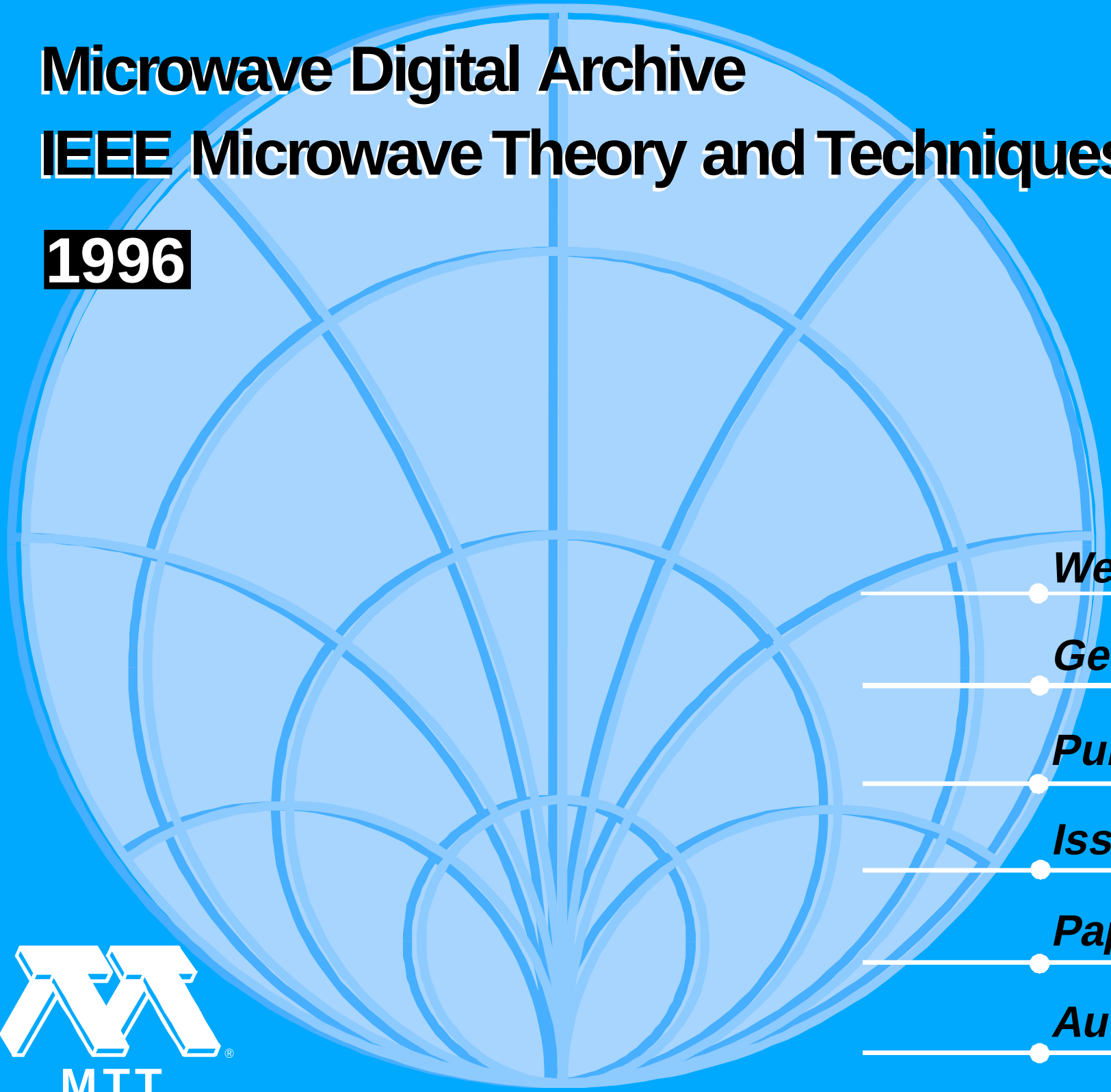
# Microwave Digital Archive

# IEEE Microwave Theory and Techniques Society

## 1996




*Welcome*

*Getting Started*

*Publications*

*Issues*

*Papers*

*Authors*


MTT®

# Welcome

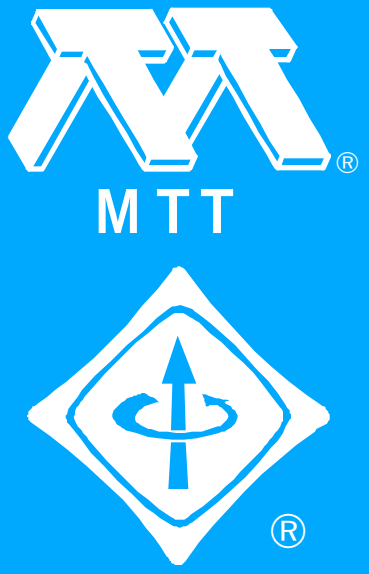
The Microwave Theory and Techniques Society of the IEEE has finished a complete archive of all reviewed and published material since 1953. Yearly updates of the published material will be compiled in the future. As digital media changes over the years, it will be necessary to update the format of the material, so this initial electronic release blazes a trail into the future.

The section “Getting Started” tells you how to optimize the Acrobat Reader Preferences to improve the readability of the document. If you need customer support before January 2001, call 831.657.2420 or 800.447.9100. If you find errors in the CD-ROM, e-mail a note to c.jackson@ieee.org, or mail a comment to the current President of the MTT Society.

Remember that the quality of the old journals is not perfect, and that some photographs will not be as clear as Technicolor. Also, the optical character recognition is good, but not perfect, so some spelling errors will occur. None the less, you can copy and paste the material for your own uses and personal study.

All papers were electronic files or images scanned from hard copy and converted to Adobe Acrobat PDF file format for cross-platform access. Since some of the papers were scanned from hard copy, the viewing quality will vary with the size and quality of fonts used. Even though the viewing quality on your monitor may vary, all papers print clearly.

Thank You and Enjoy!




Contents

# Welcome

## ACKNOWLEDGMENTS

This CD- ROM was assembled from the electronic files provided to us by Adam Philippidis at IEEE headquarters and from scanned originals provided by Ted Saad. Many people have contributed to the entire CD-ROM Archival effort. Most notably, Ted Saad provided nearly all the hard copy material, and sacrificed his entire collection of journals for the project. He also wrote a number of the original articles. Another notable contributor, Roger Pollard convinced the Society that this was a worthwhile project. The team at Sony Electronic Publishing Services, and Adam Philippidis, at the IEEE Headquarters, have also provided substantial amounts of help in completing this archival project.

## REFERENCES

IEEE Catalog Number: JP-17-0-0-C-0

ISBN: 0-7803-9906-4

# Welcome

## COPYRIGHT

Copyright discussions are appropriate, although, at times they seem tedious. The amount of Intellectual Property contained in this Microwave Digital Archive is astounding. Please treat it with the respect that our profession demands.

Libraries are permitted to photocopy beyond the limits of U.S. copyright law, for private use of patrons, those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through the Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923. For other copying, reprint, or republication permission, write to the Manager, IEEE Intellectual Property Rights, IEEE Operations Center, 445 Hoes Lane, Piscataway, NJ 08855-1331. All rights reserved.

Copyright © 1999 by The Institute of Electrical and Electronics Engineers, Inc.

MTT®

IEEE®

Contents

# Welcome

## TRADEMARKS

Sony is a registered trademark of Sony Corporation. Adobe, the Adobe logo, Acrobat and the Acrobat logo are trademarks of Adobe Systems Incorporated or its subsidiaries and may be registered in certain jurisdictions. Macintosh is a registered trademark of Apple Computer, Inc. HP is a registered trademark and HP-UX is a trademark of Hewlett-Packard Company. Motif is a trademark of Open Software Foundation, Inc. Solaris is a registered trademark of Sun Microsystems, Inc., Sun and OpenWindows are trademarks of Sun Microsystems, Inc. SPARC is a registered trademark of SPARC International, Inc. SPARCstation is a registered trademark of SPARC International, Inc., licensed exclusively to Sun Microsystems, Inc. and is based upon an architecture developed by Sun Microsystems, Inc. UNIX is a registered trademark in the United States and other countries, licensed exclusively through X/Open Company, Ltd. Windows is a trademark of Microsoft Corporation. X Window System is a trademark of the Massachusetts Institute of Technology. I386, 486 and Pentium are trademarks of Intel Corporation. All other products or name brands are trademarks of their respective holders.

# Getting Started

## INTRODUCTION

This Electronic Guide file contains hypertext links to separate article files. Links are represented by colored text (e.g. a name or title); clicking on the text activates the link.

Before you start browsing and using the information on this CD-ROM, you will need to install Adobe Acrobat Reader + Search 3.0. If you already have Acrobat Reader installed on your system, make sure it is version 3.0 or higher and includes the Search plug-in.

In many instances, we refer to the “menu bar”, shown here for reference.

## ACROBAT PREFERENCES

To make viewing and searching easier, we recommend changing two default Acrobat Preferences (found under File > Preferences on the menu bar.)

In the dialog box shown for **General** Preferences, turn OFF the "Open Cross-Document Links in Same Window" option; this will keep the Guide file open when you view article files and allows you to return to the same page in the Guide when you close an article.

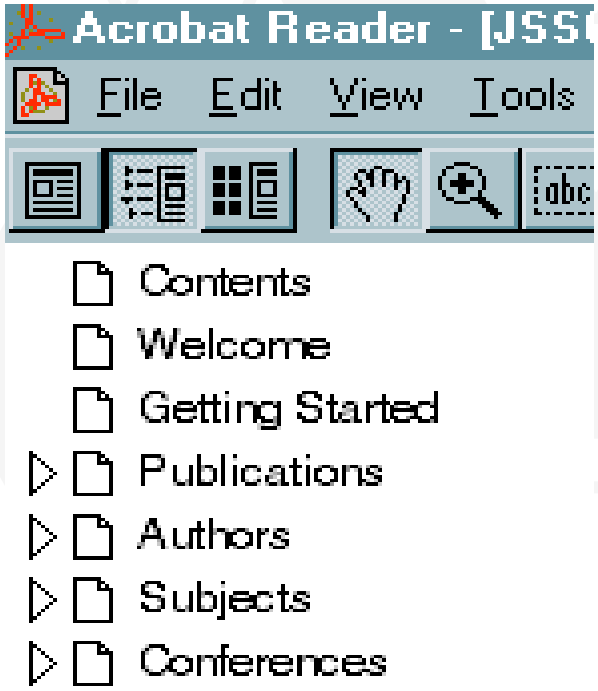
In the dialog box shown for **Search** Preferences, turn ON the "Show Fields" option so that Title, Author, Keywords, and Subject fields are visible when specifying search criteria. If for some reason this preference option is not present on your system, check to see that you have the Search plug-in installed. The Search icon will be present on the Acrobat Toolbar if the function is properly installed. Specifics of the Search function are described later in this section.

## EXITING AN ARTICLE

To exit an article after viewing, and return to the electronic guide, select File > Close from the menu bar. To switch between the article and the electronic guide or any other PDF file that is open, select "Window" and pick the open file you wish to return to.

## USING BOOKMARKS

In addition to links, you can navigate through the Electronic Guide using Bookmarks. If they are not already visible, choose View > Bookmarks and Page from the menu bar or press the “Display Page and Bookmarks” button on the tool bar. A panel opens on the left side of the screen displaying Bookmarks in a hierarchy.




Each Bookmark corresponds to a page in the Guide. Click on the text in a Bookmark to go to that page.

Entries with lower level Bookmarks show an arrowhead, pointing down when subordinate Bookmarks are visible, pointing right when hidden. To view subordinate Bookmarks, click on the arrowhead. To hide them, click on the arrowhead again. Dragging the right margin of the bookmark panel resizes it.

## PRINTING ARTICLES

Articles may have text outside normal print-area defaults. We recommend selecting “Shrink to Fit” in the print menu (File > Print) to capture the complete image for your printout. This setting will become your new default.

## SELECTING GRAPHICS

To copy graphics to the Clipboard, choose Tools > Select Graphics from the menu bar. The cursor changes to the cross-hair icon.

Drag a rectangle around the graphic to select it. When you release the mouse button, the selected graphic is highlighted.

Choose Edit > Copy from the menu bar to copy the selected graphic to the Clipboard. To view the graphic, choose Window > Show Clipboard. The graphic is copied in the WMF (Windows), PICT (Macintosh), or XPIXMAP (UNIX) format. With UNIX, the graphic is pasted in the primary selection.

# Getting Started

## NAVIGATION BUTTONS

This Guide contains a variety of navigational aids to help you easily explore the contents.

### Section Map

The Electronic Guide is constructed in sections: e.g. Sessions, Authors, Getting Started. The current section is shown at the top of each page. The “path” to this section is shown at the right. Clicking these text buttons moves you to the start of that section.

### Next Page button

Click to advance to the next page in the section.

### Previous Page button

Click to go back to the previous page in the section. The first and last pages of a section show only one button.

The Page Up and Page Down keys perform the same functions.

# Getting Started

## ACROBAT TOOLBAR

**View Modes**

Display Thumbnails and Page
Display Bookmarks and Page
Display Page

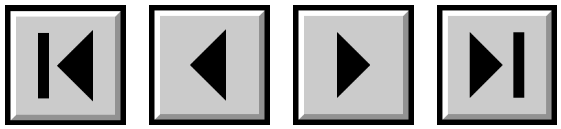
**Zoom/Selection**

Select Text
Zoom In (Magnify)
Move Page Image

# Getting Started

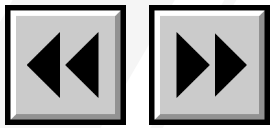
## ACROBAT TOOLBAR (continued)

### Navigation



Go to Last Page
Go Forward One Page
Go Backward One Page
Go to First Page

### History



Next (One Link)
Previous (One Link)

## ACROBAT TOOLBAR (continued)

**Page View**

Fit Width
Fit Page
Actual Size

**Find/Search**

Next Hit
Previous Hit
View Search Results
Search
Find

Contents

## SEARCHING

Two types of searching are possible with Acrobat: Find and full-text Search. Choosing Find (from the Toolbar or Tools > Find) opens a dialog box. Type a search string in the field provided, check the appropriate options and press the “Find” button. Find searches linearly through the currently open Acrobat file (not necessarily the entire Electronic Guide) from the cursor forward.

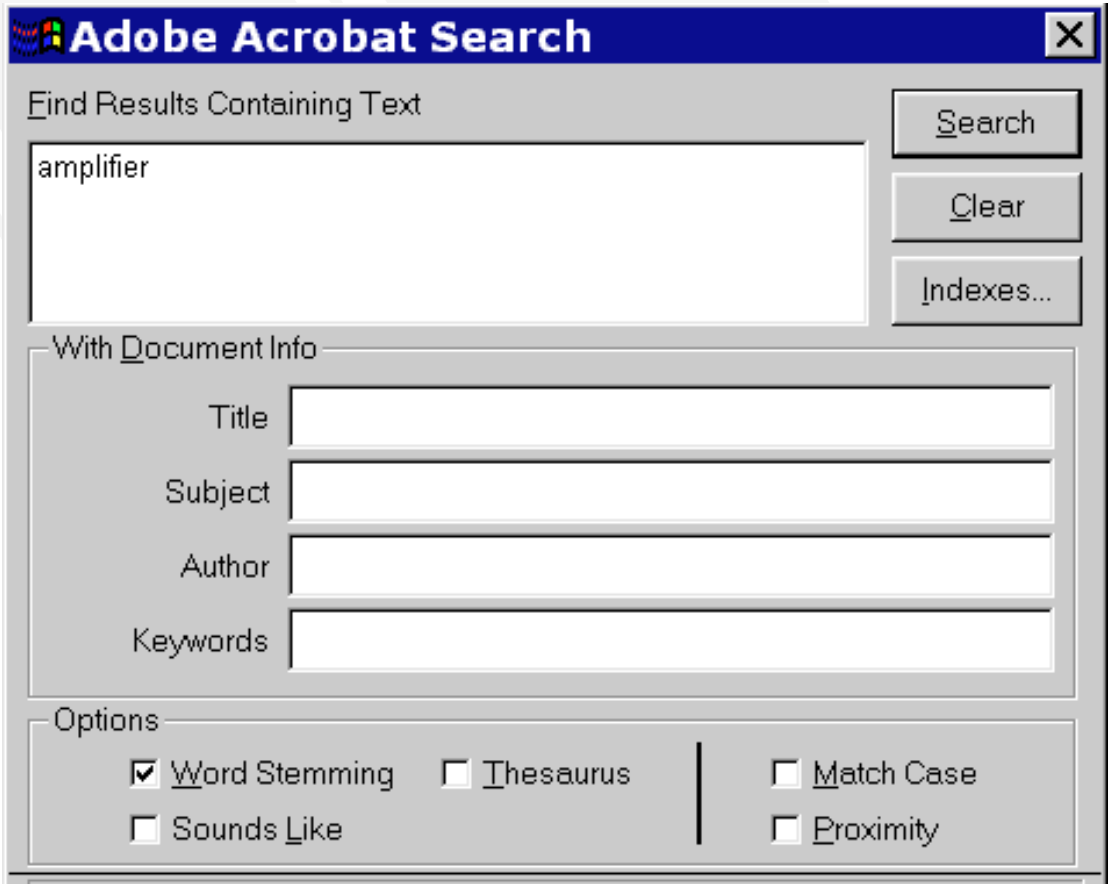
Choosing the Search button or Search menu item (Tools > Search), selecting the Query item, opens a dialog box from which you can access the more powerful full-text search engine (if you installed Acrobat with the Search plug-in from this CD-ROM). Its dialog box is shown on the next page.

Typing a term in the text box at the top of the Search dialog box and pressing the “Search” button causes a full-text search of all words in the body of papers in the collection. Entering a term in one or more of the fixed fields (Title, Author, Subject or Keywords) will cause a search for hits in only those fields.

# Getting Started

If you are not finding files you think should show in the results list, Acrobat may not be attached to the correct index file. To check, press the “Indexes...” button for a list of available indexes. If this title is not listed, press the “Add...” button and look in the root directory of the CD-ROM for a file called “index.pdx”. Click on that file to add it to the list. If none exists, this title was not indexed.

See the Search Online Guide (on Help menu) for more complete instructions on selecting appropriate options, constructing boolean queries, etc.



# Publications

- 1996 Transactions on Microwave Theory and Techniques
- 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest



Click on title for a list of issues.

MTT®

IEEE®

Contents

# Issues by Publication

## 1996 Transactions on Microwave Theory and Techniques

- Jan. 1996 [T-MTT]
- Feb. 1996 [T-MTT]
- Mar. 1996 [T-MTT]
- Apr. 1996 [T-MTT]
- May 1996 [T-MTT]
- Jun. 1996 [T-MTT]
- Jul. 1996, Part I [T-MTT]
- Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)
- Aug. 1996 [T-MTT]
- Sep. 1996 [T-MTT]
- Oct. 1996, Part I [T-MTT]

Contents
Publications

Click on issue for a list of papers.

# Issues by Publication

- Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)
- Nov. 1996 [T-MTT]
- Dec. 1996, Part I [T-MTT]
- Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)

Contents
Publications

Click on issue for a list of papers.

# Issues by Publication

## 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest

- 1996 [MCS]

Contents
Publications

Click on issue for a list of papers.

# Issues

- Jan. 1996 [T-MTT]
- Feb. 1996 [T-MTT]
- Mar. 1996 [T-MTT]
- Apr. 1996 [T-MTT]
- May 1996 [T-MTT]
- Jun. 1996 [T-MTT]
- Jul. 1996, Part I [T-MTT]
- Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)
- Aug. 1996 [T-MTT]
- Sep. 1996 [T-MTT]
- Oct. 1996, Part I [T-MTT]
- Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)
- Nov. 1996 [T-MTT]
- Dec. 1996, Part I [T-MTT]
- Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)

Click on issue for a list of papers.

# Issues

- 1996 [MCS]

MTT
IEEE
Contents
Publications

Click on issue for a list of papers.

# Papers by Issue

## Jan. 1996 [T-MTT]


- Front Cover (Jan. 1996 [T-MTT])
- Editorial (Jan. 1996 [T-MTT])
- Complete Sliced Model of Microwave FET's and Comparison with Lumped Model and Experimental Results
- A New Reciprocity Theorem
- A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements
- Statistical Computer-Aided Design for Microwave Circuits
- Propagation Characteristics of Superconducting Microstrip Lines
- Minimization of Reflection Error Caused by Absorbing Boundary Condition in the FDTD Simulation of Planar Transmission Lines
- FET Statistical Modeling Using Parameter Orthogonalization


Click on title for a paper summary.

# Papers by Issue

- Coaxial Cavities with Corrugated Inner Conductor for Gyrotrons
- Coupling Phenomena in Concentric Multi-Applicator Phased Array Hyperthermia Systems
- Analytically and Accurately Determined Quasi-Static Parameters of Coupled Microstrip Lines
- A Compact Model for Predicting the Isolation of Ports in a Closed Rectangular Microchip Package
- Recursive Mode Matching Method for Multiple Waveguide Junction Modeling
- Dual-Tone Calibration of Six-Port Junction and its Application to the Six-Port Direct Digital Millimetric Receiver
- Microwave Inductors and Capacitors in Standard Multilevel Interconnect Silicon Technology
- Automated E-Field Scanning System for Dosimetric Assessments
- Small-Signal Characterization of Microwave and Millimeter-Wave HEMT's Based on a Physical Model

Click on title for a paper summary.

# Papers by Issue

- Microwave Channelized Active Filters--A New Modular Approach to Achieving Compactness and High Selectivity
- A Fiber Optic/Millimeter-Wave Radio Transmission Link Using HBT as Direct Photodetector and an Optoelectronic Upconverter
- A Numerical Functions of Dyadic Green's Functions for Planar Bianisotropic Media with Application to Printed Transmission Lines
- Procedure for Direct Calculation of Characteristic Admittance Matrix of Coupled Transmission Lines (Short Papers)
- Elimination of Spurious Solutions in the Calculation of Eigenmodes by Moment Method (Short Papers)
- A New FEM Approach for Open Boundary Laplace's Problem (Short Papers)
- Thru Characteristics of a Coaxial Gap (FDTD Model and Measurements) (Short Papers)

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- New Explicit Expressions for the Coupling Matrix Elements Related to Scattering from a Planar Periodic Single-Strip Grating (Corrections)
- Copyright Form (Jan. 1996 [T-MTT])
- Workshop on Millimeter Waves (Advertisement) (Jan. 1996 [T-MTT])
- Information for Authors (Jan. 1996 [T-MTT])
- Back Cover (Jan. 1996 [T-MTT])

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Feb. 1996 [T-MTT]


- Front Cover (Feb. 1996 [T-MTT])
- Methods of Suppression or Avoidance of Parallel-Plate Power Leakage from Conductor-Backed Transmission Lines
- Frequency-Domain Analysis of Strongly Nonlinear Circuits Using a Consistent Large-Signal Model
- Measurements of the Low-Frequency-Gain Fluctuations of a 30-GHz High-Electron-Mobility-Transistor Cryogenic Amplifier
- Shape Sensitivities of Capacitances of Planar Conducting Surfaces Using the Method of Moments
- Propagation and Coupling Characteristics of Microstrip Lines with Laminated Ground Plane
- Mode Scattering by a Nonlinear Step-Discontinuity in Dielectric Optical Waveguides
- A Mode-Matching Technique for Mode Coupling in a Gyrotron Cavity



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Papers by Issue

- Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model
- Constraints to the Optimum Performance and Bandwidth Limitations of Diplexers Employing Symmetric Three-Port Junctions
- A New Method for Obtaining the Shape Sensitivities of Planar Microstrip Structures by a Full-Wave Analysis
- A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits
- Application of Volterra Series to the Problem of Self-Oscillating Mixer
- Novel Directional Couplers Using Broadside-Coupled Coplanar Waveguides for Double-Sided Printed Antennas
- A Generalized Analysis for a Class of Rectangular Waveguide Coupler Employing Narrow Wall Slots

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- An Efficient Finite Element Formulation to Analyze Waveguides with Lossy Inhomogeneous Bi-Anisotropic Materials
- Analysis of Guided Waves in Inhomogeneous Bianisotropic Cylindrical Waveguides
- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters
- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO
- Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems
- Study and Characterization of Optoelectronic Photoconductor-Based Probes
- Expansions for the Capacitance of a Square in a Square with a Comparison (Short Papers)
- Continuous Spectrum and Characteristic Modes of the Slot Line in Free Space (Short Papers)

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Electrostatic Potential through a Circular Aperture in a Thick Conducting Plane (Short Papers)
- A Low Phase Noise C-Band Frequency Synthesizer Using a New Fractional-N PLL with Programmable Fractionality (Short Papers)
- Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)
- Analysis of Edge Coupled Strip Inset Dielectric Guide (Short Papers)
- Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)
- Call for Papers - Directions for the Next Generation of MMIC Devices and Systems (Feb. 1996 [T-MTT])
- Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Feb. 1996 [T-MTT])
- Information for Authors (Feb. 1996 [T-MTT])
- Back Cover (Feb. 1996 [T-MTT])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Mar. 1996 [T-MTT]


- Front Cover (Mar. 1996 [T-MTT])
- Temperature-Dependent Modeling of Gallium Arsenide MESFET's
- A Practical Technique for Designing Multiport Coupling Networks
- Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements
- Improving Microwave Imaging by Enhancing Diffraction Tomography
- Design of Impedance Transformers by the Method of Least Squares
- Iterative Numerical Computation of the Electromagnetic Fields Inside Weakly Nonlinear Infinite Dielectric Cylinders of Arbitrary Cross Sections Using the Distorted-Wave Born Approximation



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Papers by Issue

- New Simple Procedure for the Computation of the Multimode Admittance or Impedance Matrix of Planar Waveguide Junctions
- Theory and Numerical Calculations for Radially Inhomogeneous Circular Ferrite Circulators
- Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications
- On the Network Characterization of Planar Passive Circuits Using the Method of Moments
- Generation and Transmission of FM and pi/4 DQPSK Signals at Microwave Frequencies Using Harmonic Generation and Optoelectronic Mixing in Mach-Zehnder Modulators
- A Novel Waveguide Y-Junction Circulator with a Ferrite Sphere for Millimeter Waves (Short Papers)
- Dielectric Slab-Loaded Resonant Cavity for Applications Requiring Enhanced Field Uniformity (Short Papers)
- Variational Solution of Microwave Circuits and Structures (Short Papers)

Click on title for a paper summary.

# Papers by Issue

- An Efficient Synthesis Technique of Tapered Transmission Line with Loss and Dispersion (Short Papers)
- Mode Orthogonality Relations and Field Structure in Chirowaveguides (Short Papers)
- Development of Semi-Empirical Design Equations for Symmetrical Three-Line Microstrip Couplers (Short Papers)
- Resonance Characteristics of Whispering-Gallery Modes in an Elliptic Dielectric Disk Resonator (Short Papers)
- Averaging Rules for the Scattering by Randomly Oriented Chiral Particles (Short Papers)
- Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)
- Error Bound for the Approximate Fourier Transformation Relationship for Nonuniform Transmission Lines (Short Papers)
- FDFD Full-Wave Analysis and Modeling of Dielectric and Metallic Losses of CPW Short Circuits (Short Papers)

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- A New Extraction Method for Noise Sources and Correlation Coefficient in MESFET (Short Papers)
- The Noise-Tee--A Lightwave Device for Microwave Noise Measurements (Short Papers)
- Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Mar. 1996 [T-MTT])
- Call for Papers - Technologies for Wireless Applications (Mar. 1996 [T-MTT])
- Information for Authors (Mar. 1996 [T-MTT])
- IEEE Financial Advantage Program (Advertisement) (Mar. 1996 [T-MTT])
- Back Cover (Mar. 1996 [T-MTT])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Apr. 1996 [T-MTT]

- Front Cover (Apr. 1996 [T-MTT])
- Analysis of Asymmetrical Multilayer Ferrite-Loaded Finlines by the Extended Spectral Domain Approach
- New Approach to the Design of Active Floating Inductors in MMIC Technology
- Characterization of Three-Dimensional Open Dielectric Structures Using the Finite-Difference Time-Domain Method
- Analytical Evaluation of the MoM Matrix Elements
- Power Leakage, Characteristic Impedance, and Leakage-Transition Behavior of Finite-Length Stub Sections of Leaky Printed Transmission Lines
- Electromagnetics in High-T/sub c/ Superconductors
- A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids

# Papers by Issue

- MRTD: New Time-Domain Schemes Based on Multiresolution Analysis
- Induced Polarization Effects in Coupling Processes of Waveguide Modes
- Coupled-Mode Formulation of Multilayered and Multiconductor Transmission Lines
- The Design of Tuned Front-End GaAs MMIC Optical Receivers
- Micromachined W-Band Filters
- Theoretical Investigation of a Free-Electron Maser Operating with a TEM Transmission Line
- Electromagnetic Dyadic Green's Function in Cylindrically Multilayered Media
- A New Empirical Large-Signal HEMT Model (Short Papers)
- Efficient Method for Scattering from a Homogeneous, Circular, Cylindrical Shell with an Inhomogeneous Angular-Region (Short Papers)

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Conductor-Loss Limited Stripline Resonator and Filters (Short Papers)
- Color Group Approach to Symmetrical Ferrite Devices with Polarization Effects (Short Papers)
- A New Approach for Analysis of Resonant Structures Based on the Spatial Finite-Difference and Temporal Differential Formulation (Short Papers)
- Analysis and Synthesis of Coplanar Coupled Lines on Substrates of Finite Thicknesses (Short Papers)
- Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (Apr. 1996 [T-MTT])
- Back Cover (Apr. 1996 [T-MTT])

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## May 1996 [T-MTT]


- Front Cover (May 1996 [T-MTT])
- Propagation and Coupling Properties of Integrated Optical Waveguides--An Integral Equation Formulation
- A Robust Approach for the Derivation of Closed-Form Green's Functions
- Analysis of Guided Modes in Multilayer/Multiconductor Structures by the "Boundary Integral--Resonant Mode Expansion Method"
- A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers
- Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films
- Novel High-Isolation FET Switches
- Analysis of the Effective-Index Method for the Vector Modes of Rectangular-Core Dielectric Waveguides

# Papers by Issue

- Full-Wave Analysis of Quasi-Optical Structures
- Modeling of Coplanar Stripline Discontinuities
- A High Efficiency GaAs MCM Power Amplifier for 1.9 GHz Digital Cordless Telephones
- Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices
- TE Wave Properties of Slab Dielectric Guide Bounded by Nonlinear Non-Kerr-Like Media (May 1996 [T-MTT])
- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers
- Modeling Lossy Anisotropic Dielectric Waveguides with the Method of Lines
- A Generalized Scattering Matrix Approach for Analysis of Quasi-Optical Grids and De-Embedding of Device Parameters
- Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement

Click on title for a paper summary.

# Papers by Issue

- Transient Coupling Reduction and Design Considerations in Edge-Coupled Coplanar Waveguide Couplers (Short Papers)
- Computation of Excess Capacitances of Various Strip Discontinuities Using Closed-Form Green's Functions (Short Papers)
- Call for Papers - Electrical Performance of Electronic Packaging (May 1996 [T-MTT])
- Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (May 1996 [T-MTT])
- Call for Papers - 8th Asia Pacific Microwave Conference (May 1996 [T-MTT])
- Call for Papers - Microwave and Millimeter-Wave Photonics II (May 1996 [T-MTT])
- Back Cover (May 1996 [T-MTT])

MTT
IEEE
Contents
Publications
Issues

# Papers by Issue

## Jun. 1996 [T-MTT]


- Front Cover (Jun. 1996 [T-MTT])
- Stepped Transformers on TEM-Transmission Lines
- Electromagnetic Wave Effects on Microwave Transistors Using a Full-Wave Time-Domain Model
- Finite-Element Method with Edge Elements for Waveguides Loaded with Ferrite Magnetized in Arbitrary Direction
- Influence of Higher Order Modes on the Measurements of Complex Permittivity and Permeability of Materials Using a Microstrip Discontinuity
- Design and Measurements of a Novel Subharmonically Pumped Millimeter-Wave Mixer Using Two Single Planar Schottky-Barrier Diodes
- Finite-Difference Time-Domain Algorithm for Solving Maxwell's Equations in Rotationally Symmetric Geometries
- Characterization of Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits




Click on title for a paper summary.

# Papers by Issue

- Study of Whispering Gallery Modes in Double Disk Sapphire Resonators
- Modeling of General Constitutive Relationships in SCN TLM
- High-Frequency Reciprocity Based Circuit Model for the Incidence of Electromagnetic Waves on General Circuits in Layered Media
- Higher-Order Vector Finite Elements for Tetrahedral Cells
- Riccati Matrix Differential Equation Formulation for the Analysis of Nonuniform Multiple Coupled Microstrip Lines
- Field Simulation of Dipole Antennas for Interstitial Microwave Hyperthermia
- CAD Models for Multilayered Substrate Interdigital Capacitors
- Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors
- A New Miniature Magnetic Field Probe for Measuring Three-Dimensional Fields in Planar High-Frequency Circuits

Click on title for a paper summary.

# Papers by Issue

- Parameter Extraction and Correction for Transmission Lines and Discontinuities Using the Finite-Difference Time-Domain Method
- Open-Ended Metallized Ceramic Coaxial Probe for High-Temperature Dielectric Properties Measurements
- DC Instability of the Series Connection of Tunneling Diodes
- Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure
- Coupling Parameters for a Side-Coupled Ring Resonator and a Microstrip Line (Short Papers)
- The Use of Active Traveling-Wave Structures in GaAs MMIC's (Short Papers)
- Finite-Difference Time-Domain Analysis of Flip-Chip Interconnects with Staggered Bumps (Short Papers)
- Thermal Management for High-Power Active Amplifier Arrays (Short Papers)
- LSE- and LSM-Mode Sheet Impedances of Thin Conductors (Short Papers)

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Accurate Analysis of Losses in Waveguide Structures by Compact Two-Dimensional FDTD Method Combined with Autoregressive Signal Analysis (Short Papers)
- A Simple Formula for the Concentration of Charge on a Three-Dimensional Corner of a Conductor (Short Papers)
- Computation of Equivalent Circuits of CPW Discontinuities Using Quasi-Static Spectral Domain Method (Short Papers)
- High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)
- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)
- Call for Papers - Electrical Performance of Electronic Packaging (Jun. 1996 [T-MTT])
- Call for Papers - Microwave and Millimeter-Wave Photonics II (Jun. 1996 [T-MTT])
- Back Cover (Jun. 1996 [T-MTT])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Jul. 1996, Part I [T-MTT]


- Front Cover (Jul. 1996, Part I [T-MTT])
- Analysis of Cylindrical Transmission Lines with the Method of Lines
- Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface
- Automatic Derivation of Equivalent Circuits for General Microstrip Interconnection Discontinuities
- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator
- A Wideband Waveguide Transition Design with Modified Dielectric Transformer Using Edge-Based Tetrahedral Finite-Element Analysis
- Design and Analysis of Transitions from Rectangular Waveguide to Layered Ridge Dielectric Waveguide
- Digitizing Multichannel Video Signals for Lightwave Transmission

# Papers by Issue

- Modal Circuit Decomposition of Lossy Multiconductor Transmission Lines
- Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"
- Thermal Noise in Lossy Waveguides
- Experimental Evaluation of Basic Circuit Components Using Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits
- Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System
- An Integrated Transition of Microstrip to Nonradiative Dielectric Waveguide for Microwave and Millimeter-Wave Circuits
- Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators

Click on title for a paper summary.

# Papers by Issue

- FD--TLM Electromagnetic Field Simulation of High-Speed Josephson Junction Digital Logic Gates
- Polarizabilities of an Annular Cut in the Wall of an Arbitrary Thickness
- Some Considerations on the Accuracy of the Nonuniform FDTD Method and its Application to Waveguide Analysis When Combined with the Perfectly Matched Layer Technique
- A Channelized-Limiter Approach to Receiver Front-End Protection
- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band
- A Circuit Topology for Microwave Modeling of Plastic Surface Mount Packages
- Eigenmodes in a Toroidal Cavity of Elliptic Cross Section (Short Papers)
- BiCG-FFT T-Matrix Method for Solving for the Scattering Solution from Inhomogeneous Bodies (Short Papers)

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Reduced Invasiveness of Noncontact Electrooptic Probes in Millimeter-Wave Optoelectronic Characterization (Short Papers)
- Analysis of Microstrip Discontinuities Using the Spatial Network Method with Absorbing Boundary Conditions (Short Papers)
- Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)
- High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)
- Analysis of Slot-Coupled Double-Sided Cylindrical Microstrip Lines (Short Papers)
- Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)
- Spectral Domain Analysis of Single and Coupled Microstrip Open Discontinuities with Anisotropic Substrates (Short Papers)

Click on title for a paper summary.

# Papers by Issue

- Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)
- Radial Mode Matching Analysis of Ridged Circular Waveguides (Short Papers)
- Sensitivity Analysis of Lossy Coupled Transmission Lines (Comments)
- Measurement of the Microwave Conductivity of a Polymeric Material with Potential Applications in Absorbers and Shielding (Comments)
- Direct Extraction of Equivalent Circuit Parameters for Heterojunction Bipolar Transistors (Corrections)
- Call for Papers - Microwave and Millimeter-Wave Photonics II (Jul. 1996, Part I [T-MTT])
- Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Jul. 1996, Part I [T-MTT])
- Back Cover (Jul. 1996, Part I [T-MTT])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)


- Front Cover (Jul. 1996, Part II [T-MTT])
- Guest Editorial (Jul. 1996, Part II [T-MTT])
- The High Temperature Superconductivity Space Experiment (HTSSE-II) Design
- Design Considerations of Superconductive Input Multiplexers for Satellite Applications
- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines
- Cryogenic Microwave Channelized Receiver
- Low Loss Multiplexers with Planar Dual Mode HTS Resonators
- High Temperature Superconductive Wideband Compressive Receivers



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Papers by Issue

- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...
- Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem
- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers
- The NRL Josephson Junction Monitoring Experiment on HTSEE-II
- Design of HTS, Lumped-Element, Manifold-Type Microwave Multiplexers
- On the Power Handling Capability of High Temperature Superconductive Filters
- Miniature Superconducting Filters
- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization
- Properties and Applications of Thick Film High Temperature Superconductors

Click on title for a paper summary.

# Papers by Issue

- Ferrite-Superconductor Devices for Advanced Microwave Applications
- Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report
- Adaptive High Temperature Superconducting Filters for Interference Rejection
- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)
- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)
- High-Spatial Resolution Resistivity Mapping of Large-Area YBCO Films by a Near-Field Millimeter-Wave Microscope (Short Papers)
- Back Cover (Jul. 1996, Part II [T-MTT])

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Aug. 1996 [T-MTT]


- Front Cover (Aug. 1996 [T-MTT])
- Full Wave Analysis of Microwave Monolithic Circuit Devices Using a Generalized Yee-Algorithm Based on an Unstructured Grid
- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator
- Propagation Characteristics of the Magnetostatic Surface Wave in the YBCO-YIG Film-Layered Structure
- Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure
- A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept
- Decoupling the Multiconductor Transmission Line Equations
- Regular Boundary Integral Formulation for the Analysis of Open Dielectric/Optical Waveguides




Click on title for a paper summary.

# Papers by Issue

- The Electric Quadruple Contribution to the Circular Birefringence of Nonmagnetic Anisotropic Chiral Media: A Circular Waveguide Experiment
- Prelaunch Calibration of the Advanced Microwave Sounding Unit-A for NOAA-K
- TE and TM Modes in Cylindrical Metallic Structures Filled with Bianisotropic Material
- Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators
- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)
- Improvements of the Two-Dimensional FDTD Method for the Simulation of Normal- and Superconducting Planar Waveguides Using Time Series Analysis (Short Papers)
- Three-Port Hybrid Power Dividers Terminated in Complex Frequency-Dependent Impedances (Short Papers)
- Field Distributions in Supported Coplanar Lines Using Conformal Mapping Techniques (Short Papers)

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Network Representation and Transverse Resonance for Layered Chirowaveguides (Short Papers)
- Fast and Efficient Extraction of HBT Model Parameters Using Multibias S-Parameter Sets (Short Papers)
- An Optimization Approach to the Frequency-Domain Inverse Problem for a Nonuniform LCRG Transmission Line (Short Papers)
- Towards a Generalized TLM Algorithm for Solving Arbitrary Reciprocal and Nonreciprocal Planar Structures (Short Papers)
- Electromagnetic Boundary Value Problem in the Presence of a Partly Lossy Dielectric: Considerations About the Uniqueness of the Solution (Short Papers)
- Measurement of Simple Resonant Equivalent Circuits for Microstrip Antennas (Short Papers)
- Capacitance Computations in a Multilayered Dielectric Medium Using Closed-Form Spatial Green's Functions (Corrections)

Click on title for a paper summary.

# Papers by Issue

- Direct Synthesis of Cascaded Quadruplet (CQ) Filters (Corrections)
- Complex Power and Mode Coupling in Circular Chirowaveguides (Corrections)
- Call for Papers - Microwave and Millimeter-Wave Photonics II (Aug. 1996 [T-MTT])
- Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Aug. 1996 [T-MTT])
- Information for Authors (Aug. 1996 [T-MTT])
- Back Cover (Aug. 1996 [T-MTT])

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Sep. 1996 [T-MTT]


- Front Cover (Sep. 1996 [T-MTT])
- Low Frequency Leaky Regime in Covered Multilayered Striplines
- Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques
- Application of a Simple and Efficient Source Excitation Technique of the FDTD Analysis of Waveguide and Microstrip Circuits
- Analysis and Design of Feeding Structures for Microstrip Leaky Wave Antenna (Sep. 1996 [T-MTT])
- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver
- A New Model for Microwave Characterization of Composite Materials in Guided-Wave Medium
- Complex Media Microstrip Ridge Structures: Formulation and Basic Characteristics of Ferrite Structures



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Papers by Issue

- Optimum Mesh Grading for Finite-Difference Method
- The Eigenfunction Expansion of Dyadic Green's Functions for Chirowaveguides
- Analytical Nonlinear HEMT Model for Large Signal Circuit Simulation (Short Papers)
- Quasi-TEM Analysis of Coplanar Waveguides with an Inhomogeneous Semiconductor Substrate (Short Papers)
- Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)
- Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)
- Application of the Spatial Finite-Difference and Temporal Differential (SFDTD) Formulation to Cylindrical Structure Problems (Short Papers)
- Analysis of a Double Step Microstrip Discontinuity in the Substrate Using the 3-D-FDTD Method (Short Papers)

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)
- Axisymmetric Modes of Cylindrical Resonators with Cascaded Inhomogeneous Dielectrics (Short Papers)
- Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)
- A CAD-Suitable Approach for the Analysis of Nonuniform MMIC and MHMIC Transmission Lines (Short Papers)
- A New Edge Element Analysis of Dispersive Waveguiding Structures (Comments)
- A New Edge Element Analysis of Dispersive Waveguiding Structures (Authors' Reply)
- Call for Papers - 1997 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference (Sep. 1996 [T-MTT])
- Back Cover (Sep. 1996 [T-MTT])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Oct. 1996, Part I [T-MTT]


- Front Cover (Oct. 1996, Part I [T-MTT])
- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform
- Modes and Their Stability of a Symmetric Two-Element Coupled Negative Conductance Oscillator Driven Spatial Power Combining Array
- Analytical Method for Determining Equivalent Circuit Parameters of GaAs FET's
- Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])
- Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates
- Extensions of the Chalmers Nonlinear HEMT and MESFET Model
- Ridge Coplanar Waveguide for Optical Amplitude Modulation




Click on title for a paper summary.

# Papers by Issue

- Multimode Equivalent Network Representation for H- and E-Plane Uniform Bends in Rectangular Waveguide
- Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems
- A Simple Technique for the Design of MMIC 90° Phase-Difference Networks
- Capacitance of Microstrip Lines with Inhomogeneous Substrate
- Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements
- Chromatic Dispersion in Fiber-Optic Microwave and Millimeter-Wave Links
- Microwave Noise Characterization of Two-Port Devices Using an Uncalibrated Tuner (Short Papers)
- The Analysis of General Two-Dimensional PEC Structures Using a Modified CPFDTD Algorithm (Short Papers)
- CAD Model for Coplanar Waveguide Synthesis (Short Papers)

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)
- Transient Analysis of Tapered Lines Based on the Method of Series Expansion (Short Papers)
- Electrostatic Potential Distribution through a Rectangular Aperture in a Thick Conducting Plane (Short Papers)
- Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)
- Call for Papers - 27th European Microwave Conference + Exhibition (Oct. 1996, Part I [T-MTT])
- Microwave and Millimeter-Wave Photonics II (Advertisement) (Oct. 1996, Part I [T-MTT])
- Back Cover (Oct. 1996, Part I [T-MTT])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)


- Front Cover (Oct. 1996, Part II [T-MTT])
- Editorial: Introduction to the Special Issue on Medical Application and Biological Effects of RF/Microwaves (Oct. 1996, Part II [T-MTT])
- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia
- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results
- FDTD Verification of Deep-Set Brain Tumor Hyperthermia Using a Spherical Microwave Source Distribution
- Use of the Field-Iteration Method in Studying the Three-Dimensional Phased Array for Electromagnetic Hyperthermia



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Papers by Issue

- Analysis of Focusing of Pulse Modulated Microwave Signals Inside a Tissue Medium
- Focusing and Impedance Properties of Conformable Phased Array Antennas for Microwave Hyperthermia
- Development of Ferrite Core Applicator System for Deep-Induction Hyperthermia
- Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method
- A Helical Microwave Antenna for Welding Plaque During Balloon Angioplasty
- Monopole Antennas for Microwave Catheter Ablation
- A Method for the In Vitro Testing of Cardiac Ablation Catheters
- A Finite Element Model of a Microwave Catheter for Cardiac Ablation
- A Study of the Handset Antenna and Human Body Interaction

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz
- Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio
- Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz
- 1990-1995 Advances in Investigating the Interaction of Microwave Fields with the Nervous System
- A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications
- Image Reconstruction of a Complex Cylinder Illuminated by TE Waves
- A Comparative Study of Four Open-Ended Coaxial Probe Models for Permittivity Measurements of Lossy Dielectric/Biological Materials at Microwave Frequencies
- Evaluation of Pulsed Microwave Influence on Isolated Hearts

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord
- Soft and Dry Phantom Modeling Material Using Silicone Rubber with Carbon Fiber
- Broadband Calibration of E-Field Probes in Lossy Media
- Induced EM Field in a Layered Eccentric Spheres Model of the Head: Plane-Wave and Localized Source Exposure
- Call for Papers - PIERS 1997 (Oct. 1996, Part II [T-MTT])
- Call for Papers - The Applied Computational Electromagnetics Society (Oct. 1996, Part II [T-MTT])
- Back Cover (Oct. 1996, Part II [T-MTT])

MTT
IEEE
Contents
Publications
Issues

# Papers by Issue

## Nov. 1996 [T-MTT]


- Front Cover (Nov. 1996 [T-MTT])
- A Full Wave Analysis of Microstrips by the Boundary Element Method
- Monolithic Millimeter Wave Optical Receivers
- A New Solution for TE Plane-Wave Scattering from a Symmetric Double-Strip Grating Composed of Equal Strips
- A Novel General Approach for the Optimum Design of Microwave and Millimeter Wave Subharmonic Mixers
- A New Large Signal HBT Model
- Analysis of an N-Way Radial Cavity Divider with a Coaxial Central Port and Waveguide Output Ports
- Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring
- L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications




Click on title for a paper summary.

# Papers by Issue

- The Anti-Circuit Concept for the Characterization of Active Circuits Using Electromagnetic Simulations
- Free-Space Power Combining and Beam Steering of Ultra-Wideband Radiation Using an Array of Laser-Triggered Antennas
- Applications of the Finite Difference Techniques to the Compensated VIP 3 dB Directional Coupler
- Characteristics of an Area-Variable Varactor Diode
- Broadband Overlaid Inset Dielectric Guide Coupler with Very Flat Coupling
- Properties of and Generalized Full-Wave Transmission Line Models for Hybrid (Bi)(an)isotropic Waveguides
- 0-40 GHz GaAs MESFET Distributed Baseband Amplifier IC's for High-Speed Optical Transmission
- Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- A 16-Element Subarray for Hybrid-Circuit Tile-Approach Spatial Power Combining
- Couplings of Microstrip Square Open-Loop Resonators for Cross-Coupled Planar Microwave Filters
- Cutoff Frequencies of Transmission Lines Consisting of Pair of Cylinders (Short Papers)
- Schottky Diodes for Analogue Phase Shifters in GaAs MMIC's (Short Papers)
- Permeability Measurement on Composites Made of Oriented Metallic Wires from 0.1 to 18 GHz (Short Papers)
- Dispersion Characteristics of Cylindrical Coplanar Waveguides (Short Papers)
- Determining Q Using S Parameter Data (Short Papers)
- Call for Papers - 1997 Topical Symposium on Millimeter Waves (Nov. 1996 [T-MTT])
- Back Cover (Nov. 1996 [T-MTT])

# Papers by Issue

## Dec. 1996, Part I [T-MTT]


- Front Cover (Dec. 1996, Part I [T-MTT])
- Development of a General Symmetrical Condensed Node for the TLM Method
- Modeling and Performance of a 100-Element pHEMT Grid Amplifier
- A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)
- Analytical Dispersion Analysis of Loaded Periodic Circuits Using the Generalized Scattering Matrix
- Dynamic Shape of the Depletion Layer of a Submillimeter-Wave Schottky Varactor
- Order-Recursive Gaussian Elimination (ORGE) and Efficient CAD of Microwave Circuits
- A Coaxial 0.5-18 GHz Near Electric Field Measurement System for Planar Microwave Circuits Using Integrated Probes


Click on title for a paper summary.

# Papers by Issue

- Numerical Simulation of the Power Density Distribution Generated in a Multimode Cavity by Using the Method of Lines Technique to Solve Directly for the Electric Field
- On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides
- Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique
- Generalized Perfectly Matched Layer for the Absorption of Propagating and Evanescent Waves in Lossless and Lossy Media
- Analytical Expansion of the Dispersion Relation for TLM Condensed Nodes
- Scattering of Millimeter Waves by Metallic Strip Gratings on an Optically Plasma-Induced Semiconductor Slab
- Electric Screen Jauman Absorber Design Algorithms
- Analysis and Linearization of a Broadband Microwave Phase Modulator Using Volterra System Approach

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Application of a Coupled-Integral-Equations Technique to Ridged Waveguides
- Oscillator-Type Active-Integrated Antenna: The Leaky-Mode Approach
- Intermodulation Distortion in Kahn-Technique Transmitters
- An Analytical Model for the Photodetection Mechanisms in High-Electron Mobility Transistors
- Stokes Phenomenon in the Development of Microstrip Green's Function and its Ramifications (Short Papers)
- A Fast Algorithm for Computing Field Radiated by an Insulated Dipole Antenna in Dissipative Medium (Short Papers)
- A Fast Integral Equation Technique for Shielded Planar Circuits Defined on Nonuniform Meshes (Short Papers)
- Analysis of Electromagnetic Boundary-Value Problems in Inhomogenous Media with the Method of Lines (Short Papers)

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- New Reciprocity Theorems for Chiral, Nonactive, and Biisotropic Media (Short Papers)
- Call for Papers - Interconnections and Packaging (Dec. 1996, Part I [T-MTT])
- Call for Papers - 1997 Topical Symposium on Millimeter Waves (Dec. 1996, Part I [T-MTT])
- Information for Authors (Dec. 1996, Part I [T-MTT])
- Back Cover (Dec. 1996, Part I [T-MTT])

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)

- Front Cover (Dec. 1996, Part II [T-MTT])
- Table of Contents (Dec. 1996, Part II [T-MTT])
- Guest Editors' Overview (Dec. 1996, Part II [T-MTT])
- The 1996 IEEE MTT-S International Microwave Symposium/Exhibition: "Bridging the Spectrum" (Dec. 1996, Part II [T-MTT])
- 1996 IEEE MTT-S International Microwave Symposium Steering Committee
- 1996 IMS Technical Program (Dec. 1996, Part II [T-MTT])
- Awards (Dec. 1996, Part II [T-MTT])
- Status of InP HEMT Technology for Microwave Receiver Applications (Dec. 1996, Part II [T-MTT])
- Design and Implementation of a Direct Digitization GPS Receiver Front End
- Highly Integrated Three-Dimensional MMIC Single-Chip Receiver and Transmitter (Dec. 1996, Part II [T-MTT])

MTT
IEEE
Contents
Publications
Issues

# Papers by Issue

- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems
- High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS
- A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter
- L-band Internally Matched Si-MMIC Front-End
- Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])
- A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE
- A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor
- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

MTT®
IEEE®
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])
- Uniplanar Power Dividers Using Coupled CPW and Asymmetrical CPS for MIC's and MMIC's
- A Novel Active Antenna with Self-Mixing and Wideband Varactor-Tuning Capabilities for Communication and Vehicle Identification Applications
- Multifrequency Microstrip Antennas Using Alumina-Ceramic/Polyimide Multilayer Dielectric Substrate
- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])
- Efficient FDTD/Matrix-Pencil Method for the Full-Wave Scattering Parameter Analysis of Waveguiding Structures
- Optimization of Aperture Transitions for Multiport Microstrip Circuits

Click on title for a paper summary.

MTT
IEEE
Contents
Publications
Issues

# Papers by Issue

- Use of Frequency Derivatives in the Three-Dimensional Full-Wave Spectral Domain Technique
- Advanced Node Formulations in TLM--The Adaptable Symmetrical Condensed Node
- Application of the Eigenmode Transformation Technique for the Analysis of Planar Transmission Lines (Dec. 1996, Part II [T-MTT])
- Rigorous Analysis of Mode Propagation and Field Scattering in Silicon-Based Coplanar MIS Slow Wave Structures with Abrupt Transitions to Transmission Lines on Normal Substrate
- EM-ANN Models for Microstrip Vias and Interconnects in Dataset Circuits
- Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])
- Accuracy of TLM Solutions of Maxwell's Equations (Dec. 1996, Part II [T-MTT])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])
- Simulation of Dispersive Multiconductor Transmission Lines by Pade Approximation via the Lanczos Process
- Full-Wave Modeling of Generalized Double Ridge Waveguide T-Junctions
- An Accurate Equivalent Circuit Model of Flip Chip and via Interconnects
- GT-PML: Generalized Theory of Perfectly Matched Layers and its Application to the Reflectionless Truncation of Finite-Difference Time-Domain Grids (Dec. 1996, Part II [T-MTT])
- CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits
- Nonlinear System and Subsystem Modeling in Time Domain
- Hybrid Analysis of Three-Dimensional MMIC Elements by the Method of Lines
- A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Order Recursive Method of Moments (ORMoM) for Iterative Design Applications
- Transient Propagation in Lossy Coplanar Waveguides
- Computer-Aided Design of Step Recovery Diode Frequency Multipliers
- Optimization of Active Microwave Frequency Multiplier Performance Utilizing Harmonic Terminating Impedances (Dec. 1996, Part II [T-MTT])
- Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's
- Conditionally Stable Amplifier Design Using Constant μ-Contours (Dec. 1996, Part II [T-MTT])
- Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's
- Optimization of a Lumped Element Circulator Based on Eigenvalue Evaluation and Structural Improvement
- Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Full Wave Analysis of Edge-Guided Mode Microstrip Isolator (Dec. 1996, Part II [T-MTT])
- L-Resonator Bandstop Filters (Dec. 1996, Part II [T-MTT])
- Quarter Wavelength Ceramic Combline Filters
- A Four-Pole Dual Mode Elliptic Filter Realized in Circular Cavity without Screws (Dec. 1996, Part II [T-MTT])
- Finite Difference Analysis of 2-D Photonic Crystals
- Two-Dimensional Fiber-Optic Control of a True Time-Steered Array Transmitter (Dec. 1996, Part II [T-MTT])
- Hybrid Lidar-Radar Ocean Experiment
- A New Measurement Approach for Phase Noise at Close-In Offset Frequencies of Free-Running Oscillators (Dec. 1996, Part II [T-MTT])
- Pulsed Device Measurements and Applications
- Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])
- Effects of Nonlinear Distortion on CDMA Communication Systems (Dec. 1996, Part II [T-MTT])
- A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras
- A Bleustein-Gulyaev-Shimizu Wave Resonator Having Resonances for TV and VCR Traps (Dec. 1996, Part II [T-MTT])
- Index, IEEE [T-MTT] 1996, Volume 44, and MTT-S Sponsored Conferences
- Your One-Stop Sourcebook on Microstrip Antennas and Microwave Systems (Advertisement) (Dec. 1996, Part II [T-MTT])
- Gain a Complete Understanding of Antenna Structure Analysis (Advertisement) (Dec. 1996, Part II [T-MTT])
- We're on the Web (Advertisement) (Dec. 1996, Part II [T-MTT])

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Back Cover (Dec. 1996, Part II [T-MTT])

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

## 1996 [MCS]


- Front Cover (1996 [MCS])
- Schedule of Events (1996 [MCS])
- IEEE 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest of Papers (1996 [MCS])
- Copyright (1996 [MCS])
- Message from the General Chairman (1996 [MCS])
- MMWMC Committees (1996 [MCS])
- Message from the Technical Program Chairman (1996 [MCS])
- MMWMC Steering Committee (1996 [MCS])
- MMWMC Technical Program Committee (1996 [MCS])
- IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium Schedule (1996 [MCS])
- Table of Contents (1996 [MCS])
- Workshop (1996 [MCS])

# Papers by Issue

- Panel (1996 [MCS])
- Session I -- MMIC Advancements for Military and Commercial Applications
- Affordability Strategies in Military Microwave Systems
- MMICs for Commercial Applications the Low-Cost High Volume Production Techniques
- A Microwave Radar for Vehicular Applications
- Session II -- Power Amplifiers
- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones
- High Efficiency Power HFETS for Low Power Wireless Applications
- Performance Comparison of 1 Watt Ka-Band MMIC Amplifiers Using Pseudomorphic HEMTs and Ion-Implanted MESFETs
- An Ion-Implanted 13 Watt C-Band MMIC with 60% Peak Power Added Efficiency

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- K through Ka-Band Driver and Power Amplifiers
- Session III -- Signal Generation and Control
- A 15/60 GHz One-Stage MMIC Frequency Quadrupler
- A GaAs Single Chip 2.4 GHz PLL Frequency Multiplier
- A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure
- A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications
- A Broadband Planar Monolithic Ring Mixer
- Session IV -- BiCMOS and HBT MMIC Technologies (Invited Session)
- Low-Voltage Broadband BiCMOS MMICs for Low-Cost High-Speed Wireless Networks Applications
- Advances in GaAs HBT Power Amplifiers for Cellular Phones and Military Applications (Invited Paper)
- Session V -- Receiver Technology

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications
- A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications
- A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment
- Low DC Power Monolithic Low Noise Amplifier for Wireless Applications at 5 GHz
- Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC
- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies
- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band
- Session VI -- Small Signal IC's and Passive Components
- Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's

Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors
- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures
- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS
- An Investigation of IM3 Distortion in Relation to Bypass Capacitor of GaAs MMIC's
- A Novel MMIC Source Impedance Tuner for On-Wafer Microwave Noise Parameter Measurements
- Session VII -- Low Noise Millimeter Wave MMICs (Joint with IMS)
- Status of InP HEMT Technology for Microwave Receiver Applications (Invited)
- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

Click on title for a paper summary.

# Papers by Issue

- A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])
- A Ka-Band GaInP/GaAs HBT Four-Stage LNA (1996 [MCS])
- Development of 44 GHz GaAs MMIC-Based Low-Noise Amplifiers for EHF Nulling Antenna
- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)
- A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])
- Session VIII -- Large Signal Generation and Application (Joint with MTT)
- Monolithic VCO Using a Novel Active Inductor (1996 [MCS])
- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])
- High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])
- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])
- A Practical MMIC Negative Resistance Structure for X and Ku Band Applications (1996 [MCS])
- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])
- Session IX -- MMIC Systems Components (Joint with IMS)
- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])
- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])
- Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])
- A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])

Click on title for a paper summary.

# Papers by Issue

- Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])
- 26 GHz Coplanar SiGe MMICS (1996 [MCS])
- MMICs for Sensor Applications (1996 [MCS])
- Session WE3F -- MMWMC Open Forum Papers (Joint with IMS)
- A Linear Class AB Single-Ended to Differential Transconverter Suitable for RF Circuits (1996 [MCS])
- Distributed Small Signal Model for Multi-Fingered GaAs PHEMT/MESFET Devices (1996 [MCS])
- A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])
- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])
- Index of Authors (1996 [MCS])
- Floor Plan, San Francisco Hilton & Towers (1996 [MCS])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Papers by Issue

- Floor Plan, Moscone Center (1996 [MCS])
- IMS Hotels (1996 [MCS])
- IEEE/MTT-S IMS Microwave Week at a Glance (1996 [MCS])
- Back Cover (1996 [MCS])

MTT
IEEE
Contents
Publications
Issues

Click on title for a paper summary.

