

A New Small Antenna for Ultra Wideband Application Using Stacked Multiresonator Patches

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Abstract: As wireless communication applications require more and more bandwidth, the demand for wideband antennas increases as well. For instance, the ultra wideband radio (UWB) utilizes the frequency band of 3.1-10.6 GHz. This paper presents some of the work carried out within ULTRAWAVES in the area of antenna design and analysis. Two antennas have been designed, optimized and simulated using Stacked Multiresonator patches. In addition results and conclusions are presented.

Keywords: Antenna, Ultra wideband, Multiresonator, Parasitic patches

1 Introduction

Ultra Wideband Radio (UWB) is a potentially revolutionary approach to wireless communication in that it transmits and receives pulse based waveforms compressed in time rather than sinusoidal waveforms compressed in frequency. This is contrary to the traditional convention of transmitting over a very narrow bandwidth of frequency, typical of standard narrowband systems such as 802.11a, b, and Bluetooth. This enables transmission over a wide swath of frequencies such that a very low power spectral density can be successfully received. The recent allocation of the 3.1-10.6 GHz frequency spectrum by the Federal Communications Commission (FCC) for Ultra Wideband (UWB) radio applications has presented a myriad of exciting opportunities and challenges for antenna designers. Pulsed UWB, by definition, refers to any radio or wireless device that uses narrow pulses (on the order of a few nanoseconds or less) for sensing and communication. This requires sufficient impedance matching, proper return loss and $VSWR < 2$ throughout the entire bandwidth. In this paper, two thin, low profile, small stacked multiresonator microstrip antennas will be presented for UWB application. The bandwidth of a microstrip antenna increases with an increase in substrate thickness and decreases in the dielectric constant also, the bandwidth of the antenna increases when multiresonators are coupled in planar or stacked configurations. In this paper we use a single patch placed in the bottom layer, and multiresonators taken on the top layer. The bottom patch is excited by a coaxial-fed.

