

# KNB-45L Battery Specification

## I. BATTERY NAME AND MATERIAL COMPOSITION:

- 1.1 Battery model: KNB-45L
- 1.2 Compatible model: NX-240 NX-340 TK-2202 TK-2302 TK-2312 TK-2317 TK-2406 TK-2407 TK-3201 TK-3202 TK-3206 TK-3301 TK-3302 TK-3312 TK-3317 TK-3401 TK-3406 TK-3407 TK-D240 TK-D340
- 1.3 Battery type: LI-ION battery
- 1.4 Battery voltage/capacity: 7.4V 2000mAh
- 1.5 Composition: 2000mA battery cell \*2 series connection and protection control circuit composition.
- 1.6 Volume: L=115(+0.15/-0.15)mm W=54(+0.15/-0.15)mm H=18 (+0.10/-0.10)mm
- 1.7 Assembly: housing ultrasonic
- 1.8 Material: PC+ABS
- 1.9 Weight: 115g ± 5g



## II. BASIC BATTERY PERFORMANCE AND TESTING REQUIREMENTS

### 2.1 BASIC BATTERY PERFORMANCE:

sports event	PERFORMANCE	note
PACK Minimum Capacity	1800mAh	
rated voltage	7.4V	
Discharge cut-off voltage	6.0V	0.2C Discharge 0.2C discharge

Charging method (standard)		CC-CV	0° C to +45° C
Charging current (standard)		540mA	0.3C
Charging voltage (standard)		8.4V±0.05V	
discharge current	norm	900mA	-20° C to +60° C / 0.5C
	maximum values	2700mA	0° C to +45° C / 1.5C
environmental temperature	standard charge	0° C to +40° C	
	electrical discharge	-20° C to +60° C	
Storage temperature	Short-term up to one month	-20° C to +60° C	Relative humidity: 45-75 per cent
	Up to three months in the medium term	-20° C to +45° C	
	Long-term up to one year	-20° C to +20° C	
Differences between 25° C battery pack cells	Capacity Deviation (mAh)	<20 mAh	
	Internal Resistance Deviation (mΩ)	<5 mΩ	
	Voltage deviation (mV)	<10 mV	
shipment status	charge (electricity)	30 per cent	7.2V-7.6V

## 2.2 TEST REQUIREMENTS:

### 2.2.1 Standard test conditions:

- a) Temperature: 20° C±5° C
- b) Relative humidity: 65±5 per cent
- c) Atmospheric pressure: 0.8-1.1 standard atmospheric pressure
- d) Ethylene concentration: 7.8 ± 0.5 per cent

### 2.2.2 Measuring instrument and equipment requirements:

- a) The accuracy of the instrument for measuring voltage shall be not less than 0.5 level, and the internal resistance shall be not less than 10KΩ/V. The accuracy of the instrument for measuring current shall be not less than 0.5 level, and the internal resistance shall be not less than 10KΩ/V;
- b) The accuracy of the instrument for measuring current shall be not less than 0.5 level;
- c) The relative error of the instrument measuring time is ± 0.1 per cent;
- d) Constant current load in the measured supply voltage range of constant current regulation of its current relative error of ± 0.1%;
- e) The charging power supply (or charger) shall be able to change to constant

voltage charging after the battery voltage reaches the constant voltage value of the charging voltage;