# Paper Index


A B C D E F G H I

J K L M N O P Q R

S T U V W X Y Z

0 1 2 3 4

5 6 7 8 9


Colored letters and/or numbers are active links to the index.

MTT®

IEEE®


Contents

Publications

Issues

# Paper Index


**0**

- 0-40 GHz GaAs MESFET Distributed Baseband Amplifier IC's for High-Speed Optical Transmission

**1**

- 1990-1995 Advances in Investigating the Interaction of Microwave Fields with the Nervous System
- 1996 IEEE MTT-S International Microwave Symposium Steering Committee
- 1996 IMS Technical Program (Dec. 1996, Part II [T-MTT])

**2**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])

**6**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems

# Paper Index

## A


- A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment
- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications
- A 15/60 GHz One-Stage MMIC Frequency Quadrupler
- A 16-Element Subarray for Hybrid-Circuit Tile-Approach Spatial Power Combining
- A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor
- A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])
- A Bleustein-Gulyaev-Shimizu Wave Resonator Having Resonances for TV and VCR Traps (Dec. 1996, Part II [T-MTT])
- A Broadband Planar Monolithic Ring Mixer
- A CAD-Suitable Approach for the Analysis of Nonuniform MMIC and MHMIC Transmission Lines (Short Papers)



Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- A Channelized-Limiter Approach to Receiver Front-End Protection
- A Circuit Topology for Microwave Modeling of Plastic Surface Mount Packages
- A Coaxial 0.5-18 GHz Near Electric Field Measurement System for Planar Microwave Circuits Using Integrated Probes
- A Compact Model for Predicting the Isolation of Ports in a Closed Rectangular Microchip Package
- A Comparative Study of Four Open-Ended Coaxial Probe Models for Permittivity Measurements of Lossy Dielectric/Biological Materials at Microwave Frequencies
- A Fast Algorithm for Computing Field Radiated by an Insulated Dipole Antenna in Dissipative Medium (Short Papers)
- A Fast Integral Equation Technique for Shielded Planar Circuits Defined on Nonuniform Meshes (Short Papers)




Click on title for a paper summary.

# Paper Index


- A Fiber Optic/Millimeter-Wave Radio Transmission Link Using HBT as Direct Photodetector and an Optoelectronic Upconverter
- A Finite Element Model of a Microwave Catheter for Cardiac Ablation
- A Four-Pole Dual Mode Elliptic Filter Realized in Circular Cavity without Screws (Dec. 1996, Part II [T-MTT])
- A Full Wave Analysis of Microstrips by the Boundary Element Method
- A GaAs Single Chip 2.4 GHz PLL Frequency Multiplier
- A Generalized Analysis for a Class of Rectangular Waveguide Coupler Employing Narrow Wall Slots
- A Generalized Scattering Matrix Approach for Analysis of Quasi-Optical Grids and De-Embedding of Device Parameters
- A Helical Microwave Antenna for Welding Plaque During Balloon Angioplasty




Click on title for a paper summary.

# Paper Index


- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])
- A High Efficiency GaAs MCM Power Amplifier for 1.9 GHz Digital Cordless Telephones
- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])
- A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications
- A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter
- A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)
- A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements
- A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept




Click on title for a paper summary.

# Paper Index


- A Ka-Band GaInP/GaAs HBT Four-Stage LNA (1996 [MCS])
- A Linear Class AB Single-Ended to Differential Transconverter Suitable for RF Circuits (1996 [MCS])
- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)
- A Low Phase Noise C-Band Frequency Synthesizer Using a New Fractional-N PLL with Programmable Fractionality (Short Papers)
- A Method for the In Vitro Testing of Cardiac Ablation Catheters
- A Microwave Radar for Vehicular Applications
- A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras
- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones
- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])
- A Mode-Matching Technique for Mode Coupling in a Gyrotron Cavity



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications
- A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits
- A New Approach for Analysis of Resonant Structures Based on the Spatial Finite-Difference and Temporal Differential Formulation (Short Papers)
- A New Edge Element Analysis of Dispersive Waveguiding Structures (Authors' Reply)
- A New Edge Element Analysis of Dispersive Waveguiding Structures (Comments)
- A New Empirical Large-Signal HEMT Model (Short Papers)
- A New Extraction Method for Noise Sources and Correlation Coefficient in MESFET (Short Papers)
- A New FEM Approach for Open Boundary Laplace's Problem (Short Papers)
- A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])
- A New Large Signal HBT Model




Click on title for a paper summary.

# Paper Index


- A New Measurement Approach for Phase Noise at Close-In Offset Frequencies of Free-Running Oscillators (Dec. 1996, Part II [T-MTT])
- A New Method for Obtaining the Shape Sensitivities of Planar Microstrip Structures by a Full-Wave Analysis
- A New Miniature Magnetic Field Probe for Measuring Three-Dimensional Fields in Planar High-Frequency Circuits
- A New Model for Microwave Characterization of Composite Materials in Guided-Wave Medium
- A New Reciprocity Theorem
- A New Solution for TE Plane-Wave Scattering from a Symmetric Double-Strip Grating Composed of Equal Strips
- A Novel Active Antenna with Self-Mixing and Wideband Varactor-Tuning Capabilities for Communication and Vehicle Identification Applications
- A Novel General Approach for the Optimum Design of Microwave and Millimeter Wave Subharmonic Mixers
- A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors




Click on title for a paper summary.

# Paper Index


- A Novel MMIC Source Impedance Tuner for On-Wafer Microwave Noise Parameter Measurements
- A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE
- A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])
- A Novel Waveguide Y-Junction Circulator with a Ferrite Sphere for Millimeter Waves (Short Papers)
- A Numerical Functions of Dyadic Green's Functions for Planar Bianisotropic Media with Application to Printed Transmission Lines
- A Practical MMIC Negative Resistance Structure for X and Ku Band Applications (1996 [MCS])
- A Practical Technique for Designing Multiport Coupling Networks
- A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])
- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures




Click on title for a paper summary.

# Paper Index


- A Robust Approach for the Derivation of Closed-Form Green's Functions
- A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications
- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])
- A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])
- A Simple Formula for the Concentration of Charge on a Three-Dimensional Corner of a Conductor (Short Papers)
- A Simple Technique for the Design of MMIC 90° Phase-Difference Networks
- A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers
- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers
- A Study of the Handset Antenna and Human Body Interaction




Click on title for a paper summary.

# Paper Index


- A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])
- A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure
- A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids
- A Wideband Waveguide Transition Design with Modified Dielectric Transformer Using Edge-Based Tetrahedral Finite-Element Analysis
- Accuracy of TLM Solutions of Maxwell's Equations (Dec. 1996, Part II [T-MTT])
- Accurate Analysis of Losses in Waveguide Structures by Compact Two-Dimensional FDTD Method Combined with Autoregressive Signal Analysis (Short Papers)
- Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique




Click on title for a paper summary.

# Paper Index


- Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications
- Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])
- Adaptive High Temperature Superconducting Filters for Interference Rejection
- Advanced Node Formulations in TLM--The Adaptable Symmetrical Condensed Node
- Advances in GaAs HBT Power Amplifiers for Cellular Phones and Military Applications (Invited Paper)
- Affordability Strategies in Military Microwave Systems
- An Accurate Equivalent Circuit Model of Flip Chip and via Interconnects
- An Analytical Model for the Photodetection Mechanisms in High-Electron Mobility Transistors
- An Efficient Finite Element Formulation to Analyze Waveguides with Lossy Inhomogeneous Bi-Anisotropic Materials


Click on title for a paper summary.

# Paper Index


- An Efficient Synthesis Technique of Tapered Transmission Line with Loss and Dispersion (Short Papers)
- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)
- An Integrated Transition of Microstrip to Nonradiative Dielectric Waveguide for Microwave and Millimeter-Wave Circuits
- An Investigation of IM3 Distortion in Relation to Bypass Capacitor of GaAs MMIC's
- An Ion-Implanted 13 Watt C-Band MMIC with 60% Peak Power Added Efficiency
- An Optimization Approach to the Frequency-Domain Inverse Problem for a Nonuniform LCRG Transmission Line (Short Papers)
- Analysis and Design of Feeding Structures for Microstrip Leaky Wave Antenna (Sep. 1996 [T-MTT])
- Analysis and Linearization of a Broadband Microwave Phase Modulator Using Volterra System Approach




Click on title for a paper summary.

# Paper Index


- Analysis and Synthesis of Coplanar Coupled Lines on Substrates of Finite Thicknesses (Short Papers)
- Analysis of a Double Step Microstrip Discontinuity in the Substrate Using the 3-D-FDTD Method (Short Papers)
- Analysis of an N-Way Radial Cavity Divider with a Coaxial Central Port and Waveguide Output Ports
- Analysis of Asymmetrical Multilayer Ferrite-Loaded Finlines by the Extended Spectral Domain Approach
- Analysis of Cylindrical Transmission Lines with the Method of Lines
- Analysis of Edge Coupled Strip Inset Dielectric Guide (Short Papers)
- Analysis of Electromagnetic Boundary-Value Problems in Inhomogenous Media with the Method of Lines (Short Papers)
- Analysis of Focusing of Pulse Modulated Microwave Signals Inside a Tissue Medium




Click on title for a paper summary.

# Paper Index


- Analysis of Guided Modes in Multilayer/Multiconductor Structures by the "Boundary Integral--Resonant Mode Expansion Method"
- Analysis of Guided Waves in Inhomogeneous Bianisotropic Cylindrical Waveguides
- Analysis of Microstrip Discontinuities Using the Spatial Network Method with Absorbing Boundary Conditions (Short Papers)
- Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure
- Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators
- Analysis of Slot-Coupled Double-Sided Cylindrical Microstrip Lines (Short Papers)
- Analysis of the Effective-Index Method for the Vector Modes of Rectangular-Core Dielectric Waveguides
- Analytical Dispersion Analysis of Loaded Periodic Circuits Using the Generalized Scattering Matrix
- Analytical Evaluation of the MoM Matrix Elements



MTT®

IEEE®

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Analytical Expansion of the Dispersion Relation for TLM Condensed Nodes
- Analytical Method for Determining Equivalent Circuit Parameters of GaAs FET's
- Analytical Nonlinear HEMT Model for Large Signal Circuit Simulation (Short Papers)
- Analytically and Accurately Determined Quasi-Static Parameters of Coupled Microstrip Lines
- Application of a Coupled-Integral-Equations Technique to Ridged Waveguides
- Application of a Simple and Efficient Source Excitation Technique of the FDTD Analysis of Waveguide and Microstrip Circuits
- Application of the Eigenmode Transformation Technique for the Analysis of Planar Transmission Lines (Dec. 1996, Part II [T-MTT])
- Application of the Spatial Finite-Difference and Temporal Differential (SFDTD) Formulation to Cylindrical Structure Problems (Short Papers)




Click on title for a paper summary.

# Paper Index


- Application of Volterra Series to the Problem of Self-Oscillating Mixer
- Applications of the Finite Difference Techniques to the Compensated VIP 3 dB Directional Coupler
- Automated E-Field Scanning System for Dosimetric Assessments
- Automatic Derivation of Equivalent Circuits for General Microstrip Interconnection Discontinuities
- Averaging Rules for the Scattering by Randomly Oriented Chiral Particles (Short Papers)
- Awards (Dec. 1996, Part II [T-MTT])
- Axisymmetric Modes of Cylindrical Resonators with Cascaded Inhomogeneous Dielectrics (Short Papers)


**B**


- Back Cover (1996 [MCS])
- Back Cover (Apr. 1996 [T-MTT])
- Back Cover (Aug. 1996 [T-MTT])
- Back Cover (Dec. 1996, Part I [T-MTT])

# Paper Index


- Back Cover (Dec. 1996, Part II [T-MTT])
- Back Cover (Feb. 1996 [T-MTT])
- Back Cover (Jan. 1996 [T-MTT])
- Back Cover (Jul. 1996, Part I [T-MTT])
- Back Cover (Jul. 1996, Part II [T-MTT])
- Back Cover (Jun. 1996 [T-MTT])
- Back Cover (Mar. 1996 [T-MTT])
- Back Cover (May 1996 [T-MTT])
- Back Cover (Nov. 1996 [T-MTT])
- Back Cover (Oct. 1996, Part I [T-MTT])
- Back Cover (Oct. 1996, Part II [T-MTT])
- Back Cover (Sep. 1996 [T-MTT])
- BiCG-FFT T-Matrix Method for Solving for the Scattering Solution from Inhomogeneous Bodies (Short Papers)
- Broadband Calibration of E-Field Probes in Lossy Media
- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Broadband Overlaid Inset Dielectric Guide Coupler with Very Flat Coupling
- Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K


## C


- CAD Model for Coplanar Waveguide Synthesis (Short Papers)
- CAD Models for Multilayered Substrate Interdigital Capacitors
- CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits
- Call for Papers - 1997 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference (Sep. 1996 [T-MTT])
- Call for Papers - 1997 Topical Symposium on Millimeter Waves (Dec. 1996, Part I [T-MTT])
- Call for Papers - 1997 Topical Symposium on Millimeter Waves (Nov. 1996 [T-MTT])

# Paper Index


- Call for Papers - 27th European Microwave Conference + Exhibition (Oct. 1996, Part I [T-MTT])
- Call for Papers - 8th Asia Pacific Microwave Conference (May 1996 [T-MTT])
- Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Feb. 1996 [T-MTT])
- Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Mar. 1996 [T-MTT])
- Call for Papers - Directions for the Next Generation of MMIC Devices and Systems (Feb. 1996 [T-MTT])
- Call for Papers - Electrical Performance of Electronic Packaging (Jun. 1996 [T-MTT])
- Call for Papers - Electrical Performance of Electronic Packaging (May 1996 [T-MTT])
- Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (Apr. 1996 [T-MTT])
- Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (May 1996 [T-MTT])




Click on title for a paper summary.

# Paper Index


- Call for Papers - Interconnections and Packaging (Dec. 1996, Part I [T-MTT])
- Call for Papers - Microwave and Millimeter-Wave Photonics II (Aug. 1996 [T-MTT])
- Call for Papers - Microwave and Millimeter-Wave Photonics II (Jul. 1996, Part I [T-MTT])
- Call for Papers - Microwave and Millimeter-Wave Photonics II (Jun. 1996 [T-MTT])
- Call for Papers - Microwave and Millimeter-Wave Photonics II (May 1996 [T-MTT])
- Call for Papers - PIERS 1997 (Oct. 1996, Part II [T-MTT])
- Call for Papers - Technologies for Wireless Applications (Mar. 1996 [T-MTT])
- Call for Papers - The Applied Computational Electromagnetics Society (Oct. 1996, Part II [T-MTT])
- Capacitance Computations in a Multilayered Dielectric Medium Using Closed-Form Spatial Green's Functions (Corrections)




Click on title for a paper summary.

# Paper Index


- Capacitance of Microstrip Lines with Inhomogeneous Substrate
- Characteristics of an Area-Variable Varactor Diode
- Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio
- Characterization of Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits
- Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement
- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band
- Characterization of Three-Dimensional Open Dielectric Structures Using the Finite-Difference Time-Domain Method
- Chromatic Dispersion in Fiber-Optic Microwave and Millimeter-Wave Links
- Coaxial Cavities with Corrugated Inner Conductor for Gyrotrons




Click on title for a paper summary.

# Paper Index


- Color Group Approach to Symmetrical Ferrite Devices with Polarization Effects (Short Papers)
- Complete Sliced Model of Microwave FET's and Comparison with Lumped Model and Experimental Results
- Complex Media Microstrip Ridge Structures: Formulation and Basic Characteristics of Ferrite Structures
- Complex Power and Mode Coupling in Circular Chirowaveguides (Corrections)
- Computation of Equivalent Circuits of CPW Discontinuities Using Quasi-Static Spectral Domain Method (Short Papers)
- Computation of Excess Capacitances of Various Strip Discontinuities Using Closed-Form Green's Functions (Short Papers)
- Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)
- Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors




Click on title for a paper summary.

# Paper Index


- Computer-Aided Design of Step Recovery Diode Frequency Multipliers
- Conditionally Stable Amplifier Design Using Constant µ-Contours (Dec. 1996, Part II [T-MTT])
- Conductor-Loss Limited Stripline Resonator and Filters (Short Papers)
- Constraints to the Optimum Performance and Bandwidth Limitations of Diplexers Employing Symmetric Three-Port Junctions
- Continuous Spectrum and Characteristic Modes of the Slot Line in Free Space (Short Papers)
- Copyright (1996 [MCS])
- Copyright Form (Jan. 1996 [T-MTT])
- Coupled-Mode Formulation of Multilayered and Multiconductor Transmission Lines
- Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring
- Coupling Parameters for a Side-Coupled Ring Resonator and a Microstrip Line (Short Papers)




Click on title for a paper summary.

# Paper Index


- Coupling Phenomena in Concentric Multi-Applicator Phased Array Hyperthermia Systems
- Couplings of Microstrip Square Open-Loop Resonators for Cross-Coupled Planar Microwave Filters
- Cryogenic Microwave Channelized Receiver
- Cutoff Frequencies of Transmission Lines Consisting of Pair of Cylinders (Short Papers)


**D**


- DC Instability of the Series Connection of Tunneling Diodes
- Decoupling the Multiconductor Transmission Line Equations
- Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films
- Design and Analysis of Transitions from Rectangular Waveguide to Layered Ridge Dielectric Waveguide
- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver



MTT®

IEEE®

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Design and Implementation of a Direct Digitization GPS Receiver Front End
- Design and Measurements of a Novel Subharmonically Pumped Millimeter-Wave Mixer Using Two Single Planar Schottky-Barrier Diodes
- Design Considerations of Superconductive Input Multiplexers for Satellite Applications
- Design of HTS, Lumped-Element, Manifold-Type Microwave Multiplexers
- Design of Impedance Transformers by the Method of Least Squares
- Determining Q Using S Parameter Data (Short Papers)
- Development of 44 GHz GaAs MMIC-Based Low-Noise Amplifiers for EHF Nulling Antenna
- Development of a General Symmetrical Condensed Node for the TLM Method
- Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)




Click on title for a paper summary.

# Paper Index


- Development of Ferrite Core Applicator System for Deep-Induction Hyperthermia
- Development of Semi-Empirical Design Equations for Symmetrical Three-Line Microstrip Couplers (Short Papers)
- Dielectric Slab-Loaded Resonant Cavity for Applications Requiring Enhanced Field Uniformity (Short Papers)
- Digitizing Multichannel Video Signals for Lightwave Transmission
- Direct Extraction of Equivalent Circuit Parameters for Heterojunction Bipolar Transistors (Corrections)
- Direct Synthesis of Cascaded Quadruplet (CQ) Filters (Corrections)
- Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Aug. 1996 [T-MTT])
- Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Jul. 1996, Part I [T-MTT])
- Dispersion Characteristics of Cylindrical Coplanar Waveguides (Short Papers)



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Distributed Small Signal Model for Multi-Fingered GaAs PHEMT/MESFET Devices (1996 [MCS])
- Dual-Tone Calibration of Six-Port Junction and its Application to the Six-Port Direct Digital Millimetric Receiver
- Dynamic Shape of the Depletion Layer of a Submillimeter-Wave Schottky Varactor


## E


- Editorial (Jan. 1996 [T-MTT])
- Editorial: Introduction to the Special Issue on Medical Application and Biological Effects of RF/Microwaves (Oct. 1996, Part II [T-MTT])
- Effects of Nonlinear Distortion on CDMA Communication Systems (Dec. 1996, Part II [T-MTT])
- Efficient FDTD/Matrix-Pencil Method for the Full-Wave Scattering Parameter Analysis of Waveguiding Structures
- Efficient Method for Scattering from a Homogeneous, Circular, Cylindrical Shell with an Inhomogeneous Angular-Region (Short Papers)



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Eigenmodes in a Toroidal Cavity of Elliptic Cross Section (Short Papers)
- Electric Screen Jauman Absorber Design Algorithms
- Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz
- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator
- Electromagnetic Boundary Value Problem in the Presence of a Partly Lossy Dielectric: Considerations About the Uniqueness of the Solution (Short Papers)
- Electromagnetic Dyadic Green's Function in Cylindrically Multilayered Media
- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator
- Electromagnetic Wave Effects on Microwave Transistors Using a Full-Wave Time-Domain Model
- Electromagnetics in High-T/sub c/ Superconductors
- Electrostatic Potential Distribution through a Rectangular Aperture in a Thick Conducting Plane (Short Papers)

# Paper Index


- Electrostatic Potential through a Circular Aperture in a Thick Conducting Plane (Short Papers)
- Elimination of Spurious Solutions in the Calculation of Eigenmodes by Moment Method (Short Papers)
- EM-ANN Models for Microstrip Vias and Interconnects in Dataset Circuits
- Error Bound for the Approximate Fourier Transformation Relationship for Nonuniform Transmission Lines (Short Papers)
- Evaluation of Pulsed Microwave Influence on Isolated Hearts
- Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements
- Expansions for the Capacitance of a Square in a Square with a Comparison (Short Papers)
- Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])




Click on title for a paper summary.

# Paper Index


- Experimental Evaluation of Basic Circuit Components Using Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits
- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers
- Extensions of the Chalmers Nonlinear HEMT and MESFET Model
- Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements


**F**


- Fast and Efficient Extraction of HBT Model Parameters Using Multibias S-Parameter Sets (Short Papers)
- FD--TLM Electromagnetic Field Simulation of High-Speed Josephson Junction Digital Logic Gates
- FDFD Full-Wave Analysis and Modeling of Dielectric and Metallic Losses of CPW Short Circuits (Short Papers)
- FDTD Verification of Deep-Set Brain Tumor Hyperthermia Using a Spherical Microwave Source Distribution

# Paper Index


- Ferrite-Superconductor Devices for Advanced Microwave Applications
- FET Statistical Modeling Using Parameter Orthogonalization
- Field Distributions in Supported Coplanar Lines Using Conformal Mapping Techniques (Short Papers)
- Field Simulation of Dipole Antennas for Interstitial Microwave Hyperthermia
- Finite Difference Analysis of 2-D Photonic Crystals
- Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates
- Finite-Difference Time-Domain Algorithm for Solving Maxwell's Equations in Rotationally Symmetric Geometries
- Finite-Difference Time-Domain Analysis of Flip-Chip Interconnects with Staggered Bumps (Short Papers)
- Finite-Element Method with Edge Elements for Waveguides Loaded with Ferrite Magnetized in Arbitrary Direction
- Floor Plan, Moscone Center (1996 [MCS])
- Floor Plan, San Francisco Hilton & Towers (1996 [MCS])




Click on title for a paper summary.

# Paper Index


- Focusing and Impedance Properties of Conformable Phased Array Antennas for Microwave Hyperthermia
- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's
- Free-Space Power Combining and Beam Steering of Ultra-Wideband Radiation Using an Array of Laser-Triggered Antennas
- Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])
- Frequency-Domain Analysis of Strongly Nonlinear Circuits Using a Consistent Large-Signal Model
- Front Cover (1996 [MCS])
- Front Cover (Apr. 1996 [T-MTT])
- Front Cover (Aug. 1996 [T-MTT])
- Front Cover (Dec. 1996, Part I [T-MTT])
- Front Cover (Dec. 1996, Part II [T-MTT])
- Front Cover (Feb. 1996 [T-MTT])
- Front Cover (Jan. 1996 [T-MTT])




Click on title for a paper summary.

# Paper Index


- Front Cover (Jul. 1996, Part I [T-MTT])
- Front Cover (Jul. 1996, Part II [T-MTT])
- Front Cover (Jun. 1996 [T-MTT])
- Front Cover (Mar. 1996 [T-MTT])
- Front Cover (May 1996 [T-MTT])
- Front Cover (Nov. 1996 [T-MTT])
- Front Cover (Oct. 1996, Part I [T-MTT])
- Front Cover (Oct. 1996, Part II [T-MTT])
- Front Cover (Sep. 1996 [T-MTT])
- Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's
- Full Wave Analysis of Edge-Guided Mode Microstrip Isolator (Dec. 1996, Part II [T-MTT])
- Full Wave Analysis of Microwave Monolithic Circuit Devices Using a Generalized Yee-Algorithm Based on an Unstructured Grid
- Full-Wave Analysis of Quasi-Optical Structures




Click on title for a paper summary.

# Paper Index


- Full-Wave Modeling of Generalized Double Ridge Waveguide T-Junctions
- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])


**G**


- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])
- Gain a Complete Understanding of Antenna Structure Analysis (Advertisement) (Dec. 1996, Part II [T-MTT])
- Generalized Perfectly Matched Layer for the Absorption of Propagating and Evanescent Waves in Lossless and Lossy Media
- Generation and Transmission of FM and pi/4 DQPSK Signals at Microwave Frequencies Using Harmonic Generation and Optoelectronic Mixing in Mach-Zehnder Modulators
- Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index

- GT-PML: Generalized Theory of Perfectly Matched Layers and its Application to the Reflectionless Truncation of Finite-Difference Time-Domain Grids (Dec. 1996, Part II [T-MTT])
- Guest Editorial (Jul. 1996, Part II [T-MTT])
- Guest Editors' Overview (Dec. 1996, Part II [T-MTT])

**H**

---

- High Efficiency Power HFETS for Low Power Wireless Applications
- High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])
- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])
- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)
- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization
- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

# Paper Index


- High Temperature Superconductive Wideband Compressive Receivers
- High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)
- High-Frequency Reciprocity Based Circuit Model for the Incidence of Electromagnetic Waves on General Circuits in Layered Media
- High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)
- High-Spatial Resolution Resistivity Mapping of Large-Area YBCO Films by a Near-Field Millimeter-Wave Microscope (Short Papers)
- High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS
- Higher-Order Vector Finite Elements for Tetrahedral Cells
- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])




Click on title for a paper summary.

# Paper Index


- Highly Integrated Three-Dimensional MMIC Single-Chip Receiver and Transmitter (Dec. 1996, Part II [T-MTT])
- Hybrid Analysis of Three-Dimensional MMIC Elements by the Method of Lines
- Hybrid Lidar-Radar Ocean Experiment

---

- IEEE 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest of Papers (1996 [MCS])
- IEEE Financial Advantage Program (Advertisement) (Mar. 1996 [T-MTT])
- IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium Schedule (1996 [MCS])
- IEEE/MTT-S IMS Microwave Week at a Glance (1996 [MCS])
- Image Reconstruction of a Complex Cylinder Illuminated by TE Waves
- Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)




Click on title for a paper summary.

# Paper Index


- Improvements of the Two-Dimensional FDTD Method for the Simulation of Normal- and Superconducting Planar Waveguides Using Time Series Analysis (Short Papers)
- Improving Microwave Imaging by Enhancing Diffraction Tomography
- IMS Hotels (1996 [MCS])
- InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS
- Index of Authors (1996 [MCS])
- Index, IEEE [T-MTT] 1996, Volume 44, and MTT-S Sponsored Conferences
- Induced EM Field in a Layered Eccentric Spheres Model of the Head: Plane-Wave and Localized Source Exposure
- Induced Polarization Effects in Coupling Processes of Waveguide Modes
- Influence of Higher Order Modes on the Measurements of Complex Permittivity and Permeability of Materials Using a Microstrip Discontinuity
- Information for Authors (Aug. 1996 [T-MTT])




Click on title for a paper summary.

# Paper Index


- Information for Authors (Dec. 1996, Part I [T-MTT])
- Information for Authors (Feb. 1996 [T-MTT])
- Information for Authors (Jan. 1996 [T-MTT])
- Information for Authors (Mar. 1996 [T-MTT])
- Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)
- Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])
- Intermodulation Distortion in Kahn-Technique Transmitters
- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform
- Iterative Numerical Computation of the Electromagnetic Fields Inside Weakly Nonlinear Infinite Dielectric Cylinders of Arbitrary Cross Sections Using the Distorted-Wave Born Approximation




Click on title for a paper summary.

# Paper Index

## J


- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...


## K


- K through Ka-Band Driver and Power Amplifiers


## L


- L-band Internally Matched Si-MMIC Front-End
- L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications
- L-Resonator Bandstop Filters (Dec. 1996, Part II [T-MTT])
- Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's
- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO
- Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])
- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])
- Low DC Power Monolithic Low Noise Amplifier for Wireless Applications at 5 GHz
- Low Frequency Leaky Regime in Covered Multilayered Striplines
- Low Loss Multiplexers with Planar Dual Mode HTS Resonators
- Low-Voltage Broadband BiCMOS MMICs for Low-Cost High-Speed Wireless Networks Applications
- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)
- LSE- and LSM-Mode Sheet Impedances of Thin Conductors (Short Papers)




Click on title for a paper summary.

# Paper Index

## M


- Measurement of Simple Resonant Equivalent Circuits for Microstrip Antennas (Short Papers)
- Measurement of the Microwave Conductivity of a Polymeric Material with Potential Applications in Absorbers and Shielding (Comments)
- Measurements of the Low-Frequency-Gain Fluctuations of a 30-GHz High-Electron-Mobility-Transistor Cryogenic Amplifier
- Message from the General Chairman (1996 [MCS])
- Message from the Technical Program Chairman (1996 [MCS])
- Methods of Suppression or Avoidance of Parallel-Plate Power Leakage from Conductor-Backed Transmission Lines
- Micromachined W-Band Filters
- Microwave and Millimeter-Wave Photonics II (Advertisement) (Oct. 1996, Part I [T-MTT])



Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Microwave Channelized Active Filters--A New Modular Approach to Achieving Compactness and High Selectivity
- Microwave Inductors and Capacitors in Standard Multilevel Interconnect Silicon Technology
- Microwave Noise Characterization of Two-Port Devices Using an Uncalibrated Tuner (Short Papers)
- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results
- Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)
- Miniature Superconducting Filters
- Minimization of Reflection Error Caused by Absorbing Boundary Condition in the FDTD Simulation of Planar Transmission Lines
- MMICs for Commercial Applications the Low-Cost High Volume Production Techniques
- MMICs for Sensor Applications (1996 [MCS])
- MMWMC Committees (1996 [MCS])




Click on title for a paper summary.

# Paper Index


- MMWMC Steering Committee (1996 [MCS])
- MMWMC Technical Program Committee (1996 [MCS])
- Modal Circuit Decomposition of Lossy Multiconductor Transmission Lines
- Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure
- Mode Orthogonality Relations and Field Structure in Chirowaveguides (Short Papers)
- Mode Scattering by a Nonlinear Step-Discontinuity in Dielectric Optical Waveguides
- Modeling and Performance of a 100-Element pHEMT Grid Amplifier
- Modeling Lossy Anisotropic Dielectric Waveguides with the Method of Lines
- Modeling of Coplanar Stripline Discontinuities
- Modeling of General Constitutive Relationships in SCN TLM
- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method
- Modes and Their Stability of a Symmetric Two-Element Coupled Negative Conductance Oscillator Driven Spatial Power Combining Array
- Monolithic Millimeter Wave Optical Receivers
- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band
- Monolithic VCO Using a Novel Active Inductor (1996 [MCS])
- Monopole Antennas for Microwave Catheter Ablation
- MRTD: New Time-Domain Schemes Based on Multiresolution Analysis
- Multifrequency Microstrip Antennas Using Alumina-Ceramic/Polyimide Multilayer Dielectric Substrate
- Multimode Equivalent Network Representation for H- and E-Plane Uniform Bends in Rectangular Waveguide
- Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])


Click on title for a paper summary.

# Paper Index

## N


- Network Representation and Transverse Resonance for Layered Chirowaveguides (Short Papers)
- New Approach to the Design of Active Floating Inductors in MMIC Technology
- New Explicit Expressions for the Coupling Matrix Elements Related to Scattering from a Planar Periodic Single-Strip Grating (Corrections)
- New Reciprocity Theorems for Chiral, Nonactive, and Biisotropic Media (Short Papers)
- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)
- New Simple Procedure for the Computation of the Multimode Admittance or Impedance Matrix of Planar Waveguide Junctions
- No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System
- Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface
- Nonlinear System and Subsystem Modeling in Time Domain
- Novel Directional Couplers Using Broadside-Coupled Coplanar Waveguides for Double-Sided Printed Antennas
- Novel High-Isolation FET Switches
- Numerical Simulation of the Power Density Distribution Generated in a Multimode Cavity by Using the Method of Lines Technique to Solve Directly for the Electric Field

**O**

- On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides
- On the Network Characterization of Planar Passive Circuits Using the Method of Moments



MTT®

IEEE®

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- On the Power Handling Capability of High Temperature Superconductive Filters
- Open-Ended Metallized Ceramic Coaxial Probe for High-Temperature Dielectric Properties Measurements
- Optimization of a Lumped Element Circulator Based on Eigenvalue Evaluation and Structural Improvement
- Optimization of Active Microwave Frequency Multiplier Performance Utilizing Harmonic Terminating Impedances (Dec. 1996, Part II [T-MTT])
- Optimization of Aperture Transitions for Multiport Microstrip Circuits
- Optimum Mesh Grading for Finite-Difference Method
- Order Recursive Method of Moments (ORMoM) for Iterative Design Applications
- Order-Recursive Gaussian Elimination (ORGE) and Efficient CAD of Microwave Circuits
- Oscillator-Type Active-Integrated Antenna: The Leaky-Mode Approach




Click on title for a paper summary.

# Paper Index

## P


- Panel (1996 [MCS])
- Parameter Extraction and Correction for Transmission Lines and Discontinuities Using the Finite-Difference Time-Domain Method
- Performance Comparison of 1 Watt Ka-Band MMIC Amplifiers Using Pseudomorphic HEMTs and Ion-Implanted MESFETs
- Permeability Measurement on Composites Made of Oriented Metallic Wires from 0.1 to 18 GHz (Short Papers)
- Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)
- Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)
- Polarizabilities of an Annular Cut in the Wall of an Arbitrary Thickness
- Power Leakage, Characteristic Impedance, and Leakage-Transition Behavior of Finite-Length Stub Sections of Leaky Printed Transmission Lines

# Paper Index


- Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)
- Prelaunch Calibration of the Advanced Microwave Sounding Unit-A for NOAA-K
- Procedure for Direct Calculation of Characteristic Admittance Matrix of Coupled Transmission Lines (Short Papers)
- Propagation and Coupling Characteristics of Microstrip Lines with Laminated Ground Plane
- Propagation and Coupling Properties of Integrated Optical Waveguides--An Integral Equation Formulation
- Propagation Characteristics of Superconducting Microstrip Lines
- Propagation Characteristics of the Magnetostatic Surface Wave in the YBCO-YIG Film-Layered Structure
- Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report
- Properties and Applications of Thick Film High Temperature Superconductors



MTT®

IEEE®

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Properties of and Generalized Full-Wave Transmission Line Models for Hybrid (Bi)(an)isotropic Waveguides
- Pulsed Device Measurements and Applications

**Q**

- Quarter Wavelength Ceramic Combline Filters
- Quasi-TEM Analysis of Coplanar Waveguides with an Inhomogeneous Semiconductor Substrate (Short Papers)

**R**

- Radial Mode Matching Analysis of Ridged Circular Waveguides (Short Papers)
- Recursive Mode Matching Method for Multiple Waveguide Junction Modeling
- Reduced Invasiveness of Noncontact Electrooptic Probes in Millimeter-Wave Optoelectronic Characterization (Short Papers)
- Regular Boundary Integral Formulation for the Analysis of Open Dielectric/Optical Waveguides

# Paper Index


- Resonance Characteristics of Whispering-Gallery Modes in an Elliptic Dielectric Disk Resonator (Short Papers)
- Riccati Matrix Differential Equation Formulation for the Analysis of Nonuniform Multiple Coupled Microstrip Lines
- Ridge Coplanar Waveguide for Optical Amplitude Modulation
- Rigorous Analysis of Mode Propagation and Field Scattering in Silicon-Based Coplanar MIS Slow Wave Structures with Abrupt Transitions to Transmission Lines on Normal Substrate


## S


- Scattering of Millimeter Waves by Metallic Strip Gratings on an Optically Plasma-Induced Semiconductor Slab
- Schedule of Events (1996 [MCS])
- Schottky Diodes for Analogue Phase Shifters in GaAs MMIC's (Short Papers)
- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

# Paper Index


- Sensitivity Analysis of Lossy Coupled Transmission Lines (Comments)
- Session I -- MMIC Advancements for Military and Commercial Applications
- Session II -- Power Amplifiers
- Session III -- Signal Generation and Control
- Session IV -- BiCMOS and HBT MMIC Technologies (Invited Session)
- Session IX -- MMIC Systems Components (Joint with IMS)
- Session V -- Receiver Technology
- Session VI -- Small Signal IC's and Passive Components
- Session VII -- Low Noise Millimeter Wave MMICs (Joint with IMS)
- Session VIII -- Large Signal Generation and Application (Joint with MTT)
- Session WE3F -- MMWMC Open Forum Papers (Joint with IMS)
- Shape Sensitivities of Capacitances of Planar Conducting Surfaces Using the Method of Moments




Click on title for a paper summary.

# Paper Index


- Simulation of Dispersive Multiconductor Transmission Lines by Pade Approximation via the Lanczos Process
- Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems
- Small-Signal Characterization of Microwave and Millimeter-Wave HEMT's Based on a Physical Model
- Soft and Dry Phantom Modeling Material Using Silicone Rubber with Carbon Fiber
- Some Considerations on the Accuracy of the Nonuniform FDTD Method and its Application to Waveguide Analysis When Combined with the Perfectly Matched Layer Technique
- Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem
- Spectral Domain Analysis of Single and Coupled Microstrip Open Discontinuities with Anisotropic Substrates (Short Papers)




Click on title for a paper summary.

# Paper Index


- Statistical Computer-Aided Design for Microwave Circuits
- Status of InP HEMT Technology for Microwave Receiver Applications (Dec. 1996, Part II [T-MTT])
- Status of InP HEMT Technology for Microwave Receiver Applications (Invited)
- Stepped Transformers on TEM-Transmission Lines
- Stokes Phenomenon in the Development of Microstrip Green's Function and its Ramifications (Short Papers)
- Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices
- Study and Characterization of Optoelectronic Photoconductor-Based Probes
- Study of Whispering Gallery Modes in Double Disk Sapphire Resonators
- Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)
- Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's


Click on title for a paper summary.

# Paper Index


- Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model


**T**


- Table of Contents (1996 [MCS])
- Table of Contents (Dec. 1996, Part II [T-MTT])
- TE and TM Modes in Cylindrical Metallic Structures Filled with Bianisotropic Material
- TE Wave Properties of Slab Dielectric Guide Bounded by Nonlinear Non-Kerr-Like Media (May 1996 [T-MTT])
- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia
- Temperature-Dependent Modeling of Gallium Arsenide MESFET's
- The 1996 IEEE MTT-S International Microwave Symposium/Exhibition: "Bridging the Spectrum" (Dec. 1996, Part II [T-MTT])



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- The Analysis of General Two-Dimensional PEC Structures Using a Modified CPFDTD Algorithm (Short Papers)
- The Anti-Circuit Concept for the Characterization of Active Circuits Using Electromagnetic Simulations
- The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz
- The Design of Tuned Front-End GaAs MMIC Optical Receivers
- The Eigenfunction Expansion of Dyadic Green's Functions for Chirowaveguides
- The Electric Quadruple Contribution to the Circular Birefringence of Nonmagnetic Anisotropic Chiral Media: A Circular Waveguide Experiment
- The High Temperature Superconductivity Space Experiment (HTSSE-II) Design
- The Noise-Tee--A Lightwave Device for Microwave Noise Measurements (Short Papers)
- The NRL Josephson Junction Monitoring Experiment on HTSEE-II



MTT®

IEEE®

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- The Use of Active Traveling-Wave Structures in GaAs MMIC's (Short Papers)
- Theoretical Investigation of a Free-Electron Maser Operating with a TEM Transmission Line
- Theory and Numerical Calculations for Radially Inhomogeneous Circular Ferrite Circulators
- Thermal Management for High-Power Active Amplifier Arrays (Short Papers)
- Thermal Noise in Lossy Waveguides
- Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC
- Three-Port Hybrid Power Dividers Terminated in Complex Frequency-Dependent Impedances (Short Papers)
- Thru Characteristics of a Coaxial Gap (FDTD Model and Measurements) (Short Papers)
- Towards a Generalized TLM Algorithm for Solving Arbitrary Reciprocal and Nonreciprocal Planar Structures (Short Papers)




Click on title for a paper summary.

# Paper Index


- Transient Analysis of Tapered Lines Based on the Method of Series Expansion (Short Papers)
- Transient Coupling Reduction and Design Considerations in Edge-Coupled Coplanar Waveguide Couplers (Short Papers)
- Transient Propagation in Lossy Coplanar Waveguides
- Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer
- Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)
- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)
- Two-Dimensional Fiber-Optic Control of a True Time-Steered Array Transmitter (Dec. 1996, Part II [T-MTT])

**U**

---

- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Uniplanar Power Dividers Using Coupled CPW and Asymmetrical CPS for MIC's and MMIC's
- Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems
- Use of Frequency Derivatives in the Three-Dimensional Full-Wave Spectral Domain Technique
- Use of the Field-Iteration Method in Studying the Three-Dimensional Phased Array for Electromagnetic Hyperthermia

**V**

- Variational Solution of Microwave Circuits and Structures (Short Papers)

**W**

- We're on the Web (Advertisement) (Dec. 1996, Part II [T-MTT])
- Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators



MTT

IEEE

Contents

Publications

Issues


Click on title for a paper summary.

# Paper Index


- Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"
- Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"
- Workshop (1996 [MCS])
- Workshop on Millimeter Waves (Advertisement) (Jan. 1996 [T-MTT])


**Y**

---


- Your One-Stop Sourcebook on Microstrip Antennas and Microwave Systems (Advertisement) (Dec. 1996, Part II [T-MTT])

# Author Index

A B C D E F G H I

J K L M N O P Q R

S T U V W X Y Z

Colored letters are active links to the index.

# Author Index

## A


- Abbate, M.
- Abdipour, A.
- Abe, B.
- Aberle, J.T.
- Abrokwah, J.
- AbuShaaban, M.
- Accatino, L.
- Achar, R.
- Acher, O.
- Adve, R.
- Ago, J.
- Aidnik, D.L.
- Aigo, T.
- Aikawa, M.
- Akerling, G.
- Akos, D.M.
- Aksun, M.I.
- Akyel, C.
- Al-Bader, S.J.
- Alatan, L.
- Albares, D.J.
- Alexopoulos, N.G.
- Alford, N.M.
- Ali, F.
- Ali, H.O.
- Allen, B.R.
- Alonso, J.I.
- Alsunaidi, M.A.
- Amari, S.
- An, H.
- Andersen, J.
- Anderson, A.C.
- Angelov, I.
- Antar, Y.M.M.


Click on author name for a list of papers.

# Author Index


- Aparin, V.
- Arcioni, P.
- Armengaud, L.
- Arndt, F.
- Arsenault, D.R.
- Artuzi, Jr., W.A.
- Aubert, H.
- Aucoin, L.M.
- Aust, M.V.
- Auten, R.
- Avenhaus, B.
- Awai, I.
- Azizi, A.


## B


- Bachtold, W.
- Baclet, P.
- Baets, R.G.F.
- Bajor, G.
- Bakkar, E.A.
- Balaji, U.
- Balanis, C.A.
- Bandla, S.
- Barrera, J.
- Barthelemy, A.
- Baudrand, H.
- Baumberger, W.
- Bautista, J.J.
- Bedard, B.
- Begley, P.A.
- Beilenhoff, K.
- Beisswanger, F.
- Beker, B.
- Bell, H.C.
- Benelbar, R.
- Bengtsson, L.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Benson, T.M.
- Berenc, T.
- Berini, P.
- Bernardino, J.
- Bernhard, J.T.
- Bernhardt, B.
- Berntgen, J.
- Bertin, G.
- Berube, D.
- Best, W.S.
- Bhasin, K.B.
- Bialkowski, M.E.
- Bica, D.
- Biebl, E.M.
- Biedenbender, M.
- Biernacki, P.D.
- Bin, M.
- Birand, M.T.
- Biro, O.
- Blais, A.
- Blas, J.M.
- Block, T.R.
- Blondy, P.
- Blundell, R.
- Bocchi, W.J.
- Boheim, M.
- Boisvert, R.R.
- Boric-Lubecke, O.
- Bornemann, J.
- Bornmann, S.
- Bosisio, R.G.
- Bowen, J.G.
- Branner, G.R.
- Bressan, M.
- Breuil, N.
- Bridges, D.R.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Bringhurst, S.
- Brings, L.
- Brown, J.
- Bruchlos, H.
- Buchheit, S.
- Buck, D.C.
- Budka, T.P.
- Burger, W.
- Burghartz, J.N.
- Burkhardt, M.
- Burm, J.
- Busse, G.
- Butler, J.K.
- Button, T.W.


## C


- Camart, J.-C.
- Camilleri, N.
- Cangellaris, A.C.
- Caorsi, S.
- Cardinal, F.
- Cardona, A.
- Cardullo, M.
- Carlsson, E.
- Carroll, J.
- Carter, III, C.
- Cascio, L.
- Celik, M.
- Celka, P.
- Chakrabarty, S.B.
- Champion, M.H.
- Chan, A.K.
- Chan, A.M.K.
- Chan, T.K.K.
- Chang, C.-W.
- Chang, C.T.

# Author Index


- Chang, K.
- Chatterjee, D.
- Chen, C.
- Chen, C.H.
- Chen, K.-M.
- Chen, K.Y.
- Chen, S.
- Chen, S.-W.
- Chen, Y.
- Chen, Z.
- Cheng, K.-K.M.
- Cheng, S.
- Chew, S.T.
- Chew, W.C.
- Chi, C.-Y.
- Chi, J.
- Chiang, K.S.
- Chino, M.
- Chiu, C.-C.
- Chive, M.
- Cho, Y.
- Chong, C.K.
- Chorey, C.M.
- Chou, G.-J.
- Chow, P.D.
- Chrissoulidis, D.P.
- Christopoulos, C.
- Chu, F.-L.
- Chui, C.K.
- Chun, J.C.
- Chung, P.S.
- Ciampolini, P.
- Citerne, J.
- Claassen, J.H.
- Clark, C.J.
- Clifton, J.C.


Click on author name for a list of papers.

# Author Index


- Cloete, J.H.
- Coen, G.
- Cole, B.F.
- Collins, C.E.
- Colpitts, B.G.
- Compton, R.C.
- Conciauro, G.
- Connor, G.
- Conradi, J.
- Contarino, V.M.
- Costa Freire, J.
- Costa, J.
- Cowles, J.C.
- Craddock, I.J.
- Crescenzi, Jr., E.J.
- Cros, D.
- Cryan, M.J.
- Curry, C.R.
- Curtis, J.A.
- Cuzin, M.


## D


- Dalle, C.
- Darvishzadeh, M.
- Das, B.N.
- Das, N.K.
- Das, S.
- Dasgupta, B.
- Davidov, D.
- Davidovitz, M.
- Davis, L.E.
- De Lisio, M.P.
- De Los Santos, H.J.
- de Menezes, L.R A.X.
- de Pablos, J.
- de Tournai, D.C.




Click on author name for a list of papers.

# Author Index


- De Zutter, D.
- Decoster, D.
- Dehe, A.
- Delaney, M.
- Delisle, J.T.
- Deng, T.
- Derov, J.S.
- Desclos, L.
- Despretz, D.
- Deuflhard, P.
- Dib, N.
- Dib, N.I.
- Dieudonne, J.-M.
- Dillon, B.M.
- Ding, Z.
- Dionne, G.F.
- Djordjevic, A.R.
- Dmitriyev, V.A.
- Dokas, V.
- Dolman, G.
- Dragon, C.
- Drozd, J.M.
- Dryagin, Y.A.
- du Toit, L.J.
- Dubois, L.
- Dufault, M.
- Duffy, S.M.
- Duhamel, F.
- Duncan, S.W.
- Dunleavy, L.P.
- Dunn, D.
- Durand, D.
- Durec, J.
- Dyczij-Edlinger, R.


Click on author name for a list of papers.

# Author Index


## E

- Eastman, L.F.
- Ebberg, A.
- Edwards, M.L.
- Egger, O.
- Eisenstadt, W.R.
- El Khoury, S.G.
- El-Ghazaly, S.M.
- El-Rabaie, S.
- El-Sharawy, E.-B.
- Eleftheriades, G.V.
- Elshafiey, T.M.F.
- Engelbrecht, R.
- Enoki, T.
- Enomoto, S.
- Eom, H.J.
- Epp, L.W.
- Erb, J.
- Esman, R.D.
- Evans, G.A.

## F

- Fabre, J.-J.
- Fache, N.
- Falt, C.
- Fan, L.
- Fan, Z.
- Fang, J.
- Feinerman, A.D.
- Felder, A.
- Felix, R.
- Feng, M.
- Fenzi, N.O.
- Ferendeci, A.M.
- Fernandez, A.S.




Click on author name for a list of papers.

# Author Index


- Fernandez, F.A.
- Fernandez, T.
- Fiedziuszko, S.J.
- Filipovic, D.
- Filipovic, D.N.
- Finkler, R.
- Fisk, E.
- Flynt, R.A.
- Fong, F.
- Forse, R.
- Forse, R.J.
- Fortes, F.
- Fouad Hanna, V.
- Frankel, M.Y.
- Franza, O.P.
- Freundorfer, A.P.
- Fricke, K.
- Friscourt, M.R.
- Fujii, M.
- Fujiwara, O.
- Fukui, T.
- Fukusako, T.
- Funabashi, M.
- Funada, J.
- Funk, E.E.
- Furse, C.M.
- Furukawa, H.


## G


- Gaidis, M.C.
- Galkin, A.
- Gamba, P.
- Gandhi, O.P.
- Gao, F.
- Gao, Y.
- Garcia, L.E.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Garcia, M.
- Garcia, S.G.
- Garske, D.
- Gedney, S.D.
- Gelin, P.
- Gentili, G.G.
- Gerdes, J.
- Geren, W.P.
- Gevorgian, S.
- Gevorgian, S.S.
- Geyer, R.G.
- Ghannouchi, F.M.
- Ghouz, H.H.M.
- Gibson, A.A.P.
- Gilmore, R.
- Gimeno, B.
- Gismero, J.
- Glass, E.
- Glasser, L.A.
- Gliese, U.
- Godden, J.
- Goebel, U.
- Golba, G.A.
- Golosovsky, M.
- Gomez Martin, R.
- Goodrich, L.C.
- Gopalsami, N.
- Gornert, P.
- Goswami, J.C.
- Goto, M.
- Gottwald, G.
- Gouker, M.A.
- Gover, A.
- Graffeuil, J.
- Graglia, R.D.
- Gragnani, G.L.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Grajal, J.
- Grammer, W.
- Greaves, S.D.
- Green, R.J.
- Greenspon, A.J.
- Griffin, E.L.
- Guglielmi, M.
- Guillon, P.
- Guillouard, K.
- Gupta, A.
- Gupta, K.C.
- Guttich, U.


## H


- Hafizi, M.
- Hajji, R.
- Halchin, D.
- Hamade, A.H.
- Hamai, M.
- Han, J.-H.
- Han, L.
- Han, Q.
- Hankui, E.
- Hanson, G.W.
- Harada, Y.
- Harari, J.
- Hargrove, K.L.
- Harms, P.
- Hartnagel, H.L.
- Harvey, J.
- Hasler, M.J.
- Haspeklo, H.
- Hayashi, H.
- Hayes, D.T.
- He, S.
- He, X.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Heime, K.
- Heinrich, W.
- Heins, M.
- Herczfeld, P.R.
- Herd, J.S.
- Herd, K.G.
- Herman, M.I.
- Herrmann, J.
- Hess, R.
- Hesselbarth, J.
- Heuken, M.
- Hey-Shipton, G.L.
- Higashino, T.
- Higgins, A.
- Higgins, J.A.
- Hirai, T.
- Hirano, M.
- Ho, S.L.
- Ho, W.-J.
- Hobart, K.D.
- Hodge, J.D.
- Hoefer, W.J.R.
- Hofschen, S.
- Hoh, L.
- Holme, S.C.
- Hombach, V.
- Hong, J.-S.
- Hong, S.
- Hong, S.-C.
- Horiuchi, H.
- Hornbuckle, D.
- Horng, T.-S.
- Hosaya, K.
- Hosny, E.A.
- Hosoya, K.
- Hsu, S.S.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Hu, H.
- Huang, F.
- Huang, J.
- Huang, J.-H.
- Huang, T.W.
- Huber, S.
- Huguenin, G.R.
- Hui, H.-T.
- Hung, D.
- Hung-Bao, T.M.
- Huyart, B.
- Hwang, J.C.M.
- Hwang, Y.

I

- Iatrou, C.T.
- Imai, K.
- Imai, N.
- Imai, Y.
- Imanishi, K.
- Imtiaz, S.M.S.
- Ingram, S.G.
- Inoue, A.
- Inoue, T.
- Ioannidou, M.P.
- Ishida, H.
- Ishida, O.
- Ishihara, H.
- Ishii, Y.
- Ishikawa, O.
- Ishikawa, T.
- Iskander, M.F.
- Isobe, R.
- Ito, H.
- Itoh, J.
- Itoh, T.




Click on author name for a list of papers.

# Author Index


- Iwai, T.
- Iyama, Y.

**J**

- Jackson, D.R.
- Jackson, M.K.
- Jackson, R.W.
- Jacob, A.F.
- Jacquart, P.-M.
- Jager, D.
- Jakoby, B.
- Jamani, Y.
- Jamid, H.A.
- Janaki, M.S.
- Jang, D.
- Janocko, M.A.
- Jarosik, N.C.
- Javadi, H.H.S.
- Jecko, B.
- Jegannathan, S.
- Jenkins, K.A.
- Jin, G.H.
- Joao Rosario, M.
- Johansson, M.E.
- Joines, W.T.
- Jolley, B.
- Jones, W.L.
- Joshin, K.
- Jostingmeier, A.
- Journet, F.

**K**

- Kadota, M.
- Kagawa, Y.
- Kahn, W.K.
- Kai, D.




Click on author name for a list of papers.

# Author Index


- Kamenetskii, E.O.
- Kamogawa, K.
- Kanazawa, K.
- Kang, Y.W.
- Kaouk, Z.
- Karamitsos, N.
- Karlsson, C.
- Kashiwabara, Y.
- Kasibhotla, V.
- Katehi, L.P.B.
- Katzin, P.
- Kau, C.P.
- Kawamura, J.
- Kawasaki, H.
- Kawasaki, Y.
- Kawecki, T.G.
- Ke, J.-Y.
- Kenney, J.P.
- Kern, S.
- Khebir, A.
- Kiang, J.-F.
- Kikuchi, K.
- Kim, D.-W.
- Kimura, S.
- Kinney, C.F.
- Kinoshita, Y.
- Kintis, M.
- Klaassen, A.
- Klein, M.V.
- Klein, N.
- Klepser, B.-U.
- Klingbeil, H.
- Klinger, M.
- Kobayashi, K.W.
- Kobayashi, M.
- Kobayashi, S.


Click on author name for a list of papers.

# Author Index


- Kogami, Y.
- Kojucharow, K.K.
- Kolawa, E.A.
- Kolbehdari, M.A.
- Kolias, N.J.
- Kollberg, E.
- Kollberg, E.L.
- Konishi, Y.
- Kono, R.
- Kooi, P.S.
- Kornatz, A.
- Kosanovich, S.
- Kotsuka, Y.
- Kouki, A.B.
- Kramer, J.
- Kremer, R.
- Krowne, C.M.
- Krozer, V.
- Krumpholz, M.
- Krupka, J.
- Krupnov, A.F.
- Kruse, J.
- Kub, F.J.
- Kubo, S.
- Kudsia, C.M.
- Kuhn, E.
- Kulke, R.
- Kumar, M.
- Kuo, J.-T.
- Kurennoy, S.S.
- Kuroki, F.
- Kuster, N.
- Kustom, R.
- Kuwabara, T.
- Kuznetsov, D.
- Kuzuhara, M.


Click on author name for a list of papers.

# Author Index


- Kwok, R.S.
- Kwon, Y.
- Kwon, Y.-S.

**L**

- Labonte, S.
- Lai, R.
- Lalande, M.
- Lamey, D.
- Lancaster, M.J.
- Lansing, F.S.
- Lardizabal, S.M.
- Laskar, J.
- Lau, K.-F.
- Lazzi, G.
- Le Gourrierec, P.
- Le, M.
- LeDuc, H.G.
- Lee, C.C.
- Lee, C.H.
- Lee, J.-J.
- Lee, J.H.
- Lee, K.
- Lee, L.-S.J.
- Lee, S.
- Lefrancois, S.
- Legault, S.R.
- Leong, M.S.
- Lester, J.
- Lester, J.A.
- Levy, R.
- Li, J.
- Li, L.W.
- Liang, G.-C.
- Liao, C.-L.
- Liao, W.-P.


Click on author name for a list of papers.

# Author Index


- Lin, J.
- Lin, J.H.
- Lin, S.-Y.
- Lin, X.P.
- Lin, Y.D.
- Linner, P.
- Lithgow, R.
- Litva, J.
- Litvin, K.I.
- Liu, C.-M.
- Liu, F.-W.
- Liu, J.
- Liu, L.C.T.
- Liu, P.
- Liu, P.-T.
- Liu, T.
- Llopis, O.
- Lo, D.C.W.
- Lott, U.
- Louhi, J.T.
- Loung, P.V.
- Lowther, R.
- Lu, J.-H.
- Lu, S.-L.
- Lu, Y.
- Lucero, R.
- Luhmann, Jr., N.C.
- Lutke, W.
- Luy, J.-F.
- Lyons, M.R.
- Lyons, W.G.

**M**

- Ma, J.-G.
- Maas, S.
- MacGowan, K.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Madihian, M.
- Madjar, A.
- Maemura, K.
- Mag, I.
- Mahadevan, K.
- Mahfoudi, M.
- Mahmood, Z.
- Main, E.
- Majerus, M.
- Makimoto, M.
- Makioka, S.
- Mansour, R.R.
- Manzel, M.
- Mao, S.-G.
- Marques, R.
- Martin, G.H.
- Martinez, M.A.G.
- Martinsson, T.
- Maruhashi, K.
- Massa, A.
- Matsumura, K.
- Matsuo, M.
- Matthaei, G.L.
- Matthews, P.J.
- Maze-Merceur, G.
- McCurdy, A.H.
- McDermott, D.B.
- Mediavilla, A.
- Meggs, C.
- Meier, D.L.
- Meier, H.-P.
- Meier, K.
- Melcon, A.A.
- Mesa, F.
- Meschanov, V.P.
- Meyers, W.J.


Click on author name for a list of papers.

# Author Index


- Mezzanotte, P.
- Michel, C.
- Mickelson, A.R.
- Miles, R.E.
- Miller, D.
- Minakawa, A.
- Mink, J.W.
- Mirshekar-Syahkal, D.
- Misra, P.
- Mitsui, Y.
- Mittleman, S.D.
- Mittra, R.
- Miura, T.
- Miyatsuji, K.
- Mo, T.
- Moazzam, M.R.
- Monahan, G.P.
- Mongiardo, M.
- Montauti, F.
- Montiel, C.M.
- Monzon, C.
- Monzon, J.C.
- Moore, E.L.
- Mori, K.
- Morin, P.
- Morini, A.
- Moritani, A.
- Mosig, J.R.
- Moskowitz, C.
- Moulthrop, A.A.
- Moussessian, A.
- Muha, M.S.
- Mullen, L.J.
- Muraguchi, M.
- Murakami, Y.
- Murch, R.D.


Click on author name for a list of papers.

# Author Index


- Murduck, J.
- Murphy, P.G.
- Musolf, J.

**N**

- Nadobny, J.
- Nagai, H.
- Nair, V.
- Naishadham, K.
- Najafabadi, R.M.
- Nakagawa, T.
- Nakatsuka, T.
- Nakayama, M.
- Nakhla, M.S.
- Narayana, S.M.
- Nardi, D.D.
- Narhi, T.
- Nash, S.J.
- Navarro, E.A.
- Navarro, J.A.
- Neidert, R.E.
- Newport, Y.
- Ng, M.W.R.
- Nghiem, D.
- Ngo, D.
- Nguyen, L.
- Nguyen, R.
- Nicholson, J.J.
- Nielsen, T.N.
- Nikawa, Y.
- Nikita, K.S.
- Nisenoff, M.
- Nishikawa, K.
- Nishimoto, M.
- Nishimura, K.
- Nishitsuji, M.



