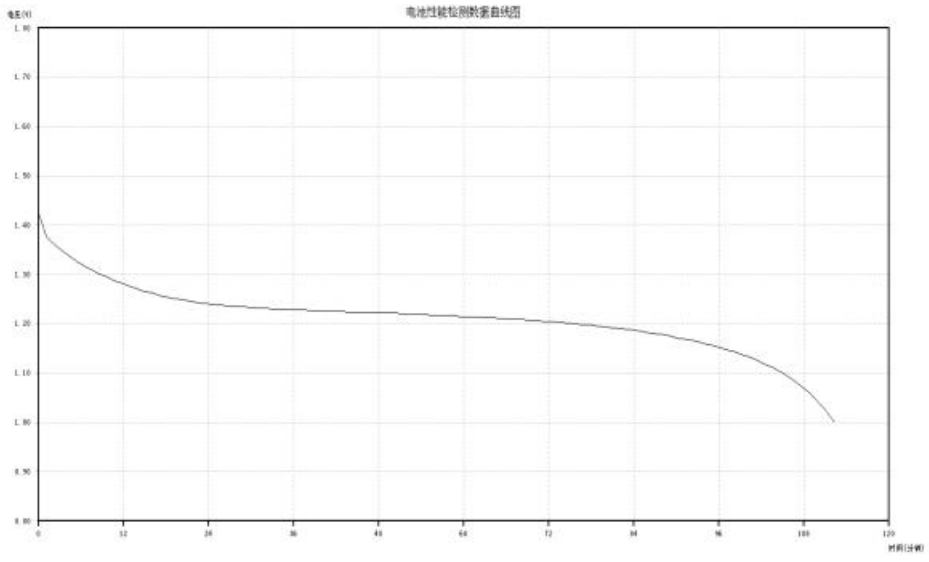
0.5C Disharge at 25℃			
Cut-off Voltage	Time	Capacity	Current
0.999V	112.4mins	5627.1mAh	3A



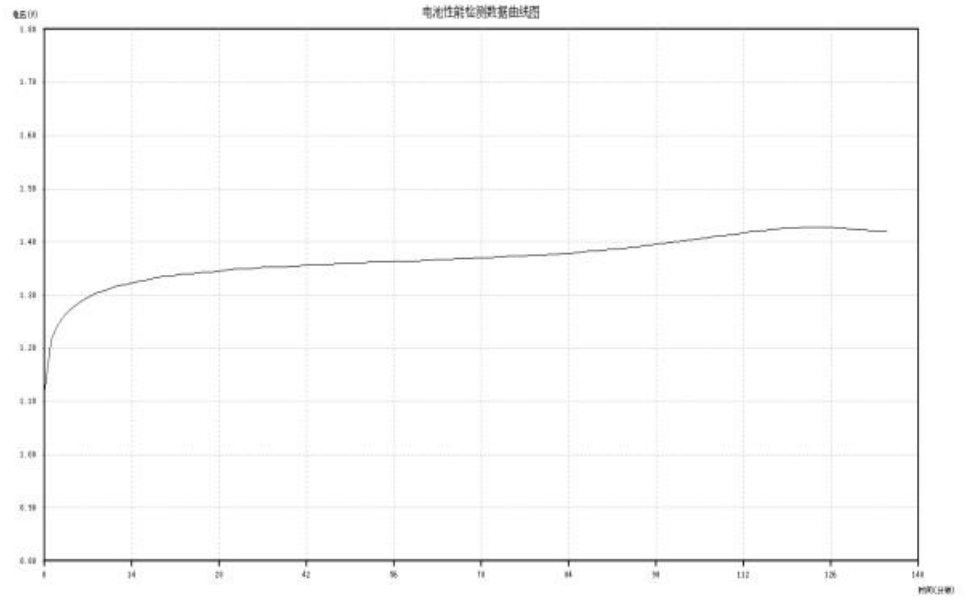
0.5C Charge at 45℃			
Cut-off Voltage	Time	Capacity	Current
1.478V	115.5mins	5775.2mAh	3A



