

PRODUCT SPECIFICATION

**Rechargeable Lithium Ion Cell Model :
HTIL4-18650**



Revision History

[illegible]

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1. General Information

- 1.1 Scope: This product specification defines the requirements of the rechargeable lithium ion battery set forth and supplied to end consumer Hohm Tech International
- 1.2 Product classification: Cylindrical rechargeable lithium ion cell
- 1.3 Model name: HTIL4 18650

2. Nominal Specification

Item	Condition / Note	Specification
2.1 Capacity	Std. charge / discharge	Nominal 3015mAh (C_{nom}) Minimum 2955mAh (C_{min})
2.2 Nominal Voltage	Average for Std. discharge	3.6V
2.3.1 Standard Charge (Refer to 4.1.1)	Constant current Constant voltage End condition (Cut off)	1250mA (1.25A) 4.2V 50mA (.05A)
2.3.2 Fast charge (Refer to 4.1.3)	Constant current Constant voltage End condition (Cut off)	2500mA (2.5A) 4.2V 100mA (0.1A)
2.4 Max. Charge Voltage	4.2V charge; 2.5V discharge limit	4.2V
2.5 Max. Charge Current	$1.47C_{nom}$ [$\leq 1C$ extends cycle life]	4432mA (4.432A - [$1.47C_{nom}$])
2.6.1 Standard Discharge (Refer to 4.1.2)	Constant current End voltage (Cut off)	603mA [$0.603A - (0.2C_{nom})$] 2.5V
2.6.2 Fast Discharge (Refer to 4.1.3)	Constant current End voltage (Cut off)	10000mA (10A), 22000mA (22A) 2.8V
2.7 Max. Discharge Current	Continuous; 80°C temperature cut	22100A (CC); 31500mA (**)
2.8 Weight	Max.	49.9 ±0.8g
2.9 Operating Temperature (Cell Surface Temperature)	Charge Discharge	0 ~ 50°C -20 ~ 80°C
2.10 Storage Temperature (for shipping state ¹)	1 month 3 month 1 year	-20 ~ 45°C -20 ~ 35°C -20 ~ 20°C

* Test and Shipping Data: 516 random sample method - 43-48% of fully charged state. ** 2.7 Max. Discharge Current until =80°C or 2.8V
2.7 Cont. Cycle Life reduced at high rates. Notice: 37100mA 5s/30s [I/O] DC test PASS.

3. Appearance and Dimension

3.1 Appearance

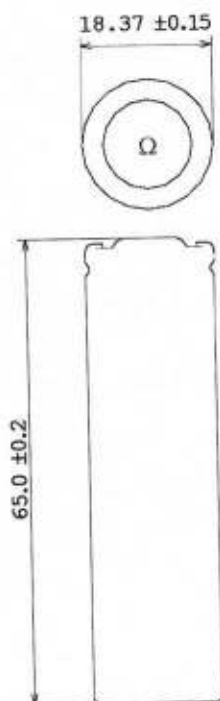
There shall be no such defects as a single deep scratch, crack, rust, discoloration or leakage, which may affect the commercial value of the cell.

3.2 Dimension

Diameter : $18.37 \pm 0.15\text{mm}$

Diameter is defined as the largest data value measured on the "A" area of a cylindrical cell.

Height : $65.0 \pm 0.2\text{mm}$



4. Performance Specification

4.1 Standard test condition

4.1.1 Standard Charge

Unless otherwise specified, "Standard Charge" shall consist of charging at constant current of 1250mA.

The cell shall then be charged at constant voltage of 4.2V while tapering the charge current. Charging shall be terminated when the charging current has tapered to 50mA. For test purposes, charging shall be

performed at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$.

4.1.2 Standard Discharge

"Standard Discharge" shall consist of discharging at a constant current of 600mA to 2.50V. Discharging is to be performed at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ unless otherwise noted (such as capacity versus temperature).

4.1.3 Fast Charge / Discharge condition

Cells shall be charged at constant current of 2500mA to 4.2V with end current of 100mA. Cells shall be discharged at constant current of 10000mA and 22000mA to 2.80V. Cells are to rest 10 minutes after charge and 30 minutes after discharge.

4.2 Electrical Specification

Item	Condition	Specification
4.2.1 Initial AC Impedance	Cell shall be measured at 1kHz after charge per 4.1.1.	$\leq 20 \text{ m}\Omega$, without PTC
4.2.2 Initial Capacity	Cell shall be charged per 4.1.1 and discharged per 4.1.2 within 1h after full charge.	$\geq 3015\text{mAh}$
4.2.3 Cycle Life	Cells shall be charged and discharged per 4.1.3, 300 cycles(10A) and 200 cycles(22A). A cycle is defined as one charge and one discharge. 301 st (10A) and 201 st (22A) discharge capacity shall be measured per 4.1.1 and 4.1.2	$\geq 70\%$ (of C_{nom} in 2.1)

4.3 Environmental specification.

Item	Condition	Specification
4.3.1 Storage Characteristics	Cells shall be charged per 4.1.1 and stored in a temperature-controlled environment at $23^{\circ}\text{C} \pm 2^{\circ}\text{C}$ for 30 days. After storage, cells shall be discharged per 4.1.2 to obtain the remaining capacity*.	Capacity recovery rate $\geq 85\%$ (of C_{nom} in 2.1)
4.3.2 High Temperature Storage Test	Cells shall be charged per 4.1.1 and stored in a temperature-controlled environment at 60°C for 1 week. After storage, cells shall be discharged per 4.1.2 and cycled per 4.1.1 and 4.1.2 for 3 cycles to obtain recovered capacity*.	No leakage, Capacity recovery rate $\geq 75\%$ (of C_{nom} in 2.1)

* Remaining Capacity : After storage, cells shall be discharged with standard condition(4.1.2) to measure the remaining capacity.

