DESIGN OF A BANDPASS FILTER AT K-BAND FREQUENCY

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ABSTRACT

Nowadays, the world telecommunication become more complex and need a high frequency in transferring the information. There are many new technologies have been developed in electronics communication such as Wireless Local Area Network and Bluetooth technology. The development in wireless communication systems has presented new challenges to design and produce high-quality miniature component. Therefore, many designers have recently received much attentions and been developed to reduce the volume and weight of communication circuits and equipments. Filters are essential component in the system for excellent operation of communication system and technology. Compact filter structures are available in demand for space-limited operations. It is known that there are many advantages in applications requiring a filter with features such as compact, low mass and low loss. Therefore, an edge coupled filter is designed to produce a compact, low mass and low loss filter.

This thesis highlights the assembling of edge-coupled bandpass filter for radar application. The filter is design at K-band frequency that operates from 20 GHz to 20.3 GHz having a Chebyshev response. The filter is simulated by using Genesys design software and was implemented on Rogers 5870 substrate. The performance evaluation of the filter was compared between simulation and measurement results. Based on the experimental analysis from the project, it is observed that the shapes of both insertion loss and return loss are the same as in the theoretical. From the simulation, the value of S11 gives about -37.8 dB, while it is recorded almost -30dB from the measurement analysis. S21 values gives about -4.102dB from the simulation results and -23.178dB from the measurement.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Modern microwave technology is an exciting and dynamic field, due in large part to the advances in modern electronic device technology and the explosion in demand or voice, data and video communication capacity. Prior to this, microwave technique was the nearly exclusive domain of the defense industry. The recent and dramatic increase in demand for communication systems such as mobile phone, satellite communications and broadcast video has transformed this field to the commercial and consumer market. As a result, the diversity of applications and operational environments has led, through the accompanying high production volumes, to tremendous advances in cost-efficient manufacturing capabilities of microwave products. This, in turn, has lowered the implementation cost of a new wireless microwave service. Inexpensive handheld GPS navigational aids, automotive collision-avoidance radar and widely available broadband digital service access are among these. Microwave technology is naturally suited for these emerging applications in communications and sensing, since the high operational frequencies permit both large numbers of independent channels for uses as well as significant available bandwidth per channel for high speed communication [1].

The current trend in microwave technology is toward circuit miniaturization, high-level integration and cost reduction. In this dissertation, the performances of