

Abstracts

Analysis and Design of Microstrip-Slot Line for Phase Shifting Applications

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This paper describes the analysis and design of printed phase shifters based on the microstrip-slot line and, as a special case, the microstrip line. A spectral-domain analysis is presented where the necessary Green's functions are formulated using the transmission matrix technique. The nonreciprocal characteristics for single and multilayer structures are studied. Microstrip-slot in a multilayer structure of ferrite and high-dielectric material is found to have considerably more nonreciprocity than microstrip-slot or microstrip in a single layer structure. Over $65^\circ/\text{cm}$ is predicted for certain optimized designs. This, in addition to the 50 Ω design capability of the line, make the microstrip-slot line a suitable choice for phase shifting applications. A multilayer microstrip-slot line was constructed on a rectangular ferrite toroid. Differential phase shifts of roughly $45^\circ/\text{cm}$ were measured over a 6.0-8.5 GHz frequency range. These results are in good agreement with the analysis.

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