



Specification Approval Sheet

Name: Nickel Metal Hydride Battery

Model: 10511

SPEC: 4/5SubC 2000mAh

Approved By	Checkup	Make

Customer Confirmation	Signature	Date
	Company Name :	
	Stamp :	

436 Kato Terrace, Fremont, CA 94539 U.S.A.

Tel: 510.687.0388 Fax: 510.687.0328

www.TenergyBattery.com



1. Application

This specification applies to the Nickel-Metal Hydride Cylindrical Cell.

Model : 10511

Cell type : 4/5 SubC

2. Specification

Description	Specification	Conditions
Nominal Voltage	1.2 V	
Nominal Capacity	2000mAh	Standard Charge/Discharge
Minimum Capacity	1920mAh	Standard Charge/Discharge
1C/1C Capacity	1900mAh	1C Charge/ 1C Discharge
Standard Charge	200mA (0.1C) × 16 hrs	Ta=0~45°C (see Note 1)
Rapid Charge	1000mA (0.5C) × 2.1 hrs approx. (see Note 2)	(With -ΔV or dT/dt or TCO control) Timer Cut-Off =105% input capacity (for ref. only) -ΔV= 5-10mV/cell dT/dt = 1~2°C/3min Temp. Cut-Off = 50°C (122°F) Ta=10~45°C
Trickle Charge	100-200mA (0.05C-0.1C)	Ta=0~45°C
Discharge Cut-off Voltage	1.0V	
Maximum Discharging Current	2000mA (1C)	Ta= -20°C~50°C
Storage Temperature	-20°C~35°C	Discharged state
Typical Weight(approximate)	43.5g	

3. Performance

3-1. TEST CONDITIONS

Unless otherwise stated, tests should be done within one month after receipt under the following conditions:

Ambient Temperature, Ta: 20±5°C

Relative Humidity: 65±20%

Notes: Standard Charge/Discharge Conditions:



Charge: 200mA (0.1C) × 16 hrs

Discharge: 400mA (0.2C) to 1.0V/cell

3-2. TEST MOTHOD & PERFORMANCE

Test	Specification	Conditions	Remarks
Capacity	≥1920mAh	Standard Charge/Discharge	Up to 3 cycles are allowed
Open Circuit Voltage(OCV)	≥1.25V	Within 1hr after standard charge	
Internal Impedance (Ri)	≤30mΩ	Upon fully charge(1000Hz)	
High Rate Discharge (0.5C)	≥104min	Standard Charge, 1hr rest before discharge	
High Rate Discharge (1 C)	≥49min	Standard Charge, 1hr rest before discharge	
Overcharge	No leakage No explosion	200mA(0.1C) charge 28 days	
Charge Retention	≥1200mAh	Standard Charge, Storage : 28 days, Standard Discharge	
IEC Cycle Test	≥500 Cycle	IEC 61951-2 : 2003	(see Note 3)
Leakage	No leakage No deformation	Fully charged at 1000mA(0.5C), Stand for 14 days	Unit cell
External Short Circuit	No fire No explosion	After standard charge, short circuit the cell(s) at 20+/-5°C until the cell(s) temperature returns to ambient temperature (The resistance of the interconnecting circuitry shall not exceed 0.1ohm)	Unit cell
Vibration Resistance	Charge of voltage Should be under 0.02V/cell, Change of impedance	Charge the battery 0.1C 16hrs, then leave for 24hrs, check battery before/after	Unit cell



	should be under 5mΩ/cell.	vibration, Amplitude : 1.5mm Vibration : 3000CPM Any direction for 60mins.	
Impact Resistance	Change of voltage should be under 0.02V/cell, Change of impedance should be under 5mΩ/cell.	Charge the battery 0.1C16hrs, then leave for 24hrs, check battery before/after dropped, Height : 50cm Wooden board (thickness 30mm) Direction not specified 3times.	Unit cell

4. ASSEMBLY & DIMENSIONS

As per attached drawing.

5. EXTERNAL APPEARANCE

The cell / battery shall be free from cracks, scars, breakage, rust, discoloration, leakage nor deformation.

6. WARRANTY

6-1. Nominal capacity of the battery depends on its performance.

6-2. All rapid charge methods should be consulted with our engineer.

6-3. All Ni-MH batteries are delivered with 30% capacity with bulk pack. If our clients need more capacity when delivery, we will have no responsibility with all safety problems during shipment and storage.

6-4. One (1) year limited warranty against workmanship and material defects.

7. CAUTION

7-1. Reverse charging is not acceptable.

7-2. Charge before use. The cells / batteries are delivered in an uncharged state.

7-3. Do not charge / discharge with more than the specified current.

7-4. Do not short circuit the cell / battery. Permanent damage to the cell / battery may result.

7-5. Do not incinerate or mutilate the cell /battery.

7-6. Do not solder directly to the cell /battery.

7-7. The life expectancy may be reduced if the cell / battery is subjected to adverse conditions like: extreme temperature , deep cycling , excessive overcharge / over-discharge.

7-8. Store the cell / battery uncharged in a cool dry place. Always discharge batteries before bulk storage or shipment.



7-9. For storage of cells/ batteries over one year, in order to prevent the degrading of the function of cells, cells / batteries should be at least charged and discharged once trimester.

7-10. Keep away from children. If swallowed, contact a physician at once.

7-11. Air ventilation should be provided in the plastic case of batteries, otherwise it may have a risk of accumulating gas (oxygen gas, hydrogen gas) generated inside the cell resulting in explosion triggered by fire sources (motors or switches). Airtight battery compartments are strongly discouraged.

