Rectangular Microstrip Patch Antenna Using U-Shape Defected Ground Structure

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Peace and blessings of Allah be upon Prophet Muhammad

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ABSTRACT

This thesis presents a rectangular microstrip patch antenna with U-shaped Defected Ground Structure (DGS) structure. The antenna design is suitable for particular wireless communication application such as WiFi and WLAN. By incorporating the U-shaped Defected Ground Structure (DGS) fabricated on the ground plane FR-4 substrate. The antenna was simulated using Computer Simulation Technology CAD Package and design on a microstrip with relative permitivity of 4.3, substrate and copper thickness of 1.6 mm and 0.035 mm respectively for frequency 2.45GHz using FR4. Vector Network Analyzer (VNA) has been used to measure the fabricated antenna. The results of antenna are very encouraging as it increases the value of bandwidth and return loss (S_{11}). The defected ground structure (DGS) on the ground plane of a microstrip line provides an additional effective inductive component, which enables a microstrip line with very high impedance to be realized and shows slow-wave characteristic.

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CHAPTER 1

INTRODUCTION

This chapter discusses a brief introduction about the background of an overall research project including background, problem statement, objectives, and scope of works and outline of this thesis.

1.1 BACKGROUND

An antenna is a device for transmitting or receiving waves [1]. Microstrip patch antennas offer an attractive solution to compact and ease-low-cost design of modern wireless communication systems due to their many advantages as light weight and low volume, low profile, planar configuration which can be easily made conformal to host surface, low fabrication cost, and the capability of obtaining dual and triple frequency operations [2]. This antenna is low profile antenna and used in high-performance aircraft, spacecraft and missile applications such as in the applications of the wireless communication [3].

Microstrip patch antenna is a type of radio antenna with a low profile, which can be mounted on a flat surface. It consists of a flat rectangular sheet or "patch" of metal, mounted over a larger sheet of metal called a ground plane. The assembly is usually contained inside a plastic radome, which protects the antenna structure from damage. Patch antennas are simple to fabricate and easy to modify and customize. They are original type of microstrip antenna described by Howell [4].