Abstracts

Efficient analysis of microstrip-coupled nonradiative dielectric (NRD) resonators for hybrid integrated circuits

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Nonradiative dielectric (NRD) resonators have been recently known as excellent stabilizing components for the design of a new class of oscillators based on hybrid integration of planar circuits and NRD-guides. However, an accurate characterization of such a component is needed in order to develop efficient computer-aided-design programs. In this paper, a hybrid planar integrated circuit comprising an NRD resonator is accurately modeled and is coupled to input and output planar microstrip circuits by means of long slots located on the top ground plane of the NRD structure. A reciprocity approach is used to solve the coupling problem between the resonator and microstrip lines. A modal expansion of the field equations has been applied to the NRD resonator in obtaining its rigorous field expressions. Finally, a transmission-line analysis is proposed for the structure, and scattering parameters have been calculated for different slot positions. Results are discussed for various parametric effects on coupling and Q-factor characteristics.

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