ISSN PRINT 2319 1775 Online 2320 7876

Research paper UGC CARE Listed (Group -I) Journal Volume 8, Issue 4, 2019

Twofold square fix radio wire with awry CPW feed for high increase applications

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Abstract:

In this work, a new asymmetric CPW feed double square patch antenna is designed and simulated using an electromagnetic solver for applications in wireless bandwidth. The planar asymmetric CPW horizontal surface (Conventional coplanar waveguide) combined with a double square patch antenna. The proposed antenna consists of the dimensions of $22x22x1.6mm^3$ over FR-4 substrate. The proposed antenna shows a return loss value <-15db and VSWR <2; moreover, the antenna shows a high gain value of >3dBi across the operating frequencies with efficiency >80%. Also, this work presents the patterns associated with radiation impacts.

Keywords: Wireless applications, CPW, Double square patch, antenna parameters.

Introduction

One of the most widely used types of antennas these days, for the most part, integrated with the sampled count of operating frequency under the discretised approximation of 1-8 GHz existed with the microstrip patch antenna. This type of antenna development began seriously in the 1970s when communication networks became firmly established at frequencies whose size and design was beneficial. In the meantime, it was attractive for mobile and rocket applications because of its light mass within the approach of mid-level outline compared to reflections in the parabolic shape that has been categorised in developing the antennas. These precise characteristics, combined with further size reduction using materials under consistency rate maximum for the patch structured antennas within handsets, receivers and transmitters, developed GPS methods including various additionally centred products commonplaces recently. Basic information on the design and use of patch antennas is anticipated to be provided by this study. We can better understand the simulation of a square patch antenna with the help

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of the data in this research. Fundamental elements of any wireless communication system are antennas. Several antennae designed with the periodic classification fed for the antenna waving to travel within the strip establishment that further generates in the reflection work designs a tiny strip antenna operating at 2.25 GHz. Microstrip antennas are increasing in value due to their ability to be explicitly printed onto a circuit board. The mobile phone industry makes significant and conspicuous use of microstrip antennas. The cost of microstrip antennas is low, they are safe, and they need little work to do.

Patch antennas have many uses since they are easy to manufacture using printed circuit technology, compact, and conform to surface variations. Development through the patch design holding the dimension length; l with reach in value at a lower rate than g/2 (where g represents the substrate's guiding wavelength). Higher efficiency and more enormous data transfer are made possible by thicker substrates with lower dielectric constants but at the expense of larger component sizes. Thin, more dielectric-constant substrates cause smaller element sizes, minimise coupling, have lower proficiency and generally show a relatively fast bandwidth. Several circularly polarised applications have increased their use of microstrip patch antennas due to their safety position and advantageous radiation characteristics. The development of modern wireless systems in the last few decades has sparked extensive research on tiny strip radiators, focusing on improving performance and shrinking. For communication systems to deliver assurance of unwavering quality, versatility, and high production qualities, superior gain value, compactness, and structural design can be generated within the antennas are required. It represents a different approach to the development of application-oriented wireless transfer because of the growth in the creation of thinner, lighter, less expensive, low-profile, and more reliable antennas for wireless devices. The planar architecture within the side of the substrate can be radiated through the patch designed in the antenna. The main benefits include low profile, planar and nonplanar surface conformability, lightweight, and ease of fabrication. The antenna's low profile and conformal design make it suited for high-speed vehicles, aeroplanes, spacecraft, and missiles **[1-6]**.

The improvement reached in the investigation developed in the case of a rectangular-shaped antenna format under a specific frequency range sampled among 1 THz, including the cover layer of the substrate of material suggested through the work projected by Mohammed Youness et al. in **[7-8]**. They have achieved the desired matching bandwidth and maximum radiation

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gain; however, they haven't looked closely at how Superstrates' effects on patch antennas are caused by changing thickness and dielectric constants.

Design of the antenna developed:

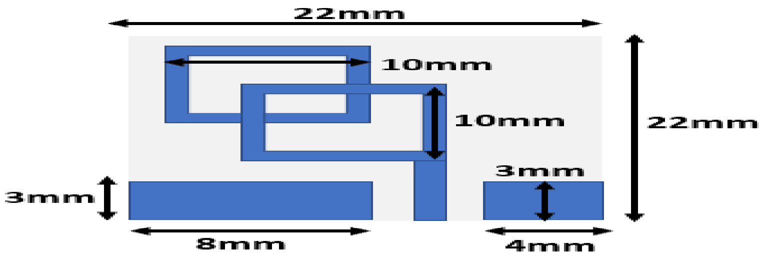

Fig.1. Representation view for antenna featured as double square patch conjunction to asymmetric CPW feed

Figure 1 illustrates the proposed patch antenna double square patch with asymmetric CPW feed within the geometry of the antenna is small and straightforward. This antenna comprises a double square patch with asymmetric CPW feed. Featuring the dielectric medium substrate to the developed antenna under FR-4 design has chosen the approximate quantity of 4.6. The dimensions are 22x22x1.6mm^3. The proposed antenna dimensions are stated.

$$f_0 = 6GHz$$

$$€_r = 4.4$$

$h = 2$ mm

Step 1: Determining the factor which undergoes the property of the material through the Able dielectric constant ($€_r$), which has been formulated using equation (1) as,

$$€_{eff} = \frac{€_r+1}{2}(1 + 0.3 * h) \qquad (1)$$

Results and Discussions

Various types of printed monopole antennas are investigated for wireless applications, including circular, square, elliptical, hexagonal, pentagonal, octagonal, and so on. Such shapes have been associated with asymmetric CPW feed with a double square patch for the consideration of analysis within the design developed.

