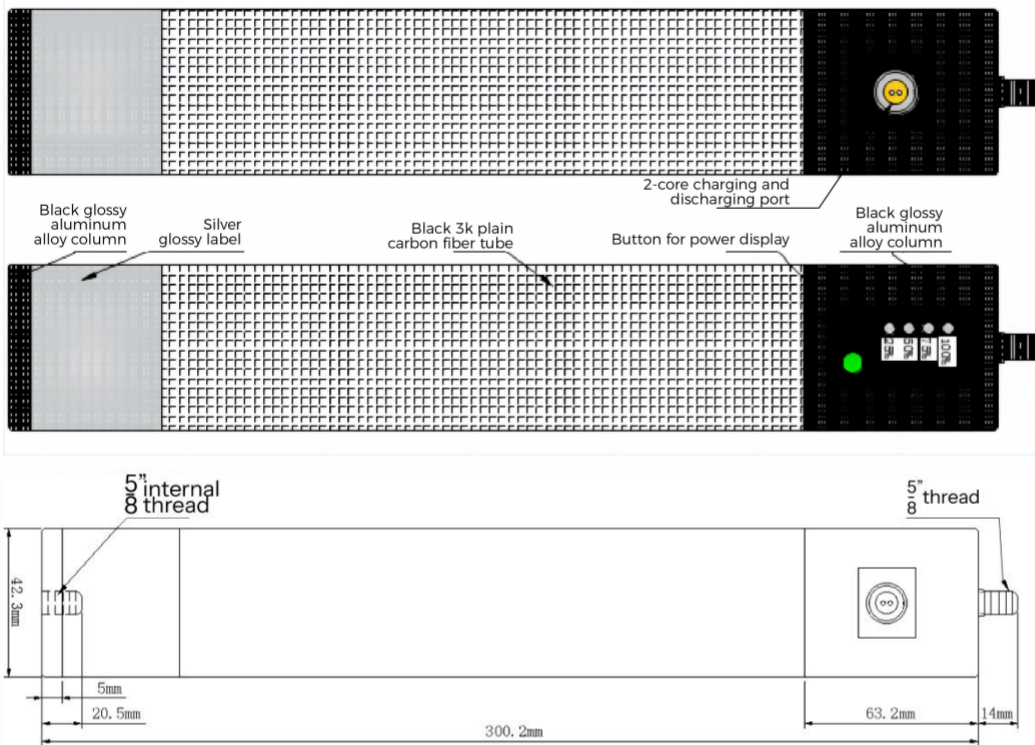


# TKB 1000-C RTK Low Temperature Power Bar

## 1. Scope

This specification describes the basic performance, technical requirement, testing method, warning and caution of the Li-ion rechargeable battery or battery pack. The battery pack defined in this documentation is an assembly which include battery, PCB, wire and other parts.



## 2. Characteristic

- 9000mAh high capacity battery
- Lightweight
- Corrosion-resistant
- Discharging in -40°C normally
- Convenient
- Multiple Units in Series
- Compatible with Full Range of Receivers
- 1.2m Drop test



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## 3. Basic Performance

ITEM	SPECIFICATION	NOTE
Rated Capacity	9000 mAh	0.2C 8.25V discharge
Nominal Capacity	8400 mAh	
Min. Capacity	8100 mAh	
Pack Weight	≈ 712g	
Pack Impedance	≤ 180m Ω	
Normal Voltage	11.1 V	
Initial Voltage	≈ 10.5V	
Limited Charge Voltage	12.6V	Voltage of CC charge to CV charge
Cut-off Voltage	8.25V	Load Voltage when discharge ended
Standard Charging Method	0.2C CC current charge to 12.6V, then CV charge till current declines to 0.01C	
Standard Charging Current	1800 mA (0.2C)	CC charge to 12.6V, then CV charge till current declines to less than 0.01C
Standard Charging Time	6.5hours	
Rapid Charging Current	3000 mA	
Standard Discharging Current	1800 mA (0.2C)	CC discharge to 8.25 V
Max. Discharging Current	4500 mA (1C)	
Operating Temperature Range	Charging: 0 ~ 60℃ Discharging: -40 ~ 60℃	-20℃ ~ -40℃ reduced discharge voltage
Operating humidity Range	≤ 90%RH	
Certification	CE、MSDS、UN38.3	

## 4. Electrical Characteristics of the Cell

### 4.1 Normal Test Conditions

TEMPERATURE	RELATIVE HUMIDITY	ATMOSPHERIC PRESSURE
15 ~ 35 ℃	45 ~ 85 % RH	86 ~ 106 KPa

### 4.2 Electrochemical Characteristics

ITEM	CRITERION	TEST METHOD
0.2C discharging capacity	Discharging capacity is not less than min. capacity	After Standard Charging, rest 5 minutes, then 0.2C discharge to cut-off voltage
1.0C discharging capacity	Discharging capacity is not less than 90% of Min. capacity	After Standard Charging, rest 5 minutes, then 1.0C discharge to cut-off voltage
Cycle life	The cycle times is not less than 500	Charge: 0.2C CC-CV charge to 4.2 V, then current declines to 0.02C Discharge: 0.2C CC discharge to 2.75 V When the discharge capacity reduced to 80% of rated capacity, stop testing, and record the cycle times.
Self-discharge	Discharging capacity is not less than 85% of initial capacity	After Standard Charging, rest the cell for 28 days in the condition of 20 ± 5℃, then 0.2C discharge to cut-off voltage, and record the capacity.



