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"Circular shape, Dual band proximity feed UWB Antenna"

Mr. Amitesh Raikwar[1] , Mr. Abhishek Choubey[2]

Abstract:- This paper presents novel proximity feed, microstrip antenna with dual band operative frequency and having ultra wide bandwidth with center frequency at 3GHz. This Circular shaped microstrip antenna offers a dual band. This paper suggests an alternative approach in enhancing the band width of microstrip antenna for the wireless application operating at a frequency of 3 GHz. A bandwidth enhancement of more than 21% was achieved. The measured results have been compared with the simulated results using software IE3D version-14.0.

Index Terms :- Rectangular, Circular microstrip antenna, IE3D Software.

1. INTRODUCTION

With the definition and acceptance of the ultrawide-band (UWB) there has been considerable research effort put into UWB radio technology worldwide. However, the nondigital part of a UWB system, i.e., transmitting/receiving antennas, remains a particularly challenging topic.

[1]*M.tech student , Department of Electronics & Communication ,RKDF Institute of Science & Technology, Bhopal(M.P) India , amiteshraikwar@gmail.com* Mr. Amitesh Raikwar is a Master of Technology (M.Tech) student at RKDF Institute of Science & Technology , Bhopal (M.P) India . He is pursuing his M.Tech in Electronics & Communication branch with specialization in the field of "Microwave & Millimeter Wave Engineering". He can be contacted via phone at +91-9893093846 or +91-755-4259415 , by e-mail at amiteshraikwar@gmail.com & by web at http://www.rkdf.in/ or http://rkdf.net/ .

[2]*Head of Department ,Department of Electronics & Communication ,RKDF Institute of Science & Technology, Bhopal (M.P) India , abhishekchoubey84@gmail.com*. Mr. Abhishek Choubey is a Head of Department (HOD) at RKDF Institute of Science & Technology , Bhopal (M.P) India . He is HOD of Electronics & Communication Engineering. He can be contacted by e-mail at abhishekchoubey84@gmail.com & by web at http://www.rkdf.in/ or http://rkdf.net/

A suitable UWB antenna should be capable of operating over an ultra wide bandwidth which is defined by the 20% or above bandwidth of center frequency. At the same time, reasonable efficiency and satisfactory radiation properties over the entire frequency range are also necessary. Another primary requirement of the UWB antenna is a good time domain performance, i.e., a good impulse response with minimal distortion [2].

In this paper, a novel design of printed circular disc monopole fed by proximity feeding method line is proposed. The parameters which affect the operation of the antenna in terms of its frequency domain characteristics are analyzed numerically and simulated with IE3D in order to understand the operation of the antenna. It has been demonstrated that the optimal design of this type of antenna can achieve an ultra wide bandwidth with satisfactory radiation properties. Furthermore, the simulations have also shown that the proposed monopole antenna is dual band with UWB radiation band from 2.7 GHz to 3.4 GHz, which is a band of 700 MHz and 21 % of center frequency.

The paper is organized in the following sections. Section II describes the antenna design and return loss bandwidth obtained less than -10 dB for an optimal design. Section III analyzes the characteristics of the antenna. Section IV summarizes and concludes the study.

II. ANTENNA DESIGN

The geometry of the proposed antenna is shown in Fig. 1 & 2. The antenna parameters are also given in Fig. The antenna is mounted on a FR4 substrate having dielectric constant 4.4 and loss tangent of 0.02, fed by a proximity method. Simulations were performed using IE3D.

In the proposed design ground plan is of square shape with side length of **L = 30 mm** and having two semicircular geometries attached with this square of radius **RG1 = 12mm** and **RG2 = 10mm.** The sandwiched layer between radiating plane and ground plane is 50 Ω line with length **LF = 20 mm** and width **WF= 3 mm.** The radiating plan is consist of a circle of radius **R = 8 mm.**