### 2.2.3 Electrical performance test requirements:

sports event	Test conditions (methods)	Rules of Judgement	
Standard charging method	The battery is charged at constant current at 0.2C until the battery voltage reaches 8.4V, then it is charged at constant voltage at 8.4V until the cut-off current is 0.02C.		
rapid recharge	In CC/CV mode, the charging power supply charges the battery with constant current at 1C until the battery voltage reaches 8.4V, and then changes to constant voltage charging mode until the charging current is lower than 0.02C.		
Rapid Discharge	After fast charging, it was set aside for 1 hour and then discharged to 6.0V at a constant current of 1C.		
standard discharge	After standard charging, it was set aside for 1 hour and then discharged to 6.0V at a constant current of 0.2C.		
Rated capacity	The rated capacity is the discharge capacity of the battery, which is the amount of electricity discharged when the battery is left for 1 hour after standard charging and discharged at 0.2C under $20 \pm 5^\circ\text{C}$ environment to the termination voltage of 6V.	$\geq 3000\text{mAh}$	
1C Discharge performance	The amount of power discharged when the standard charge is left for 1 hour and discharged at 1C at $20 \pm 5^\circ\text{C}$ to a termination voltage of 6.0V.	$\geq 90$ per cent of minimum capacity	
internal resistance	Test the internal resistance of the battery at 1KHz AC after standard charging.	electrical discharge	$\leq 250\text{m}\Omega$
		fig. rest and recuperate	/
nominal voltage	The open-circuit voltage of the battery is measured within one hour after standard charging.	$\geq 8.2\text{V}$	
self-discharge	The batteries are stored for 28 days at an ambient temperature of $25^\circ\text{C}$ after standard charging.	$\leq 10$ per cent	
Cycle life	Under the condition of ambient temperature ( $20 \pm 5^\circ\text{C}$ ), charge with 1C constant current, when the battery voltage reaches the charging voltage of 8.4V, change to constant voltage charging until the charging current is less than or equal to 0.02C, stop charging, set aside for a period of time (within 1 hour) and then discharge to the voltage of 6.0V at a constant current of 1C, and then after	$\geq 80$ per cent of total capacity	

	the end of the discharging process, set aside for 1 hour, and then carry out the next charging and discharging cycle. The battery is subjected to discharge cycles up to 300 times.	

#### 2.2.4 MECHANICAL PERFORMANCE TEST REQUIREMENTS:

sports event	Test conditions (methods)	Rules of Judgement
vibration testing	After standard charging, the batteries were fixed on a shaking table and made to vibrate in the X, Y, and Z directions from 10 Hz to 60 Hz for 1 hour in each direction.	Battery without obvious damage, no liquid leakage, no smoke, no fire, no explosion, inserted into the corresponding models with good contact, the test Rear battery terminal voltage 8.0V
Drop test	The fully charged battery was dropped freely from a height of 1.2 metres onto a steel plate of 18mm to 20mm thickness, 20 times horizontally and 20 times vertically, for a total of 40 times.	Battery appearance without obvious damage and deformation, no liquid leakage, no smoke, no fire, no explosion, battery capacity $\geq 85\%$
Waterproof test	Adjustment parameters by instrument (IPX7 waterproof rating) RDY: -15Kpa, DEL1sec, CHA: 7.0sec, BAL: 5.0sec, EXT: 0.2sec, PNG: -10Kpa	Air leakage not exceeding $\pm 120\text{pa}$ -NG: -120pa +NG: +120 pa
96H Salt Spray Test	Spray with 5% salt solution for 24 hours at room temperature and dry naturally for 24 hours for one cycle, making a total of two cycles. Take out and dry. For no-load voltage output at the discharge terminal, the single body of the discharge electrode sheet is subjected to 96H salt spray test.	Battery appearance is good, no liquid leakage, no smoke, no fire, no explosion, the charging and discharging electrode tabs do not have any corrosion or produce copper green bad phenomenon, inserted into the phase Should model fit contact well. The surface of the

		monobloc discharging electrode sheet is smooth, corrosion-free, and free of copper-green and other defects after the test.
Discharge electrode sheet contact beta (software)	The mainframe is in the power-on state, the battery and the adapted mainframe are tested for 3,000 times of adapted disassembly, and it is required that the battery discharging electrode is completely detached from the mainframe power supply electrode every time it is disassembled.	The battery is in good contact with the host computer, the discharge electrode tabs have no lower limit, and the electrode tabs do not fire or have black spots when the battery is in contact with the host computer.

