



ICASEMCT
International Conference on Advancements in Smart
Electronics, Materials and Communication Technologies

INTERNATIONAL CONFERENCE

on

**“Advancements in Smart
Electronics, Materials and
Communication Technologies”**

(ICASEMCT-2023)

FEBRUARY 17-18, 2023

CONFERENCE PROCEEDINGS

ISBN No.: 978-81- 954233-1-6

Organized by



Department of Electronics and Communication Engineering

**Swami Keshvanand Institute of Technology,
Management & Gramothan, Jaipur**

icasemct.skit.ac.in

(ICASEMCT-2023)

Table of Contents

| S. No. | Title | Page No. |
|---------------|---|-----------------|
| 1 | A Microstrip Patch Antenna with DGS in Ka Band for 5G Applications | 1-4 |
| 2 | Impact Of Mole Concentration and Well Width on Band Gap and Optical Response of GaInP/AlGaInP Heterostructure | 5-8 |
| 3 | The Electric Power System of the Future Is a "Smart Grid" | 9-12 |
| 4 | Comparative Analysis of Non-Isolated Boost Type DC-DC Converters for PV-based Application | 13-18 |
| 5 | Effects of Parasitic Elements in Microstrip Patch Antenna | 19-23 |
| 6 | VLSI Implementation of Swarm Unit for PSO Algorithm | 24-28 |
| 7 | Hardware Implementation of Notch IIR Filter | 29-33 |
| 8 | Exactly-once Stream Processing, High-throughput and Low-latency with Apache Flink™ | 34-39 |
| 9 | Optimization of energy storage for renewable energy sources: a brief overview | 40-42 |
| 10 | A Review on the Detection of Power Quality Disturbances Using Wavelet Transform | 43-47 |
| 11 | Cloud Based Smart Energy Meter | 48-51 |
| 12 | Hetero-structured Thin Film Solar Cell -An Overview | 52-55 |
| 13 | Innovative Security Technology for KYC Documents Record Maintenance | 56-59 |
| 14 | Analysis of Electro-Optical Parameters for Cobalt Blue High Efficient Organic Light-Emitting Diode Device Structure | 60-66 |
| 15 | Design and Analysis of a Compact Size 4-element MIMO Antenna for Millimeter Wave 5G Communication Systems | 67-70 |
| 16 | Quantum Dots: A Review | 71-77 |
| 17 | Tin oxide (SnO ₂) based Thin Film Transistor: A Review | 78-81 |
| 18 | Design and Development of a Touchless Hand Sanitizer Dispenser Machine | 82-85 |
| 19 | A Study of Deutsch Jozsa Algorithm on Computational Basis | 86-88 |
| 20 | Circularly Polarized Patch Antenna With Gain Enhancement Using Reflector | 89-91 |
| 21 | A Review of Stateless Opportunistic Forwarding Analysis of Latency in Intermittently Connected Networks | 92-98 |
| 22 | RRAM Technology: A Promising Non-Volatile Memory Solution | 99-102 |
| 23 | A Biodegradable Transparent Substrate from Waste Materials towards Flexible and Transient Electronics Applications | 103-106 |

Effects of parasitic elements in Microstrip Patch Antenna

Jain Shubhi

Department of Electronics &
Communication Engineering
Swami Keshwanand Institute of
Technology, Management &
Gramothan
Jaipur, India
shubhijain19@gmail.com

Jain Priyanka

Department of Electronics &
Communication Engineering
ACEIT
Jaipur, India
prija.jain@gmail.com

Choudhary Shivam

Department of Electronics &
Communication Engineering
Swami Keshwanand Institute of
Technology, Management &
Gramothan
Jaipur, India
shivamchoudhary1@hotmail.com

