Abstracts

Full-Wave Spectral-Domain Computation of Material, Radiation, and Guided Wave Losses in Infinite Multilayered Printed Transmission Lines

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A unified solution for full-wave computation of losses in a general multilayered planar transmission line is presented. It includes material losses (dielectric and conductor losses), losses due to radiation leakage, and losses caused by leakage of power to source-free characteristic modes (surface wave or waveguide modes, for example) of the multilayered geometry. A spectral-domain moment method is used with the Galerkin testing procedure. Significant modification of the conventional spectral-domain analysis of planar transmission lines is necessary in enforcing proper boundary conditions in the Galerkin testing procedure and, what is more important, is accounting for poles and branch cuts in the complex Fourier transform domain in order to rigorously account for the different loss mechanisms discussed above. Results for a few representative geometries, namely strip and/or material loss in a microstrip line and a slotline, surface parallel plate mode leakage loss in a conductor-backed slotline and a two-layer stripline, and radiation loss in a single and a coupled stripline at the interface between two infinite mediums, are presented to demonstrate these various loss effects.

❑ Return to main document.