Circular Patch Antenna Array for WLAN Communications 3.65GHz/4.9-5GHz/5GHz

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***Abstract*— Patch antenna are also called the printed antenna are most common nowadays. They are most commonly used in the fabrication of the miniaturized PCB circuits. Patch antenna can be of different shapes and sizes. In this paper we have proposed a circular patch antenna array which operates on the WLAN frequency band ranges of 3.65GHz, 4.9-5GHz and 5 GHz. The investigated structure has achieved a return loss of 30dB. The proposed antenna array has high efficiency and high gain at the frequency of operation. The proposed design have been implemented using HFSS**

Keywords—Circular Patch Antenna; Antenna Array; microstrip; Printed/patch antenna; PCB;

I. INTRODUCTION

Planar antenna is the most important invention for the development of PCB and the manufacturing of miniaturized circuit boards. They came into existence in 1980s and nowadays they have become most important part of the electronic technology and manufacturing. The antenna is device which is being used to convert the electrical energy to electromagnetic waves and vice versa []. They can be of different shapes and sizes [][][].

Circular patch antenna is also a type of printed antenna. In the following paper we have investigated an array of circular patch antenna with microstrip inset feeding technique. The investigated antenna is of small size have a maximum return loss of 30dB. It has high radiation efficiency and gain at the operating frequency.

II. ANTENNA STRUCTURE

Antenna array is a group of antennas simultaneously working to achieve specific radiation pattern, high power handling capability, high gain, a better radiation resistance and a high radiation efficiency. The proposed antenna consists of a circular patch array on one side of the substrate and ground on the other side of the substrate. The proposed structure of the antenna is shown in figure 1.1 and figure 1.2. The antenna structure have been implemented on FR-4 having relative permittivity of 4.4 and substrate height on 1.6mm.

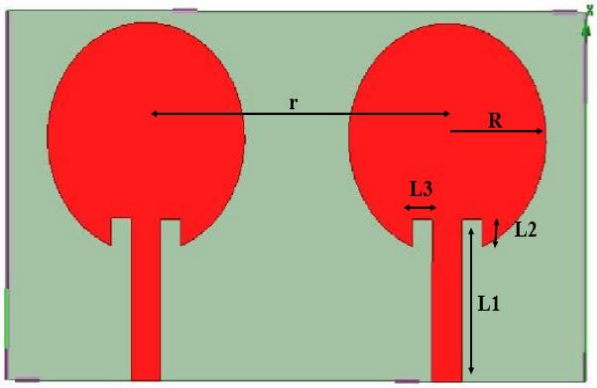

Fig. 1. Schematic of proposed Antenna- Front View. Substrate: ε_r =4.4, t=1.6mm.

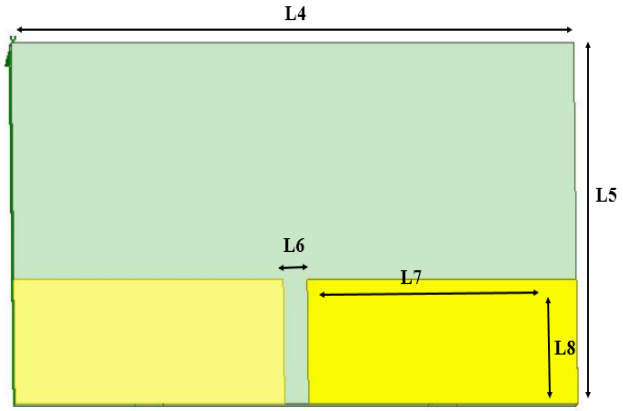

Fig. 2. Schematic of proposed Antenna- Back View. Substrate: ε_r =4.4, t=1.6mm.

The dimension of the proposed antenna is shown in the Table. I.(All dimensions in mm)

R	10	L3	2
r	28	L4	58.5
L1	12	L5	32
L2	3	L6	2.5
L7	28	L8	11

III. RESULTS

The proposed antenna has maximum return loss of 30dB. The plot for return loss of the proposed antenna is displayed in Fig. 3. The proposed antenna has good return loss response for the WLAN range of frequency.

