

**DESIGN A BUTTERWORTH MICROSTRIP HAIRPIN BAND PASS
FILTER FOR WIRELESS LOCAL AREA NETWORK (WLAN)
APPLICATION.**

**Project report presented in the partial fulfillment for the award of the
Bachelor of Electrical Engineering (Hons)
UNIVERSITI TEKNOLOGI MARA**



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ACKNOWLEDGEMENTS

Assalamualaikum w.b.t

This project was made possible by the efforts and talents of many people. First of all, I would like to express gratitude to God almighty, with hr blessing and love; we managed to complete our project proposal.

A million of thanks to our supervisor PM Norasimah Bt Khadri who truly support, help, and guide us in any situation that we face in doing our project. Their advice and assistance in the preparation of this thesis is highly appreciated.

Never forgotten to my beloved parents who truly believe and support me in what ever I do and always pray for our success in all fields that I involved. Also a lot of thanks for my friend's always give us advice or great opinion. We also appreciated the entire another wrote books that we used as a reference in order to finished our project. Thanks to who ever that supports, helps and encouraged us that we forgot to mention their name here.

Last but not least, to Prof. Dr. Zaiki Bin Awang and his staffs of Microwave Technological Centre for providing all the facilities to carry out this project.

ABSTRACT

This paper focuses on designing microstrip hairpin band pass filter for Wireless Local Area Network (WLAN) application. The Wireless Local Area Network (WLAN) is operated at frequency 2.4GHz until 5GHz. The filter is designed for a centre frequency of 3GHz and it operates within 10% operating bandwidth. The design specifications of the filter include insertion loss is not exceed than -3dB and the return loss is more than -20dB. The filter was simulated with seventh order elements of the Butterworth. It includes the design, simulation, fabrication and measurements. The filter was designed using Genesys software and implemented on RT/Duroid.

The simulation result precise to the specification result that about 100% in term of Center frequency (f_c), High cut-off frequency (f_H) and Low cut-off frequency (f_L). The simulation result for return loss is -25 dB and the insertion loss is -2.451 dB which meet the specification requirement. About 5% value of return losses and 18.3% value of insertion losses difference between specification and simulation results which meet of specification requirement. Result for the comparison between specification and measurement is about 5% different of Center frequency (f_c), 8% different of High cut-off frequency (f_H), and about 4% different of Low cut-off frequency (f_L). The measurement for return loss is -20.66 dB and the insertion loss is -2.918 dB which also meet the specification requirement, it about 3% for return losses and 1.3% for insertion losses.

The objective to design, fabricate and measure the characteristics of a microstrip hairpin band-pass filter is achieved. A comparison between the measurement and simulation is presented that the measured response strongly influenced by fabricated processing.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

In wireless communication systems, microwave filters are vital components and play important roles in many microwave applications. Band pass filters are essential components utilized in the microwave and wireless communication systems, which are usually found in both transmitters and receivers to discriminate between wanted and unwanted signal frequencies [1]. They are used to select or reject Microwave signals within assigned spectral limits. Evidently, the quality of band pass filters is extremely important to acquire precise desired frequency.

Microstrip is a popular type of planar high frequency due to ease of fabrication and its ability to integrate with other devices. RT/Duroid is one of the microstrip laminates that are suitable in designing hairpin band-pass filter [2].

In this paper, a Butterworth microstrip hairpin band pass filter for Wireless Local Area Network (WLAN) application is presented. The Wireless Local Area Network (WLAN) is operated at frequency 2.4GHz until 5GHz. The design specifications of the filter include a pass band ripple of 0.01 dB, pass band insertion loss must not exceed 3dB while the pass band return loss was to be more than -20dB and a minimum attenuation of -20dB at 3GHz.