WT9011DCL-BT50 Product Specifications

Contents

1. Product Introduction

1.1. Product Overview

- The module integrates high-precision gyroscopes, accelerometers, and geomagnetic field sensors, and uses high-performance microprocessors and advanced dynamics solvers and Kalman dynamic filtering algorithms to quickly solve the module's current real-time motion posture.
- The use of advanced digital filtering technology can effectively reduce measurement noise and improve measurement accuracy.
- The module integrates an attitude solver, which, in conjunction with the dynamic Kalman filter algorithm, can accurately output the current attitude of the module in a dynamic environment. The attitude measurement accuracy is 0.2 degrees, the stability is extremely high, and the performance is even better than some professional inclinometers!
- The high-performance cortex-M4 core processor runs at a frequency of up to 168MHZ, combining low power consumption with high performance.
- Bluetooth BLE5.0 wireless transmission, stable transmission, maximum distance up to 90 meters.

1.2. Product Features

- The module integrates high-precision gyroscopes, accelerometers, and geomagnetic field sensors, and uses high-performance microprocessors and advanced dynamics solvers and Kalman dynamic filtering algorithms to quickly solve the module's current real-time motion posture.
- The use of advanced digital filtering technology can effectively reduce measurement noise and improve measurement accuracy.
- The module integrates an attitude solver, which, in conjunction with the dynamic Kalman filter algorithm, can accurately output the current attitude of the module in a dynamic environment. The attitude measurement accuracy is

0.2°, the stability is extremely high, and the performance is even better than some professional inclinometers.

- The Z-axis heading angle is added with geomagnetic sensor filtering and fusion, which solves the cumulative error caused by the drift of gyroscope integration in the 6-axis algorithm, and can output heading angle data stably for a long time. **Note: Due to magnetic field detection, calibration is required before use, and it is necessary to stay at least 20cm away from magnetic interference areas, electronic equipment, magnets, speakers and other hard magnetic objects when using it.**
- Working current: ≈ 16mA, standby current 14uA-16uA.
- Data interface: baud rate 115200.
- The output content can be selected arbitrarily, data output frequency: 0.2Hz~200Hz, 50Hz~200Hz data package transmission, default 10HZ.
- 4-layer PCB board technology, thinner, smaller and more reliable.
- Bluetooth 5.0: Support Android /IOS operating system (specific actual use, subject to the final device)

2. Parameter indicators

2.1. Accelerometer parameters

parameter	condition	Typical Value
Range		±16g
Resolution	±16g	0.0005(g/LSB)
RMS Noise	Bandwidth = 100 Hz	0.75~1mg-rms
Static Zero Drift	Horizontal placement	±20~40mg

Temperature Drift	-40°C ~ +85°C	±0.15mg/℃
bandwidth		5~256Hz

2.2. Gyroscope parameters

parameter	condition	Typical Value
Range		±2000°/s
Resolution	±2000°/s	0.061(°/s)/(LSB)
RMS Noise	Bandwidth = 100 Hz	0.028~0.07(°/s)-rms
Static Zero Drift	Horizontal placement	±0.5~1°/s
Temperature Drift	-40°C ~ +85°C	±0.005~0.015 (°/s)/℃
bandwidth		5~256Hz

2.3. Magnetometer parameters

parameter	condition	Typical Value
Range		±2Gauss
Resolution	±2Gauss	0.0667mGauss/LSB

2.4. Pitch and roll angle parameters

parameter	condition	Typical Value
Range		X: ±180°

		Y: ±90°
Inclination accuracy		0.2°
Resolution	Horizontal placement	0.0055°
Temperature Drift	-40°C ~ +85°C	±0.5~1°

2.5. Heading Angle Parameters

parameter	condition	Typical Value
Range		Z: ±180°
Heading accuracy	9-axis algorithm, magnetic field calibration, dynamic/static	1° (without magnetic field interference) [1]
	6-axis algorithm, static	0.5° (dynamic integral cumulative error) 【2】
Resolution	Horizontal placement	0.0055°

Note:

[1] Please calibrate the magnetic field in the test environment before use to ensure that the sensor is familiar with the magnetic field in the environment. During calibration, please stay away from magnetic interference. [2] In some vibration environments, there will be cumulative errors. The specific error cannot be estimated. Please refer to the actual test.

