V-Shape and Circular Ring Defect on Rectangular Patch

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Peace and blessings of Allah be upon Prophet Muhammad

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ABSTRACT

This thesis presents a V-shape defect on patch and circular ring defect on the ground plane of a rectangular patch antenna. The antenna design is suitable for wireless communication such as Wi-Fi and WLAN application. The antenna was simulated using Computer Simulation Technology (CST) software. The design was fabricated. This antenna operates at frequency of 2.45 GHz. A FR-4 substrate with relative permittivity of 4.3 was used in this design. The substrate and copper thickness is 1.6 mm and 0.035 mm, respectively. There are two types of antenna involved. The first antenna is a rectangular patch antenna without DGS which means the conventional antenna, and the other one is V-shape and circular ring defect on rectangular patch. The fabricated antenna was measured using vector network analyzer (VNA). The return loss of conventional antenna -16 dB has been improved to -26 dB on the V-shape and circular ring defect. A bandwidth was enhances 2 MHz. The size and shape of the slot affect the resonant frequency of antenna. The defected ground structure (DGS) of a microstrip line provides an additional effective inductive component, which enables a microstrip line to have a very high impedance to be realized hence shows a slow-wave characteristic.

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CHAPTER 1

INTRODUCTION

This chapter consists of a brief introduction to this project including problem statement, objectives, scope of work and outline of this thesis.

1.1 INTRODUCTION

Microstrip antennas are low profile, conformable to planar and no planar surfaces, simple and inexpensive to manufacture using modern printed-circuit technology, mechanically robust when mounted on rigid surfaces, compatible with MMIC designs, and when the particular patch shape and mode are selected, they are very versatile in terms of resonant frequency, polarization, pattern and impedance [1]. It is consists of a radiating patch on one side of a dielectric substrate which has a ground plane on the other side. The patch is generally made of a conducting material of copper.

Major disadvantages of microstrip antennas are their low efficiency, low power, high Q, poor polarization purity, poor scan performance, and spurious feed radiation and very narrow frequency bandwidth [1].

Microstrip patch antennas electrically a bit larger than its physical dimension due to the fringing fields. For a good antenna performance, a thick dielectric substrate having a low dielectric constant is desirable since this provides better efficiency,