Analysis of Microstrip Antenna at Different Feed-Points

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Abstract—aim of this paper to study and compare the results at different feed point with their bandwidth, return loss and VSWR and with other parameters for limited range applications. The bandwidth of the microstrip antenna usually ranges for several percent. This paper defines the different bandwidth for different feed point. the range from 1.94GHz to 2.40GHz; at this range perform various applications. so in this paper we are comparing these bandwidth for different feed points and finding the best results for various application where this paper having a rectangular shape with four digs to enhance the results.

Keywords—Feed points, Bandwidth, Return Loss, MSA, IE3D Software.

I. INTRODUCTION

Microstrip antennas have many unique and attractive Properties-low in profile, light in weight and conformable in structure, and easy to fabricate and to be integrated with solid-state devices. Recently, microstrip antennas can be seen for use in radio systems with differently signal operation as well. However, the narrow bandwidths limit their applications in modern wireless communication systems.

Generally a Conventional microstrip antenna has a radiating patch of any planar geometry (e.g. square, rectangular, Circular, Ellipse and ring). Microstrip patch antennas are increasing in popularity for use in wireless applications due to their low-profile structure. Therefore they are extremely compatible for embedded antennas in wireless devices such as cellular phones, pagers etc.

WLAN antenna requires being low profile, light weight and broad bandwidth. Although the required operating frequency is 2.8GHz, at least double the bandwidth is required to avoid expensive tuning operations and to cause uncritical manufacturing. Therefore, there is a need to enhance the bandwidth of the microstrip antenna for WLAN applications. [2]

This paper defines the bandwidth at which applications can perform over a range of the microstrip antenna without increasing the lateral size and the complexity of the microstrip antenna too much. This bandwidth of microstrip antenna can be deployed for the WLAN application operating at a frequency of 2.8 GHz.

The frequency bandwidth simulated using an software IE3D with VSWR< 2 of the antenna covers 1.93GHz to 2.38GHz over 3 GHz. [3]

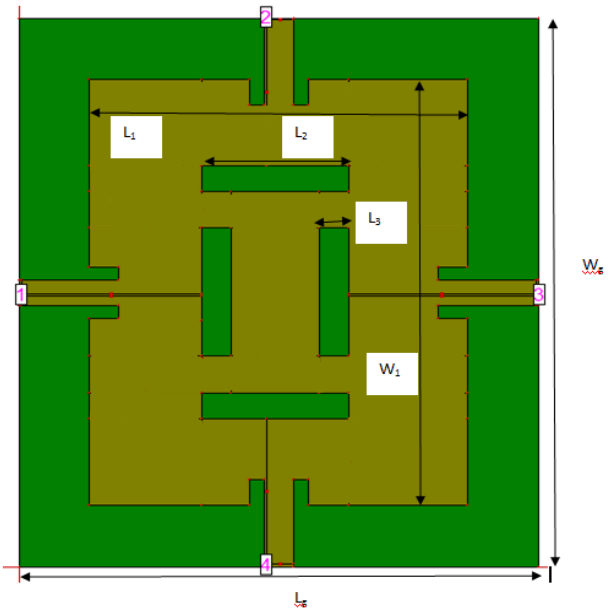


Fig. 1 The configuration of the proposed design of microstrip antenna.

II. ANTENNA DESIGN

Fig. 1 shows the configuration of the proposed design of microstrip antenna which consists of a rectangular patch with four holes in the mid of the rectangular patch and a truncated ground plane. The proposed antenna, which has compact dimension of 35.33 mm 42.82 mm, is constructed on FR4 substrate with thickness of 1.6 mm and relative dielectric constant of 4.2 at resonance frequency 2.8 GHz. The width of the microstrip feed line is fixed at 6.8 mm. by digging the four holes of suitable dimensions at the mid of rectangular patch, it is found that much enhanced impedance bandwidth can be achieved for the proposed antenna. The dimension of the truncated ground plane and

Feed gap distance is important parameters in determining the sensitivity of impedance matching. The optimal

dimensions of the designed microstrip patch antenna for different connectors are as follows: Lg= 35.33mm, Wg= 42.82mm, L_1 =25.73mm, L_2=10, L_3=2,

W_1 = 33.22. All dimensions are in mm. The four digged rectangular having length and width are 10 and 2 mm.

It is found that the designed antenna satisfies all the requirements in frequency band ranging 1 GHz to 3 GHz. In this paper we are comparing the results of designed microstrip patch at different feed points which having different applications.

III. RESULTS AND DISCUSSIONS

Various graphs result from the analysis of the patch by giving the feed point location x = 0.1 mm and y = 21.2 mm are shown in figures.

