A PROXIMITY FEED DUAL BAND CIRCULAR SHAPED ANTENNA WITH SEMICIRCULAR GROUND PLANE

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Abstract

In this work, we present a Circular Shaped proximity feed Microstrip Patch Antenna. The antenna is comprised of circular shaped radiation patch and this radiating patch is faded by proximity coupling. The ground plane of the antenna has Semicircular pattern to improve the coupling level of the patch. The simulated result shows it provides the return loss less than -10 dB for two frequencies 1.27 GHz and 1.43 GHz which could be a useful frequencies for wireless communication system. The simulation work is carried out on IE3D software, a product of Zeland Software Company.

Keywords: - broad-band, Circular microstrip antenna, slits..

Introduction

Microstrip patch antennas (MPA's) are widely preferred for wireless communication systems as they are of small size, light weight, low profile, low cost, and are easy to fabricate and assemble Microstrip patch antennas on a thin dielectric substrate inherently have the disadvantage of narrow impedance bandwidth. To overcome this disadvantage proximity feed technique is preferred by many researchers. The circular geometry drew the attention of MPA researchers as it is smaller than other patch geometries [1].

Microstrip antennas (MAs) are widely used in many wireless communication applications. The classification of the MAs is based upon the single-feed or dual-feed types. Single-feed wideband MAs are currently receiving much attention [2].

To overcome these problems that the coplanar geometry has the disadvantage of increasing the lateral size of the antenna configuration include narrow bandwidth, spurious feed radiation, poor polarization purity, limited power capacity and tolerance problems. It would therefore be of considerable interest. In order to satisfy increasingly stringent system requirement. This effort has involved the development of novel microstrip atenna configuration, and the development of accurate and versatile analytical models for understanding of the inherent limitation of microstrip antenna as well as for their design and optimization . The basic form of the microstrip antenna, consisting of a conducting patch printed on a grounded substrate, has an impedance bandwidth of 1-2%. One way of improving the bandwidth to 10-20% is to use parasitic patches, either in another layer or in the same layer.

However, the stacked geometry has the disadvantage of increasing the thickness of the antenna, while Microstrip antennas offer the advantages of thin profile, light weight, low cost, and conformability to a shaped surface and compatibility with integrated circuitry. In addition to military applications, they have become attractive candidates in a variety of commercial applications such as mobile satellite communications, the direct broadcast (DBS) system, global positioning system (GPS), remote sensing and hypothermia. This is due in large measure to the extensive research aimed at improving the impedance bandwidth of microstrip antennas in the last several years.

The patch radiator is fabricated from the copper sheet and mounted on a FR4 substrate.

Antenna Design

The prototype of the proposed antenna is given in Fig. 1. It has a ring of circular patch, sandwiched between two layer of FR4 substrate, Upper radiating patch is of 5 mm radius and ground plane is of semicircular shape with radius 10 mm. When the presented geometry is simulated with simulating software IE3d, dual resonance are observed at 1.27 GHz and 1.44 GHz

Simulation and Measured Result

Figure 2 show the antenna design and simulation results of this proximity fed antenna. In given simulation results it is shown that there are two frequencies on which return loss is less -10 dB is 1.27 GHz and 1.43 GHz. These frequencies can be useful for wireless application like GSM and CDMA mobile services, WLAN etc.

Conclusion

A geometry of circular shape with proximity feed and having semicircular ground plane can be utilize to fabricate a antenna having radiation on dual frequency. Computed axial ratio and antenna gain data for the proposed antenna have been plotted on the Graph in Fig. 3 . Dual band impedance characteristics is apparent from the tight knot in the impedance locus. Corresponding 3D radiation pattern are shown plotted in Figure 4.

