

IoT Antenna Questions Answered

1. *What is the proper grounding plane for different types of antennas?*

Ground planes are required to properly impedance match quarter-wave or collinear antennas launched directly from a conductive surface. The first element relies on image theory, described as a virtual antenna of equivalent length and spacing below the ground plane performing cooperatively with the physical antenna to provide impedance matching for far field radiation. Half-wave or 5/8-wave radiators can be stacked vertically to achieve higher gain. The proper ground plane dimensions are defined by a ground plane which is much larger (in both directions) than the antenna length.

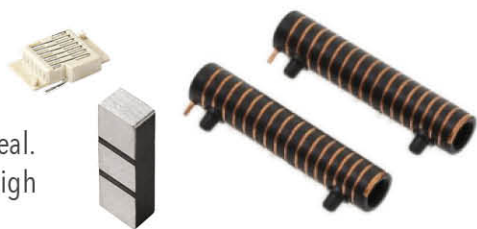


2. *Is antenna length important to reception?*

Yes, antenna length is critical to maximize performance and provide the proper radiation characteristics. The length of an antenna has an important influence on characteristics such as directivity and bandwidth.

3. *Why is gain important?*

Gain is an important measure because certain gain figures are better suited to particular usage environments. For strictly urban use, a unity gain antenna is ideal. Because a unity gain antenna sends the maximum signal above the horizon at a high angle, it is excellent for areas where there are tall buildings and for mountains as well. For people who live in suburban or rural areas, 3 dBd gain is recommended. The 3 dBd gain antenna concentrates the maximum amount of signal at the horizon while maintaining a good high-angle signal. If you are a cellular user, there is no need to buy an antenna stronger than 3 dBd gain as the USA cellular infrastructure is designed for optimum performance using 3 dBd gain antennas. If you are using a Land Mobile Radio (LMR) system and are in a rural area, a 5dBd gain antenna is suggested as this will help to provide the maximum amount of signal at the horizon with very little high-angle signal. Finally, the gain is a practical value which describes the capability of an antenna to concentrate energy in a particular direction of space.



4. *How much loss results from each connector installed on the cable?*

Connector loss is negligible with respect to the overall cable loss. Some manufacturers suggest adding 0.1 dB for every 2 connectors within a cable system for planning purposes.

5. *What are the elements in the environment around the antenna that can adversely affect performance?*

Metallic components, other antennas, wires, Flexible FPC, audio components (speaker, microphone, earpiece), high speed digital traces, shield boxes, specific ground layouts, material loading close to antenna, potting material, power components nearby, 50 Ohms line to antenna. Human body interaction (hand, head, body-worn) and water ingress for IP65/IP67 rating must be considered.