2.6. Module parameters

2.6.1. Basic parameters

parameter	condition	Minimum	default	Maximum
Communication interface	Bluetooth	115200bps	115200bps	115200bps
Output		3-axis acceleration, 3-axis angular velocity, 3-axis magnetic field, 3-axis angle, quaternion, port status		
Output rate		0.2Hz	10Hz	200Hz
Startup time				1000ms
Number of cascades	Computer Bluetooth			4
Bluetooth transmission distance	Open environment		50m	90m
Operating temperature		-20℃		60℃
Storage temperature		-40 ℃		85 ℃
Impact resistance				20000g

2.6.2. Electrical parameters

parameter	condition	Minimum	default	Maximum
Charging voltage			5V	
Battery voltage			3.7V	
Working current	10HZ		16mA	
Broadcast current				
Standby current			14uA	
Battery capacity			130mAH	
Working hours				40 hours
Charging time				2 hours

2.6.3. Indicator Light Description

WT9011DCL-BT50 has 4 states:

①State 1 is standby (power off).

②State 2 is when the button is pressed in state 1, the broadcast waits for connection and the indicator light flashes.

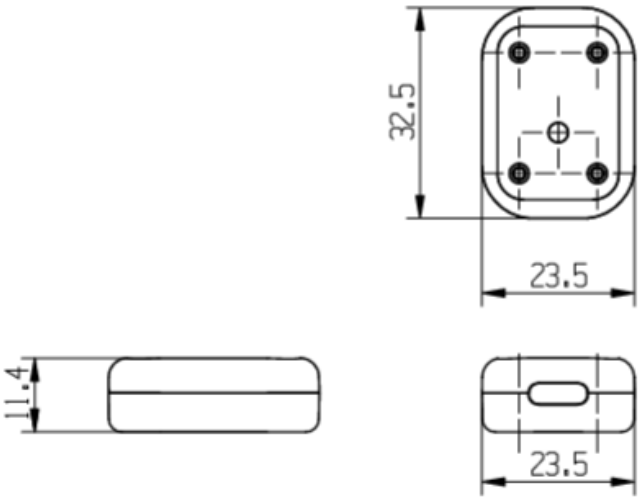
③State 3 is to turn off the indicator light if there is no connection after 1 minute in state 2 (but it is still broadcasting and the phone can still search for this device).

④State 4 is to shut down the device after no connection for 24 hours in state 3 (switch back to state 1). Except for state 1, long pressing the button will shut down the device (switch back to state 1).

When the sensor is turned on, it will enter sleep mode if there is no connection after 1 minute. The light will not flash in sleep mode. It will automatically shut down if there is no connection for 24 hours.

After connection, the indicator light flashes once every 2 seconds when the battery level is above 80%, once every second when the battery level is between 50% and 80%, and quickly flashes when the battery level is below 20%.

2.7. Product size



2.8. Axial diagram

3. Interface definition

3.1. Interface Description

Interface Name	Interface Function
TYPE-C	Charge

3.2. Bluetooth adapter connected to computer

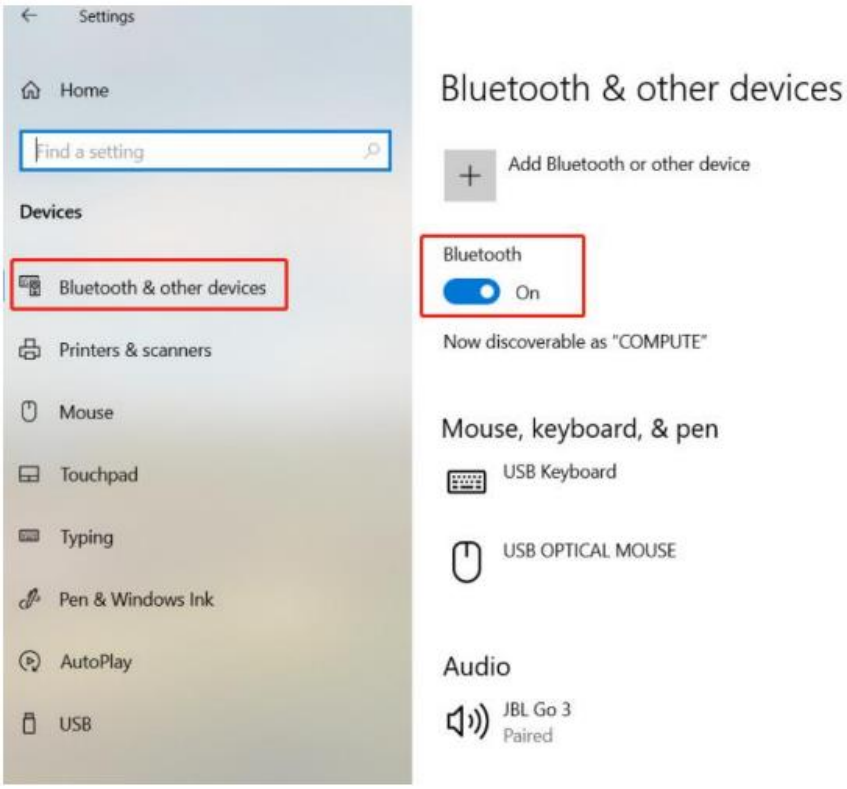
Note:

