
User Guide for GNSS BOX

----- S650/S660

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1. Safety precautions

In order to use the product correctly and safely, please read the safety instructions below carefully before use.

	Please turn off the product where ban to use the product, or use the product may cause interference or danger.		Please do not place the product or accessories in appliance with strong electromagnetic field.
	Do not use the product when driving a car in order to avoid interfering with safe driving.		Please keep the product far away from the magnetic equipment; otherwise the radiation of the product may erase the information stored on the magnetic equipment.
	In the medical place, please comply with the relevant provisions or regulations. Near the medical equipment, please turn off the product.		Please don't use the product close to high temperature place, or near flammable gases(such as gas stations)
	Please close the product when boarding the plane, lest the wireless signal interfering plane control signals.		Please place the product and accessories where children can't touch, avoid the children using the product without supervise.
	Close to high precision electronic equipment, please shut down the product, otherwise it may lead to electronic equipment failure.		Please use the specified batteries and chargers, otherwise, may cause explosion.
	Without authorization, please don't disassemble the product or the accessories, only authorized technician can repair the product.		When using the product, please comply with the relevant laws and regulations, and respect others' privacy and legal rights.

2. High precision GNSS BOX S650

2.1 Profile



Fig.1-S650 mainframe



Fig.2 Power key

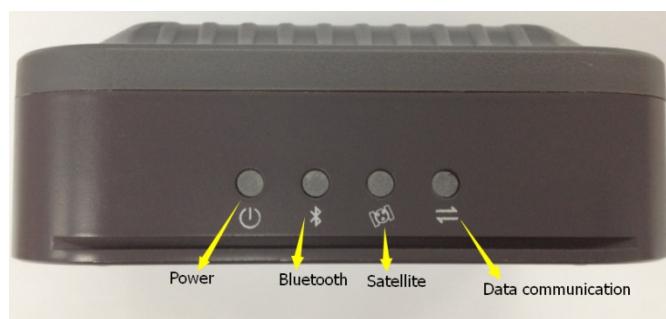


Fig.3-Indicators



Fig.4-miniUSB port

2.2 Specifications

Configuration		Parameters	Options
Support PDA	Windows Mobile /CE	√	
	Android	√	
	WIN7\WIN8	√	
	IOS	Development pending	
GNSS	GPS	L1, L2, with carrier phase smoothing	√
	GLONASS	L1, L2	√
	Compass	B1、B2、B3 (optional)	√
	support data format	NMEA-0183, TSIP	√
	I/O protocol	RTCM3、RTCA、CMR and so on	√
	Data updating rate	1Hz	√
	recapture time	<1s	√
	Cold start	<30s	√
Positioning accuracy	point positioning	2m	√
	External source accuracy	5cm	√
	SBAS	1m	√
	Static accuracy	3mm+1ppm	√
Data communication	Data interface	MicroUSB	√
	Bluetooth	Bluetooth V2.1 Class 2 support EDR	√
Power supply	Battery	3.6V,6200mAh	√
		removable 5400mAh lithium battery, 3.6V	√
	Working time	More than 10 hours typically	√
Environment characteristic	Operating temperature	-20°C — +25°C	√
	Storage temperature	-30°C — +25°C	√
	Quick-proof	1.5m natural fall to the ground	√
	IP	IP67	√
Physics	Measurement (cm)	10×10×3.5	√
	Weight	305 g	√

2.3 Standard list

Item No	Name	model name	Quantity
1	S660/S650 receiver		1
2	MicroUSB data cable	USB-2	1
3	S660/S650 holder	TP-S650	1
4	S660/S650 Adapter	PSAI10R-050Q	1
5	Packaging box		1

2.4 Principle of High precision GNSS S650

2.4.1. Positioning principle

High-precision GNSS box S650 is integrated with high-precision GNSS motherboard, professional and high sensitive satellite antenna, general bidirectional communication Bluetooth, high frequency power board, power and intelligent control system hardware and firmware, real-time positioning accuracy can achieve highest centimeter level (static post-processing precision can reach millimeter). In addition to high positioning accuracy, the biggest advantage is the split type design, which can meet the needs of different industries such as surveying and mapping, GIS and so on.



Fig.5 Appearance



Fig.6 positioning principle

Let's learn about the principle in brief:

Firstly, use the Bluetooth of the PDA (such as Android Phone with industrial defense) connects with high precision GNSS box S650/S660, the high precision antenna in the box machines receive GPS + GLONASS + Beidou satellite signal, and transmit the satellite data to the main board; PDA acquire the differential data from the CORS stations using the built-in GPRS network module or Wi-Fi module, and then send the differential data to the main board of the high-precision GNSS box via Bluetooth; then the main board of the High-precision GNSS box figure out the high precision coordinate data based on the satellite data and differential data, and give the high precision coordinate data back to PDA via built-in Bluetooth, which allows the software on the PDA to call for the high accuracy coordinates.

2.4.2 Advantages of GNSS BOX S650/S660

- Split type design, avoid the electromagnetic interference from PDA to high precision GNSS motherboard as much as possible, and make satellite search more stable and positioning accuracy more reliable as well;
- Split type design, make the PDA separated from the GNSS host, communicating via Bluetooth, a wider range of application, operation more flexible, able to fix the GNSS host on the top of a bus with a magnet base, then realize to control PDA (Android phone or tablet PC, laptop or other Bluetooth devices) in the vehicle (or download, upload data from PDA), make the surveying job more simple, and comfortable, maximum convenient for users.