MTT

IEEE

Contents

Authors


Click on author name for a list of papers.

# Author Index


- Nogawa, K.
- Nojima, T.
- Norgren, M.
- Norskov, S.
- Nuteson, T.W.
- Nye, R.S.

**O**

- Oates, D.E.
- Oberschmidt, G.
- Ogata, N.
- Oh, K.S.
- Ohara, S.
- Ohashi, Y.
- Ohata, K.
- Ohgihara, T.
- Ohta, Y.
- Ohtomo, M.
- Okazaki, H.
- Oki, A.K.
- Okoniewski, M.
- Okubo, N.
- Oliner, A.A.
- Olmedo, B.G.
- Olson, H.M.
- Olyslager, F.
- Omar, A.S.
- Onda, K.
- Ono, M.
- Onodera, K.
- Ooms, B.
- Ooms, S.
- Oraizi, H.
- Orgusaar, R.
- Orsini, R.
- Osafune, K.


Click on author name for a list of papers.

# Author Index

## P


- Pacaud, A.
- Padin, S.
- Page, C.
- Paine, S.
- Palusinski, O.A.
- Pan, D.-S.
- Pan, G.
- Pan, Q.
- Pang, P.
- Panton, W.
- Papa, D.C.
- Park, E.J.
- Park, H.H.
- Park, W.S.
- Parker, A.
- Parshin, V.V.
- Pasquet, D.
- Pastorino, M.
- Patrick, W.
- Paul, C.R.
- Pavelyev, A.B.
- Pekarek, J.E.
- Peng, H.
- Penn, S.J.
- Pennock, S.R.
- Perdomo, J.
- Perez, F.
- Perregrini, L.
- Perrin, G.
- Peterson, A.F.
- Petrosky, K.J.
- Pieseski, S.J.
- Pinhasi, Y.
- Plana, R.




Click on author name for a list of papers.

# Author Index


- Platzker, A.
- Plumb, R.G.
- Poles, L.D.
- Pollard, R.D.
- Pollman, M.D.
- Polycarpou, A.C.
- Polychronopoulos, S.J.
- Ponchak, G.E.
- Pond, J.M.
- Porch, A.
- Pospieszalski, M.W.
- Potyraj, P.A.
- Pregla, R.
- Pretterebner, J.
- Prevost, B.
- Pribble, W.L.
- Pribetich, J.
- Price, G.E.
- Prichett, S.
- Pun, E.Y.B.

**Q**

- Qian, J.
- Queffelec, P.

**R**

- Raab, F.H.
- Raab, J.
- Raffetto, M.
- Raihn, K.F.
- Railton, C.J.
- Raisanen, A.V.
- Ralston, R.W.
- Ramos, J.
- Rangel-Patino, F.E.
- Rao, G.
- Rappaport, C.M.



Contents

Authors


Click on author name for a list of papers.

# Author Index


- Raptis, A.C.
- Rascoe, D.L.
- Rasukova, I.A.
- Rathmell, J.G.
- Rauscher, C.
- Rawat, B.
- Razeghi, M.M.
- Rebagliati, M.
- Rebeiz, G.M.
- Redlich, S.
- Reiss, K.
- Reljin, B.D.
- Remillard, S.
- Remillard, S.K.
- Reynoso-Hernandez, J.A.
- Rezazadeh, A.A.
- Rheinfelder, C.
- Rhodes, R.
- Riblet, H.J.
- Rieckmann, C.
- Riegert, R.J.
- Ritter, J.
- Rivoli, A.
- Rizzi, B.J.
- Robertson, I.D.
- Robertson, S.V.
- Roblin, O.
- Rohlfing, S.M.
- Rollman, J.
- Romanofsky, R.R.
- Romero, M.A.
- Rorsman, N.
- Rosario, M.J.
- Rose, V.S.
- Roselli, L.
- Rosen, A.


Click on author name for a list of papers.

# Author Index


- Rosenbaum, R.M.
- Rosenberg, J.J.
- Rosloniec, S.
- Roy, L.
- Roy, T.
- Rozzi, T.
- Rutledge, D.B.


## S


- Sagawa, M.
- Saito, E.R.
- Sakagami, I.
- Salazar-Palma, M.
- Sanchez-Hernandez, D.
- Sangary, N.T.
- Sangster, A.J.
- Sarkar, T.K.
- Sarto, M.S.
- Saunier, P.
- Savage, J.S.
- Savard, P.
- Sawai, T.
- Sayed, M.
- Scanlan, S.O.
- Schaff, W.J.
- Schaller, G.
- Schamberger, M.A.
- Scharen, M.
- Schefer, M.
- Schellenberg, J.M.
- Schmatz, M.L.
- Schmegner, K.-E.
- Schmid, T.
- Schmuckle, F.J.
- Schneider, J.B.
- Schoenfeld, F.



MTT

IEEE

Contents

Authors


Click on author name for a list of papers.

# Author Index


- Scholen, A.
- Schutt-Aine, J.E.
- Schwarzbek, S.
- Scott, J.
- Scott, S.A.
- Seaver, M.M.
- Seebass, M.
- Sentelle, C.G.
- Shah, S.A.
- Shalkhauser, K.A.
- Shanjia, X.
- Sharma, A.K.
- Sheen, J.-W.
- Shen, Z.-Y.
- Shepherd, P.R.
- Shibata, K.
- Shifrin, M.
- Shigematsu, Y.
- Shih, C.-F.
- Shimizu, M.
- Shinozaki, S.
- Shirakawa, K.
- Silva, C.P.
- Silva, J.H.
- Silver, A.
- Simon, K.M.
- Simons, R.N.
- Singer, M.
- Singh, R.
- Sinnesbichler, F.
- Sitch, J.
- Skalitzky, R.G.
- Skaropoulos, N.C.
- Slattery, R.L.
- Sledzik, H.
- Sloan, R.


Click on author name for a list of papers.

# Author Index


- Smith, D.M.
- Smith, P.A.
- Smith, P.M.
- Smith, R.
- Smith, R.P.
- Snowden, C.M.
- Sobhy, M.I.
- Sollner, T.C.L.G.
- Sorrentino, R.
- Soulen, Jr., R.J.
- Souny, B.
- Soyuer, M.
- Sozanski, J.-P.
- Spears, E.
- Sporkman, T.
- Sporkmann, T.
- Srinivasan, M.
- Stanchina, W.E.
- Steer, M.B.
- Stern, J.A.
- Stiller, A.
- Stiller, M.
- Stotz, M.
- Streit, D.C.
- Strohm, K.
- Strohm, K.M.
- Struble, W.
- Stuchly, M.A.
- Su, D.W.-F.
- Su, H.-C.
- Suematsu, E.
- Suematsu, N.
- Sun, C.K.
- Sun, Y.
- Surridge, R.K.


Click on author name for a list of papers.

# Author Index

## T


- Tai, B.H.
- Tait, G.B.
- Taki, M.
- Takimoto, Y.
- Talisa, S.H.
- Talvacchio, J.
- Tan, J.
- Tan, M.
- Tang, S.Y.
- Tang, W.-C.
- Tang, Y.P.
- Tanimoto, T.
- Tardioli, G.
- Tateoka, K.
- Tauritz, J.L.
- Tazon, A.
- Teeter, D.
- Tefiku, F.
- Tehrani, S.
- Tellmann, N.
- Temme, D.H.
- Tempel, R.
- Teng, J.
- Terzuoli, Jr., A.J.
- Tessier, V.
- Theron, I.P.
- Thomas, Jr., D.G.
- Thompson, M.
- Thompson, P.E.
- Thompson, S.D.
- Thomson, F.S.
- Thomson, G.
- Tine, G.
- Tinga, W.R.



Contents

Authors

Click on author name for a list of papers.

# Author Index


- Titus, W.
- Tokumitsu, M.
- Tokumitsu, T.
- Tomabechi, Y.
- Tong, C.-Y.E.
- Tong, D.T.K.
- Tongyi, A.
- Tosic, D.V.
- Toyoda, I.
- Tran, L.
- Tran, L.T.
- Trenkic, V.
- Trew, R.J.
- Tripathi, A.
- Tripathi, V.K.
- Tsai, M.-J.
- Tseng, B.-C.
- Tserng, H.Q.
- Tsitsos, S.
- Tsui, J.B.Y.
- Tsukahara, T.
- Tsutsumi, M.
- Tu, D.-W.
- Tu, Y.-M.
- Tupikin, V.D.
- Turner, I.
- Tward, E.
- Tzuang, C.-K.C.


## U


- Uda, H.
- Uda, T.
- Ueda, D.
- Umeda, Y.
- Umemoto, D.K.
- Unbehauen, R.



MTT

IEEE

Contents

Authors


Click on author name for a list of papers.

# Author Index


- Unwin, R.T.
- Urban, K.W.
- Ureel, J.
- Uslenghi, P.L.E.
- Uzunoglu, N.K.

**V**

- Vahldieck, R.
- Valor, L.
- van den Brink, R.F.M.
- van Zeijl, H.
- Vandecasteele, J.
- Vander Vorst, A.
- Vannicola, V.C.
- Vendik, O.
- Verdier, J.
- Vietzorreck, L.
- Vilcot, J.P.
- Voelker, R.H.
- Vogel, S.D.
- Vorst, A.V.
- Vye, D.W.

**W**

- Waclawik, S.D.
- Waffenschmidt, E.
- Wagner, G.R.
- Walinsky, P.
- Wamhof, P.D.
- Wan, C.
- Wang, B.
- Wang, C.
- Wang, H.
- Wang, J.
- Wang, Q.H.
- Waris, V.P.



MTT

IEEE

Contents

Authors

Click on author name for a list of papers.

# Author Index


- Watanabe, S.-I.
- Watson, P.M.
- Wei, C.-J.
- Weigel, R.
- Weiss, J.A.
- Weiss, S.J.
- Weisshaar, A.
- Weller, T.M.
- Wendler, J.P.
- Wenger, J.
- Whelan, K.
- Wicks, M.C.
- Wikborg, E.
- Wilker, C.
- Williams, D.F.
- Williams, J.T.
- Wire, M.
- Withers, R.S.
- Wohlert, R.M.
- Wolff, I.
- Wong, K.-L.
- Wong, M.-F.
- Wong, R.S.K.
- Woody, D.P.
- Wu, K.
- Wu, L.-K.
- Wu, M.C.
- Wu, R.-B.
- Wu, Z.
- Wust, P.


## X


- Xiang, Z.
- Xiao, S.
- Xingqi, D.
- Xu, J.M.



MTT

IEEE

Contents

Authors


Click on author name for a list of papers.

# Author Index

## Y


- Yabuki, H.
- Yakover, I.M.
- Yamada, H.
- Yamaguchi, Y.
- Yamamoto, K.
- Yamashita, E.
- Yamazaki, T.
- Yanagawa, S.
- Yang, C.C.
- Yang, H.Y.D.
- Yao, H.-W.
- Yarborough, R.
- Yasumoto, K.
- Ye, S.
- Yeo, T.S.
- Yoneyama, T.
- Yong, C.K.
- Yook, J.-G.
- Yoshida, H.
- Yoshida, S.
- Yoshii, Y.
- Yoshikawa, N.
- Yoshinaga, H.
- Young, T.
- Yu, L.
- Yung, E.K.N.
- Yuura, H.


## Z


- Zaki, K.A.
- Zamanillo, J.M.
- Zanforlin, L.
- Zapata, J.
- Zemanian, A.H.



MTT

IEEE

Contents

Authors


Click on author name for a list of papers.

# Author Index


- Zeng, A.
- Zhang, D.G.
- Zhang, J.
- Zhang, Q.-J.
- Zhang, Q.M.
- Zhang, X.
- Zhang, Y.
- Zhao, A.P.
- Zhao, C.
- Zhao, H.
- Zhao, L.
- Zhou, L.
- Zhou, Z.
- Zhu, N.H.
- Zirath, H.
- Zmuidzinas, J.
- Zuccaro, C.



Contents

Authors


Click on author name for a list of papers.

# Papers by Author


**Abbate, M.**

- Evaluation of Pulsed Microwave Influence on Isolated Hearts

**Abdipour, A.**

- Complete Sliced Model of Microwave FET's and Comparison with Lumped Model and Experimental Results

**Abe, B.**

- A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])

**Aberle, J.T.**

- Full Wave Analysis of Edge-Guided Mode Microstrip Isolator (Dec. 1996, Part II [T-MTT])



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Abrokwah, J.**

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])

**AbuShaaban, M.**

- Modal Circuit Decomposition of Lossy Multiconductor Transmission Lines

**Accatino, L.**

- A Four-Pole Dual Mode Elliptic Filter Realized in Circular Cavity without Screws (Dec. 1996, Part II [T-MTT])

**Achar, R.**

- Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Acher, O.**

- Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films
- Permeability Measurement on Composites Made of Oriented Metallic Wires from 0.1 to 18 GHz (Short Papers)

**Adve, R.**

- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform

**Ago, J.**

- A Bleustein-Gulyaev-Shimizu Wave Resonator Having Resonances for TV and VCR Traps (Dec. 1996, Part II [T-MTT])

**Aidnik, D.L.**

- Adaptive High Temperature Superconducting Filters for Interference Rejection

# Papers by Author


**Aigo, T.**

- A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers

**Aikawa, M.**

- Highly Integrated Three-Dimensional MMIC Single-Chip Receiver and Transmitter (Dec. 1996, Part II [T-MTT])
- Multifrequency Microstrip Antennas Using Alumina-Ceramic/Polyimide Multilayer Dielectric Substrate
- Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC

**Akerling, G.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Akos, D.M.**

- Design and Implementation of a Direct Digitization GPS Receiver Front End



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Aksun, M.I.**

- A Robust Approach for the Derivation of Closed-Form Green's Functions
- Analytical Evaluation of the MoM Matrix Elements

**Akyel, C.**

- Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement

**Al-Bader, S.J.**

- Mode Scattering by a Nonlinear Step-Discontinuity in Dielectric Optical Waveguides

**Alatan, L.**

- Analytical Evaluation of the MoM Matrix Elements



MTT®

IEEE®

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Albares, D.J.**

- Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)

**Alexopoulos, N.G.**

- Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])
- Optimization of Aperture Transitions for Multiport Microstrip Circuits

**Alford, N.M.**

- Properties and Applications of Thick Film High Temperature Superconductors

**Ali, F.**

- Advances in GaAs HBT Power Amplifiers for Cellular Phones and Military Applications (Invited Paper)



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Ali, H.O.**

- Monopole Antennas for Microwave Catheter Ablation

**Allen, B.R.**

- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures

**Alonso, J.I.**

- A Simple Technique for the Design of MMIC 90° Phase-Difference Networks
- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

**Alsunaidi, M.A.**

- Electromagnetic Wave Effects on Microwave Transistors Using a Full-Wave Time-Domain Model



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Amari, S.**

- Application of a Coupled-Integral-Equations Technique to Ridged Waveguides
- LSE- and LSM-Mode Sheet Impedances of Thin Conductors (Short Papers)

**An, H.**

- A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications

**Andersen, J.**

- A Practical Technique for Designing Multiport Coupling Networks

**Anderson, A.C.**

- High Temperature Superconductive Wideband Compressive Receivers



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Angelov, I.**

- Extensions of the Chalmers Nonlinear HEMT and MESFET Model

**Antar, Y.M.M.**

- Analysis of Edge Coupled Strip Inset Dielectric Guide (Short Papers)
- Broadband Overlaid Inset Dielectric Guide Coupler with Very Flat Coupling

**Aparin, V.**

- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])
- A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications

**Arcioni, P.**

- Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)

# Papers by Author

- Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"
- Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"

**Armengaud, L.**

- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator

**Arndt, F.**

- Efficient FDTD/Matrix-Pencil Method for the Full-Wave Scattering Parameter Analysis of Waveguiding Structures

**Arsenault, D.R.**

- High Temperature Superconductive Wideband Compressive Receivers

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Artuzi, Jr., W.A.**

- Ridge Coplanar Waveguide for Optical Amplitude Modulation

**Aubert, H.**

- Elimination of Spurious Solutions in the Calculation of Eigenmodes by Moment Method (Short Papers)

**Aucoin, L.M.**

- K through Ka-Band Driver and Power Amplifiers

**Aust, M.V.**

- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies

**Auten, R.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Avenhaus, B.**

- Miniature Superconducting Filters

**Awai, I.**

- Applications of the Finite Difference Techniques to the Compensated VIP 3 dB Directional Coupler

**Azizi, A.**

- Analysis and Linearization of a Broadband Microwave Phase Modulator Using Volterra System Approach

**Bachtold, W.**

- Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])

**Baclet, P.**

- Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Baets, R.G.F.**

- Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's

**Bajor, G.**

- Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)

**Bakkar, E.A.**

- Nonlinear System and Subsystem Modeling in Time Domain

**Balaji, U.**

- Radial Mode Matching Analysis of Ridged Circular Waveguides (Short Papers)

**Balanis, C.A.**

- Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Transient Coupling Reduction and Design Considerations in Edge-Coupled Coplanar Waveguide Couplers (Short Papers)

**Bandla, S.**

- A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras

**Barrera, J.**

- The 1996 IEEE MTT-S International Microwave Symposium/Exhibition: "Bridging the Spectrum" (Dec. 1996, Part II [T-MTT])

**Barthelemy, A.**

- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator

**Baudrand, H.**

- Elimination of Spurious Solutions in the Calculation of Eigenmodes by Moment Method (Short Papers)

# Papers by Author


**Baumberger, W.**

- A GaAs Single Chip 2.4 GHz PLL Frequency Multiplier

**Bautista, J.J.**

- Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)

**Bedard, B.**

- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])
- A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications

**Begley, P.A.**

- Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Beilenhoff, K.**

- FDFD Full-Wave Analysis and Modeling of Dielectric and Metallic Losses of CPW Short Circuits (Short Papers)
- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])
- Optimum Mesh Grading for Finite-Difference Method

**Beisswanger, F.**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])

**Beker, B.**

- Analysis of Microstrip Discontinuities Using the Spatial Network Method with Absorbing Boundary Conditions (Short Papers)

**Bell, H.C.**

- L-Resonator Bandstop Filters (Dec. 1996, Part II [T-MTT])



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Benelbar, R.**

- Microwave Noise Characterization of Two-Port Devices Using an Uncalibrated Tuner (Short Papers)

**Bengtsson, L.**

- Extensions of the Chalmers Nonlinear HEMT and MESFET Model

**Benson, T.M.**

- Advanced Node Formulations in TLM--The Adaptable Symmetrical Condensed Node
- Analytical Expansion of the Dispersion Relation for TLM Condensed Nodes
- Development of a General Symmetrical Condensed Node for the TLM Method

**Berenc, T.**

- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Berini, P.**

- Modeling Lossy Anisotropic Dielectric Waveguides with the Method of Lines

**Bernardino, J.**

- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band

**Bernhard, J.T.**

- Dielectric Slab-Loaded Resonant Cavity for Applications Requiring Enhanced Field Uniformity (Short Papers)

**Bernhardt, B.**

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Berntgen, J.**

- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO

**Bertin, G.**

- A Four-Pole Dual Mode Elliptic Filter Realized in Circular Cavity without Screws (Dec. 1996, Part II [T-MTT])

**Berube, D.**

- A Comparative Study of Four Open-Ended Coaxial Probe Models for Permittivity Measurements of Lossy Dielectric/Biological Materials at Microwave Frequencies

**Best, W.S.**

- Analytical Dispersion Analysis of Loaded Periodic Circuits Using the Generalized Scattering Matrix



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Bhasin, K.B.**

- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...

**Bialkowski, M.E.**

- Analysis of an N-Way Radial Cavity Divider with a Coaxial Central Port and Waveguide Output Ports

**Bica, D.**

- Analysis of Microstrip Discontinuities Using the Spatial Network Method with Absorbing Boundary Conditions (Short Papers)

**Biebl, E.M.**

- A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Biedenbender, M.**

- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])
- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])
- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies

**Biernacki, P.D.**

- Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface

**Bin, M.**

- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band

**Birand, M.T.**

- Analytical Evaluation of the MoM Matrix Elements

# Papers by Author


**Biro, O.**

- A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements

**Blais, A.**

- Monopole Antennas for Microwave Catheter Ablation

**Blas, J.M.**

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

**Block, T.R.**

- A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE
- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Blondy, P.**

- Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators

**Blundell, R.**

- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)
- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver

**Bocchi, W.J.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

**Boheim, M.**

- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

# Papers by Author


**Boisvert, R.R.**

- High Temperature Superconductive Wideband Compressive Receivers

**Boric-Lubecke, O.**

- DC Instability of the Series Connection of Tunneling Diodes

**Bornemann, J.**

- Application of a Coupled-Integral-Equations Technique to Ridged Waveguides
- LSE- and LSM-Mode Sheet Impedances of Thin Conductors (Short Papers)

**Bornmann, S.**

- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)

# Papers by Author

## Bosisio, R.G.

- An Integrated Transition of Microstrip to Nonradiative Dielectric Waveguide for Microwave and Millimeter-Wave Circuits
- Dual-Tone Calibration of Six-Port Junction and its Application to the Six-Port Direct Digital Millimetric Receiver
- Microwave Noise Characterization of Two-Port Devices Using an Uncalibrated Tuner (Short Papers)

## Bowen, J.G.

- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...

## Branner, G.R.

- Optimization of Active Microwave Frequency Multiplier Performance Utilizing Harmonic Terminating Impedances (Dec. 1996, Part II [T-MTT])

Contents
Authors

Click on title for a paper summary.

# Papers by Author

## Bressan, M.

- Analysis of Guided Modes in Multilayer/Multiconductor Structures by the "Boundary Integral--Resonant Mode Expansion Method"
- Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"
- Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"

## Breuil, N.

- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator

## Bridges, D.R.

- FET Statistical Modeling Using Parameter Orthogonalization

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Bringhurst, S.**

- Open-Ended Metallized Ceramic Coaxial Probe for High-Temperature Dielectric Properties Measurements

**Brings, L.**

- A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])

**Brown, J.**

- Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])
- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**Bruchlos, H.**

- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Buchheit, S.**

- Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface

**Buck, D.C.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

**Budka, T.P.**

- A Coaxial 0.5-18 GHz Near Electric Field Measurement System for Planar Microwave Circuits Using Integrated Probes

**Burger, W.**

- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Burghartz, J.N.**

- Microwave Inductors and Capacitors in Standard Multilevel Interconnect Silicon Technology

**Burkhardt, M.**

- Broadband Calibration of E-Field Probes in Lossy Media
- The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz

**Burm, J.**

- Monolithic Millimeter Wave Optical Receivers

**Busse, G.**

- Complex Power and Mode Coupling in Circular Chirowaveguides (Corrections)

**Butler, J.K.**

- Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Button, T.W.**

- Properties and Applications of Thick Film High Temperature Superconductors

**Camart, J.-C.**

- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results
- Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method
- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

**Camilleri, N.**

- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Cangellaris, A.C.

- GT-PML: Generalized Theory of Perfectly Matched Layers and its Application to the Reflectionless Truncation of Finite-Difference Time-Domain Grids (Dec. 1996, Part II [T-MTT])
- Simulation of Dispersive Multiconductor Transmission Lines by Pade Approximation via the Lanczos Process

## Caorsi, S.

- A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications
- Electromagnetic Boundary Value Problem in the Presence of a Partly Lossy Dielectric: Considerations About the Uniqueness of the Solution (Short Papers)
- Iterative Numerical Computation of the Electromagnetic Fields Inside Weakly Nonlinear Infinite Dielectric Cylinders of Arbitrary Cross Sections Using the Distorted-Wave Born Approximation

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Cardinal, F.**

- A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications

**Cardona, A.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

**Cardullo, M.**

- High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])

**Carlsson, E.**

- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)

**Carroll, J.**

- FET Statistical Modeling Using Parameter Orthogonalization
- Statistical Computer-Aided Design for Microwave Circuits



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Carter, III, C.**

- High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)

**Cascio, L.**

- A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])

**Celik, M.**

- Simulation of Dispersive Multiconductor Transmission Lines by Pade Approximation via the Lanczos Process

**Celka, P.**

- Analysis and Linearization of a Broadband Microwave Phase Modulator Using Volterra System Approach

**Chakrabarty, S.B.**

- Cutoff Frequencies of Transmission Lines Consisting of Pair of Cylinders (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Champion, M.H.

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

## Chan, A.K.

- Spectral Domain Analysis of Single and Coupled Microstrip Open Discontinuities with Anisotropic Substrates (Short Papers)

## Chan, A.M.K.

- A New Approach for Analysis of Resonant Structures Based on the Spatial Finite-Difference and Temporal Differential Formulation (Short Papers)
- Application of the Spatial Finite-Difference and Temporal Differential (SFDTD) Formulation to Cylindrical Structure Problems (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Chan, T.K.K.**

- Improving Microwave Imaging by Enhancing Diffraction Tomography

**Chang, C.-W.**

- Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System

**Chang, C.T.**

- Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)

**Chang, K.**

- A Novel Active Antenna with Self-Mixing and Wideband Varactor-Tuning Capabilities for Communication and Vehicle Identification Applications



Contents

Authors


Click on title for a paper summary.

# Papers by Author

- Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])
- Modes and Their Stability of a Symmetric Two-Element Coupled Negative Conductance Oscillator Driven Spatial Power Combining Array
- Statistical Computer-Aided Design for Microwave Circuits
- Uniplanar Power Dividers Using Coupled CPW and Asymmetrical CPS for MIC's and MMIC's

**Chatterjee, D.**

- Stokes Phenomenon in the Development of Microstrip Green's Function and its Ramifications (Short Papers)

**Chen, C.**

- Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])
- Optimization of Aperture Transitions for Multiport Microstrip Circuits

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Chen, C.H.**

- Propagation Characteristics of Superconducting Microstrip Lines
- Transient Propagation in Lossy Coplanar Waveguides

**Chen, K.-M.**

- Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System

**Chen, K.Y.**

- Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface

**Chen, S.**

- Rigorous Analysis of Mode Propagation and Field Scattering in Silicon-Based Coplanar MIS Slow Wave Structures with Abrupt Transitions to Transmission Lines on Normal Substrate



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Chen, S.-W.**

- Effects of Nonlinear Distortion on CDMA Communication Systems (Dec. 1996, Part II [T-MTT])

**Chen, Y.**

- Finite-Difference Time-Domain Algorithm for Solving Maxwell's Equations in Rotationally Symmetric Geometries

**Chen, Z.**

- A New Approach for Analysis of Resonant Structures Based on the Spatial Finite-Difference and Temporal Differential Formulation (Short Papers)
- Application of the Spatial Finite-Difference and Temporal Differential (SFDTD) Formulation to Cylindrical Structure Problems (Short Papers)

**Cheng, K.-K.M.**

- Analysis and Synthesis of Coplanar Coupled Lines on Substrates of Finite Thicknesses (Short Papers)

# Papers by Author


**Cheng, S.**

- Conditionally Stable Amplifier Design Using Constant µ-Contours (Dec. 1996, Part II [T-MTT])

**Chew, S.T.**

- Application of Volterra Series to the Problem of Self-Oscillating Mixer
- Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems

**Chew, W.C.**

- BiCG-FFT T-Matrix Method for Solving for the Scattering Solution from Inhomogeneous Bodies (Short Papers)
- Recursive Mode Matching Method for Multiple Waveguide Junction Modeling

**Chi, C.-Y.**

- Conductor-Loss Limited Stripline Resonator and Filters (Short Papers)



MTT®

IEEE®

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Chi, J.**

- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])
- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])

**Chiang, K.S.**

- Analysis of the Effective-Index Method for the Vector Modes of Rectangular-Core Dielectric Waveguides

**Chino, M.**

- Soft and Dry Phantom Modeling Material Using Silicone Rubber with Carbon Fiber

**Chiu, C.-C.**

- Image Reconstruction of a Complex Cylinder Illuminated by TE Waves

# Papers by Author

## Chive, M.

- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results
- Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method
- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

## Cho, Y.

- Monolithic VCO Using a Novel Active Inductor (1996 [MCS])

## Chong, C.K.

- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters

MTT
IEEE
Contents
Authors

# Papers by Author

## Chorey, C.M.

- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...

## Chou, G.-J.

- Oscillator-Type Active-Integrated Antenna: The Leaky-Mode Approach

## Chow, P.D.

- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])
- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])

## Chrissoulidis, D.P.

- Induced EM Field in a Layered Eccentric Spheres Model of the Head: Plane-Wave and Localized Source Exposure

# Papers by Author

## Christopoulos, C.

- Advanced Node Formulations in TLM--The Adaptable Symmetrical Condensed Node
- Analytical Expansion of the Dispersion Relation for TLM Condensed Nodes
- Development of a General Symmetrical Condensed Node for the TLM Method

## Chu, F.-L.

- Measurement of the Microwave Conductivity of a Polymeric Material with Potential Applications in Absorbers and Shielding (Comments)

## Chui, C.K.

- Spectral Domain Analysis of Single and Coupled Microstrip Open Discontinuities with Anisotropic Substrates (Short Papers)

Contents
Authors

# Papers by Author


**Chun, J.C.**

- Analysis of a Double Step Microstrip Discontinuity in the Substrate Using the 3-D-FDTD Method (Short Papers)

**Chung, P.S.**

- Field Distributions in Supported Coplanar Lines Using Conformal Mapping Techniques (Short Papers)

**Ciampolini, P.**

- Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique

**Citerne, J.**

- A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])

**Claassen, J.H.**

- The NRL Josephson Junction Monitoring Experiment on HTSEE-II



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Clark, C.J.**

- Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer

**Clifton, J.C.**

- The Use of Active Traveling-Wave Structures in GaAs MMIC's (Short Papers)

**Cloete, J.H.**

- Electric Screen Jauman Absorber Design Algorithms
- The Electric Quadruple Contribution to the Circular Birefringence of Nonmagnetic Anisotropic Chiral Media: A Circular Waveguide Experiment

**Coen, G.**

- Automatic Derivation of Equivalent Circuits for General Microstrip Interconnection Discontinuities




Click on title for a paper summary.

# Papers by Author


**Cole, B.F.**

- Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem

**Collins, C.E.**

- A Novel MMIC Source Impedance Tuner for On-Wafer Microwave Noise Parameter Measurements

**Colpitts, B.G.**

- Thru Characteristics of a Coaxial Gap (FDTD Model and Measurements) (Short Papers)

**Compton, R.C.**

- Thermal Management for High-Power Active Amplifier Arrays (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Conciauro, G.

- Analysis of Guided Modes in Multilayer/Multiconductor Structures by the "Boundary Integral--Resonant Mode Expansion Method"
- Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"
- Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"

## Connor, G.

- New Simple Procedure for the Computation of the Multimode Admittance or Impedance Matrix of Planar Waveguide Junctions

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Conradi, J.**

- Generation and Transmission of FM and pi/4 DQPSK Signals at Microwave Frequencies Using Harmonic Generation and Optoelectronic Mixing in Mach-Zehnder Modulators

**Contarino, V.M.**

- Hybrid Lidar-Radar Ocean Experiment

**Costa Freire, J.**

- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band

**Costa, J.**

- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])

**Cowles, J.C.**

- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Craddock, I.J.**

- The Analysis of General Two-Dimensional PEC Structures Using a Modified CPFDTD Algorithm (Short Papers)

**Crescenzi, Jr., E.J.**

- The 1996 IEEE MTT-S International Microwave Symposium/Exhibition: "Bridging the Spectrum" (Dec. 1996, Part II [T-MTT])

**Cros, D.**

- Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators

**Cryan, M.J.**

- Schottky Diodes for Analogue Phase Shifters in GaAs MMIC's (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Curry, C.R.**

- A Practical Technique for Designing Multiport Coupling Networks

**Curtis, J.A.**

- Low Loss Multiplexers with Planar Dual Mode HTS Resonators

**Cuzin, M.**

- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator

**Dalle, C.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Darvishzadeh, M.**

- A Practical MMIC Negative Resistance Structure for X and Ku Band Applications (1996 [MCS])



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Das, B.N.**

- Cutoff Frequencies of Transmission Lines Consisting of Pair of Cylinders (Short Papers)

**Das, N.K.**

- Methods of Suppression or Avoidance of Parallel-Plate Power Leakage from Conductor-Backed Transmission Lines
- Power Leakage, Characteristic Impedance, and Leakage-Transition Behavior of Finite-Length Stub Sections of Leaky Printed Transmission Lines

**Das, S.**

- Cutoff Frequencies of Transmission Lines Consisting of Pair of Cylinders (Short Papers)

**Dasgupta, B.**

- Eigenmodes in a Toroidal Cavity of Elliptic Cross Section (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Davidov, D.**

- High-Spatial Resolution Resistivity Mapping of Large-Area YBCO Films by a Near-Field Millimeter-Wave Microscope (Short Papers)

**Davidovitz, M.**

- Continuous Spectrum and Characteristic Modes of the Slot Line in Free Space (Short Papers)
- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

**Davis, L.E.**

- Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K
- Finite-Element Method with Edge Elements for Waveguides Loaded with Ferrite Magnetized in Arbitrary Direction



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**De Lisio, M.P.**

- Modeling and Performance of a 100-Element pHEMT Grid Amplifier

**De Los Santos, H.J.**

- High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)

**de Menezes, L.R A.X.**

- Accuracy of TLM Solutions of Maxwell's Equations (Dec. 1996, Part II [T-MTT])
- Modeling of General Constitutive Relationships in SCN TLM

**de Pablos, J.**

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## de Tournai, D.C.

- No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord

## De Zutter, D.

- A New Method for Obtaining the Shape Sensitivities of Planar Microstrip Structures by a Full-Wave Analysis
- Analysis of Guided Waves in Inhomogeneous Bianisotropic Cylindrical Waveguides
- Automatic Derivation of Equivalent Circuits for General Microstrip Interconnection Discontinuities
- Shape Sensitivities of Capacitances of Planar Conducting Surfaces Using the Method of Moments
- The Anti-Circuit Concept for the Characterization of Active Circuits Using Electromagnetic Simulations

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Decoster, D.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Dehe, A.**

- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])

**Delaney, M.**

- Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])
- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**Delisle, J.T.**

- A 16-Element Subarray for Hybrid-Circuit Tile-Approach Spatial Power Combining



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Deng, T.**

- CAD Model for Coplanar Waveguide Synthesis (Short Papers)
- Use of the Field-Iteration Method in Studying the Three-Dimensional Phased Array for Electromagnetic Hyperthermia

**Derov, J.S.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

**Desclos, L.**

- A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept

**Despretz, D.**

- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results

# Papers by Author

- Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method

**Deuflhard, P.**

- A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids

**Dib, N.**

- Characterization of Three-Dimensional Open Dielectric Structures Using the Finite-Difference Time-Domain Method

**Dib, N.I.**

- Design and Analysis of Transitions from Rectangular Waveguide to Layered Ridge Dielectric Waveguide
- Modeling of Coplanar Stripline Discontinuities

**Dieudonne, J.-M.**

- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

# Papers by Author


**Dillon, B.M.**

- Variational Solution of Microwave Circuits and Structures (Short Papers)

**Ding, Z.**

- Modes and Their Stability of a Symmetric Two-Element Coupled Negative Conductance Oscillator Driven Spatial Power Combining Array

**Dionne, G.F.**

- Ferrite-Superconductor Devices for Advanced Microwave Applications

**Djordjevic, A.R.**

- A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)
- Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Dmitriyev, V.A.**

- Color Group Approach to Symmetrical Ferrite Devices with Polarization Effects (Short Papers)

**Dokas, V.**

- Design Considerations of Superconductive Input Multiplexers for Satellite Applications
- On the Power Handling Capability of High Temperature Superconductive Filters

**Dolman, G.**

- Properties and Applications of Thick Film High Temperature Superconductors

**Dragon, C.**

- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Drozd, J.M.**

- Determining Q Using S Parameter Data (Short Papers)

**Dryagin, Y.A.**

- Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)

**du Toit, L.J.**

- Electric Screen Jauman Absorber Design Algorithms

**Dubois, L.**

- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

**Dufault, M.**

- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies

# Papers by Author


**Duffy, S.M.**

- A 16-Element Subarray for Hybrid-Circuit Tile-Approach Spatial Power Combining

**Duhamel, F.**

- 1990-1995 Advances in Investigating the Interaction of Microwave Fields with the Nervous System
- No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord

**Duncan, S.W.**

- Modeling and Performance of a 100-Element pHEMT Grid Amplifier

**Dunleavy, L.P.**

- Temperature-Dependent Modeling of Gallium Arsenide MESFET's



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Dunn, D.**

- FDTD Verification of Deep-Set Brain Tumor Hyperthermia Using a Spherical Microwave Source Distribution

**Durand, D.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Durec, J.**

- A Linear Class AB Single-Ended to Differential Transconverter Suitable for RF Circuits (1996 [MCS])

**Dyczij-Edlinger, R.**

- A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements

**Eastman, L.F.**

- Monolithic Millimeter Wave Optical Receivers



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Ebberg, A.**

- Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])

**Edwards, M.L.**

- Conditionally Stable Amplifier Design Using Constant µ-Contours (Dec. 1996, Part II [T-MTT])

**Egger, O.**

- Automated E-Field Scanning System for Dosimetric Assessments

**Eisenstadt, W.R.**

- Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)

**El Khoury, S.G.**

- New Approach to the Design of Active Floating Inductors in MMIC Technology



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## El-Ghazaly, S.M.

- Electromagnetic Wave Effects on Microwave Transistors Using a Full-Wave Time-Domain Model

## El-Rabaie, S.

- Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model

## El-Sharawy, E.-B.

- An Accurate Equivalent Circuit Model of Flip Chip and via Interconnects
- Finite-Difference Time-Domain Analysis of Flip-Chip Interconnects with Staggered Bumps (Short Papers)
- Full Wave Analysis of Edge-Guided Mode Microstrip Isolator (Dec. 1996, Part II [T-MTT])

Contents
Authors

Click on title for a paper summary.

# Papers by Author


## Eleftheriades, G.V.

- A Fast Integral Equation Technique for Shielded Planar Circuits Defined on Nonuniform Meshes (Short Papers)
- On the Network Characterization of Planar Passive Circuits Using the Method of Moments

## Elshafiey, T.M.F.

- Full Wave Analysis of Edge-Guided Mode Microstrip Isolator (Dec. 1996, Part II [T-MTT])

## Engelbrecht, R.

- Field Simulation of Dipole Antennas for Interstitial Microwave Hyperthermia

## Enoki, T.

- A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter
- A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors



Contents

Authors


Click on title for a paper summary.

# Papers by Author

- High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS
- InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS
- Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems

## Enomoto, S.

- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones

## Eom, H.J.

- Electrostatic Potential Distribution through a Rectangular Aperture in a Thick Conducting Plane (Short Papers)
- Electrostatic Potential through a Circular Aperture in a Thick Conducting Plane (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Epp, L.W.**

- A Generalized Scattering Matrix Approach for Analysis of Quasi-Optical Grids and De-Embedding of Device Parameters

**Erb, J.**

- Field Simulation of Dipole Antennas for Interstitial Microwave Hyperthermia

**Esman, R.D.**

- Two-Dimensional Fiber-Optic Control of a True Time-Steered Array Transmitter (Dec. 1996, Part II [T-MTT])

**Evans, G.A.**

- Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Fabre, J.-J.**

- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results
- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

**Fache, N.**

- Automatic Derivation of Equivalent Circuits for General Microstrip Interconnection Discontinuities

**Falt, C.**

- A Ka-Band GaInP/GaAs HBT Four-Stage LNA (1996 [MCS])

**Fan, L.**

- A Novel Active Antenna with Self-Mixing and Wideband Varactor-Tuning Capabilities for Communication and Vehicle Identification Applications



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])
- Uniplanar Power Dividers Using Coupled CPW and Asymmetrical CPS for MIC's and MMIC's

## Fan, Z.

- Analysis of Asymmetrical Multilayer Ferrite-Loaded Finlines by the Extended Spectral Domain Approach
- Analysis of Edge Coupled Strip Inset Dielectric Guide (Short Papers)
- Broadband Overlaid Inset Dielectric Guide Coupler with Very Flat Coupling

## Fang, J.

- Generalized Perfectly Matched Layer for the Absorption of Propagating and Evanescent Waves in Lossless and Lossy Media

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Feinerman, A.D.**

- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator

**Felder, A.**

- Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])

**Felix, R.**

- A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids

**Feng, M.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization
- Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Fenzi, N.O.**

- Adaptive High Temperature Superconducting Filters for Interference Rejection

**Ferendeci, A.M.**

- Coupling Parameters for a Side-Coupled Ring Resonator and a Microstrip Line (Short Papers)

**Fernandez, A.S.**

- Temperature-Dependent Modeling of Gallium Arsenide MESFET's

**Fernandez, F.A.**

- A New Edge Element Analysis of Dispersive Waveguiding Structures (Comments)

**Fernandez, T.**

- Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Fiedziuszko, S.J.

- 1996 IMS Technical Program (Dec. 1996, Part II [T-MTT])
- Guest Editors' Overview (Dec. 1996, Part II [T-MTT])
- Low Loss Multiplexers with Planar Dual Mode HTS Resonators

## Filipovic, D.

- A New Solution for TE Plane-Wave Scattering from a Symmetric Double-Strip Grating Composed of Equal Strips

## Filipovic, D.N.

- New Explicit Expressions for the Coupling Matrix Elements Related to Scattering from a Planar Periodic Single-Strip Grating (Corrections)

## Finkler, R.

- Error Bound for the Approximate Fourier Transformation Relationship for Nonuniform Transmission Lines (Short Papers)

Contents
Authors

# Papers by Author


**Fisk, E.**

- High Efficiency Power HFETS for Low Power Wireless Applications

**Flynt, R.A.**

- Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])

**Fong, F.**

- A Broadband Planar Monolithic Ring Mixer

**Forse, R.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

**Forse, R.J.**

- Design of HTS, Lumped-Element, Manifold-Type Microwave Multiplexers



Contents

Authors


Click on title for a paper summary.

# Papers by Author

## Fortes, F.

- Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])
- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band

## Fouad Hanna, V.

- A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])

## Frankel, M.Y.

- Study and Characterization of Optoelectronic Photoconductor-Based Probes
- Two-Dimensional Fiber-Optic Control of a True Time-Steered Array Transmitter (Dec. 1996, Part II [T-MTT])

## Franza, O.P.

- Recursive Mode Matching Method for Multiple Waveguide Junction Modeling

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Freundorfer, A.P.**

- A Ka-Band GaInP/GaAs HBT Four-Stage LNA (1996 [MCS])

**Fricke, K.**

- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])

**Friscourt, M.R.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Fujii, M.**

- Accurate Analysis of Losses in Waveguide Structures by Compact Two-Dimensional FDTD Method Combined with Autoregressive Signal Analysis (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Fujiwara, O.**

- Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio

**Fukui, T.**

- A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure

**Fukusako, T.**

- Propagation Characteristics of the Magnetostatic Surface Wave in the YBCO-YIG Film-Layered Structure

**Funabashi, M.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Funada, J.**

- Novel Directional Couplers Using Broadside-Coupled Coplanar Waveguides for Double-Sided Printed Antennas

**Funk, E.E.**

- Free-Space Power Combining and Beam Steering of Ultra-Wideband Radiation Using an Array of Laser-Triggered Antennas

**Furse, C.M.**

- Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz

**Furukawa, H.**

- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Gaidis, M.C.**

- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band

**Galkin, A.**

- High-Spatial Resolution Resistivity Mapping of Large-Area YBCO Films by a Near-Field Millimeter-Wave Microscope (Short Papers)

**Gamba, P.**

- Analysis of Guided Modes in Multilayer/Multiconductor Structures by the "Boundary Integral--Resonant Mode Expansion Method"

**Gandhi, O.P.**

- Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Gao, F.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization
- Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure

**Gao, Y.**

- A New Miniature Magnetic Field Probe for Measuring Three-Dimensional Fields in Planar High-Frequency Circuits

**Garcia, L.E.**

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

**Garcia, M.**

- Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Extensions of the Chalmers Nonlinear HEMT and MESFET Model

**Garcia, S.G.**

- On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides

**Garske, D.**

- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])

**Gedney, S.D.**

- Full Wave Analysis of Microwave Monolithic Circuit Devices Using a Generalized Yee-Algorithm Based on an Unstructured Grid

**Gelin, P.**

- Influence of Higher Order Modes on the Measurements of Complex Permittivity and Permeability of Materials Using a Microstrip Discontinuity

# Papers by Author


**Gentili, G.G.**

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

**Gerdes, J.**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])

**Geren, W.P.**

- A Practical Technique for Designing Multiport Coupling Networks

**Gevorgian, S.**

- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)

**Gevorgian, S.S.**

- CAD Models for Multilayered Substrate Interdigital Capacitors


Click on title for a paper summary.

# Papers by Author


**Geyer, R.G.**

- Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators

**Ghannouchi, F.M.**

- A CAD-Suitable Approach for the Analysis of Nonuniform MMIC and MHMIC Transmission Lines (Short Papers)
- A Comparative Study of Four Open-Ended Coaxial Probe Models for Permittivity Measurements of Lossy Dielectric/Biological Materials at Microwave Frequencies
- Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model

**Ghouz, H.H.M.**

- An Accurate Equivalent Circuit Model of Flip Chip and via Interconnects



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

- Finite-Difference Time-Domain Analysis of Flip-Chip Interconnects with Staggered Bumps (Short Papers)

**Gibson, A.A.P.**

- Variational Solution of Microwave Circuits and Structures (Short Papers)

**Gilmore, R.**

- Effects of Nonlinear Distortion on CDMA Communication Systems (Dec. 1996, Part II [T-MTT])

**Gimeno, B.**

- Multimode Equivalent Network Representation for H- and E-Plane Uniform Bends in Rectangular Waveguide

**Gismero, J.**

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

# Papers by Author

## Glass, E.

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])
- High Efficiency Power HFETS for Low Power Wireless Applications

## Glasser, L.A.

- Affordability Strategies in Military Microwave Systems

## Gliese, U.

- Chromatic Dispersion in Fiber-Optic Microwave and Millimeter-Wave Links

## Godden, J.

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

Contents
Authors

# Papers by Author


**Goebel, U.**

- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

**Golba, G.A.**

- The High Temperature Superconductivity Space Experiment (HTSSE-II) Design

**Golosovsky, M.**

- High-Spatial Resolution Resistivity Mapping of Large-Area YBCO Films by a Near-Field Millimeter-Wave Microscope (Short Papers)

**Gomez Martin, R.**

- On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Goodrich, L.C.**

- Analytical Dispersion Analysis of Loaded Periodic Circuits Using the Generalized Scattering Matrix

**Gopalsami, N.**

- Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)

**Gornert, P.**

- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)

**Goswami, J.C.**

- Spectral Domain Analysis of Single and Coupled Microstrip Open Discontinuities with Anisotropic Substrates (Short Papers)




Click on title for a paper summary.

# Papers by Author

**Goto, M.**

- A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers

**Gottwald, G.**

- Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)

**Gouker, M.A.**

- A 16-Element Subarray for Hybrid-Circuit Tile-Approach Spatial Power Combining

**Gover, A.**

- Theoretical Investigation of a Free-Electron Maser Operating with a TEM Transmission Line

**Graffeuil, J.**

- Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Graglia, R.D.**

- TE and TM Modes in Cylindrical Metallic Structures Filled with Bianisotropic Material

**Gragnani, G.L.**

- A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications

**Grajal, J.**

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

**Grammer, W.**

- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Greaves, S.D.**

- The Design of Tuned Front-End GaAs MMIC Optical Receivers

**Green, R.J.**

- Digitizing Multichannel Video Signals for Lightwave Transmission

**Greenspon, A.J.**

- A Method for the In Vitro Testing of Cardiac Ablation Catheters

**Griffin, E.L.**

- An Ion-Implanted 13 Watt C-Band MMIC with 60% Peak Power Added Efficiency

**Guglielmi, M.**

- A Fast Integral Equation Technique for Shielded Planar Circuits Defined on Nonuniform Meshes (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)
- Multimode Equivalent Network Representation for H- and E-Plane Uniform Bends in Rectangular Waveguide
- New Simple Procedure for the Computation of the Multimode Admittance or Impedance Matrix of Planar Waveguide Junctions

**Guillon, P.**

- Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators

**Guillouard, K.**

- A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])

**Gupta, A.**

- Advances in GaAs HBT Power Amplifiers for Cellular Phones and Military Applications (Invited Paper)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Gupta, K.C.**

- EM-ANN Models for Microstrip Vias and Interconnects in Dataset Circuits

**Guttich, U.**

- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

**Hafizi, M.**

- High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)

**Hajji, R.**

- Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Halchin, D.**

- High Efficiency Power HFETS for Low Power Wireless Applications

**Hamade, A.H.**

- A CAD-Suitable Approach for the Analysis of Nonuniform MMIC and MHMIC Transmission Lines (Short Papers)

**Hamai, M.**

- Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)

**Han, J.-H.**

- A New Extraction Method for Noise Sources and Correlation Coefficient in MESFET (Short Papers)



Contents

Authors


Click on title for a paper summary.

# Papers by Author

**Han, L.**

- An Integrated Transition of Microstrip to Nonradiative Dielectric Waveguide for Microwave and Millimeter-Wave Circuits

**Han, Q.**

- Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring

**Hankui, E.**

- Development of Ferrite Core Applicator System for Deep-Induction Hyperthermia

**Hanson, G.W.**

- A Numerical Functions of Dyadic Green's Functions for Planar Bianisotropic Media with Application to Printed Transmission Lines
- Complex Media Microstrip Ridge Structures: Formulation and Basic Characteristics of Ferrite Structures

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Harada, Y.**

- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])

**Harari, J.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Hargrove, K.L.**

- High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)

**Harms, P.**

- Finite-Difference Time-Domain Algorithm for Solving Maxwell's Equations in Rotationally Symmetric Geometries

# Papers by Author


**Hartnagel, H.L.**

- FDFD Full-Wave Analysis and Modeling of Dielectric and Metallic Losses of CPW Short Circuits (Short Papers)
- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])

**Harvey, J.**

- Full-Wave Analysis of Quasi-Optical Structures

**Hasler, M.J.**

- Analysis and Linearization of a Broadband Microwave Phase Modulator Using Volterra System Approach

**Haspeklo, H.**

- Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)

# Papers by Author


**Hayashi, H.**

- A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter
- A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors

**Hayes, D.T.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

**He, S.**

- An Optimization Approach to the Frequency-Domain Inverse Problem for a Nonuniform LCRG Transmission Line (Short Papers)

**He, X.**

- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO




Click on title for a paper summary.

# Papers by Author


**Heime, K.**

- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO

**Heinrich, W.**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])
- Optimum Mesh Grading for Finite-Difference Method

**Heins, M.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

**Herczfeld, P.R.**

- An Analytical Model for the Photodetection Mechanisms in High-Electron Mobility Transistors
- Hybrid Lidar-Radar Ocean Experiment



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

**Herd, J.S.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

**Herd, K.G.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

**Herman, M.I.**

- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)

**Herrmann, J.**

- MMICs for Sensor Applications (1996 [MCS])

Contents
Authors

# Papers by Author


**Hess, R.**

- MMICs for Commercial Applications the Low-Cost High Volume Production Techniques

**Hesselbarth, J.**

- Analysis of Cylindrical Transmission Lines with the Method of Lines

**Heuken, M.**

- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO

**Hey-Shipton, G.L.**

- Adaptive High Temperature Superconducting Filters for Interference Rejection



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

## Higashino, T.

- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])

## Higgins, A.

- Advances in GaAs HBT Power Amplifiers for Cellular Phones and Military Applications (Invited Paper)

## Higgins, J.A.

- Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's

## Hirai, T.

- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])

# Papers by Author


**Hirano, M.**

- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's

**Ho, S.L.**

- Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)

**Ho, W.-J.**

- Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's

**Hobart, K.D.**

- A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor

**Hodge, J.D.**

- Properties and Applications of Thick Film High Temperature Superconductors




Click on title for a paper summary.

# Papers by Author

## Hoefer, W.J.R.

- A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])
- Accuracy of TLM Solutions of Maxwell's Equations (Dec. 1996, Part II [T-MTT])
- Modeling of General Constitutive Relationships in SCN TLM

## Hofschen, S.

- Improvements of the Two-Dimensional FDTD Method for the Simulation of Normal- and Superconducting Planar Waveguides Using Time Series Analysis (Short Papers)
- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO

## Hoh, L.

- A Method for the In Vitro Testing of Cardiac Ablation Catheters

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Holme, S.C.**

- Low Loss Multiplexers with Planar Dual Mode HTS Resonators

**Hombach, V.**

- The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz

**Hong, J.-S.**

- Couplings of Microstrip Square Open-Loop Resonators for Cross-Coupled Planar Microwave Filters
- Miniature Superconducting Filters

**Hong, S.**

- Monolithic VCO Using a Novel Active Inductor (1996 [MCS])

**Hong, S.-C.**

- Characteristics of an Area-Variable Varactor Diode



MTT®

IEEE®

Contents

Authors


Click on title for a paper summary.

# Papers by Author

**Horiuchi, H.**

- A Bleustein-Gulyaev-Shimizu Wave Resonator Having Resonances for TV and VCR Traps (Dec. 1996, Part II [T-MTT])

**Hornbuckle, D.**

- 1996 IMS Technical Program (Dec. 1996, Part II [T-MTT])

**Horng, T.-S.**

- Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])

**Hosaya, K.**

- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Hosny, E.A.**

- Nonlinear System and Subsystem Modeling in Time Domain

Contents
Authors

# Papers by Author

**Hosoya, K.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems

**Hsu, S.S.**

- A Method for the In Vitro Testing of Cardiac Ablation Catheters

**Hu, H.**

- A New Large Signal HBT Model

**Huang, F.**

- Miniature Superconducting Filters

**Huang, J.**

- Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement

Contents
Authors

Click on title for a paper summary.

# Papers by Author

- Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors
- Rigorous Analysis of Mode Propagation and Field Scattering in Silicon-Based Coplanar MIS Slow Wave Structures with Abrupt Transitions to Transmission Lines on Normal Substrate
- Towards a Generalized TLM Algorithm for Solving Arbitrary Reciprocal and Nonreciprocal Planar Structures (Short Papers)

**Huang, J.-H.**

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])

**Huang, T.W.**

- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies

# Papers by Author


**Huber, S.**

- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)

**Huguenin, G.R.**

- A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras

**Hui, H.-T.**

- The Eigenfunction Expansion of Dyadic Green's Functions for Chirowaveguides

**Hung, D.**

- Miniature Superconducting Filters

**Hung-Bao, T.M.**

- On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Huyart, B.**

- Microwave Noise Characterization of Two-Port Devices Using an Uncalibrated Tuner (Short Papers)

**Hwang, J.C.M.**

- Direct Extraction of Equivalent Circuit Parameters for Heterojunction Bipolar Transistors (Corrections)
- Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's

**Hwang, Y.**

- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])
- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Iatrou, C.T.**

- Coaxial Cavities with Corrugated Inner Conductor for Gyrotrons

**Imai, K.**

- L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications

**Imai, N.**

- A Fiber Optic/Millimeter-Wave Radio Transmission Link Using HBT as Direct Photodetector and an Optoelectronic Upconverter
- Novel High-Isolation FET Switches

**Imai, Y.**

- 0-40 GHz GaAs MESFET Distributed Baseband Amplifier IC's for High-Speed Optical Transmission
- Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Imanishi, K.**

- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

**Imtiaz, S.M.S.**

- Electromagnetic Wave Effects on Microwave Transistors Using a Full-Wave Time-Domain Model

**Ingram, S.G.**

- The Use of Active Traveling-Wave Structures in GaAs MMIC's (Short Papers)

**Inoue, A.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Inoue, T.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Ioannidou, M.P.**

- Induced EM Field in a Layered Eccentric Spheres Model of the Head: Plane-Wave and Localized Source Exposure

**Ishida, H.**

- A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure

**Ishida, O.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications


Click on title for a paper summary.

# Papers by Author

- L-band Internally Matched Si-MMIC Front-End

**Ishihara, H.**

- Analytical Method for Determining Equivalent Circuit Parameters of GaAs FET's

**Ishii, Y.**

- High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS
- InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS

**Ishikawa, O.**

- A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment

**Ishikawa, T.**

- Characterization of Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits

Contents
Authors

Click on title for a paper summary.

# Papers by Author

- Experimental Evaluation of Basic Circuit Components Using Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits

**Iskander, M.F.**

- Open-Ended Metallized Ceramic Coaxial Probe for High-Temperature Dielectric Properties Measurements

**Isobe, R.**

- Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])
- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**Ito, H.**

- High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS
- InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS

Contents
Authors

Click on title for a paper summary.

# Papers by Author

## Itoh, J.

- A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment

## Itoh, T.

- Application of Volterra Series to the Problem of Self-Oscillating Mixer
- DC Instability of the Series Connection of Tunneling Diodes
- Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems
- Use of Frequency Derivatives in the Three-Dimensional Full-Wave Spectral Domain Technique

## Iwai, T.

- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Iyama, Y.**

- L-band Internally Matched Si-MMIC Front-End

**Jackson, D.R.**

- Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements

**Jackson, M.K.**

- Reduced Invasiveness of Noncontact Electrooptic Probes in Millimeter-Wave Optoelectronic Characterization (Short Papers)

**Jackson, R.W.**

- A Circuit Topology for Microwave Modeling of Plastic Surface Mount Packages

**Jacob, A.F.**

- Averaging Rules for the Scattering by Randomly Oriented Chiral Particles (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

- Complex Power and Mode Coupling in Circular Chirowaveguides (Corrections)

**Jacquart, P.-M.**

- Permeability Measurement on Composites Made of Oriented Metallic Wires from 0.1 to 18 GHz (Short Papers)

**Jager, D.**

- A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])

**Jakoby, B.**

- Analysis of Guided Waves in Inhomogeneous Bianisotropic Cylindrical Waveguides

**Jamani, Y.**

- A Ka-Band GaInP/GaAs HBT Four-Stage LNA (1996 [MCS])

# Papers by Author


**Jamid, H.A.**

- Mode Scattering by a Nonlinear Step-Discontinuity in Dielectric Optical Waveguides

**Janaki, M.S.**

- Eigenmodes in a Toroidal Cavity of Elliptic Cross Section (Short Papers)

**Jang, D.**

- Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])
- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**Janocko, M.A.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines



MTT®

IEEE®

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Jarosik, N.C.**

- Measurements of the Low-Frequency-Gain Fluctuations of a 30-GHz High-Electron-Mobility-Transistor Cryogenic Amplifier

**Javadi, H.H.S.**

- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...

**Jecko, B.**

- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator

**Jegannathan, S.**

- Efficient Method for Scattering from a Homogeneous, Circular, Cylindrical Shell with an Inhomogeneous Angular-Region (Short Papers)




Click on title for a paper summary.

# Papers by Author


**Jenkins, K.A.**

- Microwave Inductors and Capacitors in Standard Multilevel Interconnect Silicon Technology

**Jin, G.H.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Joao Rosario, M.**

- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band

**Johansson, M.E.**

- Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem

**Joines, W.T.**

- Determining Q Using S Parameter Data (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Dielectric Slab-Loaded Resonant Cavity for Applications Requiring Enhanced Field Uniformity (Short Papers)

**Jolley, B.**

- Design Considerations of Superconductive Input Multiplexers for Satellite Applications
- On the Power Handling Capability of High Temperature Superconductive Filters

**Jones, W.L.**

- A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits

**Joshin, K.**

- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Jostingmeier, A.**

- Application of the Eigenmode Transformation Technique for the Analysis of Planar Transmission Lines (Dec. 1996, Part II [T-MTT])

**Journet, F.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Kadota, M.**

- A Bleustein-Gulyaev-Shimizu Wave Resonator Having Resonances for TV and VCR Traps (Dec. 1996, Part II [T-MTT])

**Kagawa, Y.**

- Regular Boundary Integral Formulation for the Analysis of Open Dielectric/Optical Waveguides



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Kahn, W.K.**

- Measurement of Simple Resonant Equivalent Circuits for Microstrip Antennas (Short Papers)

**Kai, D.**

- Network Representation and Transverse Resonance for Layered Chirowaveguides (Short Papers)

**Kamenetskii, E.O.**

- Induced Polarization Effects in Coupling Processes of Waveguide Modes
- Mode Orthogonality Relations and Field Structure in Chirowaveguides (Short Papers)

**Kamogawa, K.**

- Multifrequency Microstrip Antennas Using Alumina-Ceramic/Polyimide Multilayer Dielectric Substrate
- Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC

# Papers by Author


**Kanazawa, K.**

- A High Efficiency GaAs MCM Power Amplifier for 1.9 GHz Digital Cordless Telephones
- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones

**Kang, Y.W.**

- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator

**Kaouk, Z.**

- A Finite Element Model of a Microwave Catheter for Cardiac Ablation

**Karamitsos, N.**

- Variational Solution of Microwave Circuits and Structures (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Karlsson, C.**

- Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications

**Kashiwabara, Y.**

- A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])

**Kasibhotla, V.**

- A Mode-Matching Technique for Mode Coupling in a Gyrotron Cavity

**Katehi, L.P.B.**

- Characterization of Three-Dimensional Open Dielectric Structures Using the Finite-Difference Time-Domain Method
- Design and Analysis of Transitions from Rectangular Waveguide to Layered Ridge Dielectric Waveguide



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])
- Micromachined W-Band Filters
- Modeling of Coplanar Stripline Discontinuities
- MRTD: New Time-Domain Schemes Based on Multiresolution Analysis
- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)

**Katzin, P.**

- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])

**Kau, C.P.**

- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures

Contents
Authors

Click on title for a paper summary.