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### 4.3 Environment Characteristics

ITEM	CRITERION	TEST METHOD
Constant temperature and constant humidity test	No explosion, no fire, no leakage, Discharging capacity is not less than 60% of initial capacity	After Standard Charging, rest the cell for 48 hours in the conditions of $40 \pm 5^{\circ}\text{C}$ and 90-95%RH, then 1.0C discharge to cut-off voltage, and record the capacity.
Vibration test	No explosion, no fire, no leakage.	After Standard Charging, fixed the cell to vibration table, then subjected to vibration test for 30 minutes per axis of XYZ axes. Frequency rate: 1oct/min Vibration frequency: 10Hz~30Hz Excursion(single amplitude): 0.38mm Vibration frequency: 30Hz~55Hz Excursion(single amplitude): 0.19mm
Shock test	No explosion, no fire, no leakage.	After Standard Charging, test condition: Acceleration: 100m/s <sup>2</sup> Pulse lasting time: <16ms Shock times: 1000 $\pm$ 10 times

### 4.4 Safety Characteristics

ITEM	CRITERION	TEST METHOD
Overcharge test	No explosion, no fire	Acell is to be discharged to 3.0V at 0.2C constant current, then charged at 2C constant current until the voltage is 4.6V, then charged at 4.6V constant voltage. Stop the test when the surface temperature of the cell decays to about 20% from the maximum or continuous charging time up to 7hours .
Short-circuit test	No explosion, no fire	After being charged according to standard, place it in an environment of $25 \pm 5^{\circ}$ and $55 \pm 5^{\circ}$ , and then connect the positive and negative extremes with a wire to ensure that all the external resistance is $80 \pm 20\text{m}\Omega$ . The battery temperature drops to 20% lower than the peak value or the short circuit time reaches 24h.
Thermal test	No explosion, no fire	After Standard Charging, put cell into an hot box, test condition: Temperature Rate: $5 \pm 2^{\circ}\text{C}/\text{min}$ Ending temperature: $130 \pm 2^{\circ}\text{C}$ Keep temperature for 30 minutes, Then stop testing

## 5. PCB Specification PCB

### 5.1 Electrical Characteristics

ITEM	MIN	TYP	MAX	UNIT
Over-charge Protection Voltage	4.220	4.250	4.280	V
Over-discharge Protection Voltage	2.620	2.700	2.780	V
Over-current Protection for Discharge	17	20	23	A
Internal Resistance	/	50	75	m $\Omega$
Static Current	/	12.0	30.0	$\mu\text{A}$
Short Circuit Protection	with short circuit protection, there will be a self recovery when disconnected or charged			



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### 5.2 Power display board value

SYMBOL	EXPLANATION	SYMBOL	EXPLANATION
25%	9.0V~10.2V	50%	10.2V~11.0V
75%	11.0V~11.8V	100%	11.8V~12.6V

## 6.Storage and Shipment Requirement

ITEM	REQUIREMENT
Storage environment	Short period less than 1 month -20℃~+45℃, 90% RH Max.
	Long period more than 3 months -10℃~+45℃, 90% RH Max.
	Recommend storage 15℃~35℃, 85% RH Max.
Long time storage: If the cell is stored for a long time, the battery's storage voltage should be 10.8~11.5V and the battery is to be stored in a condition as No.4.1 Also, it is recommended to charge the battery every six months.	

## 7.Warning and Cautions

### 7.1 Warning

Load circuit may cause voltage and current, and the voltage or current may add to pack, the voltage or current must be controlled as lower than RWV and RWI, larger voltage or current may damage the PCM of pack.

Danger warning(it should be described in manual or instruction for users, indicated especially) to prevent the possibility of the battery from leaking, heating, explosion. Please observe the following precautions:

- ◆ Don't immerse the battery in water and seawater. Please put it in cool and dry environment if no using
- ◆ Do not discard or leave the battery near a heat source as fire or heater
- ◆ Being charged, using the battery charger specifically for that purpose
- ◆ Don't reverse the positive and negative terminals
- ◆ Don't connect the battery to an electrical outlet directly
- ◆ Don't connect the positive and negative terminal directly with metal objects such as wire. Short terminals of battery is strictly prohibited, it may damage battery
- ◆ Do not transport and store the battery together with metal objects such as necklaces, hairpins
- ◆ Do not strike, throw or trample the battery
- ◆ Do not directly solder the battery and pierce the battery with a nail or other sharp object
- ◆ Do not use the battery mixed with other different make, type, or model batteries
- ◆ Prohibition of use of damaged cells
- ◆ Don't fall, hit, bend battery body
- ◆ Battery pack designing and packing Prohibition injury batteries
- ◆ Never disassemble the cells
- ◆ The battery replacement shall be done only by either cells supplier or device supplier and never be done by the user
- ◆ Keep the battery away from babies
- ◆ Any components contacting these edges, they must be insulated



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## 7.2 Cautions

- ◆ Do not use or leave the battery at very high temperature conditions (for example, strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or fire or its performance will be degenerated and its service life will be decreased.
- ◆ Do not use it in a location where is electrostatic and magnetic greatly, otherwise, the safety devices may be damaged, causing hidden trouble of safety.
- ◆ If the battery leaks, and the electrolyte get into the eyes. Do not wipe eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, eyes injury can result.
- ◆ If the battery gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.
- ◆ In case the battery terminals are dirt, clean the terminals with a dry cloth before use. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
- ◆ Be aware discharged batteries may cause fire, tape the terminals to insulate them.



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