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DESIGN OF MICROSTRIP PATCH ANTENNA FOR HIGH FREQUENCY APPLICATIONS

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Abstract

This paper represents the design of microstrip patch antenna for ultra wideband application. Ultra wide band frequency finds a wide range of use in medical applications. Microwave medical application is one of the significant features in UWB application. Microstrip antennas are preferred to be used in medical applications because of their position of safety, conformal, light weight, and simple creation. The microstrip patch is the narrow bandwidth antenna in order to use it for wide band application certain methods has to be incorporated into the design. The design methods will create direct effect on the thunderous recurrence of the microstrip radio wire. The bandwidth modification methods used are reduction in ground plane, slotted ground plane and T and E patch. By using this method resonant frequency can be achieved up to 9GHZ. Return loss, VSWR and radiation pattern are the parameters to be analysed.

Keywords: *microstrip, antenna, VSWR*

I. Introduction

Microstrip fix receiving wire comprises an emanating fix on one side of a dielectric substrate which has a ground plane on the contrary side as shown in Figure 1. The fix is commonly made of directing materia

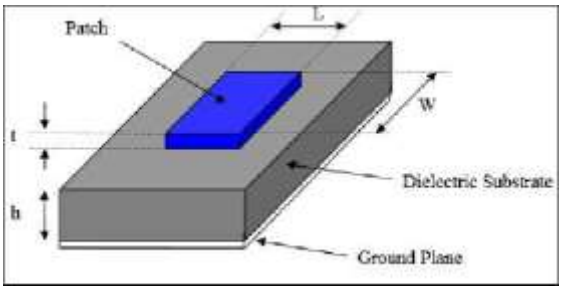

Fig 1. Structure of a Microstrip Patch Antenna

For good gathering mechanical assembly execution, a thick dielectric substrate having a low dielectric consistent is charming since this gives better capability, greater transmission limit and better radiation. In any case, such a course of action prompts a greater gathering device size. In order to design a diminished Microstrip fix getting wire, higher dielectric constants must be used which are less productive and result in smaller data transmission. So as to disentangle investigation and execution forecast, the fix is commonly square, rectangular, round, triangular, circular or some other basic shape as appeared in Figure 2. The rectangular and round patches are the fundamental and most normally utilized

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microstrip reception apparatuses. These patches are utilized for the easiest and the most requesting applications. Rectangular geometries are divisible in nature and their investigation is likewise basic.

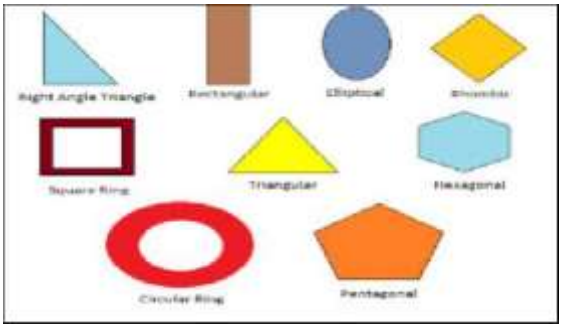


Fig 2. Shapes of microstrip patch elements.

Ultra band (UWB) radio wires are picking up noticeable quality and getting extremely alluring in present day and future remote correspondence frameworks. Due to two factors the ultra wideband is becoming more attractive in modern life. The Government Communications Commission (FCC) directs that the recurrence for the UWB strategy is from 3.1GHz to 10.6GHz in the US. Be that as it may, in Europe, the frequencies incorporate two sections: from 3.4 GHz to 4.8 GHz and 6 GHz to 8.5 GHz. The ultra-wideband (UWB) range accessible for business applications has offered us a chance to accomplish rapid remote correspondences and high- precision area applications.As one of key research in UWB innovation, a ton of imaginative broadband and scaling down methods for UWB radio wires have been extraordinarily created and produced for quite a long time.The receiving wire parameter in recurrence space examination have been explored to show its capacity as a compelling emanating component.

II. Related work

Bhanumathi [1] In this paper a minimal microstrip fix receiving wire with data transfer capacity upgrade for UWB applications by presenting L-Shaped fix with a U-opening. Right now, the Inverted L

-Shaped fix is structured on the highest point of the substrate and a U-Slot is carved in the endless ground plane and it is seen as accomplishing data transfer capacity upgrade of up to 28% with a conservative size of 24×36mm 2. For ultra- wideband application this structure operates the frequency at 5.4 GHz and 7.4 GHz

Mohamed Fathy Abo Sree[2] A reduced ultra-wide band microstrip reception apparatus is presented right now in this paper. Ultra-wide band got an uncommon consideration, especially after the endorsement of utilizing the unlicensed band beginning from 3.1 to 10.6 GHz for business use. The reception apparatus comprises double components each having a size of 24X24 mm^2, while the all out size is 58X24 mm2. The main component covers the range somewhere in the range of 3.29 and 6.9 GHZ utilizing the computerized ground and the subsequent reception apparatus covers the recurrence run from 8.76 GHz to 13.27 GHz utilizing blemished ground.This kind of reception apparatus is intended to be utilized for 4Gapplications.

