International Journal of Modern Engineering Research (IJMER)
www.ijmer.com Vol.2, Issue.2, Mar-Apr 2012 pp-479-482 ISSN: 2249-6645

Shielded Micro machined Micro strip Lines Form Ultra-Wideband Band pass Filters

Nasreddine Benahmed[1], Nadia Benabdallah[2], Kamila Aliane[1], Fethi Tarik Bendimerad[1]

[1]Department of Telecommunications, University Abou Bekr Belkaid-Tlemcen, P. O. Box 119, (13000) Tlemcen, Algeria

[2]Department of Physics, Preparatory School of Sciences and Technology (EPST-Tlemcen), Tlemcen, Algeria

ABSTRACT

Using the method of moments (MoM) the analysis and the design of a compact ultra wideband (UWB) bandpass filter using shielded micromachined microstrip lines are presented. The design of the UWB filter is based on the use of impedance steps and coupled-line sections. The center frequency around 6.85 GHz was selected, the bandwidth is between 4-10 GHz, the insertion-loss amounts to around 0.02 dB and the return loss is found higher than 20 dB in a large frequency range (4.8-9 GHz). For the selected center frequency and on a substrate with a dielectric constant of 11.7, the micromachined microstrip filter is only $0.1 \times 0.5 \times 17.45$ mm in size.

Keywords **- Analysis and design, compact filter, micromachined microstrip filter, MoM method, ultra wideband bandpass filter.**

I. INTRODUCTION

Today's microwave and millimeter-wave markets are driving three important requirements: low cost, performance and small size. Silicon micromachining has been applied to microwave and millimeter-wave circuits in many ways since its introduction in the late 1980s. Micromachining, or sculpting crystal Si can be made using either orientation dependent (anisotropic) or orientation-independent (isotropic) etchants. Silicon micromachined, dielectric membrane supported structures, such as antennas, transmission lines and filters have shown improved performance and have extended the operating range of planar circuits to W-band frequencies and beyond [1-3]. In addition, silicon micromachined-based packaging provides a high isolation self-package without the need for external carriers or external hermetic shielding. This method of circuit integration provides a comprehensive technique to opportunity for an order of magnitude or more reduction in the size, weight and cost of planar circuits, which can have a major impact on radar and communications applications in the military, commercial and space arenas.

Micromachining techniques can be applied to any semiconductor substrate, but the use of Si substrate layers as the foundation of the micromachined structure has major advantages in cost and the direct integration of SiGe and CMOS circuits. High resistivity Si also has mechanical, thermal and electrical properties that compare well with the best ceramics, and as a result has been successfully demonstrated as the substrate of choice in three-dimensional integrated circuit [4]. Cost comparisons have been made for simple circuit applications and show one- and two-orders of magnitude cost reductions over the same circuit packaged in ceramic. Circuit integration based on micromachined fabrication technology promises to be the key to achieving the very demanding cost, size, weight and simplicity goals required for the next advances in communications and radar systems commercial, space and military applications.

Since the Federal Communications Commission (FCC) released the unlicensed use of ultra-wideband (UWB: 3.1 to 10.6 GHz) wireless systems in February 2002 [5], many researchers have started exploring various UWB components, devices, and systems [6], [7]. As one of the key circuit blocks in the whole system, the UWB bandpass filter (BPF) has been studied through the use of the matured filter theory [8] and other techniques [9], [10]. On the basis of impedance steps and coupled-line sections as inverter circuits, several works were interested in the design of planar broadband filters (using microstrip, striplines and CPW [11]) with low loss, compact size, high suppression of spurious responses, and improved stopband performances [11], [12].

In this article, we are interested in the study of an ultra