

MICROSTRIP PATCH ANTENNA USING SIW TECHNOLOGY

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Abstract : The trending technologies of wireless communication such as WLAN and WiMAX working at multiband frequencies for devices is needed. The paper proposes multiband frequency antenna at 2.4/4.1/5.2 GHz range. It is observed that an inverted slot etch in the antenna can be used for the purpose in a meta material reactive loading configuration. It is also seen that the antenna having a compact size generates a monopole patterns of radiation with acceptable gains.

IndexTerms - WLAN, WiMAX, MPA.

I. INTRODUCTION

Antenna is important elements in communications, in receiving and transmitting signals. Without perfect design of the antenna, the signal generated by the RF system will not be transmitted and no signal can be detected at the receiver. Different types of antennas are designed to suit many devices. One of the type is rectangular monopole antenna which is also called as Microstrip patch antenna (MPA). MPAs are most popular antennas because ease of fabrication it offers, which in turn makes mass production easier, low cost and fabrication is easy. It includes several advantages such as low profile, it can be fabricated using lithographic technology, and easy integration with other components in the communication for this reason we use MPAs. MPAs are broadly utilized because light weight, low volume, low cost and simple establishment. They are effectively to work in double band and multi-band applications.

II. OBJECTIVES

The major objectives are as follows

- To design compact antennas for wireless communication applications.
- Introduce substrate integrated waveguide (SIW) technology to achieve radiation pattern and size reduction.
- To achieve Multiband resonance, omnidirectional radiation pattern, better Performance at low cost.

III. METHODOLOGY

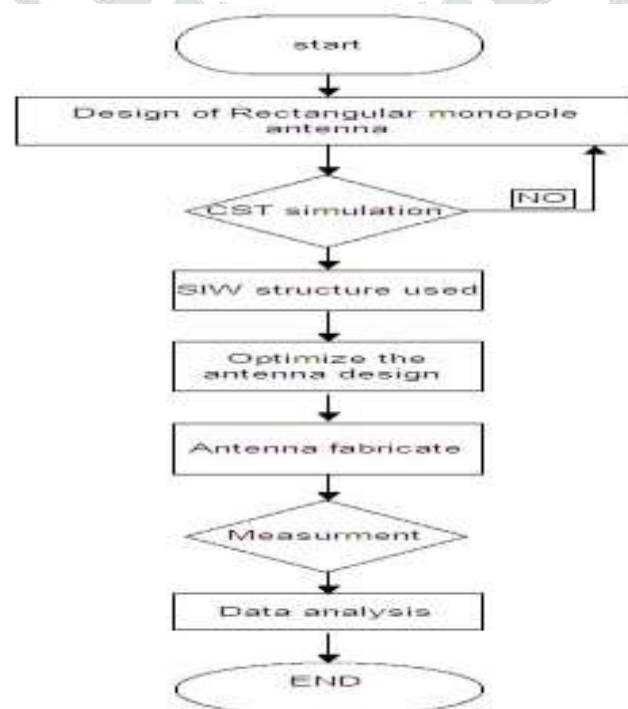


Fig.1 Flow chart of antenna design.

This section explains the outline of this project, which includes the simulation and fabrication process. For antenna design we are using microstrip rectangular patch monopole antenna technology. Which includes the study of antenna properties such as operating frequency, return loss, efficiency and antenna gain. The literature survey has been carried out from the reference books and IEEE published papers. The simulation has been carried out by using the computer simulation technology microwave studio (CST MWS-2017).

To meet the theoretical expectation, the design is being optimized accordingly. Flow chart or designing steps for antenna design as shown in Fig.1. The process of fabrication starts after the completion of simulation.

This project implementation includes two parts which are software design and hardware design. The software simulation includes the designing of desired antenna. By using CST microwave studio. The designing of micro strip rectangular patch antenna is implemented on the substrate material (FR4-lossy) Flame retardant thickness $h_c=1.6\text{mm}$ and dielectric constant $\epsilon_r=4.3$ with copper material of (PEC) having thickness is 0.036mm .

IV. SIW STRUCTURE

SIW Stands for Substrate integrated waveguide (SIW). SIW is type of transmission line power is easily transmitted from top of the material to bottom material or surface. It encourages an acknowledgment from non planar circuits into planar form. SIW covers frequency ranges from 8 to 12 GHz and it has loss less than 0.6dB, return loss is 10dB.

