

Compact SRR Loaded UWB Circular Monopole Antenna with Reconfigurable Characteristics

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A compact split ring resonator (SRR) loaded, coplanar waveguide (CPW) fed ultrawideband (UWB) circular monopole antenna having reconfigurable characteristics is presented in this paper. The SRRs are placed symmetrically on the back side of the CPW fed planar monopole antenna as shown in Fig. 1. The propagating signal excites the magnetic resonance of the SRR which prohibits transmission around the frequency determined by the SRR's geometry and the constitutive parameters of the substrate and thereby yields in weak radiation around that frequency. However, placing a shunt wire along lateral direction (x axis) in the x - y plane along the CPW line thereby effectively shorting the CPW yields interesting characteristic. When the shorting wires are placed parallel to the plane and located along the center of the SRR separated by the dielectric thickness, h , the structure exhibits complimentary characteristics. This simple but insightful idea is used to reconfigure the planar UWB monopole antenna into a narrow band antenna radiating at the resonance frequency of the SRR.

This design can be employed on any CPW fed UWB antenna and does not require change in the shape of the radiator or the ground plane nor does it conflict with any other geometrical parameters of the antenna. Prototype of the proposed UWB circular monopole antenna with radius $R = 12.5\text{mm}$ was fabricated on a dielectric substrate having dielectric constant, $\epsilon_r = 2.33$ and thickness $h = 1.575\text{mm}$ and operating from 2.6 GHz to 10.8 GHz. Figure 2 compares the measured S_{11} of the CPW fed SRR loaded UWB circular monopole with and without shunt wires showing dual characteristic of the antenna around SRRs magnetic resonance at 6.34 GHz. The radiation patterns exhibit good directivity in the x - y plane and omni directionality in the x - z plane.

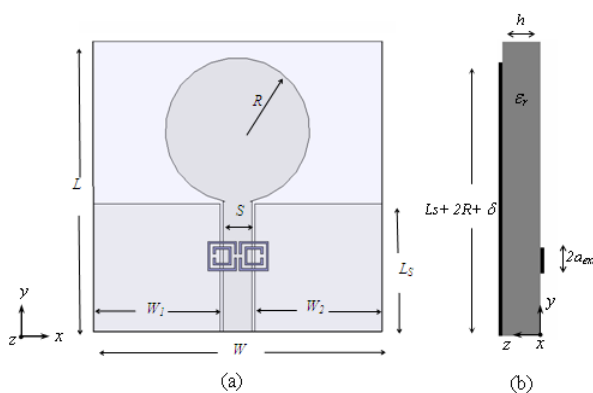


Fig. 1. Schematic of a CPW fed Printed Circular Monopole loaded with Square SRR (a) Top view with SRR loaded in the back side (b) Side View showing the printed SRR separated by h from the CPW fed Printed Circular Monopole

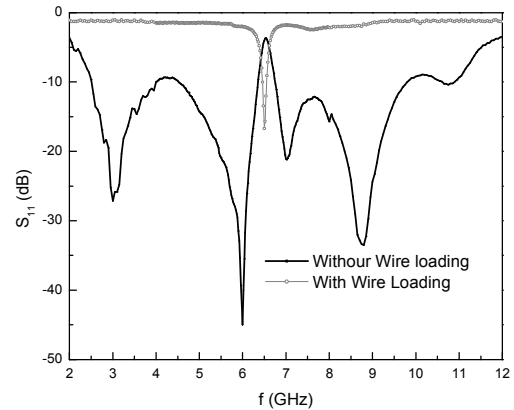


Fig. 2. Return loss characteristics of the fabricated CPW fed SRR Loaded UWB Circular monopole antenna with and without thin wire loading.