BGT60LTR11AiP radome design cookbook

About this document

Scope and purpose
A radome is a radar sensor enclosure or cover that reduces the signal strength of the detected radar targets. The objective of this cookbook is to show how to minimize loss through the radome to ensure good performance of the radar system. It will show how to simplify the radome design process for the BGT60LTR11AiP sensor. For further information, read Infineon’s white paper on radome design (1).

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1 Material considerations

- **Use:** Plastics such as Teflon, Plexiglas, polycarbonate or ABS.

- **Avoid:** Metals – especially solid metals, but even thin foils like aluminum foil will hinder radar operation. Some paint colors contain tiny metal particles, which greatly reduce radar signal strength.

- **Avoid:** Dielectrics that are not listed above. For example, some dielectrics are lossy and absorb radar radiation. A list of materials and their losses at a frequency of 60 GHz can be found in Table 2 of the white paper (1). For example, even a thin layer of water on the surface will drastically attenuate radar signals. Other examples of materials to avoid are dielectrics with high electrical permittivity (e.g. ceramic zirconia), which reflect most of the radar radiation instead of letting it pass through.
2 Mechanical considerations

- The distance between the BGT60LTR11AiP and the radome should be $\lambda/2$ (≈ 2.5 mm for 60 GHz radar) or multiples of that; see Figure 1a – for lower distances, refer to the white paper (1).

- Field of view (FoV): Try to simplify the requirements. For example in Figure 1b, a simple tilting of the sensor toward the floor shapes the FoV so that a ceiling fan is no longer detected. For more details on how to shape the FoV, for example with lenses, refer to the white paper (1).

- Vibrations: Mount the whole radar system rigidly so there are no vibrations. Avoid vibrations between the radome and the radar antennas at all costs!

![Figure 1](https://example.com/figure1.png)

**Figure 1** Spacing between BGT60LTR11AiP and cover (a), and tilting a sensor to avoid detection of unwanted targets (b)
3 Electrical considerations

- For the antennas in the BGT60LTR11AiP to function as designed, the sensor needs a strong connection to a grounded copper plane. The PCB with the grounded copper plane should extend at least $\lambda$ ($\lambda \approx 5$ mm for 60 GHz radar) in all directions around the BGT60LTR11AiP. Place as few components as possible in this area, e.g. the buffer capacitors for the supply of the radar sensor. These components should have heights that are smaller than the package height of the BGT60LTR11AiP ($\approx 0.6$ mm), as shown in Figure 2a and b.

- In general, try to place all tall components on the back side of the PCB so they cannot interfere with the radar radiation (Figure 2b).

- With a metallic casing, the cover must be replaced with plastic at the position of the sensor. The distance to the plastic must be 2.5 mm and the plastic must extend at least $\lambda$ ($\lambda \approx 5$ mm for 60 GHz radar) around the sensor in all directions, as shown in Figure 2c and d.

![Figure 2](image-url)
4 References

## Revision history

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<tr>
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