

A miniature fractal-based dual-mode dual-band microstrip bandpass filter design

Abstract

In this paper, a fractal-based complementary split-ring resonator (CSRR) has been introduced as a defected ground structure (DGS) in the ground plane of a dual-mode microstrip bandpass filter to produce a new compact filter with dual-band response. The conventional double square ring resonator structure is modified such that its inner ring is made with a fractal shape instead of a square. Measured and simulation results show that the resulting filter offers a dual passband response; the higher passband is attributed to the dual-mode microstrip ring structure, whereas the lower passband is as a result of the embedded CSRR DGS structure. In addition, the results show that the position of the lower passband could be varied, to a certain extent, without affecting the position of the higher passband by applying higher fractal iteration levels to the inner split ring. These features, together with the compact size the proposed filter offers, make it suitable for use in a wide variety of dual-band communication applications. Measured results, carried out on filter prototypes, have been found in agreement with those theoretically predicted.