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ANTENNA APPLICABLE FOR GPS RECEIVER USED BY CIVILIAN USER AND WLAN APPLICATIONS

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Abstract-***In this paper, an antenna is designed which is applicable for GPS and WLAN application and operational frequencies of designed antenna are 1.58 and 2.4 GHz with 33 and 40 MHz bandwidth. Designed antenna is made circularly polarized by truncating the opposite corner of patch. In this, return loss, axial ratio, gain radiation pattern and VSWR of antenna is measured and the results are simulated by using Ansoft HFSS V_{12}.***

Keywords-slots, dua band.

I. INTRODUCTION

The designed antenna operates for GPS and WLAN application i.e. the designed antenna is dual band antenna that operates for two different frequencies simultaneously i.e 1.58 and 2.42 GHz. The designed antenna is applicable for wireless application because the antenna is circularly polarized.
Microstrip patch antenna is selected for wireless communication because it is of low coast, leight weight and easy fabrication.
Different types of feeding techniques are used to achieve different results. In this paper co-axial feed is used in order to increase the bandwidth of antenna. The achieved bandwidth of antenna is 33 MHz for GPS L1 band and 40 MHz for WLAN application.
The antenna can operate for single, dual or multiband. The designed antenna is operating for dual band i.e it can operate for two applications simultaneously.

The design in [1] is made by using L and U shaped slot on patch and gives a triple band antenna. [2-3] shows an antenna that operates for triple band and is achieved by using different shapes on slot. Gain can be increased by adding foam or air or different material between ground and substrate or it gain can also be increased by placing a substrate of air between ground and radiating patch [4] shows an antenna in which gain is enhanced by introducing an EBG material in the antenna
Stacking is a concept in merging of two or more antenna that are capable to operate in one or more band is done in order to achieve a single antenna that is operating for multibands.[5-6] shows the antenna in which stacking concept is used to make an antenna that can operate in multiple bands simultaneously.
In this manuscript, an antenna is designed by cutting L and F shaped slot on patch. The designed antenna is applicable for GPS receiver used by civilian user and WLAN application. Antenna is fed by coaxial probe into the substrate, with an input impedance of 50Ω. Details designed antenna is discussed.

II. ANTENNA DESIGN

Fig. 1 describes the geometry of the proposed antenna. The dimension of ground is 58 x 58 mm^2, substrate used is FR4 with a

width of 4.8 mm and relative permittivity of 4.4. a small size square patch of dimension 30 x 30 mm^2 is designed on the substrate with two cut slots, one is F slot rotated at 90° in clock-wise direction and other is L shaped, opposite corners of square patch are truncated by using a dimension of 3.5 mm and 2.5 mm. The feed location is (4, 3.5). The slots cut from patch are measured correctly and the dimensions are given below:

Table 1 Dimension of proposed antenna

Parameter	a	b	c	d
Value(mm)	16.6	14.6	0.5	0.76
Parameter	e	f	h	i
Value(mm)	15.2	0.77	6	0.5
Parameter	j	g		
Value(mm)	2.4	0.81		

III. RESULTS

Fig. 2 shows return loss of proposed antenna. At both the resonating frequencies value of VSWR are less than 2. VSWR determines the amount of power reflected back from antenna. It is required to be less than 2, so that antenna may scatter all the waves' incident on it.

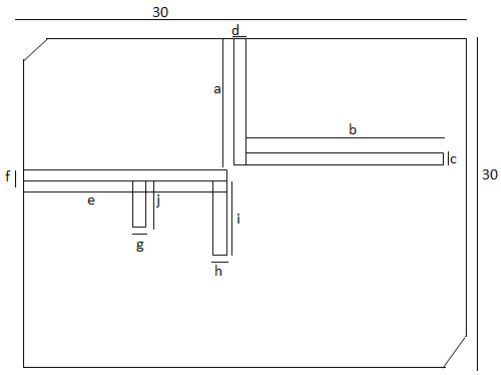


Fig.1 Top view of proposed antenna model

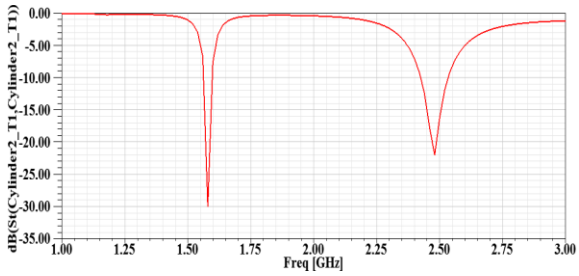


Fig. 2 Return Loss of proposed antenna

The gain of antenna is required to be high, so in order to achieve high gain substrate or more thickness is always prefers. Gain of proposed antenna is shown in Fig. 3. Gain defines the amount of power is radiated in given direction.

