



Design of UWB antenna with 5G frequency band-notched using split ring-shaped slit

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Ultra-wideband (UWB) technology for wireless communications has been received attention for many years. UWB antennas require characteristics that maintain good impedance matching and radiation patterns over a wide frequency range. The UWB frequency range includes the already existing narrow band, which can cause interference to the UWB system. To minimize this interference, we propose a notch band antenna that removes the 5G (3.4 GHz - 3.7 GHz) band using a split ring-shaped slit.

The antenna printed on the FR4 board consists of the gap-loading antenna and the ground plane. The end of the bowtie-like sector is connected to a coaxial probe extending from the internal conductor of the 50-Ω SMA connector and the external component is connected directly to the ground plane. The antenna has a size of $75 \times 10 \times 1.2 \text{ mm}^3$. In the conventional UWB spectrum, a separate ring-shaped slit was etched to minimize interference in the 5G band.

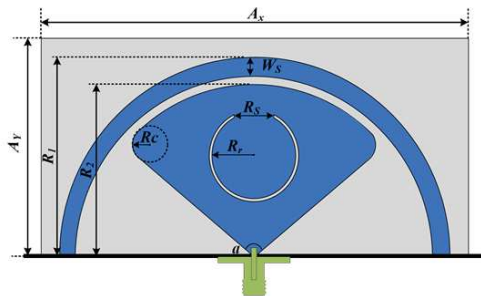


Figure 1. Proposed antenna geometry.

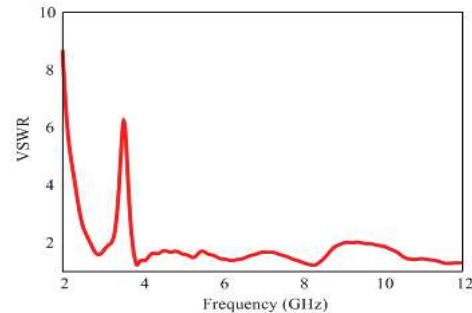


Figure 2. Simulated VSWR of proposed antenna.

Simulation result shows antenna bandwidth for $VSWR < 2$ of 2.62GHz -14.66GHz (138.8%), which is the total bandwidth excluding the notched-band (3.24GHz - 3.74GHz). Also, simulated radiation pattern shows that the radiation pattern of E-plane at 3 GHz, 7 GHz and 10 GHz is stable and almost omnidirectional. In the H-plane, the radiation pattern appeared bi-directional with a dumbbell-like pattern such as monopole.

The design and characteristics of UWB antenna with notch characteristics are presented. UWB Gap-loading folding an additional ring-shaped slit is added to the center of the antenna to minimize the interference of 5G (3.5GHz) signals. The simulation results confirm that the antenna covers the full bandwidth (3.1 GHz - 10.6 GHz) of the UWB band with two notch bands. Further, the antenna has stable gain and radiation efficiency.

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