** Recovery Capacity : After storage, cells shall be discharged with standard discharge condition (4.1.2), and then cells shall be charged with standard charge condition (4.1.1), and then discharged with standard discharge condition (4.1.2). This charge / discharge cycle shall be repeated three times to measure recovery capacity.

4.3.3 Thermal Shock Test	65°C (8h) ← 3hrs → -20°C (8h) for 8 cycles with cells charged per 4.1.1 After test, cells are discharged per 4.1.2 and cycled per 4.1.1 and 4.1.2 for 3 cycles to obtain recovered capacity.		No leakage Capacity recovery rate ≥ 80% (of C _{nom} in 2.1)
4.3.4 Temperature Dependency of Capacity	Cells shall be charged per 4.1.1 at 23°C ± 2°C and discharged per 4.1.2 at the following temperatures.		
	Charge	Discharge	Capacity
	23°C	-10°C 0°C 23°C 60°C	65% (of C _{nom} in 2.1) 80% (of C _{nom} in 2.1) 100% (of C _{nom} in 2.1) 95% (of C _{nom} in 2.1)

4.4 Mechanical Specification

Item	Condition	Specification
Drop Test	Cells charged per 4.1.1 are dropped onto an oak board from 1 meter height for 1 cycle, 2 drops from each cell terminal and 1 drop from side of cell. (Total number of drops =3).	No leakage No temperature rising
4.4.2 Vibration Test	Cells charged per 4.1.1 are vibrated for 90 minutes per each of the three mutually perpendicular axes (x, y, z) with total excursion of 0.8mm, frequency of 10Hz to 55Hz and sweep of 1Hz change per minute.	No leakage

4.5 Safety Specification

Item	Condition	Specification
4.5.1 Overcharge Test	Cells are discharged per 4.1.2, then charged at constant current of 3 times the max. charge condition and constant voltage of 4.2V while tapering the charge current. Charging is continued for 7 hours (Per UL1642).	No explosion, No fire
4.5.2 External Short - Circuiting Test	Cells are charged per 4.1.1, and the positive and negative terminal is connected by a 100 mΩ-wire for 1 hour (Per UL1642).	No explosion, No fire

4.5.3 Overdischarge Test	Cells are discharged at constant current of 0.2C to 250% of the minimum capacity.	No explosion, No fire
4.5.4 Heating Test	Cells are charged per 4.1.1 and heated in a circulating air oven at a rate of 5°C per minute to 130°C. At 130°C, oven is to remain for 10 minutes before test is discontinued (Per UL1642).	No explosion, No fire
4.5.5 Impact Test	Cells charged per 4.1.1 are impacted with their longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8mm diameter bar (Per UL1642).	No explosion, No fire
4.5.6 Crush Test	Cells charged per 4.1.1 are crushed with their longitudinal axis parallel to the flat surface of the crushing apparatus (Per UL1642).	No explosion, No fire

5. Caution and Prohibition in Handling

Warning for using the lithium ion rechargeable battery. Mishandling of the battery may cause heat, fire and deterioration in performance. Be sure to observe the following.

Caution

- When using the application equipped with the cell(s), refer to the user's manual before use.
- Please read the specific charger manual before charging.
- If cell is not charged with long exposure to the charger, discontinue charging.
- Cell must be charged at operating temperature range 0 ~ 50 °C.
- Cell must be discharged at operating temperature (cell surface temperature) range -20 ~ 80 °C.
- Please check the positive (+) and negative (-) direction before packing.
- When a lead plate or wire is connected to the cell for packing, check out insulation not to short-circuit.
- Cell must be stored separately.
- Cell must be stored in a dry area with low temperature for long-term storage.
- Do not place the cell in direct sunlight or heat.
- Do not use the cell in high static energy environment where the protection device can be damaged.
- If rust or smell is detected on first use, please return the product to the seller immediately.
- The cell must be kept away from children and pets.
- When cell life span shortens after repeated use, replace with new cells.

Prohibitions

- Do not use charger that is not specifically for lithium ion cells (batteries).
- Do not use cigarette jacks (in cars) for charging.
- Do not charge with constant current more than maximum charge current.
- Do not charge with voltage more than maximum charge voltage.
- Do not disassemble or reconstruct the cell (battery).
- Do not throw or cause impact.
- Do not pierce a hole in the cell with sharp things. (such as nail, knife, pencil or drill, etc.)
- Do not use with other model, brand, capacity, or size of cell.
- Do not solder on cell directly.
- Do not press the cell with overload in manufacturing process, especially ultrasonic welding.
- Do not use old and new cells together for packing.
- Do not expose the battery to high heat. (such as fire)
- Do not put the cell into a microwave or high pressure container.
- Do not use the cell with reversed polarity
- Do not connect positive(+) and negative(-) with conductive materials. (such as metal, wire)
- Do not allow the cell to be immersed in or wetted with water or sea-water.
- Do not use if label wrap covering cell has any tears or punctures.
- Do not build or use a lithium cell pack without consulting a certified pack assembler.
- Do not exceed specifications of cell output or charging input limitations.
- Have space or non conductive spacer between cells if adjacent cells have different polarity.

QUESTIONS REGARDING USE OF, HANDLING OF, OR RECYCLING OF
LITHIUM ION BATTERIES, CONTACT LOCAL CERTIFIED LITHIUM ION PACK
ASSEMBLER OR LOCAL BATTERY RECYCLING AGENCY.