Abstracts

Fabrication and characterization of micromachined rectangular waveguide components for use at millimeter-wave and terahertz frequencies

J.W. Digby, C.E. McIntosh, G.M. Parkhurst, B.M. Towlson, S. Hadjiloucas, J.W. Bowen, J.M. Chamberlain, R.D. Pollard, R.E. Miles, D.P. Steenson, L.S. Karatzas, N.J. Cronin and S.R. Davies. *"Fabrication and characterization of micromachined rectangular waveguide components for use at millimeter-wave and terahertz frequencies." 2000 Transactions on Microwave Theory and Techniques 48.8 (Aug. 2000 [T-MTT]): 1293-1302.*

The fabrication and characterization of micromachined reduced-height air-filled rectangular waveguide components suitable for integration is reported in this paper. The lithographic technique used permits structures with heights of up to 100 /spl mu/m to be successfully constructed in a repeatable manner. Waveguide S-parameter measurements at frequencies between 75-110 GHz using a vector network analyzer demonstrate low loss propagation in the TE/sub 10/ mode reaching 0.2 dB per wavelength. Scanning electron microscope photographs of conventional and micromachined waveguides show that the fabrication technique can provide a superior surface finish than possible with commercially available components. In order to circumvent problems in efficiently coupling free-space propagating beams to the reduced-height G-band waveguides, as well as to characterize them using quasi-optical techniques, a novel integrated micromachined slotted horn antenna has been designed and fabricated, E-, H-, and D-plane far-field antenna pattern measurements at different frequencies using a quasi-optical setup show that the fabricated structures are optimized for 180-GHz operation with an E-plane half-power beamwidth of 32/spl deg/ elevated 35/spl deg/ above the substrate, a symmetrical H-plane pattern with a half-power beamwidth of 23/spl deg/ and a maximum D-plane cross-polar level of -33 dB. Far-field pattern simulations using HFSS show good agreement with experimental results.

❑ Return to main document.