7-12. The batteries comply with Restrictions on Hazardous Substances (RoHS) Direction.

8. Notes

8.1 Ta : Ambient Temperature

8.2 Approximate charge time from discharged state, for reference only.

8.3 IEC 61951: 2003 Cycle Life Test:

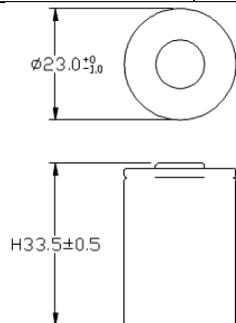
Cycle number	Charge	Rest	Discharge
1	0.1C × 16hrs	None	0.25C × 2hrs20mins
2-48	0.25C × 3hrs10mins	None	0.25C × 2hrs20mins
49	0.25C × 3hrs10mins	None	0.25C × 1.0V/cell
50	0.1C × 16hrs	1-4hr(s)	0.2C × 1.0V/cell

Cycles 1 to 50 shall be repeated until the discharge duration on any 50th cycle becomes less than 3hrs



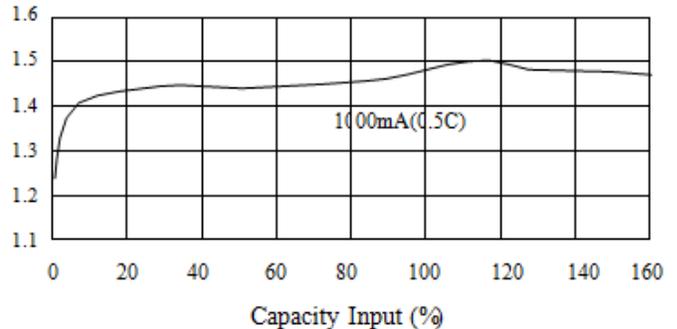
Specifications

Type	Rechargeable Nickel Metal Hydride Cylindrical Cell	
Model	10511	
Nominal Voltage	1.2	
Applications	200-2000mA(Recommended Discharge Current)	
Capacity	when discharge at 400mA to 1.0V at 20°C	
	Nominal	2000mAh
	Minimum	1920mAh
Dimensions	Diameter	23.0 mm
	Height	33.5±0.5mm
Charge Condition	200mA for 16hrs at 20°C	
Rapid Charge	1000mA(0.5C) Charge termination control recommended control parameters: Timer Cut-Off =105% -ΔV= 5-10mV/cell dT/dt = 1~2°C/3min Temp. Cut-Off = 50°C (122°F) Ta=10~45°C	
Internal Resistance	Average 20mΩ upon fully charged (Range 15-30mΩ) at 1000Hz	
Service Life(IEC standard)	≥500 cycles	
Weight	About 43.5g	
Ambient Temperature	Standard Charging	0°C to 45°C
	Fast Charging	10°C to 45°C
	Discharging	-20°C to 65°C
	Storage	-20°C to 35°C

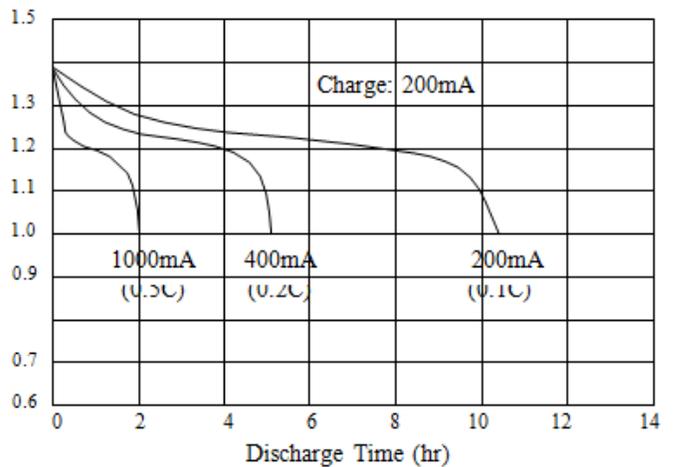


Characteristics

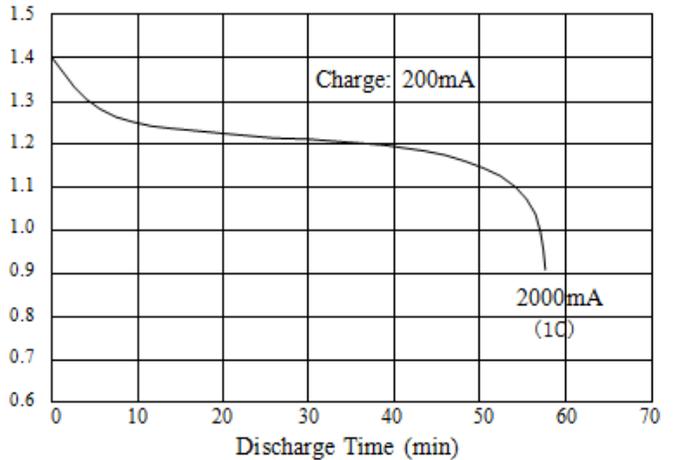
Fast Charge



Low Rate Discharge



High Rate Discharge



Note:

- Nominal capacity rated at 0.2C, 20°C.
- The above information is generally descriptive only and is not intended as guarantee or warranty cell and battery specifications are subject to change without notice. All descriptions or warranties are contained solely in specification sheets accompanying formal offers. Please consult Tenergy Corp for conditions of application outside those described in this document.