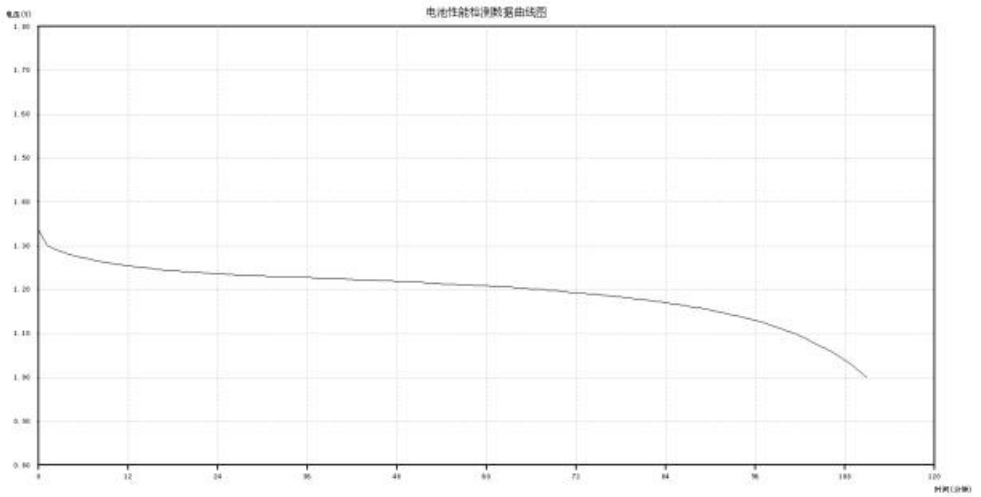
0.5C Disharge at 45℃			
Cut-off Voltage	Time	Capacity	Current
0.999V	114.9mins	5752.3mAh	3A



0.5C Charge at 70℃			
Cut-off Voltage	Time	Capacity	Current
1.419V	135mins	6748.5mAh	3A



0.5C Disharge at 70℃			
Cut-off Voltage	Time	Capacity	Current
0.999V	110.9mins	5555.3mAh	3A



11. Quality guarantee period:

Guarantee time for three years due to the processing and raw material defectiveness.

Suggestion: According to the transportation distance and packing condition, the battery would be charged 20-80% capacity before delivery. While checking the capacity, please discharge the battery at 0.2C to 20.0V/pack; then charge and discharge the battery at standard current. If the storage time over 3 months or above, please discharge the battery at the 0.2C current to 20.0V/pack, then charge the battery at 0.1C for 16 hours, after 20mins, discharge the battery at 0.2C to 20.0V/pack. After this activation, check the capacity after charge and discharge battery with standard current. For the first time. We'd like suggest charging the battery by standard charge method to prevent from damage to battery.

12. Transport & Storage：

12.1 Transport：

Batteries should be kept in a clean, dry and ventilated environment in the process of transportation to prevent severe vibration, shock, extrusion, prevent the sun and rain, should be in automobile, train, ship, airplane and other forms.

12.2 Storage：

12.2.1 Temperature and humidity storage：

The battery should be stored at ambient temperature for -20℃~35℃,The relative humidity is not more than a clean and dry 95% indoor ventilation. Should avoid contact with corrosive substance. We should keep away from fire and heat source.

12.2.2 Placed way storage：

Batteries stacked layers of boxes of highest do not exceed five layers， In order to ensure good air circulation between the state of the battery box, Please keep box between 5 ~ 10cm distance, Prevent battery due to the deposition temperature gathering and cause safety accident.

13. Guard:

In order to prevent from battery effect caused by equipment failures. Ensure that the circuit and battery set of safety. In the design and production equipment. Please give full consideration to the following matters, and consider the specification.

Note：

- Batteries should be charged prior to use.
- Fast charging method of all should be discussed with our engineer.
- 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.
- Store batteries in a cool dry place.
- When connecting a battery pack to a charger, ensure correct polarity.
- When not using a battery, disconnect it from the device.

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

Warning:

- Do not reverse charge batteries.
- Do not short circuit batteries, permanent damage to batteries may result.
- Do not subject batteries to adverse condition such as extreme temperature, deep cycling and excessive Overcharge / over discharge.
- Do not mix HM 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, over discharge may occur.
- 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 over discharge.
- Do not put the sea water or other oxidation on battery treatment trial, Because this will cause the battery to rust and fever. If the battery is rusty. Its decompression explosion-proof valve will not work, So it will cause an explosion.
- Do not over charging HM Ni MH battery. The preset charging time continue to charge that is not more than the charger description or indication. If the HM Ni MH battery charging device preset time after charging is still not full. Please stop charging, Prolong the charging time will cause battery leakage heating and explosion.
- HM Ni MH battery contains colorless alkali solution(That is, the electrolyte), If on skin or clothing and HM Ni MH battery electrolyte contact, Please clean with boric acid or acetic acid water, Rinse thoroughly with clean water. The battery's electrolyte will corrode the skin.
- When HM Ni MH battery is full of electricity use time is far less than the initial work time, The service life of the battery is full, Should be replaced with a new battery.

