Abstracts

A finite ground coplanar line-to-silicon micromachined waveguide transition

J.P. Becker, Y. Lee, J.R. East and L.P.B. Katehi. "A finite ground coplanar line-to-silicon micromachined waveguide transition." 2001 Transactions on Microwave Theory and Techniques 49.10 (Oct. 2001, Part I [T-MTT] (Mini-Special Issue on Electrical Performance of Electronic Packaging (EPEP))): 1671-1676.

Circuits operating in the terahertz frequency range have traditionally been developed using hollow metal waveguides, which, due to the small wavelength at these operating frequencies, must be correspondingly small in cross section. As a result of the high cost of conventional precision machining of such small waveguides, alternate fabrication methods continue to be explored. Silicon micromachining has been suggested as a potential means to produce waveguides in a more cost-effective manner for operation at these frequencies. This paper presents a transition structure that couples the popular finite ground coplanar transmission line to a W-band silicon micromachined waveguide, forming a fully micromachined module. The waveguide is formed via bulk micromachining using a wet etchant, resulting in a diamond cross section. The consequences of utilizing a diamond waveguide in place of the more common rectangular waveguide are considered and potential means of developing rectangular-walled waveguides in silicon are noted. A Ka-band microwave model of a similar transition to a conventional rectangular waveguide is also demonstrated.

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