UNIVERSITI TEKNOLOGI MARA

RECONFIGURABLE DUAL-BAND BANDPASS FILTER WITH CAPACITIVE ELEMENT INSERTION

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ABSTRACT

The novel Reconfigurable Dual-Band Bandpass Filter with Capacitive Elements Insertion is presented. This filter design is applicable for L band military radar application. These paper proposed of designing a microstrip reconfigurable dual-band bandpass filter based on an existing dual-band bandpass filter topology using High Frequency Structural Simulator (HFSS). This basic filter topology involve couple-line with transmission line forming a dual-path that produce a dual-band frequency response. The center frequency of this filter design was stated at 2 GHz. Overall, the basic dual-band bandpass filter operated at center frequency 1.35 GHz and 2.71 GHz. A pair of additional lumped capacitor converted into distributed element is added at suitable location on the basic design in order to shift the frequency response. The center frequency of this filter design was shifted from 2 GHz to 1.73 GHz by varied capacitance value in order to reconfigure the frequency response.

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CHAPTER 1

INTRODUCTION

1.1   OVERVIEW

Various methods were used in designing dual-band bandpass filter such as two narrowband bandpass filter [1] combined together. The designs having different centre frequencies produce a dual-band response. A stepped-impedance resonators was then applied to obtain its higher-order resonances to form the first and second passbands [2], [3]. The semiconductor varactor method is one of the popular method used in designing a tunable dual-band band pass filter (BPF) due to its compact size, low cost and easy to be integrated with other system [4]–[6].

This filter also able to design by using implemented on ferroelectric devices [7], [8] piezoelectric transducer [9], and p-i-n diodes [10] can be used as well in designing a reconfigurable and tunable dual-band bandpass filter. However, these techniques must be injected with voltage as an active element to be tunable filter. Another design technique of tunable filter also using by stub techniques which is just consist of redesigning the topology size.