Brief antenna description

Fractus® Compact Reach Xtend™ chip antenna is engineered specifically for devices operating at 2.4 GHz and using both Bluetooth® and WLAN 802.11 b/g systems. Compact Reach Xtend combines small form factor size and high performance to improve the functionality of your wireless devices.

Frequently asked questions

Question 1. Compact Reach Xtend offers the same technical features than Reach Xtend antenna but in a smaller form factor. What are the main differences between both antennas? How do I know which antenna to consider for a specific application?

Answer 1. Both Reach Xtend and Compact Reach Xtend antennas provide an excellent performance for applications using the 2.4 GHz band (Bluetooth, WLAN 802.11 b/g, Zigbee, ISM 2.4 GHz). Compact Reach Xtend was designed to answer smaller form factor requirements for applications such as wireless headsets and mobile phones. Its natural resonant frequency is shifted to higher frequencies to compensate the effect of plastics and human head.

As a general rule:

- Use Reach Xtend antenna if there is enough clearance zone for the antenna and there is not a specific need to highly compensate frequency mismatches due to plastics and human body.

- Use Compact Reach Xtend in case you require additional design flexibility to compensate the effect of the human body and other surrounding elements that generate large frequency mismatches.

Refer to the User Manual and Application notes of both antennas for additional information about which antenna fits better into your application.

Question 2. Does the antenna need a clearance? Does the clearance affect the antenna performance?

Answer 2. Yes. Compact Reach Xtend antenna is a fractal monopole antenna and requires a certain area free of ground plane, under and nearby the antenna, to work properly. The size and shape of the ground plane will have a big influence in the antenna performance. This is one of the most important design parameters to take into account during the integration of the antenna in the device.
Compared to Reach Xtend antenna, Compact Reach Xtend offers an additional design feature. It includes a feeding line that must be placed over the clearance zone and acts as part of the antenna.

Please, refer to the User Manual and Application notes to obtain additional information on several recommended antenna clearances.

**Question 3.** The PCB footprint described in the Compact Reach Xtend User Manual consists of the both soldering pads (feed pad + soldering pad) and a feeding line. Can the dimensions of this feeding line be modified if I do not have enough space on the clearance zone? Can I place part of this feeding line over the PCB ground plane?

**Answer 3.** The feeding line plays an important role in the antenna performance. The line must be placed over the clearance only and its dimensions should be, in general, maintained as depicted in the User Manual. The feeding line can be considered in some cases as a design parameter, to modify the resonant frequency of the antenna and compensate the effect of plastics, human head, etc. This tuning process requires a deep knowledge on antenna design. As an alternative to the modification of the dimensions of the feeding line, a matching network can be considered improve the return loss of the antenna.

**Question 4.** Do the plastics and covers of the devices affect the antenna performance? How?

**Answer 4.** Yes. The proximity of plastics and other materials to the antenna shifts down the resonant frequency and, therefore, affects its performance. Compact Reach Xtend offers several design parameters that can help to obtain the optimal results. From lower to higher technical complexity, the customer should consider the following actions to compensate the mismatch effect of the plastics and other surrounding components:

1. Use one of the recommended clearance zones included in the User Manual and Application Notes.
2. Use a matching network to improve the return loss performance.
3. Design a customised clearance.
4. Modify the feeding line over the clearance zone.

Please, note that (4) and (5) require a deep RF knowledge. Fractus will be pleased to support customers with issues related to the integration of the antenna in their devices.

**Question 5.** I am designing a headset. Do I have to take any specific design consideration?

**Answer 5.** Compact Reach Xtend antenna has been specially designed for small devices such as wireless headsets. The headset environment is one of the tougher due to the many aspects that affect the antenna performance and that must be considered to obtain the optimal antenna performance:

- Very small PCB sizes,
- Effect of metallic components (battery for instance) placed close by the antenna
- Effect of the human head

Fractus has issued specific Application Notes for this type of devices and will be pleased to offer technical support to our clients to overcome all issues related to the integration of the antennas in wireless headsets.