Calculation of Capacitances of Symmetrical Triple Coupled CPW Transmission Lines and Multilayer CPW Broadside Coupled Lines Balun

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Abstract

The accurate estimate of values of electromagnetic parameters are essential to determine the final circuit speeds and functionality for designing of high-performance integrated circuits and integrated circuits packaging. In this paper, the quasi-TEM capacitances per unit length analysis of symmetrical triple coupled Coplanar Waveguide (CPW) transmission lines and CPW broadside coupled-line balun are successfully demonstrated using the COMSOL Multiphysics®. We specifically illustrate two electrostatic models of open three interconnected lines with two levels system. Figure 1 shows cross section of symmetrical triple coupled CPW transmission lines. Figure 2 shows the contour plot for the first designed model which its results compared to the conformal mapping method and potential integral formalization method in this paper. Indeed, excellent agreement with results from the previous methods is demonstrated. Figure 3 shows the cross section of CPW broadside coupled-line balun. Figure 4 shows the potential distribution of the second designed model the CPW broadside coupled-line balun which is recently developed by the authors using the finite element method. Also, we determine the quasi-static spectral for the potential distribution of the developed integrated circuits.

Keywords: Finite element method, Capacitances, IC Interconnect, CPW transmission lines.

Reference

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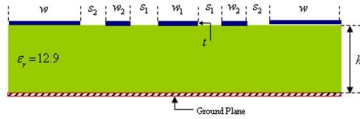
Figures used in the abstract

Figure 1. Cross section of symmetrical triple coupled CPW lines.

Figure 1: Cross section of symmetrical triple coupled CPW transmssion lines.
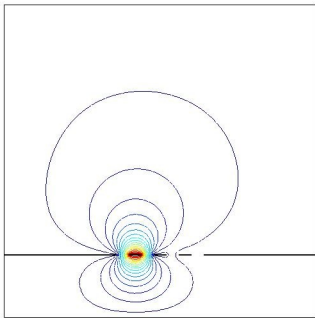

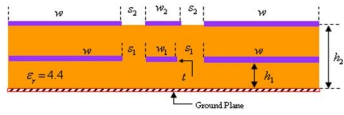**Figure 2**: Contour plot Cross of symmetrical triple coupled CPW transmission lines.

Figure 2. Cross section of CPW broadside coupled-line balun.

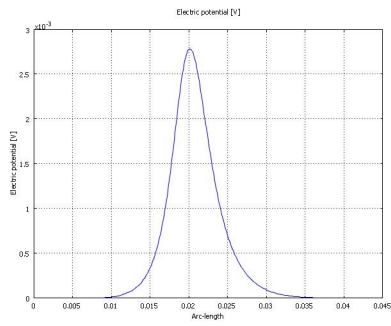**Figure 3**: Cross section of CPW broadside coupled-line balun.

Figure 4: Potential distribution of CPW broadside coupled-line balun.