

# Assembly and Testing of Various Microstrip Components

Vidhya.R<sup>1</sup>, Meerabai.B<sup>2</sup>, Sindhuja.N<sup>3</sup> and Dr.K.A.Dattatreya<sup>4</sup>

UG Scholar, Department of ECE, Adhiyamaan College of Engineering, Hosur, TN, India <sup>1,2,3</sup>

Professor, Department of ECE, Adhiyamaan College of Engineering, Hosur, TN, India <sup>4</sup>

**ABSTRACT:** In this microstrips work, design and performance of various types of antennas and microstrip components manufactured using the microstrip technology in S Band is described. It involves choosing a suitable substrate and material. The design involves finding the width and length of microstrip antennas and is done using the software namely HFSS and CEMONE After the antenna is been printed its parameters like radiation pattern, VSWR etc.... are been tested.

**KEYWORDS:** HFSS, FR4, CEMONE, S band.

## I.INTRODUCTION

The technology is been developing as the years pass by. The communication is a two way process of reaching mutual understanding, in which the participants not only exchange information's, news, ideas and feelings but also create and share meaning. In general the communication means of connecting the people or places. In business it is a key function of management. An organization cannot operate without communication between levels, department and employees. Thus the communication is the very important tool in this present scenario. Olden days it was difficult to communicate in some rural areas, but now due to developed technologies its been implemented. Antennas are used for obtaining better communication with transfer of all the information effectively. Older days antennas were very huge in size and mostly used in radio and television broadcast. Nowadays in all the communications such as mobile and cellular, satellite and radars the antennas are used. The vital thing to be considered in the antennas is the frequency, wavelength and its parameters like VSWR, gain, radiation pattern etc... The paper says about the manufacturing and testing of microstripcomponenets like antennas, ring resonator, power divider and couplers. Antenna is a tool used in communication. The manufacturing of the antennas is done using the microstrip technology. In which the antenna is been designed using the high frequency structure simulator, which is one of several commercial tools used for antenna design, and the design of complex RF electronic circuit elements including filters, transmission lines etc.. The design is been printed on the circuit boards by using the microstrip technology.

## II.EXISTINGSYSTEM

In olden days antennas where huger in size and they were not much used in all the areas for communication.antenna is just a part of communication to improve its efficiency In older days the antennas were used in radio and television broadcasting systems.as a size of antenna was huge the materials that were used for manufactured purpose was needed in huge amount. Mostly materials used were metals like Aluminium, copper, stainless steel etc....There was no much testing methodologies in the previous years for testing the parameters of the antenna. Thus the reliability and efficiency of the antennas used in older days were less. Moreover the area in which the antenna is to be placed is also mandatory to be considered. Because if any abstacles are present in the transmission path, then the radiation from the antenna gets diffracted and distracted, thus causing some data or information to be lost.

### **III. PROPOSED SYSTEM**

In this system the antennas are manufactured using the microstrip technology. The first process is designing, which is done by the software called the HFSS (high frequency structure simulator). It is one of the several commercial tools used for antenna design. It was developed by prof. ZontalCendes and his students at Carnegie Mellon University in the year 1989. Its gold standard accuracy, advanced solver and compute technology have made it an essential tool for engineers designing high frequency and high speed electronic components. Then the antennas are manufactured in the circuit board. The circuit board used is known as the substrate, mostly the substrate material used in antennas manufacturing is FR4 (flame retardant). It's a composite material composed of woven fiberglass cloth with an epoxy resin binder that is flame resistant. It's a popular and versatile high pressure thermoset plastic laminate grade with good strength to weight ratios. With near zero water absorption, FR4 is most commonly used as an electrical insulator processing considerable mechanical strength. The antennas are printed on the substrate material. And then they are been tested. The parameters that are been tested are the gain, radiation pattern, VSWR etc. the other micro strip components like power divider, ring resonator and couplers are used. The power divider is used in the division of power exactly into two halves. The ring resonator in the transmission process acts as a add/drop filter in which only particular frequency is been utilized. Antenna coupler is a device connected between transmitter or receiver and its antenna to improve power transfer between them by matching the impedance of the radio antennas feedline.

### **IV. ANALYSIS ON PARAMETERS**

The antenna parameters are to be considered during the designing and manufacturing of antenna. The parameters are gain, radiation pattern, VSWR, losses, directivity, resistivity etc. Directivity is the parameter of an antenna that measures the degree to which the radiation emitted is concentrated in single direction. It measures the power density the antenna radiates in the direction of its strongest emission, versus the power density radiated by an ideal isotropic radiator. Gain combines the antennas directivity and electrical efficiency. Its actually defined as the ratio of power produced by an antenna from far field source on the antennas beam axis to the power produced by a hypothetical lossless isotropic antenna. A measure of how well matched the antenna is to the transmission line or receiver is known as the voltage standing wave ratio (VSWR). Higher values of VSWR indicates more mismatch loss. And its function of reflection coefficient. Antenna impedance is the resistance and reactance seen at the antenna terminals or the ratio of electric to magnetic field at the input. Possibly the gain should be high, VSWR should be low, mostly for many antennas its value is one. And ofcourse the losses value should be null. But somehow there exists some loss values.

