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Accurate closed-form formulas for the electromagnetic parameters of 50 Ω micromachined microstrip directional couplers

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Abstract :

This article presents analytical expressions for the electromagnetic parameters (even- and odd-mode characteristic impedances (Z0e, Z0o) and coupling coefficient k) of micromachined microstrip directional couplers (MMC) at characteristic impedance of 50 Ω. The analytical expressions can be deduced from rigorous analyses using method of moments (MoM) analysis and curve-fitting techniques. An analysis can be readily implemented in modern CAE software tools for the design of microwave and wireless components. This study presents accurate and suitable general expressions for all 50 Ω micromachined microstrip directional coupler having a coupling coefficient between 5 and 50 dB. A micromachined directional coupler operating at 60 GHz will be designed to demonstrate the usefulness of these design equations.

Key Words :

Analytical expressions, EM parameters, Micromachined branch line coupler, Micromachined line, MoM results, Shielded membrane microstrip line (SMM).