

Design of T Slot Shaped Microstrip Patch Antenna for S Band Applications

Navleen Kaur, Munish Rattan, Chahat Jain

Abstract: In this paper, the T slot shaped micro strip patch antenna is designed on FR4 substrate. The length and width of proposed antenna is 32.5mm and 25.2mm. The T slot shaped antenna is simulated on IE3D software for s band application. This simulated antenna operates on 3.379 GHz with Return Loss -23.66s. Finally, the simulated and base/ previous results are compared.

Keywords: Microstrip, Patch, Antenna, T Slot.

I. INTRODUCTION

An antenna plays an important role in the field of wireless communication. It is a bi-directional device which means it transmits as well as receives the electromagnetic energy at a time. Antenna is used in transmission lines in order to transfer the electromagnetic energy which is known as guided wave propagation. So, one can say that antenna transfers the guided wave to radio waves and vice versa [1]. The present technological era, shows incredible changes in the field of antenna. Therefore, microstrip patch antenna is popular because it has many benefits such as its simplicity in designing, easy fabrication and less cost. Along with this, it has some disadvantages such as less bandwidth and power. The patch antenna works on microwave frequencies [2]. The slots on patch antenna reduce the size of antenna and also progress the bandwidth and bandwidth of patch antenna [3]. In present time, wireless communication is becoming more advanced and researchers have started developing dual T shaped antenna for WLAN applications [4]. In addition, T shaped micro strip patch antenna operates at the frequency of 2.45 GHz and can be employed for 4G system [5]. Moreover, inverted T shaped antenna is also designed for X band applications. It operates at 9.4GHz, 8.4GHz and 5.1GHz [6]. Also, fractal folded T shaped fractal antenna is designed with coplanar feed which is used for UWB applications [7]. In this current paper, the segment 1 contains the information about micro strip patch antenna and review paper related to T shape geometry. The T slot shaped antenna is designed in the section 2 and results are described in the segment 3.

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II. ANTENNA DESIGN

The T slot shaped microstrip patch antenna is designed on the FR4 substrate with 1.6mm thickness. Also, it has relative permittivity 4.4 and loss tangent 0.008. The rectangular patch antenna is designed with length 32.5mm and width 25.2mm. After that T slot is loaded on the rectangular patch antenna shown as in the Fig.1.

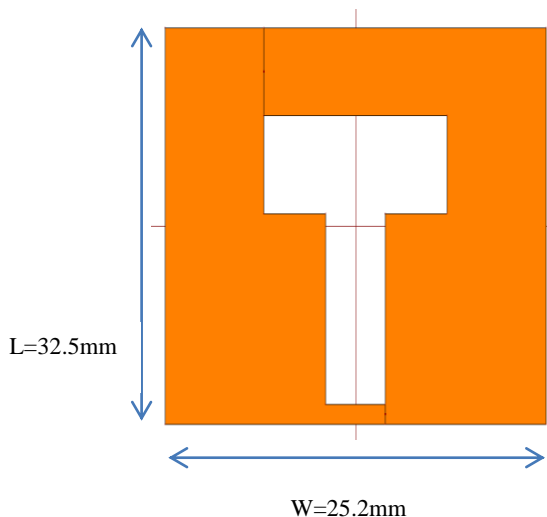


Fig. 1 T slot microstrip patch antenna

The vertical length and width of T slot is 7mm and 3mm. The horizontal length and width of T slot is 3.21mm and 4.21mm. After designing T slot patch antenna coaxial feed is used to simulate so that its parameters gets tuned for S band application in Fig 2. Patch antenna geometry is shown with feed point.