### **V. IMPLEMENTATION**

Based on the design the process is implemented. The frequency bands in which the antennas are manufactured mostly are in C, S, L, X, Ku and Ka. Here the antennas are manufactured in C, S and X. The frequency range of S band is 2 to 4 Ghz, C band is 4 to 12 Ghz and X band is 8 to 12 Ghz. The antennas wavelenght depends on the frequency. Higher the value of frequency, lower the value of the wavelenght. And thus the size of the antenna gets reduced.

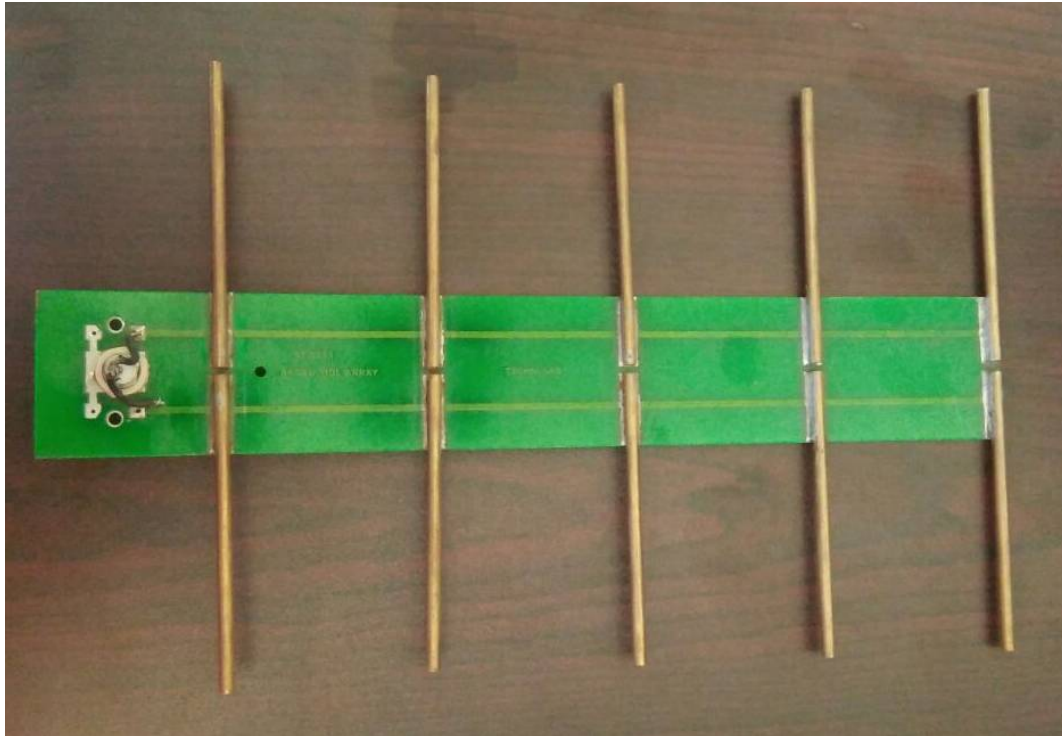


Fig 1: Microstrip Yagi Uda antenna



Fig 2: Microstrip Monopole antenna



Fig 3: Microstrip branch line coupler

## VI.RESULTS

Thus the antennas are very much important in communication. In mobiles there are almost two or three antennas. Everyone has its own purpose. One for Bluetooth, other for Wi-fi, and other for transmitting, and another one for both transmit and receive etc.. The antennas that are been manufactured are dipole antenna, monopole antenna, patch antenna in which there are some types again, yagiuda antenna, horn antenna, array antenna, smart antenna etc.. The other components have also been designed using the microstrip methodology.



Fig 4: Microstrip elements

## REFERENCES

1. James j and P.S. Hall (Eds), Handbook of microstrip antenna, Peter Peregrinus, London, UK, 1989.
2. RameshGarg, Prakash Bartia, InderBahl, ApisakIttipiboon, "Microstrip Antenna Design Handbook", 2001, Norwood.
3. Wentworth M. Stuart, "Fundamentals of Electromagnetic with Engineering Applications", John Wiley & Sons, NJ, USA.