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CPW ULTRA-WIDEBAND BANDPASS FILTER USING DEFECTED GROUND

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ABSTRACT

In this work, we are trying to develop a new filter that have good in-band and out-band and wideband property. The main part of this filter is a parallel-coupled microstrip-coplanar waveguide (CPW),an rectangular ring is made up on the ground of the substrate, and an parallel coupled CPW is placed on the top of the substrate, it is utilized for enhancing the in-band performance and decreasing the reflection coefficient. This configuration provides a very simple and compact filter configuration.

KEYWORDS: coplanar waveguide(CPW),Defected Ground,

INTRODUCTION

For modern microwave filters, Small size, high performance and low cost are the most basic demands., Design and implementation of UWB filters started commercially in 2002 when FCC allocated unlicensed band from 3.1 to 10.6 GHz , The key part of this filter structure is a parallel-coupled microstrip-coplanar waveguide (CPW), an rectangular ring is fabricated on the ground of the substrate, and an parallel coupled CPW is fabricated on the top of the substrate, it is utilized for enhancing the in-band performance and decreasing the reflection coefficient, and using the slot at the center of the single mode resonator for sharpening the band performance. The main part of the filter has parallel coupled Microstrip lines .In this filter using the rectangular ring at the ground. [2][1]. simulation were performed on the microstrip [5]. The substrate is gml1032 used which has thickness h is 0.762mm and relative permittivity $\in_r$ is 3.2.

DESIGNINING OF FILTER

Figure 1 shows the design of the ultra wide band BP filter with centre frequency 6.85 GHz. The top surface has been converted in to the coplanar waveguide and the bottom aperture has been also changed to ring structure. It is having an MMR in the middle of two similar aperture-backed parallel-coupled microstrip lines. size of the MMR is equal to one quarter-wavelength 6].

The CPW dimensions are measured with the help of transmission line calculator, in the present study using CPW at the top of the structure as shown in Fig.2. This filter having the overall length of the filter is one and half guided wavelength. The backed ring width is approximately 1mm and the length is equivalent to $\lambda_{g0}/2$ and twice gap between the two coupled lines.The structure was analyzed and optimized with MicroStripes *ver* 7.0 [5]. The parameters are listed in Table1. The upper side CPW shows the tight coupling between the parallel coupled lines [7].

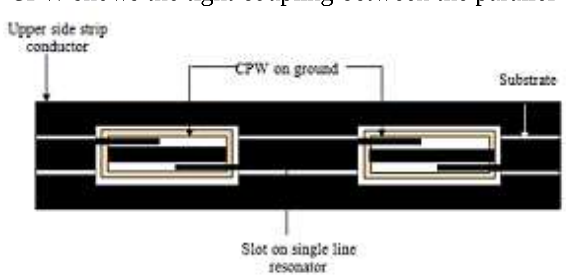

Figure 1: Ultra-Wideband Filter Using Coplanar waveguide and ring structure at ground

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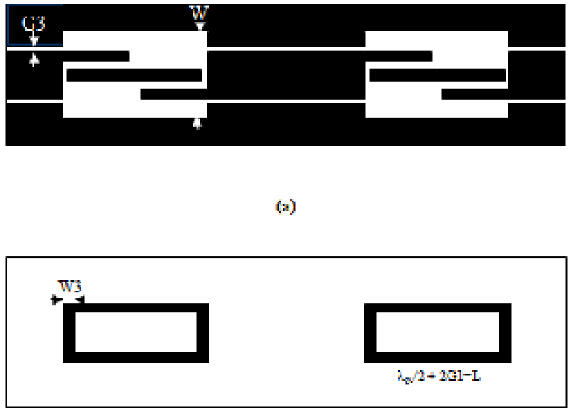


(b)

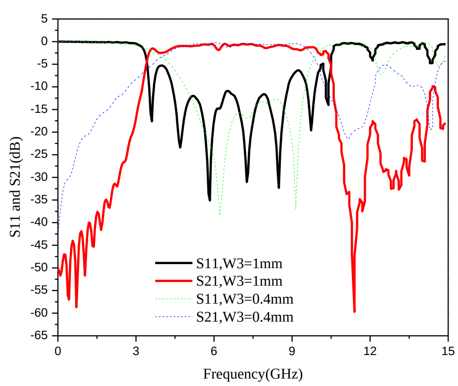
Figure 2: UWB bandpass filter (a) Top View (b) Back view

Dielectric substrate	Thickness of substrate: 0.762 mm Metal film: 10 μm Cu,εr: 3.2							
50 ohm line mm	Width is 1.8 , Length is 5							
Filter dimensions	$\lambda_{g0}/4$	W	W_1	W_2	W_3	G_1	G_2	G_3
	6.55	3.3	0.5	0.5	1	0.15	0.2	0.1

Table 1: Optimized dimensions of the proposed filter

RESULTS AND ANALYSIS

For getting S11 less then -10dB (that was the requirement), is change the width of the back side rectangular ring. The result is shown in fig.3, with same length of the coupled line 6.55mm.the band is getting wide and insertion loss in the whole band is less then -1dB and the upper and lower cutoff are very sharp for width is equal to 1 mm and good out of band performance has been achieved. Back side rectangular ring with width 1mm is considerable. Simulated results are fulfill the requirement of the outdoor limit that was specified by the FCC [3,4]



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CONCULISION

In this paper a parallel coupled coplanar waveguide with rectangular rings on the back side of the substrate are used for achieving the UWB. From the simulated results total band 3.3 to 10.1 has been covered. The simulated insertion loss is 1.0dB at the center frequency 6.85 GHz. The maximum return loss is -35dB. The proposed filter exhibited good passband and out-of band performance.

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