

DUAL-BAND RING RESONATOR FOR NARROWBAND APPLICATION

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In the name of ALLAH

Most Gracious and Most Merciful

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ABSTRACT

Microwave filters have important role in many wireless and communication systems such as satellite and cellular mobile network. In such kind of systems, factors such as compact size, low cost, light weight, high performance, and low loss in designing of microwave filters are of primary importance. In comparison with waveguide filters, microstrip filters are smaller and in such applications mentioned before there are needs to have smaller microstrip filters. In this paper, a combination of rectangular-shaped ring resonator with three quarter wavelength coupled lines and a stub is proposed to produce a very narrow dual band filter response. The resonator, which in pairs to a high impedance microstrip line, will generate two operating modes in the desired band. The consequences in varying the length of tuning stubs and gap size between tuning stubs and ring resonator have been studied. Realized on FR4 microstrip substrate, the filter is centred at 2.6GHz and 3.4GHz. The measurement results are found to be equivalent with the simulation.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND OF STUDIES

Nowadays the increasing demand for wireless communication applications requires RF components to operate in multiple separated frequency bands in order to access different services with a single multimode terminal. In addition, high speed wireless Local Area Networks (LAN's) and other services such as WiMAX and ISM operate at frequencies between 2 GHz and 6 GHz with bandwidths up to 100 MHz. In order to accommodate this multi-band RF signal reception and transmission into a single RF transceiver, a dual-band or multi-band RF front-end circuit is required [1-3]. This can be achieved by switching between separate filters, but such an approach leads to a high number of filter components, thus enlarging circuit size and increasing power consumption.

In such environment, dual-bandpass filter is one of the key components in the frequency transceiver circuits that must be designed according to the stringent specifications such as selectivity, size and cost. Many structures of bandpass filter were developed for a dual-band response such as ring resonator and step impedances resonators will produced dual band effects and require additional parameters that need to be considered throughout the simulation process. Cheng [2] describes a dual-band filter with half-wave step-impedance resonator in a classical comb-line configuration,