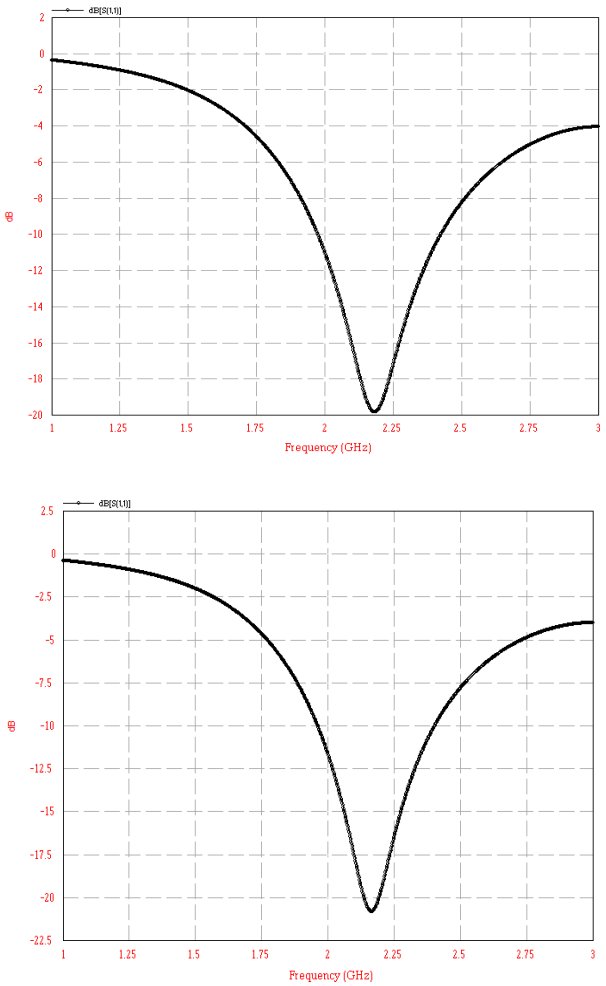


Fig 2 Return Loss Vs. Frequency Result at different Feed Point of microstrip patch at connector 1 and connector 3.

Fig 2 and Fig 3 shows the graph of return loss verses frequency at different port of microstrip patch antenna.

The Return Loss Bandwidth achieved is 20% (1.93-2.38 GHz) and 21% (1.94-2.40 GHz) with a Return loss -20.9dB and -19.9 dB for connector 1 and connector 3.

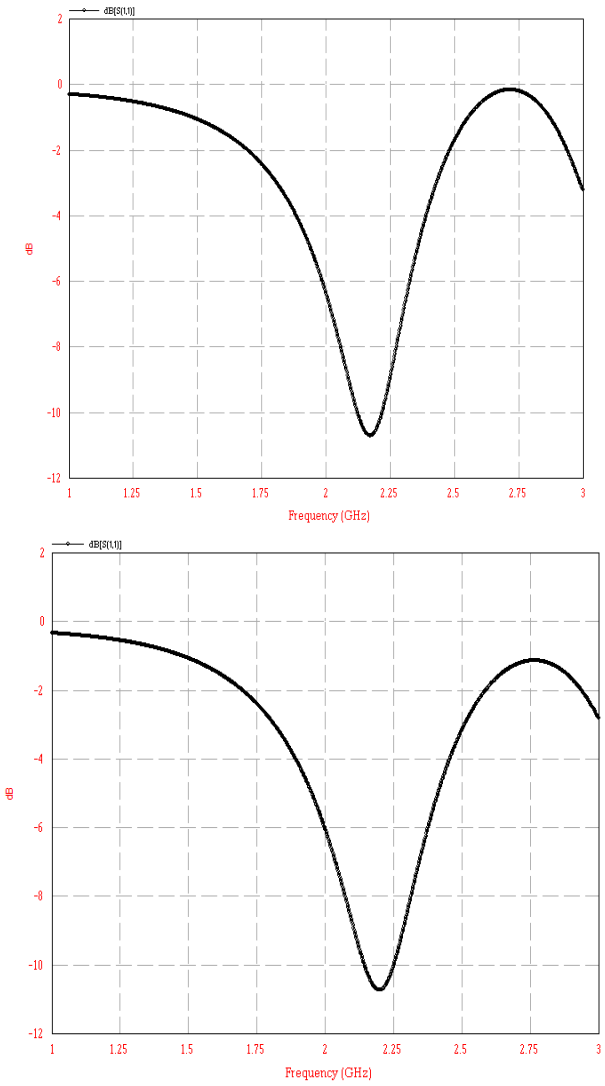
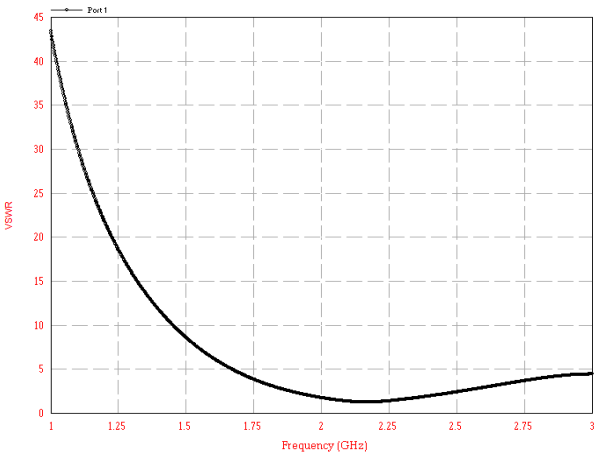
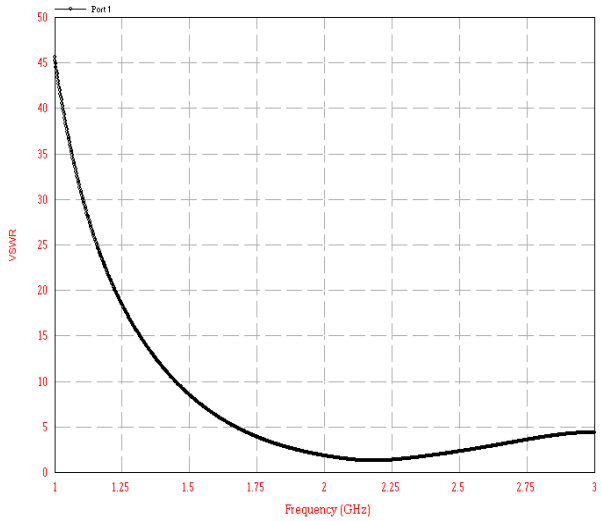


