SINGLE-SIDE-COUPLED RING RESONATOR FILTER

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ABSTRACT

In this paper, a Single-Side-Coupled Ring Resonator circuit is designed and fabricated. This filter has a ring structure and has one coupled-line at one side of the ring. The filter which is designed at a centre frequency of 2GHz has one pole and is considered as a 1st order filter. This filter is simulated by mean of CAD and to obtain the desired response, the length and the width of the filter element are tuned. After the desired response is obtained, the simulated filter is fabricated on Fire-Retardant 4 (FR-4) substrate. This FR-4 has a permittivity of 5.4 and a thickness of 1.6 mm. The dimension of the fabricated filter is 6.6 x 6.7 cm. The fabricated filter is then measured to verify the theory. The measured result shows that the filter return loss is -17.14 dB and the filter has a minimum insertion loss of -3.98 dB. This filter has been verified by simulation and measurement.

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CHAPTER 1

INTRODUCTION

1.1 INTRODUCTION

Recently, communication field has become wider and requires a wide band frequency to transmit data. Thus, filters are designed to reject the unwanted frequency signal and ensure good transmission of the wanted frequency [1]. In circuit theory, a filter is an electrical network that alters the amplitude and phase characteristics of a signal with respect to frequency. Ideally, a filter will not add new frequencies to the input signal, nor will it change the component frequencies of that signal, but it will change the relative amplitudes of the various frequency components and their phase relationships. As the world change, the current trends require smaller devices which operate in the microwave frequency band to avoid spectral congestion in lower frequency bands. Low insertion loss, high return loss and high rejection band are the desired characteristics of a good filter. The difference types of filter have the difference features such as:

i. **High-pass filters** that preferentially pass high frequency signals.
ii. **Low-pass filters** that preferentially pass low frequency signals and do not pass higher frequency signals.