

I-SHAPED METAMATERIAL PATCH ANTENNA WITH DEFECTED GROUND STRUCTURE (DGS)

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ABSTRACT

This paper presents a I-Shaped Metamaterial Patch Antenna with Defect Ground Structure (DGS), 4.5GHz operating frequency. This frequency is the application for broadband antenna. The construction of I-shaped DGS at ground plane contributes the metamaterial features to the antenna. Conventional antenna and metamaterial antenna has been simulated, fabricated and measured. The simulation design has been done using Computer Simulation Technology (CST) microwave studio and both antenna were fabricated on RO3003 substrate with dielectric constant 3 and 0.75mm height. The proposed of the project is to reducing the antenna size, and the same time, performance of the antenna in term of return loss and directivity not be neglected.

TABLE OF CONTENTS

CHAPTER	LIST OF TITLE	PAGE
	DECLARATION	III
	DEDICATION	IV
	ACKNOWLEDGEMENT	V
	ABSTRACT	VI
	TABLE OF CONTENTS	VII
	LIST OF FIGURES	IX
	LIST OF TABLES	XII
	LIST OF SYMBOLS AND ABBREVIATIONS	XIII
1	INTRODUCTION	1
	1.1 Introduction	1
	1.2 Objective	3
	1.3 Scope of Work	3
	1.4 Problem Statement	4
	1.6 Outline of Thesis	4
2	LITERATURE REVIEW	5
	2.1 Introduction	5
	2.2 Metamaterial	5
	2.3 Defected Ground Structure	9
	2.4 Microstrip Patch Antenna	10
	2.5 Antenna Fundamental	12
	2.5.1 Gain	12
	2.5.2 Directivity	12
	2.5.3 Efficiency	12
	2.5.4 Return Loss	13
	2.5.5 Bandwidth	13
	2.6 Past Work Review	14

CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Left-handed material (LHM) or usually known as metamaterial is the material that has both side, permittivity (ϵ_r) and permeability (μ_r) is negative value, also have a negative index of refraction [1]. From time to time, research continued to find the best way to make antenna become much more better from before. Then metamaterial was found. The challenging part is to make this method from theoretical part into practical application. This method was introduced to overcome the limitation of conventional microstrip patch antenna such as lower gain and narrow bandwidth [2]. Metamaterial also can improve the characteristic of the antenna [3].

Type of antenna used in this design is microstrip patch antenna. Microstrip patch antenna is commonly used as printed antennas in practice. The application for this type of antenna makes it high in demanding. Others factor like low cost, simple structure, and can be operating at the high frequency might be reason of choosing this type of antenna [4]. Microstrip patch antenna widely used in mobile radio and wireless communications [5].

However, microstrip patch antenna had its weakness, like low gain and directivity, small bandwidth, small wavelength and the signals will reflect back to the source. This will produce side lobe and back lobe [2]. Some ways maybe can be uses to settle this problem like increasing the height of the antenna to increase bandwidth , but due