

Double band ‘A’ shape slotted micro strip patch Antenna for wireless communication.

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Abstract— various micro strip patch antenna are designed in the field of wireless communication. In this paper A slotting is made in between the rectangular patch and the ground. The size of antenna gets reduced. Here inset feeding technique is used for the coupling of the signal. The various parameters such as return loss, gain, directivity and radiation pattern are measured which is acceptable in wireless communication.

Index Terms—Directivity, Gain, Inset feed, Micro strip rectangular patch antenna, Return loss.

I. INTRODUCTION

There are various medium for the propagation of signals some of them are coaxial cables, optical fibres, waveguide etc. Now a days medium air is generally used for the wireless communication system [1]. In wireless communication system antenna plays an important role in both transmitter and receiver. An antenna is a device which is made up of conductors which is used for the radiating and receiving the electromagnetic field [2]. Micro strip patch antenna is a key building in wireless communication and Global Positioning system since it was first demonstrate in 1886 by Heinrich Hertz and its practical application by Gugli Marconi in 1901 [3]. Micro strip patch antenna (MPA) consists of conducting patch of any planar or non-planar geometry on one side of dielectric substrate with a ground plane on the other side [4]. The patch is generally made of conducting material such as copper or gold and can take any possible shape. A patch antenna is a narrowband, wide-beam antenna fabricated by photo etching the antenna element pattern in metal trace on the dielectric substrate. Their radiation characteristics are similar, despite the difference in geometrical shape, because they behave like dipole. A patch antenna has the gain in between 5-6 dB [5]. Patch antenna is generally used for the wireless communication system due to their unique properties such as light weight, low profile, low production cost, reliability and ease in fabrication and integration with solid state devices [6]. They are also compact and inexpensive. Patch antennas are planar antennas used in wireless links and other microwave applications. Micro strip can be fabricated using photolithographic techniques. Micro strip patch antenna consists of a radiating patch on one side

of a dielectric substrate with a continuous metal layer bonded to the opposite side of the substrate which forms a ground plane [7]. The patch is generally made of conducting material such as copper or gold and can take any possible shape. The proposed antenna are compact and has a patch area less than that of a conventional micro strip rectangular patch antenna fabricated on the same substrate [8]. In spite of several advantages. The micro strip antenna inherently has a low gain and a narrow bandwidth. To overcome its inherent limitation of narrow impedance bandwidth and low gain, many techniques have been suggested e.g., for triangular arm, micro strip patch antennas on electrically thick substrate, triangular patch antenna have been proposed and investigated. In general, the impedance bandwidth of a patch antenna is proportional to the antenna volume, measured in wavelengths. However, by using triangular arm patch with the walls at the substrate, one can obtain enhanced impedance band width.

In twentieth century there is the requirement of rapid decrease in size for the handling purposes. Conventional rectangular patch has low gain and bandwidth but to avoid this triangular patch antenna is used to increase the gain and the bandwidth [9]. The purpose of this paper is to increase the gain and various parameter required for the wireless communication.

II. GEOMETRY OF ‘A’ SLOT RECTANGULAR PATCH ANTENNA

In this paper A shape slot is made in rectangular patch antenna whose dimension are given in the table. The structure of micro strip patch antenna consists of thin rectangular patch of a dielectric substrate of material fr4 epoxy and on the other side having a plane to the ground. The patch is generally made up of conducting material such as copper and gold.