- Split type design makes the high precision GNSS smaller, more convenient to carry, for high precision positioning device, such a small device can realize cm-level real-time positioning, is a revolutionary progress, this equipment will greatly reduce the weight and volume of the carrying equipment field for personnel.
- Split type design, make the equipment to use the power supply for high precision GNSS itself, which greatly saves the power, and make the equipment work longer hours, to realize more than 10hours work continuously.
- Use Android tablet or mobile phone to control high precision GNSS BOX, greatly reduces the equipment operation difficulty, more easy to use, make high-tech, high-precision positioning instrument more civilian and simplification.
- Magnesium aluminum alloy shell, durable, IP67, dust-proof waterproof, shock-proof, meet the field severe environment.
- This product is a portable product, beautiful, perfect combination of fashionable design and industrial aesthetics.

3. Operation (take S650 for an example)

3.1 Charge

S650 adopts 6800mAH built-in large capacity battery or 5700mAH removable large capacity battery, it can work10 hours typically. Equipped with a specified charging socket and charger, it can charge when connect with a computer via a USB cable.

Before use, need to recharge equipment first. Make sure the charging time reach to 8 to 10 hours at the first several times, and fully discharged, in order to maximize the battery capacity, at the same time extend battery life.



Fig.7-S650

3.2 Power ON/OFF

Power on the BOX receiver by holding on POWER key for 3seconds, the POWER light  is lit up. To Power OFF, hold on power key for several seconds in boot status.



Fig.8-Power indicator

3.3 Bluetooth connection

Pair high precision GNSS box with other GPS equipment via Bluetooth module.

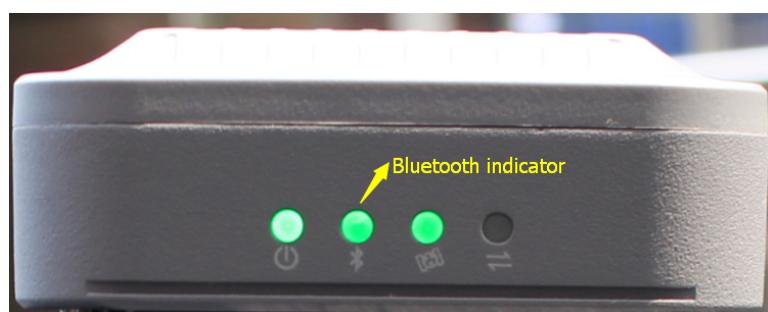


Fig.9-Bluetooth indicator

3.4 Satellite signals

The satellite light lit up, showing high precision GNSS box begin searching satellites (indicator light flashing once after a while).

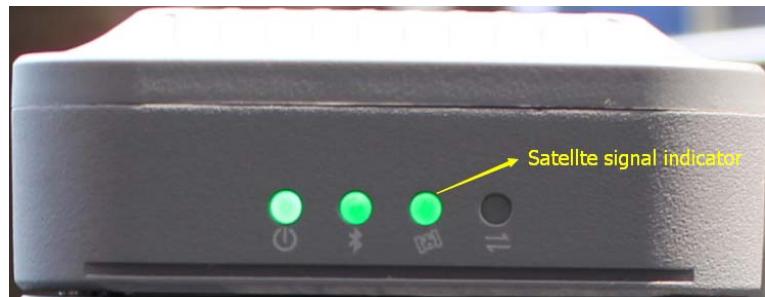


Fig.10-Satellite signal indicator

3.5 Data communication

When the data transmission light flashing, indicates that the connected GPS data acquisition equipment and analysis management devices can receive satellite data, and a new project (engineering) is beginning.



Fig.11-Data communication indicator

4. Safety Warnings and Attentions

4.1 Safety Warnings

- Near high precision control electronic equipment, please shut down the product, otherwise it may lead to electronic equipment failure.
- The equipments may be effected by the product: hearing- AIDS, pacemakers, fire alarm, automatic doors and other automatic control equipment. Electronic medical auxiliary equipment users shall confirm with the equipment service center about the influence the radio waves may affect on the device.
- Pacemaker manufacturers recommend keeping this product at least 15cm far away from the heart pacemaker, to avoid potential interference on the pacemaker. When carrying the product, please don't put it in the bag near breast;
- Do not take the product to the operating room, intensive care unit (ICU) or coronary care unit (CCU).
- In medical areas where ban to use the product, please abide the directives and regulations.
- Please pay attention to the use and placement of the product, so as not to affect heart disease patients.
- In the flammable and explosive region, please power off the product, and don't remove or install the battery, charge the battery or use the product, to avoid fire or explosion.

4.2 Attentions

- Please place the product far away from the magnetic equipment; the radiation may erase storage on the magnetic equipment.
- Do not use this product, batteries and chargers in an appliance with strong electromagnetic field, such as electromagnetic oven and microwave oven, otherwise it may cause electrical failure, fire or explosion.

- Please do not use the product (battery and charger) in the area of high temperature, or low temperature region, otherwise it may lead to the products, battery and charger failure, fire or explosion.
- Please charge the battery in a safe environment (not inflammable and explosive places, dangerous situations), should try to hold the battery temperature at between 0°C and 45°C. Battery storage environment temperature between -20°C and 60°C. If put the battery in too hot or too cold area, may reduce the battery capacity and service life. When the temperature is lower than 0°C, the performance of the battery is particularly restricted.
- When the product close to ears, please don't boot or shutdown, lest affect the body health.
- The product's interference may affect neighboring television, radio or computer.
- Please abide by the provisions of the radio frequency radiation international norms, use the company specified accessories.
- When using the product, please comply with the relevant laws and regulations, and respect others' privacy and legal rights.
- Please shut down the box prior to cleaning and maintenance, if still connected to the charger, you will need to unplug the charger from the power socket, disconnect the charger with the product at the same time, lest produce an electric shock, or short circuit of the battery or charger.
- Please do not disassemble the product and accessories without authorization, only authorized institution can repair it.