# Papers by Author

**Kawamura, J.**

- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver

**Kawasaki, H.**

- An Investigation of IM3 Distortion in Relation to Bypass Capacitor of GaAs MMIC's

**Kawasaki, Y.**

- A 15/60 GHz One-Stage MMIC Frequency Quadrupler
- A New Empirical Large-Signal HEMT Model (Short Papers)

**Kawecki, T.G.**

- The High Temperature Superconductivity Space Experiment (HTSSE-II) Design

**Ke, J.-Y.**

- Propagation Characteristics of Superconducting Microstrip Lines

# Papers by Author

- Transient Propagation in Lossy Coplanar Waveguides

**Kenney, J.P.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

**Kern, S.**

- Coaxial Cavities with Corrugated Inner Conductor for Gyrotrons

**Khebir, A.**

- A Finite Element Model of a Microwave Catheter for Cardiac Ablation

**Kiang, J.-F.**

- Axisymmetric Modes of Cylindrical Resonators with Cascaded Inhomogeneous Dielectrics (Short Papers)
- Capacitance of Microstrip Lines with Inhomogeneous Substrate

# Papers by Author

- Propagation and Coupling Characteristics of Microstrip Lines with Laminated Ground Plane
- Quasi-TEM Analysis of Coplanar Waveguides with an Inhomogeneous Semiconductor Substrate (Short Papers)

**Kikuchi, K.**

- Soft and Dry Phantom Modeling Material Using Silicone Rubber with Carbon Fiber

**Kim, D.-W.**

- Characteristics of an Area-Variable Varactor Diode

**Kimura, S.**

- 0-40 GHz GaAs MESFET Distributed Baseband Amplifier IC's for High-Speed Optical Transmission
- Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Kinney, C.F.**

- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters

**Kinoshita, Y.**

- L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications

**Kintis, M.**

- A Broadband Planar Monolithic Ring Mixer

**Klaassen, A.**

- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

**Klein, M.V.**

- Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Klein, N.**

- Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report

**Klepser, B.-U.**

- Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])

**Klingbeil, H.**

- FDFD Full-Wave Analysis and Modeling of Dielectric and Metallic Losses of CPW Short Circuits (Short Papers)
- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])

**Klinger, M.**

- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

## Kobayashi, K.W.

- A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits
- A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE
- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures
- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers

## Kobayashi, M.

- Optimization of a Lumped Element Circulator Based on Eigenvalue Evaluation and Structural Improvement

## Kobayashi, S.

- Accurate Analysis of Losses in Waveguide Structures by Compact Two-Dimensional FDTD Method Combined with Autoregressive Signal Analysis (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Kogami, Y.**

- Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring
- Resonance Characteristics of Whispering-Gallery Modes in an Elliptic Dielectric Disk Resonator (Short Papers)

**Kojucharow, K.K.**

- Full-Wave Analysis of Quasi-Optical Structures

**Kolawa, E.A.**

- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)

**Kolbehdari, M.A.**

- Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Kolias, N.J.**

- Thermal Management for High-Power Active Amplifier Arrays (Short Papers)

**Kollberg, E.**

- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)

**Kollberg, E.L.**

- CAD Models for Multilayered Substrate Interdigital Capacitors

**Konishi, Y.**

- Optimization of a Lumped Element Circulator Based on Eigenvalue Evaluation and Structural Improvement

**Kono, R.**

- A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Kooi, P.S.**

- Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)

**Kornatz, A.**

- Analysis of Electromagnetic Boundary-Value Problems in Inhomogenous Media with the Method of Lines (Short Papers)

**Kosanovich, S.**

- Parameter Extraction and Correction for Transmission Lines and Discontinuities Using the Finite-Difference Time-Domain Method

**Kotsuka, Y.**

- Development of Ferrite Core Applicator System for Deep-Induction Hyperthermia



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Kouki, A.B.**

- A CAD-Suitable Approach for the Analysis of Nonuniform MMIC and MHMIC Transmission Lines (Short Papers)
- Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model

**Kramer, J.**

- A New Measurement Approach for Phase Noise at Close-In Offset Frequencies of Free-Running Oscillators (Dec. 1996, Part II [T-MTT])

**Kremer, R.**

- A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])

**Krowne, C.M.**

- Theory and Numerical Calculations for Radially Inhomogeneous Circular Ferrite Circulators

# Papers by Author


**Krozer, V.**

- GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])

**Krumpholz, M.**

- MRTD: New Time-Domain Schemes Based on Multiresolution Analysis

**Krupka, J.**

- Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators

**Krupnov, A.F.**

- Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)

**Kruse, J.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure

**Kub, F.J.**

- A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor

**Kubo, S.**

- L-band Internally Matched Si-MMIC Front-End

**Kudsia, C.M.**

- Design Considerations of Superconductive Input Multiplexers for Satellite Applications

**Kuhn, E.**

- The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz

**Kulke, R.**

- Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])

Contents
Authors

Click on title for a paper summary.

# Papers by Author

- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band

**Kumar, M.**

- Message from the General Chairman (1996 [MCS])

**Kuo, J.-T.**

- Riccati Matrix Differential Equation Formulation for the Analysis of Nonuniform Multiple Coupled Microstrip Lines

**Kurennoy, S.S.**

- Polarizabilities of an Annular Cut in the Wall of an Arbitrary Thickness

**Kuroki, F.**

- Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors

# Papers by Author


## Kuster, N.

- Automated E-Field Scanning System for Dosimetric Assessments
- Broadband Calibration of E-Field Probes in Lossy Media
- The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz

## Kustom, R.

- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator

## Kuwabara, T.

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Kuznetsov, D.**

- Capacitance Computations in a Multilayered Dielectric Medium Using Closed-Form Spatial Green's Functions (Corrections)

**Kuzuhara, M.**

- A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])
- A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept

**Kwok, R.S.**

- Low Loss Multiplexers with Planar Dual Mode HTS Resonators

**Kwon, Y.**

- Monolithic VCO Using a Novel Active Inductor (1996 [MCS])

# Papers by Author


**Kwon, Y.-S.**

- Characteristics of an Area-Variable Varactor Diode

**Labonte, S.**

- Monopole Antennas for Microwave Catheter Ablation

**Lai, R.**

- Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)
- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])
- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])
- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Lalande, M.**

- Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator

**Lamey, D.**

- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])

**Lancaster, M.J.**

- Couplings of Microstrip Square Open-Loop Resonators for Cross-Coupled Planar Microwave Filters
- Miniature Superconducting Filters

**Lansing, F.S.**

- Full Wave Analysis of Microwave Monolithic Circuit Devices Using a Generalized Yee-Algorithm Based on an Unstructured Grid



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Lardizabal, S.M.**

- Temperature-Dependent Modeling of Gallium Arsenide MESFET's

**Laskar, J.**

- Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)

**Lau, K.-F.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Lazzi, G.**

- Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz



Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Le Gourrierec, P.**

- Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films

**Le, M.**

- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**LeDuc, H.G.**

- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)
- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band
- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Lee, C.C.**

- A Full Wave Analysis of Microstrips by the Boundary Element Method

**Lee, C.H.**

- Free-Space Power Combining and Beam Steering of Ultra-Wideband Radiation Using an Array of Laser-Triggered Antennas

**Lee, J.-J.**

- Characteristics of an Area-Variable Varactor Diode

**Lee, J.H.**

- Electrostatic Potential through a Circular Aperture in a Thick Conducting Plane (Short Papers)

**Lee, K.**

- A New Extraction Method for Noise Sources and Correlation Coefficient in MESFET (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)

**Lee, L.-S.J.**

- A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits

**Lee, S.**

- Fast and Efficient Extraction of HBT Model Parameters Using Multibias S-Parameter Sets (Short Papers)

**Lefrancois, S.**

- A New Model for Microwave Characterization of Composite Materials in Guided-Wave Medium

**Legault, S.R.**

- Monopole Antennas for Microwave Catheter Ablation

# Papers by Author


**Leong, M.S.**

- Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)

**Lester, J.**

- Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])

**Lester, J.A.**

- Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])

**Levy, R.**

- Direct Synthesis of Cascaded Quadruplet (CQ) Filters (Corrections)

# Papers by Author

**Li, J.**

- Dual-Tone Calibration of Six-Port Junction and its Application to the Six-Port Direct Digital Millimetric Receiver

**Li, L.W.**

- Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)

**Liang, G.-C.**

- Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem

**Liao, C.-L.**

- Transient Propagation in Lossy Coplanar Waveguides

**Liao, W.-P.**

- Measurement of the Microwave Conductivity of a Polymeric Material with Potential Applications in Absorbers and Shielding (Comments)

# Papers by Author


**Lin, J.**

- Development of 44 GHz GaAs MMIC-Based Low-Noise Amplifiers for EHF Nulling Antenna

**Lin, J.H.**

- BiCG-FFT T-Matrix Method for Solving for the Scattering Solution from Inhomogeneous Bodies (Short Papers)

**Lin, S.-Y.**

- A Full Wave Analysis of Microstrips by the Boundary Element Method

**Lin, X.P.**

- Minimization of Reflection Error Caused by Absorbing Boundary Condition in the FDTD Simulation of Planar Transmission Lines



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Lin, Y.D.**

- Analysis and Design of Feeding Structures for Microstrip Leaky Wave Antenna (Sep. 1996 [T-MTT])

**Linner, P.**

- CAD Models for Multilayered Substrate Interdigital Capacitors
- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)

**Lithgow, R.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

**Litva, J.**

- Some Considerations on the Accuracy of the Nonuniform FDTD Method and its Application to Waveguide Analysis When Combined with the Perfectly Matched Layer Technique



Contents

Authors

Click on title for a paper summary.

# Papers by Author

**Litvin, K.I.**

- Monolithic Millimeter Wave Optical Receivers

**Liu, C.-M.**

- Modeling and Performance of a 100-Element pHEMT Grid Amplifier

**Liu, F.-W.**

- Numerical Simulation of the Power Density Distribution Generated in a Multimode Cavity by Using the Method of Lines Technique to Solve Directly for the Electric Field

**Liu, J.**

- Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure

**Liu, L.C.T.**

- Message from the Technical Program Chairman (1996 [MCS])

# Papers by Author


**Liu, P.**

- A Helical Microwave Antenna for Welding Plaque During Balloon Angioplasty

**Liu, P.-T.**

- Image Reconstruction of a Complex Cylinder Illuminated by TE Waves

**Liu, T.**

- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**Llopis, O.**

- Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators

**Lo, D.C.W.**

- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies


Click on title for a paper summary.

# Papers by Author


**Lott, U.**

- Low DC Power Monolithic Low Noise Amplifier for Wireless Applications at 5 GHz

**Louhi, J.T.**

- Dynamic Shape of the Depletion Layer of a Submillimeter-Wave Schottky Varactor

**Loung, P.V.**

- Adaptive High Temperature Superconducting Filters for Interference Rejection

**Lowther, R.**

- Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)

**Lu, J.-H.**

- Analysis of Slot-Coupled Double-Sided Cylindrical Microstrip Lines (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Lu, S.-L.**

- Coupling Parameters for a Side-Coupled Ring Resonator and a Microstrip Line (Short Papers)

**Lu, Y.**

- A New Edge Element Analysis of Dispersive Waveguiding Structures (Comments)
- Electromagnetic Dyadic Green's Function in Cylindrically Multilayered Media

**Lucero, R.**

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])

**Luhmann, Jr., N.C.**

- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters

# Papers by Author


**Lutke, W.**

- MMICs for Sensor Applications (1996 [MCS])

**Luy, J.-F.**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])
- A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])

**Lyons, M.R.**

- Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates
- Transient Coupling Reduction and Design Considerations in Edge-Coupled Coplanar Waveguide Couplers (Short Papers)

**Lyons, W.G.**

- High Temperature Superconductive Wideband Compressive Receivers




Click on title for a paper summary.

# Papers by Author


**Ma, J.-G.**

- Electromagnetics in High-T/sub c/ Superconductors
- TE Wave Properties of Slab Dielectric Guide Bounded by Nonlinear Non-Kerr-Like Media (May 1996 [T-MTT])

**Maas, S.**

- A Broadband Planar Monolithic Ring Mixer

**MacGowan, K.**

- A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits

**Madihian, M.**

- A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])
- A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications
- Low-Voltage Broadband BiCMOS MMICs for Low-Cost High-Speed Wireless Networks Applications

**Madjar, A.**

- A Novel General Approach for the Optimum Design of Microwave and Millimeter Wave Subharmonic Mixers

**Maemura, K.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

**Mag, I.**

- A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications

**Mahadevan, K.**

- Analytical Evaluation of the MoM Matrix Elements

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Mahfoudi, M.**

- A Simple Technique for the Design of MMIC 90° Phase-Difference Networks

**Mahmood, Z.**

- Regular Boundary Integral Formulation for the Analysis of Open Dielectric/Optical Waveguides

**Main, E.**

- A Linear Class AB Single-Ended to Differential Transconverter Suitable for RF Circuits (1996 [MCS])

**Majerus, M.**

- High Efficiency Power HFETS for Low Power Wireless Applications

**Makimoto, M.**

- Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Makioka, S.**

- A High Efficiency GaAs MCM Power Amplifier for 1.9 GHz Digital Cordless Telephones
- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones

**Mansour, R.R.**

- Design Considerations of Superconductive Input Multiplexers for Satellite Applications
- On the Power Handling Capability of High Temperature Superconductive Filters

**Manzel, M.**

- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)

**Mao, S.-G.**

- Propagation Characteristics of Superconducting Microstrip Lines


Click on title for a paper summary.

# Papers by Author


**Marques, R.**

- Low Frequency Leaky Regime in Covered Multilayered Striplines

**Martin, G.H.**

- Monolithic Millimeter Wave Optical Receivers

**Martinez, M.A.G.**

- An Analytical Model for the Photodetection Mechanisms in High-Electron Mobility Transistors

**Martinsson, T.**

- CAD Models for Multilayered Substrate Interdigital Capacitors

**Maruhashi, K.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])
- A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Massa, A.**

- Iterative Numerical Computation of the Electromagnetic Fields Inside Weakly Nonlinear Infinite Dielectric Cylinders of Arbitrary Cross Sections Using the Distorted-Wave Born Approximation

**Matsumura, K.**

- Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring
- Resonance Characteristics of Whispering-Gallery Modes in an Elliptic Dielectric Disk Resonator (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Matsuo, M.**

- Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices

**Matthaei, G.L.**

- Design of HTS, Lumped-Element, Manifold-Type Microwave Multiplexers

**Matthews, P.J.**

- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator
- Two-Dimensional Fiber-Optic Control of a True Time-Steered Array Transmitter (Dec. 1996, Part II [T-MTT])

**Maze-Merceur, G.**

- A New Model for Microwave Characterization of Composite Materials in Guided-Wave Medium



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**McCurdy, A.H.**

- A Mode-Matching Technique for Mode Coupling in a Gyrotron Cavity

**McDermott, D.B.**

- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters

**Mediavilla, A.**

- Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements

**Meggs, C.**

- Properties and Applications of Thick Film High Temperature Superconductors

**Meier, D.L.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines


Click on title for a paper summary.

# Papers by Author


**Meier, H.-P.**

- Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])

**Meier, K.**

- Broadband Calibration of E-Field Probes in Lossy Media
- The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz

**Melcon, A.A.**

- New Simple Procedure for the Computation of the Multimode Admittance or Impedance Matrix of Planar Waveguide Junctions

**Mesa, F.**

- Low Frequency Leaky Regime in Covered Multilayered Striplines



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Meschanov, V.P.**

- Stepped Transformers on TEM-Transmission Lines

**Meyers, W.J.**

- Guest Editorial (Jul. 1996, Part II [T-MTT])
- The High Temperature Superconductivity Space Experiment (HTSSE-II) Design

**Mezzanotte, P.**

- Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique
- Optimum Mesh Grading for Finite-Difference Method

**Michel, C.**

- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results




Click on title for a paper summary.

# Papers by Author


**Mickelson, A.R.**

- Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface

**Miles, R.E.**

- A Novel MMIC Source Impedance Tuner for On-Wafer Microwave Noise Parameter Measurements

**Miller, D.**

- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band

**Minakawa, A.**

- Novel High-Isolation FET Switches

**Mink, J.W.**

- Full-Wave Analysis of Quasi-Optical Structures



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Mirshekar-Syahkal, D.**

- Computation of Equivalent Circuits of CPW Discontinuities Using Quasi-Static Spectral Domain Method (Short Papers)

**Misra, P.**

- Order Recursive Method of Moments (ORMoM) for Iterative Design Applications
- Order-Recursive Gaussian Elimination (ORGE) and Efficient CAD of Microwave Circuits

**Mitsui, Y.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

**Mittleman, S.D.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)




Click on title for a paper summary.

# Papers by Author

## Mittra, R.

- Computation of Excess Capacitances of Various Strip Discontinuities Using Closed-Form Green's Functions (Short Papers)
- Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)
- Finite-Difference Time-Domain Algorithm for Solving Maxwell's Equations in Rotationally Symmetric Geometries
- Parameter Extraction and Correction for Transmission Lines and Discontinuities Using the Finite-Difference Time-Domain Method

## Miura, T.

- Optimization of a Lumped Element Circulator Based on Eigenvalue Evaluation and Structural Improvement

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Miyatsuji, K.**

- A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure

**Mo, T.**

- Prelaunch Calibration of the Advanced Microwave Sounding Unit-A for NOAA-K

**Moazzam, M.R.**

- A Practical MMIC Negative Resistance Structure for X and Ku Band Applications (1996 [MCS])

**Monahan, G.P.**

- Full-Wave Analysis of Quasi-Optical Structures

**Mongiardo, M.**

- A Four-Pole Dual Mode Elliptic Filter Realized in Circular Cavity without Screws (Dec. 1996, Part II [T-MTT])



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits

**Montauti, F.**

- Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)

**Montiel, C.M.**

- A Novel Active Antenna with Self-Mixing and Wideband Varactor-Tuning Capabilities for Communication and Vehicle Identification Applications

**Monzon, C.**

- New Reciprocity Theorems for Chiral, Nonactive, and Biisotropic Media (Short Papers)

**Monzon, J.C.**

- A New Reciprocity Theorem

Contents
Authors

# Papers by Author


**Moore, E.L.**

- A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras

**Mori, K.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

**Morin, P.**

- Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement

**Morini, A.**

- Constraints to the Optimum Performance and Bandwidth Limitations of Diplexers Employing Symmetric Three-Port Junctions



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Moritani, A.**

- A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers

**Mosig, J.R.**

- A Fast Integral Equation Technique for Shielded Planar Circuits Defined on Nonuniform Meshes (Short Papers)
- On the Network Characterization of Planar Passive Circuits Using the Method of Moments

**Moskowitz, C.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

**Moulthrop, A.A.**

- Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer




Click on title for a paper summary.

# Papers by Author


**Moussessian, A.**

- Modeling and Performance of a 100-Element pHEMT Grid Amplifier

**Muha, M.S.**

- Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer

**Mullen, L.J.**

- Hybrid Lidar-Radar Ocean Experiment

**Muraguchi, M.**

- A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter
- A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors



Contents

Authors


Click on title for a paper summary.

# Papers by Author

**Murakami, Y.**

- An Investigation of IM3 Distortion in Relation to Bypass Capacitor of GaAs MMIC's

**Murch, R.D.**

- Improving Microwave Imaging by Enhancing Diffraction Tomography

**Murduck, J.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Murphy, P.G.**

- High Temperature Superconductive Wideband Compressive Receivers

**Musolf, J.**

- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Nadobny, J.**

- A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids

**Nagai, H.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Nair, V.**

- High Efficiency Power HFETS for Low Power Wireless Applications

**Naishadham, K.**

- Full-Wave Analysis of Quasi-Optical Structures


Click on title for a paper summary.

# Papers by Author

- Minimization of Reflection Error Caused by Absorbing Boundary Condition in the FDTD Simulation of Planar Transmission Lines
- Order Recursive Method of Moments (ORMoM) for Iterative Design Applications
- Order-Recursive Gaussian Elimination (ORGE) and Efficient CAD of Microwave Circuits

**Najafabadi, R.M.**

---

- Focusing and Impedance Properties of Conformable Phased Array Antennas for Microwave Hyperthermia

**Nakagawa, T.**

---

- A Low Phase Noise C-Band Frequency Synthesizer Using a New Fractional-N PLL with Programmable Fractionality (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Nakatsuka, T.**

- A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment

**Nakayama, M.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

**Nakhla, M.S.**

- Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques

**Narayana, S.M.**

- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform

**Nardi, D.D.**

- High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)


Click on title for a paper summary.

# Papers by Author


**Narhi, T.**

- Frequency-Domain Analysis of Strongly Nonlinear Circuits Using a Consistent Large-Signal Model

**Nash, S.J.**

- Distributed Small Signal Model for Multi-Fingered GaAs PHEMT/MESFET Devices (1996 [MCS])

**Navarro, E.A.**

- Some Considerations on the Accuracy of the Nonuniform FDTD Method and its Application to Waveguide Analysis When Combined with the Perfectly Matched Layer Technique

**Navarro, J.A.**

- Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Neidert, R.E.**

- Theory and Numerical Calculations for Radially Inhomogeneous Circular Ferrite Circulators

**Newport, Y.**

- Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements

**Ng, M.W.R.**

- Nonlinear System and Subsystem Modeling in Time Domain

**Nghiem, D.**

- Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements

**Ngo, D.**

- A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Nguyen, L.**

- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**Nguyen, R.**

- Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)

**Nicholson, J.J.**

- A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras

**Nielsen, T.N.**

- Chromatic Dispersion in Fiber-Optic Microwave and Millimeter-Wave Links

**Nikawa, Y.**

- Soft and Dry Phantom Modeling Material Using Silicone Rubber with Carbon Fiber


Click on title for a paper summary.

# Papers by Author


**Nikita, K.S.**

- Analysis of Focusing of Pulse Modulated Microwave Signals Inside a Tissue Medium
- Coupling Phenomena in Concentric Multi-Applicator Phased Array Hyperthermia Systems

**Nisenoff, M.**

- Guest Editorial (Jul. 1996, Part II [T-MTT])

**Nishikawa, K.**

- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's
- Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC

**Nishimoto, M.**

- Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)

# Papers by Author

**Nishimura, K.**

- Scattering of Millimeter Waves by Metallic Strip Gratings on an Optically Plasma-Induced Semiconductor Slab

**Nishitsuji, M.**

- A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment

**Nogawa, K.**

- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])

**Nojima, T.**

- Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Norgren, M.**

- An Optimization Approach to the Frequency-Domain Inverse Problem for a Nonuniform LCRG Transmission Line (Short Papers)

**Norskov, S.**

- Chromatic Dispersion in Fiber-Optic Microwave and Millimeter-Wave Links

**Nuteson, T.W.**

- Full-Wave Analysis of Quasi-Optical Structures

**Nye, R.S.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

**Oates, D.E.**

- Ferrite-Superconductor Devices for Advanced Microwave Applications



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Oberschmidt, G.

- Averaging Rules for the Scattering by Randomly Oriented Chiral Particles (Short Papers)

## Ogata, N.

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

## Oh, K.S.

- Capacitance Computations in a Multilayered Dielectric Medium Using Closed-Form Spatial Green's Functions (Corrections)
- Computation of Excess Capacitances of Various Strip Discontinuities Using Closed-Form Green's Functions (Short Papers)
- Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Ohara, S.**

- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

**Ohashi, Y.**

- A 15/60 GHz One-Stage MMIC Frequency Quadrupler
- A New Empirical Large-Signal HEMT Model (Short Papers)

**Ohata, K.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Ohgihara, T.**

- An Investigation of IM3 Distortion in Relation to Bypass Capacitor of GaAs MMIC's




Click on title for a paper summary.

# Papers by Author


**Ohta, Y.**

- A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers

**Ohtomo, M.**

- Analytical Method for Determining Equivalent Circuit Parameters of GaAs FET's

**Okazaki, H.**

- Novel High-Isolation FET Switches

**Oki, A.K.**

- A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE
- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures
- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Okoniewski, M.**

- A Study of the Handset Antenna and Human Body Interaction

**Okubo, N.**

- A 15/60 GHz One-Stage MMIC Frequency Quadrupler
- A New Empirical Large-Signal HEMT Model (Short Papers)

**Oliner, A.A.**

- Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements

**Olmedo, B.G.**

- On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides

**Olson, H.M.**

- A Compact Model for Predicting the Isolation of Ports in a Closed Rectangular Microchip Package



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Olyslager, F.**

- High-Frequency Reciprocity Based Circuit Model for the Incidence of Electromagnetic Waves on General Circuits in Layered Media
- Properties of and Generalized Full-Wave Transmission Line Models for Hybrid (Bi)(an)isotropic Waveguides

**Omar, A.S.**

- Application of the Eigenmode Transformation Technique for the Analysis of Planar Transmission Lines (Dec. 1996, Part II [T-MTT])

**Onda, K.**

- A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept

**Ono, M.**

- L-band Internally Matched Si-MMIC Front-End



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Onodera, K.**

- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's

**Ooms, B.**

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])

**Ooms, S.**

- The Anti-Circuit Concept for the Characterization of Active Circuits Using Electromagnetic Simulations

**Oraizi, H.**

- Design of Impedance Transformers by the Method of Least Squares



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Orgusaar, R.**

- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])

**Orsini, R.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Osafune, K.**

- High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS
- InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS

**Pacaud, A.**

- Complete Sliced Model of Microwave FET's and Comparison with Lumped Model and Experimental Results



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Padin, S.**

- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)

**Page, C.**

- High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])

**Paine, S.**

- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver

**Palusinski, O.A.**

- Procedure for Direct Calculation of Characteristic Admittance Matrix of Coupled Transmission Lines (Short Papers)

**Pan, D.-S.**

- DC Instability of the Series Connection of Tunneling Diodes



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Pan, G.**

- A New Edge Element Analysis of Dispersive Waveguiding Structures (Authors' Reply)

**Pan, Q.**

- Digitizing Multichannel Video Signals for Lightwave Transmission

**Pang, P.**

- High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)

**Panton, W.**

- Effects of Nonlinear Distortion on CDMA Communication Systems (Dec. 1996, Part II [T-MTT])

**Papa, D.C.**

- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver

# Papers by Author

**Park, E.J.**

- An Efficient Synthesis Technique of Tapered Transmission Line with Loss and Dispersion (Short Papers)

**Park, H.H.**

- Electrostatic Potential Distribution through a Rectangular Aperture in a Thick Conducting Plane (Short Papers)

**Park, W.S.**

- Analysis of a Double Step Microstrip Discontinuity in the Substrate Using the 3-D-FDTD Method (Short Papers)

**Parker, A.**

- Pulsed Device Measurements and Applications

**Parshin, V.V.**

- Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)

Contents
Authors

# Papers by Author


**Pasquet, D.**

- A New Model for Microwave Characterization of Composite Materials in Guided-Wave Medium

**Pastorino, M.**

- A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications
- Iterative Numerical Computation of the Electromagnetic Fields Inside Weakly Nonlinear Infinite Dielectric Cylinders of Arbitrary Cross Sections Using the Distorted-Wave Born Approximation

**Patrick, W.**

- Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])

**Paul, C.R.**

- Decoupling the Multiconductor Transmission Line Equations



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Pavelyev, A.B.**

- Coaxial Cavities with Corrugated Inner Conductor for Gyrotrons

**Pekarek, J.E.**

- Use of Frequency Derivatives in the Three-Dimensional Full-Wave Spectral Domain Technique

**Peng, H.**

- Study of Whispering Gallery Modes in Double Disk Sapphire Resonators

**Penn, S.J.**

- Properties and Applications of Thick Film High Temperature Superconductors

**Pennock, S.R.**

- Analysis of Asymmetrical Multilayer Ferrite-Loaded Finlines by the Extended Spectral Domain Approach



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Perdomo, J.

- Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's

## Perez, F.

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

## Perregrini, L.

- Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)
- Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"
- Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"

Contents
Authors

# Papers by Author


**Perrin, G.**

- Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films

**Peterson, A.F.**

- Focusing and Impedance Properties of Conformable Phased Array Antennas for Microwave Hyperthermia
- Higher-Order Vector Finite Elements for Tetrahedral Cells

**Petrosky, K.J.**

- A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor

**Pieseski, S.J.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines




Click on title for a paper summary.

# Papers by Author


**Pinhasi, Y.**

- Theoretical Investigation of a Free-Electron Maser Operating with a TEM Transmission Line

**Plana, R.**

- Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators

**Platzker, A.**

- Distributed Small Signal Model for Multi-Fingered GaAs PHEMT/MESFET Devices (1996 [MCS])
- High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])

**Plumb, R.G.**

- Stokes Phenomenon in the Development of Microstrip Green's Function and its Ramifications (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

## Poles, L.D.

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

## Pollard, R.D.

- A Novel MMIC Source Impedance Tuner for On-Wafer Microwave Noise Parameter Measurements

## Pollman, M.D.

- A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])

## Polycarpou, A.C.

- Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Polychronopoulos, S.J.**

- Propagation and Coupling Properties of Integrated Optical Waveguides--An Integral Equation Formulation

**Ponchak, G.E.**

- Design and Analysis of Transitions from Rectangular Waveguide to Layered Ridge Dielectric Waveguide

**Pond, J.M.**

- Cryogenic Microwave Channelized Receiver

**Porch, A.**

- Miniature Superconducting Filters

**Pospieszalski, M.W.**

- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Potyraj, P.A.**

- A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor

**Pregla, R.**

- Analysis of Electromagnetic Boundary-Value Problems in Inhomogenous Media with the Method of Lines (Short Papers)
- Hybrid Analysis of Three-Dimensional MMIC Elements by the Method of Lines

**Pretterebner, J.**

- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters

**Prevost, B.**

- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Pribble, W.L.**

- An Ion-Implanted 13 Watt C-Band MMIC with 60% Peak Power Added Efficiency

**Pribetich, J.**

- Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method
- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

**Price, G.E.**

- The High Temperature Superconductivity Space Experiment (HTSSE-II) Design

**Prichett, S.**

- FET Statistical Modeling Using Parameter Orthogonalization



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Pun, E.Y.B.**

- Field Distributions in Supported Coplanar Lines Using Conformal Mapping Techniques (Short Papers)

**Qian, J.**

- Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System

**Queffelec, P.**

- Influence of Higher Order Modes on the Measurements of Complex Permittivity and Permeability of Materials Using a Microstrip Discontinuity

**Raab, F.H.**

- Intermodulation Distortion in Kahn-Technique Transmitters



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Raab, J.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Raffetto, M.**

- Electromagnetic Boundary Value Problem in the Presence of a Partly Lossy Dielectric: Considerations About the Uniqueness of the Solution (Short Papers)

**Raihn, K.F.**

- Adaptive High Temperature Superconducting Filters for Interference Rejection

**Railton, C.J.**

- The Analysis of General Two-Dimensional PEC Structures Using a Modified CPFDTD Algorithm (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Raisanen, A.V.

- Application of a Simple and Efficient Source Excitation Technique of the FDTD Analysis of Waveguide and Microstrip Circuits
- Computer-Aided Design of Step Recovery Diode Frequency Multipliers
- Dynamic Shape of the Depletion Layer of a Submillimeter-Wave Schottky Varactor

## Ralston, R.W.

- High Temperature Superconductive Wideband Compressive Receivers

## Ramos, J.

- Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Rangel-Patino, F.E.**

- Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's

**Rao, G.**

- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform

**Rappaport, C.M.**

- A Helical Microwave Antenna for Welding Plaque During Balloon Angioplasty
- FDTD Verification of Deep-Set Brain Tumor Hyperthermia Using a Spherical Microwave Source Distribution

**Raptis, A.C.**

- Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Rascoe, D.L.**

- Full Wave Analysis of Microwave Monolithic Circuit Devices Using a Generalized Yee-Algorithm Based on an Unstructured Grid
- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...

**Rasukova, I.A.**

- Stepped Transformers on TEM-Transmission Lines

**Rathmell, J.G.**

- Pulsed Device Measurements and Applications

**Rauscher, C.**

- A Channelized-Limiter Approach to Receiver Front-End Protection
- Cryogenic Microwave Channelized Receiver



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Microwave Channelized Active Filters--A New Modular Approach to Achieving Compactness and High Selectivity

**Rawat, B.**

- Development of Semi-Empirical Design Equations for Symmetrical Three-Line Microstrip Couplers (Short Papers)

**Razeghi, M.M.**

- Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters

**Rebagliati, M.**

- A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications

**Rebeiz, G.M.**

- A Coaxial 0.5-18 GHz Near Electric Field Measurement System for Planar Microwave Circuits Using Integrated Probes

Contents
Authors

# Papers by Author

- Conductor-Loss Limited Stripline Resonator and Filters (Short Papers)
- Micromachined W-Band Filters

**Redlich, S.**

- A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])

**Reiss, K.**

- Procedure for Direct Calculation of Characteristic Admittance Matrix of Coupled Transmission Lines (Short Papers)

**Reljin, B.D.**

- Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)

**Remillard, S.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Remillard, S.K.**

- Properties and Applications of Thick Film High Temperature Superconductors

**Reynoso-Hernandez, J.A.**

- Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's

**Rezazadeh, A.A.**

- Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)

**Rheinfelder, C.**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])

**Rhodes, R.**

- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

# Papers by Author


**Riblet, H.J.**

- Expansions for the Capacitance of a Square in a Square with a Comparison (Short Papers)

**Rieckmann, C.**

- Application of the Eigenmode Transformation Technique for the Analysis of Planar Transmission Lines (Dec. 1996, Part II [T-MTT])

**Riegert, R.J.**

- Analytical Dispersion Analysis of Loaded Periodic Circuits Using the Generalized Scattering Matrix

**Ritter, J.**

- Efficient FDTD/Matrix-Pencil Method for the Full-Wave Scattering Parameter Analysis of Waveguiding Structures

# Papers by Author


**Rivoli, A.**

- Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)

**Rizzi, B.J.**

- A New Measurement Approach for Phase Noise at Close-In Offset Frequencies of Free-Running Oscillators (Dec. 1996, Part II [T-MTT])

**Robertson, I.D.**

- Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)

**Robertson, S.V.**

- Micromachined W-Band Filters



Contents

Authors


Click on title for a paper summary.

# Papers by Author

**Roblin, O.**

- Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films

**Rohlfing, S.M.**

- Design of HTS, Lumped-Element, Manifold-Type Microwave Multiplexers

**Rollman, J.**

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])

**Romanofsky, R.R.**

- Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...

Contents
Authors

# Papers by Author


**Romero, M.A.**

- An Analytical Model for the Photodetection Mechanisms in High-Electron Mobility Transistors

**Rorsman, N.**

- Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications

**Rosario, M.J.**

- Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])

**Rose, V.S.**

- The High Temperature Superconductivity Space Experiment (HTSSE-II) Design

**Roselli, L.**

- Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique

# Papers by Author

- Optimum Mesh Grading for Finite-Difference Method

**Rosen, A.**

- A Method for the In Vitro Testing of Cardiac Ablation Catheters
- Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure
- Editorial: Introduction to the Special Issue on Medical Application and Biological Effects of RF/Microwaves (Oct. 1996, Part II [T-MTT])

**Rosenbaum, R.M.**

- A Method for the In Vitro Testing of Cardiac Ablation Catheters

**Rosenberg, J.J.**

- Modeling and Performance of a 100-Element pHEMT Grid Amplifier

# Papers by Author


**Rosloniec, S.**

- Three-Port Hybrid Power Dividers Terminated in Complex Frequency-Dependent Impedances (Short Papers)

**Roy, L.**

- Monopole Antennas for Microwave Catheter Ablation

**Roy, T.**

- A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)

**Rozzi, T.**

- A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])
- Constraints to the Optimum Performance and Bandwidth Limitations of Diplexers Employing Symmetric Three-Port Junctions



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Rutledge, D.B.**

- Modeling and Performance of a 100-Element pHEMT Grid Amplifier

**Sagawa, M.**

- Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices

**Saito, E.R.**

- Adaptive High Temperature Superconducting Filters for Interference Rejection

**Sakagami, I.**

- Sensitivity Analysis of Lossy Coupled Transmission Lines (Comments)

**Salazar-Palma, M.**

- A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Sanchez-Hernandez, D.**

- Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)

**Sangary, N.T.**

- Some Considerations on the Accuracy of the Nonuniform FDTD Method and its Application to Waveguide Analysis When Combined with the Perfectly Matched Layer Technique

**Sangster, A.J.**

- A Generalized Analysis for a Class of Rectangular Waveguide Coupler Employing Narrow Wall Slots

**Sarkar, T.K.**

- A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)
- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)

**Sarto, M.S.**

- TE and TM Modes in Cylindrical Metallic Structures Filled with Bianisotropic Material

**Saunier, P.**

- Performance Comparison of 1 Watt Ka-Band MMIC Amplifiers Using Pseudomorphic HEMTs and Ion-Implanted MESFETs

**Savage, J.S.**

- Higher-Order Vector Finite Elements for Tetrahedral Cells

**Savard, P.**

- A Comparative Study of Four Open-Ended Coaxial Probe Models for Permittivity Measurements of Lossy Dielectric/Biological Materials at Microwave Frequencies

Click on title for a paper summary.

# Papers by Author

- A Finite Element Model of a Microwave Catheter for Cardiac Ablation

**Sawai, T.**

---

- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])

**Sayed, M.**

---

- Pulsed Device Measurements and Applications

**Scanlan, S.O.**

---

- Modal Circuit Decomposition of Lossy Multiconductor Transmission Lines

**Schaff, W.J.**

---

- Monolithic Millimeter Wave Optical Receivers

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Schaller, G.**

- Field Simulation of Dipole Antennas for Interstitial Microwave Hyperthermia

**Schamberger, M.A.**

- Parameter Extraction and Correction for Transmission Lines and Discontinuities Using the Finite-Difference Time-Domain Method

**Scharen, M.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

**Schefer, M.**

- Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])

**Schellenberg, J.M.**

- Guest Editors' Overview (Dec. 1996, Part II [T-MTT])



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Schmatz, M.L.**

- A GaAs Single Chip 2.4 GHz PLL Frequency Multiplier

**Schmegner, K.-E.**

- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

**Schmid, T.**

- Automated E-Field Scanning System for Dosimetric Assessments
- Broadband Calibration of E-Field Probes in Lossy Media

**Schmuckle, F.J.**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])

**Schneider, J.B.**

- The Analysis of General Two-Dimensional PEC Structures Using a Modified CPFDTD Algorithm (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Schoenfeld, F.

- Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator

## Scholen, A.

- Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report

## Schutt-Aine, J.E.

- Capacitance Computations in a Multilayered Dielectric Medium Using Closed-Form Spatial Green's Functions (Corrections)
- Computation of Excess Capacitances of Various Strip Discontinuities Using Closed-Form Green's Functions (Short Papers)
- Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)

# Papers by Author

**Schwarzbek, S.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Scott, J.**

- Pulsed Device Measurements and Applications

**Scott, S.A.**

- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform

**Seaver, M.M.**

- High Temperature Superconductive Wideband Compressive Receivers

**Seebass, M.**

- A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Sentelle, C.G.**

- FD--TLM Electromagnetic Field Simulation of High-Speed Josephson Junction Digital Logic Gates
- Study and Characterization of Optoelectronic Photoconductor-Based Probes

**Shah, S.A.**

- Reduced Invasiveness of Noncontact Electrooptic Probes in Millimeter-Wave Optoelectronic Characterization (Short Papers)

**Shalkhauser, K.A.**

- Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])

**Shanjia, X.**

- Network Representation and Transverse Resonance for Layered Chirowaveguides (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Sharma, A.K.**

- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures

**Sheen, J.-W.**

- Analysis and Design of Feeding Structures for Microstrip Leaky Wave Antenna (Sep. 1996 [T-MTT])

**Shen, Z.-Y.**

- High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)

**Shepherd, P.R.**

- Schottky Diodes for Analogue Phase Shifters in GaAs MMIC's (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Shibata, K.**

- A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])

**Shifrin, M.**

- A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications

**Shigematsu, Y.**

- Development of Ferrite Core Applicator System for Deep-Induction Hyperthermia

**Shih, C.-F.**

- Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem

**Shimizu, M.**

- A New Empirical Large-Signal HEMT Model (Short Papers)



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Shinozaki, S.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Shirakawa, K.**

- A 15/60 GHz One-Stage MMIC Frequency Quadrupler
- A New Empirical Large-Signal HEMT Model (Short Papers)

**Silva, C.P.**

- Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer

**Silva, J.H.**

- Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)




Click on title for a paper summary.

# Papers by Author


**Silver, A.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Simon, K.M.**

- K through Ka-Band Driver and Power Amplifiers

**Simons, R.N.**

- Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])
- Modeling of Coplanar Stripline Discontinuities

**Singer, M.**

- A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])



Contents

Authors

Click on title for a paper summary.

# Papers by Author

**Singh, R.**

- Small-Signal Characterization of Microwave and Millimeter-Wave HEMT's Based on a Physical Model

**Sinnesbichler, F.**

- Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])

**Sitch, J.**

- A New Large Signal HBT Model

**Skalitzky, R.G.**

- The NRL Josephson Junction Monitoring Experiment on HTSEE-II

**Skaropoulos, N.C.**

- Induced EM Field in a Layered Eccentric Spheres Model of the Head: Plane-Wave and Localized Source Exposure

Contents
Authors

Click on title for a paper summary.

# Papers by Author

**Slattery, R.L.**

- High Temperature Superconductive Wideband Compressive Receivers

**Sledzik, H.**

- A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

**Sloan, R.**

- Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K

**Smith, D.M.**

- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures

**Smith, P.A.**

- Properties and Applications of Thick Film High Temperature Superconductors

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Smith, P.M.**

- Status of InP HEMT Technology for Microwave Receiver Applications (Dec. 1996, Part II [T-MTT])
- Status of InP HEMT Technology for Microwave Receiver Applications (Invited)

**Smith, R.**

- A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications

**Smith, R.P.**

- A Generalized Scattering Matrix Approach for Analysis of Quasi-Optical Grids and De-Embedding of Device Parameters

**Snowden, C.M.**

- Small-Signal Characterization of Microwave and Millimeter-Wave HEMT's Based on a Physical Model



Contents

Authors


Click on title for a paper summary.

# Papers by Author

**Sobhy, M.I.**

- Nonlinear System and Subsystem Modeling in Time Domain

**Sollner, T.C.L.G.**

- High Temperature Superconductive Wideband Compressive Receivers

**Sorrentino, R.**

- Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique

**Soulen, Jr., R.J.**

- The NRL Josephson Junction Monitoring Experiment on HTSEE-II

**Souny, B.**

- Elimination of Spurious Solutions in the Calculation of Eigenmodes by Moment Method (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Soyuer, M.**

- Microwave Inductors and Capacitors in Standard Multilevel Interconnect Silicon Technology

**Sozanski, J.-P.**

- Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination--Theoretical Study and Animal Experimental Results
- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

**Spears, E.**

- A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])

**Sporkman, T.**

- Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band


Click on title for a paper summary.

# Papers by Author


**Sporkmann, T.**

- Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])

**Srinivasan, M.**

- Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques

**Stanchina, W.E.**

- High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)

**Steer, M.B.**

- Full-Wave Analysis of Quasi-Optical Structures

**Stern, J.A.**

- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band
- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver

**Stiller, A.**

- A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])

**Stiller, M.**

- High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)

**Stotz, M.**

- Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)

**Streit, D.C.**

- A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE

Contents
Authors

Click on title for a paper summary.

# Papers by Author

- A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures
- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers

**Strohm, K.**

- 26 GHz Coplanar SiGe MMICS (1996 [MCS])

**Strohm, K.M.**

- A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])

**Struble, W.**

- Distributed Small Signal Model for Multi-Fingered GaAs PHEMT/MESFET Devices (1996 [MCS])

**Stuchly, M.A.**

- A Study of the Handset Antenna and Human Body Interaction

# Papers by Author


**Su, D.W.-F.**

- A Fast Algorithm for Computing Field Radiated by an Insulated Dipole Antenna in Dissipative Medium (Short Papers)

**Su, H.-C.**

- Dispersion Characteristics of Cylindrical Coplanar Waveguides (Short Papers)

**Suematsu, E.**

- A Fiber Optic/Millimeter-Wave Radio Transmission Link Using HBT as Direct Photodetector and an Optoelectronic Upconverter

**Suematsu, N.**

- L-band Internally Matched Si-MMIC Front-End



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Sun, C.K.**

- Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)

**Sun, Y.**

- Regular Boundary Integral Formulation for the Analysis of Open Dielectric/Optical Waveguides
- Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's

**Surridge, R.K.**

- A New Large Signal HBT Model

**Tai, B.H.**

- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Tait, G.B.**

- Cryogenic Microwave Channelized Receiver

**Taki, M.**

- Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio

**Takimoto, Y.**

- 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems
- Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

**Talisa, S.H.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

# Papers by Author


**Talvacchio, J.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

**Tan, J.**

- A New Edge Element Analysis of Dispersive Waveguiding Structures (Authors' Reply)

**Tan, M.**

- A Broadband Planar Monolithic Ring Mixer

**Tang, S.Y.**

- Transient Analysis of Tapered Lines Based on the Method of Series Expansion (Short Papers)

**Tang, W.-C.**

- Design Considerations of Superconductive Input Multiplexers for Satellite Applications



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Tang, Y.P.**

- Transient Analysis of Tapered Lines Based on the Method of Series Expansion (Short Papers)

**Tanimoto, T.**

- Analytical Nonlinear HEMT Model for Large Signal Circuit Simulation (Short Papers)

**Tardioli, G.**

- A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])

**Tateoka, K.**

- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones

**Tauritz, J.L.**

- Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's




Click on title for a paper summary.

# Papers by Author


**Tazon, A.**

- Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements

**Teeter, D.**

- High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])

**Tefiku, F.**

- Novel Directional Couplers Using Broadside-Coupled Coplanar Waveguides for Double-Sided Printed Antennas

**Tehrani, S.**

- High Efficiency Power HFETS for Low Power Wireless Applications

**Tellmann, N.**

- Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report



Contents

Authors

Click on title for a paper summary.

# Papers by Author

**Temme, D.H.**

- Ferrite-Superconductor Devices for Advanced Microwave Applications

**Tempel, R.**

- MMICs for Sensor Applications (1996 [MCS])

**Teng, J.**

- No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord

**Terzuoli, Jr., A.J.**

- FDTD Verification of Deep-Set Brain Tumor Hyperthermia Using a Spherical Microwave Source Distribution

**Tessier, V.**

- Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

# Papers by Author


**Theron, I.P.**

- The Electric Quadruple Contribution to the Circular Birefringence of Nonmagnetic Anisotropic Chiral Media: A Circular Waveguide Experiment

**Thomas, Jr., D.G.**

- Optimization of Active Microwave Frequency Multiplier Performance Utilizing Harmonic Terminating Impedances (Dec. 1996, Part II [T-MTT])

**Thompson, M.**

- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

**Thompson, P.E.**

- A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor

**Thompson, S.D.**

- A Microwave Radar for Vehicular Applications


Click on title for a paper summary.

# Papers by Author


**Thomson, F.S.**

- On the Power Handling Capability of High Temperature Superconductive Filters

**Thomson, G.**

- Design Considerations of Superconductive Input Multiplexers for Satellite Applications

**Tine, G.**

- Evaluation of Pulsed Microwave Influence on Isolated Hearts

**Tinga, W.R.**

- Generation and Transmission of FM and pi/4 DQPSK Signals at Microwave Frequencies Using Harmonic Generation and Optoelectronic Mixing in Mach-Zehnder Modulators

**Titus, W.**

- A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications



Contents

Authors

Click on title for a paper summary.

# Papers by Author

## Tokumitsu, M.

- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's

## Tokumitsu, T.

- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's
- Highly Integrated Three-Dimensional MMIC Single-Chip Receiver and Transmitter (Dec. 1996, Part II [T-MTT])
- Multifrequency Microstrip Antennas Using Alumina-Ceramic/Polyimide Multilayer Dielectric Substrate
- Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC

## Tomabechi, Y.

- Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring

# Papers by Author

- Resonance Characteristics of Whispering-Gallery Modes in an Elliptic Dielectric Disk Resonator (Short Papers)

**Tong, C.-Y.E.**

- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)
- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver

**Tong, D.T.K.**

- Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems

**Tongyi, A.**

- A New FEM Approach for Open Boundary Laplace's Problem (Short Papers)

**Tosic, D.V.**

- Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)

Click on title for a paper summary.

# Papers by Author

## Toyoda, I.

- Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's
- Highly Integrated Three-Dimensional MMIC Single-Chip Receiver and Transmitter (Dec. 1996, Part II [T-MTT])
- Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC

## Tran, L.

- Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])
- High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

## Tran, L.T.

- Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers

MTT
IEEE
Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Trenkic, V.**

- Advanced Node Formulations in TLM--The Adaptable Symmetrical Condensed Node
- Analytical Expansion of the Dispersion Relation for TLM Condensed Nodes
- Development of a General Symmetrical Condensed Node for the TLM Method

**Trew, R.J.**

- Editorial (Jan. 1996 [T-MTT])

**Tripathi, A.**

- CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits

**Tripathi, V.K.**

- CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Tsai, M.-J.**

- Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])
- Optimization of Aperture Transitions for Multiport Microstrip Circuits

**Tseng, B.-C.**

- A Fast Algorithm for Computing Field Radiated by an Insulated Dipole Antenna in Dissipative Medium (Short Papers)

**Tserng, H.Q.**

- Performance Comparison of 1 Watt Ka-Band MMIC Amplifiers Using Pseudomorphic HEMTs and Ion-Implanted MESFETs

**Tsitsos, S.**

- Variational Solution of Microwave Circuits and Structures (Short Papers)



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Tsui, J.B.Y.**

- Design and Implementation of a Direct Digitization GPS Receiver Front End

**Tsukahara, T.**

- A Low Phase Noise C-Band Frequency Synthesizer Using a New Fractional-N PLL with Programmable Fractionality (Short Papers)

**Tsutsumi, M.**

- Propagation Characteristics of the Magnetostatic Surface Wave in the YBCO-YIG Film-Layered Structure
- Scattering of Millimeter Waves by Metallic Strip Gratings on an Optically Plasma-Induced Semiconductor Slab

**Tu, D.-W.**

- Modeling and Performance of a 100-Element pHEMT Grid Amplifier



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Tu, Y.-M.**

- Transient Propagation in Lossy Coplanar Waveguides

**Tupikin, V.D.**

- Stepped Transformers on TEM-Transmission Lines

**Turner, I.**

- Numerical Simulation of the Power Density Distribution Generated in a Multimode Cavity by Using the Method of Lines Technique to Solve Directly for the Electric Field

**Tward, E.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Tzuang, C.-K.C.**

- Analysis and Design of Feeding Structures for Microstrip Leaky Wave Antenna (Sep. 1996 [T-MTT])



Contents

Authors


Click on title for a paper summary.

# Papers by Author

- Oscillator-Type Active-Integrated Antenna: The Leaky-Mode Approach

**Uda, H.**

---

- A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])

**Uda, T.**

---

- A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment

**Ueda, D.**

---

- A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure

**Umeda, Y.**

---

- A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter

# Papers by Author

- A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors
- High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS
- InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS
- Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems

## Umemoto, D.K.

- A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE

## Unbehauen, R.

- Error Bound for the Approximate Fourier Transformation Relationship for Nonuniform Transmission Lines (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Unwin, R.T.**

- The Design of Tuned Front-End GaAs MMIC Optical Receivers

**Urban, K.W.**

- Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report

**Ureel, J.**

- A New Method for Obtaining the Shape Sensitivities of Planar Microstrip Structures by a Full-Wave Analysis
- Shape Sensitivities of Capacitances of Planar Conducting Surfaces Using the Method of Moments

**Uslenghi, P.L.E.**

- TE and TM Modes in Cylindrical Metallic Structures Filled with Bianisotropic Material



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

## Uzunoglu, N.K.

- Analysis of Focusing of Pulse Modulated Microwave Signals Inside a Tissue Medium
- Coupling Phenomena in Concentric Multi-Applicator Phased Array Hyperthermia Systems
- Propagation and Coupling Properties of Integrated Optical Waveguides--An Integral Equation Formulation

## Vahldieck, R.

- Analysis of Cylindrical Transmission Lines with the Method of Lines
- Application of a Coupled-Integral-Equations Technique to Ridged Waveguides
- Radial Mode Matching Analysis of Ridged Circular Waveguides (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author

- Rigorous Analysis of Mode Propagation and Field Scattering in Silicon-Based Coplanar MIS Slow Wave Structures with Abrupt Transitions to Transmission Lines on Normal Substrate

**Valor, L.**

- An Efficient Finite Element Formulation to Analyze Waveguides with Lossy Inhomogeneous Bi-Anisotropic Materials

**van den Brink, R.F.M.**

- The Noise-Tee--A Lightwave Device for Microwave Noise Measurements (Short Papers)

**van Zeijl, H.**

- Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Vandecasteele, J.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Vander Vorst, A.**

- 1990-1995 Advances in Investigating the Interaction of Microwave Fields with the Nervous System
- No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord

**Vannicola, V.C.**

- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform

**Vendik, O.**

- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)


Click on title for a paper summary.

# Papers by Author


**Verdier, J.**

- Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators

**Vietzorreck, L.**

- Hybrid Analysis of Three-Dimensional MMIC Elements by the Method of Lines

**Vilcot, J.P.**

- Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

**Voelker, R.H.**

- FD--TLM Electromagnetic Field Simulation of High-Speed Josephson Junction Digital Logic Gates
- Study and Characterization of Optoelectronic Photoconductor-Based Probes

# Papers by Author


**Vogel, S.D.**

- Design and Measurements of a Novel Subharmonically Pumped Millimeter-Wave Mixer Using Two Single Planar Schottky-Barrier Diodes

**Vorst, A.V.**

- Editorial: Introduction to the Special Issue on Medical Application and Biological Effects of RF/Microwaves (Oct. 1996, Part II [T-MTT])

**Vye, D.W.**

- K through Ka-Band Driver and Power Amplifiers

**Waclawik, S.D.**

- A Coaxial 0.5-18 GHz Near Electric Field Measurement System for Planar Microwave Circuits Using Integrated Probes

# Papers by Author


**Waffenschmidt, E.**

- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO

**Wagner, G.R.**

- High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

**Walinsky, P.**

- A Method for the In Vitro Testing of Cardiac Ablation Catheters

**Wamhof, P.D.**

- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Wan, C.**

- Analytically and Accurately Determined Quasi-Static Parameters of Coupled Microstrip Lines

**Wang, B.**

- Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)

**Wang, C.**

- Full-Wave Modeling of Generalized Double Ridge Waveguide T-Junctions
- Quarter Wavelength Ceramic Combline Filters

**Wang, H.**

- A Generalized Analysis for a Class of Rectangular Waveguide Coupler Employing Narrow Wall Slots
- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Wang, J.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

**Wang, Q.H.**

- Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)

**Waris, V.P.**

- Analysis of an N-Way Radial Cavity Divider with a Coaxial Central Port and Waveguide Output Ports

**Watanabe, S.-I.**

- Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio




Click on title for a paper summary.

# Papers by Author


**Watson, P.M.**

- EM-ANN Models for Microstrip Vias and Interconnects in Dataset Circuits

**Wei, C.-J.**

- Direct Extraction of Equivalent Circuit Parameters for Heterojunction Bipolar Transistors (Corrections)
- Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's

**Weigel, R.**

- Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])

**Weiss, J.A.**

- Ferrite-Superconductor Devices for Advanced Microwave Applications



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Weiss, S.J.**

- Measurement of Simple Resonant Equivalent Circuits for Microstrip Antennas (Short Papers)

**Weisshaar, A.**

- CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits

**Weller, T.M.**

- New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)

**Wendler, J.P.**

- K through Ka-Band Driver and Power Amplifiers

**Wenger, J.**

- Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)


Click on title for a paper summary.

# Papers by Author


**Whelan, K.**

- FET Statistical Modeling Using Parameter Orthogonalization

**Wicks, M.C.**

- Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform

**Wikborg, E.**

- Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)

**Wilker, C.**

- High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)

**Williams, D.F.**

- Thermal Noise in Lossy Waveguides



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Williams, J.T.**

- Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements

**Wire, M.**

- A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

**Withers, R.S.**

- Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem

**Wohlert, R.M.**

- K through Ka-Band Driver and Power Amplifiers

**Wolff, I.**

- A New Miniature Magnetic Field Probe for Measuring Three-Dimensional Fields in Planar High-Frequency Circuits



Contents

Authors

Click on title for a paper summary.

# Papers by Author

- Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])
- Electromagnetics in High-T/sub c/ Superconductors
- Improvements of the Two-Dimensional FDTD Method for the Simulation of Normal- and Superconducting Planar Waveguides Using Time Series Analysis (Short Papers)
- Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO
- MMICs for Sensor Applications (1996 [MCS])
- TE Wave Properties of Slab Dielectric Guide Bounded by Nonlinear Non-Kerr-Like Media (May 1996 [T-MTT])

**Wong, K.-L.**

- Analysis of Slot-Coupled Double-Sided Cylindrical Microstrip Lines (Short Papers)
- Dispersion Characteristics of Cylindrical Coplanar Waveguides (Short Papers)

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Wong, M.-F.**

- A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])

**Wong, R.S.K.**

- A Novel Waveguide Y-Junction Circulator with a Ferrite Sphere for Millimeter Waves (Short Papers)

**Woody, D.P.**

- An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)

**Wu, K.**

- An Integrated Transition of Microstrip to Nonradiative Dielectric Waveguide for Microwave and Millimeter-Wave Circuits
- Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement


Click on title for a paper summary.

# Papers by Author

- Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors
- Dual-Tone Calibration of Six-Port Junction and its Application to the Six-Port Direct Digital Millimetric Receiver
- Modeling Lossy Anisotropic Dielectric Waveguides with the Method of Lines
- Towards a Generalized TLM Algorithm for Solving Arbitrary Reciprocal and Nonreciprocal Planar Structures (Short Papers)

**Wu, L.-K.**

- A Fast Algorithm for Computing Field Radiated by an Insulated Dipole Antenna in Dissipative Medium (Short Papers)

**Wu, M.C.**

- Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Wu, R.-B.**

- A Wideband Waveguide Transition Design with Modified Dielectric Transformer Using Edge-Based Tetrahedral Finite-Element Analysis

**Wu, Z.**

- Generalized Perfectly Matched Layer for the Absorption of Propagating and Evanescent Waves in Lossless and Lossy Media

**Wust, P.**

- A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids

**Xiang, Z.**

- Electromagnetic Dyadic Green's Function in Cylindrically Multilayered Media



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Xiao, S.**

- Analysis of Cylindrical Transmission Lines with the Method of Lines

**Xingqi, D.**

- A New FEM Approach for Open Boundary Laplace's Problem (Short Papers)

**Xu, J.M.**

- A New Large Signal HBT Model

**Yabuki, H.**

- Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices

**Yakover, I.M.**

- Theoretical Investigation of a Free-Electron Maser Operating with a TEM Transmission Line



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Yamada, H.**

- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

**Yamaguchi, Y.**

- Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

**Yamamoto, K.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

**Yamashita, E.**

- Characterization of Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits
- Experimental Evaluation of Basic Circuit Components Using Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author

- Novel Directional Couplers Using Broadside-Coupled Coplanar Waveguides for Double-Sided Printed Antennas

**Yamazaki, T.**

- L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications

**Yanagawa, S.**

- Analytical Method for Determining Equivalent Circuit Parameters of GaAs FET's

**Yang, C.C.**

- Development of 44 GHz GaAs MMIC-Based Low-Noise Amplifiers for EHF Nulling Antenna
- Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies

**Yang, H.Y.D.**

- Finite Difference Analysis of 2-D Photonic Crystals

Contents
Authors

Click on title for a paper summary.

