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A Compact Microstrip Patch Antenna for Wireless Communication

Dr. B.Mazumdar[1] and Barun Mazumdar[2]

[1] NIT, Durgapur

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Abstract

A single feed compact rectangular microstrip antenna is presented in this paper. Two L slots are introduced at the edge of the patch to reduce the resonant frequency. The antenna size has been reduced by 71.14

Index terms— Compact, patch antenna, Quad band, slot

1 Introduction

n recent years compact antenna with multiband characteristics is topic of interest for research work for application in wireless Communication system. One of the techniques to design a compact microstrip antenna **??**MSA] is cutting slots or slits on the radiating patch to increase the length of the patch of the surface current. Some articles on the design of compact MSA were studied by the author [1][2][3][4].MSAs are used in a broad range of applications from communication systems to biomedical systems, primarily due to several attractive properties such as light weight, low profile, low production cost, conformability, reproducibility, reliability, and ease in fabrication and integration with solid statedevices. The work to be presented in this paper is also a compact microstrip antenna by cutting two L slits on the right side of the patch [5][6][7]. Our aim is to reduce the size of the antenna as well as increase the operating bandwidth. The proposed antenna (substrate with ?r=4.4) presents a size reduction of 71.14% when compared to a conventional square microstrip patch with a maximum bandwidth of 48.56 MHz. The simulation has been carried out by IE3D software which uses the MOM method [8]. Due to the Small size, low cost and low weight this antenna is a good candidate for the application of EMPS and WiMax technology.

2 II.

3 Antenna Structure

The geometry of the square patch is shown in Figure1 which is a 20 mm x 20 mm. The antenna is fabricated on a substrate of FR4 epoxy with dielectric constant (?r) =4.4 and substrate height (h) =1.6 mm. Co-axial probe feed of radius 0.5 mm.

4 Simulated Results

In this section, various parametric analysis of theproposed antenna are carried out and presented. Several slit parameters have been investigated toimprove bandwidth, gain and return loss performance of the antenna. Optimal parameter values of the two L slits are listed in Table **??**and 2.

Table **??**:Table 2 :

The simulated return loss of the conventional antenna (antenna 1) and the proposed antenna (antenna 2) are shown in Fig. **??**

5 Experimental Results

Comparisons between the measured return loss with the simulated ones are shown in Fig. 9 and 10. All the easurements are carried out using Vector Network Analyzer (VNA) Agilent N5 230A.The agreement between the

simulated and measured data is reasonably good. The discrepancy between the measured and simulated results is due to the effect of improper soldering of SMA connector or fabrication tolerance.

6 Conclusion

A single feed single layer two L slits microstrip antenna has been proposed in this paper. It is shown that the proposed antenna can operate in four frequency bands. The slits reduced the size of the antenna by 71.14 % for the resonant frequency 2.16GHz and increase the bandwidth up to 48.56 MHz with a return loss of -30.6 dB and 3 dB beamwidth of 166.82 deg. An optimization between size reduction with multiband operation is maintained in this work. [1]

1

Figure 1: Fig. 1 :

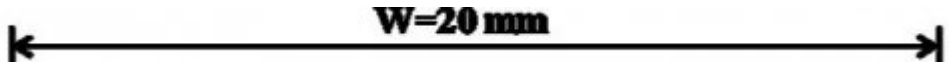

Figure 2:

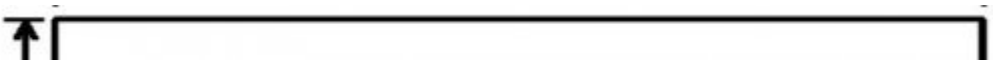

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Figure 3: Fig. 3 : 4 :Fig. 5 :Fig. 6 :Fig. 7 :Fig. 8 :

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Figure 4: Fig. 9 :

.1 Return loss in dB

.2 Frequency in GHz

Simulated Result Measured Result

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[Zeland Software Inc. IE3D: MOM-Based EM Simulator] `http://www.zeland.com` *Zeland Software Inc. IE3D: MOM-Based EM Simulator*,