

muRata SPEAKS

TECHNOLOGY | SOLUTIONS | INNOVATIONS

Questions & Answers



1 What's maximum detection range possible by UWB receiver?

With Murata EVB antenna testing, power is adjusted within -41.3dBm/MHz condition, roughly ~40m.

2 How many antennas request for ranging detection? 2 or 3 antennas?

To do distance ranging only, the responder (e.g. 2BP) and initiator (e.g. 2BP or 2DK) side just need one antenna each. To get the azimuth angle (2D AoA), the one of the devices would need two antennas to receive the ranging polls and measure the difference in the phase of the signals that arrive at each antenna. If we want to get the elevation as well (3D AoA), this will require three antennas. The 2BP has three antennas allowing it to be capable of distance ranging and 2D or 3D AoA functionality. 2DK has only one antenna so it can only act as a tag device (initiator).

3 I have bought 2 development kit 2BP for testing with mobile phone ranging. How to get the example code?

The sample codes for doing smartphone ranging can be found in the SDK provided in the my Murata NXP UWB site. Please refer to the sample codes "demo_UWB_ble_sr150" and "demo_UWB_ble_sr150i" for android and iPhone use respectively.

There is also a documentation in my Murata "MTD-APN-044_A_Type2BP_EVK_connection_guide_for_Apple_device.pdf" that has more information on iPhone testing and starting the development.

4 Which module (EVK) we can use for short range radar application?

A pair of 2BP and 2DK should suffice. The 2BP anchor is able to range and find the 2DK tag device. Multiple tags can be used as well.

5 What exactly is an secure ranging?

Secure ranging ensures that UWB connections are robust and protected against possible "distance shortening" attacks.

6 It seem like it have to exchange data prior to ranging session, Does it have any standard in that communication?

Yes you are right, the devices would have to perform some sort of discovery and handshaking, this is up to the developer but one approach is to use BLE which is a low-power communication protocol.

7 What's the minimum and maximum distance between the anchor and the tag in order to achieve +/- 0.1m accuracy on the measured tag location?

The UWB modules are able to achieve +/- 10cm as stated in the datasheets. The minimum and maximum distances to attain this accuracy would be about 1m to 10m in line of sight environments, this is a FiRa requirement. In NLOS environments, it is expected that the accuracy will be reduced. Thus, it is recommended that the final product be tested in the actual environment and improved with calibration, please refer to our myMurata documentations for that.

8 Can the anchor device (mounted Murata-NXP UWB module) provide the x, y and z coordinates of the tag device?

This application sounds like indoor positioning. So to do this just using the distance, the bare minimum we will need is 4 anchors and 1 tag device. Then using ranging techniques like TDOA or RTLS, we will be able to get the 2D location of the tag device. But since we are able to use 3D AoA, one anchor should suffice. To get the relative positioning from itself. This is one way, but this also depends on the setup.

9 We design our own hardware (QN9090 + SR150 module). Can I use the NXP's UWB SDK resource (source code) to our final commercial product? Do I need to sign/pay for Software License with Murata or NXP?

There is no need to pay to use the NXP UWB SDK. An EULA (End User License Agreement) is in the package of the SDK. By default, the customer should accept this EULA beginning to use the SDK package. Please read this EULA carefully.

10 Is SR040 suitable for keyfob application? and is it compliant with FIRA?

Yes the Trimension SR040 module in the Type 2BP is suitable for keyfob or tag applications. It is compliant with FiRa consortium specifications.

11 What is the recommended Host MCU to connect the UWB module?

Host interface is SPI, need to connect with HOST CPU by SPI.
The NXP reference configuration is, NXP BLE (QN9090) + SR150 (Type-2BP).
With this configuration, there is reference SDK to develop the software.
In case customer is going to use NON QN9090 Host processor, customer need to make write the own program.

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12 Is the SDK available for user application development?

Yes, the software development kits can be found in the myMurata site. Please refer to our starting software development guide for more information.

13 Is this UWB module interoperable with Apple devices?

Yes, our UWB modules are interoperable with Apple devices that contain the U1 ultrawideband chip. As showed in the presentation, do check out the Apple WWDC21 for sample code and documentations to work with third party devices, i.e. our murata EVK/modules.