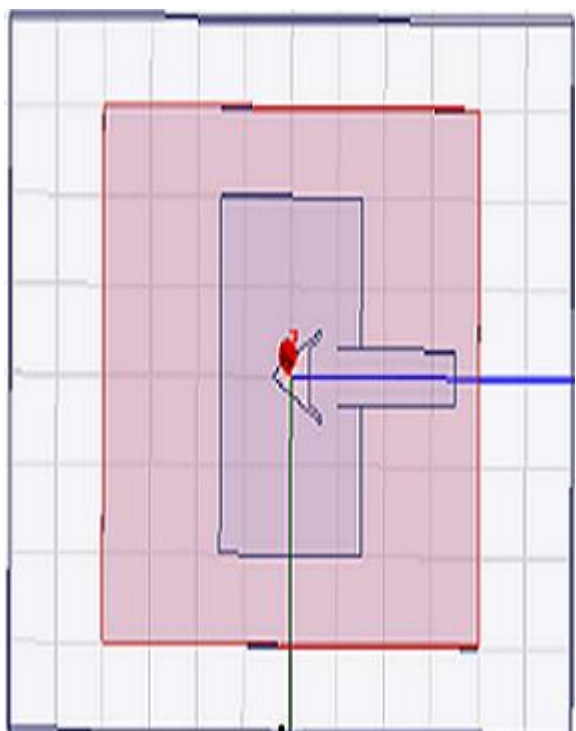
	PATCH	GROUND	SUBSTRATE	FEED
LENGTH(Y)	30 mm	80mm	80mm	25m m
WIDTH(X)	40 mm	60mm	60mm	6mm
HEIGHT(Z)	-	-	3.2mm	-

TABLE 1

The operating frequency for the above ‘A’ slotted rectangular patch antenna is 5.5 GHZ. The feeding technique used in this paper is inset feeding which typically yields high

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input impedance. Since the current is low at the ends of a half wave patch and increases in magnitude toward the center, the input impedance could be reduced if the patch was fed closer to the center.



. FIG 1: DESIGN OF A SLOT RECTANGULAR PATCH ANTENNA

III. RESULT

A. Return loss

Return loss measures the mismatching between transmitter and receiver. It is the logarithm ratio of reflected power to the transmitted power measured. Fig 2 shows the graph of return loss at the frequency

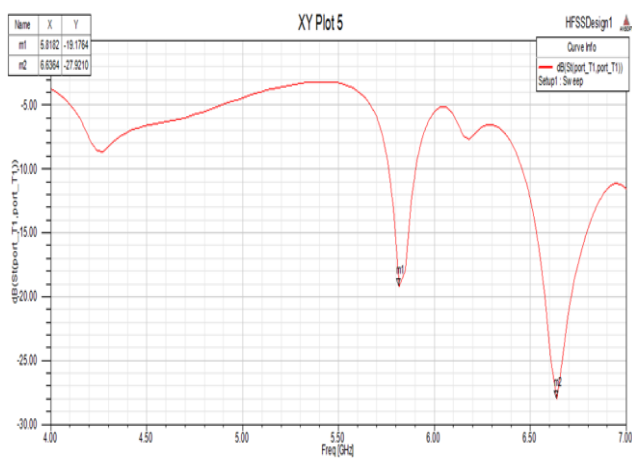


FIG 2: RETURN LOSS OF SLOTTED RECTANGULAR PATCH ANTENNA.

The return loss for the paper is given in the above figure. It is dual band. First band is formed at the frequency at 5.818

GHZ of return loss of -19.1764. Second band is formed at 6.6364 of return loss of -27.9210. At the second frequency return loss gets reduced

B. Gain

Actually the gain of rectangular patch antenna is in between 5-6db. The gain in this paper is calculated as 8 db which is better than the rectangular patch antenna's gain.

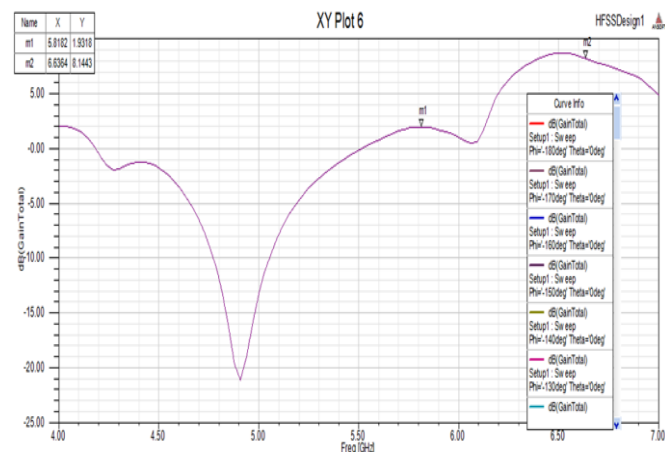


FIG 3: GAIN OF SLOTTED RECTANGULAR PATCH ANTENNA

There will be two gains at two frequencies as it is dual band. The gain at 5.878 GHz is 1.7693 dB which is quiet acceptable and at the frequency of 6.606 GHz is 8.35 dB which is best for the wireless communication.