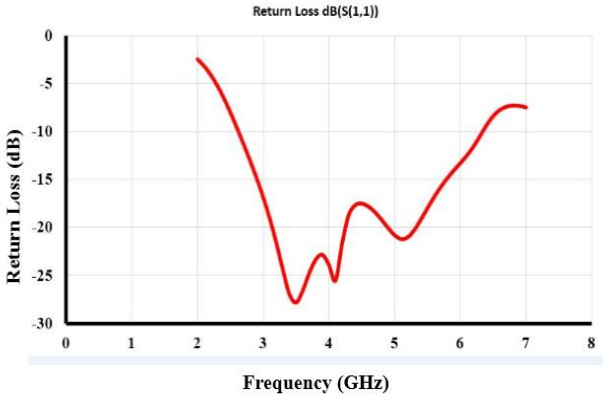

Fig. 3. Return Loss Characterstics

In Fig 4 and 5 the radiation pattern plot of the proposed antenna at different frequencies.

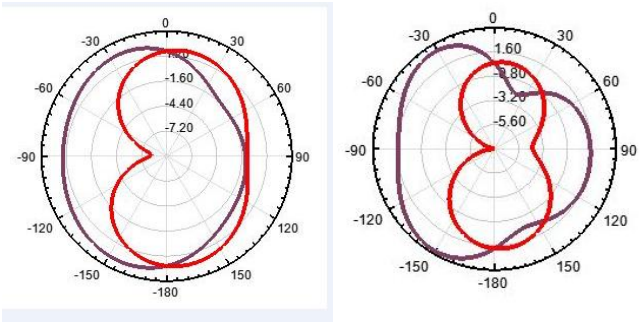

Fig. 4. Radiation Pattern

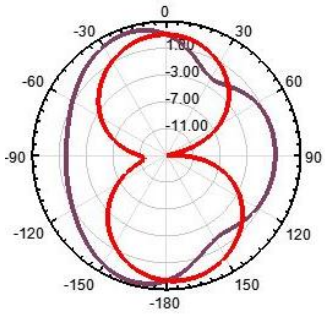

Fig. 5. Radiation Pattern

In Fig 6 and 7 depicts the radiation efficiency and the gain of the proposed antenna.

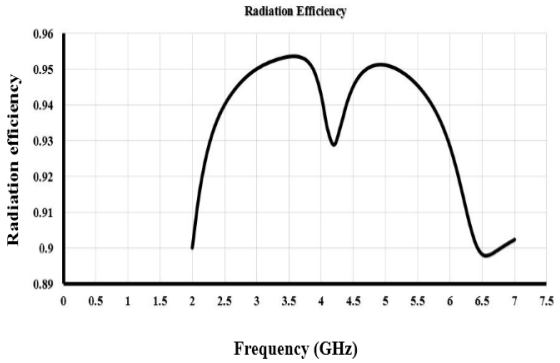

Fig. 6. Radiation Efficiency of the Proposed antenna

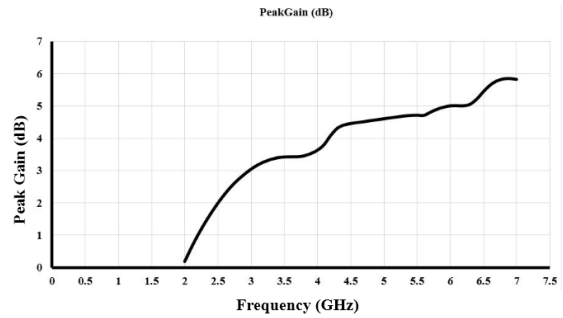

Fig. 7. Peak Gain of the Proposed antenna

IV. CONCLUSIONS

The investigated antenna in the above paper is found to be satisfactorily working in the frequency range of the WLAN frequencies i.e. 3.65GHz, 4.9-5GHz and 5GHz. The proposed antenna is having the return loss of maximum 30dB. It has a gain greater than 2 for the frequency of operation. It has an overall efficiency of 94%.

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