# Papers by Author


**Yao, H.-W.**

- Quarter Wavelength Ceramic Combline Filters

**Yarborough, R.**

- Performance Comparison of 1 Watt Ka-Band MMIC Amplifiers Using Pseudomorphic HEMTs and Ion-Implanted MESFETs

**Yasumoto, K.**

- Coupled-Mode Formulation of Multilayered and Multiconductor Transmission Lines

**Ye, S.**

- Design Considerations of Superconductive Input Multiplexers for Satellite Applications
- On the Power Handling Capability of High Temperature Superconductive Filters



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Yeo, T.S.**

- Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)

**Yoneyama, T.**

- Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors
- Ridge Coplanar Waveguide for Optical Amplitude Modulation

**Yong, C.K.**

- Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K

**Yook, J.-G.**

- Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])

# Papers by Author


**Yoshida, H.**

- L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications

**Yoshida, S.**

- Propagation Characteristics of the Magnetostatic Surface Wave in the YBCO-YIG Film-Layered Structure

**Yoshii, Y.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

**Yoshikawa, N.**

- A High Efficiency GaAs MCM Power Amplifier for 1.9 GHz Digital Cordless Telephones
- A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones



MTT

IEEE

Contents

Authors


Click on title for a paper summary.

# Papers by Author


**Yoshinaga, H.**

- A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])

**Young, T.**

- Generation and Transmission of FM and pi/4 DQPSK Signals at Microwave Frequencies Using Harmonic Generation and Optoelectronic Mixing in Mach-Zehnder Modulators

**Yu, L.**

- Development of Semi-Empirical Design Equations for Symmetrical Three-Line Microstrip Couplers (Short Papers)

**Yung, E.K.N.**

- A Novel Waveguide Y-Junction Circulator with a Ferrite Sphere for Millimeter Waves (Short Papers)
- The Eigenfunction Expansion of Dyadic Green's Functions for Chirowaveguides



MTT

IEEE

Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Yuura, H.**

- A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

**Zaki, K.A.**

- Full-Wave Modeling of Generalized Double Ridge Waveguide T-Junctions
- Quarter Wavelength Ceramic Combline Filters

**Zamanillo, J.M.**

- Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements

**Zanforlin, L.**

- Evaluation of Pulsed Microwave Influence on Isolated Hearts



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Zapata, J.**

- An Efficient Finite Element Formulation to Analyze Waveguides with Lossy Inhomogeneous Bi-Anisotropic Materials

**Zemanian, A.H.**

- A Simple Formula for the Concentration of Charge on a Three-Dimensional Corner of a Conductor (Short Papers)

**Zeng, A.**

- Reduced Invasiveness of Noncontact Electrooptic Probes in Millimeter-Wave Optoelectronic Characterization (Short Papers)

**Zhang, D.G.**

- A Novel Waveguide Y-Junction Circulator with a Ferrite Sphere for Millimeter Waves (Short Papers)



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Zhang, J.**

- Computer-Aided Design of Step Recovery Diode Frequency Multipliers

**Zhang, Q.-J.**

- Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques

**Zhang, Q.M.**

- A New Large Signal HBT Model

**Zhang, X.**

- A New Measurement Approach for Phase Noise at Close-In Offset Frequencies of Free-Running Oscillators (Dec. 1996, Part II [T-MTT])
- Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver



Contents

Authors

Click on title for a paper summary.

# Papers by Author


**Zhang, Y.**

- A Simple Formula for the Concentration of Charge on a Three-Dimensional Corner of a Conductor (Short Papers)

**Zhao, A.P.**

- Application of a Simple and Efficient Source Excitation Technique of the FDTD Analysis of Waveguide and Microstrip Circuits

**Zhao, C.**

- Applications of the Finite Difference Techniques to the Compensated VIP 3 dB Directional Coupler

**Zhao, H.**

- Numerical Simulation of the Power Density Distribution Generated in a Multimode Cavity by Using the Method of Lines Technique to Solve Directly for the Electric Field



Contents

Authors


Click on title for a paper summary.

# Papers by Author

**Zhao, L.**

- GT-PML: Generalized Theory of Perfectly Matched Layers and its Application to the Reflectionless Truncation of Finite-Difference Time-Domain Grids (Dec. 1996, Part II [T-MTT])

**Zhou, L.**

- Finite-Element Method with Edge Elements for Waveguides Loaded with Ferrite Magnetized in Arbitrary Direction

**Zhou, Z.**

- High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

**Zhu, N.H.**

- Field Distributions in Supported Coplanar Lines Using Conformal Mapping Techniques (Short Papers)

# Papers by Author


**Zirath, H.**

- Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications

**Zmuidzinas, J.**

- Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band

**Zuccaro, C.**

- Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report



Contents

Authors


Click on title for a paper summary.

# Abstracts

## Front Cover (Jan. 1996 [T-MTT])

*"Front Cover (Jan. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Editorial (Jan. 1996 [T-MTT])

*R.J. Trew. "Editorial (Jan. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 1-3.*

It's amazing how fast time flies! It's been almost a year now that I've been Editor of the IEEE Transactions on Microwave Theory and Techniques. First, I want to sincerely thank the previous editor, Dan Masse for his outstanding work on the journal. He left the journal in excellent shape and running smoothly. The quality and amount of work he performed is truly amazing. The journal has been receiving about two new manuscripts per day and since each manuscript goes to three reviewers, the volume of work quickly multiplies. Second, I want to thank the members of ADCOM for their confidence in me. I am pledged to maintain the high standards of the IEEE Transactions on Microwave Theory and Techniques and will work diligently to keep it the premier journal for presentation of work in the microwave area. Last, but certainly not least, I want to thank members of the Editorial Board for their efforts and cooperation. Reviewing is a time-consuming and sometimes unpleasant task. However, the quality of the Transactions is critically dependent upon the peer-review process, and it is only through the selfless efforts of Editorial Board members that the high standards of the Transactions can be maintained. Editorial Board members who actively reviewed during the previous year are listed on the back cover. Please take the time to thank them when you have the opportunity.

# Abstracts

## Complete Sliced Model of Microwave FET's and Comparison with Lumped Model and Experimental Results

*A. Abdipour and A. Pacaud. "Complete Sliced Model of Microwave FET's and Comparison with Lumped Model and Experimental Results." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 4-9.*

This paper describes a rigorous and systematic procedure to derive a unified and complete semidistributed FET model that can be easily implemented in CAD routines of simulators. We have used the three coupled-line theory, including active and passive electromagnetic coupling between the semiconductor electrodes. The analytical formulas are given in order to calculate the capacitances of the electrodes and sufficient agreement is obtained in comparison with numerical analysis. For the first time, the experimental data of the device are compared with full three coupled-line theory and three coupled-line sliced model. This full semidistributed approach to FET modeling is applied to the analysis of a submicrometer-gate GaAs FET at centimeter and millimeter-wave frequencies, and the results are compared with the lumped element approach. The maximum available power gain (MAG) and the maximum stable power gain (MSG) of the device is calculated as a function of device width and frequency. Both the losses caused by the channel and those caused by the finite electrode conductivity are included. Good agreement is obtained between theory and experiment.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A New Reciprocity Theorem

*J.C. Monzon. "A New Reciprocity Theorem." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 10-14.*

A new reciprocity theorem for isotropic media is presented. This new theorem accounts for the effect of cross polarization therefore gracefully complementing the accepted, and century old, reciprocity theorem.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements

*R. Dyczij-Edlinger and O. Biro. "A Joint Vector and Scalar Potential Formulation for Driven High Frequency Problems Using Hybrid Edge and Nodal Finite Elements." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 15-23.*

An advanced A-V method employing edge-based finite elements for the vector potential A and nodal shape functions for the scalar potential V is proposed. Both gauged and ungauged formulations are considered. The novel scheme is particularly well suited for efficient iterative solvers such as the preconditioned conjugate gradient method, since it leads to significantly faster numerical convergence rates than pure edge element schemes. In contrast to nodal finite element implementations, spurious solutions do not occur and the inherent singularities of the electromagnetic fields in the vicinity of perfectly conducting edges and corners are handled correctly. Several numerical examples are presented to verify the suggested approach.

# Abstracts

## Statistical Computer-Aided Design for Microwave Circuits

*J. Carroll and K. Chang. "Statistical Computer-Aided Design for Microwave Circuits." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 24-32.*

A useful methodology for microwave circuit design is presented. A statistical technique known as Design of Experiments is used in conjunction with computer-aided design (CAD) tools to obtain simple mathematical expressions for circuit responses. The response models can then be used to quantify response trade-offs, optimize designs, and minimize circuit variations. The use of this methodology puts the designer's intelligence back into design optimization while making "designing for circuit manufacturability" a more systematic and straightforward process. The method improves the design process, circuit performance, and manufacturability. Two design examples are presented in context to the new design methodology.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Propagation Characteristics of Superconducting Microstrip Lines

*S.-G. Mao, J.-Y. Ke and C.H. Chen. "Propagation Characteristics of Superconducting Microstrip Lines." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 33-39.*

The modified spectral-domain approach is applied to study the propagation characteristics of high temperature superconducting microstrip lines whose signal strip and ground plane are of arbitrary thickness. In this study, numerical results for effective dielectric constant, attenuation constant, and strip current distribution are presented to discuss the effects due to frequency, temperature, strip thickness, and substrate loss tangent. In particular, the conductor and dielectric attenuation constants of superconducting microstrip line are depicted separately to discuss the mechanism of the line losses. A comparison with published theoretical and experimental results is also included to check the accuracy of the new approach's results.

# Abstracts

## Minimization of Reflection Error Caused by Absorbing Boundary Condition in the FDTD Simulation of Planar Transmission Lines

*K. Naishadham and X.P. Lin. "Minimization of Reflection Error Caused by Absorbing Boundary Condition in the FDTD Simulation of Planar Transmission Lines." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 41-46.*

Residual reflection from absorbing boundaries introduces considerable error in the frequency-domain parameters of open-region planar transmission line components simulated in the time-domain. Various dispersive and super-absorbing boundary conditions have been developed to minimize this reflection. In this paper, a computationally efficient method, termed as geometry rearrangement technique (GRT), is proposed to correct the dominant reflection from absorbing boundaries by superposition of two subproblems with different source or boundary locations. The computational improvement of GRT is demonstrated by the FDTD simulation of dispersion in microstrip and coplanar transmission lines. A new method is discussed to accurately estimate the boundary reflection, and then applied to correct the characteristic impedance of planar transmission lines for boundary reflection.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## FET Statistical Modeling Using Parameter Orthogonalization

*J. Carroll, K. Whelan, S. Prichett and D.R. Bridges. "FET Statistical Modeling Using Parameter Orthogonalization." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 47-55.*

A new method for representing the statistical variation of FET equivalent circuit parameters (ECP's) is presented. This method utilizes a statistical technique known as principal components and provides an efficient method for statistically representing the means, standard deviations, and correlations of the FET ECP's. The technique can easily be implemented into commercial CAD simulators resulting in FET variation simulations that are more accurate than existing methods. Appropriate statistical tests for determination of equivalence between simulated and measured FET parameter distributions is also discussed. Both the modeling methodology and statistical testing were demonstrated using both scattering and noise parameters for 300 µm low-noise GaAs FET's.

# Abstracts

## Coaxial Cavities with Corrugated Inner Conductor for Gyrotrons

*C.T. Iatrou, S. Kern and A.B. Pavelyev. "Coaxial Cavities with Corrugated Inner Conductor for Gyrotrons." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 56-64.*

This paper investigates coaxial gyrotron cavities with longitudinal slots on the inner conductor as a means to reduce the number of possible competing modes. In the analytic theory the corrugated surface is treated as a homogeneous impedance surface ("impedance corrugation") to obtain simple formulas for the characteristic equation of the eigenmodes, for the electromagnetic fields and the wall losses. The developed model applies if the number of slots is sufficiently high (cutoff wavelength much larger than the corrugation period). The characteristic equation in terms of the ratio C of the outer wall radius to the inner conductor radius is solved numerically to determine a range of eigenvalues and C where the eigenvalue curves are monotonically decreasing. In such a region a cavity having its inner conductor downtapered (radius decreasing toward the cavity output) can be used to reduce the diffractive quality factors of several modes, leaving the working mode undisturbed and without favoring other modes. In addition the electromagnetic field profiles are investigated, and in particular it is shown that for certain cavity parameters a mode could have its energy concentrated close to the inner conductor. As a check on the validity of the theoretical approximations, simulations with the MAFIA code are carried out. These give good agreement with the results of the analytic equations.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Coupling Phenomena in Concentric Multi-Applicator Phased Array Hyperthermia Systems

*K.S. Nikita and N.K. Uzunoglu. "Coupling Phenomena in Concentric Multi-Applicator Phased Array Hyperthermia Systems." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 65-74.*

The coupling between the waveguide applicators of a four-element phased array hyperthermia system irradiating a three-layered cylindrical tissue model of circular cross section is analyzed theoretically. The fields inside the tissue layers are expressed in terms of cylindrical vector wave functions satisfying the corresponding wave equations, while the fields inside each waveguide are expanded in terms of guided and evanescent normal modes. Then, by implementing the appropriate boundary conditions, a system of four coupled integral equations is derived in terms of the unknown electric field distributions on the open waveguide apertures. This system is solved by expanding the unknown electric field on each aperture into waveguide normal modes and by applying a Galerkin's procedure. The self reflection coefficient and the mutual coupling coefficients are then determined and numerical results for a four-element phased array hyperthermia system are computed and presented for different waveguide applicator sizes and settings.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Analytically and Accurately Determined Quasi-Static Parameters of Coupled Microstrip Lines

*C. Wan. "Analytically and Accurately Determined Quasi-Static Parameters of Coupled Microstrip Lines." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 75-80.*

Using modified conformal mapping technique and magnetic-wall approximation, closed-form expressions for quasi-static parameters of coupled microstrip lines are determined accurately in this paper. They are found to be very accurate when compared with the well-recognized numerical solutions in the literature. Specifically, the present effective permittivities for both modes are accurate to within 0.4%, the even-mode characteristic impedance is accurate to within 1.2%, and the odd-mode impedance is accurate to within 1.8% for w/h >= 0.4 and 3.8% for 0.4 > w/h >= 0.1. They are believed to be the most accurate closed-form formulas for coupled microstrip lines and should find applications in microstrip computer-aided design. In addition, two sets of existing equations have been checked against exact values or accurate results. According to the comparisons, they are either unacceptable or partially acceptable. Three data tables instead of figures are given for clarity.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Compact Model for Predicting the Isolation of Ports in a Closed Rectangular Microchip Package

*H.M. Olson. "A Compact Model for Predicting the Isolation of Ports in a Closed Rectangular Microchip Package." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 81-86.*

This paper presents the derivation of a compact model for predicting the isolation between ports on opposite sides of a microchip package such as would be used for MMIC chips. The model consists of four current sources, two electric, and two magnetic, representing the port currents and voltages which excite the modes of a cavity formed by the interior of the package. The contribution of each mode to the total electric field is summed, and the average of the total tangential field along the two probes that project into the cavity at the ports is set equal to zero. The model, which runs on a PC, is used to compute data for an actual package, and the data is compared with that produced by a commercial electromagnetic analysis package running on a work station.

# Abstracts

## Recursive Mode Matching Method for Multiple Waveguide Junction Modeling

*O.P. Franza and W.C. Chew. "Recursive Mode Matching Method for Multiple Waveguide Junction Modeling." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 87-92.*

The mode matching method is applied to different waveguide geometries, and a recursive scheme is defined to use the appropriate number of modes in each section of the waveguide. Numerical simulations for different types of applications are given and show very good results.

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Dual-Tone Calibration of Six-Port Junction and its Application to the Six-Port Direct Digital Millimetric Receiver

*J. Li, R.G. Bosisio and K. Wu. "Dual-Tone Calibration of Six-Port Junction and its Application to the Six-Port Direct Digital Millimetric Receiver." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 93-99.*

This paper describes a novel dual-tone calibration technique of six-port using two carriers with closely spaced frequencies. The samples for the calibration are extracted from outputs of four power detectors using a self-adaptive algorithm. The calibration procedure is fully automatic and can be implemented in a system capable of capturing the output waveforms of a six-port. Although the proposed method is applicable to general six-port calibrations, it finds itself particularly suitable for the calibration of a new six-port direct digital mm-wave receiver. It is shown that such a calibration of the digital receiver can be fulfilled on site simply by receiving usual incoming signals. Dual-tone calibrations made at 26.5 GHz, 33 GHz, and 40 GHz demonstrate the same order of accuracy as the conventional six-port calibrations. However, the new technique is much simpler and faster as it requires less effort in its implementation.

# Abstracts

## Microwave Inductors and Capacitors in Standard Multilevel Interconnect Silicon Technology

*J.N. Burghartz, M. Soyuer and K.A. Jenkins. "Microwave Inductors and Capacitors in Standard Multilevel Interconnect Silicon Technology." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 100-104.*

Spiral inductors and metal-to-metal capacitors for microwave applications, which are integrated on a silicon substrate by using standard 0.8 µm BiCMOS technology, are described. Optimization of the inductors has been achieved by tailoring the vertical and lateral dimensions and by shunting several interconnect metal layers together. Lumped element models of inductors and capacitors provide detailed understanding of the important geometry and technological parameters on the device characteristics. The high quality factors of nearly 10 for the inductors are among the best results in silicon, particularly when using standard silicon technology.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Automated E-Field Scanning System for Dosimetric Assessments

*T. Schmid, O. Egger and N. Kuster. "Automated E-Field Scanning System for Dosimetric Assessments." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 105-113.*

The interest in accurate dosimetric measurements inside phantoms that simulate biological bodies has burgeoned since several regulatory commissions began calling for or recommending the testing for compliance with safety standards of low power devices. This paper presents a newly developed, robot-based system that allows automated E-field scanning in tissue simulating solutions. The distinguishing characteristics of the system are its high sensitivity and its broad dynamic range (1 µW/g to 100 mW/g) over the entire frequency range (10 MHz to over 3 GHz) used for mobile communications. The reproducibility of the dosimetric evaluations has been shown to be considerably better than ±5%. This has been accomplished by the use of an improved isotropic E-field probe connected to amplifiers with extremely low noise and drift characteristics in conjunction with digital processing of the data. Special emphasis has been placed on system reliability, user-friendliness and graphic visualization of data.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Small-Signal Characterization of Microwave and Millimeter-Wave HEMT's Based on a Physical Model

*R. Singh and C.M. Snowden. "Small-Signal Characterization of Microwave and Millimeter-Wave HEMT's Based on a Physical Model." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 114-121.*

A highly efficient generalized physics-based approach for small-signal characterization of FET devices is presented. A novel method is developed for extracting the frequency dependent two-port parameters from a single time-domain physical simulation based on a multi-signal excitation scheme. The technique is applied to simulating the frequency- and bias-dependent scattering parameters of HEMT's using a quasi-two-dimensional physical model that incorporates the main physical phenomena which govern the device behavior. A new carrier energy distribution model is presented which improves the accuracy of the physical model. An equivalent circuit is also generated from the physical dynamic simulation which can be used for predicting S-parameters and for indirect linking of the physical model to existing CAD tools. The unique formulation and efficiency of the present technique make it suitable for computer aided design of FET subsystems. The accuracy and flexibility of this approach is demonstrated by comparison of simulated results with measured data for a pulse doped pHEMT and uniformly doped GaAs channel HEMT.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Microwave Channelized Active Filters--A New Modular Approach to Achieving Compactness and High Selectivity

*C. Rauscher. "Microwave Channelized Active Filters--A New Modular Approach to Achieving Compactness and High Selectivity." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 122-132.*

The new class of microwave active filters being presented offers a convenient way to realize miniature filter circuits with sharp passband-to-stopband transitions. The approach, which lends itself to a broad range of narrowband and wideband filtering applications, involves parallel connections of frequency-selective, unilateral network branches that contain both passive and active subcircuits. Highly selective filtering action derives from controlled interferences among branch signal components. Attributes of the new technique include unconditional circuit stability, tolerance for large passive-circuit-element losses, practicability of narrowband lumped-element configurations, graceful performance degradation with active element parameter changes, and the advantage of module-based procedures for design and implementation. The broad applicability of the new approach is illustrated with three experimental demonstration circuits that employ off-the-shelf MMIC amplifier chips. The circuits comprise a 1O-GHz notch filter of one quarter percent bandwidth, a 10GHz bandpass filter of two percent bandwidth, and a 7.5-GHz lowpass filter.

# Abstracts

## A Fiber Optic/Millimeter-Wave Radio Transmission Link Using HBT as Direct Photodetector and an Optoelectronic Upconverter

*E. Suematsu and N. Imai. "A Fiber Optic/Millimeter-Wave Radio Transmission Link Using HBT as Direct Photodetector and an Optoelectronic Upconverter." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 133-143.*

The performance of a fiber optic subcarrier Iink using an HBT as a direct photodetector and an optoelectronic up-converter in 50 GHz band has been experimentally investigated at a wavelength of 0.83 µm. From comparison with the performances of links using other MMIC-compatible photodetectors and with that of a high speed PIN-photodetector, this paper shows that the HBT-photodetector is superior to the other MMIC compatible photodetectors (MSM and HEMT). It is also shown that HBT not only has a high photodetection ability in the millimeter-wave band but also provides low conversion loss between a microwave subcarrier modulated by an optical signal and a millimeter-wave carrier. Also demonstrated are video FM-subcarrier transmission and 140 Mbps QPSK digital radio transmission using an HBT optical/RF transducer. At transducer transmission power of around -20 dBm, the HBT optical/RF transducer allows 50 GHz band radio transmission over optical fiber to achieve a weighted SNR of more than 50 dB and a data rate of 140 Mbps in indoor application.

# Abstracts

## A Numerical Functions of Dyadic Green's Functions for Planar Bianisotropic Media with Application to Printed Transmission Lines

*G.W. Hanson. "A Numerical Functions of Dyadic Green's Functions for Planar Bianisotropic Media with Application to Printed Transmission Lines." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 144-151.*

An integral equation (IE) method with numerical solution is presented to determine the complete Green's dyadic for planar bianisotropic media. This method follows directly from the linearity of Maxwell's equations upon applying the volume equivalence principle for general linear media. The Green's function components are determined by the solution of two coupled one-dimensional IE's, with the regular part determined numerically and the depolarizing dyad contribution determined analytically. This method is appropriate for generating Green's functions for the computation of guided-wave propagation characteristics of conducting transmission lines and dielectric waveguides. The formulation is relatively simple, with the kernels of the IE's to be solved involving only linear combinations of Green's functions for an isotropic half-space. This method is verified by examining various results for microstrip transmission lines with electrically and magnetically anisotropic substrates, nonreciprocal ferrite superstrates, and chiral substrates. New results are presented for microstrip embedded in chiroferrite media.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Procedure for Direct Calculation of Characteristic Admittance Matrix of Coupled Transmission Lines (Short Papers)

*K. Reiss and O.A. Palusinski. "Procedure for Direct Calculation of Characteristic Admittance Matrix of Coupled Transmission Lines (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 152-154.*

Physical design of contemporary electronic circuits and sytems involves their analysis with interconnections modeled as transmission lines. Algorithms proposed in the literature for calculation of characteristic admittance matrix are based on eigenanalysis and have inherent ambiguities associated with this method when multiple eigenvalues occur. In this paper, the underlying theory and details of a new algorithm developed for unconditionally unique results are given.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Elimination of Spurious Solutions in the Calculation of Eigenmodes by Moment Method (Short Papers)

*B. Souny, H. Aubert and H. Baudrand. "Elimination of Spurious Solutions in the Calculation of Eigenmodes by Moment Method (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 154-157.*

In this paper the origin of nonphysical solutions obtained with Galerkin's method is described. To remove these spurious solutions a practical criterion is derived. It is shown on a patch resonator example with expansion functions satisfying edge conditions, that spurious solutions generated by the conventional approach are eliminated by the application of the proposed method.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A New FEM Approach for Open Boundary Laplace's Problem (Short Papers)

*D. Xingqi and A. Tongyi. "A New FEM Approach for Open Boundary Laplace's Problem (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 157-160.*

An efficient improved finite element method (FEM) is presented for electromagnetic Laplace's problems with open boundary. The whole infinite domain is divided into a set of infinite elements instead of ordinary finite elements. Since a special FEM discretization and FEM solving procedure are used, it can not only take much less computer memory than that the conventional FEM needs, but also avoid the calculation error introduced by the truncated boundary or absorbing boundary condition used in conventional FEM.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Thru Characteristics of a Coaxial Gap (FDTD Model and Measurements) (Short Papers)

*B.G. Colpitts. "Thru Characteristics of a Coaxial Gap (FDTD Model and Measurements) (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 160-163.*

Thru characteristics of a coaxial cable interrupted by a small gap are modeled and measured. Finite-difference time-domain (FDTD) modeling is applied in cylindrical coordinates to semirigid coaxial cable and to the intervening gap material. Both dispersive and nondispersive gap materials are investigated. Gap loss and phase shift are accurately predicted by this two-dimensional model which accounts for TEM and TM modes in the gap and coaxiat apertures. An application of the model is to establish reference data for thin sample permittivity or moisture measurements.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## New Explicit Expressions for the Coupling Matrix Elements Related to Scattering from a Planar Periodic Single-Strip Grating (Corrections)

*D.N. Filipovic. "New Explicit Expressions for the Coupling Matrix Elements Related to Scattering from a Planar Periodic Single-Strip Grating (Corrections)." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 164-164.*

In the above paper, (2), (3), and (11) need some corrections and should read as follows:

# Abstracts

## Copyright Form (Jan. 1996 [T-MTT])

*"Copyright Form (Jan. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 165-166.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Workshop on Millimeter Waves (Advertisement) (Jan. 1996 [T-MTT])

*"Workshop on Millimeter Waves (Advertisement) (Jan. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 167-167.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Information for Authors (Jan. 1996 [T-MTT])

*"Information for Authors (Jan. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): 168-168.*



Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Jan. 1996 [T-MTT])

*"Back Cover (Jan. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.1 (Jan. 1996 [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Feb. 1996 [T-MTT])

*"Front Cover (Feb. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Methods of Suppression or Avoidance of Parallel-Plate Power Leakage from Conductor-Backed Transmission Lines

*N.K. Das. "Methods of Suppression or Avoidance of Parallel-Plate Power Leakage from Conductor-Backed Transmission Lines." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 169-181.*

Four useful methods are presented to suppress and/or avoid parallel-plate leakage from conductor-backed printed transmission lines. These include: 1) the use of shorting-pins; 2) the use of a dielectric-guide-coupled configuration; 3) using a two-layered conductor-backing configuration; and 4) dielectric loading on top. New analyses to model the leakage suppression due to the shorting-strips and the dielectric-guide-coupled geometries are presented, with selected demonstrative results and critical discussions. It is concluded that the unwanted leakage in many printed transmission lines, that are otherwise attractive for integrated circuits and phased array applications, can be successfully avoided and/or significantly suppressed using the proposed techniques.

# Abstracts

## Frequency-Domain Analysis of Strongly Nonlinear Circuits Using a Consistent Large-Signal Model

*T. Narhi. "Frequency-Domain Analysis of Strongly Nonlinear Circuits Using a Consistent Large-Signal Model." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 182-192.*

This paper describes an analysis method that extends the applicability of the frequency-domain methods to strongly nonlinear circuits. Nonlinearities are described with Chebyshev expansions which are evaluated with a numerically stable three-term recurrence formula. The method is coupled with a novel, measurement-based consistent modeling approach which allows improved accuracy in describing the frequency-dependence of the measured small-signal parameters. The analysis method and the modeling approach are verified by comparing measurements and calculations on a MESFET mixer, driven with two and three tones.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Measurements of the Low-Frequency-Gain Fluctuations of a 30-GHz High-Electron-Mobility-Transistor Cryogenic Amplifier

*N.C. Jarosik. "Measurements of the Low-Frequency-Gain Fluctuations of a 30-GHz High-Electron-Mobility-Transistor Cryogenic Amplifier." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 193-197.*

Low-frequency-gain fluctuations of a 30-GHz cryogenic HEMT amplifier have been measured with the input of the amplifier connected to a 15-K load. Effects of fluctuations of other components of the test set-up were eliminated by use of a power-power correlation technique. Strong correlation between output power fluctuations of the amplifier and drain current fluctuations of the transistors comprising the amplifier are observed. The existence of these correlations introduces the possibility regressing some of the excess noise from the HEMT amplifier's output using the measured drain currents.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Shape Sensitivities of Capacitances of Planar Conducting Surfaces Using the Method of Moments

*J. Ureel and D. De Zutter. "Shape Sensitivities of Capacitances of Planar Conducting Surfaces Using the Method of Moments." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 198-207.*

In this contribution, a new method is presented to obtain the sensitivities of the capacitance or the charge with respect to a geometrical parameter of planar conducting surfaces. The charge density is found by an integral equation technique. By applying the flux-transport theorem, a new integral equation for the total derivative of the charge with respect to a geometrical parameter is derived from the original electrostatic integral equation for the charge distribution. This new integral equation is solved together with the original integral equation by the method of moments using the same set of basis and test functions. The method is also applied to obtain derivatives for the inductance, impedance and effective dielectric constant. Some simple electrostatic problems are presented, which illustrate the capabilities of our approach. In these examples we also discuss the difference between the geometrical derivatives obtained in this way with geometrical derivatives which are obtained by a central finite difference estimate. Next, some examples of the calculation of geometrical derivatives of capacitance and inductance matrices of multilayer, multiconductor thin microstrip lines are discussed.

Click on title for a complete paper.

# Abstracts

## Propagation and Coupling Characteristics of Microstrip Lines with Laminated Ground Plane

*J.-F. Kiang. "Propagation and Coupling Characteristics of Microstrip Lines with Laminated Ground Plane." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 208-217.*

In this paper, we analyze the effect of laminated ground plane on the propagation and coupling characteristics of microstrip lines. Each lamina is modeled as an anisotropic layer, and transition matrix is used to relate the tangential field components in different laminae. An integral equation is formulated in the spectral domain, and the Galerkin's method is applied to solve the integral equation for the phase and the attenuation constants of several microstrip line structures. The effects of substrate dielectric are also studied. The attenuation constant variation thus obtained will be useful in circuit board design and in studying signal transmission in lamina environment.

# Abstracts

## Mode Scattering by a Nonlinear Step-Discontinuity in Dielectric Optical Waveguides

*S.J. Al-Bader and H.A. Jamid. "Mode Scattering by a Nonlinear Step-Discontinuity in Dielectric Optical Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 218-224.*

The scatter of an incident TE/sub 0/ mode at a step-discontinuity separating linear and nonlinear waveguides is studied. Under certain conditions the self-focusing nonlinearity is shown to strongly modify the scattered field in comparison with the linear counterpart. The stronger effects are shown to occur when the nonlinear waveguide is operated in the cut-off condition at low power while supporting a nonlinear guided mode at high power. The method of lines is used in modeling the structure.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Mode-Matching Technique for Mode Coupling in a Gyrotron Cavity

*V. Kasibhotla and A.H. McCurdy. "A Mode-Matching Technique for Mode Coupling in a Gyrotron Cavity." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 225-232.*

The mode-matching technique (MMT) is used to compute the electromagnetic fields, stored energy, and input admittances of a gyrotron cavity coupled to one or more waveguides. The method is based on matching the cavity and waveguide eigenmodes across the cavity apertures and accommodates cavity walls of finite conductivity. The MMT is used in the gyrotron problem because fields in and near the aperture must be computed accurately, and because the eigenmode decomposition is advantageous for inclusion of an electron beam. Irrotational modes are part of the complete set of orthogonal vectors required to expand an H-field in an open cavity, but were excluded in most gyrotron literature; here, this is corrected. The MMT is numerically implemented for cavities of rectangular and circular cross section. Coupling between different modes in a gyrotron cavity through external and ohmic losses is demonstrated. A coupled (complex) cavity gyrotron design is analyzed using MMT. The energy and modal spectra of the cavity are computed, demonstrating the mode selective properties of the design.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model

*R. Hajji, A.B. Kouki, S. El-Rabaie and F.M. Ghannouchi. "Systematic DC/Small-Signal/Large-Signal Analysis of Heterojunction Bipolar Transistors Using a New Consistent Nonlinear Model." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 233-241.*

In this paper, a new systematic approach to heterojunction bipolar transistors (HBT's) characterization and modeling is presented. The proposed approach is based on a new compact HBT nonlinear circuit model which accounts for both self-heating and the temperature dependence effects. The model's parameters are extracted from measured dc-IV characteristics and S-parameters. The power characteristics of the device are then predicted using the extracted model without any further optimizations. The same model is also used for intermodulation distortion analysis. The model has been implemented in a number of commercial nonlinear simulators and in an in-house computer code. Results are presented for two different size devices showing good agreement with measurements.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Constraints to the Optimum Performance and Bandwidth Limitations of Diplexers Employing Symmetric Three-Port Junctions

*A. Morini and T. Rozzi. "Constraints to the Optimum Performance and Bandwidth Limitations of Diplexers Employing Symmetric Three-Port Junctions." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 242-248.*

This work addresses the problem of the fundamental limitations to the optimum performance of diplexers employing three-port junctions and preassigned branching filters. In this situation it is a common misconception that optimum results are achieved by utilizing a good power divider closed by two good branching filters. From the properties of the S-matrix of a three-port junction, we show this not to be the case and derive a set of necessary conditions to be satisfied in order that the junction be successfully employed in the realization of diplexers. We derive explicit expressions for the positions at which the filters must be placed in the junction arms for optimum diplexer performance, resulting in considerable simplification of the difficult diplexer synthesis problem. A theorem on the maximum achievable bandwidth is proved and validated by means of two practical examples.

# Abstracts

## A New Method for Obtaining the Shape Sensitivities of Planar Microstrip Structures by a Full-Wave Analysis

*J. Ureel and D. De Zutter. "A New Method for Obtaining the Shape Sensitivities of Planar Microstrip Structures by a Full-Wave Analysis." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 249-260.*

We present the principles and the derivation of a new mixed potential integral equation for the derivative of the surface current with respect to a geometrical parameter for planar microstrip structures embedded in a multilayered substrate. This new integral equation is solved together with the original integral equation with the method of moments by using the same set of test and basis functions. Expressions for the matrix elements as a function of the basis and test functions are given. From the geometrical derivatives of the surface currents, geometrical derivatives of the S-parameters are obtained. In the examples a geometrical parameter is swept over some interval, and the derivative, obtained with the new integral equation, is compared with estimates calculated by using finite differences. Very good agreement is found between these estimates.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits

*K.W. Kobayashi, W.L. Jones, K. MacGowan, R. Kono and L.-S.J. Lee. "A Monolithic DC Temperature Compensation Bias Scheme for Multistage HEMT Integrated Circuits." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 261-268.*

This work benchmarks the first demonstration of a multistage monolithic HEMT IC design which incorporates a dc temperature compensated current-mirror bias scheme. This is believed to be the first demonstrated monolithic HEMT bias scheme of its kind. The active bias approach has been applied to a 2-18 GHz five-section low noise HEMT distributed amplifier which achieves a nominal gain of 12.5 dB and a noise figure <2.5 dB across a 2-18 GHz band. The regulated current-mirror scheme achieves better than 0.2% current regulation over a 0-125°C temperature range. The RF gain response was also measured over the same temperature range and showed less than 0.75 dB gain degradation. This results in a -0.006 dB/°C temperature coefficient which is strictly due to HEMT device G/sub m/ variation with temperature. The regulated current-mirror circuit can be employed as a stand-alone V/sub gs/-voltage reference circuit which can be monolithically applied to the gate bias terminal of existing HEMT IC's for providing temperature compensated performance. This monolithic bias approach provides a practical solution to dc bias regulation and temperature compensation for HEMT MMIC's which can improve the performance, reliability, and cost of integrated microwave assemblies (IMA's) used in space-flight military applications.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Application of Volterra Series to the Problem of Self-Oscillating Mixer

*S.T. Chew and T. Itoh. "Application of Volterra Series to the Problem of Self-Oscillating Mixer." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 269-274.*

A new approach to the nonlinear problem of self-oscillating mixer has been investigated using Volterra series. The circuit under consideration is first converted into a one-port network. The input and coupling impedances of various ports are represented by Volterra kernels generated by nonlinear current method. Advantage of this approach is that the phase relationships among signals are not required for the analysis. Also, no stability criterion testing is needed to ensure convergence to the correct solution numerically. It is computationally efficient and mathematically simple, yet reasonably accurate. Measured results with respect to RF frequency and power show good agreement with that calculated.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Novel Directional Couplers Using Broadside-Coupled Coplanar Waveguides for Double-Sided Printed Antennas

*F. Tefiku, E. Yamashita and J. Funada. "Novel Directional Couplers Using Broadside-Coupled Coplanar Waveguides for Double-Sided Printed Antennas." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 275-282.*

Two types of tight-coupling, broadband directional couplers employing open broadside-coupled coplanar waveguides (BC CPW's) are proposed which can easily be integrated with printed strip antennas. The first type uses the BC CPW's with dielectric overlays above and below the center substrate, while the second type uses the nonuniform BC CPW's. The scattering parameters of these directional couplers are derived with the even-odd mode analysis method based on the quasi-TEM wave approximation. Two 3-dB directional couplers, one for each type, are designed and measured characteristics are compared with theoretical results.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Generalized Analysis for a Class of Rectangular Waveguide Coupler Employing Narrow Wall Slots

*A.J. Sangster and H. Wang. "A Generalized Analysis for a Class of Rectangular Waveguide Coupler Employing Narrow Wall Slots." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 283-290.*

A comprehensive analysis is presented which is applicable to the general class of waveguide couplers comprising a dissimilar pair of rectangular waveguide coupled by means of an inclined slot on the narrow wall of the primary waveguide. An entire domain moment method is used to solve a pair of coupled-integral equations for the tangential electric fields on the surfaces of the slot. Three typical examples have been examined to demonstrate the validity of the method. The numerical results are shown to be in good agreement with those obtained from independently procured theoretical evidence and measurements.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## An Efficient Finite Element Formulation to Analyze Waveguides with Lossy Inhomogeneous Bi-Anisotropic Materials

*L. Valor and J. Zapata. "An Efficient Finite Element Formulation to Analyze Waveguides with Lossy Inhomogeneous Bi-Anisotropic Materials." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 291-296.*

In this paper a finite element formulation in terms of the magnetic field is presented for the analysis of waveguides with bianisotropic media. Such a formulation can deal with lossy inhomogeneous materials characterized by simultaneous permittivity, permeability, and cross-coupling (as in optical activity) arbitrary full tensors. The analysis takes into account arbitrary cross sections, and results in spurious-mode suppression, complex-mode computation, and the possibility of alternatively specifying the frequency or the complex propagation constant as an input parameter. In this way, many novel classes of waveguides with promising applications, such as chirowaveguides and chiroferrite-waveguides, can be analyzed. The formulation leads to a quadratic sparse eigenvalue problem which is transformed into a sparse generalized eigenvalue problem. This eigensystem is solved by the subspace method, the sparsity of the matrices being fully utilized. The proposed method has been validated by analyzing waveguides with biisotropic and bianisotropic materials. The agreement with previously published data is found to be excellent.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Analysis of Guided Waves in Inhomogeneous Bianisotropic Cylindrical Waveguides

*B. Jakoby and D. De Zutter. "Analysis of Guided Waves in Inhomogeneous Bianisotropic Cylindrical Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 297-310.*

Electromagnetic fields in structures composed of inhomogeneous cylindrical layers are analyzed using a propagator matrix approach. The presented formulation is capable of analyzing fully bianisotropic media, where the involved propagator matrix for bianisotropic media is derived in cylindrical coordinates. The applicability of the method is demonstrated by calculating the dispersion characteristics of surface waves as well as fundamental and higher order modes on cylindrical microstrip lines on top of an inhomogeneous bianisotropic substrate.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters

*D.B. McDermott, J. Pretterebner, C.K. Chong, C.F. Kinney, M.M. Razeghi and N.C. Luhmann, Jr.. "Broadband Linearly Polarized Beat-Wave TE/sub m1/TE/sub 11/ Mode Converters." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 311-317.*

Broadband linearly polarized waveguide mode converters have been developed to transform the high-order cylindrical TE/sub m1/ output wave from harmonic gyrotron amplifiers into the more useful TE/sub11/ fundamental waveguide mode. The converter's corrugation period is equal to the beat between the two waves and the bandwidth is predicted to be inversely proportional to the number of periods. Four-period TE/sub 31/TE/sub 11/ and TE/sub 41/TE/sub 11/ converters with an azimuthal perturbation of m/sub c/ = 4 and m/sub c/= 5, respectively, have yielded a peak conversion efficiency of 98% with a bandwidth greater than 3% and a one-period beat-wave converter has been designed to yield 12% bandwidth. However, it has been observed in measurements that the strong coupling in a short converter can lead to a shift of the center-frequency with an accompanying reduction of the efficiency and bandwidth. A two-period TE/sub 41/TE/sub 11/ converter with 5% bandwidth displayed a 5% frequency shift and a conversion efficiency of only 86%.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO

*J. Berntgen, E. Waffenschmidt, J. Musolf, X. He, M. Heuken, K. Heime, S. Hofschen and I. Wolff. "Line Impedance and Propagation Coefficient of Narrow Superconducting Coplanar Lines Made of YBaCuO." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 318-325.*

The microwave properties of coplanar waveguides with line widths from 1 µm to 40 µm made of superconducting YBaCuO films with a thickness t = 180 nm on LaAlO/sub 3/ are investigated. The line impedance Z/sub L/ and the normalized propagation coefficient beta/beta o of these waveguides are measured between 45 MHz and 26.5 GHz at temperatures between 77.4 K and 92 K. The ratio of the line width w to the distance of the ground layers d is constant with w/d = 0.2. Therefore, Z/sub L/ and beta/beta/sub 0/ are independent of w for perfectly conducting waveguides. For superconducting waveguides it is found that Z/sub L/ and beta/beta/sub 0/ differ from the values of perfectly conducting waveguides. They increase for smaller line widths at a constant temperature. At w = 1 µm and T = 80 K, Z/sub L/ and beta/beta/sub 0/ are nearly twice as high as calculated for perfect conductors. Furthermore, Z/sub L/ and beta/beta/sub 0/ increase with the temperature. It is shown that these effects are attributed to an increase of the inductance per unit length L' due to the superconducting material, whereas the capacitance per unit length C' behaves like C' of perfectly conducting waveguides. Using these results, the dimensions of the superconducting waveguides, which are necessary to obtain a desired Z/sub L/ at a given line width w, are calculated.

Click on title for a complete paper.

# Abstracts

## Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems

*S.T. Chew, D.T.K. Tong, M.C. Wu and T. Itoh. "Use of Direct-Modulated/Gain-Switched Optical Links in Monopulse-Type Active Phased Array Systems." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 326-330.*

With the advance of high speed laser technology, optical interaction with microwave circuits has become highly viable. Such interaction is advantageous as the fiber is low-loss, lightweight, and immune to electromagnetic interference. In this paper, interaction of direct-modulated and gain-switched optical links with active antenna phased array systems is demonstrated. In the direct-modulated optical system, the RF signal directly modulates the DFB laser. In the gain-switched optical system, the laser is gain-switched to function as a RF frequency doubler. The modulated signal is transmitted via an optical fiber and recovered at the receiving end by a high-speed photodetector. The recovered RF is then injected into the active antenna phased array systems as an injection-locking reference signal. Two active antenna systems are used for this demonstration: beam-switching and Doppler transceiver.

# Abstracts

## Study and Characterization of Optoelectronic Photoconductor-Based Probes

*R.H. Voelker, M.Y. Frankel and C.G. Sentelle. "Study and Characterization of Optoelectronic Photoconductor-Based Probes." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 331-337.*

Photoconductor sampling probes are important for optoelectronic device and circuit measurement applications. We use the finite-difference transmission line matrix (FD-TLM) method to characterize the ultrafast photoconductor sampling probes' fundamental performance limits imposed by electromagnetic constraints. Both on-wafer and free-standing photoconductor probes are investigated as applied to microstrip lines found in millimeter-wave integrated circuits and as applied to coplanar strip lines found in ultrafast device characterization systems. Localized invasiveness, distributed loading, and measurement accuracy are investigated for various probing configurations and orientations. Localized invasiveness is small for all our simulations. Distributed loading is negligible for cases where the guided-mode field confinement is tighter than the spatial separation between the probe support structure and the transmission line. Measurement accuracy is acceptable for simulated structures, but amplitude calibration precision may be compromised. We also study photoconductor probes for high-bandwidth signal generation on transmission line structures. The generated signals follow the photoconductor switch photocurrent signal for cases where both the probe and the transmission line form well-matched guiding-wave structures but are attenuated and distorted for other cases.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Expansions for the Capacitance of a Square in a Square with a Comparison (Short Papers)

*H.J. Riblet. "Expansions for the Capacitance of a Square in a Square with a Comparison (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 338-340.*

Expansions are given for the capacitance per unit length for the geometry in which two infinite square cylinders are placed concentric with each other with their sides parallel to each other. A comparison is made with an expansion for the capacitance of the Bowman squares.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Continuous Spectrum and Characteristic Modes of the Slot Line in Free Space (Short Papers)

*M. Davidovitz. "Continuous Spectrum and Characteristic Modes of the Slot Line in Free Space (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 340-341.*

The continuous spectrum of the slot in an infinite ground plane is expressed in terms of the Mathieu functions. The so-called characteristic values and field modes of the slot are stated explicitly.

# Abstracts

## Electrostatic Potential through a Circular Aperture in a Thick Conducting Plane (Short Papers)

*J.H. Lee and H.J. Eom. "Electrostatic Potential through a Circular Aperture in a Thick Conducting Plane (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 341-343.*

The electrostatic potential through a circular aperture in a thick conducting plane is examined. The Hankel transform is applied to express the scattered potential in the spectral domain and the boundary conditions are enforced to obtain simultaneous equations for the transmitted potential inside the thick conducting plane. The simultaneous equations are solved to represent the transmitted and scattered potentials in series forms. Numerical computations are performed to illustrate the behavior of polarizability in terms of the aperture size. The numerical comparisons to other available data show excellent agreement. The presented series solution is fast convergent so that it is very efficient for numerical computation.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Low Phase Noise C-Band Frequency Synthesizer Using a New Fractional-N PLL with Programmable Fractionality (Short Papers)

*T. Nakagawa and T. Tsukahara. "A Low Phase Noise C-Band Frequency Synthesizer Using a New Fractional-N PLL with Programmable Fractionality (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 344-346.*

This paper presents a new fractional-N PLL that has an arbitrary denominator of the fractional division ratio as well as an arbitrary numerator and an integer part. This enables a reduction in the phase noise of frequency synthesizers for many applications with various channel-space frequencies. The circuit elements of this fractional-N PLL are fabricated in LSI's that operate up to 6.5 GHz. They have been successfully installed in a C-band frequency synthesizer with a low phase noise MMIC VCO.

# Abstracts

## Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)

*K.S. Oh, J.E. Schutt-Aine, R. Mittra and B. Wang. "Computation of the Equivalent Capacitance of a Via in a Multilayered Board Using the Closed-Form Green's Function (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 347-349.*

A method based on the quasi-static approximation for computing the equivalent capacitance of a via is presented in this paper. The geometry of a via consists of traces, pads and a perfectly conducting cylindrical rod; the via is buried in a multilayered dielectric medium with optional reference (ground) planes. The total number of traces, pads, and ground planes can be arbitrary, as well as the angles and cross sections. The method is based on the excess charge formulation of an integral equation applied in conjunction with the recently developed closed-form Green's function.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Analysis of Edge Coupled Strip Inset Dielectric Guide (Short Papers)

*Z. Fan and Y.M.M. Antar. "Analysis of Edge Coupled Strip Inset Dielectric Guide (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 349-352.*

The edge coupled strip inset dielectric guide is analyzed rising the extended spectral domain approach. This structure, as compared to microstrip line, has several interesting features and can be very useful for microwave and millimeter wave applications. Validity of the approach is established by comparing numerical results with measured data. As many structural and material parameters can be chosen, a wide fundamental mode bandwidth and a broad range of characteristic impedances can be achieved, leading to great flexibility. The dispersion in fundamental mode propagation constants and impedances is found to be very low. With suitable choice of different permittivities for two dielectric layers, the same propagation constants for two fundamental modes can be obtained. This property is desirable for directional coupler applications.

# Abstracts

## Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)

*M. Guglielmi, F. Montauti, L. Perregrini and P. Arcioni. "Implementing Transmission Zeros in Inductive-Window Bandpass Filters (Corrections)." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 353-353.*

In the above paper, the name of the third author is misprinted. The correct spelling is Perregrini.

# Abstracts

## Call for Papers - Directions for the Next Generation of MMIC Devices and Systems (Feb. 1996 [T-MTT])

*"Call for Papers - Directions for the Next Generation of MMIC Devices and Systems (Feb. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 354-354.*

# Abstracts

## Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Feb. 1996 [T-MTT])

*"Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Feb. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 355-355.*

# Abstracts

## Information for Authors (Feb. 1996 [T-MTT])

*"Information for Authors (Feb. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): 356-356.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Feb. 1996 [T-MTT])

*"Back Cover (Feb. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.2 (Feb. 1996 [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Mar. 1996 [T-MTT])

*"Front Cover (Mar. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): f1-f2.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Temperature-Dependent Modeling of Gallium Arsenide MESFET's

*S.M. Lardizabal, A.S. Fernandez and L.P. Dunleavy. "Temperature-Dependent Modeling of Gallium Arsenide MESFET's." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 357-363.*

A complete temperature-dependent small signal model extraction methodology is used to achieve accurate circuit level simulations of metal semiconductor field-effect transistor (MESFET) amplifier performance over temperature. The procedure applies a previously described field-effect transistor (FET) modeling approach to predict the performance of a small signal amplifier over a -55° C to 100° C temperature range. This work includes a description of the MESFET equivalent circuit element thermal coefficients along with an amplifier simulation. Therefore, for the first time, a clear correspondence between circuit level simulation and measured results over temperature are published together. A new comparison of published temperature-dependent data shows a common agreement for amplifier gain variations of 0.015 dB/°C/Stage for a broad range of designs from 400 K down to cryogenic levels (77 K).

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Practical Technique for Designing Multiport Coupling Networks

*W.P. Geren, C.R. Curry and J. Andersen. "A Practical Technique for Designing Multiport Coupling Networks." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 364-371.*

A new technique is proposed for designing a passive lossless coupling network transforming any prescribed N by N symmetric immittance matrix into a corresponding N by N diagonal immittance matrix. A principal application of the technique is in the design of matching networks between N uncoupled resistive source impedances and planar antenna arrays. The technique is based upon repeated applications of Givens rotations, which can be implemented by a cascade connection of four-port directional couplers. Thus, both in the design technique and in the subsequent hardware implementation, our approach represents a significant departure from past design procedures. Existing synthesis methods involve the use of multiwinding transformers, which are impractical at microwave frequencies.

# Abstracts

## Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements

*T. Fernandez, Y. Newport, J.M. Zamanillo, A. Tazon and A. Mediavilla. "Extracting a Bias-Dependent Large Signal MESFET Model from Pulsed I/V Measurements." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 372-378.*

In this paper a new large-signal metal semiconductor field effect transitor (MESFET) model suitable for applications to nonlinear microwave CAD has been developed and the different phenomena involved in the nonlinear behavior of the transistor have been studied. The importance of this work lies in the fact that multibias starting points (hot and cold device) for pulsed measurements are used to derive a single expression for I/sub ds/ that describes the dc as well as the small and large signal behavior of the transistor, while taking into account the quiescent point dependence. The algorithms of this new model can easily be incorporated into commercially available nonlinear simulators. The operating-point dependent current I/sub ds/ is modeled by two nonlinear sources: one of them is the dc characteristic nonlinear equation, and the other represents the differences between dc and pulsed characteristics at every bias point. A complete large-signal model is presented for a 10 * 140 µm GaAs-MESFET chip (F20 process) from the GEC-MARCONI Foundry and a 16 * 250 µm MESFET chip (DIOM process) from the Siemens Foundry. Comparisons have been made between simulations and measurements of pulsed characteristics at different operating points. There was very good agreement between the P/sub m//P/sub out/ measurements and the MDS simulations using the complete large signal model.

# Abstracts

## Improving Microwave Imaging by Enhancing Diffraction Tomography

*R.D. Murch and T.K.K. Chan. "Improving Microwave Imaging by Enhancing Diffraction Tomography." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 379-388.*

In this paper, a technique for enhancing the reconstruction quality of diffraction tomography for microwave imaging is presented. The technique invokes the WKB approximation in conjunction with utilizing measurement data at more than one frequency to overcome some of the limitations of diffraction tomography. The resulting formulation has a mathematical interpretation which leads to some interesting insights into the limitations of diffraction tomography. Numerical implementation of the technique is also described and actual simulation results using this implementation for a variety of two-dimensional (2-D) objects are provided. These show that indeed significant improvements over conventional diffraction tomography are possible with our enhanced technique.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Design of Impedance Transformers by the Method of Least Squares

*H. Oraizi. "Design of Impedance Transformers by the Method of Least Squares." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 389-399.*

The method of least squares is applied to the theory of small reflections of transmission lines to develop numerical algorithms for the design of stepline and tapered line impedance transformers to match two impedances over a frequency band. The transformer characteristic impedance function is expanded by polynomials, pulse functions, approximate operators, and piecewise linear functions to construct an error function for the input reflection coefficient which, after minimization, gives the line impedance and length. The computer programs could be used to design a transformer under the specified conditions and then to optimize the design under the constraints of a problem.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Iterative Numerical Computation of the Electromagnetic Fields Inside Weakly Nonlinear Infinite Dielectric Cylinders of Arbitrary Cross Sections Using the Distorted-Wave Born Approximation

*S. Caorsi, A. Massa and M. Pastorino. "Iterative Numerical Computation of the Electromagnetic Fields Inside Weakly Nonlinear Infinite Dielectric Cylinders of Arbitrary Cross Sections Using the Distorted-Wave Born Approximation." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 400-412.*

The electromagnetic scattering by weakly nonlinear infinite dielectric cylinders is the topic dealt with in this paper. The cylinders are assumed to be isotropic, inhomogeneous, and lossless and to have arbitrarily shaped cross sections. A time-periodic illumination of the transverse magnetic type is considered. The nonlinearity is assumed to be expressed by the dependence of the dielectric permittivity on the internal electric field, under the hypothesis that the operator responsible for the nonlinearity does not modify the scalar nature of the dielectric permittivity and produces a time-periodic output. The electromagnetic scattering is then described by an integral equation formulation, and the electromagnetic field distributions inside and outside a scatterer are approximated by an iterative numerical procedure starting with the application of the distorted-wave Born approximation. In a simplified version of the approach, the classic first-order Born approximation is used. The convergence of the approach is discussed in several examples. In the computer simulations concerning cylinders with different cross-section shapes, the effects of the nonlinearity on the field-component fundamental frequency were evaluated for different values of the nonlinear parameters in the case of a Kerr-like nonlinearity and of a uniform incident plane wave. The generation of higher-order harmonics was also considered.

Click on title for a complete paper.

# Abstracts

## New Simple Procedure for the Computation of the Multimode Admittance or Impedance Matrix of Planar Waveguide Junctions

*A.A. Melcon, G. Connor and M. Guglielmi. "New Simple Procedure for the Computation of the Multimode Admittance or Impedance Matrix of Planar Waveguide Junctions." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 413-418.*

Much effort has been devoted in the past to the development of electromagnetic simulation algorithms for waveguide junctions that could at the same time include higher-order mode interactions and lead to computationally efficient codes. Even though this is indeed a classical subject, there is still a strong interest in this area as waveguide systems become increasingly complex, and ever shorter development and manufacturing times are required. In this paper a simple method is described for the evaluation of the multimode network representation of planar waveguide junctions in terms of admittance or impedance parameters. The key feature of the method is that it starts from the wanted final results, the equivalent network representation, in order to obtain an analytic expression for the evaluation of the relevant matrix elements. The procedure is based on general network theory and is equivalent to ideally measuring directly the value of the admittance or impedance elements. In this paper the evaluation procedure is fully described. Measured results of actual hardware are then compared with simulations indicating that the codes developed are indeed very accurate as well as computationally very efficient.

# Abstracts

## Theory and Numerical Calculations for Radially Inhomogeneous Circular Ferrite Circulators

*C.M. Krowne and R.E. Neidert. "Theory and Numerical Calculations for Radially Inhomogeneous Circular Ferrite Circulators." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 419-431.*

This paper presents a new theory for the operation of microstrip and stripline circulators, specially set up to permit radial variation of all the magnetic parameters. A computer code, taking only a few seconds per calculated point on a modest computer, was developed from the theory, and calculated results are given. In the theory we develop a two-dimensional (2-D) recursive Green's function G suitable for determining the electric field E, anywhere within a microstrip or stripline circulator. The recursive nature of G is a reflection of the inhomogeneous region being broken up into one inner disk containing a singularity and N annuli. G has the correct properties to allow matching to the external ports, thereby enabling s-parameters to be found for a three-port ferrite circulator. Because of the general nature of the problem construction, the ports may be located at arbitrary azimuthal angle Phi and possess arbitrary line widths. Inhomogeneities may occur in the applied magnetic field H/sub app/, magnetization -4piM/sub s/, and demagnetization factor N/sub d/. All magnetic inhomogeneity effects can be put into the frequency dependent tensor elements of the anisotropic permeability tensor. Numerical results are presented for the simpler but immensely practical case of symmetrically disposed ports of equal widths taking into account these radial inhomogeneities. Studies of breaking up the area into 1, 2, and 5 annuli are undertaken to treat specific inhomogeneous problems. The computer code which evaluates the recursive Green's function is very efficient and has no convergence problems.

# Abstracts

## Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications

*N. Rorsman, M. Garcia, C. Karlsson and H. Zirath. "Accurate Small-Signal Modeling of HFET's for Millimeter-Wave Applications." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 432-437.*

In this paper we discuss the small-signal modeling of HFET's at millimeter-wave frequencies. A new and iterative method is used to extract the parasitic components. This method allows calculating of a pi-network to mndel the heterojunction field-effect transitor (HFET) pads, thus extending the validity of the model to higher frequencies. Formulas are derived to translate this pi-network into a transmission line. A new and general cold field-effect transitor (FET) equivalent circuit, including a Schottky series resistance, is used to extract the parasitic resistances and inductances. Finally, a new and compact set of analytical equations for calculation of the intrinsic parameters is presented. The real part of Y/sub 12/ accounted for in these equations and its modeling is discussed. The accounting of Re(Y/sub 12/) improves the S-parameter modeling. Model parameters are extracted for an InAlAs/InGaAs/InP HFET from measured S-parameters up to 50 GHz. and the validity of the model is evaluated by comparison with measured data at 75-110 GHz.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## On the Network Characterization of Planar Passive Circuits Using the Method of Moments

*G.V. Eleftheriades and J.R. Mosig. "On the Network Characterization of Planar Passive Circuits Using the Method of Moments." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 438-445.*

The issue of characterizing multiport planar circuits using the method of moments is addressed. For this purpose two commonly encountered excitation models, the delta-gap voltage, and the impressed-current ones are considered. The two excitation models are thoroughly examined and the conditions are determined under which they become equivalent. Based on this equivalence, it is shown how to correctly use the models for extracting the required network representation of general multiport planar circuits, possibly having transversely multisegmented ports, in an unambiguous way. Supportive numerical and experimental results for the characterization of shielded planar circuits are also provided.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Generation and Transmission of FM and pi/4 DQPSK Signals at Microwave Frequencies Using Harmonic Generation and Optoelectronic Mixing in Mach-Zehnder Modulators

*T. Young, J. Conradi and W.R. Tinga. "Generation and Transmission of FM and pi/4 DQPSK Signals at Microwave Frequencies Using Harmonic Generation and Optoelectronic Mixing in Mach-Zehnder Modulators." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 446-453.*

A novel method of using the harmonic generation and optoelectronic mixing properties of Mach-Zehnder modulators to generate modulated subcarrier signals at high-order harmonics of the input signals is presented. The method permits the simultaneous transmission over optical fiber of a modulated and an unmodulated signal both at high-order harmonic frequencies of the input signals, for the purpose of transmitting both a local oscillator tone and the modulated signal required at a base station for microcellular applications. We present the theory of operation and demonstrate the validity of the concept with a narrow band single-tone FM experiment as well as a 20-Mb/s pi/4 DQPSK experiment.

Click on title for a complete paper.