【1】When using a Bluetooth 5.0 USB adapter, you need to use an adapter host computer .

3.3. Bluetooth wireless connection to computer

3.3.1. Connection steps

1. Turn on your computer’s Bluetooth



2.Then open the PC software

①Select model **WT9011DCL-BT50**

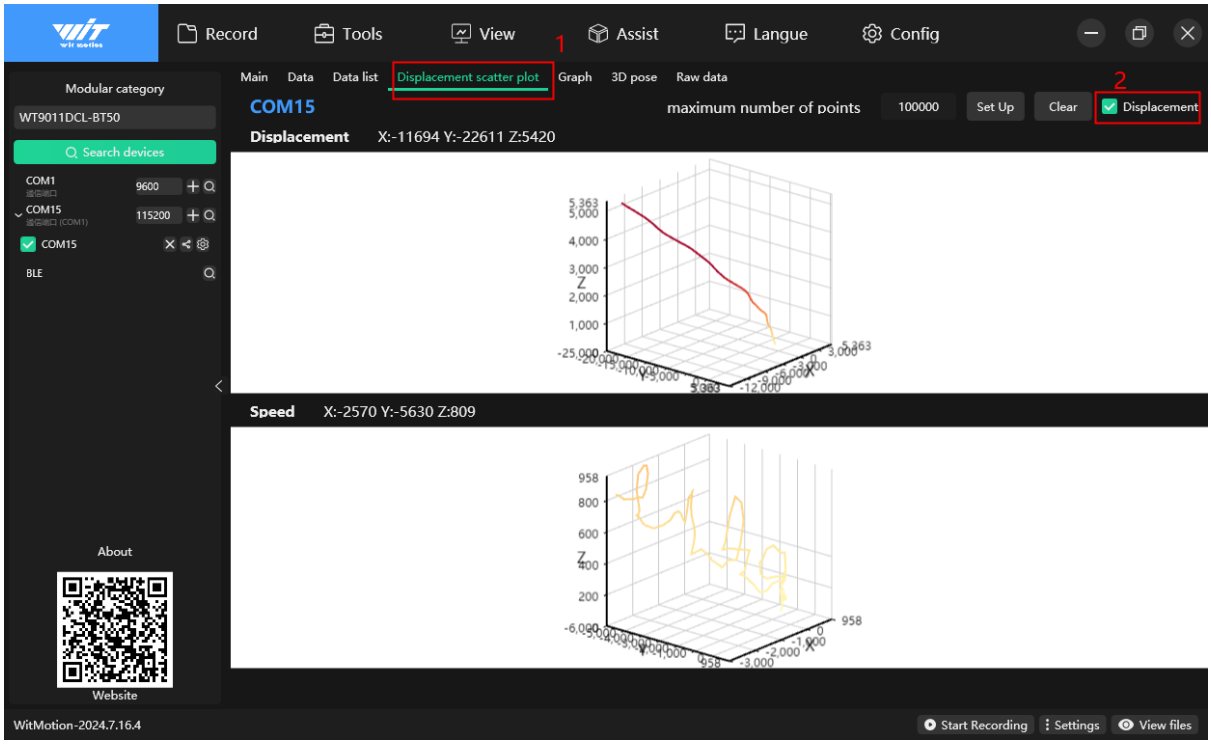
②Click "Search Device"

③Check the identified Bluetooth device. If the data on the host computer interface is updated, it means the connection is successful.