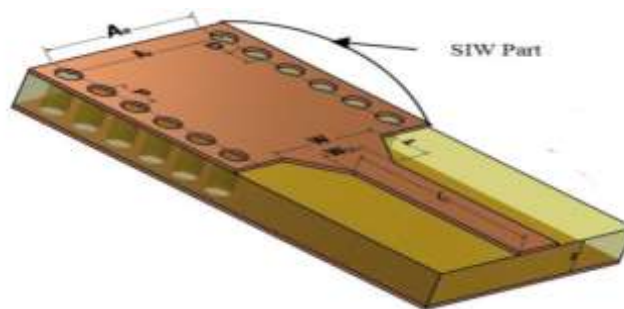


Fig.2 SIW to Microstrip Transition Design Scheme

Table 1 Characteristic parameter of substrate (FR4-Lossy)

Characteristics	Values
Permittivity, ϵ_r	4.3
Loss tangent, $\tan \delta$	0.02
Copper cladding, t	0.035 mm
Thickness, h_c	1.6 mm

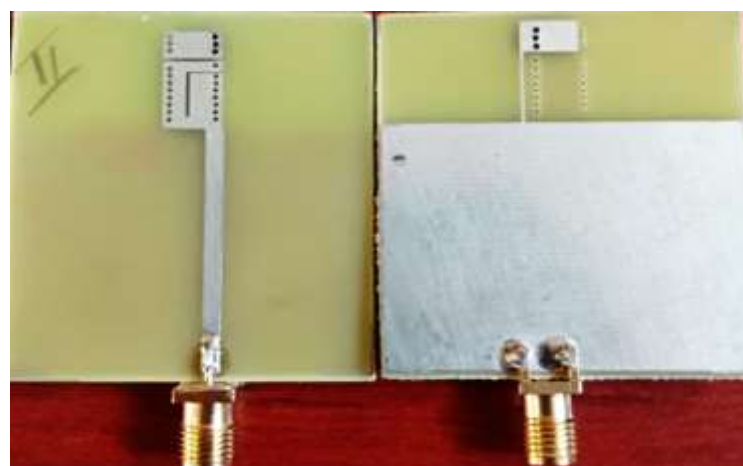


Fig.3 Fabricated proposed antenna

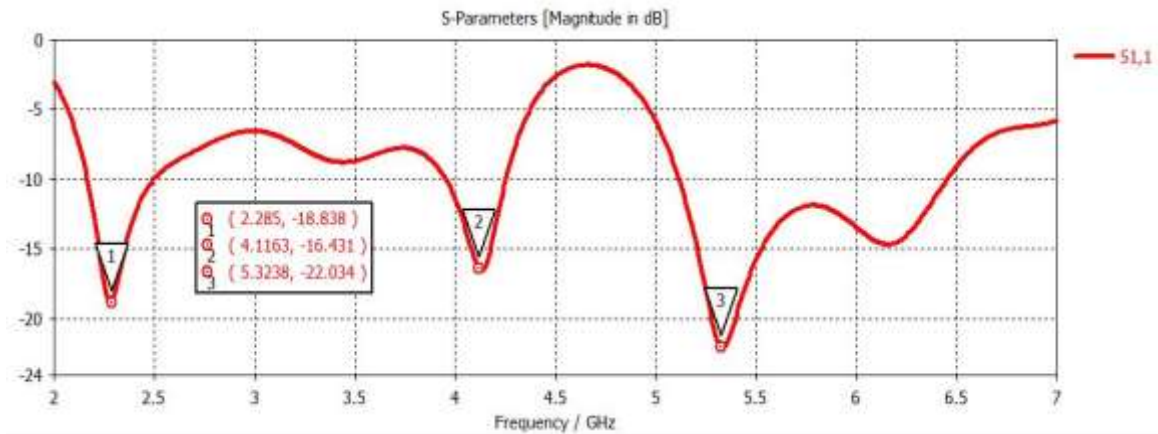


Fig.4 Measured return loss of proposed antenna

V. CONCLUSION

The design and realization of multiband monopole antenna was performed for WLAN and WiMAX applications a substrate integrated waveguide technology was employed for reduction in size and radiation pattern efficiency. The proposed apparatus showed 10dB impedance data transmission of 0.2GHz (2.2-2.4GHz), 0.33GHz (3.5-3.83GHz) and 0.35GHz(5.5-5.85GHz).

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