

Directional Wideband Wearable Antenna with Circular Parasitic Element for Microwave Imaging Applications

ABSTRACT

This work proposes a wideband and unidirectional antenna consisting of dual layer of coplanar waveguide based on the circular parasitic element technique. The design procedure is implemented in three stages: Design A, which operates at 3.94 GHz with a bandwidth of 3.83 GHz and a fractional bandwidth (FBW) of 97.2%; Design B, which operates at 3.98 GHz with a bandwidth of 0.66 GHz (FBW of 56.53%); and Design C as the final antenna. The final Design C is designed to resonate at several frequencies between 2.89 and 7.0 GHz for microwave imaging applications with a bandwidth of 4.11 GHz (79.8%) centered at 5.15 GHz. This antenna is fabricated fully using two textile materials: felt as the substrate and Shield It as the conductor. It features a unidirectional radiation with a gain of 5.5 dBi and reduced low back radiation from 2.06 to -7.81 dB. The front-to-back ratio (FBR) for Design A, Design B and Design C are 4.82, 2.94 and 11.36 dB, respectively. This antenna is wideband with unidirectional radiation, lightweight, and flexible.