3.3.2. Switching displacement mode

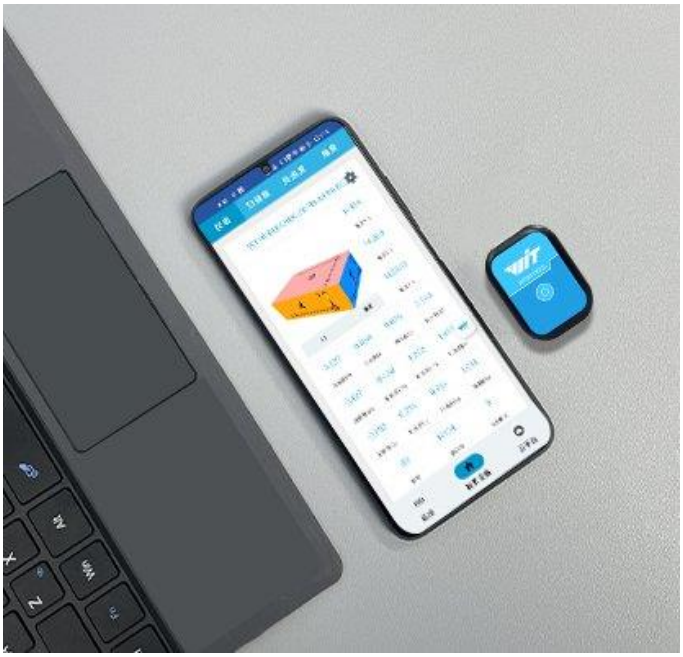
1. Open the "Displacement Scatter Plot"

2. Check "Displacement" and then rotate the sensor to see the displacement trajectory and displacement speed curve.



Note: After switching to displacement mode, only displacement, displacement velocity, and angle data are output; acceleration and angular velocity are not output. If you want to output acceleration, you need to turn off the displacement output button.

3.4. Bluetooth wireless connection to Android phone



3.4.1. Connection steps

1. Turn on your phone's Bluetooth

2. Open the mobile app

①②③Select device model **WT9011DCL-BT50.**

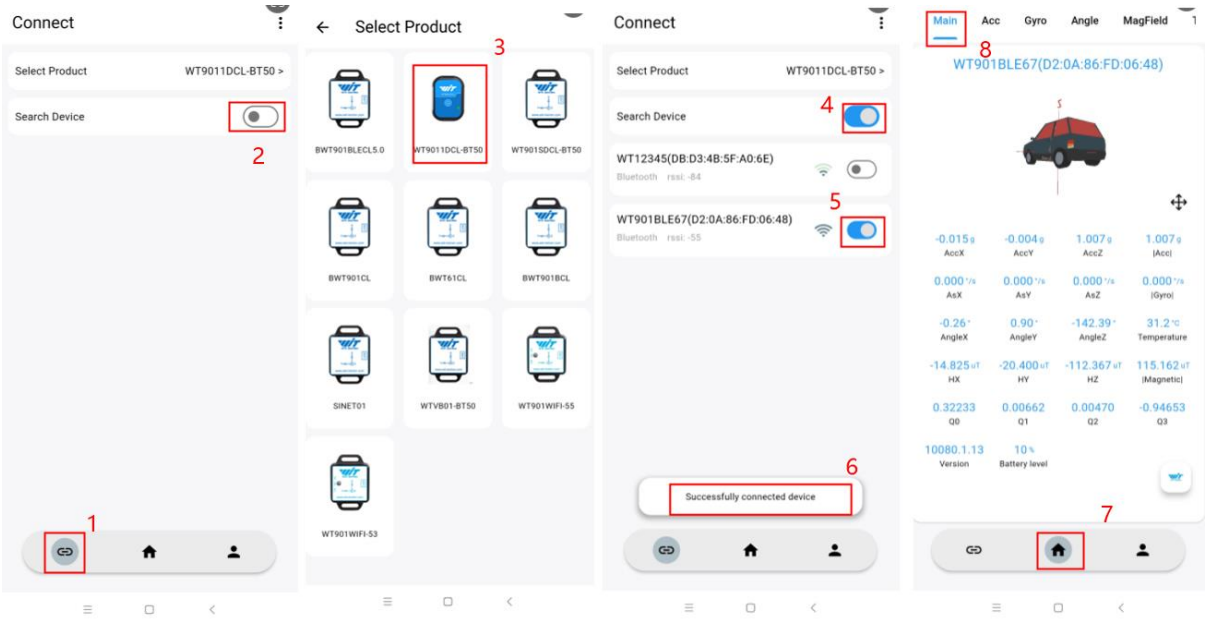
④Start the surrounding search.

⑤Turn on the Bluetooth connection.

⑥The device is successfully connected.

⑦Open the main interface.