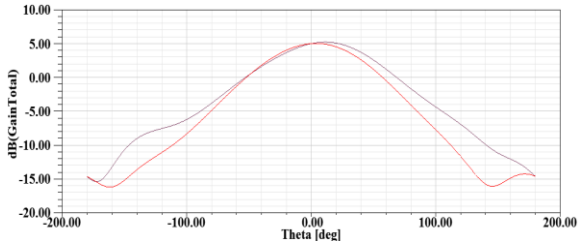
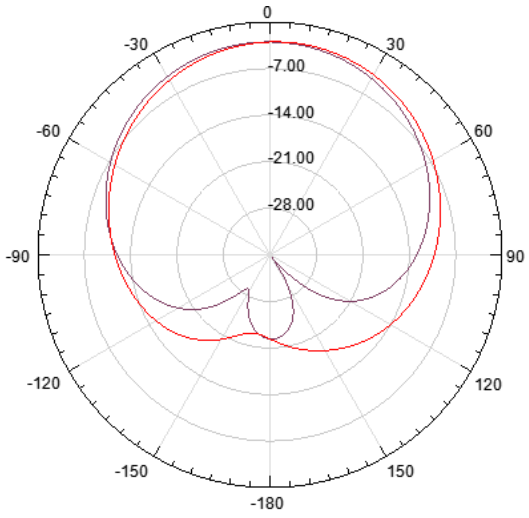
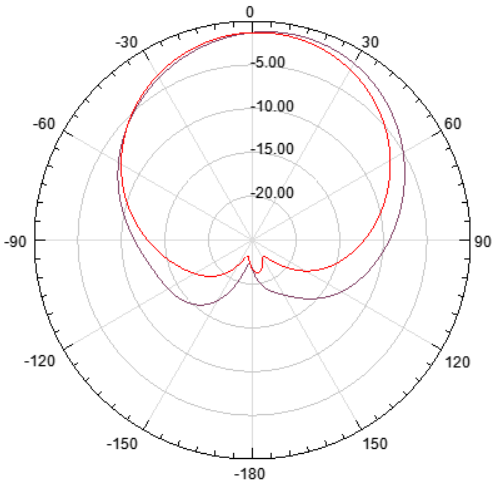


Fig. 3 Gain of proposed antenna

The radiation pattern is shown in Fig.4. The designed antenna shows directional radiation pattern.



(a)



(b)

Fig. 4 Radiation patterns of proposed antenna at different frequencies: (a) 1575 MHz (b) 2440 MHz.

Since the antenna operates for two particular frequencies and is not radiating in all direction so it must have some directivity. Directivity of the proposed antenna is shown in Fig. 5,

Axial Ratio is defined as the ratio of orthogonal E-field component of equal amplitudes. Axial ratio of proposed antenna is shown in Fig. 6.

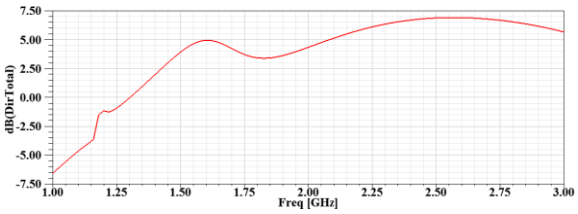
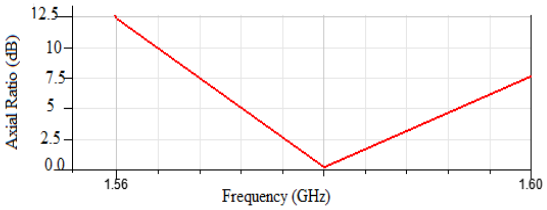
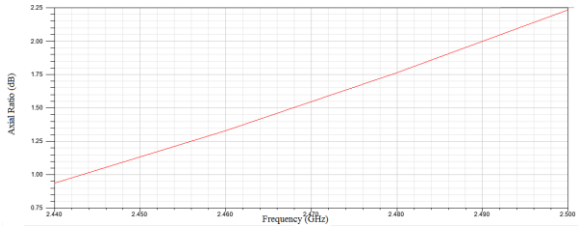


Fig. 5 Directivity of proposed antenna



(a)



(b)

Fig. 6 Axial Ratio at different frequencies: (a) 1575 MHz (b) 2440 MHz.

IV. CONCLUSION

In this an antenna is designed which operates for two particular band i.e GPS L1 band and WLAN applications. The antenna is made by cutting two slots on patch i.e. L and rotated F. substrate used is FR4 becuause of its low cost and easy availability. Radiation paatern, return loss, axial ratio, gain and directivity of antenna are measured and measured results states that the antenna is applicable for wireless communication

V. FUTURE SCOPE

The designed antenna is dual band operating i.e. it can operate for two applications simultaneously i.e GPS recieiver which is used by civilians and WLAN applications. Due to heavy investment and demand, the cost of GPS tracking will decrease over the new few years, making an even more affordable proposition for businesses.

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