C. Directivity

Directivity is an ability of an antenna to focus energy in a particular direction while transmitting and receiving. In static situation (when the transmitter and receiver of antenna is fixed) the antenna will radiate in only wanted direction. In dynamic situation (when the transreciever of antenna is not fixed) the antenna will radiate equally in all direction this is also called radiation pattern which will be shown in the next figure.

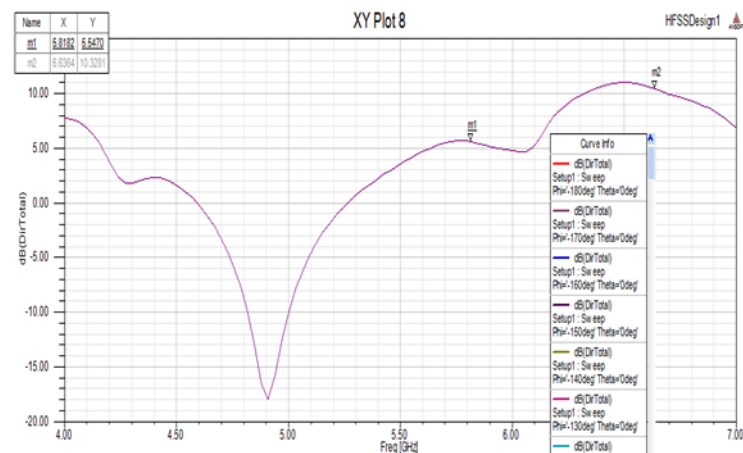


FIG 4: DIRECTIVITY OF SLOTTED RECTANGULAR PATCH ANTENNA

The directivity is increased and can be found at two frequencies one at 5.878GHZ which is about to 5.24 dB and at 6.878 the directivity is 10.

D. Radiation pattern.

Radiation pattern describes the power distribution of antenna radiation. When the power is distributed in all the direction then the antenna is called as omnidirectional antenna. As there is dual band graph in the return loss so there will be two radiation pattern at two frequency represented by the figure 5 and 6

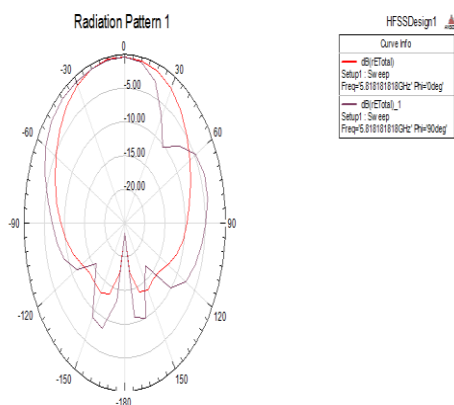


FIG 5: RADIATION PATTERN AT 5.878GHZ.

Red graph shows the radiation pattern at phi 0 degree and blue graph shows the radiation pattern at phi 90 degree. Each graph shows the radiation pattern at 0 and 90 degree. Due to dual band there are two radiation pattern.

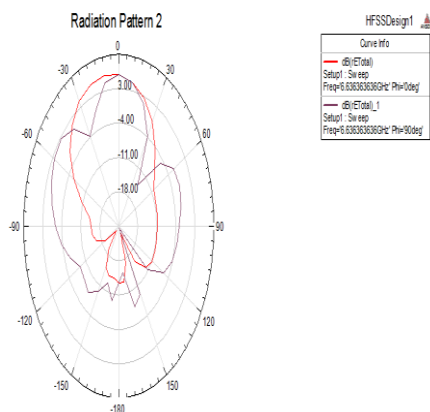


FIG 6 RADIATION PATTERN AT 6.6061 GHz

IV. CONCLUSION

It is easily concluded from the above figures that the gain of antenna is increased up to 8 dB which is more than the acceptable value after A slot is made in the rectangular patch. The size of antenna also get reduced which is the requirement in the modern days. The return loss is decreased

and the directivity is increased and the maximum output is achieved.

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