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Comparative Study of Proposed Patch Antenna

[1]Rajbir Singh , [2]Damandeep Kaur

[1]Research Scholor, Department of Electronics & Communication Engineering, Golden College of Engineering & Technology, Gurdaspur, Punjab, INDIA
[2]Assistant Professor, Department of Electronics & Communication Engineering, Golden College of Engineering & Technology, Gurdaspur, Punjab, INDIA.

A B S T R A C T

An antenna element is the most imperative element of communication. In this paper comparative analysis is done between two designs. In first segment of designing rectangular patch design is purposed and its resonant at 10GHZ. For both antennas similar dimensions of 11.9×0.9mm is taken out. In second segment of design two slits cut out from substrate sheet. The modified design resonant at 11.5 GHZ Frequency value. Design results VSWR and Return loss for both designs are compared.Thepurpose design antenna analyzed and simulate with HFSS (High Frequency Simulation Software) [1] [8]

Keywords: compact S- shaped

1.1Introduction

In wireless communication there are numerous types of micro strip patch antennas. It is made up of small conducting patch mounted on ground plane take apart by dielectric substrate. In 1970's this type of antenna involved interest of antenna community. In recent trends for mobile phones and other electronic gadgets miniature antennas are preferred. Due to its low profile configuration, and wide band multi band operation is vastly advantageous. Various feeding technique can be used to enhance the performance of antenna. In this paper one of the technique coaxially probe fed are used. Thecentral goal of this paper to study the effect of cutting slits on the

$$w = \frac{c}{2 f_0 \sqrt{\frac{\varepsilon_r + 1}{2}}} \qquad (1)$$

f_O – Center frequency and C- Velocity of light& Relative permittivity

patch with different dimension values .In this part of paper we set up basic design consideration of antenna. In design process firstly simple patch dimension was taken out in terms of its length and width. The design length and width is calculated by using following equation.

* *Corresponding author.* Tel.: +919779445047
E-mail address: *lucksingh5939@gmail.com*

$$Leff = \frac{c}{2 f_o \sqrt{\varepsilon_{reff}}} \quad (2)$$

$$\varepsilon_{reff} = \frac{\varepsilon_r + 1}{2} + \frac{\varepsilon_r + 1}{2} \left(\frac{1}{\sqrt{1 + 12t}} \right) \quad (3)$$

By using above equation we can calculate length and width of conventional patch. In equation t representing thickness of material used as substrate. [3].

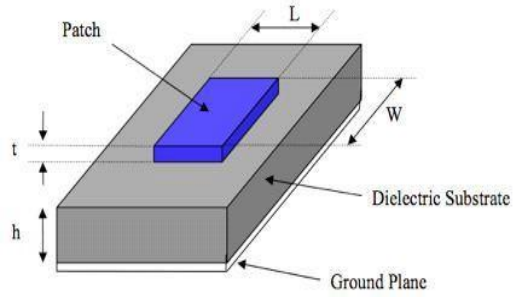

Fig. 1.1: Structure of Rectangular Micro strip PatchAntenna

In this paper purpose rectangular patch design have dimension of patch 11.9×9 mm and ground dimension is 30×30 mm^2 in its first segment of design. After this slit of dimension L =4 mm & W= 0.05 taken out. By varying feed methods and continuously slot position until we get specified results. In this paper purpose rectangular patch design have dimension of patch 11.9×9 mm and ground dimension is 30×30 mm^2 in its first segment of design. After this slit of dimension L =4 mm & W= 0.05 taken out. By varying feed methods and continuously slot position until we get specified results.The purpose design of conventional rectangular patch and making slit cut on patch design became compact s-shaped, both design simulate on HFSS 13.0 .and simulated results are compared.

