

Dual-Band Bandpass Filter with Rectangular Dumbbell Shaped Defected Ground Structure

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ABSTRACT

In this thesis, a design of rectangular dumbbell shaped defected ground structure (DGS) is presented to enhance the response of an existing design of a dual-band bandpass filter topology. The filter design is based on a parallel-coupled lines connected to transmission lines forming a single ring that exhibits a dual-band response with high selectivity with the existence. The filter can be characterized as impedances of the transmission line represented by Z_r , even-mode, Z_{oe} and odd-mode, Z_{oo} . The variety of size and positions of the DGS were studied with the analysis on the response of the filter. An insertion of a rectangular dumbbell shaped DGS in this topology enhances the response with center frequency given at 2 GHz using Taconic, TRF-45 material. The dimension and position of the dumbbell shape is improved individually, situated at the ground plane. The simulated and measured aftereffects of the DGS insertion are analyzed to validate the concept.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

Recently, development of dual-band radio frequency circuit increased in various wireless communication applications. Various techniques have been applied by researchers in designing RF front ends components such as filter in order to improve the performance and minimizing the sizes. One of the techniques is to use a Defective Ground Structure (DGS). There are various DGS shapes that have been employed in the filter designs such as square, rectangular, circular, rings, spiral and many more. Every shape of the DGS has its own attributes to enhance the response of a filter. The dimension of the DGS plays an important role for effective. A limited rejection band and passband can be accomplished alongside slow-wave characteristics by designing and etching a DGS on the ground plane.