⑧Open the dashboard interface and you can see the data update, which means the sensor is connected successfully.



3.4.2. Switching displacement mode

1. Turn on your phone's Bluetooth

2. Open the mobile app

①②③Select device model **WT9011DCL-BT50.**

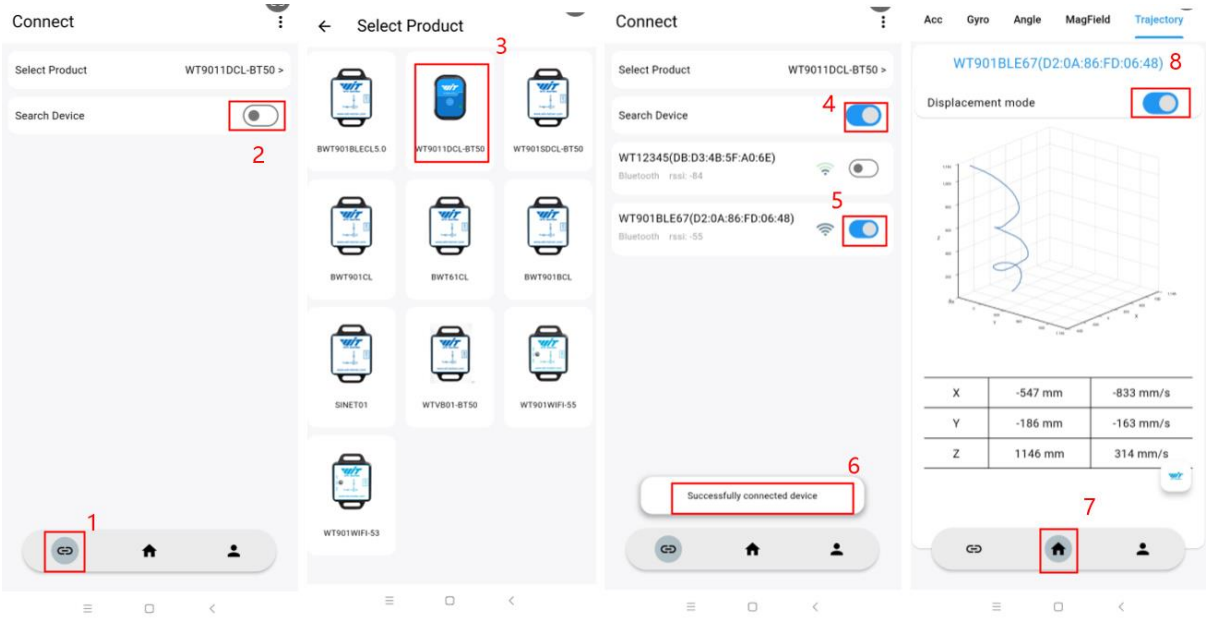
④Start the surrounding search.

⑤Turn on the Bluetooth connection.

⑥The device is successfully connected.

⑦Open the main interface.

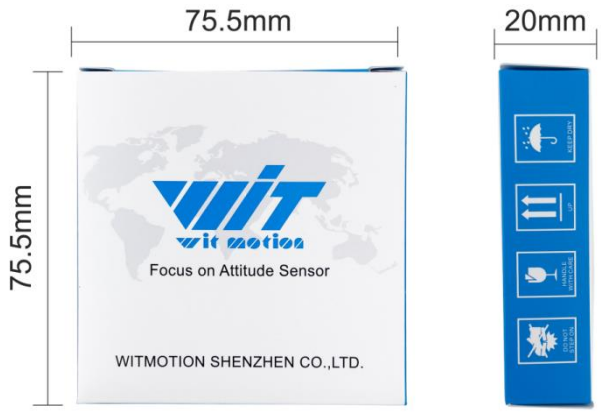
⑧Open the trajectory interface, move the sensor in space and you can see the trajectory update.



Note: After switching to displacement mode, only displacement, displacement velocity, and angle data are output; acceleration and angular velocity are not output. If you want to output acceleration, you need to turn off the displacement output button.

4. Product packaging

4.1. Sample packaging



5. Application areas

- Virtual reality/augmented reality, head mounted displays
- Large-scale agricultural automated farming
- Safety monitoring of aerial work
- UAV, manned aircraft
- Industrial posture monitoring
- Human motion tracking/capture

- Robots, Automated Guided Vehicles
- Pedestrian Navigation
- Autonomous driving/assisted driving
- Military, intelligent weapons and equipment