

# **Study of Capacitance Effect for Dual Open Circuit Band-Stop Resonator**

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## ABSTRACT

Microstrip Dual Open Circuit Stub filters is fabricated using FR4 substrate to investigate the effect of capacitance in series with the resonator stub. The FR4 substrate thickness is 1.6mm and has a relative dielectric constant of 5.4. The capacitance is added at the resonator open ends such as to tune the Dual series stub filter from 2GHz frequency to 1.36GHz frequency. It is known that to see the effect of shifting, the electrical length of the resonator is being altered from its original value. Different values of capacitors are simulated with the dual open circuit stub filter design to see the effect shifting to the left of the  $S_{12}$  value. Frequency are practically shifted from right to left with increasing the value of capacitor and the suitable value is selected for measurement. From the project, the tuning percentage achieved is 32%. Thus, it shows better selectivity can be achieved by the designer to obtained different centre frequencies for other uses.

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# CHAPTER 1

## INTRODUCTION

### 1.1 BACKGROUND OF STUDY

Rapid development of modern communication systems leads to increasingly rigid specifications that put a tough challenge to RF engineers. In addition, filters with high performance, compact size, and low cost are highly desirable for modern era in the next generation of many wireless systems [1]. Filters with tunable characteristics attracted a lot of researchers and designers since filters with tuning capacity provide solutions to many commercial and military applications. Tuning filter can be widely used in vast application such as multi-band systems, radio band systems and wideband radar systems. In other words, tuneable filters are modern RF components that can vary the frequencies behaviour in one filter. These filters produce more than one desired response in a controllable manner [2]. With a reconfigurable filter, it also can reduce the complexity of a system to introducing a filter bank.

In this paper, design of dual-open circuit stub band-stop filter is presented. The studies of capacitance are implemented to the basics of tuning filter. In order to alter the frequency, values of a filter that need to be changed is the electrical length. In a RF world, the higher the operating frequency thus the smaller the device application will be. To design such that a device in a lower RF frequency but need a compact size, a change in the electrical length will provide a compact size device and also the user can experience a better selectivity of operating frequencies.