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INVESTIGATIONS OF A BOW TIE MICROSTRIP ANTENNA IN WIRE LESS APPLICATION

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Abstract

This paper presents a study on use of micro strip antenna and Planar Inverted- F Antenna in wireless communication. A triangular shaped micro strip antenna and Planar Inverted- F Antenna design is presented in this paper which can be use for wireless communication. The basic problem with micro strip antenna and Planar Inverted- F Antenna is its lower bandwidth, by making appropriate changes in antenna design this problem can be solved for some instant. In this paper technique of facilitation is used for enhancing the bandwidth of presented antenna.

Key-words: Microstrip, Antenna, Application

Introduction

In Present scenario use of wireless communication increasing day by day very rapidly. Wires are getting removed from everywhere, mobile communication and wi-fi are recent example of wireless communication. As wireless communication increasing, because availability of bandwidth of wireless communication is decreasing very rapidly. Planar Inverted- F Antenna use as an embedded antenna in some radiotelephone handsets especially in wireless communication. Among different type of antennas micro strip antenna has its different place, because it is easy to fabricate, light in weight, low profile, cheap in cost, ease to installation. Because of low power handling capability micro strip antenna can be used in low power transmitting and receiving application But a serious limitation associated with micro strip antenna is that it has narrow bandwidth. Many techniques had been developed to enhance the bandwidth of micro strip antennas. In this paper an attempt has been made to enhance the bandwidth of traditional micro strip antenna by using bow tie antenna of triangular shape and IE3D Software simulates all the design geometry.

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Antenna design

The proposed antenna offers wide bandwidth covering frequency bands that are close together using a single non-contacting feed ,in a small, low cost and easy to manufacture. The Inverted F Antenna (IFA) typically consists of a rectangular planar element located above a ground plane, a short circuiting plate or pin, and a feeding mechanism for the planar element. The Inverted F antenna is a variant of the monopole where the top section has been folded down so as to be parallel with the ground plane. This is done to reduce the height of the antenna, while maintaining a resonant trace length. This parallel section introduces capacitance to the input impedance of the antenna, which is compensated by implementing a short-circuit stub. The stub's end is connected to the ground plane through a via .The ground plane of the antenna plays a significant role in its operation. In recent years, rapid expansion of the wireless communication industry has created a need for multi frequency band operation portable devices to meet the ever increasing subscriber demand.

Dual-band antennas have been realized in the past, but the great concern about these antennas is that some are designed using dual feed, which introduces some difficulties in the feed design. Other dual-band designs cover frequencies that are far apart, such as AMPS and PCS operating bands. The proposed antenna offers wide bandwidth covering frequency bands that are close together using a single non-contacting feed, in a small, low cost, and easy to manufacture. These topics will be used to design the proposed antenna, the bowtie. The bowtie characteristics will be evaluated using IE3D simulations and the measured data. Performance inside a box and in the proximity of a human hand will also be investigated. These results will then be used later to improve the antenna to combat the coupling effects of the hand. for hand-held devices such as cellphones and palm pilot, coupling effects with human body play an important factor in detuning antennas embedded in such devices. The antenna impedance mismatch level is higher at the lower end of the frequency band.

Structure	Dimension along x-axis in mm	Dimension along y-axis in mm	Dimension along z-axis in mm
Rectangular patch for connecting feed	10	80	1.6
First Triangle	-108.9203	120	3.2
Second Triangle	126.243	140	3.2
Feed	0	27.5	1.6
Folded Stub	10	60	3.2
First fold	50	10	3.2
Second fold	10	40	3.2
Fractal	32	32	3.2

