COPLANAR WAVEGUIDE STUB FILTER AT 2.4 GHZ 3RD ORDER

AIZAT MURTAZA BIN ABAS

FACULTY OF ELECTRICAL ENGINEERING

UNIVERSITI TEKNOLOGI MARA

MALAYSIA

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ABSTRACT

This thesis describes the design and characterization a bandpass filter (BPF) realized using coplanar waveguide (CPW) stub structures. The demonstrated CPW-BPF is centered at 2.4 GHz and is in 3rd order form. FR4 Epoxy laminate with permittivity ε_r=5.4 and substrate thickness of 1.6mm is used in the implementation of the filter.

The filter is simulated by using CAD software and Computer Simulation Technology (CST) software and then the design is fabricated on FR4 Epoxy laminate. The Coplanar waveguide stub filter is then measured using Vector Network Analyzer which then shows good agreement with the simulation results.

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CHAPTER 1

INTRODUCTION

1.1 PROJECT OVERVIEW

Filters are an extremely crucial element in the evolution of communication engineering. One of the most commonly used filters is bandpass filter. Bandpass filters are found in DSL and cable Internet technologies, fiber optic communication, satellite communication, digital image processing, and noise cancellation. Due to this importance, there has been an incredible amount of research and expansion on the design theory and construction of bandpass filters. There is an increasing demand for compact and cost effective filters.

In the past, most of the filters are realized using the microstrip technology. During the past few years, coplanar waveguide (CPW) structure has gained popularity in the design of microwave and millimeter wave filter circuits due to its own advantages. It was shown based on the past studies, that coplanar waveguides can be considered as a good alternative to microstip lines [1]. In the millimeter frequency range especially many studies has proven that coplanar waveguide is a good alternative to be considered apart from microstrip lines [2]-[9].

In a coplanar waveguide design, the entire conductors are located on the same plane. This eliminates the need for ground connections through via-holes and also reverses side processing. This significantly reduces cost and more practical. CPW facilitates easy shunt as well as series surface mounting of active and passive devices.