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Accession number:WOS:000305389600023

Title:Dielectric probes for submillimeter and terahertz-wave range instrumentation and characterizations

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Source title:MICROWAVE AND OPTICAL TECHNOLOGY LETTERS

Abbreviated source title:MICROW OPT TECHN LET

Volume:54

Issue:9

Issue date:SEP 2012

Pages:2095-2098

Language:English

ISSN:0895-2477

Document type:Article

Publisher:WILEY-BLACKWELL, 111 RIVER ST, HOBOKEN 07030-5774, NJ USA

Abstract: In this letter, a new set of silicon probes, at submillimeter and terahertz frequency range, for I/O connectivity and instrumentation applications are introduced.The designed probes are optimized for testing of planar silicon-based integrated circuits using newly introduced network analyzers, e.g., a PNA-X. The probes have been optimized for different frequency windows matched to the standard metallic rectangular waveguides (WR-2, WR-4, and WR-6) corresponding to the frequency band of 110-500 GHz and higher. The probes comprised of highly resistive silicon channel waveguides, which are tapered on both sides laterally and vertically. The side of the probes which is coupled to the WR waveguide is tapered laterally and the other end which is used to couple the signal to or out of the sample under the test is tapered vertically with an angle of 54.6 degrees. The probes are pressed (side-coupled) on the sample under the test. The probing system consisting of the input and output tapers and a channel silicon waveguide as the sample under the test are designed and simulated using HFSS v.12 for three windows of frequencies including 110-170, 170-260, and 325-500 GHz. The simulation results show that the insertion loss and return loss are lower than 3 dB and higher than 15 dB, respectively; which are much better than the losses of commercially available high frequency probes. (C) 2012 Wiley Periodicals, Inc. Microwave Opt Technol Lett 54:2095-2098, 2012; View this article online at wileyonlinelibrary.com. DOI 10.1002/mop.27003

Number of references:9

Main heading:Engineering; Optics

DOI:10.1002/mop.27003