

**SYNTHESIS AND DESIGN OF A GENERALIZED
CHEBYSHEV LOW PASS PROTOTYPE MICROWAVE
FILTER**

**This is presented in partial fulfilment for the award of the
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ABSTRACT

The function of the filter is to pass only those frequencies in the assigned operating range of the system and reject all others. The lumped element prototype filters are used as a basis for the realisation of distributed commensurate transmission line filters. The lumped element prototype filters are converted into distributed transmission line filters by using Richard's Transformations. Microwave filters can be designed by approximation equations or by exact synthesis method.

This thesis presents the synthesis and design of a Generalized Chebyshev low-pass prototype microwave filter. The synthesis of prototype networks is done by using Maple V mathematical software. It was then analysed and optimised on HP/ESSOFT Libra software. The prototype was designed with a cut-off frequency of 4 GHz, stopband attenuation of 60 dB and a return loss of 20 dB.

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CHAPTER 1

INTRODUCTION

1.1 Microwave Theory

A microwave filter is a two- port network used to control the frequency response at a certain point in a microwave system by providing transmission at frequencies within the passband of the filter, and the attenuation in the stopband of the filter. Typical frequency responses include low-pass, high pass, bandpass and band-stop characteristics. Filter performance is shown in Figure 1.1.1 .The graph shows the attenuation of a microwave signal passing through the filter as a function of the frequency. At frequencies below the filter passband, the attenuation is high and most of the microwave signal is attenuated. In a narrow frequency range about the center frequency 10GHz, ± 10 MHz on either side of the center frequency , almost all the signal passes through the filter. At frequencies above the passband , most of the signal is attenuated.

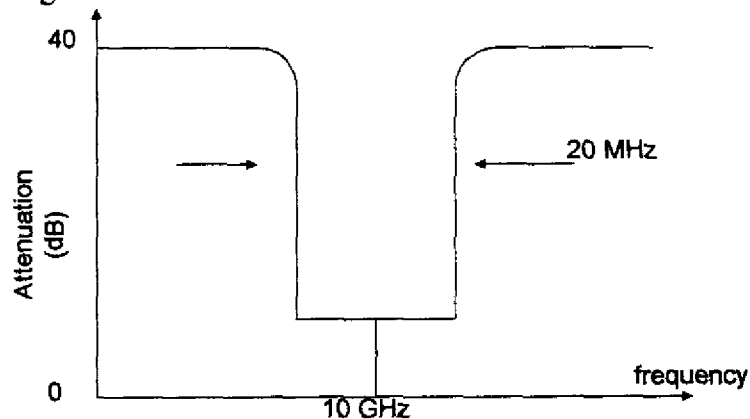


Figure 1.1.1 Filters