

# **DUAL-FREQUENCY SIERPINSKI CARPET FRACTAL GEOMETRY MICROSTRIP PATCH ANTENNA**

**This is presented in partial fulfillment for the award of the Bachelor of  
Engineering (Hons.) Electrical**

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MAY 2011**

## **ACKNOWLEDGEMENT**

First and foremost, Alhamdulillah praise to Allah the Almighty because of His blessings and guidance in giving me inspiration and strength, I lastly manage to finish this project successfully. I would like to express my gratitude's to all who helped me a lot in finishing this project especially to my beloved parents for their support, my auxiliary supervisor Puan Suhaila Subahir, all my lovely housemates and my great friends too.

Great thanks from the deep bottom of my heart for the communication department lecturers for their help and advice during working on this project. Not forget to members of Microwave Technology Center (MTC) and experiment lab that really supports and help me a lot until all this project was done successfully.

Thank you.

## ABSTRACT

This paper presents a design of Dual-Frequency Sierpinski Carpet Fractal Microstrip Patch Antenna. The frequencies operations are 1.26GHz for integrated active radar application and 1.9GHz for GSM application. This patch antenna is designed based on the  $50\Omega$  characteristic impedance for the transmission line model. The size of the antenna is 100mm x 100mm. This antenna is designed on the FR4 substrate with relative dielectric constant,  $\epsilon_r = 5$ , loss tangent,  $\delta = 0.02$  and lastly the thickness used is 1.6mm. The designed is simulated using CST Microwave Software before fabricate. Then the results based on return loss, VSWR and input impedance will be compared between simulation and measurement of the antenna by using Rohde & Schwarz ZVA40 Vector network Analyzer (VNA) 10MHz – 40MHz. The results obtained from the fabricated antenna measurement are shifted from the simulation results. The error percentage obtained from this analysis is that for the 1.26GHz is 6.4% and for frequency 1.9GHz, the percentage is about 7.9%. The bandwidth gained from the analysis also less than 5% for both frequencies.

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# **CHAPTER 1**

## **INTRODUCTION**

### **1.1 BACKGROUND STUDY**

In telecommunication, antenna is really important in transmitting and receiving an electromagnetic wave. The sizes and the shapes of the antenna can be various but still operates based on the same basics principle of electromagnetic. Microstrip patch antenna type is one of the microwaves antennas and the operation of this is still similar to the antenna that operates at lower frequency. The only difference is that the operating frequency range of the microwave antenna is between 1GHz and 30GHz. Microwave antennas are widely used especially in radars and communications field. As there is a rapid growth in telecommunication field nowadays, this has initiated the various antenna researches like an example of this fractal geometry. This fractal geometry consists of many shapes like Koch Island, Sierpinski Gasket, Sierpinski Carpet, Hilbert Curve and Minskowski [1] that has been applied in microstrip patch antenna. This parasitic elements introduced in the basic rectangular patch antenna will produced a multiband antenna.