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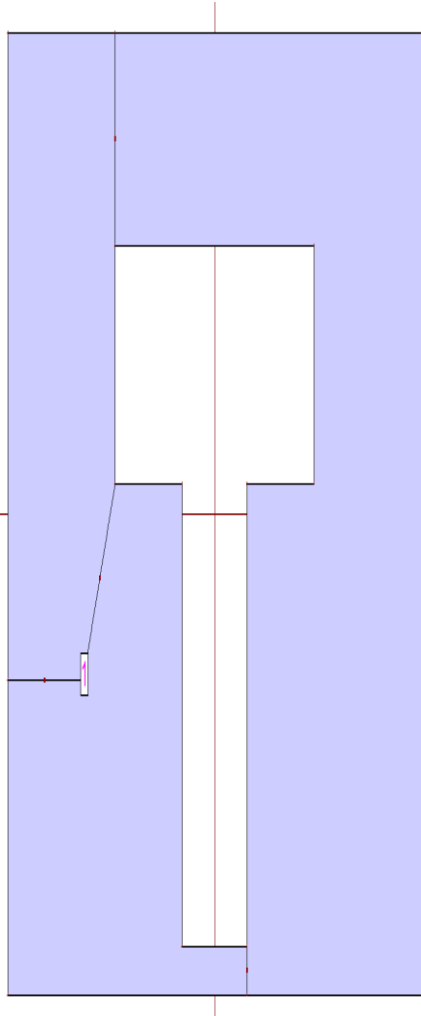


Fig. 2 T slot patch antenna with coaxial feed

III. RESULTS

The designed patch antenna is simulated with the help of IE3D software. The parameter S_{11} resonant at frequency 3.379 GHz with -23.66 return loss shown in Fig 3. The gain of recommended antenna is 0.89 shown in Fig 4. The Azimuth and Elevation radiation pattern shown in Fig 5 and 6.

