

WIDEBAND RING RESONATOR BANDPASS FILTER (WRRBPF)

This thesis is presented in partial fulfillment for the award of the Bachelor of Electrical Engineering (Honors) (Communication)



NUR FATEHAH BT ASRI
Faculty of Electrical Engineering
UNIVERSITI TECHNOLOGY MARA
MALAYSIA (UITM)
40450 SHAH ALAM
SELANGOR DARUL EHS AN

AKCNOWLEDGEMENT

In the Name of Allah

Most Gracious Most Merciful

Firstly, I like to express my deep sense of gratitude and appreciation toward my supervisor Pn Kamariah Bt Ismail for allowing the chance to work under her guidance, opinion and full support in completing this thesis. Without her this work might not be done successfully.

Hereby, I would like to express my deepest thank to my family for their help, support and encouragement in completing this course and thesis.

My sincere and special thanks to all my friends and lecturers especially the member of Microwave Technology Centre (MTC) for the support and providing access required materials for the completion of this thesis.

Nur Fatehah Bt Asrt
Faculty of Electrical Engineering
University Technology MARA
Shah Alam

Nov **2009**

ABSTRACT

Micrdstrip Bandpass Filter (BPF) is one of the essential devices in communication system either at the transmitter and receiver. Thus, the quality of BPF is very important. This work highlights the design, simulation and the fabrication of a ring resonator bandpass filter for wideband application. The operating frequency range is 1- 9 GHz with the center frequency of 5.77GHz using Rogers Duroid 4350 substrate with, $\epsilon_r = 3.48$. The design, simulation and EM analysis were carried out using commercial software. Measurements of the prototype were carried out using Vector Network Analyzer (VNA). It was observed that the measured and the simulation results were quite similar.

TABLE OF CONTENTS

- Declaration
- Acknowledgement
- Abstract
- Table of Contents
- List of Figures
- List of Tables
- List of Abbreviation

CHAPTER 1

INTRODUCTION

- 1.1** Background
- 1.2** Problem Statement
- 1.3** Objectives
- 1.4** Scope of the Project
- 1.5** Thesis Organization

CHAPTER 2

LITERATURE REVIEW

- 2.1** Microstrip Line
 - 2.1.1 Substrate Materials
 - 2.1.2 Losses in Microstrip

- 2.2** Scattering Parameter (S-Parameter)
 - 2.2.1 Response of S-parameter

2.2	Types of Design Filter	13
2.2.1	Butterworth	13
2.2.2	Tschebyscheff	14
2.4	Filter Configuration	15
2.4.1	End-Coupled, Half-Wavelength Resonator Filters	15
2.4.2	Parallel-Coupled, Half-Wavelength Resonator Filters	15
2.4.3	Hairpin-Line Bandpass Filters	16
2.4.4	Interdigital Bandpass Filters	17
2.4.5	Comblines Filters	18
2.5	Genesys Software	20

CHAPTER 3

METHODOLOGY

3.1	Flowchart	21
3.2	Choose Substrate and Structure	22
3.3	Calculation of the Filter	23
3.4	Design and Simulation	25
3.4.1	Design the lumped element	25
3.4.2	Find the width and length of the resonator	26
3.4.3	Design the distributed element	28
3.5	Fabrication Process	32
3.5.1	Layout of the filter	32
3.5.2	The prototype of the WRRBPF	33
3.6	Measurement Process	34