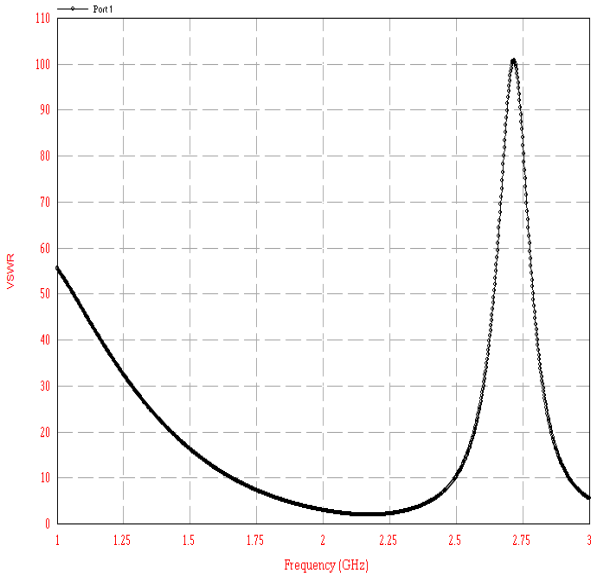
Fig 3 Return Loss vs. Frequency Result at different Feed Point of microstrip patch at connector 2 and connector 4.



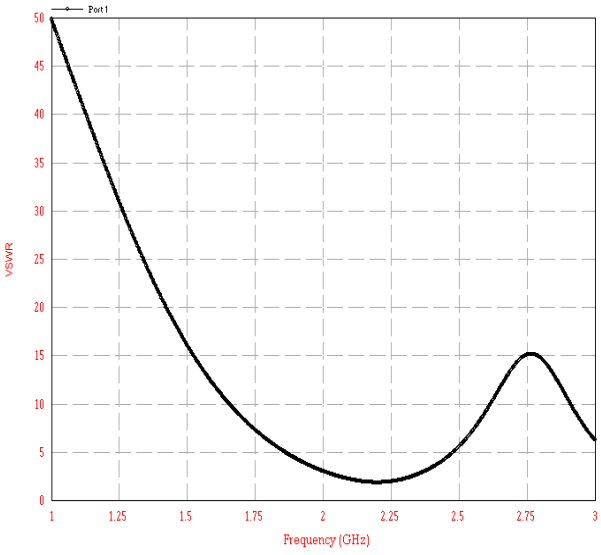
Connector 1



Connector 2



Connector 3



Connector 4

Fig. 4 VSWR vs. Frequency of proposed microstrip antenna.

Also the return loss and bandwidth for connector 2 and connector 4 are 3.26% (2.11-2.21 GHz) and 5% (2.21-2.23) at resonant frequency 2.8 GHz. The graph shows of VSWR. The value of VSWR should be less than 2 for desirable communication.

Fig 4 shows the graph of VSWR. The value of VSWR should be less than 2 for desirable communication.

IV. CONCLUSION

A compact microstrip patch antenna at different feed-point has been proposed and implemented for WLAN and DBS application. The proposed antenna has a simple configuration and is easy to fabricate. To obtain the required bandwidth for these applications, the sizes of holes of the patch have been optimized by parametric analysis. The designed antenna satisfies the -20.9 dB return loss requirement from 1.93 to 2.38 GHz and provides good radiation patterns. Experimental results show that the proposed antenna could be a good for hand held WLAN and DBS applications.

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