# Abstracts

## A Novel Waveguide Y-Junction Circulator with a Ferrite Sphere for Millimeter Waves (Short Papers)

*E.K.N. Yung, D.G. Zhang and R.S.K. Wong. "A Novel Waveguide Y-Junction Circulator with a Ferrite Sphere for Millimeter Waves (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 454-456.*

A novel waveguide Y-junction circulator with a ferrite sphere is developed for uses at millimeter-wave frequencies. Sphere is preferred because the production cost of a pertinent circulator is lower. Performance of the new circulator is comparable to the conventional one with a cylindrical ferrite. A simple formula is derived for determining the center frequency of a circulator. Good agreement between analytical results and measurements is observed. An extremely fast method is developed to analyze the circulator. Various properties of the circulator can be predicted with reasonable accuracy.

# Abstracts

## Dielectric Slab-Loaded Resonant Cavity for Applications Requiring Enhanced Field Uniformity (Short Papers)

*J.T. Bernhard and W.T. Joines. "Dielectric Slab-Loaded Resonant Cavity for Applications Requiring Enhanced Field Uniformity (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 457-460.*

This paper introduces and analyzes a rectangular resonant structure that provides an alternative to the multimode resonant cavity in applications requiring enhanced field uniformity. The resonant cavity contains four dielectric loading slabs placed along the cavity walls. Its first resonant mode is related to the uniform field distribution supported in a rectangular TEM waveguide. The electromagnetic fields within the cavity are described using a closed-form approach, with approximations taken to account for the presence of two of the loading slabs. Application of the boundary conditions leads to an eigenvalue formulation, which is used to determine resonant frequencies and electromagnetic field distributions within the cavity. Measurements of both resonant frequencies and electric field magnitudes confirm the analysis. This work provides the basis for future analyses and implementation of slab-loaded cavities in both scientific and industrial settings.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Variational Solution of Microwave Circuits and Structures (Short Papers)

*S. Tsitsos, N. Karamitsos, B.M. Dillon and A.A.P. Gibson. "Variational Solution of Microwave Circuits and Structures (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 460-462.*

A unified variational formulation for microwave planar transmission lines and lumped-element impedances is developed and applied to an isolated stripline power splitter. Scattering parameters are calculated via the transfinite-element method and the numerical results are corroborated by three-port experimental measurements. The microwave impedance of a thin-film isolation resistor is separately measured and included in the model.

# Abstracts

## An Efficient Synthesis Technique of Tapered Transmission Line with Loss and Dispersion (Short Papers)

*E.J. Park. "An Efficient Synthesis Technique of Tapered Transmission Line with Loss and Dispersion (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 462-465.*

A sythesis technique of lossy and dispersive tapered transmission line is newly presented that extends lossless cases suggested by Klopfenstein and others. A special optimization process based on the Fourier transform pair and generalized Taylor's procedure is performed to extract the exact null points of lobe-like frequency response in terms of the input reflection coefficient of lossy-tapered line in which the loss may be frequency dependent and distance dependent. The theory is verified by evaluation of a synthesized microstrip taper profile in the lossy case and is expected to be helpful for design of tapered line in tie high-freqnency microwave integrated circuits (MIC's) with loss.

# Abstracts

## Mode Orthogonality Relations and Field Structure in Chirowaveguides (Short Papers)

*E.O. Kamenetskii. "Mode Orthogonality Relations and Field Structure in Chirowaveguides (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 465-469.*

By analyzing the vector and scalar equations for chirowaveguides, two forms of mode orthogonafity relations are obtained: the vector formulated orthogonality and the scalar formulated orthogonafity. The first one is applicable to the general case of open chiroplasma or chiroferrite waveguides. It is shown that for two parallel-plate isotropic chirowaveguides, these two forms of orthogonafity relations differ. Based on mode orthogonatity relations, it is shown that in chirowaveguides the polarization of so-called complex modes differs from that of propagating or evanescent modes. The correlation between field components of two complex modes that transfer active power flow in chirowaveguides is obtained.

# Abstracts

## Development of Semi-Empirical Design Equations for Symmetrical Three-Line Microstrip Couplers (Short Papers)

*L. Yu and B. Rawat. "Development of Semi-Empirical Design Equations for Symmetrical Three-Line Microstrip Couplers (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 469-472.*

Semi-empirical design equations for symmetrical three-line microstrip couplers (TMC's) have been developed. The approach is based on dividing the total capacitance of the system into various basic capacitances, which are then calculated empirically and semi-numerically. The numerical results based on these design equations have been found in good agreement with the previously obtained results.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Resonance Characteristics of Whispering-Gallery Modes in an Elliptic Dielectric Disk Resonator (Short Papers)

*Y. Kogami, Y. Tomabechi and K. Matsumura. "Resonance Characteristics of Whispering-Gallery Modes in an Elliptic Dielectric Disk Resonator (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 473-475.*

This paper presents a novel calculation method for resonance characteristics of an elliptic dielectric disk resonator. In the elliptic resonator, electromagnetic energy propagates as a whispering gallery (WG) mode along the edge region of the dielectric disk. In the novel analysis, a local propagation constant of the WG mode at each point of the elliptic disk edge is represented by a propagation constant of a WG mode in a circular disk whose radius of curvature, material constants, and thickness are equal to those of the elliptic disk. Therefore, we can easily calculate the resonance characteristics of the elliptic dielectric disk resonator by applying a conventional technique for the circular dielectric disk. The calculated results of the resonant frequencies and field distribution are well confirmed by experiments.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Averaging Rules for the Scattering by Randomly Oriented Chiral Particles (Short Papers)

*G. Oberschmidt and A.F. Jacob. "Averaging Rules for the Scattering by Randomly Oriented Chiral Particles (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 476-478.*

The orientational averages arising when calculating the effective behavior of ensembles of randomly dispersed (chiral) particles are examined. Two methods, i.e., the vector radiative transfer equation (VRTE) and the Lorenz-Lorentz mixing formulas, are briefly discussed. Since integration over products of up to six elements of a rotational matrix are involved, the effort for performing the averaging is high. To minimize the computational burden, rules for evaluating the integrals will be given in this communication. Application to average polarizability-tensors are presented.

# Abstracts

## Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)

*A.R. Djordjevic, B.D. Reljin, D.V. Tosic and T.K. Sarkar. "Transmission-Line Theory Approach to Solution of State Equations for Linear-Lumped Circuits (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 479-482.*

Linear-lumped circuits containing capacitors and/or inductors are described by differential equations. In computer-aided circuit analysis, these equations are discretized in time, thus being reduced to approximate formulas involving samples of voltages and currents. It is shown that these relations can be interpreted as exact equations for networks containing transmission lines. Hence, some features of the approximate formulas gain a clear physical interpretation. In particular, convergence and energy balance properties of the formulas become obvious, confirming advantages of the trapezoidal rule over all other formulas.

# Abstracts

## Error Bound for the Approximate Fourier Transformation Relationship for Nonuniform Transmission Lines (Short Papers)

*R. Finkler and R. Unbehauen. "Error Bound for the Approximate Fourier Transformation Relationship for Nonuniform Transmission Lines (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 482-484.*

In this paper, an error bound is presented for Bolinder's well-known approximate formula relating the input reflection coefficient and the local reflectivity parameter of a lossless nonuniform transmission line (NTL) via the Fourier transformation. Despite modern computers allowing an accurate analysis, Bolinder's formula is still of interest. First, it makes possible an approximate synthesis of NTL's which can be used in a subsequent optimization. Second, it supports an intuitive grasp for the electrical properties of NTL's.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## FDFD Full-Wave Analysis and Modeling of Dielectric and Metallic Losses of CPW Short Circuits (Short Papers)

*H. Klingbeil, K. Beilenhoff and H.L. Hartnagel. "FDFD Full-Wave Analysis and Modeling of Dielectric and Metallic Losses of CPW Short Circuits (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 485-487.*

A finite-difference method in the frequency domain (FDFD) is used to analyze the influence of lossy materials on the scattering behavior of CPW short ends. Not only dielectric losses but also realistic metallic losses are taken into account for the first time in an FDFD method. Both, the numerical results for the three-dimensional structure and the complex propagation constants of the homogeneous waveguide are presented. These are compared with those yielded by an analytical method and shown to be of good agreement. Finally, a simple model is presented, which describes the CPW short end with good accuracy.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A New Extraction Method for Noise Sources and Correlation Coefficient in MESFET (Short Papers)

*J.-H. Han and K. Lee. "A New Extraction Method for Noise Sources and Correlation Coefficient in MESFET (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 487-490.*

A new extraction method for noise sources and correlation coefficient in the noise equivalent circuit of GaAs metal semiconductor field effect transistor (MESFET) is proposed. It is based on the linear regression, which allows us to extract physically meaningful parameters from the measurement in a systematic and straightforward way. The confidence level of the measured data can also be easily examined from the linearity, y-intercept of the linear regression, and the scattering from the regression line. Furthermore, it is found that the time constant of correlation coefficient whose value is almost the same as that of the transconductance should be considered to model noise parameters accurately. The calculated values of minimum noise figure, optimum impedance, and noise resistance using above approach, show excellent agreement with measurement for a typical MESFET device studied in this paper.

# Abstracts

## The Noise-Tee--A Lightwave Device for Microwave Noise Measurements (Short Papers)

*R.F.M. van den Brink. "The Noise-Tee--A Lightwave Device for Microwave Noise Measurements (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 490-492.*

An innovative lightwave method is proposed to insert noise in electronic circuits in favor of microwave noise measurements. The proposed noise-tee has attractive additional features compared to the use of 50 Omega noise sources: 1) The inserted noise level and noise bandwidth is continuously variable over a wide dynamic range; 2) The wideband scaling accuracy of this level, relative to a pre-calibrated level, equals the accuracy of simple dc-current measurements; 3) Level-induced impedance variations are negligible, compared to the 20% impedance variation of a commonly used microwave noise source; and 4) Noise-tees enable the realization of 100% reflective noise sources, in favor of two-port noise-parameter measurements.

# Abstracts

## Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Mar. 1996 [T-MTT])

*"Call for Papers - Automated Circuit Design Using Electromagnetic Simulators (Mar. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 493-493.*

# Abstracts

## Call for Papers - Technologies for Wireless Applications (Mar. 1996 [T-MTT])

*"Call for Papers - Technologies for Wireless Applications (Mar. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 494-494.*

# Abstracts

## Information for Authors (Mar. 1996 [T-MTT])

*"Information for Authors (Mar. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 495-495.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## IEEE Financial Advantage Program (Advertisement) (Mar. 1996 [T-MTT])

*"IEEE Financial Advantage Program (Advertisement) (Mar. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): 496-496.*

# Abstracts

## Back Cover (Mar. 1996 [T-MTT])

*"Back Cover (Mar. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.3 (Mar. 1996 [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Apr. 1996 [T-MTT])

*"Front Cover (Apr. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Analysis of Asymmetrical Multilayer Ferrite-Loaded Finlines by the Extended Spectral Domain Approach

*Z. Fan and S.R. Pennock. "Analysis of Asymmetrical Multilayer Ferrite-Loaded Finlines by the Extended Spectral Domain Approach." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 497-504.*

The spectral domain approach is extended to analyze the nonreciprocal propagation characteristics of asymmetrical multilayer finlines containing magnetized ferrites. This extended method offers several advantages. It can be applied to nonuniform cross-section geometries, uses only one set of basis functions, and the dyadic Green's function is efficiently derived by a recursive algorithm. Fast convergence is obtained and the accuracy of the method is verified by comparison with available computed and measured data. In comparison with symmetrical structures, the additional design degree of freedom of the asymmetry can be used to obtain wider bandwidth and higher nonreciprocity. Of the various structures considered, a four-layer dual ferrite (DF) structure is seen to be the best choice for realization of nonreciprocal phase shifters with widest bandwidth.

# Abstracts

## New Approach to the Design of Active Floating Inductors in MMIC Technology

*S.G. El Khoury. "New Approach to the Design of Active Floating Inductors in MMIC Technology." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 505-512.*

An original method for the determination of all possible inductive circuits as a function of the number of field-effect transistors (FET's) used is described in this paper. The method is of general use in monolithic microwave integrated circuits. Circuits with large inductance, either positive or negative in value, can be obtained along with low loss or even negative resistance.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Characterization of Three-Dimensional Open Dielectric Structures Using the Finite-Difference Time-Domain Method

*N. Dib and L.P.B. Katehi. "Characterization of Three-Dimensional Open Dielectric Structures Using the Finite-Difference Time-Domain Method." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 513-518.*

Millimeter and submillimeter wave three-dimensional (3-D) open dielectric structures are characterized using the finite-difference time-domain (FDTD) technique. The use of FDTD method allows for the accurate characterization of these components in a very wide frequency range. The first structure characterized through FDTD for validation purposes is a mm-wave image guide coupler. The derived theoretical results for this structure are compared to experimental data and show good agreement. Following this validation, a sub-mm wave transition from a strip-ridge line to a layered ridge dielectric waveguide (LRDW) in open environment is analyzed, and the effects of parasitic radiation on electrical performance are studied. The transition is found to be very efficient over a wide sub-mm frequency band which makes it useful for a variety of applications. In addition to the transition, a sub-mm wave distributed directional coupler made of the LRDW is extensively studied using the FDTD method as an analysis tool. Furthermore, an iterative procedure based on the FDTD models is used to design a 3-dB coupler with a center frequency of 650 GHz and negligible radiation loss. This successful design shows that the FDTD techniqne can be used not only as an analysis method, but also as a design tool to provide designs which take into account all high frequency parasitic effects.

# Abstracts

## Analytical Evaluation of the MoM Matrix Elements

*L. Alatan, M.I. Aksun, K. Mahadevan and M.T. Birand. "Analytical Evaluation of the MoM Matrix Elements." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 519-525.*

Derivation of the closed-form Green's functions has eliminated the computationally expensive evaluation of the Sommerfeld integrals to obtain the Green's functions in the spatial domain. Therefore, using the closed-form Green's functions in conjunction with the method of moments (MoM) has improved the computational efficiency of the technique significantly. Further improvement can be achieved on the calculation of the matrix elements involved in the MoM, usually double integrals for planar geometries, by eliminating the numetical integration. The contribution of this paper is to present the analytical evaluation of the matrix elements when the closed-form Green's functions are used, and to demonstrate the amount of improvement in computation time.

# Abstracts

## Power Leakage, Characteristic Impedance, and Leakage-Transition Behavior of Finite-Length Stub Sections of Leaky Printed Transmission Lines

*N.K. Das. "Power Leakage, Characteristic Impedance, and Leakage-Transition Behavior of Finite-Length Stub Sections of Leaky Printed Transmission Lines." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 526-536.*

Power leakage and leakage transition phenomena in finite-length stub sections are studied for slot- as well as strip-type leaky transmission lines. A three-dimensional (3-D) method of moments is used for the rigorous analysis of the stub sections. The results reveal several important characteristics of power leakage in printed circuits that are not obtainable from the two-dimensional (2-D) analyses of ideal infinite-length lines. A new definition of the characteristic impedance for a leaky printed transmission line is proposed, which is shown to correctly model the impedance behavior of the finite-length sections. It is noted that the standard definitions of characteristic impedance, commonly used for nonleaky transmission lines, may not apply to practical circuits when leakage exists. Further, the leakage transition behavior in the finite-length sections, operated around a "mode-transition" region, is explained from the 3-D analysis results. Leakage analyses of ideal infinite-length lines can not model such transition excitation in finite-length circuits.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Electromagnetics in High-T/sub c/ Superconductors

*J.-G. Ma and I. Wolff. "Electromagnetics in High-T/sub c/ Superconductors." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 537-542.*

The behavior of electromagnetic fields in high-T/sub c/ superconductors (HTS's) is studied in order to examine their effects in classical electromagnetic boundary value problems. It is shown that an HTS can not be simply treated as a low loss conductor and boundary conditions of HTS's can not be considered as perfect conducting boundaries like conventional treatments. The electromagnetics of HTS are investigated in terms of complex conductivity, surface impedance with applied magnetic fields, and computational electrodynamics using the new proposed model in [1].

# Abstracts

## A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids

*J. Nadobny, P. Wust, M. Seebass, P. Deuflhard and R. Felix. "A Volume-Surface Integral Equation Method for Solving Maxwell's Equations in Electrically Inhomogeneous Media Using Tetrahedral Grids." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 543-554.*

Starting with the solution of Maxwell's equations based on the volume integral equation (VIE) method, the transition to a volume-surface integral equation (VSIE) formulation is described. For the VSIE method, a generalized calculation method is developed to help us directly determine E fields at any interface combination in three-dimensional (3-D) electrically inhomogeneous media. The VSIE implementation described here is based on separating the domain of interest into discrete parts using nonuniform tetrahedral grids. Interfaces are described using curved or plane triangles. Applying linear nodal elements, a general 3-D formulation is developed for handling scatter field contributions in the immediate vicinity of grid nodes, and this formulation is applicable to all multiregion junctions. The special case of a smooth interface around a grid node is given naturally by this formulation. Grid nodes are split into pairs of points for E-field calculation, and node normals are assigned to these points. The pairs of points are assigned to the elements adjoining the grid node. For each pair of points, the correct field jumps on the interface are given by a surface integral over the polarization surface charge density.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## MRTD: New Time-Domain Schemes Based on Multiresolution Analysis

*M. Krumpholz and L.P.B. Katehi. "MRTD: New Time-Domain Schemes Based on Multiresolution Analysis." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 555-571.*

The application of multiresolution analysis to Maxwell's equations results in new multiresolution time-domain (MRTD) schemes with unparalleled inherent properties. In particular, the approach allows the development of MRTD schemes which are based on scaling functions only or on a comblnation of scaling functions and wavelets leading to a variable mesh grading. The dispersion of the MRTD schemes compared to the conventional Yee finite-difference time-domain (FDTD) scheme shows an excellent capability to approximate the exact solution with negligible error for sampling rates approaching the Nyquist limit. Simple microwave structures including dielectric materials are analyzed in order to illustrate the application of the MRTD schemes and to demonstrate the advantages over Yee's FDTD scheme with respect to memory requirements and execution time.

# Abstracts

## Induced Polarization Effects in Coupling Processes of Waveguide Modes

*E.O. Kamenetskii. "Induced Polarization Effects in Coupling Processes of Waveguide Modes." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 572-584.*

An analysis of waveguide problems based on a solution of full vector-wave equations is very important for many applications. To solve such problems, a new coupled-mode method, taking into account the so-called induced polarization effects, is proposed in this paper. The theory is based on the spectral method, which makes it possible to analyze correctly a mode excitation by arbitrary sources with longitudinal components. It also takes into consideration singularities caused by abrupt discontinuities of longitudinal currents. The method may be a powerful tool for investigation of propagating and evanescent modes coupling due to both material and geometric effects.

Click on title for a complete paper.

# Abstracts

## Coupled-Mode Formulation of Multilayered and Multiconductor Transmission Lines

*K. Yasumoto. "Coupled-Mode Formulation of Multilayered and Multiconductor Transmission Lines." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 585-590.*

A novel coupled-mode formulation for multilayered and multiconductor transmission lines is developed. In this formulation, the solutions to the original multiconductor system are approximated by a linear combination of eigenmode solutions associated with the isolated single conductor line located in an appropriate reference dielectric medium, and the reciprocity theorem is used to derive the coupled-mode equations. The coupling coefficients are expressed in terms of the simple overlap integrals between the eigenmode fields and currents of the individual conductor lines. As a basic application, the dispersion characteristics of two identical coupled-microstrip lines are analyzed using the proposed coupled-mode theory. It is shown that the results are in very close agreement with those obtained by the direct Galerkin's moment method over a broad range of weak to strong coupling.

# Abstracts

## The Design of Tuned Front-End GaAs MMIC Optical Receivers

*S.D. Greaves and R.T. Unwin. "The Design of Tuned Front-End GaAs MMIC Optical Receivers." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 591-597.*

Recently, much interest has been shown in the design of very low noise tuned front-end optical receivers for use in lightwave systems. This paper looks at the accurate design of such receivers. Simplified design expressions are presented for a number of tuning configurations with theoretical and measured results being presented. The designs were realized as GaAs monolithic microwave/millimeter-wave integrated circuits (MMIC's).

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Micromachined W-Band Filters

*S.V. Robertson, L.P.B. Katehi and G.M. Rebeiz. "Micromachined W-Band Filters." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 598-606.*

Results are presented for high performance planar W-band filters based on silicon micromachining techniques common in microsensor fabrication. Two types of micromachined planar transmission lines are studied: microshield line and shielded membrane microstrip (SMM) line. In both of these structures, the conducting lines are suspended on thin dielectric membranes. These transmission lines are essentially "floating" in air, possess negligible levels of dielectric loss, and do not suffer from the parasitic effects of radiation and dispersion. A 90 GHz low pass filter and several 95 GHz bandpass filters are tested and display excellent performance which cannot be achieved with traditional substrate supported circuits in CPW or microstrip configurations. A full-wave finite-difference time-domain (FDTD) technique verifies the measured performance of the W-band circuits and provides a basis for comparison between the performances of membrane supported circuits and equivalent substrate supported circuits.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Theoretical Investigation of a Free-Electron Maser Operating with a TEM Transmission Line

*I.M. Yakover, Y. Pinhasi and A. Gover. "Theoretical Investigation of a Free-Electron Maser Operating with a TEM Transmission Line." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 607-613.*

The possibility of using the transverse electric magnetic (TEM) transmission line in free-electron masers (FEM) is discussed. It is shown that at the centimeter and long-millimeter wavelengths such transmission lines allow one to combine the advantages of an open cavity and a waveguide-based resonator. A particular case of an FEM-based on the use of a shielded two-wire transmission line is investigated theoretically. A mathematical approach that allows one to calculate transmission-line parameters important to the FEM application is developed. It is based on the use of the integral equation technique and on a new representation of the Green function of the internal region of a circle, which was obtained in this paper. Numerical analysis of effective mode area, wave impedance, and attenuation constant was made for the odd TEM mode, which is excited in FEM operation. The FEM under research at Tel Aviv University was considered as an example. The frequency dependence of gain for an FEM operating in the linear regime was calculated. That the obtained gain value is much higher than the ohmic losses in the transmission line shows the possibility of using the TEM transmission line in this FEM.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Electromagnetic Dyadic Green's Function in Cylindrically Multilayered Media

*Z. Xiang and Y. Lu. "Electromagnetic Dyadic Green's Function in Cylindrically Multilayered Media." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 614-621.*

A spectral-domain dyadic Green's function for electromagnetic fields in cylindrically multilayered media with circular cross section is derived in terms of matrices of the cylindrical vector wave functions. Some useful concepts, such as the effective plane wave reflection and transmission coefficients, are extended in the present spectral domain eigenfunction expansion. The coupling coefficient matrices of the scattering dyadic Green's functions are given by applying the principle of scattering super-position. The general solution has been applied to the case of axial symmetry (n =0, n is eigenvalue parameter in /spl O slash/ direction) where the scattering coefficients are decoupled between TM and TE waves. Two specific geometries, i.e., two- and three-layered media that are frequently employed to model the practical problems are considered in detail, and the coupling coefficient matrices of their dyadic Green's functions are given, respectively.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A New Empirical Large-Signal HEMT Model (Short Papers)

*K. Shirakawa, M. Shimizu, Y. Kawasaki, Y. Ohashi and N. Okubo. "A New Empirical Large-Signal HEMT Model (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 622-624.*

We propose an empirical large-signal model of high electron mobitity transistors (HEMT's). The bias-dependent data of small-signal equivalent circuit elements are obtained from S-parameters measured at various bias settings. And C/sub gs/, C /sub gd/, gm, and g/sub ds/ are described as functions of V/sub gs/ and V/ sub ds/. We included our large-signal model in a commercially available circuit simulator as a user-defined model and designed a 30/60-GHz frequency doubler. The fabricated doubler's characteristics agreed well with the design calculations.

# Abstracts

## Efficient Method for Scattering from a Homogeneous, Circular, Cylindrical Shell with an Inhomogeneous Angular-Region (Short Papers)

*S. Jegannathan. "Efficient Method for Scattering from a Homogeneous, Circular, Cylindrical Shell with an Inhomogeneous Angular-Region (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 624-626.*

The two-dimensional (2-D) scalar problem of a circular, dielectric, cylindrical shell exposed to transverse magnetic (TM) incident field is considered. The shell is considered to be homogeneous everywhere, except in a narrow angular-region where it is allowed to be inhomogeneous. The problem is formulated using the moment method (MM). It is shown that the resulting system of MM equations could be very efficiently solved employing a new theory of diagonally-perturbed circulant matrices. The method presented here could be applied for thin shells as weIl as shells which are "not-so-thin." Results of computer simulations are also provided verifying the validity of the method proposed.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Conductor-Loss Limited Stripline Resonator and Filters (Short Papers)

*C.-Y. Chi and G.M. Rebeiz. "Conductor-Loss Limited Stripline Resonator and Filters (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 626-630.*

We report on stripline resonators on thin dielectric membranes that show dispersion-free, conductor-loss limited performance at 13.5 GHz, 27.3 GHz, and 39.6 GHz. The unloaded-Q (Q/sub u/) of the resonators increases as /spl rudic/f with frequency and is measured to be 386 at 27 GHz. The measured results agree well with a new conformal mapping analysis. The stripline resonators are used in a micromachined state-of-the-art planar interdigitated bandpass filter at K-band frequencies. Excellent agreement has been achieved between the microwave model at 850 MHz and the 20 GHz filter. The micromachined filter exhibits a passband return loss better than -15 dB and a conductor-loss limited 1.7 dB port-to-port insertion loss (including input/output CPW line loss) at 20.3 GHz.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Color Group Approach to Symmetrical Ferrite Devices with Polarization Effects (Short Papers)

*V.A. Dmitriyev. "Color Group Approach to Symmetrical Ferrite Devices with Polarization Effects (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 630-631.*

Applicability of the color group approach to symmetrical ferrite devices with polarization effects is demonstrated. By using the theory of symmetry, the scattering matrices of square and circular waveguides with quadrupole dc magnetic field are derived.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A New Approach for Analysis of Resonant Structures Based on the Spatial Finite-Difference and Temporal Differential Formulation (Short Papers)

*Z. Chen and A.M.K. Chan. "A New Approach for Analysis of Resonant Structures Based on the Spatial Finite-Difference and Temporal Differential Formulation (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 631-635.*

This paper presents a new procedure for analyzing resonant structures using the spatial finite-difference and temporal differential formulation. Unlike the conventional finite-difference time-domain methods, the finite-difference are only enforced in the spatial domain for Maxwell's equations. The time domain differentials of Maxwell's equations are kept, resulting in a system of first-order deferential equations. In consequence, a resonant structure problem can be formulated in the eigenvalue problem form and resonant modes are obtained by solving the corresponding eigenvalue problem directly. It is shown that the coefficients of the matrix for the eigenvalue problem can be simply obtained from the finite difference time-domain formulation. As a result, an efficient alternative way of using the finite-difference time-domain approach to solve the resonant structure problems is presented. The algorithm is applied to metallic waveguide structures and the numerical results agree well with those from other techniques.

# Abstracts

## Analysis and Synthesis of Coplanar Coupled Lines on Substrates of Finite Thicknesses (Short Papers)

*K.-K.M. Cheng. "Analysis and Synthesis of Coplanar Coupled Lines on Substrates of Finite Thicknesses (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 636-639.*

This paper presents two sets of newly developed CAD-oriented formulas for the evaluation of the quasi-static even- and odd-mode characteristics of coplanar coupled lines on substrates of finite thicknesses. The first set of expressions is derived based on the conformal mapping method. Numerical results show that both the even- and odd-mode characteristic impedances and effective dielectric constants computed by these expressions are in good agreement with the results generated by the spectral domain method. The second set of formulas is derived based on a seminumerical approach and can be used to calculate the geometrical parameters of coplanar coupled lines directly from the given electrical parameters, without using an iterative approach. These seminumerical formulas give maximum error in impedance calculation of about 2.0% (c/h<2), over a wide range of impedance and dielectric constant values.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (Apr. 1996 [T-MTT])

*"Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (Apr. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): 640-640.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Apr. 1996 [T-MTT])

*"Back Cover (Apr. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.4 (Apr. 1996 [T-MTT]): b1-b2.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (May 1996 [T-MTT])

*"Front Cover (May 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Propagation and Coupling Properties of Integrated Optical Waveguides--An Integral Equation Formulation

*S.J. Polychronopoulos and N.K. Uzunoglu. "Propagation and Coupling Properties of Integrated Optical Waveguides--An Integral Equation Formulation." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 641-650.*

The propagation and coupling properties of integrated optical waveguides are analyzed by means of the electric field integral equation approach. The kernel of the integral equation is the Green's function of a two-layered medium. The Galerkin's method is then employed to solve the integral equation numerically. The set of basis and test functions consists of entire domain plane wave functions. Fast convergence and superior accuracy are the advantages of the chosen set of basis and test functions. The method is used to compute the propagation and coupling properties of several structures. Very good agreement is observed with previously published results. Field distributions of several coupled mode structures, such as the symmetrical and asymmetrical coupler are also investigated and presented. Finally, the same method is used to produce the field distribution of waveguides having more complex cross section like the trapezoidal waveguide.

# Abstracts

## A Robust Approach for the Derivation of Closed-Form Green's Functions

*M.I. Aksun. "A Robust Approach for the Derivation of Closed-Form Green's Functions." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 651-658.*

Spatial-domain Green's functions for multilayer, planar geometries are cast into closed forms with two-level approximation of the spectral-domain representation of the Green's functions. This approach is very robust and much faster compared to the original one-level approximation. Moreover, it does not require the investigation of the spectral-domain behavior of the Green's functions in advance to decide on the parameters of the approximation technique, and it can be applied to any component of the dyadlc Green's function with the same ease.

# Abstracts

## Analysis of Guided Modes in Multilayer/Multiconductor Structures by the "Boundary Integral--Resonant Mode Expansion Method"

*M. Bressan, G. Conciauro and P. Gamba. "Analysis of Guided Modes in Multilayer/Multiconductor Structures by the "Boundary Integral--Resonant Mode Expansion Method"." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 659-667.*

This paper describes a new method for the analysis of modes propagating in shielded waveguides consisting of many dielectric and perfectly conducting layers of different widths. The eigenvalue problem inherent to the mode determination is formulated subdividing the structure into layered elementary wave-guides (EWG's) and matching the fields generated in adjacent EWG's by unknown equivalent sources placed at the interfaces. The special representation of the EWG field, consisting of boundary integrals and mode expansions, leads to a linear matrix eigenvalue problem involving a limited number of variables. Thanks to the peculiarity the method permits to determine many modes in short computing times. The method was implemented in a flexible and fully automatic computer code, whose reliability and efficiency has been confirmed by many tests.

# Abstracts

## A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers

*M. Goto, Y. Ohta, T. Aigo and A. Moritani. "A Small-Signal Linear Equivalent Circuit of HEMT's Fabricated on GaAs-on-Si Wafers." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 668-673.*

A new small-signal linear equivalent circuit for high electron mobility transistors (HEMT's) fabricated on GaAs-on-Si wafers, HEMT's-on-Si, has been proposed. The new equivalent circuit describes the microwave characteristics of HEMT's-on-Si much better than the conventional metal-semiconductor field-effect transistor (MESFET) equivalent circuit does. Influences of the pads, the GaAs-Si interface, and the Si substrate on the microwave characteristics are included in the circuit. It also has a great advantage in that it can separately analyze the intrinsic device characteristics and influences of Si substrate and GaAs-Si interface. Analyzes using the new equivalent circuit show that the crucial problem of HEMT's-on-Si is the larger values of the pad capacitances and the drain-source capacitances than those of HEMT's fabricated on GaAs bulk wafers, HEMT's-on-GaAs, and that the substrate resistivity is not an important factor for microwave performances of HEMT's-on-Si. The microwave performance was improved by the reduction of the pad capacitances.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films

*O. Acher, P. Le Gourrierec, G. Perrin, P. Baclet and O. Roblin. "Demonstration of Anisotropic Composites with Tuneable Microwave Permeability Manufactured from Ferromagnetic Thin Films." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 674-684.*

Recently, we presented the microwave properties of laminated insulator ferromagnetic on the edge (LIFE) composites. For the fundamental mode propagating in a coaxial line, they exhibit large permeability and low permittivity. In this paper we investigate the properties of LIFE composites in the 0.1 to 18 GHz range when a static magnetic field is applied along the propagation direction. We show that the evolution of the resonance frequency with the external field can be described by conventional gyromagnetic resonance models. The effect of demagnetizing fields is analyzed. In particular, it is shown that LIFE materials exhibit comparatively low demagnetizing effects and large permeabilities. The evolution of the resonance linewidth with the external field is investigated. LIFE material may be used for a variety of microwave applications in a coaxial line or in a guide. In particular, we demonstrate a tuneable coaxial absorbing termination with peak attenuation frequency tuneable from 1.7 to 18 GHz with more than 15 dB maximum attenuation, and a switchable termination that can be either reflective or absorbing. The operation of a field-driven variable attenuator is also presented.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Novel High-Isolation FET Switches

*N. Imai, A. Minakawa and H. Okazaki. "Novel High-Isolation FET Switches." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 685-691.*

This paper describes novel high-isolation monolithic microwave/millimeter-wave integrated circuit (MMIC) field-effect transistor (FET) switches that have higher isolation characteristics than conventional switches without much insertion loss degradation. The newly developed switches consist of series/shount FET's and T-shaped R-C-R circuit. Each FET switch utilizes the parasitic capacitive component of the FET's in the off-state to produce a band-rejection filter at the operating frequency. The design method of the newly proposed switches and their characteristics are described herein. With this method, the isolation characteristics are improved by more than 15 dB between 5.4 GHz and 6.4 GHz and more than 20dB between 5.5 GHz and 6.1 GHz over conventional values.

# Abstracts

## Analysis of the Effective-Index Method for the Vector Modes of Rectangular-Core Dielectric Waveguides

*K.S. Chiang. "Analysis of the Effective-Index Method for the Vector Modes of Rectangular-Core Dielectric Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 692-700.*

The approximations involved in the effective-index method for analyzing the vector modes of rectangular-core dielectric waveguides are examined in detail. It is shown that the effective-index method does not solve the full vector-wave equation that governs the modes. Instead, it solves the reduced vector-wave equation, which is accurate only for approximately linearly polarized waves. Furthermore, in solving the reduced vector-wave equation, the method of separation of variables is used, which leads to additional errors as the waveguide being analyzed is a mathematically nonseparable structure. To characterize the performance of the effective-index method, asymptotic expressions are derived for the errors in the calculation of propagation constants, Apart from separating the effects of different approximations involved, these expressions show explicitly how the accuracy of the method depends on the mode type, the normalized frequency, the mode orders, the dimensions of the waveguide, and the relative refractive-index differences between the core and the surrounding media. With the help of these expressions, it is demonstrated that more accurate results can be obtained by combining various effective-index solutions.

# Abstracts

## Full-Wave Analysis of Quasi-Optical Structures

*T.W. Nuteson, G.P. Monahan, M.B. Steer, K. Naishadham, J.W. Mink, K.K. Kojucharow and J. Harvey. "Full-Wave Analysis of Quasi-Optical Structures." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 701-710.*

A full-wave moment method implementation, using a combination of spatial and spectral domains, is developed for the analysis of quasi-optical systems. An electric field dyadic Green's function, including resonant and nonresonant terms corresponding to coupling from modal and nonmodal fields, is employed in a Galerkin routine. The dyadic Green's function is derived by separately considering paraxial and nonparaxial fields and is much easier to develop than a mixed, scalar and vector, potential Green's function. The driving point impedance of several antenna elements in a quasi-optical open cavity resonator and a 3 x 3 grid in free space are computed and compared with measurements.

# Abstracts

## Modeling of Coplanar Stripline Discontinuities

*R.N. Simons, N.I. Dib and L.P.B. Katehi. "Modeling of Coplanar Stripline Discontinuities." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 711-716.*

The paper presents a technique to obtain lumped equivalent circuit models for typical coplanar stripline (CPS) discontinuities such as an open circuit, a short circuit, and a series gap in one of the strip conductors and gives their element values as a function of the discontinuity physical dimensions for a specific substrate. The model element values are determined from the discontinuity scattering parameters which are de-embedded from the measured scattering parameters using a thru-reflect-line (TRL) algorithm. In addition, the resonant frequency of a spur-slot is presented as a function of the spur length. The experimental results are validated by data obtained using the finite-difference time-domain (FDTD) technique.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A High Efficiency GaAs MCM Power Amplifier for 1.9 GHz Digital Cordless Telephones

*S. Makioka, N. Yoshikawa and K. Kanazawa. "A High Efficiency GaAs MCM Power Amplifier for 1.9 GHz Digital Cordless Telephones." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 717-722.*

A GaAs MCM power amplifier has been developed for 1.9-GHz digital cordless telephones. Power-added efficiency of 40.2% and P/sub 1 dB/ of 22.2 dBm have been obtained at drain supply voltage of 3.6 V. Adoption of the multilayer MCM structure, i.e., multilayer microwave integrated circuits (MuMIC), and on-chip ferroelectric capacitors successfully reduced the GaAs total chip area to be 1.1 mm². We consider that the MuMIC is the most effective candidate for high frequency circuits.

# Abstracts

## Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices

*H. Yabuki, M. Sagawa, M. Matsuo and M. Makimoto. "Stripline Dual-Mode Ring Resonators and Their Application to Microwave Devices." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 723-729.*

This paper describes the fundamental properties of two orthogonal resonant modes within stripline ring resonators and their application to microwave devices. There are two principal methods for application of ring resonators, the first is by using two-port devices and the second four-port devices. In the case of two-port configurations, dual-mode filters using coupling between two degenerate modes have been studied as typical applications. In this paper, new methods for the coupling of two modes and their applications to practical devices are proposed, and then experimental results for proof of the new structures are presented. Four-port configurations, which make use of two resonant modes as being independent or having no coupling between them, have a wider range of application to microwave devices. Microwave circuits such as tuned amplifiers and oscillators with novel structures are proposed, and their excellent characteristics are demonstrated. The experimental results obtained in this study on two and four-port devices make it clear that dual-mode ring resonators have great potential for application to various microwave devices.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## TE Wave Properties of Slab Dielectric Guide Bounded by Nonlinear Non-Kerr-Like Media (May 1996 [T-MTT])

*J.-G. Ma and I. Wolff. "TE Wave Properties of Slab Dielectric Guide Bounded by Nonlinear Non-Kerr-Like Media (May 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 730-738.*

TE wave properties of slab dielectric waveguides with nonlinear non-Kerr-like substrate and cladding are presented. The guide can support even- and odd-symmetric modes in asymmetrical substrate and asymmetrical modes in completely symmetrical substrate. Dispersion relations and electric field profiles are illustrated and analytically discussed in detail.

# Abstracts

## Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers

*K.W. Kobayashi, L.T. Tran, J.C. Cowles, T.R. Block, A.K. Oki and D.C. Streit. "Extending the Bandwidth Performance of Heterojunction Bipolar Transistor-Based Distributed Amplifiers." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 739-748.*

An InAIAs/InGaAs-InP HBT CPW distributed amplifier (DA) with a 2-30 GHz 1-dB bandwidth has been demonstrated which benchmarks the widest bandwidth reported for an HBT DA. The DA combines a 100 GHz fmax and 60 GHz fT HBT technology with a cascode coplanar waveguide DA topology to achieve this record bandwidth. The cascode gain cell offers 5-7 dB more available gain (MAG) than a common-emitter, and is used to extend the amplifier's upper frequency performance. A coplanar waveguide design environment is used to simplify the modeling and fabrication, as well as to reduce the size of the amplifier. Novel active load terminations for extending the DA's lower frequency response were separately demonstrated. The active loads are capable of extending the lower bandwidth performance by two decades resulting in performance below 45 MHz. This work explores both design techniques and technology capability which can be applied to other distributively matched HBT circuits such as active baluns for mixers, active combiners/dividers, and low dc power-broadband amplifiers.

# Abstracts

## Modeling Lossy Anisotropic Dielectric Waveguides with the Method of Lines

*P. Berini and K. Wu. "Modeling Lossy Anisotropic Dielectric Waveguides with the Method of Lines." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 749-759.*

This paper presents a new formulation useful for modeling waveguides constructed from lossy inhomogeneous anisotropic media. Our approach is based on a pair of Sturm-Liouville type wave equations that have been derived to handle inhomogeneous, diagonalized complex permittivity and permeability tensors. The method of lines is then applied to these wave equations, and related field equations, creating an indirect eigenvalue problem that correctly models this class of structure. Some refinements to the method of lines are also proposed, particularly, regarding the construction of the modal matrices found in the eigenvalue problem. Using our approach, modal dispersion curves have been computed for millimeter-wave and optical structures. Comparisons made with results available from the literature validate our approach.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Generalized Scattering Matrix Approach for Analysis of Quasi-Optical Grids and De-Embedding of Device Parameters

*L.W. Epp and R.P. Smith. "A Generalized Scattering Matrix Approach for Analysis of Quasi-Optical Grids and De-Embedding of Device Parameters." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 760-769.*

A generalized scattering matrix approach to analyzing quasi-optical grids used for grid amplifiers and grid oscillators is developed. The approach is verified by a novel method for de-embedding, in a waveguide simulator, the active device parameters of a differential pair high electron mobility transistor (HEMT) from the single unit cell of a grid amplifier. The method incorporates the additional ports presented to the active device into a method of moments solution of the embedding periodic array. The port(s) defined at the device or load location are within the plane of the array, and not terminated in a microstrip line with a known characteristic impedance. Therefore the generalized scattering matrix for the embedding array is normalized to the calculated input impedance(s) at these port(s). The approach described here uses a Floquet representation of the fields incident and reflected from the grid as the remaining ports in the generalized scattering matrix. The use of Floquet modes allows analysis of general geometries and nonnormal incident angles without the need for magnetic and electric wall assumptions. By developing a generalized scattering matrix for the embedding periodic array, this approach now allows conventional amplifier design techniques and analysis methods to be applied to quasi-optical grid amplifier and oscillator design. The major advantage of this unification for grid amplifier design being that the stability of the design can be predicted.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement

*J. Huang, K. Wu, P. Morin and C. Akyel. "Characterization of Highly Dispersive Materials Using Composite Coaxial Cells: Electromagnetic Analysis and Wideband Measurement." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 770-777.*

In this work, theoretical modeling and experimental characterization of composite coaxial-line cells are made for accurate dielectric measurement. The coaxial cells are designed such that highly dispersive materials can be characterized over a wide band of frequencies. In addition, a transmission line matrix (TLM) algorithm with a new type of node is proposed for electromagnetic analysis of the complex composite geometry of the measurement cells. Such a hybrid-mode simulation allows the electrical performance of the proposed cells to be determined for a variety of complex permittivity measurements. The proposed node in the cylindrical coordinate not only accommodates cylindrical coaxial discontinuities in the cell, but also describes the frequency-dependent properties of material. Experiments on a network analyzer were done with a number of APC-7 coaxial cells and various liquid samples to verify the wideband characteristics of the technique. It is found both theoretically and experimentally that the sample volume can be adjusted to ensure a wideband sensibility of the S-parameters. A sensitivity factor is also defined to characterize the frequency response of the coaxial cells. Such an electromagnetic analysis (direct problem) can be used in extracting unknown dielectric characteristics of a material (inverse problem) based on a recently proposed generic approach.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Transient Coupling Reduction and Design Considerations in Edge-Coupled Coplanar Waveguide Couplers (Short Papers)

*M.R. Lyons and C.A. Balanis. "Transient Coupling Reduction and Design Considerations in Edge-Coupled Coplanar Waveguide Couplers (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 778-783.*

Edge-coupled coplanar waveguide (CPW) forward directional couplers are studied using an even/odd mode analysis. Specific height combinations of multilayer substrates are found which equalize the phase velocities of the even and odd modes. These modal velocity equalization points are seen to be relatively constant over a wide band of frequencies. Results of simulated pulse distortion are presented in a multilayer compensated structure showing a dramatic reduction in transient signal coupling and overall distortion. Design considerations for practical circuit designs are also discussed.

# Abstracts

## Computation of Excess Capacitances of Various Strip Discontinuities Using Closed-Form Green's Functions (Short Papers)

*K.S. Oh, J.E. Schutt-Aine and R. Mittra. "Computation of Excess Capacitances of Various Strip Discontinuities Using Closed-Form Green's Functions (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 783-788.*

An efficient quasi-static method to compute excess (equivalent) capacitances of various strip discontinuities in a multilayered dielectric medium is presented. The excess charge distribution on the surface of a conductor is obtained by solving an integral equation in conjunction with closed-form Green's functions. A complete list of expressions of the closed-form Green's functions for a point charge, a line charge, and a semi-infinite line charge is presented. An open end, a bend, a step junction, and aT junction are considered as numerical examples.

# Abstracts

## Call for Papers - Electrical Performance of Electronic Packaging (May 1996 [T-MTT])

*"Call for Papers - Electrical Performance of Electronic Packaging (May 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 789-789.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (May 1996 [T-MTT])

*"Call for Papers - Integrated Circuits in GaAs, InP, and Other Compound Semiconductors (May 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 790-790.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - 8th Asia Pacific Microwave Conference (May 1996 [T-MTT])

*"Call for Papers - 8th Asia Pacific Microwave Conference (May 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 791-791.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - Microwave and Millimeter-Wave Photonics II (May 1996 [T-MTT])

*"Call for Papers - Microwave and Millimeter-Wave Photonics II (May 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): 792-792.*

# Abstracts

## Back Cover (May 1996 [T-MTT])

*"Back Cover (May 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.5 (May 1996 [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Jun. 1996 [T-MTT])

*"Front Cover (Jun. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Stepped Transformers on TEM-Transmission Lines

*V.P. Meschanov, I.A. Rasukova and V.D. Tupikin. "Stepped Transformers on TEM-Transmission Lines." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 793-798.*

The paper presents comparative analysis of the properties of impedance stepped transformers both with monotonous and nonmonotonous step-to-step impedance variation. A miniature stepped transformer of a new structure based on a cascade of an even number of uniform transmission line sections has been synthesized. Section lengths are considerably shorter than a quarter of the central wavelength, and the section impedances alternate. The proposed transformers are the simplest to implement among the available analogs. As an example, the results of the solution of the Chebyshev approximation problem for the four-and six-section transformers of different specifications are given.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Electromagnetic Wave Effects on Microwave Transistors Using a Full-Wave Time-Domain Model

*M.A. Alsunaidi, S.M.S. Imtiaz and S.M. El-Ghazaly. "Electromagnetic Wave Effects on Microwave Transistors Using a Full-Wave Time-Domain Model." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 799-808.*

A detailed full-wave time-domain simulation model for the analysis of electromagnetic effects on the behavior of the submicrometer-gate field-effect transistor (FET's) is presented. The full wave simulation model couples a three-dimensional (3D) time-domain solution of Maxwell's equations to the active device model. The active device model is based on the moments of the Boltzmann's transport equation obtained by integration over the momentum space. The coupling between the two models is established by using fields obtained from the solution of Maxwell's equations in the active device model to calculate the current densities inside the device. These current densities are used to update the electric and magnetic fields. Numerical results are generated using the coupled model to investigate the effects of electron-wave interaction on the behavior of microwave FET's. The results show that the voltage gain increases along the device width. While the amplitude of the input-voltage wave decays along the device width, due to the electromagnetic energy loss to the conducting electrons, the amplitude of the output-voltage wave increases as more and more energy is transferred from the electrons to the propagating wave along the device width. The simulation confirms that there is an optimum device width for highest voltage gain for a given device structure. Fourier analysis is performed on the device output characteristics to obtain the gain-frequency and phase-frequency dependencies. The analysis shows a nonlinear energy build-up and wave dispersion at higher frequencies.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Finite-Element Method with Edge Elements for Waveguides Loaded with Ferrite Magnetized in Arbitrary Direction

*L. Zhou and L.E. Davis. "Finite-Element Method with Edge Elements for Waveguides Loaded with Ferrite Magnetized in Arbitrary Direction." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 809-815.*

In this paper, finite-element method (FEM) formulations with edge elements for directly calculating the phase constants of ferrite-loaded waveguides with arbitrarily magnetized directions are presented. Dispersion characteristics are calculated for the partially-filled ferrite rectangular waveguide structure, where the dc field is in any arbitrary direction including parallel to any of the three axes. The variation of phase constants with the direction of dc magnetic field is illustrated. In order to solve the quadratic eigenvalue equation, which appears in the case where the magnetized direction is not parallel to the propagation, a simple and effective approach is proposed with no increase in the size of the matrices.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Influence of Higher Order Modes on the Measurements of Complex Permittivity and Permeability of Materials Using a Microstrip Discontinuity

*P. Queffelec and P. Gelin. "Influence of Higher Order Modes on the Measurements of Complex Permittivity and Permeability of Materials Using a Microstrip Discontinuity." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 816-824.*

The accurate electromagnetic analysis of discontinuities in a microstrip device, used for the broad band measurement of complex permittivity and permeability of materials, is presented. This analysis is based on the spectral domain approach together with the mode matching method which consists in the electromagnetic field matching at the discontinuities for each mode of the microstrip line. The study of the influence of higher order modes on the S-parameter measurements enabled us to determine the domain of validity of the transmission-line theory that has been used until now in the processing of the data. The use of the transmission-line theory for the description of the electromagnetic behavior of the cell discontinuities permits in the 45 MHz-14 GHz frequency band the achievement of a good precision (better than 5%) for the results on materials with low electromagnetic characteristics (epsilon' <10 and μ' < 10). The improvement in high frequencies of the results on materials with greater permittivity and permeability is provided by the calculation of higher order modes (about 10) in the analysis of the microstrip discontinuity.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Design and Measurements of a Novel Subharmonically Pumped Millimeter-Wave Mixer Using Two Single Planar Schottky-Barrier Diodes

*S.D. Vogel. "Design and Measurements of a Novel Subharmonically Pumped Millimeter-Wave Mixer Using Two Single Planar Schottky-Barrier Diodes." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 825-831.*

A novel design of a subharmonically pumped millimeter-wave mixer operating at room temperature was developed and realized. The double sideband conversion loss and mixer noise temperature were measured to be 6.2 dB and 930 K, respectively, at a local oscillator frequency of 73 GHz and an IF of 1.5 GHz. These results are comparable to the best published results measured for subharmonically pumped mixers at similar frequencies. The mixer shows good performance even at IF's up to 9.5 GHz resulting in a useful RF range from 136 GHz to 156 GHz. For the first time a subharmonically pumped millimeter-wave mixer was designed without the use of any scale model measurements or other high-frequency measurements. The whole design process occurred on the basis of computer simulations. Two single Iow-capacitance planar air-bridge type Schottky-Barrier diodes are used as the mixing elements.

# Abstracts

## Finite-Difference Time-Domain Algorithm for Solving Maxwell's Equations in Rotationally Symmetric Geometries

*Y. Chen, R. Mittra and P. Harms. "Finite-Difference Time-Domain Algorithm for Solving Maxwell's Equations in Rotationally Symmetric Geometries." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 832-839.*

In this paper, an efficient finite-difference time-domain algorithm (FDTD) is presented for solving Maxwell's equations with rotationally symmetric geometries. The azimuthal symmetry enables us to employ a two-dimensional (2-D) differ-ence lattice by projecting the three-dimensional (3-D) Yee-cell in cylindrical coordinates (r./spl oslash/.z) onto the r-z plane. Extensive numerical results have been derived for various cavity structures and these results have been compared with those available in the literature. Excellent agreement has been observed for all of the cases investigated.

# Abstracts

## Characterization of Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits

*T. Ishikawa and E. Yamashita. "Characterization of Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 840-847.*

This paper describes the characterization of a guided wave structure, buried microstrip line (BMSL), which is considered to be promising for constructing high-density microwave and millimeter-wave integrated circuits because of its high isolation characteristics. The BMSL includes a dielectric medium surrounded by ground conductor walls and a strip conductor on the top of the dielectric. The BMSL structure is characterized by the two methods, the rectangular boundary division (RBD) method and the finite-difference time-domain (FDTD) method. The RBD method is employed to obtain basic parameters of the BMSL such as characteristic impedances and coupling coefficients over a wide range of line sizes taking advantages of its high calculation efficiency. On the other hand, the FDTD method has been used for more detailed characterization such as the frequency performances of stub matching circuits. The FDTD method is also used to confirm the validlity of the quasi-TEM wave approximation which the RBD is based on. The analysis results reveal that the BMSL structure possesses much lower coupling coefficients than a conventional miicrostrip line does, from -15 dB to -100 dB depending on their burial depths.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Study of Whispering Gallery Modes in Double Disk Sapphire Resonators

*H. Peng. "Study of Whispering Gallery Modes in Double Disk Sapphire Resonators." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 848-853.*

A mode matching method for determining the resonant frequencies of the whispering gallery modes in a double cylindrical disk dielectric resonator is presented. The method has an improved accuracy in the calculation of the transverse magnetic modes with high axial numbers in a single uniaxial-anisotropic disk resonator. In this paper, frequency tuning and detuning due to the interaction between various whispering gallery modes will also be discussed.

# Abstracts

## Modeling of General Constitutive Relationships in SCN TLM

*L.R A.X. de Menezes and W.J.R. Hoefer. "Modeling of General Constitutive Relationships in SCN TLM." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 854-861.*

The modeling of general constitutive relationships in SCN (symmetrical condensed node) TLM is presented. The technique consists of decoupling the impulse scattering at the nodes from equations describing the medium by using equivalent node sources with state-variable formulation of the constitutive relationships. The procedure requires few modifications of TLM. Numerical examples are presented.

Contents
Publications
Issues
Papers
Authors

# Abstracts

## High-Frequency Reciprocity Based Circuit Model for the Incidence of Electromagnetic Waves on General Circuits in Layered Media

*F. Olyslager. "High-Frequency Reciprocity Based Circuit Model for the Incidence of Electromagnetic Waves on General Circuits in Layered Media." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 862-873.*

Traditionally a circuit on a high-speed multichip module (MM) or a microwave monolithic integrated circuit (MMIC) is represented in an equivalent circuit by S-parameters for the different components, such as filters or bends, and by transmission lines for the interconnections between the components. Nowadays the S-parameters of the components are easily determined by a numerical electromagnetic analysis. Different components close to each other will interact, often this interaction is unwanted. In the present contribution we develop a circuit model for these interactions without having to perform a global electromagnetic analysis of the interacting components. These interactions are then represented by discrete and distributed sources in the equivalent circuit. Our technique is based on reciprocity and is focused on the surface wave interaction which is often the most important one. Each component is characterized by a surface wave radiation pattern.

# Abstracts

## Higher-Order Vector Finite Elements for Tetrahedral Cells

*J.S. Savage and A.F. Peterson. "Higher-Order Vector Finite Elements for Tetrahedral Cells." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 874-879.*

Edge-based vector finite elements are widely used for two-dimensional (2-D) and three-dimensional (3-D) electro-magnetic modeling. This paper seeks to extend these low-order elements to higher orders to improve the accuracy of numerical solutions. These elements have relaxed normal-component continuity to prohibit spurious modes, and also satisfy Nedelec's constraints to eliminate unnecessary degrees of freedom while remaining entirely local in character. Element matrix derivations are given for the first two vector finite element sets. Also, results of the application of these basis functions to cavity resonators demonstrate the superiority of the higher-order elements.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Riccati Matrix Differential Equation Formulation for the Analysis of Nonuniform Multiple Coupled Microstrip Lines

*J.-T. Kuo. "Riccati Matrix Differential Equation Formulation for the Analysis of Nonuniform Multiple Coupled Microstrip Lines." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 880-886.*

A Riccati matrix differential equation (RMDE) is formulated for analyzing nonuniform coupled microstrip lines (NCML'S) in the frequency domain. The formulation is based on a reciprocity-related definition in the theory of multiconductor transmission lines under quasi-TEM assumption. The hybrid-mode nature of modal phase velocities and strip characteristic impedances for multiconductor microstrip structure is included. The nonlinear RMDE is first transformed into a first-order linear differential matrix equation which can be efficiently solved using method of moments. A convergence study is performed to investigate the sufficient number of basis functions used in the method. The voltage-scattering parameters of a tapered microstrip and two three-line structures are presented. The frequency responses of a pair of nonuniform coupled lines are measured and compared with calculated results.

# Abstracts

## Field Simulation of Dipole Antennas for Interstitial Microwave Hyperthermia

*G. Schaller, J. Erb and R. Engelbrecht. "Field Simulation of Dipole Antennas for Interstitial Microwave Hyperthermia." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 887-895.*

The electromagnetic field of dipole antennas for interstitial microwave hyperthermia is investigated using a finite integration algorithm program. The numerical method is applied to conventional, clinically used applicators and is also used for the improvement and optimization of sophisticated applicators, e.g., in a triaxial technique. Simulations of the frequency dependent impedance match, the E-field and the specific absorption rate (SAR) distribution of different applicators immersed in a muscle phantom are presented and compared with measurements. More-over, results for arrays of two and four applicators are given. The field simulation allows one to study the effects at the various discontinuities of the applicator-catheter-tissue system and gives a better understanding of known phenomena.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## CAD Models for Multilayered Substrate Interdigital Capacitors

*S.S. Gevorgian, T. Martinsson, P. Linner and E.L. Kollberg. "CAD Models for Multilayered Substrate Interdigital Capacitors." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 896-904.*

Conformal mapping-based models are given for interdigital capacitors on substrates with a thin superstrata and/or covering dielectric film. The models are useful for a wide range of dielectric constants and layer thicknesses. Capacitors with finger numbers n > 2 are discussed. The finger widths and spacing between them may be different. The results are compared with the available data and some examples are given to demonstrate the potential of the models.

# Abstracts

## Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors

*J. Huang, K. Wu, F. Kuroki and T. Yoneyama. "Computer-Aided Design and Optimization of NRD-Guide Mode Suppressors." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 905-910.*

A novel class of optimized nonradiative dielectric waveguide (NRD-guide) mode suppressors are proposed for wide-band applications in passive and active NRD integrated circuits. A rigorous field-theoretical analysis is made by using the frequency-domain TLM technique. The optimum design is based on a filter-like scheme with a low-pass filter simulation tech-nique and its performance-prediction algorithm. Compared to the existing choke metallic pattern, the proposed mode suppressor demonstrates excellent capabilities of effectively suppressing un-wanted modes while offering a more compact geometry. Using the geometry proposed in this work for a three-section low-pass tilter, for example, it is found that the transmission loss of the mode suppressor is better than -30 dB over the frequency band of interest which is well confirmed theoretically and experimentally. In addition, the length of the resulting mode suppressor becomes shorter than its counterpart using the choke metallic pattern by 20%. The theoretical prediction of electrical performance is well confirmed by our measurements.

# Abstracts

## A New Miniature Magnetic Field Probe for Measuring Three-Dimensional Fields in Planar High-Frequency Circuits

*Y. Gao and I. Wolff. "A New Miniature Magnetic Field Probe for Measuring Three-Dimensional Fields in Planar High-Frequency Circuits." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 911-918.*

A new noncontacting miniature magnetic field probe for measuring the surface current distribution on high-frequency planar circuits in x-, y-, z-directions in the 1-20 GHz band has been designed, fabricated and tested. The field probes have very small dimensions and do not need any connection to the operating circuit under test, therefore there is almost no perturbation of the circuit properties. This simple and practical magnetic field probes can be used to assist the design of microwave circuits, antenna diagnostics and to test products in industry. This paper describes the producing procedure of the magnetic field probes, a scanning diagnostic system, measurement examples and comparisons between measurements and calculations. The measurement results agree very well with theoretically expected field distributions.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Parameter Extraction and Correction for Transmission Lines and Discontinuities Using the Finite-Difference Time-Domain Method

*M.A. Schamberger, S. Kosanovich and R. Mittra. "Parameter Extraction and Correction for Transmission Lines and Discontinuities Using the Finite-Difference Time-Domain Method." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 919-925.*

The finite-difference time-domain (FDTD) method is useful for performing broadband characterization of uniform transmissiom lines and discontinuities. Modeling a geometry often requires the implementation of an absorbing boundary condition (ABC). When this is the case, numerical reflections from the ABC's willl add significant error to the calculated transmission line or scattering (S) parameters. This paper introduces a simple post-processing algorithm for extracting these parameters and correcting for numerical reflection error. Furthermore, the method is shown to have a unique relationship to Prony's method. Practical application and limitations of this technique are also discussed. Finally, the impedance and propagation constant of a miscrostrip tine are calculated using this method.

