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Ultra-Wideband Pentagonal Fractal Antenna with Stable Radiation Characteristics for Microwave Imaging Applications

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Abstract

For microwave imaging applications, a design for an ultra-wideband (UWB) fractal antenna is presented. The antenna design is composed of a pentagonal fractal patch radiator fed by a modified co-planar waveguide (CPW) ground plane. It is built on a low-loss Rogers RT/Duroid 5880 dielectric substrate with a dimensions of 24 × 30 × 0.787 mm3. According to the measurements, the designed antenna offers a fractional bandwidth of 123.56% ranging from 3 GHz to 12.7 GHz. In addition, a maximum gain of 3.6 dBi is achieved at 8.5 GHz. From the results, it is also observed that the proposed antenna structure attains constant radiation characteristics in the operating bandwidth, which is useful for microwave imaging applications. The time domain analysis of the proposed design is also performed, and it is observed that the designed antenna offers a group delay of ≤ 1.5 ns, which ensures minimum pulse distortion. © 2022 by the authors. Licensee MDPI, Basel, Switzerland.

Author Keywords

co-planar waveguide; fractal antenna; fractional bandwidth; group delay; microwave imaging; ultra-wideband

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