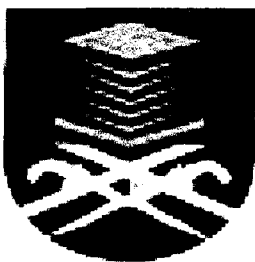


DESIGN OF INTERDIGITAL BANDPASS FILTER

This project is presented as a fulfillment for the award of the
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ABSTRACT

The purpose of this project is to design, fabricate and measure the characteristics of a microstrip interdigital bandpass filter operating at microwave frequencies using computer-aided design package. The filter was designed using conventional circuit simulator and electromagnetic circuit simulator such as *HP Eesoft Libra* and *GENESYS Eagleware*. Before this, other types of filters with different topologies have already been designed by other students such as bandpass filter, Chebyshev, Butterworth low-pass and parallel coupled bandpass filter.

The filter specification calls for a 0.5 dB passband ripple at a center frequency of 5 GHz with a bandwidth of 8%. The filter has an insertion loss not exceeding 6 dB in the passband and more than 20 dB in the stopband.

Rogers RT/Duroid microstrip laminates microstrip with a 0.5 mm substrate thickness and a relative permittivity of 2.33 were used to build the filter. Measurements were carried out using a vector network analyzer at the Microwave Technology Center. The filter was synthesized based on the above specification. Results from simulation were compared with the measurements from vector network analyzer to determine the successfulness of the design.

TABLE OF CONTENTS

DECLARATION	ii
ACKNOWLEDGEMENT	iii
ABSTRACT	iv
LIST OF FIGURES	ix
LIST OF TABLES	xi
LIST OF ABBREVIATION	xii

CHAPTER	PAGE
1 INTRODUCTION	
1.1 Introduction	1
1.2 Objectives	1
1.3 Microstrip circuit	2
1.3.1 The Quasi TEM Analysis	3
1.3.2 Substrate Materials	5
1.3.2.1 Hard Substrate	5
1.3.2.2 Soft Substrate	6
1.3.3 Losses in Microstrip	6
1.3.3.1 Conductor Loss (α_c)	6
1.3.3.2 Dielectric Loss (α_d)	7
1.3.3.3 Radiation Loss (α_r) and the Quality Factor Q	7
1.4 Parallel Coupled Microstrip Lines	7
1.4.1 The Geometry of Microstrip	7
1.4.2 Effective Permittivity	8

CHAPTER 1

INTRODUCTION

1.1 Introduction

Microwave bandpass microstrip filters are commonly used in communication systems, satellite and radar. The most obvious application of a filter is to reject unwanted frequencies while allowing others to pass through. Microstrips are printed circuits operating in the microwave range, over the gigahertz region of the electromagnetic spectrum. A Chebychev is chosen although Butterworth response has a nice, smooth passband but the passband edges typically aren't as sharp as those of a Chebychev filter design with the same number of elements. A Chebychev has ripple but it has the advantage of being sharper than Butterworth filter of similar complexity.

1.2 Objective

The purpose of this project is to design, fabricate and measure the characteristics of a microstrip interdigital bandpass filter. The filter has a 0.5 dB passband ripple at a center frequency of 5 GHz with 8% of bandwidth. The filter insertion loss must not exceed 6 dB in the passband and more than 20 dB in the stopband.

HP EEs of Libra and *GENESYS Eagleware* were used to simulate the filter. These softwares are easy to use and produce very accurate results. Simulation results from the *GENESYS Eagleware* were compared with the measurement taken from vector network analyzer.