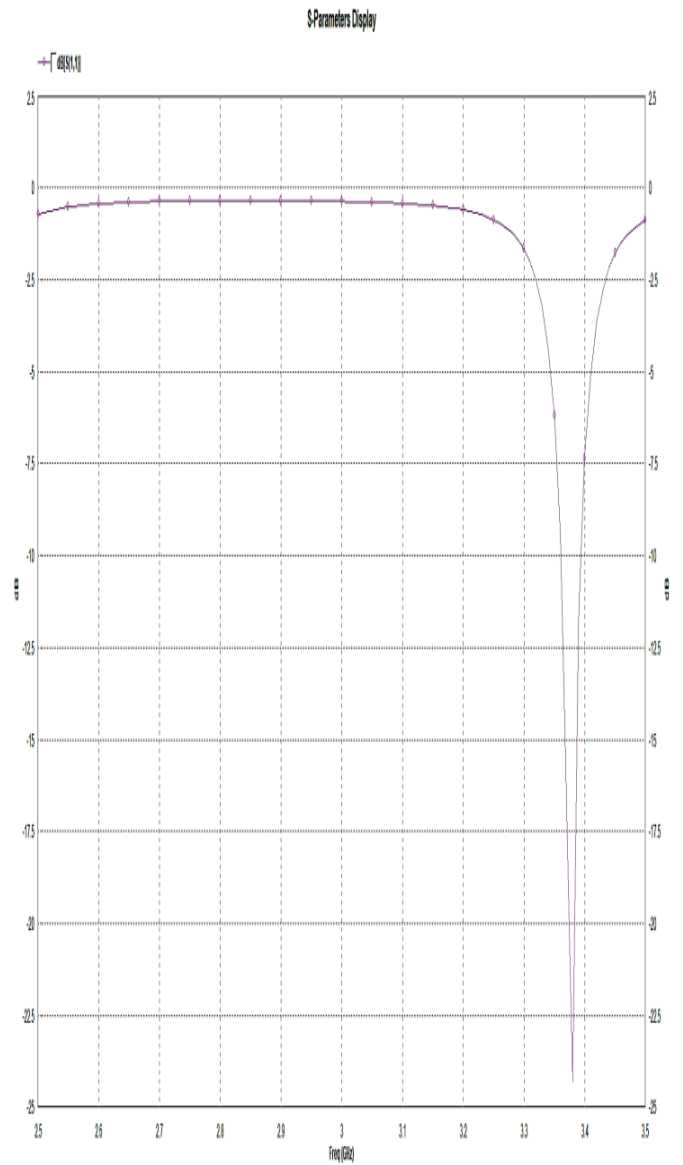


Fig. 3 S_{11} parameter of T slot patch antenna

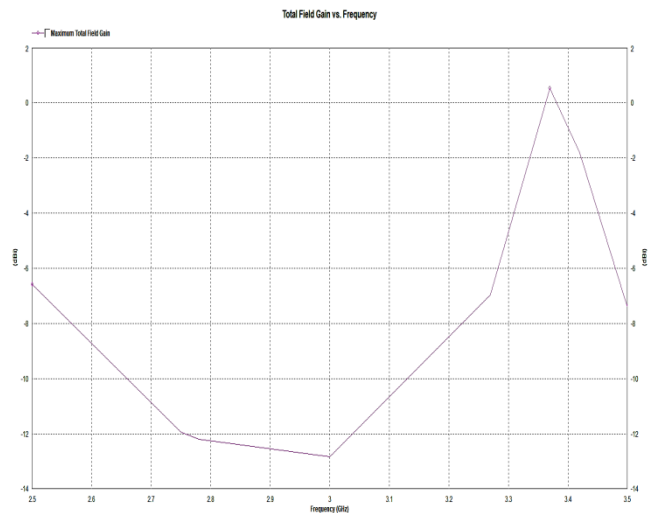


Fig. 4 Gain of patch antenna

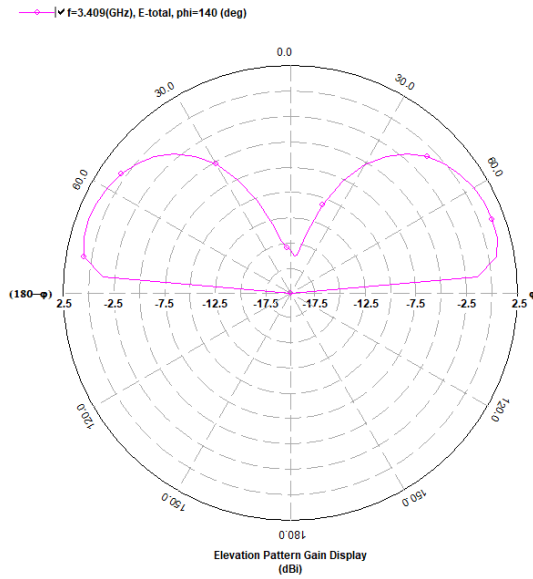


Fig.5 Azimuth pattern of patch antenna

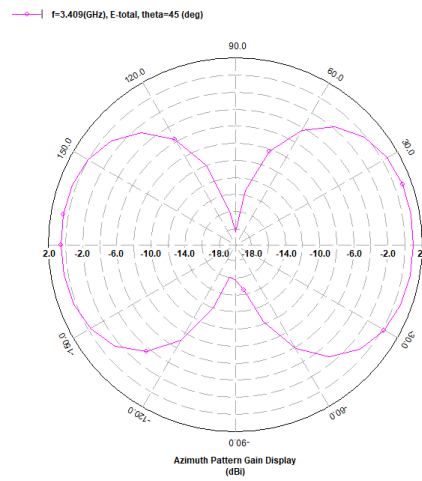


Fig.6 Elevation of Patch Antenna

Table 1 Comparison of simulated results and ref. paper results

Parameters	Simulated result	Base paper
Resonant Freq. (GHz)	3.379	2.5
Return loss (dB)	-23.66	-13.63

IV. CONCLUSION

The T slot shaped patch antenna is designed for S band application and it is compared with the results of s parameter from base paper. The microstrip patch antenna is simulated at frequency 3.379GHz for S band application. The gain of antenna is 0.89dBi. In future; one can do more advancement in the proposed topic for getting better results.

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