Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 86 (2016) 59 – 62

Procedia Computer Science

2016 International Electrical Engineering Congress, iEECON2016, 2-4 March 2016, Chiang Mai, Thailand

Wideband Rectangular Slot Antenna with 3.5 GHz Notched Band

Nipont Tangthong[a]* and Somsak Akatimagool[b]

[ab]*King Mongkut's University of Technology North Bangkok, Thailand*

Abstract

This paper presents the wideband rectangular slot antenna with 3.5 GHz notched band. The designed antenna consists of radiating rectangular slot, an exciting semicircle patch with the CPW-Fed and two L shaped slits on the top plane of slot antenna, so the notched band was obtained. The proposed antenna can support a wide band frequency range which covers the WLAN/WiMAX standard. The two L shaped splits were rejecting the undesired resonant frequency at 3.5 GHz. The measured results shown that the designed antenna provided the two impedance bandwidths; the first band is from 2.15 – 3.40 GHz, the second band is from 3.60-7.72 GHz, and the band notching from 3.41 – 3.59 GHz. The radiation patterns of designed antenna present omni-directional in xz plane and bi-directional in yz plane. Thus, the proposed antenna can be used efficiently for the WLAN/ WiMAX applications.

Peer-review under responsibility of the Organizing Committee of iEECON2016

Keywords: Wideband, Slot antenna, Notched band ;

1. Introduction

Presently, the wireless communication technology has been developed continuously. The wireless communication system will use the antenna as a medium for transmitting and receiving data to support several bands existing, such as the wireless local area network systems (WLANs) and worldwide interoperability for microwave access (WiMAX). There are many researches to develop the wide band antenna for the wireless communication systems with corresponding to changing wireless technologies rapidly.[1,2] The most widely used the slot antenna and design for dual band operation.[3,4] However, these antennas cannot reject undesired frequency band, therefore, researchers have developed the antenna to be able to use dual frequency bands that can also tune the undesirable frequency band. There are many method to make it, such as usage of different shape slots in the radiation patch[5] or in the ground plane.[6] However, these antennas are designed with double metallic side on substrate which has complicated structure and design.

In this paper, the design of a dual band printed slot antenna for WLAN/WiMAX applications and rejecting the undesired resonant frequency at 3.5 GHz are presented. Usage of two symmetrical L shaped spits, a semi-circle tuning stub, CPW-fed of slot antenna on a single side of FR4 substrate, the designed slot antenna can operate the dual band covering all frequency band of WLAN/WiMAX.

* Nipont Tangthong. Tel.: +66-854836851.
E-mail address: tnipont.t@gmail.com.

Peer-review under responsibility of the Organizing Committee of iEECON2016
doi:10.1016/j.procs.2016.05.015

2. Slot Antenna Design

In this paper, the wideband rectangular slot antenna with 3.5 GHz notched band is designed by IE3D program. The simulator performed the antenna parameters, such as returns loss, radiation pattern, and gain, etc. The slot antenna is printed on FR4 printed circuit board of 34 x 36 mm dimensions with the dielectric constant of 4.4 of thickness 1.6 mm and loss tangent of 0.019. Based on rectangular slot and CPW-fed of 50 ohms, the central feed line of 3 mm with gap distance of 0.5 mm and semi-circle exciting stub with radii of 8 mm are used. The first step, we design the rectangular slot antenna in two models, the first is a wideband slot antenna and the second is a double band slot antenna with 3.5 GHz notched band, the both antennas and the simulated results are shown in Fig. 1. Next, the notched band 3.5 GHz by splitting two symmetrical L shapes on the top plan of antenna was analyzed[7].

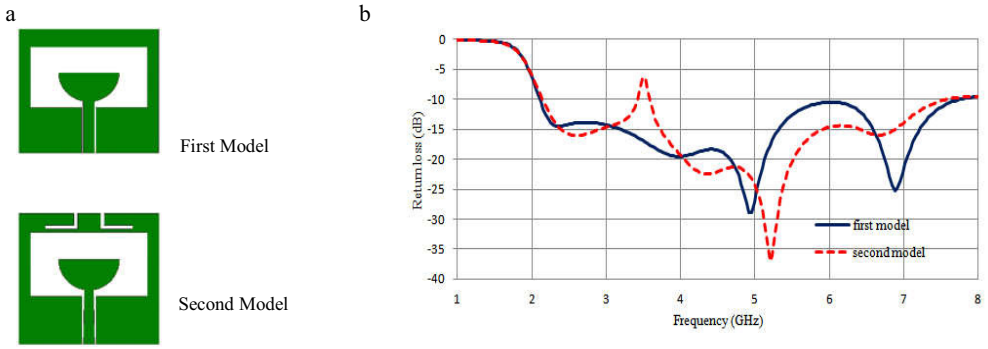

Fig. 1. (a) Geometry of the antennas; (b) Return-loss comparison of two correlative antennas

The designed double band slot antenna was presented by rejecting the frequency band notched from 3.40-3.60 GHz and the centre frequency of the band notched is 3.5 GHz. The impedance bandwidth is 2.14-3.39 GHz and 3.61-7.57 GHz which cover the WLAN/WiMAX applications.

2.1. Improvement of Symmetrical L Shapes of Antenna

Using two symmetrical L shapes on the top plan of antenna, the wideband frequency of proposed slot antenna was notched at the frequency from 3.40-3.60 GHz with the center frequency of 3.5 GHz. We found that some parameters of symmetrical L shapes have major effects to the notched band. Thus, the parameters including length *l1* and width *W1* were studied, as shown in Fig. 2.

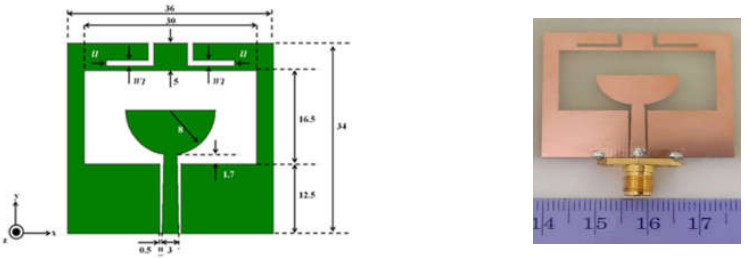

Fig. 2. Photograph of proposed slot antenna

Fig. 3(a) illustrates the simulated return loss results by varying length *l1*. The bandwidth of the notched band can be adjusted easily by increasing or decreasing the length *l1* of two symmetrical L shapes slit on the top plan of slot antenna with other parameters remaining constant, the center frequency of the notched band is decreased when the length *l1* increase and the center frequency of the notched band is increased when the length *l1* decrease. The optimal length *l1* of 13 mm provides the reject frequency band notched from 3.40-3.60 GHz and the center frequency of the band notched is 3.5 GHz.

Fig. 3(b) illustrates the simulated return loss results by varying width *W1*, with other parameters remaining constant. We found that the center frequency of the notched band is increased slightly, when the width *W1* decrease, and the center frequency of the notched band is decreased slightly when the width *W1* increase. The optimal width *W1* of 1 mm provides the reject frequency band notched from 3.40-3.60 GHz and the centre frequency of the band notched is 3.5 GHz.