

A DESIGN OF A COMPACT WIDEBAND MICROSTRIP ANTENNA FOR KU-BAND APPLICATIONS

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Bachelor of Engineering (HONS) in Electrical



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ABSTRACT

The main purpose of this project is to design a microstrip antenna that operates with the operating or resonant frequency at approximately 12.60GHz, in the KU-Band frequency range (10.7GHz-14.5GHz). The antenna should also show a circular polarization with the voltage to standing wave ratio (VSWR) of less than 2 at the operating frequency.

The response that we take into account is the return loss S_{11} and the VSWR. For the simulation process, we used *HP EESof Libra* and *Genesys Eagleware* Computer Aided Design (CAD) simulator to determine the overall response of the designed antenna.

The microstrip antenna is fabricated on RT/duriod[®] 5870 microstrip substrate. The dielectric constant (ϵ_r) is 2.33 and the substrate thickness (h) is 0.5mm.

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INTRODUCTION

1.0 BASIC INTRODUCTION

Antenna is an electronic device used to propagate radio or electromagnetic waves or to capture radio waves [1]. Antennas are necessary to transmit or receive radio signal, radar signal, and television transmission and microwave telephone application. Most antennas for television and radio application consist of metal wires connected to the transmitter and receiver. It provides a transition from a guided wave on a transmission line to a free space wave.

In microwave technology, an antenna has been used in numerous telecommunication systems, namely the radar system and communication. Microwave technology consists of active and passive component arranged to perform useful functions. Most of the criteria of a microwave design can be fulfilled using microstrip technology.

Microstrip is popular because it uses the same fabrication technique as PCBs at low frequencies and has been one of the most popular in antenna design in recent years. The applications of an antenna are increasing in proportional with the wide range of modern microwave system application. Some of their advantages include low cost, ease of fabrication. Reproducibility, lightweight, etc.

The basic function of a patch antenna was first discovered in 1955 [2], since then literally dozens of patch shapes, feeding techniques, substrate configurations, and array geometries have been developed by researchers throughout the world. To date, KU Band applications nowadays include radar and satellite microwave communication in various usage. The basic configuration of a microstrip antenna is a metallic patch (mainly copper) printed on a thin, grounded dielectric substrate. Originally, the element was fed with either a coaxial line through the bottom of the substrate, or by a coplanar microstrip line. This latter type of excitation allows feed networks and other circuitry to be fabricated on the same substrate as the antenna element. The microstrip antenna radiates a relatively