Abstracts

Double Dielectric-Slab-Filled Waveguide Phase Shifter

F. Arndt, A. Frye, M. Wellnitz and R. Wirsing. "Double Dielectric-Slab-Filled Waveguide Phase Shifter." 1985 Transactions on Microwave Theory and Techniques 33.5 (May 1985 [T-MTT]): 373-381.

A field theory method based on the orthogonal expansion into eigenmodes is presented for the design of double dielectric-slab-filled waveguide phase shifters with linearly tapered sections. Prototypes of 90° differential phase shift with reference to a corresponding empty waveguide of the same length achieved typically about ±4° phase error and less than -30-dB input reflection within ±5-percent bandwidth, for WR 102-band (7-11 GHz) through WR 28-band (26.5-40 GHz) waveguides. Design curves for differential phase shifts of 12.25°, 22.5°, 45°, 90°, 180°, and 270° are given. Utilizing the differential phase compensation effect of the dispersive behavior of the dielectric-filled and empty reference waveguides, the phase error is only ±1° within ±8.5-percent bandwidth. Further investigations include composite phase shifters, mechanical lateral displacement, and tolerance influences. An experimental 90° phase shifter for 14-GHz midband frequency shows good agreement between theory and measurements.

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