DESIGN OF MICROSTRIP PATCH ARRAY ANTENNA USING LTCC TECHNOLOGY FOR 5 GHz BAND APPLICATIONS

This project report is presented in partial fulfillment for the award of the

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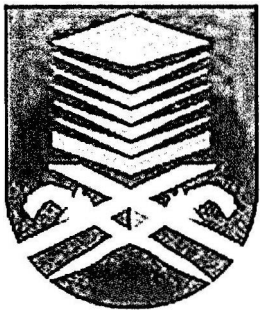

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ABSTRACT

The purpose of this project focuses on the design and analysis of rectangular planar array microstrip antenna with a non-contacting feed. The type of non-contacting feeding used is aperture coupled technique. The antenna concept is based on 5 GHz operating frequency using Low Temperature Cofired Ceramics (LTCC) technology. The antenna design composed of eight layer of substrates using Ferro A6S material with relative permittivity of 5.9.Microstrip patch of the array antenna are printed on the top of substrate which is at layer eight while the feed line is located on the bottom substrate of layer one. The proposed antenna design consist of three design of array antenna which is two, four and six patches of array antenna using aperture coupled feed with eight layer of substrate. The single patch microstrip antenna having eight layer of substrate using aperture coupled feed is also designed as a benchmark for designing those array antennas. All the design is using the same material of substrate which is Ferro A6S. The parameters of patch dimension is varies in order to achieved the desired operating frequency.

The multilayer microstrip patch array antenna was designed and optimized using CST Microwave Studio Suite 2011 software. The simulation result were analyzed and presented in terms of return loss (S_{11}), radiation pattern, gain, directivity, Voltage Standing Wave Ratio (VSWR) and bandwidth. The simulation result for every proposed design will be analyzed and discussed in details.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

According to Webster's Dictionary, an antenna is a metallic device for transmitting and receiving electromagnetic waves. The conducting or dielectric structures called antennas or radiators will help the radiation of the waves into the space effectively. Otherwise, an antenna also can be defined as transition of matching unit between sources and waves in the spaces. In recent years, miniaturized Radio Frequency (RF) electronic devices require advance design to achieve compact design and at the same time will improve the performance of the antenna.

With their several advantages such as low profile, light weight, low cost and compatibility with integrated circuits, microstrip patch antenna is widely used in wireless applications. However, microstrip antenna has major operative disadvantages such as narrow bandwidth and less gain. Therefore, in this project, an array patch antenna design has been proposed. An array antenna design can further increase the gain of the antenna. There are various type of feeding method in microstrip antenna such as microstrip line, coaxial probe, aperture coupling and proximity coupling. Throughout this project, aperture coupled feeding technique have been chosen since there are numerous advantages such as simple structure, wider bandwidth, less conductor loss and better isolation between feed line and radiating element. By using the LTCC technology, this project composed of eight multilayers of substrates.