Abstracts

Optimum Design of Waveguide E-Plane Stub-Loaded Phase Shifters

J. Dittloff, F. Arndt and D. Grauerholz. "Optimum Design of Waveguide E-Plane Stub-Loaded Phase Shifters." 1988 Transactions on Microwave Theory and Techniques 36.3 (Mar. 1988 [T-MTT]): 582-587.

Novel broad-band low-insertion-loss E-plane stub-loaded rectangular waveguide phase shifters are designed with the method of field expansion into normalized eigenmodes, which includes higher order mode interaction between the step discontinuities. Computer-optimized three-stub prototypes of 90° differential phase shift with reference to an empty waveguide of appropriate length, designed for R140-band (12.4-18 GHz) and R320-band (26.5-40 GHz) waveguides, achieve typically ± 0.5° phase shift deviation within about 20 percent bandwidth. For two-stub designs, the corresponding values are about + 2.5°/ -1° and 17 percent. Both designs achieve minimum return loss of 30 dB. The theory is verified by measurements at a compact R120-band (10-15 GHz) waveguide phase shifter design example milled from a solid block, showing measured insertion loss of about 0.1 dB and about + 2.5°/ -0.5° phase error between 10.7 and 12.7 GHz.

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