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COMPARATIVE STUDY OF PCML AND CPW BAND PASS FILTER FOR UWB APPLICATIONS

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ABSTRACT

Here the comparative study of Parallel coupled and CPW band pass filter for UWB applications is proposed. Defected ground technique is used for size reduction. firstly designed a defected parallel coupled band pass filter at the center frequency and then we apply a CPW on the same structure and then compare the result of these two.

KEYWORDS: Bandpass filter, parallel coupled microstripline (PCML), Backside Aperture, Defected ground,CPW

INTRODUCTION

Small size and low cost and easy fabrication are the most fundamental demands in today's modern microwave filters. There has been considerable research going on developing ultra-wideband (UWB) The Federal Communications Commission (FCC) in the USA has permitted unlicensed use of UWB band from 3.1–10.6 GHz with 110% fractional bandwidth at 7.5 GHz for Indoor and handheld systems in 2002 [1][4].We are trying to compare two filter of same structure. so the proposed designs are compact, planar, simpler, all the simulation done on the HFSS tool [5]. The substrate is Gilgml1032 used which has thickness h = 0.762mm and relative permittivity ϵ_r = 3.2.

DESIGNINING OF PCL FILTER WITH DEFECTED GROUND

PCML Filter [6] with defected ground is shown in fig 1. ground slot width is nearly λgo/8 and its length is one half wave lengths long(Fig.3(a)).aperture T back side is for increasing the coupling [1][2].All the dimensions are same except the width of slot on ground is calculated and shown in table 1.

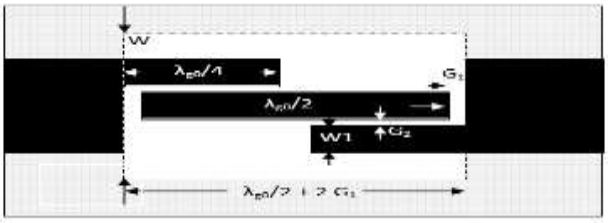

Fig. 1: Parallel coupled line filter with defected ground

Input/output lines(50 ohm microstrip line)	Width: 1.8 mm Length: 5 mm				
	$\lambda_{g0}/4$	W1	W	G_1	G_2

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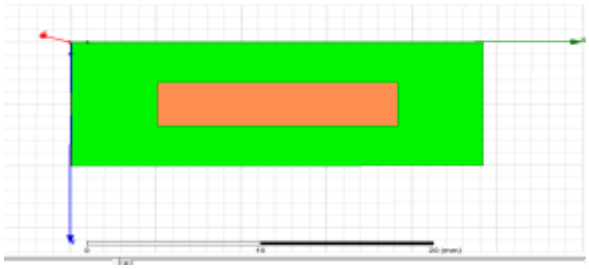
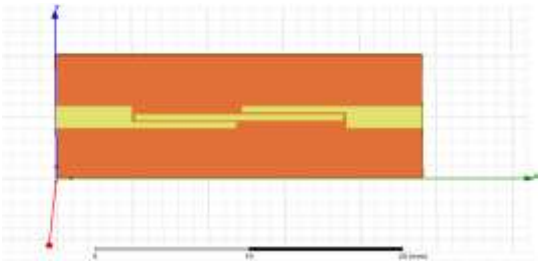
Optimized Filter dimensions	6.85 mm	0.5 mm	3.5 mm	0.2 mm	0.15 mm

Table 1: Dimensions of filter with defected ground



(a)



(b)

Fig. 2: PCML filter with defected ground
(a)Bottom view (b) Top view

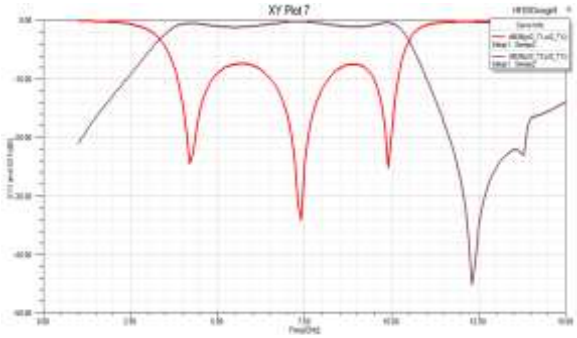


Fig 2(c) : Simulated result with defected ground

figure 2(c) shows the simulated result of this filter, result shows maximum return loss of PCML filter with defected ground is -34.0798dB at 7.4GHz.The simulated band width of the filter is from 4.2GHz to 9.9GHz. We got bandwidth only 5.5 GHz whereas UWB bandwidth should be 7.5 GHz

DESIGNINING OF CPW FILTER WITH DEFECTED GROUND

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 λg0/2 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

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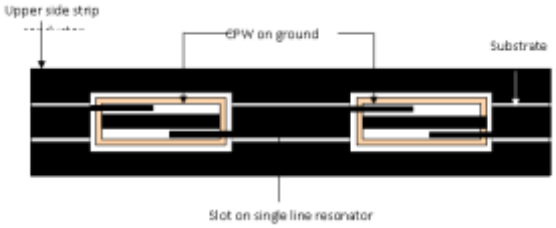

Figure 3: Ultra-Wideband Filter Using Coplanar waveguide and ring structure at ground

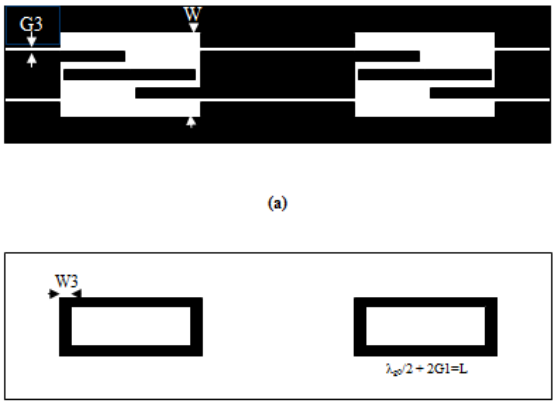

Figure 4: UWB bandpass filter (a) Top View (b) Back view

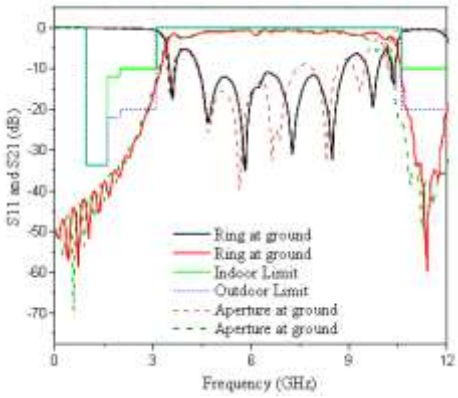

Fig.5 Simulated result with defected ground

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]

CONCULISION

In this paper the design and analysis of Ultra wide band, parallel coupled microstrip line and CPW bandpass filter is proposed. The bandwidth of the proposed filter has been enhanced by using CPW. The main key feature of the filter is the having good in band and out off band performance using the defected CPW structure that is very compact i.e.24.1mm in size. and exhibits all the CPW advantages.

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