Zubin Chen[3] Right now, printed monopole getting wire plan for WLAN applications in interface free self-arranging seismograph center points is proposed. Extraordinary enhancements were accomplished in scaling down the reception apparatus and in broadening the limited data transmission of the high- frequency band. By using some structures like M- shape and F- shapes and rotating some angle through 90 degrees counterclockwise to get radiation patch surface.

This structure adequately broadened the working data transmission of the reception apparatus. Excitation prompted the Genesis of two impedance groups of 2.39—2.49 and 4.26—7.99 GHz for a voltage standing wave proportion of under 2. The two impedance data transfer capacities were 100 MHz, i.e., 4.08% comparative with the inside recurrence of 2.45 GHz, and 3730 MHz, i.e., 64.31% comparative with the middle recurrence of

5.80 GHz, covering the WiMAX high- recurrence band (5.25—5.85 GHz) and the WLAN band (2.4/5.2/5.8).

Ranjan Mishra In this paper a microstrip[p patch antenna is designed for wireless communication network. For that we can use both rectangular and square shapes patches to test and analysed. The square formed microstrip reception apparatus is offering more extensive data transfer capacity when contrasted with rectangular microstrip and adequate return misfortune. It shows 500MHz of ultrawide bandwidth with -24dB return loss. This high transfer speed gives its helpfulness in numerous wideband utilities in X-band. The current circumstance plan is to make a basic geometrical formed structure of the microstrip reception apparatus, which would give better than average broadband.

Ayad Shohdy W. Ghattas In this paper a closeness feed ultra-wide band (UWB) fix receiving wires with a minimal size (millimeters size) for K band applications.Right now the data transmission of radio wire Defected ground structure (DGS) strategy is utilized. The proposed radio wire presents UWB execution in the recurrence scope of 16 GHz to 29 GHz with a minimized size of 7 x 10 mm2, which is reasonable for some applications. The antenna is omnidirectional radiation with an average return loss of 3.5dBi. By using CST microwave studio (MWS) the proposed antenna was investigated.

Proposed system

The proposed system is to structure the microstrip fix reception apparatus with wide band resonant frequency. The ultra wide band resonant frequency can be achieved by designing an antenna with narrow bandwidth approved by FCC. From that design wide band have to be achieved with certain methods discussed below. These methods will have a direct impact on the bandwidth and resonant frequency. Vswr and return loss also to be improved with the design of ultra wide band.

1) Reduced ground plane.

2) slotted ground plane.

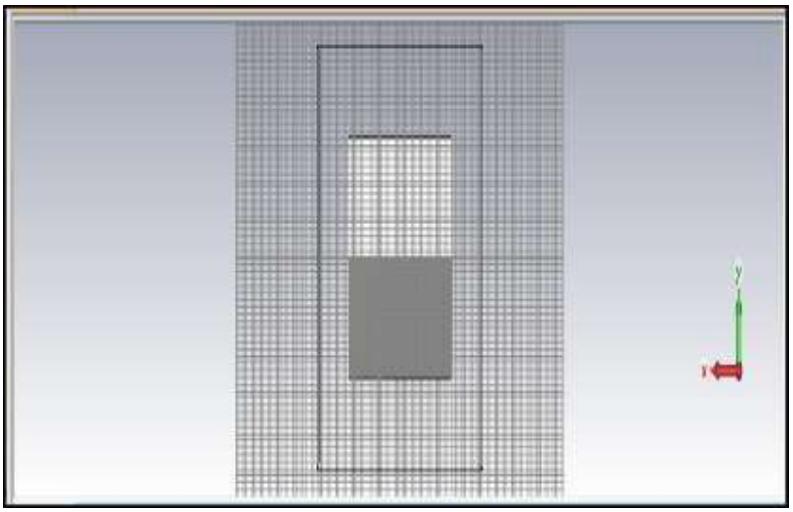
3) UWB SParameter

III. SIMULATION OUTPUT FOR UWB

A .**Reduced Ground Plane**

Ultra wide groups are accomplished by different systems and one of the techniques is decreased ground planes. Ground plane decrease is accomplished by diminishing the length of the ground in the microstrip fix receiving wire to the base right now upgrade will be gotten. Microstrip patch antenna is a slim band antenna due to the fact the radiation will occur simplest on each facet of the patch.

By reducing the ground plane the entire patch will radiate this will improve the bandwidth. The reduced ground plane is shown in the below fig.



