FREQUENCY SHIFTING OF RING FILTER USING LUMPED CAPACITORS

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ABSTRACT

Frequency shifting of ring filter is designed by adding four lumped capacitors to its initial topology. The capacitors value used is 8.2pF. The purpose of the capacitors used in this design is to shift the center frequency of the initial filter to lower frequency and result in a smaller filter as compared to the one realized directly at the desired frequency. The filter is realized FR4 substrate with a relative dielectric constant of 5.4, thickness of 1.6 mm and loss tangent of 0.02. The layout, simulation and measurement result are presented in this paper.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDY

In modern communication systems, microwave bandpass filter appears as one of the most critical point since they required hardened constraints in terms of selectivity, out-of-band rejection, insertion loss, and size reduction. Microstrip filters play an important role in many RF applications. As technologies advances, more stringent requirements of filters are required. One of the requirements is the compactness of filters [1].

Within this context, the use of ring resonator has been reported in many works because of their advantages towards size reduction, due to dual mode propagation [2-5]. Due to the advantages of low fabrication cost and simple design, microstrip ring resonators have found wide usage in the development of various microwave devices [6]. In recent years, there have been many reports on the application of the ring resonators to bandpass filters [7]-[9]. Numerous works dealt with this topic [10]-[11] but most of them focussed on technological solutions while neglecting synthesis which is all the same the base of effective and flexible design. Work has been followed by the development of synthesis equation to tune the center frequency of the resonator [12]. This allows one to predict in advance the value required for every element in the resonator for a desired passband response.