67
Accession number:12711767
Title:2.5D Micromachined 240 GHz Cavity-Backed Coplanar Waveguide to Rectangular Waveguide Transition
Authors:Vahidpour, M. (1); Sarabandi, K. (1)
Author affiliation:(1) Dept. of Electr. Eng. & Comput. Sci., Univ. of Michigan, Ann Arbor, MI, United States
Source title:IEEE Transactions on Terahertz Science and Technology
Abbreviated source title:IEEE Trans. Terahz. Sci. Technol. (USA)
Volume:2
Issue:3
Publication date:May 2012
Pages:315-22
Language:English
ISSN:2156-342X
CODEN:ITTSBX
Document type:Journal article (JA)
Publisher:IEEE
Country of publication:USA
Material Identity Number:GR96-2012-003
Abstract:A novel cavity-backed coplanar waveguide (CBCPW) to rectangular waveguide transition having a 2.5D geometry compatible with micromachining fabrication technique is presented. This transition makes use of a short-circuited pin (as opposed to a suspended probe) in conjunction with resonant sections of CPW line over the broad wall of a reduced height waveguide segment to facilitate impedance matching. Although the bandwidth of this transition is smaller than the standard suspended probe transitions, its fabrication at submillimeter-wave and terahertz bands is rather straightforward and does not require assembly of many small parts with very high precision. The design procedure starts from an equivalent circuit model which is then fine-tuned using a full-wave approach. A silicon micromachining process for the fabrication of the proposed transition is presented. To validate the design and demonstrate the feasibility of the fabrication process, a prototype transition operating at 240 GHz is fabricated and tested. It is shown that a back-to-back transition prototype at 240 GHz provides less than 1 dB of insertion loss over more that 17% fractional bandwidth. It is also shown that the measured S-parameters of the back-to-back transition are in good agreement with the simulation results. The microfabrication process and associated tolerances allows for scaling the dimensions and frequency of operation to THz frequencies.
Number of references:32
Inspec controlled terms:coplanar waveguides - equivalent circuits - micromachining - rectangular waveguides - short-circuit currents - S-parameters - submillimetre wave devices
Uncontrolled terms:2.5D micromachined 240 GHz cavity-backed coplanar waveguide - rectangular waveguide transition - micromachining fabrication technique - short-circuited pin - CPW line - waveguide segment - impedance matching - probe transition - submillimeter-wave band - terahertz band - S-parameters - back-to-back transition - microfabrication process - equivalent circuit model - full-wave approach - silicon micromachining process - frequency 240

GHz

Inspec classification codes:B1310 Waveguides and striplines - B2560B Semiconductor device modelling and equivalent circuits

Numerical data indexing:frequency 2.4E+11 Hz

Treatment:Practical (PRA); Experimental (EXP)

Discipline:Electrical/Electronic engineering (B)

DOI:10.1109/TTHZ.2012.2191150

Database:Inspec

IPC Code:B81C1/00; H01L29/00; H01P3/00