# Abstracts

## Open-Ended Metallized Ceramic Coaxial Probe for High-Temperature Dielectric Properties Measurements

*S. Bringhurst and M.F. Iskander. "Open-Ended Metallized Ceramic Coaxial Probe for High-Temperature Dielectric Properties Measurements." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 926-935.*

A metallized ceramic coaxial probe has been developed for high temperature complex permittivity measurements. The probe is made of alumina and metallized with a 3.0-mil-thick layer of moly-manganese, and a 0.5-mil-thick protective coating of nickel plating. It is shown that based on carrying out the network analysis calibration procedure up to 1000° C, and on actual dielectric properties measurements, the probe provides accurate dielectric measurements over a broad frequency range (500 MHz to 3 GHz) and for temperatures up to 1000° C. An uncertainty analysis based on two different calibration techniques was also given to help quantify possible measurement errors.

# Abstracts

## DC Instability of the Series Connection of Tunneling Diodes

*O. Boric-Lubecke, D.-S. Pan and T. Itoh. "DC Instability of the Series Connection of Tunneling Diodes." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 936-943.*

An oscillator with a series connection of tunneling diodes produces significantly higher power than a single diode oscillator. However, a circuit with series-connected tunneling diodes biased simultaneously in the negative differential resistance (NDR) region of the I-V curve is dc unstable. This dc instability makes the series connection oscillator fundamentally different from a single diode oscillator. Associated with the dc instability are the phenomena of minimum oscillation amplitude and frequency. Due to the minimum oscillation amplitude, it is critical to provide the impedance match between the oscillator circuit and the series connection at the desired oscillation amplitude level. An in depth, comprehensive analysis of the dc instability is given here. Based on this analysis, a numerical procedure is developed to accurately predict the minimum oscillation amplitude and frequency. Time domain simulations which give further insight into series-connection oscillator behavior are discussed. The effect of increasing the number of diodes on the oscillator performance is explored as well. Based on numerical and simulation results, oscillators with several tunnel diodes connected in series were designed and tested. Experimental results that confirm the existence of the minimum oscillation amplitude are presented for oscillators with two, three, and four tunnel diodes.

# Abstracts

## Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure

*F. Gao, M.V. Klein, J. Kruse and M. Feng. "Mode Coupling in Superconducting Parallel Plate Resonator in a Cavity with Outer Conductive Enclosure." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 944-952.*

We have carefully studied the mode coupling effect from analysis of the measured microwave scattering parameters of superconducting films using a parallel-plate-resonator technique. Due to its high resolution and simplicity, this technique has been widely employed to identify the quality of high-TC superconducting films by measuring the resonance bandwidth, from which the microwave surface resistance is directly derived. To minimize the radiation loss, the resonator is usually housed in a conductive cavity. Using this method, we observe that a number of strong "cavity" modes due to the test enclosure fall around the lowest TM mode of the superconducting resonator and that a strong interaction between these two types of resonant modes occurs when their eigenfrequencies are close, causing a significant distortion or a strong antiresonance for the resonator mode. To describe this effect, a coupled harmonic-oscillator model is proposed. We suggest that the interaction arises from a phase interference or a linear coupling among the individual oscillators. Our model fits very well the observed Fano-type asymmetric or antiresonant features, and thus can be used to extract the intrinsic Q of the superconducting resonator.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Coupling Parameters for a Side-Coupled Ring Resonator and a Microstrip Line (Short Papers)

*S.-L. Lu and A.M. Ferendeci. "Coupling Parameters for a Side-Coupled Ring Resonator and a Microstrip Line (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 953-956.*

A ring resonator side coupled to a microstrip line shows two close but distinct resonance peaks. These are identified as due to even mode (magnetic field), odd-mode (electric field) coupling. Equivalent circuit models for both cases have been proposed, coupling parameters are calculated using piecewise, coupled-tine approximations. The calculated coupling coefficients for the two cases are compared with the experimentally measured coupling coefficients, show very good agreement with the models used.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## The Use of Active Traveling-Wave Structures in GaAs MMIC's (Short Papers)

*S.G. Ingram and J.C. Clifton. "The Use of Active Traveling-Wave Structures in GaAs MMIC's (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 956-960.*

A coplanar waveguide has been fabricated on a modulation doped GaAs substrate in order to evaluate the potential of traveling-wave structures in microwave applications. The use of a Schottky contact center conductor enables the line to function as a slow wave structure in which the rf propagation characteristics can be modified with a dc bias. Measurements are reported at 10 GHz on simple structures, some of which incorporated an additional dielectric layer. Results show that slow-wave factors of between 8 and 24 are readily obtained with a loss per slow-wave factor was about 0.7 dB/mm. The practical issues relating to the application of such structures in phase shifters, chip size reduction, compact active filters and resonators are examined.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Finite-Difference Time-Domain Analysis of Flip-Chip Interconnects with Staggered Bumps (Short Papers)

*H.H.M. Ghouz and E.-B. El-Sharawy. "Finite-Difference Time-Domain Analysis of Flip-Chip Interconnects with Staggered Bumps (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 960-963.*

This paper presents finite-difference time-domain (FDTD) analysis of flip-chip interconnects. Transition between coplanar waveguides on the chip and the mother board are investigated over a broad band of frequency by means of Fourier transform of the time-domain results. Objectives of the analysis include the evaluation of bump reflection and insertion loss as well as the reconfiguration of the transition to improve package performance. Novel designs have been developed and presented to reduce the effects of package discontinuities and asymmetry. Staggering the bumps has been found to reduce reflection and insertion loss over a broad band of frequency. A reduction in bump reflection of up to 8 dB per transition can be achieved by staggering the ground and signal connects. The degradation in package performance due to structure asymmetry is also studied. The present designs have been also found to reduce the effects of flip-chip asymmetry on insertion and reflection losses.

# Abstracts

## Thermal Management for High-Power Active Amplifier Arrays (Short Papers)

*N.J. Kolias and R.C. Compton. "Thermal Management for High-Power Active Amplifier Arrays (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 963-966.*

Much of the active array work reported to date has been directed toward the demonstration of prototypes at low-power levels. Analysis results presented here show that overheating failures will occur as these arrays are scaled to reasonable output powers. Large air-cooled heat sinks attached to the backside of a thinned array can be used for single-sided designs such as oscillator arrays, but heat sinking becomes substantially more difficult for two-sided transmission-type arrays. For these designs, a possible solution is described which uses an aluminum-nitride dielectric layer to facilitate conduction to heat sinks on the array's perimeter.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## LSE- and LSM-Mode Sheet Impedances of Thin Conductors (Short Papers)

*S. Amari and J. Bornemann. "LSE- and LSM-Mode Sheet Impedances of Thin Conductors (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 967-970.*

The sheet resistance of very thin conductors is commonly taken as R = 1/sigma t. We show that the sheet impedance, defined as the ratio of the tangential electric field at the surface of the conductor to the conduction current per unit length in the conductor, depends on the field distribution. The LSE (TE-to-y) and LSM (TM-to-y) modes used in the spectral domain immittance approach have sheet impedance which are distinct for vanishingly small or large values of the wavenumber gamma in the medium surrounding a thin conductor. In the limit gamma --> O and t/delta 1 <<Z/sup LSE//sub sh/ approaches R =1/sigma while Z/sup LSM/sub sh/ --> 2 1/sigma t. In the limit gamma --> O and t/delta << 1, Z/sup LSE//sub sh/ approaches R = 2/sigma t and Z/sup LSE//sub sh/ approaches R = 1/sigma t. When t/delta >> 1, the sheet impedance approaches the surface impedance Z/sub s/= (1 + j) /sigma delta and is independent of the field distribution.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Accurate Analysis of Losses in Waveguide Structures by Compact Two-Dimensional FDTD Method Combined with Autoregressive Signal Analysis (Short Papers)

*M. Fujii and S. Kobayashi. "Accurate Analysis of Losses in Waveguide Structures by Compact Two-Dimensional FDTD Method Combined with Autoregressive Signal Analysis (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 970-975.*

An efficient two-dimensional finite-difference time-domain (2-D FDTD) method combined with an autoregressive (AR) signal analysis bas been proposed for analyzing the propagation properties of microwave guiding structures. The method is especially suitable for analyzing lossy transmission lines; and in contrast with previons approaches. It is based on an algorithm of a real domain only. The algorithm is verified by comparing the numerical results with exact solutions for dielectric loaded rectangular waveguides. The conductor losses in a variety of microstrip lines and coplanar waveguides have been accurately estimated by solving the electromagnetic fields in the conductors directly.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Simple Formula for the Concentration of Charge on a Three-Dimensional Corner of a Conductor (Short Papers)

*Y. Zhang and A.H. Zemanian. "A Simple Formula for the Concentration of Charge on a Three-Dimensional Corner of a Conductor (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 975-979.*

A major problem in the computation of capacitance coeffi-cients for microwave transmission and VLSI interconnection systems is caused by the singularities in the electric field at the corners and edges of conductors. For edges, a solution is given by the Duncan correction, which is based on a two-dimensional (2-D) polar expansion of the field. No such exact expansion exists for corners. Recent research by Beagles and Whiteman has yielded an asymptotic expansion for the electric field in the vicinity of a rectangular three-dimensional conductive corner, and this is used to derive a simple formula for the charge Q (in coulombs) concentrated at any such corner. The formula is Q = 1.307epsilon d(V/sub c/-- V/sub zeta/) where epsilon is the dielectric permittivity (in farads per meter) of the medium surrounding the conductive corner, d is the length (in meters) of one side of a cubic region situated on the conductor adjacent to the corner, V/sub zeta/, is the electric potential (in volts) of the conductor, and V, is the electric potential at a point in the medium displaced from the corner's apex along a time through the cube's diagonal and at a distance eqmd to that diagonal. Q is the charge on the cube's three surfaces lying along the conductor's surfaces. Such a configuration is convenient for a finite-difference computation of capacitance.

# Abstracts

## Computation of Equivalent Circuits of CPW Discontinuities Using Quasi-Static Spectral Domain Method (Short Papers)

*D. Mirshekar-Syahkal. "Computation of Equivalent Circuits of CPW Discontinuities Using Quasi-Static Spectral Domain Method (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 979-984.*

An efficient and simple computer technique based on the quasistatic approximation for the determination of the component values of the equivalent circuits of a broad-class of coplanar waveguide (CPW) discontinuities is introduced. The technique does not depend on the extraction of the component values from the scattering parameters. It uses the spectral domain formulation in conjunction with the method of moments. The concepts behind the method are illustrated using a complex example, the CPW T-junction. A few T-junctions are treated with the technique. Both the measurements and the full-wave electromagnetic simulation support the accuracy of the results.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)

*Z.-Y. Shen, C. Wilker, P. Pang and C. Carter, III. "High-power HTS Planar Filters with Novel Back-Side Coupling (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 984-986.*

Novel back-side coupling was used to produce high-power high temperature superconducting (HTS) filters. Several 2.88 GHz, 0.7% equal-ripple bandwidth, 2-pole TE/sub 01/ mode filters were fabricated using TI/sub 2/ Ba/sub 2/CaCu/sub 2/O/sub 8/ HTS thin films on 20-mil LaA10/sub 3/ substrates. The calibrated, measured performance of the filter at 77 K was <0,1 dB in-band insertion loss and 0.2 dB ripple up to 8 W. The uncalibrated measured performance of the filter was unchanged up to 21 W. This represents a significant advance in the power handling of planar HTS filters. These high-power, high-performance, compact HTS filters were designed to be used in transmitters for satellite communications.

# Abstracts

## An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)

*S. Padin, D.P. Woody, J.A. Stern, H.G. LeDuc, R. Blundell, C.-Y.E. Tong and M.W. Pospieszalski. "An Integrated SIS Mixer and HEMT IF Amplifier (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 987-990.*

Design details are given for a 205-270 GHz fixed-tuned S1S receiver in which the S1S mixer and HEMT IF amplifier are integerated into a single compact unit. The mixer and IF amplifier are connected with an inductor which provides the reactive part of the optimum input impedance for the HEMT. This simple coupling circuit gives an IF bandwidth of ~4 GHz. The receiver has a DSB noise temperature in the range 35-80K over the 205-270, GHz local oscillator band and 0.5-4.5 GHz IF band.

# Abstracts

## Call for Papers - Electrical Performance of Electronic Packaging (Jun. 1996 [T-MTT])

*"Call for Papers - Electrical Performance of Electronic Packaging (Jun. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 991-991.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - Microwave and Millimeter-Wave Photonics II (Jun. 1996 [T-MTT])

*"Call for Papers - Microwave and Millimeter-Wave Photonics II (Jun. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): 992-992.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Jun. 1996 [T-MTT])

*"Back Cover (Jun. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.6 (Jun. 1996 [T-MTT]): b1-b2.*

# Abstracts

## Front Cover (Jul. 1996, Part I [T-MTT])

*"Front Cover (Jul. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Analysis of Cylindrical Transmission Lines with the Method of Lines

*S. Xiao, R. Vahldieck and J. Hesselbarth. "Analysis of Cylindrical Transmission Lines with the Method of Lines." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 993-999.*

Cylindrical transmission lines are important for a variety of applications. To calculate their propagation characteristics, the method of lines in cylindrical coordinates has been adopted. By discretizing the angular space direction with radial lines, the two-dimensional (2-D) Helmholtz equation reduces to a set of ordinary one-dimensional (1-D) differential equations, which can be solved analytically in radial direction after an orthogonal transformation. To improve the accuracy of the cylindrical method of lines from second-order to fourth-order, neighboring lines are used to eliminate second-order discretization errors not only in the Helmholtz equation but also in the continuity equation and in the edge condition. The method is suitable for the analysis of asymmetric cylindrical homogeneous and inhomogeneous guided wave structures.

# Abstracts

## Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface

*K.Y. Chen, P.D. Biernacki, S. Buchheit and A.R. Mickelson. "Noninvasive Experimental Determination of Charge and Voltage Distributions on an Active Surface." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1000-1009.*

Optical sampling has been employed to obtain the charge and voltage distributions on both a self oscillating active antenna and a power combining oscillating array of such active antennas. Various oscillating arrays have been fabricated on GaAs substrates, and the microwave characteristics of these active structures were tested before the optical sampling measurements were performed. The results of optical sampling measurements have revealed some interesting characteristics of both the individual antenna and array operation. It was noted that the charge and voltage distributions of a single isolated oscillating antenna were quite similar to those measured on an oscillating antenna in an array. Along with this, no edge effects were observed in the finite arrays. The charge and voltage distributions repeated smoothly in periods less that a wavelength with the excess phase necessary to achieve 180 degrees per cell being taken up by a large phase jump across each transistor, despite the fact that each transistor has dimension much smaller than the free space wavelength of the oscillation. Some analytical modeling results are presented to try to put the results into perspective.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Automatic Derivation of Equivalent Circuits for General Microstrip Interconnection Discontinuities

*G. Coen, D. De Zutter and N. Fache. "Automatic Derivation of Equivalent Circuits for General Microstrip Interconnection Discontinuities." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1010-1016.*

The techniques presented in this paper allow one to automatically derive equivalent LC-networks for general lossless microstrip interconnection discoutinuities. The method is completely based on physical considerations and does not involve any fitting procedure. The technique is quite fast, and the resulting networks are closely related to the physical structure. Due to the fact that we only use lumped passive circuit elements, the structures under consideration are assumed to be small as compared to the electrical wavelength. The extension of our technique to multilayered planar structures with vias is possible. It is also possible to deal with lossy dielectrics, finite conductivity metallizations, and radiation. The main application area of our technique is the modeling of interconnection discontinuities in high speed digital circuits.

# Abstracts

## Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator

*L. Armengaud, M. Lalande, B. Jecko, N. Breuil, A. Barthelemy and M. Cuzin. "Electromagnetic Analysis of Optoelectronic Devices Applied to the Study of a Sampler and an Autocorrelator." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1017-1023.*

In this paper, an optoelectronic sampler and an autocorrelator are described. The devices are made with microstrip propagation lines, and ultra-rapid photoconductive switches are integrated in the same substrate. These devices are studied along two interacting directions: sampler description and operation, and electromagnetic study. In particular, the electromagnetic study is discussed here. The purpose of the first is to understand the electromagnetic behavior of the optoelectronic sampler. The second study enables us to simulate the autocorrelator operation in order to characterize the ultra rapid photoconductive switch.

# Abstracts

## A Wideband Waveguide Transition Design with Modified Dielectric Transformer Using Edge-Based Tetrahedral Finite-Element Analysis

*R.-B. Wu. "A Wideband Waveguide Transition Design with Modified Dielectric Transformer Using Edge-Based Tetrahedral Finite-Element Analysis." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1024-1031.*

A waveguide transition analysis approach has been established to deal with arbitrary shaped three-dimensional (3-D) waveguide discontinuity problems, by hybridizing the edge-based tetrahedral finite-element method for the junction region and the analytic modal expansion technique for the waveguide region. Several unique features have been imbedded in the analysis, including a variational formula for the scattering coefficients, a modified Delaunay triangulation for the mesh generation, and a frontal solution technique for the sparse matrix solution. As a result, the analysis is verified to be accurate, versatile, and efficient through extensive comparisons with the theoretical and measurement data in the available literature. The approach is then applied to design a rectangular to dielectric-filled circular waveguide transition with less than -20 dB return loss over a 40% bandwidth by using a suitable modified dielectric rod transformer.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Design and Analysis of Transitions from Rectangular Waveguide to Layered Ridge Dielectric Waveguide

*G.E. Ponchak, N.I. Dib and L.P.B. Katehi. "Design and Analysis of Transitions from Rectangular Waveguide to Layered Ridge Dielectric Waveguide." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1032-1040.*

Transitions from rectangular waveguide to layered ridge dielectric waveguide are studied both experimentally and theoretically. In addition, a design procedure is given for each transition. The analysis and design procedures are valid for transitions between rectangular waveguide and other open dielectric waveguides such as image guide, insulated image guide, dielectric ridge guide, and inverted strip dielectric waveguide. It is shown that for small dielectric waveguides such as layered ridge dielectric waveguide, a transition which is comprised of a tapered ridge waveguide reduces the radiation loss by at least 1 dB.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Digitizing Multichannel Video Signals for Lightwave Transmission

*R.J. Green and Q. Pan. "Digitizing Multichannel Video Signals for Lightwave Transmission." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1041-1045.*

This paper presents a new approach to the design of lightwave multichannel CATV transmission systems using broadband digital coding to convert an all-analog multiplexed video signal to a string of pulses suitable for digital transmission. Four broadband coding methods have been discussed and compared, which are: uniform and optimal commanding PCM, as well as uniform and adaptive DM. The principle advantages of this approach include the benefits obtainable from digital transmission and also direct compatibility with current CATV networks. CNR limits have been investigated for all of these methods.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Modal Circuit Decomposition of Lossy Multiconductor Transmission Lines

*M. AbuShaaban and S.O. Scanlan. "Modal Circuit Decomposition of Lossy Multiconductor Transmission Lines." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1046-1056.*

General multi-conductor transmission lines are investigated using modal analysis. This is performed by finding the solution to the telegrapher's equations for general impedance and admittance per unit length matrices Z and Y, respectively, and obtaining the transmission matrix in terms of Z and Y. Hence, the modal circuit is sought, resulting in a cascade of two n-port ideal transformers and n uncoupled transmission lines. A set of necessary and sufficient conditions are established and a construction method is given if the conditions are satisfied. It is shown that the modal circuit will always exist for general homogeneous constant parameters and for the nonhomogeneous case under the quasi-TEM assumption the existence depends on the geometry. The modal circuit is extended for frequency dependent parameters and a set of sufficient conditions are given.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"

*G. Conciauro, P. Arcioni, M. Bressan and L. Perregrini. "Wideband Modeling of Arbitrarily Shaped H-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1057-1066.*

The paper describes a very fast and flexible algorithm for the wideband modeling of arbitrarily shaped H-plane waveguide components. The algorithm is based on the evaluation of the poles and the residues of the Y-parameters by the "boundary integral--resonant mode expansion method." It also permits the fast evaluation of the effect of a deformation on the frequency response, a feature very useful either for optimization or for setting the mechanical tolerances. Some examples demonstrate the efficiency, flexibility, and reliability of the method. They show that the frequency response of complicated structures, such as multicavity filters, can be calculated in times of the order of one minute (or less) on ordinary workstations.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Thermal Noise in Lossy Waveguides

*D.F. Williams. "Thermal Noise in Lossy Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1067-1073.*

This work rigorously treats thermal electromagnetic noise in lossy waveguides and develops explicit modal equivalent-circuit representations for the noise generated by arbitrary passive networks embedded in them. The results show that the formulations in common use are limited to lossless transmission media.

# Abstracts

## Experimental Evaluation of Basic Circuit Components Using Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits

*T. Ishikawa and E. Yamashita. "Experimental Evaluation of Basic Circuit Components Using Buried Microstrip Lines for Constructing High-Density Microwave Integrated Circuits." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1074-1080.*

The buried microstrip line (BMSL) is a promising transmission line structure for realizing low crosstalk characteristics. The measured crosstalk characteristics of model BMSL's have shown good agreement with the estimated ones based on the rectangular boundary division method and the finite-difference time-domain (FDTD) method, indicating that these calculation methods are appropriate for estimating the performance of BMSL's. These results also confirm our expectation that BMSL's have extremely low crosstalk characteristics such as -100 dB in real circuits at high microwave frequencies. The basic circuit components to construct high-density microwave circuits using BMSL's, couplers, stub matching circuits, and gap-coupled resonance filter circuits, were fabricated and experimentally evaluated.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System

*C.-W. Chang, K.-M. Chen and J. Qian. "Nondestructive Measurements of Complex Tensor Permittivity of Anisotropic Materials Using a Waveguide Probe System." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1081-1090.*

A nondestructive measurement of electromagnetic (EM) properties of anisotropic materials using an open-ended waveguide probe has been conducted. Two coupled electric field integral equations (EFIE's) for the aperture electric field are derived and solved numerically by employing the method of moments (MoM). After the determination of the aperture electric field, the reflection coefficient of the incident wave can be expressed in terms of the EM parameters of the material. Then, the EM parameters of the material layer can be inversely determined if the reflection coefficient of the incident wave is experimentally measured. A series of experiments has been conducted using the waveguide probe system constructed at MSU electromagnetic laboratory. The inverse results of the EM properties of various materials are presented. Finally, the effects of material parameters on the probe input admittance that cause problems in the measurement are analyzed.

# Abstracts

## An Integrated Transition of Microstrip to Nonradiative Dielectric Waveguide for Microwave and Millimeter-Wave Circuits

*L. Han, K. Wu and R.G. Bosisio. "An Integrated Transition of Microstrip to Nonradiative Dielectric Waveguide for Microwave and Millimeter-Wave Circuits." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1091-1096.*

Effective interconnects between two or more different waveguides are essential for using hybrid architecture of circuits as well as multipurpose instrumentation and measurements at microwave and millimeter-wave frequencies. In this paper, a new transition of microstrip line to nonradiative dielectric (NRD) guide is reported that makes it possible to design a class of compact NRD waveguide circuits directly integrated with planar-microstrip-based devices and components. A small aperture coupling theory is developed and effectively applied to model the proposed structure. It is found that theoretical results are in good agreement with experiments. The proposed transition promises to be instrumental in integrating planar microstrip devices and components with NRD guide circuits.

# Abstracts

## Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators

*J. Krupka, P. Blondy, D. Cros, P. Guillon and R.G. Geyer. "Whispering-Gallery Modes and Permeability Tensor Measurements in Magnetized Ferrite Resonators." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1097-1102.*

Whispering-gallery modes in axially magnetized ferrite disk samples have been studied using rigorous Rayleigh-Ritz and finite-element analyses. The influence of radial magnetization on the resonant frequencies of both WGE and WGH modes was investigated, both theoretically and experimentally. Permeability tensor components of biased ferrites were determined from measurements of the resonant frequencies of the WGH/sub n00/ and the WGE/sub n00/ mode families.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## FD--TLM Electromagnetic Field Simulation of High-Speed Josephson Junction Digital Logic Gates

*C.G. Sentelle and R.H. Voelker. "FD--TLM Electromagnetic Field Simulation of High-Speed Josephson Junction Digital Logic Gates." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1103-1108.*

The finite-difference transmission line matrix (FD-TLM) method is extended to modeling low-T/sub c/ Josephson junction (JJ) digitial logic integrated circuits (IC's), providing comprehensive simultaneous time-domain, three-dimensional (3-D) full-wave electromagnetic field and JJ device analysis. Techniques for FD-TLM modeling of a Josephson Atto-Webber switch (JAWS), a two-junction superconducting quantum interference device (SQUID), and modified variable threshold logic (MVTL) logic gates are discussed and simulation results are presented. Interconnection lengths are intentionally short so that the full-wave FD-TLM simulation results can be validated with results of conventional quasistatic-based circuit simulations. Good agreement between the simulation techniques validates the FD-TLM JJ logic circuit modeling approach. In the FD-TLM method the electromagnetic behavior of the circuit is modeled from the material properties and dimensions of the circuit, avoiding separate extractions of parasitic capacitance and inductance as needed in conventional circuit simulations.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Polarizabilities of an Annular Cut in the Wall of an Arbitrary Thickness

*S.S. Kurennoy. "Polarizabilities of an Annular Cut in the Wall of an Arbitrary Thickness." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1109-1114.*

The knowledge of electric and magnetic polarizabilities of an aperture is often required in problems related to waveguide coupling and diffraction of EM waves by apertures. The beam coupling impedances due to a small discontinuity on the chamber wall of an accelerator can also be expressed in terms of the polarizabilities of the discontinuity. The polarizabilities are geometrical factors which can be found by solving a static (electric or magnetic) problem. However, they are known in an explicit analytical form only for a few simple-shaped discontinuities, such as an elliptic hole in a thin wall. In the present paper the polarizabilities of a ring-shaped cut in the wall of an arbitrary thickness are studied using a combination of analytical, variational and numerical methods. The results are applied to estimate the coupling impedances of button-type beam position monitors.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Some Considerations on the Accuracy of the Nonuniform FDTD Method and its Application to Waveguide Analysis When Combined with the Perfectly Matched Layer Technique

*E.A. Navarro, N.T. Sangary and J. Litva. "Some Considerations on the Accuracy of the Nonuniform FDTD Method and its Application to Waveguide Analysis When Combined with the Perfectly Matched Layer Technique." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1115-1124.*

The accuracy of the finite-difference time-domain (FDTD) technique is measured with respect to the mesh's cell dimensions. The accuracy of the FDTD technique is investigated for those applications that demand the use of nonuniform meshes. The results of simulations suggest that second-order accuracy can be achieved. These simulations are carried out using different boundary conditions. It is observed that the choice of boundary conditions plays a large role in the accuracy that is achieved with the FDTD method, The perfectly matched layer (PML) technique is found to be well suited to waveguide analysis because of its wide bandwidth, and the ease with which it can be implemented with a nonuniform mesh. We apply the nonuniform FDTD method, in combination with the PML technique, to analyze a narrow iris in waveguide.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Channelized-Limiter Approach to Receiver Front-End Protection

*C. Rauscher. "A Channelized-Limiter Approach to Receiver Front-End Protection." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1125-1129.*

The receiver protection scheme being presented relies on frequency channelization of incident signals to accomplish +amptitude limiting on a frequency-selective, self-induced, instantaneous basis. A demultiplexer separates signals into contiguous subbands for parallel processing, after which they are reunited by a multiplexer to yield a signal composite of original bandwidth. The scheme's attractiveness lies in its ability to combine the advantages of fast response, broadband, passive limiters with the benefits of narrowband signal rejection techniques that employ frequency-tunable or switched notch filters. The concept is demonstrated with an experimental five-channel modified-logarithmic-periodic limiter prototype circuit, configured as a 7.5- to 12.5-GHz channelized self-limiting amplifier. The measured results confirm the circuit's transparency to small-amplitude signals and illustrate its effectiveness in confining large-signal effects, such as gain compression and intermodulation products, to narrow frequency intervals.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band

*M.C. Gaidis, H.G. LeDuc, M. Bin, D. Miller, J.A. Stern and J. Zmuidzinas. "Characterization of Low-Noise Quasi-Optical SIS Mixers for the Submillimeter Band." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1130-1139.*

We report on the development of low-noise quasi-optical SIS mixers for the frequency range 400-850 GHz. The mixers utilize twin-slot antennas, two-junction tuning circuits, and Nb-trilayer junctions. Fourier-transform spectrometry has been used to verify that the frequency response of the devices is well predicted by computer simulations. The 400-850 GHz frequency band can be covered with four separate fixed-tuned mixers. We measure uncorrected double-sideband receiver noise temperatures around 5hv/k/sub B/ to 700 GHz, and better than 540 K at 808 GHz. These results are among the best reported to date for broadband heterodyne receivers.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Circuit Topology for Microwave Modeling of Plastic Surface Mount Packages

*R.W. Jackson. "A Circuit Topology for Microwave Modeling of Plastic Surface Mount Packages." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1140-1146.*

A circuit topology is described for modeling a class of plastic surface mount packages. The model consists of three pieces each of which is circuit modeled based on an electromagnetic simulation. The resulting parts of the model can then be interconnected with each other and with the model of the monolithic microwave/millimeter wave integrated circuit (MMIC) to be packaged. Various interconnections and grounding schemes can be investigated without resorting to further electromagnetic simulation. The circuit model topology is verified by circuit simulating two simple packaged test circuits and comparing the results to a full electromagnetic simulation. The resulting S parameters are in good agreement over a wide range of frequencies and for a variety of grounding configurations.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Eigenmodes in a Toroidal Cavity of Elliptic Cross Section (Short Papers)

*M.S. Janaki and B. Dasgupta. "Eigenmodes in a Toroidal Cavity of Elliptic Cross Section (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1147-1150.*

The axisymmetric electromagnetic eigenmodes of a toroidal resonator with elliptic cross section are analyzed by solving the basic equations up to the lowest order in inverse aspect ratio. The effects of toroidicity and ellipticity of the cross section are quite significant for both TE and TM modes.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## BiCG-FFT T-Matrix Method for Solving for the Scattering Solution from Inhomogeneous Bodies (Short Papers)

*J.H. Lin and W.C. Chew. "BiCG-FFT T-Matrix Method for Solving for the Scattering Solution from Inhomogeneous Bodies (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1150-1155.*

A BiCG-FFT T-Matrix algorithm is proposed to efficiently solve three-dimensional scattering problems of inhomogeneous bodies. The memory storage is of O(N) (N is the number of unknowns) and each iteration in BiCG requires O(N log N) operations. A good agreement between the numerical and exact solutions is observed. The convergence rate for lossless and lossy bodies of various sizes are shown. It is also demonstrated that the matrix condition number for fine grids is the same as that for coarse grids.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Reduced Invasiveness of Noncontact Electrooptic Probes in Millimeter-Wave Optoelectronic Characterization (Short Papers)

*A. Zeng, S.A. Shah and M.K. Jackson. "Reduced Invasiveness of Noncontact Electrooptic Probes in Millimeter-Wave Optoelectronic Characterization (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1155-1157.*

We report time-resolved measurements of the invasiveness of LiTaO/sub 3/ external probes in millimeter-wave electrooptic sampling. Using external probe tips at varying distances from a coplanar stripline, we show that invasiveness can be reduced in a noncontact configuration at the expense of measurement sensitivity. In the contact configuration, the risetime can be significantly lengthened by dispersion and signal reflection caused by the probe tip.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Analysis of Microstrip Discontinuities Using the Spatial Network Method with Absorbing Boundary Conditions (Short Papers)

*D. Bica and B. Beker. "Analysis of Microstrip Discontinuities Using the Spatial Network Method with Absorbing Boundary Conditions (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1157-1161.*

In this paper it is shown that spatial network method (SNM) can be formally derived as a finite differencing scheme, which ensures that the necessary stability and convergence conditions are met. For the first time, Mur and Higdon second-order absorbing boundary conditions (ABC's) have been used in conjunction with SNM. It has been found that the Higdon second-order ABC's perform better than the Mur algorithm for guided wave problems with inhomogeneous substrates. Finally, it is shown that SNM can successfully be employed for the analysis of planar and three-dimensional (3-D) microstrip discontinuities in open or shielded environments.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)

*M.S. Leong, L.W. Li, P.S. Kooi, T.S. Yeo and S.L. Ho. "Input Impedance of a Coaxial Probe Located Inside a Rectangular Cavity: Theory and Experiment (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1161-1164.*

In this work, theoretical and experimental analyzes of input impedance of a coaxial probe located in a rectangular cavity are presented. The technique of dyadic Green function (DGF) and the method of moments (MM) are applied in the theoretical analysis. For the magnetic equivalent source with a y-directed discontinuity, two alternative representations of magnetic DGF for a rectangular cavity are derived in this paper. Numerical input reactance and phase of the reflection coefficient at the base of the probe obtained using both the conventional form and the alternative representations of the DGF are compared with the experimental data collected. It is found that the computed results obtained utitizing alternative DGF's agree better with the measured data.

# Abstracts

## High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)

*H.J. De Los Santos, D.D. Nardi, K.L. Hargrove, M. Hafizi and W.E. Stanchina. "High-Efficiency InP-Based DHBT Active Frequency Multipliers for Wireless Communications (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1165-1167.*

We present, for the first time, the performance of AlInAs/GaInAs/InP double heterostructure bipolar transistors (DHBT's) as active frequency multipliers at frequencies of relevance to Wireless Communications applications. In particular, we present results comparing the performance of X6 (127 --> 762 MHz) and X4 (762.5 --> 3050.0 MHz) InP- and Si-based (NEC2107) multiplier circuits. A well-known multiplier circuit topology has been chusen as a vehicle, so that we can focus on active device comparison. The X6 InP-based multiplier exhibits output power and efficiency of +6 dBm and 11%, respectively, compared to +7.2 dBm and 4.8% of the Si-based circuit. The X4 InP-based multiplier exhibits output power and efficiency of +3.74 dBm and 8%, respectively, compared to -6.1 dBm and 0.4% of the Si-based circuit. The superior electronic properties of InP-DHBT's enable high-conversion gain/highly DC-efficient multipliers, however, their nonexponential I/sub C/-V/sub BE/ characteristic limits the maximum obtainable conversion gain at high-order frequency multiplication.

Click on title for a complete paper.

# Abstracts

## Analysis of Slot-Coupled Double-Sided Cylindrical Microstrip Lines (Short Papers)

*J.-H. Lu and K.-L. Wong. "Analysis of Slot-Coupled Double-Sided Cylindrical Microstrip Lines (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1167-1170.*

The problem of double-sided cylindrical microstrip lines coupled through a rectangular slot in the common cylindrical ground plane is studied using the reciprocity theorem and a moment-method calculation. Theoretical results of the S parameters for the slot-coupled cylindrical microstrip lines are calculated and analyzed. Experiments are also conducted to verify the theoretical results.

# Abstracts

## Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)

*R. Lowther, P.A. Begley, G. Bajor, A. Rivoli and W.R. Eisenstadt. "Substrate Parasitic and Dual-Resistivity Substrates (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1170-1174.*

In high-frequency semiconductor applications, substrate effects can be a dominant source of parasitic unless they are carefully minimized. Here a dual-resistivity substrate in a bonded-oxide process is considered for the optimization of the two major types of substrate parasitic: resistive substrate losses and capacitive coupling (crosstalk) through the substrate. These will both depend on the frequency, the two substrate resistivities, and the thickness of the two substrate layers. The thickness of the upper layer is treated as a fully designable parameter. The mechanisms will be evaluated numerically, but intuitive rule-of-thumb arguments will also be provided for a good understanding of the physics and of the tradeoffs in selecting an optimal design. The results of these sections may also serve as a guide for determining standard substrate resistivities.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Spectral Domain Analysis of Single and Coupled Microstrip Open Discontinuities with Anisotropic Substrates (Short Papers)

*J.C. Goswami, A.K. Chan and C.K. Chui. "Spectral Domain Analysis of Single and Coupled Microstrip Open Discontinuities with Anisotropic Substrates (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1174-1178.*

The normalized input admittance for single and coupled microstrip open discontinuities with anisotropic substrates are obtained using a full-wave analysis. Problem is formulated in terms of the field Green's function in the spectral domain. Numerical results are found to be in good agreement with the published theoretical and experimental results for microstrip open discontinuities with anisotropic/isotropic substrates.

# Abstracts

## Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)

*J. Laskar, J.J. Bautista, M. Nishimoto, M. Hamai and R. Lai. "Development of Accurate On-Wafer, Cryogenic Characterization Techniques (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1178-1183.*

Significant advances in the development of high electron mobility field-effect transistors (HEMT's) have resulted in cryogenic, low-noise amplifiers (LNA's) whose noise temperatures are within an order of magnitude of the quantum noise limit (hv/k). Further advances in HEMT technology at cryogenic temperatures may eventually lead to the replacement of maser and superconducting-insulator-superconducting (SIS) front-ends in the 1-100 GHz frequency band. Key to identification of the best HEMT's and optimization of cryogenic LNA's is accurate and repeatable device measurements at cryogenic temperatures. A cryogenic on-wafer noise and scattering parameter measurement system has heen developed to provide a systematic investigation of HEMT noise characteristics. In addition an improved parameter extraction technique has been developed to help understand the relationship between device structure and LNA performance.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Radial Mode Matching Analysis of Ridged Circular Waveguides (Short Papers)

*U. Balaji and R. Vahldieck. "Radial Mode Matching Analysis of Ridged Circular Waveguides (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1183-1186.*

In this paper a radial mode matching analysis is presented to calculate rigorously the TE and TM mode propagation in single-, double-, triple-, and quadruple-ridged circular waveguide structures. The ridges have been cut radially in all the cases. Results are presented for variations of the ridge depth and ridge thickness and are compared to results from finite element analysis. Furthermore, for the first time, the characteristic impedance of the double and quadruple-ridged circular waveguides have been calculated using the power-voltage definition.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Sensitivity Analysis of Lossy Coupled Transmission Lines (Comments)

*I. Sakagami. "Sensitivity Analysis of Lossy Coupled Transmission Lines (Comments)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1187-1188.*

In Fig. 5 of the above paper, a good agreement between the numerical inversion of Laplace transform (NILT) and HSPICE is presented on the transient response of transmission line system with lumped terminal and interconnecting networks. However, I would like to mention some comments in the following.

# Abstracts

## Measurement of the Microwave Conductivity of a Polymeric Material with Potential Applications in Absorbers and Shielding (Comments)

*W.-P. Liao and F.-L. Chu. "Measurement of the Microwave Conductivity of a Polymeric Material with Potential Applications in Absorbers and Shielding (Comments)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1188-1189.*

In Fig. 5, Fig. 7, and Fig. 8 of the above paper, Naishadham and Kadaba have demonstrated the utilization of polyacetylene and PBT conductive polymers as single-layer, double-layer electric Salisbury screen and EMI shield. However, some inconsistencies were found between the calculated results and the assumptions stated in the paper.

# Direct Extraction of Equivalent Circuit Parameters for Heterojunction Bipolar Transistors (Corrections)

*C.-J. Wei and J.C.M. Hwang. "Direct Extraction of Equivalent Circuit Parameters for Heterojunction Bipolar Transistors (Corrections)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1190-1190.*

As has been correctly pointed out, (16) and (17) in the above paper should read as follows.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - Microwave and Millimeter-Wave Photonics II (Jul. 1996, Part I [T-MTT])

*"Call for Papers - Microwave and Millimeter-Wave Photonics II (Jul. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1191-1191.*

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Jul. 1996, Part I [T-MTT])

*"Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Jul. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): 1192-1192.*

# Abstracts

## Back Cover (Jul. 1996, Part I [T-MTT])

*"Back Cover (Jul. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part I [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Jul. 1996, Part II [T-MTT])

*"Front Cover (Jul. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Guest Editorial (Jul. 1996, Part II [T-MTT])

*M. Nisenoff and W.J. Meyers. "Guest Editorial (Jul. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1193-1197.*

This Special Issue of the IEEE Transactions on Microwave Theory and Techniques is focused on the microwave and millimeter wave applications of high temperature superconductivity (HTS) with an emphasis on the Naval Research Laboratory's program known as the high temperature superconductivity space experiment (HTSSE).

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## The High Temperature Superconductivity Space Experiment (HTSSE-II) Design

*T.G. Kawecki, G.A. Golba, G.E. Price, V.S. Rose and W.J. Meyers. "The High Temperature Superconductivity Space Experiment (HTSSE-II) Design." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1198-1212.*

The high temperature superconductivity space experiment (HTSSE) program, initiated by the Naval Research Laboratory (NRL) in 1988, is described. The HTSSE program focuses high temperature superconductor (HTS) technology applications on space systems. The program phases, goals, and objectives are discussed. The devices developed for the HTSSE-II phase of the program and their suppliers are enumerated. Eight space-qualified components were integrated as a cryogenic experimental payload on DOD's ARGOS spacecraft. The payload was designed and built using a unique NRL/industry partnership and was integrated and space-qualified at NRL.

# Abstracts

## Design Considerations of Superconductive Input Multiplexers for Satellite Applications

*R.R. Mansour, S. Ye, V. Dokas, B. Jolley, G. Thomson, W.-C. Tang and C.M. Kudsia. "Design Considerations of Superconductive Input Multiplexers for Satellite Applications." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1213-1228.*

This paper describes the evolution and development of low power superconductive filters and multiplexers for satellite applications under the HTSSE-II program. Experimental results and tradeoffs are presented for thin film and dielectric loaded HTS multiplexer configurations, leading to the development and implementation of a fully integrated four-channel C-band HTS input multiplexer. Measured data shows performance comparable to conventional technology and promise of large reduction in mass and volume of such equipment. The multiplexer is scheduled to fly as part of the HTSSE-II package on the ARGOS satellite in 1996.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines

*S.H. Talisa, M.A. Janocko, D.L. Meier, J. Talvacchio, C. Moskowitz, D.C. Buck, R.S. Nye, S.J. Pieseski and G.R. Wagner. "High Temperature Superconducting Space-Qualified Multiplexer and Delay Lines." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1229-1239.*

A high temperature superconducting (HTS) four-channel multiplexer and a delay line were fabricated, space qualified and tested as part of the U. S. Navy's High Temperature Superconductivity Space Experiment II (HTSSE-II). The multiplexer had an architecture that included two branch-line hybrids and two identical parallel-coupled line filters per channel. Its operation was centered at 4 GHz, with 50-MHz-wide channels. It was fully integrated, with microstrip interconnections between channels and thin-film load terminations in the out-of-phase port of the output hybrid. The delay line was made up of two cascaded modules for a total delay of 45 ns between 2 and 6 GHz. Both devices were made using 5-cm-diameter LaAlO/sub 3/ wafers coated with epitaxial thin film YBa/sub 2/ Cu/sub 3/O/sub 7/, on both sides in the case of the delay line. Both devices operated at 77 K.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Cryogenic Microwave Channelized Receiver

*C. Rauscher, J.M. Pond and G.B. Tait. "Cryogenic Microwave Channelized Receiver." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1240-1247.*

The channelized receiver being presented demonstrates the use of high temperature superconductor technology in a microwave system setting where superconductor, microwave-monolithic-integrated-circuit, and hybrid-integrated-circuit components are united in one package and cooled to liquid-nitrogen temperatures. The receiver consists of a superconducting X-band four-channel demultiplexer with 100-MHz-wide channels, four commercial monolithically integrated mixers, and four custom-designed hybrid-circuit detectors containing heterostructure ramp diodes. The composite receiver unit has been integrated into the payload of the second-phase NRL high temperature superconductor space experiment (HTSSE-II). Prior to payload assembly, the response characteristics of the receiver were measured as functions of frequency, temperature, and drive levels. The article describes the circuitry, discusses the key issues related to design and implementation, and summarizes the experimental results.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Low Loss Multiplexers with Planar Dual Mode HTS Resonators

*S.J. Fiedziuszko, J.A. Curtis, S.C. Holme and R.S. Kwok. "Low Loss Multiplexers with Planar Dual Mode HTS Resonators." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1248-1257.*

High temperature superconductivity space experiments (HTSSE-I and II) are aimed to demonstrate the feasibility of using high temperature superconductivity (HTS) technology in space systems. In communication satellites, high performance filters and multiplexers represent key microwave components of the payload. Utilization of HTS films in these devices is presented in this paper. The basic HTS resonator/filter structures (including HTSSE-I resonator/filter) suitable for these applications are described. The multiplexer designs and measured results are also described (including the HTSSE-II multiplexer).

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## High Temperature Superconductive Wideband Compressive Receivers

*W.G. Lyons, D.R. Arsenault, A.C. Anderson, T.C.L.G. Sollner, P.G. Murphy, M.M. Seaver, R.R. Boisvert, R.L. Slattery and R.W. Ralston. "High Temperature Superconductive Wideband Compressive Receivers." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1258-1278.*

Wideband compressive receivers are an attractive application niche for analog high temperature superconductive (HTS) microwave filters. Chirp filters form the basis of compressive receivers, implementing a chirp-transform algorithm in the analog domain for real-time spectral analysis. HTS tapped-delay-line chirp filters are an enabling technology for instantaneous bandwidths greater than 1 GHz, and have evolved sufficiently to support dispersive delays as long as 40 ns with multigigahertz bandwidths and time-bandwidth products in excess of 100. Long dispersive delays have been obtained using a bonded/thinned-wafer technique to fabricate YBa/sub 2/CU/sub 3/O/sub 7/-/spl part/ stripline devices on 5-mil-thick, 2-in-diameter LaAlO/sub 3/ substrates. These filters have produced better than - 18-dB error sidelobes. In addition, a 3-GHz-bandwidth HTS compressive cueing receiver was recently delivered to the Naval Research Laboratory to be flown on the high temperature superconductor space experiment (HTSSE), and demonstrations have been performed combining HTS chirp filters with conventional compressive-receiver hardware. A novel compressive cryoreceiver architecture is proposed combining HTS, cryoelectronic, and advanced high-speed semiconductor technologies. The proposed receiver will rival the sensitivity of a narrowband receiver while providing unprecedented wideband instantaneous frequency coverage. Future developments will extend the bandwidth capability. Detailed comparisons are made to an all-digital receiver and to channelized-filter receiver architectures. An HTS compressive receiver is projected to be clearly superior in overall size, weight, and power. Applications include electronic warfare and dynamic molecular spectroscopy for remote sensing.

# Abstracts

## Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...

*H.H.S. Javadi, J.G. Bowen, D.L. Rascoe, R.R. Romanofsky, C.M. Chorey and K.B. Bhasin. "Jet Propulsion Laboratory/NASA Lewis Research Center Space Qualified Hybrid High Temperature Superconducting/Semiconducting 7.4 GHz...." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1279-1288.*

A deep space satellite downconverter receiver was proposed by Jet Propulsion Laboratory (JPL) and NASA Lewis Research Center (LeRC) for the Naval Research Laboratory's (NRL) high temperature superconductivity space experiment, phase-II (HTSSE-II) program. Space qualified low-noise cryogenic downconverter receivers utilizing thin-film high temperature superconducting (HTS) passive circuitry and semiconductor active devices were developed and delivered to NRL. The downconverter consists of an HTS preselect filter, a cryogenic low-noise amplifier, a cryogenic mixer, and a cryogenic oscillator with an HTS resonator. HTS components were inserted as the front-end filter and the local oscillator resonator for their superior 77 K performance over the conventional components. The semiconducting low noise amplifier also benefited from cooling to 77 K. The mixer was designed specifically for cryogenic applications and provided low conversion loss and low power consumption. In addition to an engineering model, two space qualified units (qualification, flight) were built and delivered to NRL. Manufacturing, integration and test of the space qualified downconverters adhered to the requirements of JPL class-D space instruments and partially to MIL-STD-883D specifications. The qualification unit has ~50 K system noise temperature which is a factor of three better than a conventional downconverter at room temperature. Commercial applications such as intersatellite links and V-SATS are envisioned to benefit by >3 dB link margin, or a factor of 2 in antenna size, from a future hybrid HTS/semiconducting cryogenic receiver employing new InP based HEMT LNA. In a spread spectrum communication network, the number of users per beam would more than double.

# Abstracts

## Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem

*G.-C. Liang, C.-F. Shih, R.S. Withers, B.F. Cole and M.E. Johansson. "Space-Qualified Superconductive Digital Instantaneous Frequency-Measurement Subsystem." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1289-1299.*

We have constructed a five-bit high temperature superconductive digital instantaneous frequency measurement (DIFM) subsystem capable of determining the frequency of unknown signals over a 500-MHz bandwidth, centered on 4 GHz, with a resolution of ±7.8 MHz. The system consists of three parts: a limiting amplifier and filter, a comparator and data processing unit operating at room temperature, and a cryogenic subsystem containing five discriminator modules based on superconductive delay lines, GaAs mixers and power dividers. With a single-tone CW input between -40 dBm and +10 dBm, the frequency quantization boundaries of the subsystem are, on average, 3.1 MHz from their design values. This system was built for the High-Temperature Superconductor Space Experiment, Phase II (HTSSE II). It has passed all required qualification tests for vibration, shock and thermal cycling. The system is currently scheduled for satellite launch in fall 1996. Compared to a conventional system, the superconductive version of the DIFM is considerably smaller and provides enhanced resolution. In addition, the technology employed can be readily extended to a system with additional bits and wider instantaneous bandwidth. The system built demonstrates the potential for system-level applications of high-temperature superconductive electronics in instrumentation, communications, radar, and electronic warfare.

# Abstracts

## A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers

*A. Silver, G. Akerling, R. Auten, D. Durand, J. Godden, K.-F. Lau, J. Murduck, R. Orsini, J. Raab, S. Schwarzbek, E. Tward and M. Wire. "A Space-Qualified Experiment Integrating HTS Digital Circuits and Small Cryocoolers." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1300-1307.*

High temperature superconductors (HTS) promise to achieve electrical performance superior to that of conventional electronics. For application in space systems, HTS systems must simultaneously achieve lower power, weight, and volume than conventional electronics, and meet stringent space qualification and reliability requirements. Most effort to date has focused on passive RF/microwave applications. However, incorporation of active microwave components such as amplifiers, mixers, and phase shifters, and on-board high data rate digital signal processing is limited by the power and weight of their spacecraft electronic and support modules. Absence of data on active HTS components will prevent their utilization in space. To validate the feasibility in space of HTS circuits and components based on Josephson junctions, we need to demonstrate HTS circuits and critical supporting technologies, such as space-qualified packaging and interconnects, closed-cycle cryocooling, and interface electronics. This paper describes the packaging, performance, and space test plan of an integrated, space-qualified experimental package consisting of HTS Josephson junction circuits and all the supporting components for NRL's high temperature superconductor space experiment (HTSSE-II). Most of the technical challenges and approaches are equally applicable to passive and active RF/microwave and digital electronic components, and this experiment will provide valuable validation data.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## The NRL Josephson Junction Monitoring Experiment on HTSEE-II

*J.H. Claassen, R.G. Skalitzky and R.J. Soulen, Jr.. "The NRL Josephson Junction Monitoring Experiment on HTSEE-II." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1308-1312.*

An experiment designed to ride on the high temperature superconductor space experiment (HTSSE-II) satellite package is described, which monitors the current-voltage characteristics of two high temperature superconductor (HTS) Josephson junctions. The junctions are typical examples of the state-of-the-art at the time of incorporation, and were obtained from two industrial laboratories: TRW and Conductus. Stringent requirements on shielding the devices from rf interference and dc magnetic fields are necessary to ensure that the measurements are meaningful. An additional constraint is imposed by the necessity to minimize flow of heat into the device package. Engineering solutions to these problems, and the resulting performance of the measurement system, are described. The package and associated electronics have been integrated into the flight satellite.

# Abstracts

## Design of HTS, Lumped-Element, Manifold-Type Microwave Multiplexers

*G.L. Matthaei, S.M. Rohlfing and R.J. Forse. "Design of HTS, Lumped-Element, Manifold-Type Microwave Multiplexers." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1313-1321.*

Manifold-type frequency multiplexers are especially useful when a sizable number of channels are required. However, they normally use interconnecting transmission lines that could result in an overall structure many wavelengths across. Herein we investigate the design of compact manifold multiplexers using lumped-element filters which are convenient for high temperature superconductor (HTS) realization, while the transmission lines are replaced with lumped-element equivalents. Design examples calculated for frequencies in the vicinity of 0.8 GHz yield element values which are quite feasible for realization in HTS microstrip circuits. The examples indicate that very compact multiplexers should be obtainable.

# Abstracts

## On the Power Handling Capability of High Temperature Superconductive Filters

*R.R. Mansour, B. Jolley, S. Ye, F.S. Thomson and V. Dokas. "On the Power Handling Capability of High Temperature Superconductive Filters." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1322-1338.*

This paper presents high power test results for high temperature superconductor (HTS) filters having six different configurations. The results demonstrate the possibility of realizing narrow band HTS filters that are capable of handling 30-50 W at 77 K. The paper also introduces a procedure for comparing the power handling capability of HTS filters with different RF characteristics. Issues related to thermal design of high power HTS filters are discussed in detail.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Miniature Superconducting Filters

*M.J. Lancaster, F. Huang, A. Porch, B. Avenhaus, J.-S. Hong and D. Hung. "Miniature Superconducting Filters." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1339-1346.*

Because of the intrinsic low loss of high temperature superconductors at microwave frequencies it is possible to reduce the size of filters while still retaining excellent performance. In order to accomplish this reduction in size new filter geometry is required. Under this theme of miniaturization a number of new and novel types of microwave filter are discussed, this includes delay line filters, lumped element filters and filters based on slow wave structures. Each of the filters are constructed out of high temperature superconductors (HTS).

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization

*M. Feng, F. Gao, Z. Zhou, J. Kruse, M. Heins, J. Wang, S. Remillard, R. Lithgow, M. Scharen, A. Cardona and R. Forse. "High Temperature Superconducting Resonators and Switches: Design, Fabrication, and Characterization." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1347-1355.*

We report our recent efforts in designs of several RF and microwave devices using high temperature superconducting (HTS) thin film technology. Devices considered include transmission lines, resonators, switches, and phase shifters in microstrip, stripline and coplanar waveguide. The circuit design, modeling, simulation, fabrication, packaging, and testing are discussed. Using a two-dimensional (2-D) EM simulator, we have optimized the geometry of the RF microstrip and stripline resonators for frequencies near 900 MHz. An unloaded Q is obtained as high as 80,000, three orders of magnitude greater than the traditional 2-D gold or copper resonators with identical structures. On-wafer probe and bit-error rate measurements show that the HTS transmission lines have an extremely small insertion loss and dispersion; thus they are ideal candidates for applications in multichip module interconnects and delay lines. A sharp switching characteristic and an unusually strong RF power hysteresis loop have been observed in the HTS lines. This interesting behavior has been utilized for designs of new HTS microwave phase shifters. The use of HTS lines can substantially reduce the losses suffered by conventional PIN diode switches.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Properties and Applications of Thick Film High Temperature Superconductors

*T.W. Button, P.A. Smith, G. Dolman, C. Meggs, S.K. Remillard, J.D. Hodge, S.J. Penn and N.M. Alford. "Properties and Applications of Thick Film High Temperature Superconductors." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1356-1360.*

Melt processed YBa/sub 2/ Cu/sub 3/O/sub x/ thick films display low surface resistance, moderate performance in fields and can be applied to three-dimensional (3-D) substrates with ease. The processing and properties of such films are described. Possible applications are examined and prototype devices are described. These include high Q, low frequency resonators for cellular communications filters, low phase noise oscillators, magnetic resonance imaging receiver coils, low noise magnetic shields, coils, flux transformers, and antennas.

# Abstracts

## Ferrite-Superconductor Devices for Advanced Microwave Applications

*G.F. Dionne, D.E. Oates, D.H. Temme and J.A. Weiss. "Ferrite-Superconductor Devices for Advanced Microwave Applications." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1361-1368.*

Microwave devices comprising magnetized ferrite in contact with superconductor circuits designed to eliminate magnetic field penetration of the superconductor have demonstrated phase shift without significant conduction losses. The device structures are adaptable to low- or high-T/sub c/ superconductors. A nonoptimized design of a ferrite phase shifter that employs niobium or YBCO meanderlines has produced over 1000 degrees of differential phase shift with a figure of merit exceeding 1000 degrees/dB at X band. By combining superconductor meanderline sections with alternating T junctions on a ferrite substrate in a configuration with three-fold symmetry, a low-loss three-port switching circulator has been demonstrated.

# Abstracts

## Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report

*N. Klein, A. Scholen, N. Tellmann, C. Zuccaro and K.W. Urban. "Properties and Applications of HTS-Shielded Dielectric Resonators: A State-of-the-Art Report." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1369-1373.*

High temperature superconductor (HTS) shielded dielectric resonators (DR's) have demonstrated to provide quality factors Q between 5 x 10/sup 5/ and several 10/sup 6/ at frequencies up to 20 GHz and levels of dissipated rf power in the range of Watts. As dielectric materials, high purity single crystals of sapphire, LaAIO/sub 3/, and rutile exhibit sufficiently low microwave losses. There are two main areas of application which are considered to benefit from HTS-shielded DR's, namely low-phase-noise oscillators for radar systems and digital communication, and high-power filters for satellite communication. Projections for phase noise are --145 dBc/Hz at 1 kHz offset from the carrier frequency, a value of --110 dBc/Hz at 1 kHz was measured recently for an oscillator with a carrier frequency of 5.6 GHz. Modeling of filters based on resonators with Qs in the 10/sup 6/ range indicates their ability to reduce the rf power dissipation apparent in the output multiplexers of communication satellite payloads. Presently, schemes for resonator coupling and tuning while maintaining high Qs are under development.

# Abstracts

## Adaptive High Temperature Superconducting Filters for Interference Rejection

*K.F. Raihn, N.O. Fenzi, G.L. Hey-Shipton, E.R. Saito, P.V. Loung and D.L. Aidnik. "Adaptive High Temperature Superconducting Filters for Interference Rejection." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1374-1381.*

An optically switched high temperature superconducting (HTS) band-reject filter bank is presented. Fast low loss switching of high quality (Q) factor HTS filter elements enables digital selection of arbitrary pass-bands and stop-bands. Patterned pieces of GaAs and silicon are used in the manufacture of the photosensitive switches. Fiber optic cabling is used to transfer the optical energy from an LED to the switch. The fiber optic cable minimizes the thermal loading of the filter package and de-couples the switch's power source from the RF circuit. This paper will discuss the development of a computer-controlled HTS bank of optically switchable, narrow band, high Q bandstop filters which incorporates a cryocooler to maintain the 77 K operating temperature of the HTS microwave circuit.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)

*M. Manzel, S. Huber, H. Bruchlos, S. Bornmann, P. Gornert, M. Klinger and M. Stiller. "High Q-Value Resonators for the SHF-Region Based on TBCCO-Films (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1382-1384.*

We used a sapphire dielectric resonator with a copper cylindrical shield and two endplates replaced by HTS layers for very accurate surface resistance measurements of TBCCO films made by the two step method. This technique allows for the preparation of high quality 2-in diameter T1-2223 superconducting films with surface resistance values (R/sub s/) smaller than 100 µOmega at 5.6 GHz and 77 K. The use of these films in sapphire dielectric resonators yields resonators for the C-band with very high unloaded quafity factors (Q/sub o/ >2 x 10/sup 6/ at 77 K). Such high Q/sub o/ -values are not reached with any conventional resonators of comparable size.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)

*J.S. Herd, L.D. Poles, J.P. Kenney, J.S. Derov, M.H. Champion, J.H. Silva, M. Davidovitz, K.G. Herd, W.J. Bocchi, S.D. Mittleman and D.T. Hayes. "Twenty-GHz Broadband Microstrip Array with Electromagnetically Coupled High T/sub c/ Superconducting Feed Network (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1384-1389.*

The use of high-temperature superconducting (HTS) feed lines and phase shifters can substantially improve the performance of microwave and millimeter-wave printed phased array antennas. A novel antenna architecture is described that provides a broadband radiating aperture to be used as a scanning array with compatible low-loss HTS phase shifters. The approach follows an earlier design demonstrated at 12 GHz, and this work extends the approach to 20 GHz. The antenna design, radiation patterns, bandwidth measurements, and thermal analysis are reported. A prototype thermal isolator design is described that reduces the heat load of coaxial interconnections between cryocooled and room temperature systems.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## High-Spatial Resolution Resistivity Mapping of Large-Area YBCO Films by a Near-Field Millimeter-Wave Microscope (Short Papers)

*M. Golosovsky, A. Galkin and D. Davidov. "High-Spatial Resolution Resistivity Mapping of Large-Area YBCO Films by a Near-Field Millimeter-Wave Microscope (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): 1390-1392.*

We demonstrate a new millimeter-wave technique for the resistivity mapping of large-area conducting films, namely, a near-field resistivity microscope. The microscope is based on the idea that electro-magnetic waves are transmitted through a narrow resonant slit with high efficiency. By scanning this slit at fixed height above an inhomogeneous conducting surface and measuring the intensity and phase of the reflected wave, the resistivity of this surface may be determined with a 10-100 µm spatial resolution using 80-GHz radiation. Using this technique, we map normal-sate resistivit y of 1 in x 1 in YBCO films at ambient temperature. In some films we find inhomogeneities of the normal-state sheet resistance of the order of 10%--2O%.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Back Cover (Jul. 1996, Part II [T-MTT])

*"Back Cover (Jul. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.7 (Jul. 1996, Part II [T-MTT] (Special Issue on the Microwave and Millimeter Wave Applications of High Temperature Superconductivity)): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Aug. 1996 [T-MTT])

*"Front Cover (Aug. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Full Wave Analysis of Microwave Monolithic Circuit Devices Using a Generalized Yee-Algorithm Based on an Unstructured Grid

*S.D. Gedney, F.S. Lansing and D.L. Rascoe. "Full Wave Analysis of Microwave Monolithic Circuit Devices Using a Generalized Yee-Algorithm Based on an Unstructured Grid." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1393-1400.*

A generalized Yee-algorithm is presented for the temporal full-wave analysis of microwave monolithic integrated circuit (MMIC) devices. This algorithm has the significant advantage over the traditional Yee-algorithm in that it is based on unstructured and irregular grids. Thus, using the generalized Yee-algorithm, MMIC devices that contain curved conductors or complex geometries can be more accurately and conveniently modeled using standard automatic grid generation techniques. The generalized Yee-algorithm is based on the time-marching solution of the discrete form of Maxwell's equations in their integral form. A correction scheme is introduced that is stable, maintains second-order accuracy, and maintains the divergenceless nature of the flux densities. Furthermore, by structuring the algorithm as a series of sparse matrix-vector multiplications, the generalized Yee-algorithm can be efficiently implemented on vector or parallel high performance computers.