Table 1 Material used for Patch

	Material
Patch	copper
Substrate	Rogerduroid Relative Permittivity 2.2

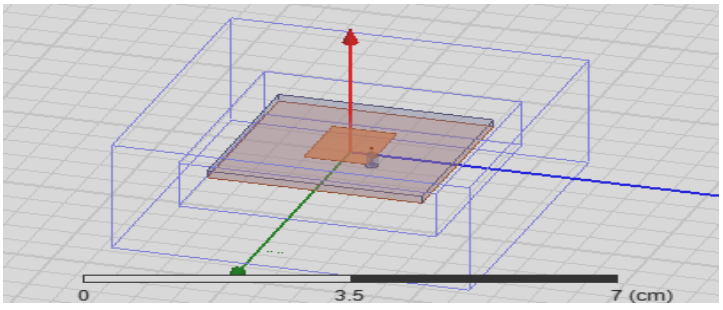

Figure1.2: Geometry of proposed Antenna using probefed Resonating at 10 GHZ

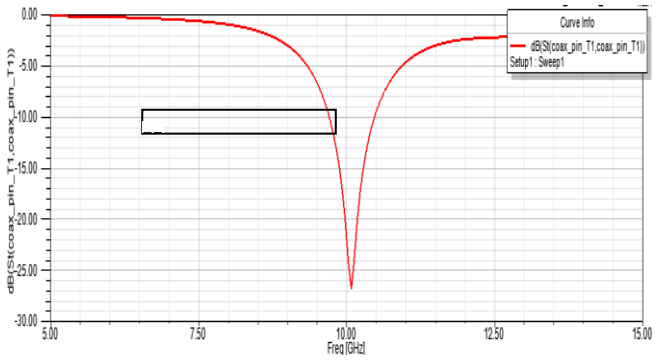

Fig1.3: Return loss Graph of rectangular patch

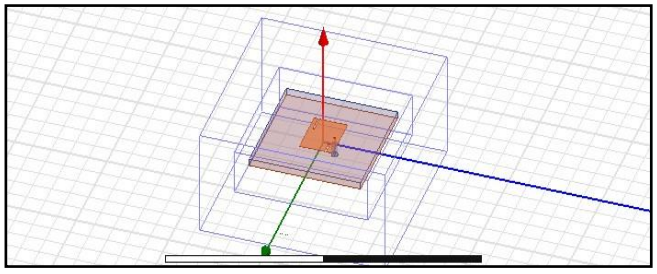

Figure1.4: Geometry of proposed S- Shaped Antennausing probe fed Resonating at 10 GHZ

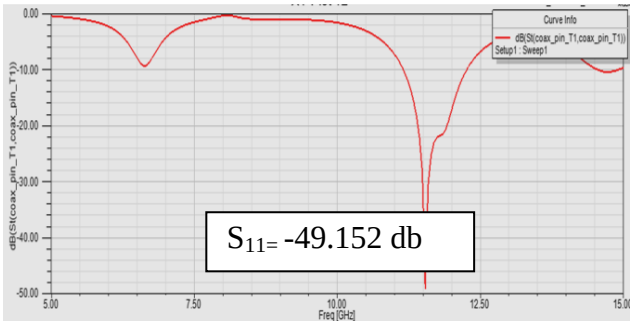

Fig1.5: Return loss of S- shaped Patch antenna

The above simulated graphs represent increase in specific value of return loss. For rectangular patch return loss value nearly -26.7811 but for modified S-Shaped return loss value obtained is -49.152 db.Similarly VSWR pattern for both purpose design its value lies between purpose design its value lies between 0 &1 .

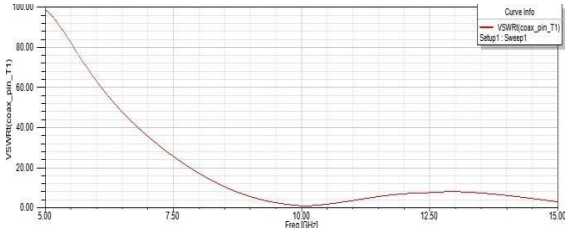

Figure1.6 :VSWR Pattern of rectangular patch antenna

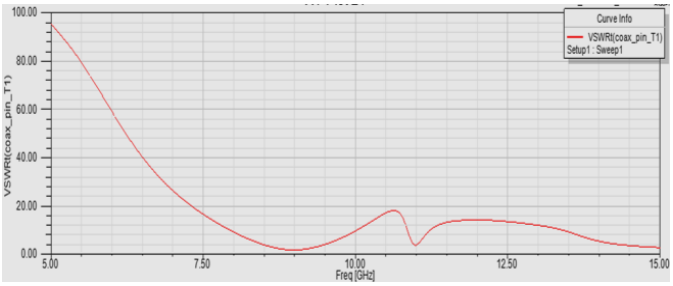

Figure 1.7 VSWR Pattern of S-Shaped patch antenna

Conclusion:

By comparison done between 1st Segment and second segment of design. Better performance achieved in the results of return loss and VSWR pattern. In the second result higher value of return loss which shows close impedance match. In future program the slits can be varied and another feeding techniques implemented to enhance the performance of antenna. The modified S- Shaped design can be used for C band & X band application.

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