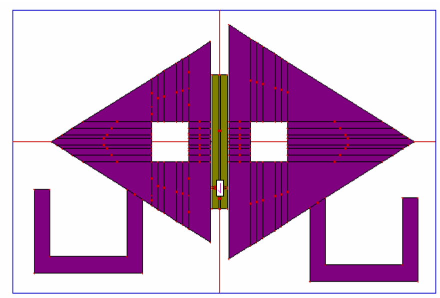
Bowtie microstrip antenna

The triangular geometry of the micro strip patch is one of the most common shapes having a wide range of applications ranging from circuit elements to modern wireless antennas. Recent survey of open literature shows interesting development of this patch as novel circuit elements and antennas. In this paper, a very comprehensive review of the applications and investigations on triangular microstrip patch In this paper designs of triangular shape antenna are presented. In antenna design two equilateral triangles of 120 mm, and 140 mm are placed on glassapoxi of dielectric constant = 4.4 as substrata , and proximity feed of 10 x 80 mm size is given on different plane. Height of each plane is 1.6 mm & dielectric constant is 4.4. Now here is a tri to increase the bandwidth by adding stubs . *Design*

When analyzing this design using IE3D, radiation bandwidth is find increased. VSWR become less than 2, from 1.82 GHz to 1.855 GHz. So the radiation bandwidth is now became 35 MHz and the center frequency is 1.8375 GHz . So it is concluded that by making fractal in triangular shaped geometry radiation bandwidth is increased, but still improvement is needed in this design.

By making such fractal the radiation bandwidth of microstrip antenna can be enhanced till 35 % of center frequency that is 65 MHz with center frequency 1.8225 GHz. VSWR become less than 2 from 1.79 GHz to 1.855 GHz. It is sufficient radiation bandwidth for calling this microstrip antenna as wideband antenna

From this Papers it is concluded that bandwidth of microstrip antenna can be widens by using proximity fed and making two equilateral triangles of different size.



In first design bandwidth was not sufficiently large so stubs of length 150 mm and width 10 mm are attached with triangular shape at the center on a side of triangle. Through this bandwidth of antenna is widened but size of antenna was not comfortable for practical use.

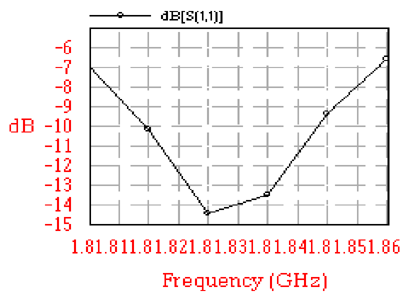
For solving the problem of second design stubs are folded in third design. But due to this bandwidth of antenna is get narrower.

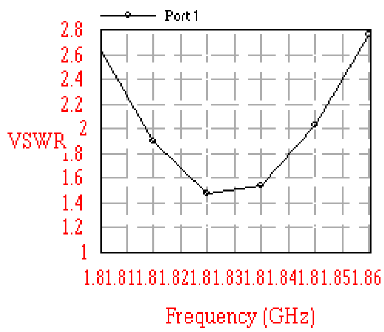
- A antenna with reduced size at center frequency of 1.82 GHz and bandwidth of 65 MHz from 1.79 GHz to 1.855 GHz.
- By analysis of this antenna concluded that by making fractals in triangular shaped bow tie antenna bandwidth of antenna can be enhanced greatly, radiation range of presented antenna is 35.12% of center frequency.

Still the need of improvement is in the final design in the size of antenna. The size of antenna is the biggest obstacle in the way it self. The radiation bandwidth can more improve by using different type substrate material and of different height.

Conclusion

A From this paper it is concluded that bandwidth of microstrip antenna can be widens by using proximity fed and making two equilateral triangles of different size. In design bandwidth was not sufficiently large so stubs of length 150 mm and width 10 mm are attached with triangular shape at the center on a side of triangle. Through this bandwidth of antenna is widened but size of antenna was not comfortable for practical use.





Future work and scope

Still the need of improvement is in the final design in the size of antenna. The size of antenna is the biggest obstacle in the way it self. The radiation bandwidth can more improve by using different type substrate material and of different height. These include a wideband compact antennas that can be operated from GPS band up to the unlicensed band at 2.4 GHz, a dual-band compact antenna for personal wireless communications, Bluetooth, and the 5-GHz unlicensed band, and a dual-band compact antenna for 2.45/5.25 GHz WLAN.

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