

Data Sheet For TYSONIC 9v low-discharge Cell

System ----- Sealed rechargeable
 Ni-MH cylindrical Battery

Type ----- LH020-H7C(LF)

Specification----- AAAA × 7

Nominal voltage ----- 8.4V

Weight approx. ----- 40 g (for reference only)

Capacity (20°C, 0.2 C to 7.0V)

Typical ----- 210 mAh (for reference only)

Min. ----- 200 mAh

Charging conditions (20°C)

Standard charge----- 20 mA × 16 hrs

Fast charge* ----- up to 200 mA

(DT/dt=0.8-1°C /min, -ΔV=0-5 mV/cell , TCO=45-50 °C , Timer=110%)

Permanent chdrge ----- 6 mA to 10 mA

Max. overcharge current----- 20 mA (up to 1 year)

Discharge conditions

Discharge cut-off Voltage----- 7.0 V

Max. discharge current (continuous)----- 600 mA

Storage temperatures (relative humidity : 65 ± 20%)

Storage(1 year) ----- -20°C to + 25°C

Storage(6 month) ----- -20°C to + 35°C

Storage(1 month)----- -20°C to + 45°C

Storage(1 week)----- -20°C to + 55°C

Operation temperatures (relative humidity : 65 ± 20%)

Discharge ----- -20°C to +60°C

Standard charge ----- 0°C to +45°C

Fast charge ----- +10°C to +40°C

Permanent charge----- 0°C to +45°C

1. CHARACTERISTICS

Unless special stated, tests should be carried out within one month of delivery.

Ambient conditions:

Ambient Temperature: $20 \pm 5^{\circ}\text{C}$

Relative Humidity: $65 \pm 20\%RH$

Notes:1) Standard charge/discharge

Charge: 20 mA (0.1It) \times 16 hr

Discharge: 40 mA (0.2It) to 7.0V

2) Except special explaining, the battery shall not leakage and PVC shall not breakage during the test.

| Test Items | Test Conditions | Requirements | Remark |
|----------------------------|---|--|--------------------------------|
| Capacity | Standard Charge and Discharge | Discharge Capacity: $\geq 200 \text{ mAh}$ | Up to three cycles are allowed |
| Open-circuit Voltage (OCV) | Voltage between the battery terminals shall be measured within 1 hour after standard charge | $\geq 8.75\text{V}$ | |
| High-rate discharge(1It) | After standard charge, rest for 1 hour before discharge to 7.0V at 200 mA current | ≥ 50 minutes | Up to three cycles are allowed |
| Internal impedance(Ri) | Upon fully charge (1KHZ) | $\leq 1200\text{m}\Omega / \text{pack}$ | |
| IEC cycle life | IEC61951-2/2003 7.4.1.1(See Remark 1) | ≥ 500 cycles | |
| Self- discharge | Standard charged ,stored for 180days below 20°C , then standard discharge to 7.0V | Discharge Capacity: $\geq 85\%$ original capacity★ | |
| | Standard charged ,stored for 360days below 20°C , then standard discharge to 7.0V | Discharge Capacity: $\geq 80\%$ original capacity★ | |
| Over-charge | Charge at 20 mA (0.1 It) for 1 year. | No leakage, nor disrupt, nor burst. | |
| Over- discharge | (1) Standard charge and discharge for 3cycles , (2) Conducted with constant load resistor 210Ω for 3days (3) Then standard charge and discharge | Discharge Capacity: $\geq 80\%$ original capacity | Up to three cycles are allowed |
| Vibration resistance | Standard charge. Then leave for 24 hours, check cell before / after vibration. Amplitude: 1.5 mm Vibration: 3000 CPM | Change of voltage $\Delta V < 0.02\text{V} / \text{cell}$ Change of internal impedance $\Delta R < 5 \text{ m}\Omega / \text{cell}$ | Any direction for 30 minutes |

| Test Items | Test Conditions | Requirements | Remark |
|------------------------|--|--|---|
| Drop resistance | Charge the battery at 0.1It for 15hours. Then leave for 24 hours, check battery before / after dropped. Height: 100 cm Thickness of the wooden board : 30 mm | Change of voltage $\Delta V < 0.02V / \text{cell}$ Change of internal impedance $\Delta R < 5m \Omega / \text{cell}$ No breakage except impact point for PVC sleeves | Direction is not specified, Test for 3 times |
| Safety | The Reverse-charge is conducted for 60 minutes at current of 1.0It after pre-discharge at 0.2 It current to 0V | The battery shall not explode, but leakage & deformation are acceptable | |
| External Short Circuit | After standard charge, short circuit the cell at 20+/-5°C until the cell temperature returns to ambient temperature. (The resistance of the inter-connecting circuitry shall not exceed 0.1ohm.) | The battery shall not fire and explode, but leakage & deformation are acceptable | External Short Circuit |

★ If the ambient temperature is changed, the date may be different from the above value.

***REMARK:**

1. Cycle life: IEC61951-2(2003) 7.4.1.1

| Cycles | Charge | rest | Discharge |
|---|-----------------------------------|--------|-----------------------------------|
| 1 | 0.1I _t × 16hrs | 0 | 0.25 I _t × 2hrs 20mins |
| 2-48 | 0.25 I _t × 3hrs 10mins | 0 | 0.25 I _t × 2hrs 20mins |
| 49 | 0.25 I _t × 3hrs 10mins | 0 | 0.25 I _t to 1.0V/cell |
| 50 | 0.1 I _t × 16hrs | 1~4hrs | 0.20 I _t to 1.0V/cell |
| Repeat 1 to 50 cycles, until the discharge time of any 50 th cycle is less than 3hrs | | | |

2. COSMETIC

Batteries should be without any flaw、stain、discoloration or leakage and deformation.

3. CAUTION:

- 3.1 Do not dispose of cell into fire or dismantled under any condition.
- 3.2 Do not mix different cell types and capacities in the same battery assembly.
- 3.3 Charge and discharge under specified ambient temperature recommend to Tysonic battery's specification
- 3.4 Short circuit leading to cell venting must be avoided.
- 3.5 Never solder onto cell directly.
- 3.6 Cell reversal should be avoided.

4. NOTICE:

- 4.1 Use batteries in extreme condition may affect the service life, such as: extreme temperature 、 deep cycle、 extreme overcharge and over discharge.
- 4.2 Batteries should be stored in a cool, dry place
- 4.3 Once problems be found, stop using, send batteries to local agent.

5. STORAGE:

- 5.1 It is strongly recommended to stored Ni-MH batteries and cells in the temperature range from -20°C to 35°C ,and in low humidity and no corrosive gas environment, to maintain a reasonably high capacity recovery level.
- 5.2 Avoid storage higher (e.g. 35°C), lower temperature than -20°C , or higher humidity which would result in deterioration or damage to the cells and batteries such as follows:
 - . Permanent capacity loss
 - . Electrolyte leakage resulted from the expansion or shrinkage of organic material inside the cells.
 - . Rust of metal parts.
- 5.3 Up to three full cycles of charge/discharge after long-term storage may need to obtain highest capacity.
- 5.4 Recommended every three months doing a battery release-charging.