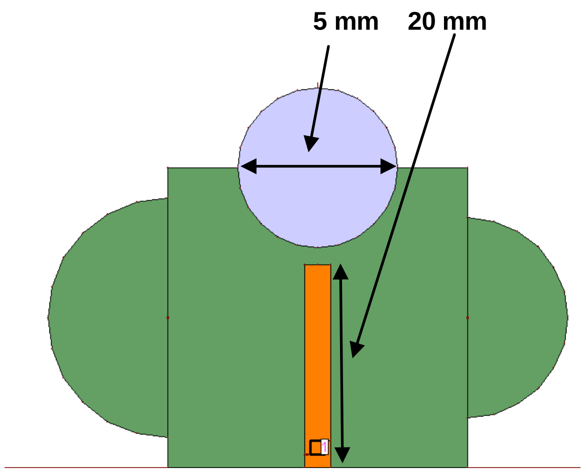

Fig – 1 Front View of Antenna

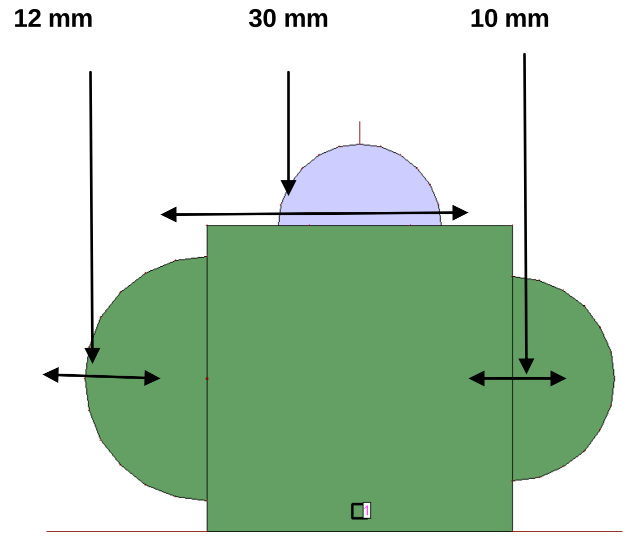

Fig – 2 Back View of Antenna

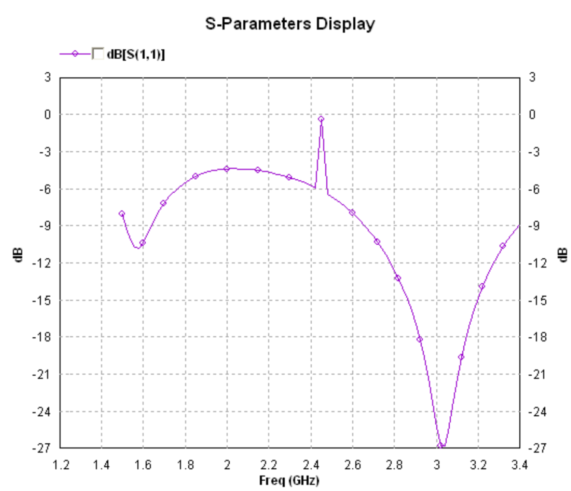

Fig – 3 S-Parameter

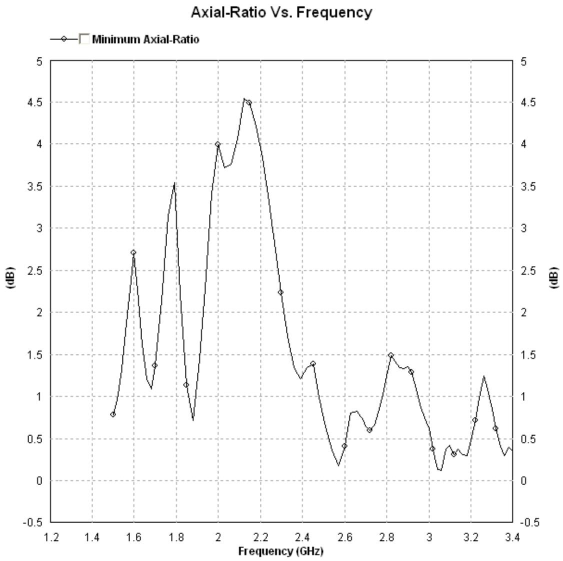

Fig – 4 Axial ratio

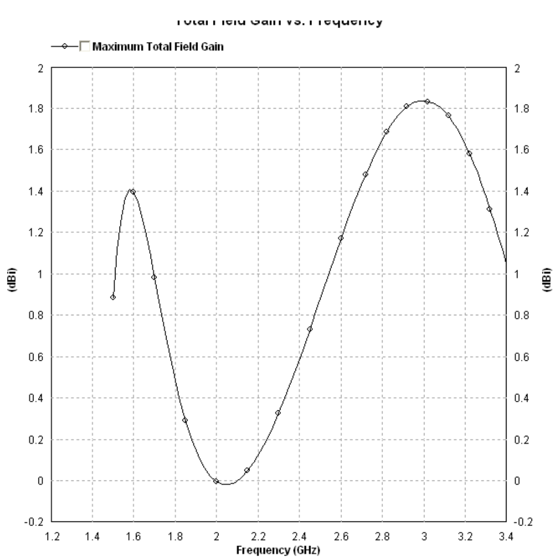

Fig – 5 Antenna Gain

III. Antenna Characteristics

Fig- 3 shows the return loss graph of microstrip antenna depicting the three resonant points . At the first resonant point on 1.53 GHz the bandwidth is about 4% and at the other resonant point at 3 GHz bandwidth is 21 % the combined bandwidth is approximately 25% which is sufficient for making the antenna suitable for UMTS WIMAX and WLAN applications. Figure 4.shows the Axial Ratio which is approx 1 for all frequencies having return loss less than -10 dB. and figure 5 shows the Gain Vs Frequency curve which shows gain of about 1.8.

IV. Conclusion

Using a new configuration of coupling slots, the design and measured results for an aperture-coupled dual linearly polarized circular microstrip patch antenna at L-band have been presented. The antenna exhibits measured 10 dB RL bandwidth of 4.0% and 21.0% for the two polarizations. A study of Gain and axial ratio with respect to frequency is also carried out.

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