Danger:

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

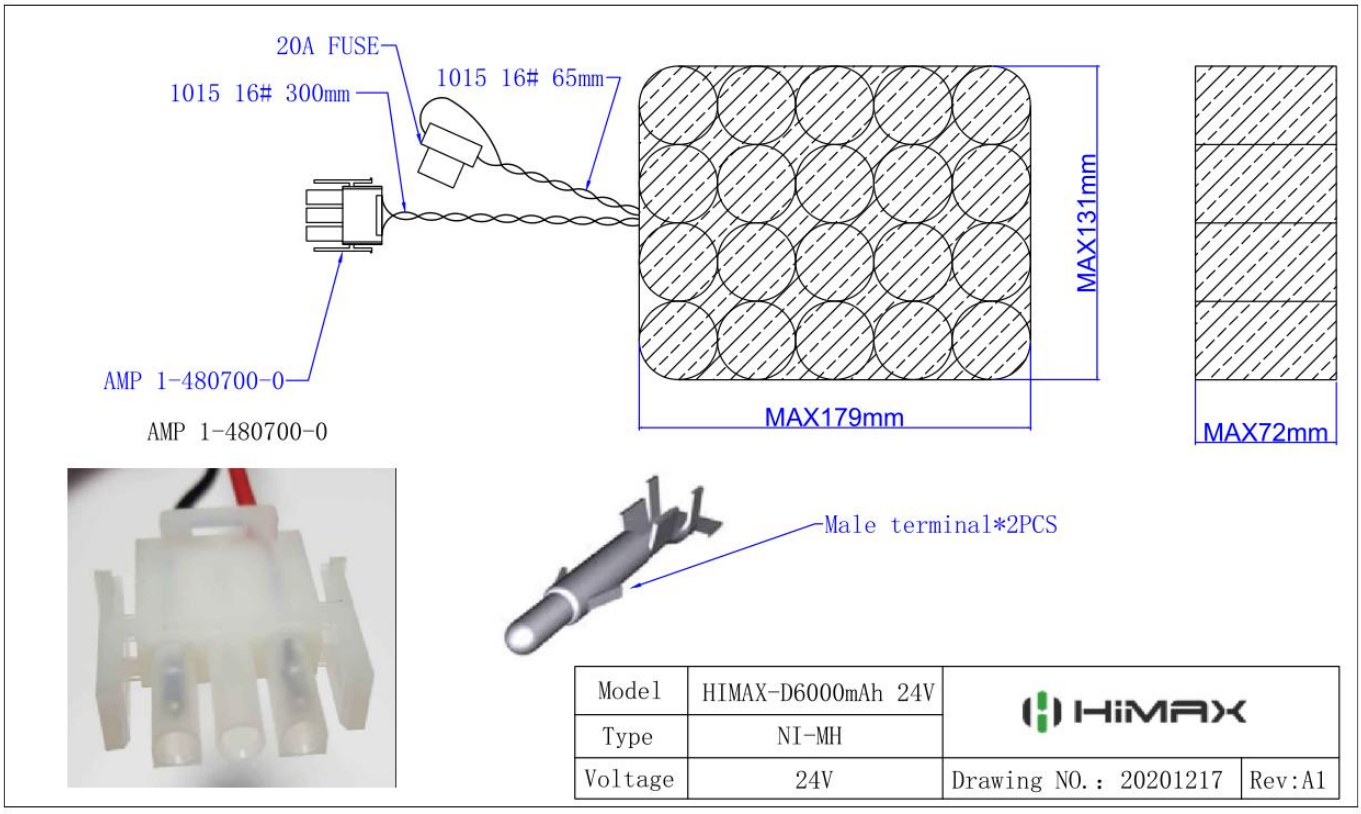
- That is not to be HM Ni MH battery placed higher than 1.5 meters of easily falling place, do not make it from more than 1.5 meters above the ground, drop.
- That will not HM Ni MH battery positive and negative electrode with conductive material, Such as wires connected directly. Do not transport or storage, Transportation and storage battery, Transportation and storage battery, pay attention not to let the metal necklace key contact conductive house, Transport or storage use special tool (Such as special carton).
- The prohibition of open HM Ni MH battery. Removing the battery will cause the external or internal short circuit, Lead battery components exposed chemical reaction occurred in the air, The explosion of fire will cause fever, Will cause the battery alkali splash, Very dangerous.
- Keep away from children. If swallowed, contact a physician at once.

