

241

Accession number:20123315335424

Title:A 15-50-GHz quasi-optical scalar network analyzer scalable to terahertz frequencies

Authors:Grichener, Alex (1); Rebeiz, Gabriel M. (2)

Author affiliation:(1) Agilent Technologies, Santa Rosa, CA 95403, United States; (2) Department of Electrical and Computer Engineering, University of California at San Diego, San Diego, CA 92093, United States

Corresponding author:Grichener, A.(agrighener@gmail.com)

Source title:IEEE Transactions on Microwave Theory and Techniques

Abbreviated source title:IEEE Trans. Microwave Theory Tech.

Volume:60

Issue:8

Issue date:2012

Publication year:2012

Pages:2622-2633

Article number:6217287

Language:English

ISSN:00189480

CODEN:IETMAB

Document type:Journal article (JA)

Publisher:Institute of Electrical and Electronics Engineers Inc., 445 Hoes Lane / P.O. Box 1331, Piscataway, NJ 08855-1331, United States

Abstract:A 15-50-GHz two-port quasi-optical scalar network analyzer consisting of a transmitter and receiver built in a planar technology is presented. The network analyzer is based on a Schottky-diode multiplier and mixer integrated inside a planar antenna and fed differentially by a coplanar waveguide transmission line. The antenna is placed on an extended hemispherical high-resistivity silicon substrate lens. The local oscillator signal is swept from 3 to 5 GHz and high-order harmonic mixing in both the up- and down- conversion mode is used to realize the RF bandwidth. The network analyzer has a dynamic range of > 50 dB in a 1-kHz bandwidth, and was successfully used to measure frequency-selective surfaces with $f_{\text{inf}} = 20, 30, \text{ and } 40$ GHz and a second-order bandpass response. Furthermore, the system was built with circuits and components for easy scaling to millimeter-wave frequencies, which is the primary motivation for this work. © 1963-2012 IEEE.

Number of references:30

Main heading:Electric network analyzers

Controlled terms:Antenna arrays - Coplanar waveguides - Lens antennas - Mixers (machinery) - Schottky barrier diodes - Slot antennas

Uncontrolled terms:Bandpass response - Coplanar waveguide transmission line - Dynamic range - Frequency-selective surfaces - High order harmonics - High-resistivity silicon substrate - Local oscillator signals - Microwave imaging - Millimeter wave frequencies - Planar antennas - Planar technology - Quasi-optical - RF bandwidths - Schottky diode mixers - Second orders - Terahertz frequencies - Transmitter and receiver

Classification code:706 Electric Transmission and Distribution - 714.2 Semiconductor Devices and Integrated Circuits - 714.3 Waveguides - 716 Telecommunication; Radar, Radio and

Television - 816.2 Plants and Machinery for Plastics and Other Polymers

DOI:10.1109/TMTT.2012.2201951

Database:Compendex

Compilation and indexing terms, Copyright 2012 Elsevier Inc.