IMPLEMENTATION AND JUSTIFICATION OF A TRIPLE FREQUENCY-NOTCHED UWB PROXIMITY-FED ANTENNA WITH SHUNT STUBS

Mohamed Mamdouh M. Ali, Ayman Ayd R. Saad, and Elsayed Esam M. Khaled

Abstract:

In this article, an ultrawideband (UWB) antenna with triple band-rejection characteristics is proposed. The antenna is compact with size of 22.5 3 24 mm2. Matching between a sector-disk shaped radiating patch and the 50-X microstrip line is manipulated through a proximity-feed technique. An elliptically-shaped aperture is etched in the ground plane to enhance the antenna bandwidth. Double shunt stubs are used to get more enhancement of the impedance bandwidth of the antenna. The band notches at WiMAX of 3.3–3.9 GHz, lower WLAN of 5.15–5.35 GHz, and upper WLAN of 5.725–5.825 GHz are realized by embedding three elements; a reversed F-shaped slot etched off in the patch, a reversed U-shaped slot etched off in the feed line, and adding a parasitic flipped C-shaped strip around the patch, respectively. The antenna is fabricated and the experimental data show that the designed antenna has an impedance bandwidth of 3.2–11.6 GHz for VSWR less than 2, except at three frequency stop-bands of 3.20–4.19, 5.02–5.32, and 5.51–6.10 GHz. Curve fitting formulations to describe the influences of the embedded structures on the corresponding notched frequencies are obtained by using a second-order polynomial. Moreover, physical lumped elements of an electrical equivalent circuit model of the proposed antenna are obtained using a rational function approximation based on the vector fitting technique. The antenna provides almost omnidirectional patterns, relatively flat gain, and high radiation efficiency over the entire UWB frequency excluding the rejected bands. VC 2014 Wiley Periodicals, Inc. Microwave Opt Technol Lett 56:646–654, 2014; View this article online at wileyonlinelibrary.com. DOI: 10.1002/mop.28149

Keywords:

ultrawideband; proximity-fed; triple band-notched; aperture antenna; rational function; equivalent circuit modeling

Published In:

MICROWAVE AND OPTICAL TECHNOLOGY LETTERS , Vol.56, No.3 , PP.646-654