MULTILAYER DUAL-BAND BANDPASS FILTER

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ABSTRACT

This paper presents a dual-mode dual-band bandpass filter design using multilayer technology. The filter structure is based on parallel couple-line directly connected to a transmission line and parallel connected with another similar connection, creating a dual-path topology. The topology consists of characteristic impedances of the transmission line which is represented as *Zr* and even- and odd-mode characteristics impedance of the couple-lines, *Zoe* and *Zoo*. These impedances are the controlling parameter to control the dual-band filter response concentrating on the bandwidth and separation between the passbands. The multilayer technique improves the rejection-band and separation between the two passband, which is vital for a dual-band bandpass filter response. The filter was designed at 2 GHz using microstrip technology on FR-4. The result show the passband of the dual-band filter is centered at 1.59 GHz and 2.41 GHz. Simulated and measured result are presented throughout this paper to validate the design.

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CHAPTER 1

INTRODUCTION

1.1 BACKGROUND

In general, filter is a two-port device that allows only a certain frequency in the passband to pass through and to block other frequencies in the stopband. It is one of the most important passive components used in Radio Frequency (RF) and microwave subsystems to obtain a precise frequency response. Filters are used widely in military or civilian communication systems and they are used to control the frequency response of a device, provide a means of channel separation in frequency division multiplexing systems, remove harmonics in oscillators or amplifiers, and are employed for noise reduction and to reject signals at particular frequencies [1].

Basically, there are four types of filters which describe by its frequency characteristic which is low-pass, bandpass, high-pass, and band-stop. This can be illustrated in figure 1. In low pass filter, all signals below the cut off frequency, f_c are allowed to pass through while all the signals above f_c are blocked. High pass filter is the conversion of low pass filter. In bandpass filter, a frequencies ranging from f_1 to f_2 are allowed to pass through while a bandstop filter rejects the frequencies ranging from f_1 to f_2.