14. Other:

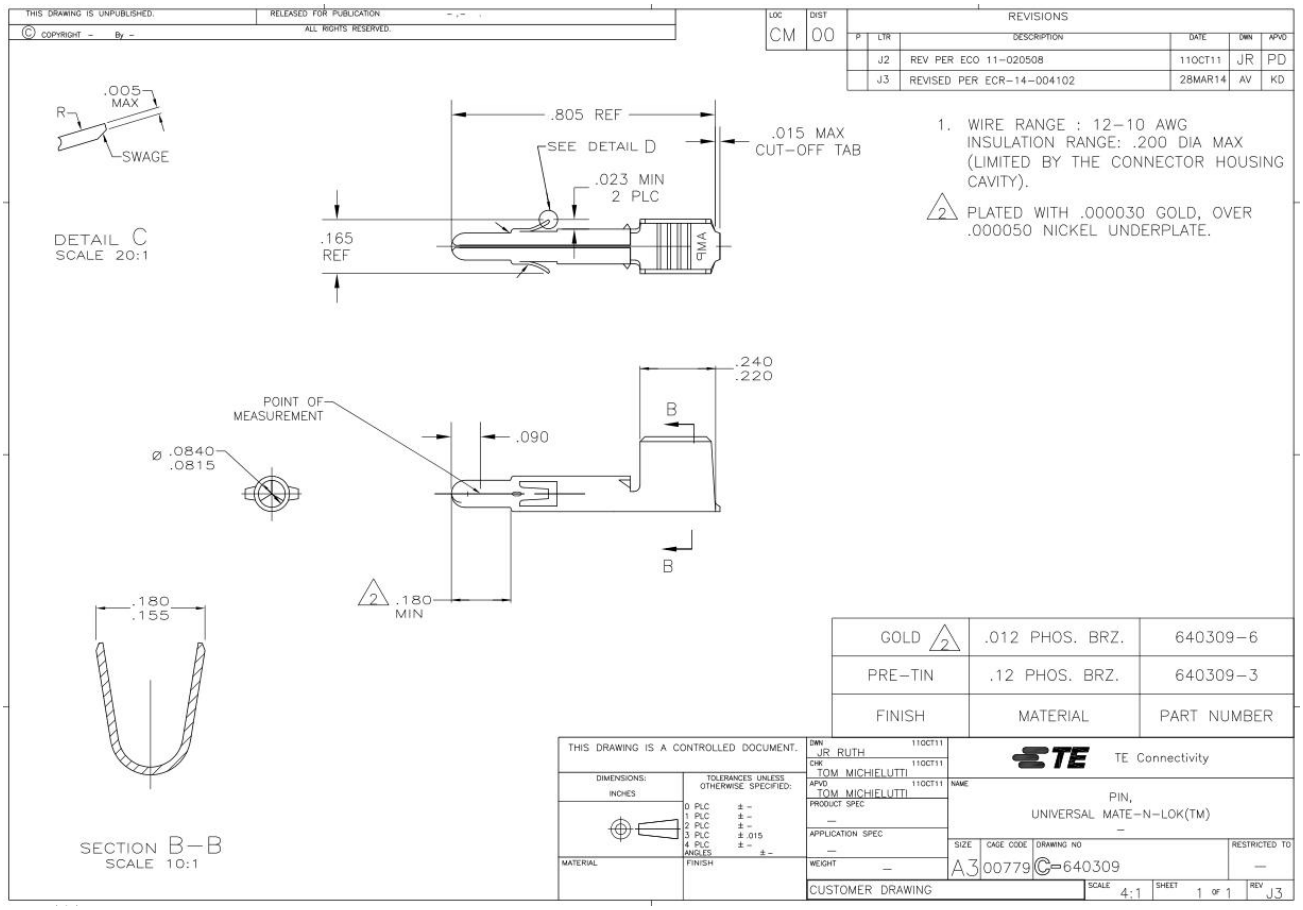
- HIMAX has to modify the specification does not notify the customer in case of rights.
- Matters discussed and decided by the supply and demand sides.
- Not according to the specification of operation caused the accident, the company does not undertake any responsibility.

15. PACK-UP DIAGRAM:

15.1 Product Dimension：



15.2 Male terminal drawing



15.3 Product picture