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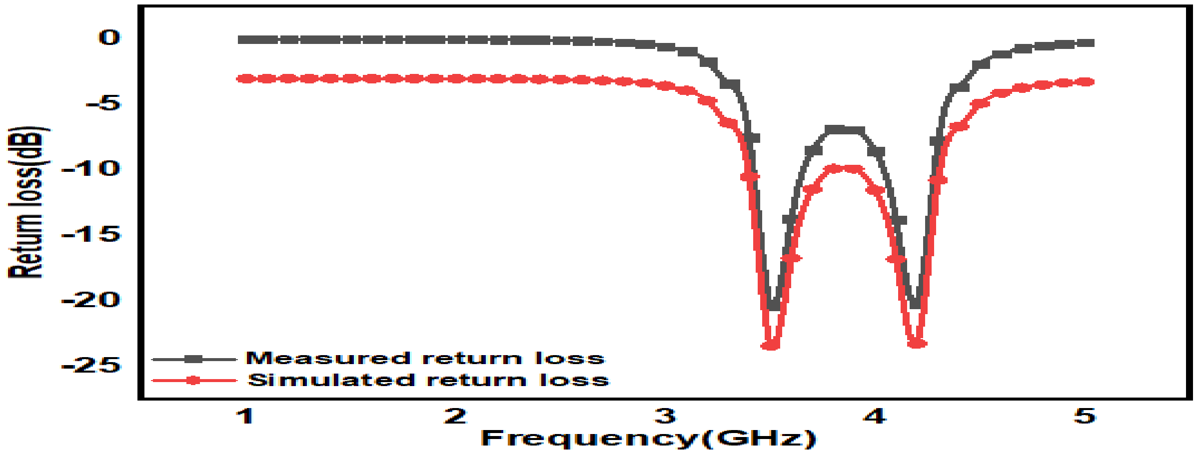

Fig.2 Return loss value

Figure 2 states the loss range returned for the antenna proposed over several ranges of frequency employed, and it is observed that the return loss value is -22dB across the operating frequency of 3.5GHz, similarly across the operating frequency of 4.2 GHz, the antenna stating the return loss value of -22dB. The implementation of the double square patch with asymmetric CPW feed of the proposed antenna shows high-performance values in the antenna parameter in figure 2.

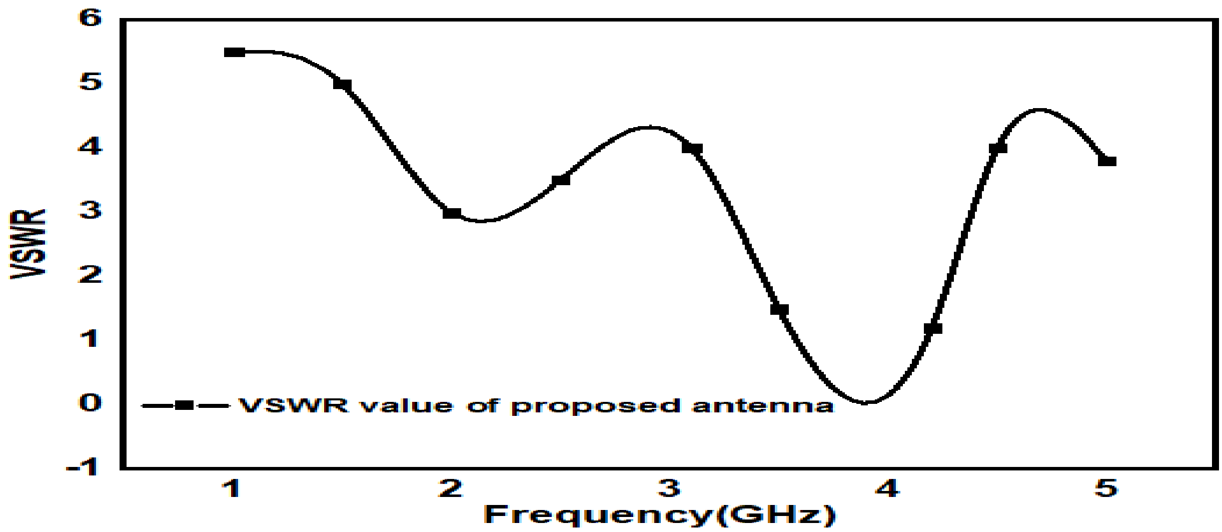

Fig.3 VSWR value of the proposed antenna

Figure 3 depicts the value of VSWR, which denotes the impedance mapped to the structure built with the antenna incorporating the signal passed in the line across the operating frequency. The proposed antenna has the VSWR value of 1.5 across the operating frequency of 3.5GHz, similarly across 4.2 GHz frequency functioning, stating the VSWR value at 1.5 and 1, which are in the acceptable range. The implementation of the double square patch with asymmetric

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CPW feed of the proposed antenna shows high-performance values in terms of the antenna parameter in the system model.

Conclusion:

The research studied the dual-level band featuring the double square-patch architecture antenna with asymmetric CPW feed covering wireless applications across bands of 3.5 and 4.2 GHz under the gain reach evaluated with specific patterned structures. The Double square shaped patch antenna including asymmetric CPW feed improves performance of the proposed antenna acting the elementary component of radiation, enabling the capability in applications orienting the multiple range responsibility under wireless technology. Modelling the design through the compacted network with ease in construction, thus achieving simple fabrication using available FR-4 material.

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