

Frequency-Reconfigurable Monopole Antennas

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Abstract

A novel coplanar-waveguide (CPW) bandpass filter using short-circuit slotlines and varactor diodes is introduced. This bandpass filter, when integrated with a CPW wideband antenna, produces frequency agility with a wideband mode and a continuous narrowband mode. The design of another CPW filter based on a square-ring resonator with switches is also shown and applied to a wideband antenna, making it reconfigurable. Both filters are based on controlling two stop bands far enough apart so that there is a passband between them. When the stop band frequencies are altered using switches or varactors, the passband is altered. Complete working and design principles along with simulated S-parameter results of the filters are presented. The simulated and measured reflection coefficients of the antennas incorporating the filters are also shown. Good monopole-like radiation characteristics are observed for both antennas. The filters are small in size and can be incorporated in any CPW antenna design to make it reconfigurable. The benefits of the novel varactor filter antenna over the switch filter antenna are also described.

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