Abstract—In modern era wireless communication is the vast area of research. For wireless communication antenna plays a vital role. In this paper a U-shaped patch antenna is fabricated on FR-4 substrate which has a EBG (Electronic band gap) structure on their ground plane. The simulation is done on HFSS (high frequency structure simulator) software and experimental results are calculated through VNA(vector network analyzer). The experimental and simulated results showed great matching results. In this design parasitic elements are also attached with design and the effects of different shape parasitic elements i.e., triangular, circle, hexagon and square region in the form of return loss (S11) and bandwidth is studied. It shows through the results that effect of parasitic elements improves the results of antenna in return loss(S11) and bandwidth. In all the different kind of shapes of parasitic elements triangular shape element design give the resonant frequency 4.42 GHz experimentally and the simulated frequency is 4.11 GHz which is very good and the bandwidth and return loss for this structure is 5.83 GHz and -40 dB respectively. So, the comparative results show this antenna has Wideband applications for wireless communication from the range of 2.51 GHz to 8.34 GHz.

Keywords—Microstrip patch antenna, HFSS, VNA, parasitic elements, EBG, return loss, Bandwidth

I. INTRODUCTION

Researchers have long been interested in the ultra-wideband frequency range of 3.1 to 10.6 GHz, which is mostly used for wireless and mobile communication [1]. Antennas are crucial to wireless system communication, and the spark discharge experiment in UWB transmission has opened up new possibilities for the development of the technology. Due of its appealing merit and ease of manufacture, this invention is currently offered commercially as public domain. [2-3]. High bandwidth is needed for mobile communication in order for future equipment to be integrated with high performance and deliver results across many bands [4-5]. Slot loaded patch [6], multilayer broadband microstrip antenna [7], multilayer structure [8], multi-banding techniques [9], defaced ground plane structure [10, 22], split ring resonator [11], and multiple slot patch [12] are just a few of the techniques that can be used to obtain broadband techniques of antenna. Meander Antenna, L-shaped line feed, miniaturize patch, and circular ring patch are some examples of antennas. Mutual coupling is increasingly recommended for wireless devices in order to reduce size while increasing efficiency and gain of antennas [17-18]. It reduces side lobes and rear lobes by acting like an artificial conductor.

These are made possible through the placement of metallic conductors [19–21]. In this study, the ground is flawed to enhance antenna performance and size for multiband operations. The metallic ground plane's back side has an etched lattice pattern that is defective to improve the performance and size of the antenna for multiband operations in this paper [22-26].

II. DESIGN OF ANTENNAS

The microstrip patch antenna has been created on a FR4 substrate with a dielectric constant of 4.4, a loss tangent of 0.025, a thickness of 1.6 mm, and an antenna width and length of 18 mm. This antenna's design incorporates a slotted microstrip line and a partial ground plane, as seen in Fig. 1. The further measurements of the antenna are as follows: Lg is 7 mm, q is 3 mm, s is 2 mm, h is 8 mm, c is 1 mm, and p is 6.5 mm. The antenna was modeled using HFSS, and the S11 properties were noted. Additionally, in compliance with industry norms, a PCB mask was used to generate the intended antennas.

The radiation characteristics of the antennas were evaluated by means of the network analyzers HP 8510C VNA and Agilent 8362B PNA. Designing a finite ground structure with a FR4 substrate and 1.6 mm thickness with alterations to a parasitic patch and a rectangular patch in comparison is the basic idea behind this structure. On the 18 x 21 mm² substrate, the ground and the antenna are both modified. The basic assumption is that the active element has a U-shaped geometry with full ground. Many aspects of the ground are influenced by its structure, including scattering brought on by high-frequency signals emitting in undesirable frequency ranges and bandwidth. The earth is used to decrease the influence of radiation's unfavorable bend. Therefore, an EBG (electromagnetic band gap) structure is a part of the proposed ground plane. The ground plane's dimensions can be restricted to 7x18 mm² by utilizing this EBG structure.

Patches in the EBG structure could only be 1mm by 1mm in size. In addition, the effects of the various parasitic element structures on the antenna's performance metrics were investigated. The top copper surface of the double-sided copper FR4 sheet is used to construct the U-shape patch geometry. Additionally used as a feed line is the slotted microstrip line. This slotted strip line transmits as much electricity as feasible. The U-structure patch's limbs were covered with numerous parasitic components are inject