

# **DESIGN OF SIW BASED DIPLEXER FOR LTE APPLICATIONS**

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## ABSTRACT

This paper presents a design of planar diplexer based on substrate integrated waveguide first order single mode filters with circular cavity. The diplexer consists of two filters. The design is based on Substrate Integrated Waveguide (SIW) on a FR-4 substrate fabricated by printed circuit board technique. The dielectric constant of the substrate is  $\epsilon_r = 4.7$ . Firstly, the circular SIW filters on the  $TM_{010}$  mode were designed separately at 2.6 GHz and 2.7GHz. The results of the two filter are obtained with return loss less than -10dB and insertion loss higher than -3dB. Then, the two filters are combined together to work as diplexer. The simulated design is fabricated and measured. The results of the simulation is compared to the measurement taken from fabricated hardware.

## TABLE OF CONTENT

CHAPTER	TITLE	PAGE
	<b>TITLE</b>	
	<b>APPROVAL</b>	<b>ii</b>
	<b>DECLARATION</b>	<b>iii</b>
	<b>ACKNOWLEDGEMENT</b>	<b>iv</b>
	<b>ABSTRACT</b>	<b>v</b>
	<b>TABLE OF CONTENT</b>	<b>vi</b>
	<b>LIST OF FIGURE</b>	<b>ix</b>
	<b>LIST OF TABLE</b>	<b>xi</b>
	<b>LIST OF ABBREVIATIONS</b>	<b>xii</b>
<b>1.0</b>	<b>INTRODUCTION</b>	<b>1</b>
	1.1 INTRODUCTION	1
	1.2 PROBLEM STATEMENT	3
	1.3 OBJECTIVES	3
	1.5 SCOPE OF WORK	4
	1.6 THESIS OUTLINE	5
<b>2.0</b>	<b>LITERATURE REVIEW</b>	<b>6</b>
	2.1 INTRODUCTION TO ANTENNA	6
	2.2 SUBSTRATE INTEGRATED WAVEGUIDE (SIW)	6
	2.3 DIPLEXER	8
	2.4 LITERATURE REVIEW	9
<b>3.0</b>	<b>METHODOLOGY</b>	<b>11</b>
	3.1 INTRODUCTION	11
	3.2 FLOWCHART	11
	3.3 DIPLEXER SPECIFICATION	13
	3.4 NETWORK SYNTHESIS OF SINGLE MODE FILTER IN ADVANCED DESIGN SYSTEM	14
	3.5 COMPUTER SIMULATION TECHNOLOGY (CST)	17
	3.6 DESIGN PROCEDURE	18

# CHAPTER 1

## INTRODUCTION

### 1.1 INTRODUCTION

In last few decades, rapid development in communication system such as GSM, WLAN, LTE, and satellite applications have introduced many wireless product for millimeter-wave applications [1]. In those systems, low cost, high performances, and high integration are important design considerations. The diplexer is one of the key components in a transceiver front end and greatly affects system's performance [2]. The waveguide diplexers are well studied and widely used in wireless communication systems, due to their excellent performances [3-4]. It is usually designed based on a waveguide or metal cavity with excellent performances [5-6]. However, the designs suffer disadvantages such as being bulky, costly, and difficult to fabricate, etc [7]. It is difficult to integrate waveguide elements into a planar circuit, and the transition from a waveguide to planar integrated circuits would substantially degrade the performance. Therefore, how to design a bandpass filter and diplexer with low cost and with high performance is currently of great interest [8-13].