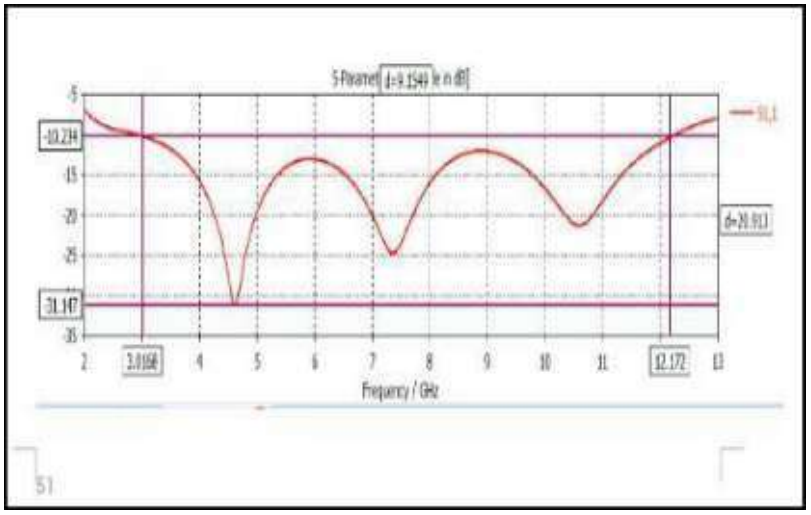


Fig. 3 Reduced Ground plane of transmission medium. The representation of s parameter of microstrip patch made of dielectric substrate FR-4 material is shown in Fig

MSA

Fig. 4 Resonant Frequency

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B. **Slotted ground plane**

Extremely extensive band is carried out by way of numerous making the slot inside the floor aircraft of the microstrip rectangular patch antenna. Microstrip patch antenna is a narrow band antenna due to the fact the radiation will occur simplest on both sides of the patch. by using introducing the slot inside the ground aircraft the whole patch will radiate this could enhance the bandwidth. The slot brought antenna is proven inside the beneath fig.

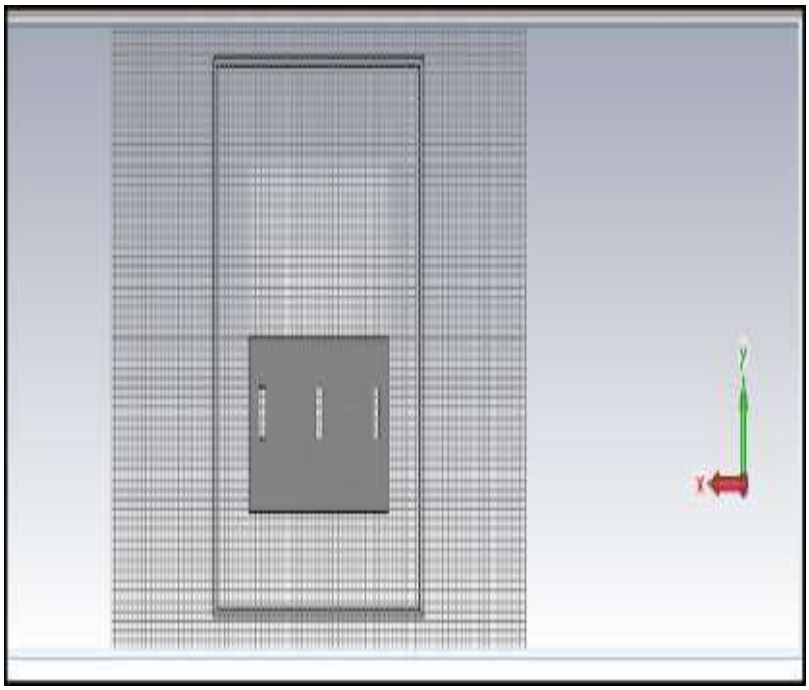

Fig. 4 Slotted ground plane

C. **UWB SPARAMETER**

S parameter based on the reflection coefficient of the designed antenna. This parameter describes how much of an electromagnetic wave is reflected by an impedance discontinuity in the

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Bandwidth enhancement strategies together with slot introduction will growth the bandwidth up to 30% after which developing the substrate thickness additionally will increase the bandwidth to reap the extremely significant band frequency. Introducing partial floor and then decreasing the dielectric constant each of those increases the fringing place and then will increase the resonant frequency. correct Ranging statistics, Radar and Imaging

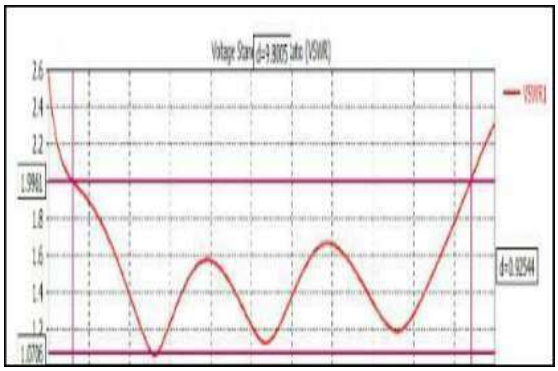

Fig 5. Vswr of MSA

IV. CONCLUSION

The microstrip fix reception apparatus is a narrowband radio wire, so artistic creations has been done to scale down the microstrip fix recieving wire by means of diminishing the measurements to build the data transfer capacity of the recieving wire. The general execution examination of rectangular microstrip recieving wire for narrowband programming has been done in current works of art. for one thing, a rectangular fix reception apparatus took care of with the guide of microstrip line has been planned and acquired 7GHz full recurrence and VSWR of 1.061 and return absence of roughly forty eight.8db. ultra wide band is performed 3-12.1GHZ of full recurrence and vswr of1.996.

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