14 For 3D localization using antennas, how can we improve the performance of antenna when facing the backside?

We are currently evaluating +/- 90 degree for the AoA. Possibly 360 degree support in the near future. So at the moment, with only +/- 60 deg, the 3D localization would have to use more anchors to improve the localization accuracy. From which the localization algorithm would have to make a best guess of the target or tag device.

15 In a larger system, how to handle the UWB message collisions(two-way ranging)? Which measures are to be taken care of when more number of ranging sessions run parallel?

The important measures are to ensure that the ranging session IDs are strictly unique and known to both controller and controllee devices. In this way, the main responder is also able to know how many sessions are running and prevent any collision even if multiple payloads are sent at the same time.

16 Which Channel Murata UWB module supports?

2BP and 2DK can support Ch5,6,8,9 but our EVB UWB antenna supports only Ch 5 and 9. As mentioned, Fira Consortium and UWB alliance selected channel 9 as the UWB mandatory channel to avoid the overlapping with other RF frequency like WiFi 7.

17 Type 2BP is suitable to build as UWB tag?

Type-2BP also can be used for TAG and Anchor, but TAG generally required only one antenna. We do have 2DK with NXP SR040 based module for TAG application, it will support only one antenna and power consumption will be lower than SR150 module(Type-2BP).

18 What is the life span of Tag device (2DK)?

2DK is designed to keep going for a year on a standard battery (CR2032) you can easily replace. However, It depends on location data update frequency and our tag can integrated a accelerometer sensor for power saving.

19 How accurate is Murata Ultra Wide Band (UWB) module ?

Indoor positioning with Ultra-wideband has some significant advantages:
With Murata EVB antenna testing, power is adjusted within -41.3dBm/MHz condition, roughly ~40m. The accuracy of distance ranging is ± 10 cm and angle of accuracy is $\pm 3^\circ$ (within $\pm 60^\circ$) after calibration.

20 What is the advantage of UWB, comparing with BLE AOA, WIFI and RFID RTLS?

- UWB works at 6GHz which hardly has interference with smart phone device or other RF device.
- UWB provides the highest RTLS accuracy comparing to BLE AOA, WIFI and RFID RTLS
- UWB is getting more popular since Apple, Samsung, HUAWAI, OPPO and Xiaomi are installing UWB ICs on their smart phones.
- UWB provides unbeatable security comparing other ranging technics. It's also more efficient and faster.

21 How does UWB measure distance?

A distance can be measured by calculating the time of flight of radio signals between a sender and a receiver. Because bandwidths over 500 MHz are used to communicate in, it is called ultra wideband.

22 Is UWB better than Bluetooth?

It depends what we are comparing.

In terms of localization, UWB has better performance than BLE. This is because UWB works on both LOS and NLOS mode, while BLE ranging is NLOS, based on the relative signal strength. So, for BLE, obstacles between the ranging device will reduce the signal strength and make the ranging appear further than it actually is. Furthermore, BLE is a narrowband technology so interference is possible by the crowded 2.4GHz operating devices.

However, BLE still shines in terms of energy consumption, is good for discovering nearby devices and doing the ranging session setup for UWB devices.

Instead of comparing them, it's better to think of them as complimentary technologies. BLE helps to build an efficient and sustainable ranging application together with UWB.

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23 What is UWB good for?

UWB is useful for real-time location systems, and its precision capabilities and low power make it well-suited for radio-frequency-sensitive environments, such as hospitals. UWB is also useful for peer-to-peer fine ranging, which allows many applications based on relative distance between two entities.

24 Will 5G kill everything? Sigfox, ZigBee, LoRa

Short answer, not likely. 5G offers higher data speeds at shorter coverages. IoT protocols like Cat-M and NB-IoT will still be needed to meet some IoT requirements like long range and lower data rates. LoRa will likely still be in existence for customers who want long range without having to pay as it's unlicensed. So, point is no. There are too many requirements out there and 5G is not a "one size fits all" solution that will kill everything.