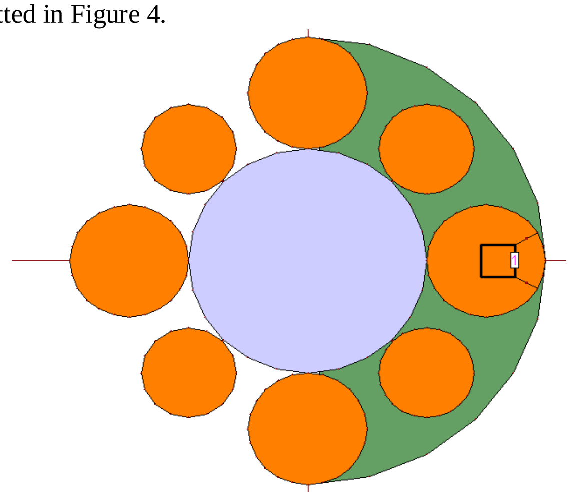

Figure 1: Antenna design

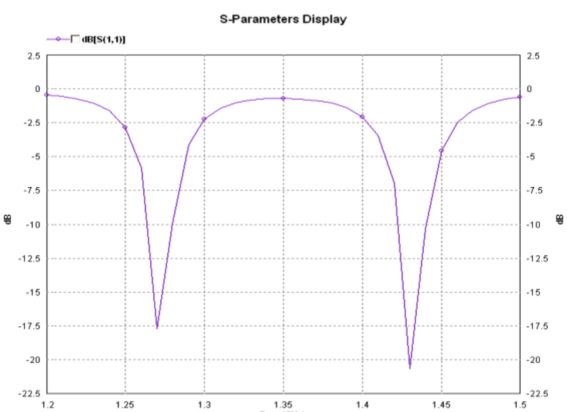

Figure 2: Return Loss

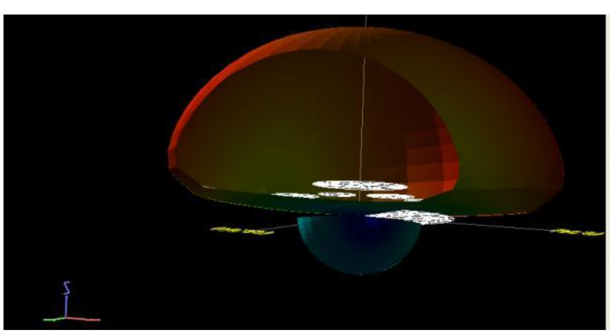

Figure 3: 3D Radiation Pattern

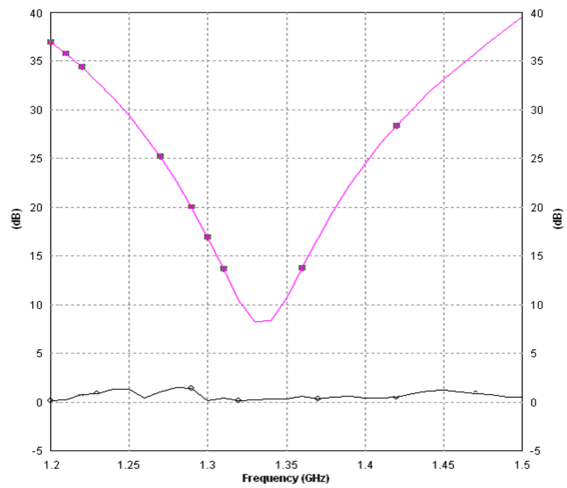

Figure 4: Antenna Gain

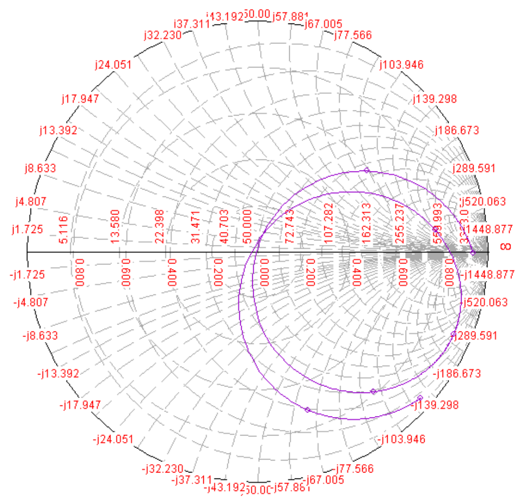

Figure 5 : Smith Chart

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