

Parametric Analysis of a Low profile UWB Trapezoidal Antenna for Ultra Wireless Communication System

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Abstract- This paper presents the analysis of CPW-fed trapezoidal monopole antenna with return loss lower than -10dB and VSWR lower than 2. The proposed antenna operates from 2.2GHz to 11.5GHz and is suitable for ultra wideband applications. This antenna consists of a ground plane, a feed line and a trapezoidal radiating structure. The trapezoidal shaped patch is chosen because of its simple structure, which reduces the complexity of its geometrical optimization process. Initially the proposed antenna is designed with a single trapezoidal shaped patch and later additional structures were loaded at the bottom of the patch. With a total size 38mm x 51mm x 1.6 mm and designed on a substrate with dielectric constant 4.4, the antenna satisfies the licensed frequency band of S band (2- 4) GHz, C band (4-8) GHz and X band (8-12) GHz application.

Index Terms—CPW-fed trapezoidal monopole antenna, ultra wideband applications, geometrical alteration.

I. INTRODUCTION

UWB technology has been around for so many years and in the past 20 years, UWB was used for radar, sensing, military communications and niche applications. UWB systems offered a lot of advantages to consumer such as low complexity, low cost, noise-like signal, resistant to severe multipath and jamming, very good time domain resolution allowing for location and tracking applications. All these advantages and variety of applications is strong evidence of the viability and flexibility of the technology[1]. The UWB systems are usually applied for WLAN and IEEE 802.11 protocols set the frequency ranges 2.4GHz, 3.6GHz, 4.9GHz, 5GHz and 5.9GHz bands for WLAN channels. While C band (4-8) GHz and X band (8-12) GHz are normally used for short range tracking, missile guidance, mapping, marine radar and airborne intercept [2, 3]. Antennas that display the characteristic like a high pass filter is becoming popular in a UWB system as these kinds of antennas could differentiate different kind of pulse signals[1]. However, designing a UWB antenna is challenging process as these antennas requires proper impedance matching, accurate type of feed and excitation, compact in size, and typically these antenna are limited to short range transmission.

CPW- fed antennas are frequently used in UWB system based on their advantages in salient features. There are many previous work investigated CPW-fed antenna in different kinds of shapes like octagon, circular, linear, semi-circle, and flower shaped [3-7]. In this paper, a reconfigurable CPW-fed antenna is proposed. The reconfiguration of the antenna will be achieved electronically by using PIN diode as its RF switches. All the experiment in this paper is to investigate the effects of geometrical altering to the operating frequency of the proposed antenna. Simulation of the antenna is carried. At this stage the model has been simulated using the time domain solver, Computer Simulation Technology (CST) Microwave Studio and discussed here. In the end, the antenna will be fabricated and measured experimentally.

II. ANTENNA STRUCTURE AND DESIGN

The geometrical configuration of the proposed antenna is shown in Fig. 1. The parameters of the antenna are as follows in Table I.