#### 2.2.5 Temperature and humidity adaptation:

sports event	Test conditions (methods)	Rules of Judgement
High temperature storage test	The battery is discharged at 50% charge at an ambient temperature of The products were stored at 60° C for 24 hours and then at 25° C 1C fast charge/discharge in ambient conditions.	The capacity is above 90%, the battery is in good appearance and the protection circuit functions properly.
High temperature performance	After the battery has been fully charged in the standard charging manner, set aside the 0.5h~1h, put the battery into the 50°C high temperature box constant temperature 2h, then discharged at 1C to a termination voltage of 6.0V.	Discharge capacity greater than minimum capacity 90%, the battery is in good cosmetic condition and the protection circuit functions properly.
Low temperature storage test	The battery is discharged at 50% charge, left at ambient temperature -20°C for 24 hours, and then charged and discharged at 25°C in the standard charging/discharging mode.	The capacity is above 90%, the battery is in good appearance and the protection circuit functions properly.
Low Temperature Performance	After the battery is fully charged according to the standard charging method, put it aside for 0.5h~1h, and then put the battery into a low temperature box at -20°C for 24h, and then discharge the battery at	0.2C Capacity $\geq 70\%$

	0.2C to the termination voltage of 6.0V under the environment of -20°C.	
	After the battery is fully charged according to the standard charging method, put it aside for 0.5h~1h, and then put the battery into a low temperature box at -10°C for 24h, and then discharge the battery at 1C to the termination voltage of 6.0V under the environment of -10°C.	1C ≥ 50 per cent capacity
High temperature and humidity storage experimental	The batteries are discharged at 50% charge, shelved for 24 hours at a high temperature of 60° C and 85% relative humidity, and then charged and discharged in the standard charge/discharge mode at 25° C.	The capacity is above 90%, the battery is in good appearance and the protection circuit functions properly.
Constant humidity and heat storage performances	After standard charging, set aside the battery for 0.5h~1h, store the battery at 40±2°C and 95% relative humidity for 60 hours, and then discharge the battery at 25±5°C with 0.2C to a termination voltage of 6.0V.	Capacity ≥ 80 per cent and good appearance

#### 2.2.6 PACK cell safety performance:

sports event	Test conditions (methods)	Rules of Judgement
Thermal shock (130 degrees)	Battery fully charged in the high temperature box, the temperature to 5 °C ± 2 °C /The temperature was increased to 130° C at a rate of 0.5-1.5 min and held for 30 min.	Batteries should be non-explosive, non-fire, non-leakage and non-smoking
shorts	The battery was charged to 8.4V at 0.2C and short-circuited by directly connecting the positive and negative terminals of the battery with wires having a total resistance of less than 50m Ω in a room temperature environment.	Requirements for the battery without explosion, fire, liquid leakage, smoke phenomenon, the battery surface temperature can not be greater than 150 degrees.
forced discharge	To do this experiment in an explosion-proof box, the battery is discharged to the termination voltage at 0.2C at room temperature, and then the battery is reverse charged at a current of 1C, the charging voltage is the maximum voltage output from the charger, and the charging time is not less than 90min.	The samples are required to have no fire, no explosion and no leakage of liquid after the experiment.

#### 2.2.7 Safety performance of the electric core:

sports event	Test conditions (methods)	Rules of Judgement
Thermal shock (130 degree)	The battery was fully charged and placed in a high temperature chamber, where the temperature was increased to 130° C at a rate of 5° C±2° C/min and held for 30 min.	Batteries should not explode, catch fire, leak, or smoke
hit	The battery was fully charged (4.2 V) at 0.2 C. The battery was placed on an impact platform with a 15.8 mm diameter round bar placed across the centre of the battery, and a 9.1 Kg weight was dropped freely on the front of the battery from a height of 610 ± 25 mm.	It is required that there is no explosion, fire or smoke in the battery during the test.
shorts	The battery cells were charged to 4.20V at 0.2C, and short-circuited by directly connecting the positive and negative terminals of the batteries with wires having a total resistance value of less than 50mΩ in a room temperature environment.	Requirements for the battery without explosion, fire, liquid leakage, smoke phenomenon, the battery surface temperature can not be greater than 150 degrees.
overflow	The battery was charged to 4.2V at 1C, and then the battery was charged to 4.6V at a constant current of 2C without any protective components.	Requirements for the test battery without explosion, fire, liquid leakage, smoke phenomenon, the battery surface temperature can not be greater than 150 degrees.
forced discharge	Doing this experiment in an explosion-proof box, with the battery at room temperature at 0.2C discharged to the termination voltage, and then a current of 1C was applied to the electrical The battery is reverse charged and the charging voltage is the output of the charger's Maximum voltage, charging time not less than 90min.	The samples are required to have no fire, no explosion and no leakage of liquid after the experiment.