Abstracts

Field Theory Design of Rectangular Waveguide Multiple-Slot Narrow-Wall Couplers

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A compact narrow-wall multiple-slot coupler suitable for inexpensive and very accurate metal-etching manufacturing techniques is proposed and optimized. A computer-aided design theory based on the method of field expansion of eigenmodes considers the effects of finite insert thickness and higher order mode interaction, step discontinuities, and changes in width. Computer-optimized design data for --20-, --8.34-, and --3-dB couplers in the R140-waveguide band (12.4--18 GHz) are given. These data are transferable into other common waveguide bands, e.g., R620 band (50-75 GHz), by suitable frequency scaling calculations. A metal-etched 12-slot coupler prototype for a midband frequency of about 15 GHz achieves a ±1-dB bandwidth of the --3-dB coupling of about 3.2 GHz together with a measured isolation of typically 35-40 dB (minimum 25 dB at the band limits). The measurements show good agreement with theory.

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