# Abstracts

## Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator

*P.J. Matthews, T. Berenc, F. Schoenfeld, A.D. Feinerman, Y.W. Kang and R. Kustom. "Electromagnetic Field Measurements on a Millimeter Wave Linear Accelerator." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1401-1409.*

Perturbational field strength measurements suitable for use on a proposed 120-GHz 50-MeV electron linear accelerator are described. The measurements are used to determine the R/Q of the device, where R is the shunt impedance. The perturbation is achieved by the use of hollow metallic cylinders with diameters ranging from 25 to 127 µm which are approximately 500 µm long. The cylinders were fabricated by sputtering aluminum through a shadow mask onto silica optical fibers as well as nylon surgical thread. The perturbational "form factors" for such a geometry are experimentally determined using a pillbox cavity. The measured values for the form factors are compared to theoretical estimations, which result in simple analytical expressions. The measured form factors are also compared to values calculated from a finite difference model of the perturbing object. The R/Q for various accelerating modes is measured on a 12GHz model of the 120-GHz structure. Results are compared to predictions from a finite difference model of the accelerating structure.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Propagation Characteristics of the Magnetostatic Surface Wave in the YBCO-YIG Film-Layered Structure

*M. Tsutsumi, T. Fukusako and S. Yoshida. "Propagation Characteristics of the Magnetostatic Surface Wave in the YBCO-YIG Film-Layered Structure." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1410-1415.*

Propagation characteristics of the magnetostatic surface wave (MSSW) in a YBa/sub 2/CU/sub 3/O/sub 7-x/ (YBCO)-yttrium iron garnet (YIG) multilayered structure are investigated. Effects of the superconductor on the MSSW are discussed with regard to the dispersion characteristics of both the phase and attenuation constants as a function of the air gap between YIG and YBCO, taking into consideration the magnetic line-width of the YIG film. It was found that the nonreciprocity of MSSW is enhanced significantly by the superconductivity and depends on the magnetic line-width of the YIG film. To examine the effect of a YBCO on the MSSW propagation, experiments are carried out using a commercially available YIG film. Magnetic losses at low temperature are briefly discussed with experimentally observed nonreciprocity.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure

*J. Liu, J.K. Butler, G.A. Evans and A. Rosen. "Analysis of Millimeter Wave Phase Shifters Coupled to a Fixed Periodic Structure." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1416-1423.*

The propagation characteristics of an active plasma-induced millimeter wave phase shifter coupled to a fixed periodic structure are discussed. The numerical calculation is based on an improved boundary value solution. Like a normal dielectric slab waveguide with a plasma layer, the grating waveguide displays a phase shift with the increase of the plasma density. This phase shift due to the significant change of the field distribution has an impact on the modal attenuation coefficient. It results in the scanning of the radiation beam in the vicinity of the second Bragg. Especially, at both weak and strong plasma densities when the mode losses are small, the resonances caused by the periodic structure do not appear to be weakened. The results can be used to design electronically controllable millimeter wave scanning antennas.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept

*K. Maruhashi, M. Madihian, L. Desclos, K. Onda and M. Kuzuhara. "A K-Band Monolithic Oscillator Integrated with a Buffer Amplifier Using a Device-Circuit Interaction Design Concept." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1424-1428.*

We report on a high power, high efficiency, and small-size monolithic coplanar waveguide oscillator incorporating a single-stage buffer amplifier on the same chip. For the oscillator design, by changing RF current level through the device, the optimum load line was chosen in order to have an oscillation frequency insensitive to the effect of the subsequently connected amplifier, based on a device-circuit interaction concept. The amplifier, on the other hand, which was driven directly by the oscillator, was designed to achieve an overall high power and high efficiency operation. At 21 GHz, the output power of the developed chip recorded 17 dBm with an overall dc-RF efficiency of 22%. By changing the length of a source feedback line, the oscillation frequency was varied from 21 GHz to 26 GHz. For all cases, the output power remained higher than 16 dBm.

# Abstracts

## Decoupling the Multiconductor Transmission Line Equations

*C.R. Paul. "Decoupling the Multiconductor Transmission Line Equations." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1429-1440.*

A comprehensive discussion of the method of decoupling the multiconductor transmission line (MTL) equations by the method of transformation of the voltages and currents to mode voltages and currents in order to obtain their general solution is presented. Various ways of defining and obtaining the transformations are shown which serve to connect the myriad of such definitions and also point out where inconsistencies in those definitions can result. Structures for which the decoupling is assured are also discussed. The MTL equations to be decoupled are in the frequency domain, and extensions to their applicability in the time-domain are shown.

# Abstracts

## Regular Boundary Integral Formulation for the Analysis of Open Dielectric/Optical Waveguides

*Y. Kagawa, Y. Sun and Z. Mahmood. "Regular Boundary Integral Formulation for the Analysis of Open Dielectric/Optical Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1441-1450.*

Regular boundary element method is employed for the variational formulation of Hehnholtz equation that governs the waveguiding problems. The problems are defined on the boundary as usual, but like in the charge simulation method, the source points associated with the fundamental solutions are allocated outside the domain so that the singular integrals which occur in the standard boundary element procedure can be avoided. First, the formulation is developed for the two-dimensional (2D) scalar Helmholtz problem solving for the axial components of either electric or magnetic fields. Then the formulation is extended for the analysis of dielectric waveguides of open type incorporating axial components of both electric and magnetic fields, for the solution of the propagating modes which are generally of hybrid types. Very close agreements have been found when the solutions obtained by the present formulation are compared with the ones obtained by different methods. One merit of the extended formulation is that it has been fixed to suppress the spurious solutions.

# Abstracts

## The Electric Quadruple Contribution to the Circular Birefringence of Nonmagnetic Anisotropic Chiral Media: A Circular Waveguide Experiment

*I.P. Theron and J.H. Cloete. "The Electric Quadruple Contribution to the Circular Birefringence of Nonmagnetic Anisotropic Chiral Media: A Circular Waveguide Experiment." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1451-1459.*

Constitutive relations which include electric quadruple terms, in addition to electric and magnetic dipole terms, are used to describe the "optical activity" in particular the circular birefringence, of an anisotropic chiral medium which is nonmagnetic. The resulting permittivity and chirality tensors are then used to predict the rotation of the polarization plane of a linearly polarized wave propagating in a circular waveguide filled with the medium. The numerical predictions were tested by measurements between 2.4 and 4 GHz on a 2 m long artificial crystal in a circular waveguide and it was found that the rotation of the polarization was within 13% of the predicted value-good agreement after considering the possible sources of error. It is thus established that the effect of electric quadruples must be included when modeling the optical activity of anisotropic chiral media in the long wavelength regime. The anisotropic chiral media which are dealt with here can be classified according to the crystallographic point groups to which they belong, and they may therefore also be considered to be artificial crystals.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Prelaunch Calibration of the Advanced Microwave Sounding Unit-A for NOAA-K

*T. Mo. "Prelaunch Calibration of the Advanced Microwave Sounding Unit-A for NOAA-K." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1460-1469.*

The thermal-vacuum chamber calibration data from the advanced microwave sounding unit-A (AMSU-A) for NOAA-K, which will be launched in 1997, were analyzed to evaluate the instrument performance, including calibration accuracy, nonlinearity, and temperature sensitivity. Particularly, the nonlinearity parameters which will be used for correcting the nonlinear contributions from an imperfect square-law detector were determined from this data analysis. It was found that the calibration accuracies (differences between the measured scene radiances and those calculated from a linear two-point calibration formula) are polarization-dependent. Channels with vertical polarizations show little cold biases at the lowest scene target temperature 84 K, while those with horizontal polarizations all have appreciable cold biases, which can be up to 0.6 K. It is unknown where these polarization-dependent cold biases originate, but the instrument's manufacturer suggests that the source of the observed biases is probably due to some low-level coherent radiation leakage from the instrument itself. The existence and magnitude of nonlinearities in each channel were established and a quadratic formula for modeling these nonlinear contributions was developed. The model was characterized by a single parameter u, values of which were obtained for each channel via least-squares fit to the data. Using the best-fit u values, we performed a series of simulations of the quadratic corrections which would be expected from the space data after the launch of AMSU-A on NOAA-K. In these simulations, the cosmic background temperature of 2.73 K (instead of 84 K that was used in the thermal-vacuum chamber test) was adopted as one of the two reference points of calibration. The largest simulated nonlinear correction is about 0.3 K, which occurs at channel 15 when the instrument temperature is at 38° C. Others are less than 0.2 K in the remaining channels.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## TE and TM Modes in Cylindrical Metallic Structures Filled with Bianisotropic Material

*R.D. Graglia, M.S. Sarto and P.L.E. Uslenghi. "TE and TM Modes in Cylindrical Metallic Structures Filled with Bianisotropic Material." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1470-1477.*

Modal propagation is studied for metallic circular waveguides, coaxial cables and sectoral waveguides filled with linear bianisotropic material. By representing the material constitutive tensors in cylindrical coordinates, the conditions under which TE and TM modal decoupling occurs are obtained, and second-order differential equations for the longitudinal field components are derived. Though the TE and TM longitudinal field components are expressible in terms of hypergeometric functions, a complete numerical solution scheme is, in general, more convenient. Conventional application of finite elements renders the differential problem numerically equivalent to a generalized eigenvalue matrix problem, whose solution yields the dispersion relation and cutoff frequencies of the waveguides together with the eigenfields expression. The effects one can obtain by varying the various coefficients of the constitutive tensors are illustrated by several numerical results.

# Abstracts

## Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators

*J. Verdier, O. Llopis, R. Plana and J. Graffeuil. "Analysis of Noise Up-Conversion in Microwave Field-Effect Transistor Oscillators." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1478-1483.*

The conversion process of the low frequency noise into phase noise in field-effect transistors (FET) oscillators is investigated. First, an evaluation of the baseband noise contribution to the oscillator phase noise is provided from the analysis of the baseband noise and the frequency noise spectra. A distinction is made within the different components of the low frequency noise contributions to close-in carrier phase noise. Next, the frequency noise of the oscillator circuit is analyzed in terms of the FET's low frequency noise multiplied by the oscillator's pushing factor. Though this product usually provides a good evaluation of the phase noise, experimental results presented here show the inaccuracy of this method at particular gate bias voltages where the pushing factor decreases to zero. To account for these observations, a new nonlinear FET model involving at least two noise sources distributed along the channel is proposed.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)

*J. Harari, G.H. Jin, F. Journet, J. Vandecasteele, J.P. Vilcot, C. Dalle, M.R. Friscourt and D. Decoster. "Modeling of Microwave Top Illuminated PIN Photodetector Under Very High Optical Power (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1484-1487.*

In this paper, we present a theoretical study and a numerical simulation of a classical long wavelength top illuminated PIN photodetector for microwave applications under very high optical power. The modeling includes a monodimensional drift-diffusion model for the device and takes into account the external circuit. At first, this modeting is validated using experimental results from the literature. Second, we consider a classical InP/GaInAs/InP photodiode grown on N/sup +/ InP substrate. The presented results show that the distortion and the saturation of the microwave signal at 20 GHz are due to the space charge effect in the photodetector and also to the depolarization of the device because of the external circuit. The main parameter influencing these phenomena are the optical power, the bias voltage, the optical spot width and the modulation depth. In case of small optical spot, the effect of the external circuit is neglectable, while it contributes to the decrease of the microwave responsivity in case of large spot. The maximum output power is calculated in different cases and we can expect up to 12 dBm microwave ontput power for a 5 V reverse bias voltage.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Improvements of the Two-Dimensional FDTD Method for the Simulation of Normal- and Superconducting Planar Waveguides Using Time Series Analysis (Short Papers)

*S. Hofschen and I. Wolff. "Improvements of the Two-Dimensional FDTD Method for the Simulation of Normal- and Superconducting Planar Waveguides Using Time Series Analysis (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1487-1490.*

Time-domain simulation results of two-dimensional (2-D) planar waveguide finite-difference time-domain (FDTD) analysis are normally analyzed using Fourier transform. The introduced method of time series analysis to extract propagation and attenuation constants reduces the desired computation time drastically. Additionally, a nonequidistant discretization together with an adequate excitation technique is used to reduce the number of spatial grid points. Therefore, it is possible to simulate normal- and superconducting planar waveguide structures with very thin conductors and small dimensions, as they are used in MMIC technology. The simulation results are compared with measurements and show good agreement.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Three-Port Hybrid Power Dividers Terminated in Complex Frequency-Dependent Impedances (Short Papers)

*S. Rosloniec. "Three-Port Hybrid Power Dividers Terminated in Complex Frequency-Dependent Impedances (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1490-1493.*

A new CAD algorithm for design of two- and four-section three-port hybrid power dividers terminated with complex frequency-dependent impedances is described. The dividers under consideration are composed of lumped element resistors and noncommensurate transmission line sections whose characteristic impedances take extreme, practically realizable, values. These values are assumed freely at the beginning of a design process. The validity of the presented design algorithm has been confirmed by numerical modeling and experimentation.

# Abstracts

## Field Distributions in Supported Coplanar Lines Using Conformal Mapping Techniques (Short Papers)

*N.H. Zhu, E.Y.B. Pun and P.S. Chung. "Field Distributions in Supported Coplanar Lines Using Conformal Mapping Techniques (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1493-1496.*

We use conformal mapping techniques to derive the analytical expressions for calculating the field distributions in supported coplanar lines. Our calculations agree well with the results obtained using the point matching method. Our method is an extension of the approximate technique proposed by Veyres and Hanna, and provides an accurate and fast calculation of the field distributions. This method can be extended to the analysis of other coplanar lines widely used in monolithic microwave integrated circuits (MMIC) and optical integrated circuits (OIC) applications.

# Abstracts

## Network Representation and Transverse Resonance for Layered Chirowaveguides (Short Papers)

*X. Shanjia and D. Kai. "Network Representation and Transverse Resonance for Layered Chirowaveguides (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1496-1499.*

This paper presents an equivalent network method for dispersion analysis of general chirowaveguides. First, wave propagation in each homogeneous layer is represented by two pairs of transmission lines, the matrix wave impedance is defined. Next, the transformation properties of the input impedance are established. It is then demonstrated that the transverse resonance condition involving the previously obtained matrix impedance leads to the dispersion equation for the waveguides. The numerical results show that this network approach is feasible and practicable.

# Abstracts

## Fast and Efficient Extraction of HBT Model Parameters Using Multibias S-Parameter Sets (Short Papers)

*S. Lee. "Fast and Efficient Extraction of HBT Model Parameters Using Multibias S-Parameter Sets (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1499-1502.*

Accurate parameter extraction technique has been presented for a small-signal equivalent circuit model of AlGaAs/GaAs HBT's. This technique makes use of multibias data optimization regarding two sets of S-parameters in the active mode and one in the cut-off mode, under the physics-based constrain that current-dependent elements in two active bias circuits are linked each other by the ratio of their currents. This multibias optimization as well as the constrain imposed on intrinsic parameters may reduce the degree of freedom of circuit variables and increase the probability of finding a global minimum result. As a result of this extraction, good agreement is seen between the circuit models and their measured S-parameters in the frequency range of 0.045 to 26.5 GHz.

# Abstracts

## An Optimization Approach to the Frequency-Domain Inverse Problem for a Nonuniform LCRG Transmission Line (Short Papers)

*M. Norgren and S. He. "An Optimization Approach to the Frequency-Domain Inverse Problem for a Nonuniform LCRG Transmission Line (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1503-1507.*

The inverse problem for a nonuniform LCRG transmission line is considered in the frequency domain. Imbedding equations for the reflection and transmission coefficients are derived through the concept of wave-splitting. An optimization approach is applied to reconstruct the line parameters as functions of the position using band-limited reflection and/or transmission data. Exact and explicit expressions for the gradients are derived, and the reconstruction algorithm (based upon a conjugate gradient method) is tested with both clean and noisy data. The problem of the nonuniqueness is also discussed.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Towards a Generalized TLM Algorithm for Solving Arbitrary Reciprocal and Nonreciprocal Planar Structures (Short Papers)

*J. Huang and K. Wu. "Towards a Generalized TLM Algorithm for Solving Arbitrary Reciprocal and Nonreciprocal Planar Structures (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1508-1511.*

A generalized transmission line matrix (TLM) algorithm is developed in the frequency domain to tackle arbitrary both reciprocal and nonreciprocal anisotropic waveguiding problems. In particular, the modeling issue for arbitrary planar structures is stressed in this work. A new three-dimensional (3-D) condensed node is used to consider the effect of both electric and magnetic constitutive tensors. Various results indicate how the modal dispersive behavior can be manipulated by changing not only the anisotropic characteristics of the substrate, but also the strip/slot geometry as well as the magnitude and orientation of the applied static magnetic field. The present algorithm is useful for CAD and simulation of a large class of gyrotropic waveguide-based microwave and millimeter-wave circuits.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Electromagnetic Boundary Value Problem in the Presence of a Partly Lossy Dielectric: Considerations About the Uniqueness of the Solution (Short Papers)

*S. Caorsi and M. Raffetto. "Electromagnetic Boundary Value Problem in the Presence of a Partly Lossy Dielectric: Considerations About the Uniqueness of the Solution (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1511-1513.*

This paper deals with the uniqueness of the solution of a boundary value problem defined by specifying the tangential components of the electric field over the closed regular boundary (or the tangential components of the magnetic field over the boundary, or the former components over part of the boundary and the latter components over the rest of the boundary) of a limited region containing a linear dielectric material not lossy everywhere. In particular, the uniqueness of the solution is proved in the case where the dielectric is everywhere linear, homogeneous, and lossless, except for a subregion where the dielectric is lossy, linear but not necessarily homogeneous.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Measurement of Simple Resonant Equivalent Circuits for Microstrip Antennas (Short Papers)

*S.J. Weiss and W.K. Kahn. "Measurement of Simple Resonant Equivalent Circuits for Microstrip Antennas (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1513-1516.*

This paper presents a procedure which can be used to model the input admittance of a probe-fed microstrip antenna using simple circuit components. The values of the components are extracted from experimental data and represent the antenna about any resonant mode. A good circuit description of the antenna can greatly facilitate system analysis.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Capacitance Computations in a Multilayered Dielectric Medium Using Closed-Form Spatial Green's Functions (Corrections)

*K.S. Oh, D. Kuznetsov and J.E. Schutt-Aine. "Capacitance Computations in a Multilayered Dielectric Medium Using Closed-Form Spatial Green's Functions (Corrections)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1517-1517.*

In the above paper, several misprints were found, and they are corrected below.

# Abstracts

## Direct Synthesis of Cascaded Quadruplet (CQ) Filters (Corrections)

*R. Levy. "Direct Synthesis of Cascaded Quadruplet (CQ) Filters (Corrections)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1517-1517.*

In the above paper the value of C/sub 20/ in the caption to Fig. 7(a) should be 1.40406.

## Complex Power and Mode Coupling in Circular Chirowaveguides (Corrections)

*G. Busse and A.F. Jacob. "Complex Power and Mode Coupling in Circular Chirowaveguides (Corrections)." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1517-1517.*

In the above paper, some typographical errors need to be corrected as follows.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - Microwave and Millimeter-Wave Photonics II (Aug. 1996 [T-MTT])

*"Call for Papers - Microwave and Millimeter-Wave Photonics II (Aug. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1518-1518.*

# Abstracts

## Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Aug. 1996 [T-MTT])

*"Directions for the Next Generation of MMIC Devices and Systems (Advertisement) (Aug. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1519-1519.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Information for Authors (Aug. 1996 [T-MTT])

*"Information for Authors (Aug. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): 1520-1520.*



Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Aug. 1996 [T-MTT])

*"Back Cover (Aug. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.8 (Aug. 1996 [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Sep. 1996 [T-MTT])

*"Front Cover (Sep. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): f1-f2.*

# Abstracts

## Low Frequency Leaky Regime in Covered Multilayered Striplines

*F. Mesa and R. Marques. "Low Frequency Leaky Regime in Covered Multilayered Striplines." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1521-1525.*

This work studies the low frequency leakage of power in covered multilayered striplines including the possibility of several conductors on different interfaces. The appearance and features of the lateral radiation is discussed, assuming that only one parallel-plate waveguide mode is above cutoff. Comparison with quasi-TEM results shows that some leaky waves behave like quasi-TEM modes with radiation losses. Lateral radiation and ohmic conductor losses are also compared.

# Abstracts

## Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques

*M.A. Kolbehdari, M. Srinivasan, M.S. Nakhla, Q.-J. Zhang and R. Achar. "Simultaneous Time and Frequency Domain Solutions of EM Problems Using Finite Element and CFH Techniques." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1526-1534.*

This paper describes an efficient method for both time- and frequency-domain solutions of electromagnetic (EM) field problems. In this method EM field problems are formulated using Laplace-domain finite element approach and are solved using complex frequency hopping (CFH) technique. CFH is a moment-matching technique which has been used successfully in the circuit simulation area for solution of large set of ordinary differential equations. Problems consisting of Dirichlet, Neumann and combined boundary conditions can be solved using the proposed algorithm to obtain both time and frequency responses. Several electromagnetic field problems have been studied using the new technique and the speed-up advantage (one to three orders of magnitude) compared to conventional finite element technique is demonstrated. A good agreement between numerical results obtained using the proposed method and the previously published results has been found.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Application of a Simple and Efficient Source Excitation Technique of the FDTD Analysis of Waveguide and Microstrip Circuits

*A.P. Zhao and A.V. Raisanen. "Application of a Simple and Efficient Source Excitation Technique of the FDTD Analysis of Waveguide and Microstrip Circuits." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1535-1539.*

A simple, efficient, and unified source excitation scheme for the finite-difference time-domain (FDTD) analysis of both waveguides and microstrip circuits is developed and validated. In this scheme, by moving the source plane several cells inside the terminal plane and adding the excitation wave as an extra term in the FDTD equation, the interaction between the excitation and reflected waves are totally separated in time domain. Hence, for both waveguide and microstrip discontinuities, absorbing boundary conditions can be applied on the terminal plane directly. In particular, for microstrip circuits, our scheme does not induce any source distortions when a simplified field distribution is used as the excitation. Consequently, the terminal plane can be moved very close to the discontinuity and thus significant computational savings are achieved. In addition, for microstrip systems, the validity and efficiency of the Mei's simplified field distribution are evaluated and confirmed for the first time.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Analysis and Design of Feeding Structures for Microstrip Leaky Wave Antenna (Sep. 1996 [T-MTT])

*Y.D. Lin, J.-W. Sheen and C.-K.C. Tzuang. "Analysis and Design of Feeding Structures for Microstrip Leaky Wave Antenna (Sep. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1540-1547.*

Three arrangements of the feeding structure for the excitation of a microstrip leaky wave antenna are proposed and investigated in this paper. A full-wave spectral domain integral equation method combined with the fundamental mode sampling technique is applied to determine the reflection coefficient of the excitation source. Tabulation technique is used to reduce the computational effort. Dependence on structural parameters such as line width, line spacing and overlap length is fully analyzed to obtain the design criteria for a microstrip leaky wave antenna. Additionally, an experimental setup is used to check the validity of our numerical results and verify the radiation nature of the microstrip line first higher-order mode.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver

*C.-Y.E. Tong, R. Blundell, S. Paine, D.C. Papa, J. Kawamura, X. Zhang, J.A. Stern and H.G. LeDuc. "Design and Characterization of a 250-350-GHz Fixed-Tuned Superconductor-Insulator-Superconductor Receiver." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1548-1556.*

A fixed-tuned superconductor-insulator-super-conductor (SIS) receiver has been designed to operate in the 250-350-GHz frequency band. This receiver has a double-sideband noise temperature of between 35 and 45 K, or about 3hv/kB, over its entire operating band. Extensive characterization of the receiver has been carried out using techniques developed for submillimeter waves. The input noise, side-band ratio, 1 dB compression point, optimum LO drive level, and vector near-field beam profile have all been measured experimentally. The measurement techniques and results are presented and discussed.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A New Model for Microwave Characterization of Composite Materials in Guided-Wave Medium

*S. Lefrancois, D. Pasquet and G. Maze-Merceur. "A New Model for Microwave Characterization of Composite Materials in Guided-Wave Medium." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1557-1562.*

A method of determining the permittivity and the permeability of heterogeneous materials from microwave measurement in a coaxial line or in a rectangular waveguide is presented. Fluctuations are observed in the curves of the transmission and reflection coefficients measured in a guided space cell which are caused by the propagation of modes higher than lowest order. The measuring cell containing the sample is represented by an unperturbed line in series with resonators which model the coupling between the sample and the measurement cell for each higher mode resonating inside the sample. Finally, the intrinsic characteristics of the material are computed from the data for the unperturbed line. Results for several composite materials and measurement cells are presented to demonstrate the capabilities of this model.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Complex Media Microstrip Ridge Structures: Formulation and Basic Characteristics of Ferrite Structures

*G.W. Hanson. "Complex Media Microstrip Ridge Structures: Formulation and Basic Characteristics of Ferrite Structures." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1563-1568.*

Microstrip transmission lines residing on bianisotropic material ridges embedded in a multilayered environment are studied using a coupled set of integral equations (IE's). The full-wave IE formulation accounts for general linear media in the ridge region using equivalent polarization currents residing in a multilayered bianisotropic background. Numerical results showing basic propagation characteristics are presented for a variety of single and coupled ferrite ridge structures. It is shown that the use of finite width ferrite ridges as either substrates or superstrates can produce nonreciprocity while confining the ferrite material to a small area in the vicinity of the transmission line.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

Click on title for a complete paper.

# Abstracts

## Optimum Mesh Grading for Finite-Difference Method

*W. Heinrich, K. Beilenhoff, P. Mezzanotte and L. Roselli. "Optimum Mesh Grading for Finite-Difference Method." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1569-1574.*

The coarseness error of the finite-difference (FD) method is studied analyzing a typical planar waveguide and a rectangular coaxial geometry. Results for equidistant and graded mesh are compared in terms of accuracy and numerical efforts. Because of the field singularities involved a graded mesh proves to be superior compared to the equidistant case. A grading strategy with optimum efficiency is presented. Furthermore, the results show that the most significant improvement in accuracy can be obtained by incorporating the edge behavior into the FD scheme.

# Abstracts

## The Eigenfunction Expansion of Dyadic Green's Functions for Chirowaveguides

*H.-T. Hui and E.K.N. Yung. "The Eigenfunction Expansion of Dyadic Green's Functions for Chirowaveguides." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1575-1583.*

A general method of formulating eigenfunction expansion of dyadic Green's functions in lossless, reciprocal and homogeneous chirowaveguides is presented. Bohren's decomposition of the electromagnetic field is used to obtain the vector wavefunctions. The method of G/sub m/ is used to rigorously derive the magnetic and electric dyadic Green's functions. A specific application to the cylindrical chirowaveguide illustrates the method.

# Abstracts

## Analytical Nonlinear HEMT Model for Large Signal Circuit Simulation (Short Papers)

*T. Tanimoto. "Analytical Nonlinear HEMT Model for Large Signal Circuit Simulation (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1584-1586.*

A new nonlinear high electron mobility transistor (HEMT) model based on Curtice model is described. This model introduces term for leakage current for subthreshold bias, drain voltage dependencies of knee voltage, drain conductance and threshold voltage, transconductance enhancement at high frequencies caused by DX centers, and the bias dependence of capacitance. Applying this model to pseudomorphic double-recessed gate HEMT's, average error of 2.6% for dc current and 10% for S-parameters yields.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Quasi-TEM Analysis of Coplanar Waveguides with an Inhomogeneous Semiconductor Substrate (Short Papers)

*J.-F. Kiang. "Quasi-TEM Analysis of Coplanar Waveguides with an Inhomogeneous Semiconductor Substrate (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1586-1589.*

In this paper, we study the normalized wavelength and attenuation constant of coplanar waveguides with a finite metal thickness. The substrate is a lossy inhomogeneous insulator-semiconductor, and the conductor is assumed perfect. Electroquasistatic approximation is used to derive a Laplace's equation with a complex permittivity in each inhomogeneous layer, from which the eigenmodes are obtained. Proper boundary conditions between contiguous layers are applied to calculate the charge distribution on the center conductor. The effects of the insulator depth and semiconductor conductivity on the normalized wavelength and attenuation constant are analyzed.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)

*D. Sanchez-Hernandez, Q.H. Wang, A.A. Rezazadeh and I.D. Robertson. "Millimeter-Wave Dual-Band Microstrip Patch Antennas Using Multilayer GaAs Technology (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1590-1593.*

This paper describes the performance and construction of several multiband integrated microstrip antennas around 35 GHz on in-house semi-insulating multilayer GaAs. The simulated and measured input impedances and radiation patterns at both the lower and upper resonant frequencies are given and some experimental results are provided to check the accuracy of the electromagnetic simulations.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)

*M. Stotz, G. Gottwald, H. Haspeklo and J. Wenger. "Planar Millimeter-Wave Antennas Using SiN/sub x/-Membranes on GaAs (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1593-1595.*

Planar aperture coupled microstrip antennas for 77 GHz are demonstrated for the first time, As far as possible standard GaAs monolithic microwave/millimeter-wave integrated circuit (MMIC) technology is used to realize the antennas. The antenna patches are suspended on a thin dielectric SiN/sub x/ membrane on GaAs substrate. Therefore a novel plasma-enhanced chemical vapor deposition (PECVD) process step for the fabrication of the membranes is developed and described. The single antenna patches are coupled to a microstrip line through an aperture in the ground metallization. The method of moments in spectral domain is applied to design the patches. The feed network of a 3 x 1 antenna array for homogeneous excitation is simulated and optimized with a microwave design system (MDS). From reflection measurements the operation frequency of this triple patch antenna is determined to be 77.6 GHz. The farfield antenna characteristics are measured in an anechoic chamber, showing good agreement between simulated and measured results and a co- to cross-polarization isolation better than 30 dB.

# Abstracts

## Application of the Spatial Finite-Difference and Temporal Differential (SFDTD) Formulation to Cylindrical Structure Problems (Short Papers)

*A.M.K. Chan and Z. Chen. "Application of the Spatial Finite-Difference and Temporal Differential (SFDTD) Formulation to Cylindrical Structure Problems (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1595-1600.*

The recently developed spatial finite-difference and temporal differential (SFDTD) approach is extended to dielectric loaded cylindrical environments. Although the method is developed differently, its resultant formulation can be directly obtained from the corresponding finite-difference time-domain (FD-TD) method. Good agreements between the SFDTD and reference results are obtained for different configurations of dielectric loaded cylindrical structures. As a result, the SFDTD approach is shown to be generally effective and robust for resonant structures.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Analysis of a Double Step Microstrip Discontinuity in the Substrate Using the 3-D-FDTD Method (Short Papers)

*J.C. Chun and W.S. Park. "Analysis of a Double Step Microstrip Discontinuity in the Substrate Using the 3-D-FDTD Method (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1600-1602.*

The finite-difference time-domain (FDTD) method has been applied to the analysis of a double step microstrip discontinuity having thickness changes in the longitudinal direction. The discontinuity occurs in patch antenna feeds or interconnections between microwave planar circuit modules. The simulation results are compared with those computed by HFSS to show a good agreement. An equivalent circuit for the double step discontinuity is developed from the scattering parameters computed by the FDTD method.

# Abstracts

## New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)

*T.M. Weller, L.P.B. Katehi, M.I. Herman, P.D. Wamhof, K. Lee, E.A. Kolawa and B.H. Tai. "New Results Using Membrane-Supported Circuits: A Ka-Band Power Amplifier and Survivability Testing (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1603-1606.*

This paper describes recent results which pertain to the integration and reliability testing of micromachined, membrane-supported transmission line circuits. These circuits employ a 1.4-µm-thick dielectric membrane to support thin-film conducting lines above an air substrate. With regard to integration, the development of a Ka-band solid state power amplifier (SSPA) is presented. The design includes a membrane-supported Wilkinson power divider/combiner with 0.2 dB loss, along with a commercially available monolithic microwave/millimeter wave integrated circuit (MMIC) amplifier stage. Also reported are tests which investigated the survivability of membrane lines under space qualification conditions. No failures occurred as a result of thermal cycling and vibration testing at levels which reached 39.6 grms.

# Abstracts

## Axisymmetric Modes of Cylindrical Resonators with Cascaded Inhomogeneous Dielectrics (Short Papers)

*J.-F. Kiang. "Axisymmetric Modes of Cylindrical Resonators with Cascaded Inhomogeneous Dielectrics (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1606-1610.*

A generic numerical scheme is developed to calculate the resonant frequency of axisymmetric modes in an inhomogeneous cylindrical dielectric resonator. The resonator consists of sections of cylindrically stratified dielectrics within a cylindrical waveguide. In each section, the TM/sub 0m/ and TE/sub 0m/ waveguide modes are solved by expanding the H/sub Phi/ and E/sub Phi/ components in terms of the eigenmodes in an empty waveguide. The fields in each section are then expanded in terms of these TM/sub 0m/ and TE/sub 0m/ modes. The transverse resonance technique is then applied to obtain the resonant frequencies. Comparison with literatures validates the effectiveness of this approach. Results with continuous dielectric profiles are also obtained.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)

*Y.A. Dryagin, V.V. Parshin, A.F. Krupnov, N. Gopalsami and A.C. Raptis. "Precision Broadband Wavemeter for Millimeter and Submillimeter Range (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1610-1613.*

A precise, broadband, Fabry-Perot wavemeter has been designed and built to measure wavelengths in the millimeter and submillimeter range. The design of the wavemeter is novel in that it enhances the fundamental mode over a wide band and permits determination of the exact longitudinal index of the mode. With the use of an exact mode number in wavelength calculations, high measurement accuracies, to the extent permissible by the quality factor of the resonator, can be obtained. The wavemeter was tested by measuring well-known spectral lines of the OCS molecule in the frequency range of 72-607 GHz. Measurement of 24 OCS lines demonstrated an accuracy of better than 2 x 10/sup -5/ in relative units and 0.87 x 10/sup -5/ in rms units for frequency/wavelength. A discussion of further development and automation of the wavemeter is included.

# Abstracts

## A CAD-Suitable Approach for the Analysis of Nonuniform MMIC and MHMIC Transmission Lines (Short Papers)

*A.H. Hamade, A.B. Kouki and F.M. Ghannouchi. "A CAD-Suitable Approach for the Analysis of Nonuniform MMIC and MHMIC Transmission Lines (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1614-1617.*

A new method of moment-based formulation for the solution of the telegraphist's equations in nonuniform transmission lines is presented. Entire domain basis functions that build in a frequency variation are used to cover wider frequency and physical dimension ranges. The results obtained using the proposed formulation are validated by comparison to those obtained by a CAD package and to measured data. Different nonuniform lines in microstrip and coplanar technologies on monolithic microwave/millimeter wave integrated circuit (MMIC) and miniaturized hybrid microwave integrated circuit (MHMIC) substrates are investigated with an application to the design a matched taper transition in a MMIC coplanar line.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A New Edge Element Analysis of Dispersive Waveguiding Structures (Comments)

*F.A. Fernandez and Y. Lu. "A New Edge Element Analysis of Dispersive Waveguiding Structures (Comments)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1618-1619.*

In a recent paper the authors state that the methods described in [1] and [2] (their references [12] and [13]), "cannot be directly applied to transmission lines with finite thickness and finite conductivity because of the appearance of spurious modes." This is completely erroneous. No spurious modes appear when using the transverse field formulation implemented with node-based or edge FE when applied to transmission lines with finite thickness and finite conductivity or indeed to any other waveguide (bounded or open-bounded).

# Abstracts

## A New Edge Element Analysis of Dispersive Waveguiding Structures (Authors' Reply)

*G. Pan and J. Tan. "A New Edge Element Analysis of Dispersive Waveguiding Structures (Authors' Reply)." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1618-1619.*

In response to the above comments, we wish to stress the following points.

# Abstracts

## Call for Papers - 1997 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference (Sep. 1996 [T-MTT])

*"Call for Papers - 1997 SBMO/IEEE MTT-S International Microwave and Optoelectronics Conference (Sep. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): 1620-1620.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Sep. 1996 [T-MTT])

*"Back Cover (Sep. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.9 (Sep. 1996 [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Oct. 1996, Part I [T-MTT])

*"Front Cover (Oct. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform

*S.M. Narayana, G. Rao, R. Adve, T.K. Sarkar, V.C. Vannicola, M.C. Wicks and S.A. Scott. "Interpolation/Extrapolation of Frequency Domain Responses Using the Hilbert Transform." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1621-1627.*

The Hilbert transform relates the real and the imaginary parts of the transfer function of a causal system. The objective of this paper is to illustrate how the Hilbert transform relationship can be utilized to interpolate/extrapolate measured frequency domain responses of devices. Sample numerical examples are presented to illustrate the efficacy of this method.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Modes and Their Stability of a Symmetric Two-Element Coupled Negative Conductance Oscillator Driven Spatial Power Combining Array

*Z. Ding and K. Chang. "Modes and Their Stability of a Symmetric Two-Element Coupled Negative Conductance Oscillator Driven Spatial Power Combining Array." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1628-1636.*

The modes and their stability of a symmetric two-element coupled negative conductance oscillator driven spatial power combining array were addressed theoretically. It was shown that the symmetric two-element spatial power combining array can produce two stable operation modes, one in-phase, the other 180° -out-of-phase. The theory explains all previously published experimental phenomena. Experiments done at C-band with a symmetric two-element coupled Gunn oscillator driven spatial power combining array demonstrated the validity of the theory to a certain extent. The theory can be generalized to study the modes and their stability of any coupled oscillator driven spatial power combining arrays.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Analytical Method for Determining Equivalent Circuit Parameters of GaAs FET's

*S. Yanagawa, H. Ishihara and M. Ohtomo. "Analytical Method for Determining Equivalent Circuit Parameters of GaAs FET's." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1637-1641.*

An analytical method has been developed that gives a simple and practical means of extracting small-signal equivalent circuit parameters (ECP's) of GaAs FET's with negligibly small bond-pad capacitances. Only the S-parameter measurement of the pinched-off cold field-effect transistor (FET) is enough to determine the extrinsic FET ECP's. The intrinsic FET ECP's of a medium-power Ku-band GaAs FET chip with a total gate width of 800 µm have been analytically extracted for two types of eight-element intrinsic FET models; Model 1 (Curtice model) and Model 2 that differ in the control voltage (V/sub G/) definition. Model 2 with V/sub G/ defined across the gate-source capacitance is found more appropriate judging from the smaller frequency dependence of the ECP's and a better agreement between the calculated and measured S-parameters over 2-20 GHz.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])

*R.A. Flynt, L. Fan, J.A. Navarro and K. Chang. "Low Cost and Compact Active Integrated Antenna Transceiver for System Applications (Oct. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1642-1649.*

Integrated and active antennas incorporate component functions directly at the antenna terminals thereby reducing the size, weight, and cost of many microwave systems. Active integrated antennas have been used for distributed oscillators in spatial and quasi-optical power combining arrays, but the concept can be extended to include such applications as Doppler sensors, radars, and wireless communications to produce compact, low-cost products. In this paper, we report that a field-effect transistor (FET) and a Schottky mixer diode have been integrated within an inverted patch antenna for transceiver applications. The position of the mixer diode on the patch was optimized to achieve a minimum conversion loss. Preliminary results exhibit a 5.5 dB isotropic mixer conversion loss at 6 GHz for a 200 MHz intermediate frequency. The FET serves as both the transmitter and the local oscillator at 5.8 GHz. A two-way communication system using these transceivers is proposed.

# Abstracts

## Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates

*A.C. Polycarpou, M.R. Lyons and C.A. Balanis. "Finite Element Analysis of MMIC Waveguide Structures with Anisotropic Substrates." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1650-1663.*

This paper presents an extended finite element formulation for a full-wave analysis of biaxial and transverse plane electric and magnetic anisotropic materials with application to monolithic microwave integrated circuits (MMIC's). A convenient formulation of the characteristic impedance based on a power-voltage definition is developed using vector-based finite elements. The resultant generalized eigenvalue problem is solved using a numerically efficient algorithm based on a forward iteration, taking full advantage of the sparsity of the involved matrices. Numerical results are compared and agree well with existing published data for various MMIC configurations. Two specific coplanar waveguide structures, one with a conventional and the other with a suspended substrate, are examined using four common anisotropic materials. Principal axis rotations of the anisotropic substrates are also considered to improve dominant mode dispersion characteristics and minimize higher order mode interactions.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Extensions of the Chalmers Nonlinear HEMT and MESFET Model

*I. Angelov, L. Bengtsson and M. Garcia. "Extensions of the Chalmers Nonlinear HEMT and MESFET Model." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1664-1674.*

The ability to simulate temperature, dispersion, and soft-breakdown effects as well as a new a dependence was added to the Chalmers nonlinear model for high electron mobility transistor (HEMT's) and metal semiconductor field-effect transistor (MESFET's). DC, pulsed dc, low frequency (10 Hz-10 MHz), RF, and small signal S-parameter measurements (1-18 GHz) have been made on a large number of commercial HEMT and MESFET devices from different manufacturers in the temperature range 17-400 K in order to evaluate the validity of the model extensions.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Ridge Coplanar Waveguide for Optical Amplitude Modulation

*W.A. Artuzi, Jr. and T. Yoneyama. "Ridge Coplanar Waveguide for Optical Amplitude Modulation." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1675-1678.*

A novel structure called ridge coplanar waveguide is proposed for Mach-Zhender optical modulator. Numerical modeling using a two-dimensional finite-difference time-domain (2D-FDTD) algorithm has shown that a ridge coplanar waveguide on Y-cut LiNbO/sub 3/ substrate without SiO/sub 2/ buffer layer yields very high efficiency of modulation over a wide frequency bandwidth.

# Abstracts

## Multimode Equivalent Network Representation for H- and E-Plane Uniform Bends in Rectangular Waveguide

*B. Gimeno and M. Guglielmi. "Multimode Equivalent Network Representation for H- and E-Plane Uniform Bends in Rectangular Waveguide." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1679-1687.*

Uniform bends in rectangular waveguides are frequently used components in many microwave subsystems both for ground and space applications. Their accurate and efficient full-wave characterization is therefore required for the development of modern CAD tools to analyze and design complex waveguide structures. In this paper we describe new multimode network representations for both H- and E-plane uniform bends in terms of impedance and admittance multimode coupling matrices, respectively. The key element of the network is the transition from the straight waveguide to the curved waveguide. The relevant multimode equivalent network representation is obtained following a simple procedure that has already been used with success for other types of junctions involving straight waveguides. The convergency properties of the method are discussed, and comparisons between our simulations and theoretical and experimental data are presented, indicating that the approach proposed is at the same time accurate and computationally very efficient.

# Abstracts

## Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems

*S. Kimura, Y. Imai, Y. Umeda and T. Enoki. "Loss-Compensated Distributed Baseband Amplifier IC's for Optical Transmission Systems." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1688-1693.*

We describe a distributed baseband amplifier using a new loss compensation technique for the drain artificial line. The new loss compensation circuit improves a high-frequency performance of the amplifier and makes the gain bandwidth product of the amplifier larger than that of conventional ones. We also use dc matching terminations and dumping resistors for the gate and drain artificial lines to obtain flat gain from frequencies as low as 0 Hz. One IC fabricated using 0.1 µm-gate-length InAlAs/InGaAs/InP HEMT's has a gain of 16 dB over a 0-to-50 GHz band, resulting in a gain bandwidth product of about 300 GHz. Another IC has a gain of 10 dB over a 0-to-90 GHz band. These are the highest gain bandwidth product and the widest band reported for baseband amplifier IC's applicable to optical transmission systems.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Simple Technique for the Design of MMIC 90° Phase-Difference Networks

*M. Mahfoudi and J.I. Alonso. "A Simple Technique for the Design of MMIC 90° Phase-Difference Networks." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1694-1702.*

In this paper, a simple technique for the design of broadband 90° phase-difference networks, using balanced and unbalanced all-pass network topologies, is presented. In the developed method, the element values of the structures are calculated as function of two design variables: Q/sub 0/ and r. Utilizing this approach, a 90° phase shifter has been realized, having less than 2° phase error and better than 0.5 dB amplitude error in the operating band from 0.7 to 3.5 GHz.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Capacitance of Microstrip Lines with Inhomogeneous Substrate

*J.-F. Kiang. "Capacitance of Microstrip Lines with Inhomogeneous Substrate." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1703-1709.*

A mode-matching approach combined with Galerkin's method is proposed in this paper to calculate the capacitance matrix of microstrip lines embedded in an inhomogeneous stratified medium. Eigenmodes in each layer is first solved numerically, and the potential in each layer can be expressed in terms of these eigenmodes. Coupling between two sets of eigenmodes in contiguous layers are described by defining reflection matrices. A Green's function is thus obtained in terms of these eigenmode sets to relate the potential to a line charge. Integral equation is then constructed relating the charge distribution and the imposed voltage on the microstrip surface. Galerkin's method is next applied to solve the charge distribution and hence the capacitance matrix. Several inhomogeneous profiles are studied to understand the effects of inhomogeneities on the capacitance and relevant parameters.

# Abstracts

## Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements

*D. Nghiem, J.T. Williams, D.R. Jackson and A.A. Oliner. "Existence of a Leaky Dominant Mode on Microstrip Line with an Isotropic Substrate: Theory and Measurements." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1710-1715.*

A newly discovered leaky dominant mode is reported for conventional microstrip line on an isotropic substrate, at higher frequencies. The existence of this leaky mode has been confirmed both numerically and experimentally. This new mode exists independently of, and in addition to, the customary bound dominant mode. It leaks power away from the line into the fundamental TM/sub 0/ surface wave of the surrounding grounded substrate, and may therefore be responsible for spurious microstrip circuit performance at higher frequencies. This could have important implications for millimeter-wave circuits.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Chromatic Dispersion in Fiber-Optic Microwave and Millimeter-Wave Links

*U. Gliese, S. Norskov and T.N. Nielsen. "Chromatic Dispersion in Fiber-Optic Microwave and Millimeter-Wave Links." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1716-1724.*

The influence of chromatic fiber-dispersion on the transmission distance of fiber-optic microwave and millimeter-wave links is analyzed and discussed in this paper. It is shown that dispersion significantly limits the transmission distance in intensity modulated direct detection links operating in the above 20 GHz frequency region by inducing a carrier to noise penalty on the transmitted signal. At 60 GHz, a 1 dB penalty is induced after less than 500 m transmission over standard single-mode fiber with a dispersion of 17 ps/km · nm and the signal is completely extinct after 1 km. In remote heterodyne detection links, the dispersion induces both a carrier to noise penalty and a phase noise increase on the transmitted signal. It is shown, however, that the induced carrier to noise penalty is insignificant. At 60 GHz, the induced penalty is less than 0.3 dB after 100 km transmission. The phase noise increase proves more dominant. At 60 GHz, a 150 Mbit/s QPSK signal is timited to around 10 km of transmission.

# Abstracts

## Microwave Noise Characterization of Two-Port Devices Using an Uncalibrated Tuner (Short Papers)

*R. Benelbar, B. Huyart and R.G. Bosisio. "Microwave Noise Characterization of Two-Port Devices Using an Uncalibrated Tuner (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1725-1728.*

A novel noise-parameter and S-parameter measurement system is proposed. Any device under test (DUT) can be characterized using the proposed setup. Such characterization is performed without any preset conditions on the input impedance of the noise-receiver and the repeatability of the impedance tuning mechanism. The DUT is used as a standard for tuner calibration. Measurements were carried out on a general purpose GaAs-MESFET. The extracted transistor noise-parameters are in good agreement with the manufacturer's specified values over the operating frequency band (4-8 GHz).

# Abstracts

## The Analysis of General Two-Dimensional PEC Structures Using a Modified CPFDTD Algorithm (Short Papers)

*C.J. Railton, I.J. Craddock and J.B. Schneider. "The Analysis of General Two-Dimensional PEC Structures Using a Modified CPFDTD Algorithm (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1728-1733.*

The use of the contour path finite difference time domain (CPFDTD) method with locally distorted contours has been shown to give accurate results for curved metal structures. However, the numerical stability of this scheme is not guaranteed and significant skill is required in order to generate an appropriate grid. In this contribution, we present a modification to the CPFDTD scheme which ensures stability and give a step-by-step procedure for simple generation of the distorted grid. Examples are presented to demonstrate that the modified scheme yields results superior to those obtained using the standard staircase finite difference time domain (FDTD) approach. Example geometries are cylindrical cavities having complex cross-sections with smooth surfaces and right-angle bends. The accuracy of the method is demonstrated by comparison to analytical results where available.

# Abstracts

## CAD Model for Coplanar Waveguide Synthesis (Short Papers)

*T. Deng. "CAD Model for Coplanar Waveguide Synthesis (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1733-1738.*

Accurate closed-form synthesis formulas for coplanar waveguides are presented for CAD applications, which are approximated in terms of ordinary functions. These formulas are derived, based on function approximation and curve-fitting correction of quasi-static numerical results. Comprehensive comparisons have been made by using results from the quasi-static analysis, the rigorous full-wave analysis, and the experiment available in the literature. Accuracy is found to be better than 1.5 percent for the practical range. The application range of frequency is within the limits well known for quasi-static TEM approximation and can be applied up to 20 GHz.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)

*S. Gevorgian, E. Carlsson, P. Linner, E. Kollberg, O. Vendik and E. Wikborg. "Lower Order Modes of YBCO/STO/YBCO Circular Disk Resonators (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1738-1741.*

Lower order modes in a single crystal strontium titanate (STO) circular disk resonator are studied experimentally. Superconducting epitaxial YBCO films form the parallel-plates of the resonator. Due to the extremely high dielectric constant of STO, the electric fields are concentrated between the plates, while there is a substantial magnetic fringing field which affects both the resonant frequencies, Q-factors, and tunability of all modes, especially the TM/sub 110/ and TM/sub 210/.

# Abstracts

## Transient Analysis of Tapered Lines Based on the Method of Series Expansion (Short Papers)

*Y.P. Tang and S.Y. Tang. "Transient Analysis of Tapered Lines Based on the Method of Series Expansion (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1742-1744.*

Step response of tapered lines under matched conditions is studied in detail by a novel method of series expansion. We use the concept of fall time to characterize the transient characteristics and, by using approximate formulas concerned with Gaussian pulse, response characteristics are derived which may be a guide in practical applications of tapered line. The effectiveness of the formulas is verified by numerical calculations.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Electrostatic Potential Distribution through a Rectangular Aperture in a Thick Conducting Plane (Short Papers)

*H.H. Park and H.J. Eom. "Electrostatic Potential Distribution through a Rectangular Aperture in a Thick Conducting Plane (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1745-1747.*

A potential distribution through a rectangular aperture in a thick conducting plane is examined when the incident electric field is normal to the rectangular aperture. The Fourier-transform is used to represent the potential in the spectral domain and the boundary conditions are enforced to represent a solution in closed form. Numerical computations are performed to illustrate the behavior of the potential distribution through a thick rectangular aperture. Our solution for the electric polarizabllity is represented in rapidly converging series so that it is numerically efficient.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)

*C.K. Sun, R. Nguyen, C.T. Chang and D.J. Albares. "Photovoltaic-FET for Optoelectronic RF/μwave Switching (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1747-1750.*

A photovoltaic-FET (PV-FET) is demonstrated for RF/μwave switching with performance improved over other optoelectronic switches reported while operating with 10-100 times less optical power. The PV-FET characteristics were 3 Omega on-resistance, > 30 MOmega off-resistance under <1 mW optical power, and 300 fF switch capacitance. This PV-FET was inductor tuned at 790 MHz and 7.4GHz to enhance isolation, intended for reconfigurable antenna applications. The measured insertion loss and isolation agree well with those from theoretical calculation and numerical circuit simulation based on the switch parameters. The measured switch rise and fall times were 20 μm and 2 μs, respectively. Controlled by light via opticaf fiber, the PV-FET can be used for remote RF/μwave switching control with no electrical bias, complete electromagnetic, and good thermal isolation.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - 27th European Microwave Conference + Exhibition (Oct. 1996, Part I [T-MTT])

*"Call for Papers - 27th European Microwave Conference + Exhibition (Oct. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1751-1751.*

# Abstracts

## Microwave and Millimeter-Wave Photonics II (Advertisement) (Oct. 1996, Part I [T-MTT])

*"Microwave and Millimeter-Wave Photonics II (Advertisement) (Oct. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): 1752-1752.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Oct. 1996, Part I [T-MTT])

*"Back Cover (Oct. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part I [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Oct. 1996, Part II [T-MTT])

*"Front Cover (Oct. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): f1-f2.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Editorial: Introduction to the Special Issue on Medical Application and Biological Effects of RF/Microwaves (Oct. 1996, Part II [T-MTT])

*A. Rosen and A.V. Vorst. "Editorial: Introduction to the Special Issue on Medical Application and Biological Effects of RF/Microwaves (Oct. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1753-1754.*

In recent years, there has been a dramatic increase in the utilization of microwave/radio frequency (RF) technologies in the commercial world, specifically in communications. This has resulted in the widespread availability of improved microwave/RF components and systems of much smaller sizes and at much lower prices than were previously possible. This has, in turn, resulted in a proliferation of many new ideas for the use of electromagnetic energy in medical therapies which were not previously considered practical.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia

*L. Dubois, J.-P. Sozanski, V. Tessier, J.-C. Camart, J.-J. Fabre, J. Pribetich and M. Chive. "Temperature Control and Thermal Dosimetry by Microwave Radiometry in Hyperthermia." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1755-1761.*

This paper presents a synthesis of works undertaken by the Hyperthermia Group of Lille (France) concerning the utilization of the microwave radiometry for the temperature control in hyperthermia therapy. This technique of noninvasive temperature control within the biological tissues has been integrated on many hyperthermia systems now commercialized, We describe the principle of a new radiometer as well as the calculation of radiometric signals. They allow a noninvasive determination of thermal maps inside tissues during the hyperthermia treatments. Many comparisons between theory and experiment have validated our models of thermal dosimetry whose provide a quantitative guidance for the planning of hyperthermia treatments.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination-- Theoretical Study and Animal Experimental Results

*D. Despretz, J.-C. Camart, C. Michel, J.-J. Fabre, B. Prevost, J.-P. Sozanski and M. Chive. "Microwave Prostatic Hyperthermia: Interest of Urethral and Rectal Applicators Combination-- Theoretical Study and Animal Experimental Results." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1762-1768.*

Microwave thermotherapy systems used for benign prostatic hyperplasia treatment generally operate with urethral or rectal applicator to deliver the microwave energy in the prostate. This technique does not allow an efficient heating of all the gland particularly in the case of large adenoma or when the treatment is limited to only one heating session. A solution to this problem is given by using simultaneously the rectal and urethral applicators. A complete 915-MHz microwave thermotherapy system is presented with two applicators which can operate independently or simultaneously to deliver the microwave energy in the prostate. Electromagnetic and thermal modeling have been developed for the applicator antenna optimization, to calculate the specific absorption rate (SAR) and the thermal pattern in the prostate for each applicator alone and when they operate together in phase. Different canine experiments have been performed to prove the interest of using the two applicators simultaneously as compared when they operate alone. Hystological examination cuts of the prostate gland after heating have been carried out.

# Abstracts

## FDTD Verification of Deep-Set Brain Tumor Hyperthermia Using a Spherical Microwave Source Distribution

*D. Dunn, C.M. Rappaport and A.J. Terzuoli, Jr.. "FDTD Verification of Deep-Set Brain Tumor Hyperthermia Using a Spherical Microwave Source Distribution." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1769-1777.*

Although use of noninvasive microwave hyperthermia to treat cancer is problematic in many human body structures, careful selection of the source electric field distribution around the entire surface of the head can generate a tightly focused global power density maximum at the deepest point within the brain. An analytic prediction of the optimum volume field distribution in a layered concentric head model based on summing spherical harmonic modes is derived and presented. This ideal distribution is then verified using a three-dimensional finite difference time domain (FDTD) simulation with a discretized, MRI-based head model excited by the spherical source. The numerical computation gives a very similar dissipated power pattern as the analytic prediction. This study demonstrates that microwave hyperthermia can theoretically be a feasible cancer treatment modality for tumors in the head, providing a well-resolved "hot-spot" at depth without overheating any other healthy tissue.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Use of the Field-Iteration Method in Studying the Three-Dimensional Phased Array for Electromagnetic Hyperthermia

*T. Deng. "Use of the Field-Iteration Method in Studying the Three-Dimensional Phased Array for Electromagnetic Hyperthermia." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1778-1787.*

The field-iteration method (FIM) is used for simulation of the three-dimensional (3-D) phased array for deep regional hyperthermia at a frequency of 200 MHz. The iterative equation involving the electric field integral equation is derived using the dyadic Green's function with singularities at source points. The electric field and specific absorption rate distributions in a circular cylindrical model of muscle-like medium and in a model of computerized tomography scans of a liver cancer patient are calculated, respectively, using different amplitudes and/or phases and/or positions of individual applicators of the H-horn phased array. The obtained numerical results compared with the moment method results are analyzed to assess the accuracy of the field-iteration method and also to predict the advantages of the 3-D phased array hyperthermia system.

# Abstracts

## Analysis of Focusing of Pulse Modulated Microwave Signals Inside a Tissue Medium

*K.S. Nikita and N.K. Uzunoglu. "Analysis of Focusing of Pulse Modulated Microwave Signals Inside a Tissue Medium." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1788-1798.*

The possibility to achieve focusing in a three-layer cylindrical biological tissue model, by using a large number of concentrically placed waveguide applicators and pulsed signals (~1 ns pulse width) with a high frequency (9.5 GHz) carrier is examined rigorously. The medium response to time harmonic excitation of the array is predicted, by solving the associated boundary value problem. To this end, the fields inside the tissue layers are expressed as integrals of vector cylindrical waves, satisfying the corresponding wave equations, while the fields inside the waveguides are expanded in terms of the guided and evanescent normal modes. By imposing the appropriate boundary conditions, a system of coupled integral equations is derived on the waveguide apertures, which is solved by expressing the unknown electric fields in terms of the waveguide modes and by applying a Galerkin procedure. Then, the medium response to pulse modulated excitation of the array elements is considered and the time dependence of the electromagnetic fields produced at any point within tissue is obtained in the form of an inverse Fourier integral. Numerical results are computed and presented at several points in a three-layer geometry, 20 cm in diameter, irradiated by a 30-element waveguide array and the use of time coincidence and constructive phase interference principles is examined, in order to achieve focusing at a specific point of interest within tissue.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Focusing and Impedance Properties of Conformable Phased Array Antennas for Microwave Hyperthermia

*R.M. Najafabadi and A.F. Peterson. "Focusing and Impedance Properties of Conformable Phased Array Antennas for Microwave Hyperthermia." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1799-1802.*

Phased array applicators for microwave hyperthermia are usually developed using planar, layered tissue models, and then evaluated using numerical techniques. The present investigation considers the use of a cylindrical, layered tissue model to replace the first step of the design procedure. This model facilitates an evaluation of the impact of curvature, polarization, and bolus materials on the antenna performance.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Development of Ferrite Core Applicator System for Deep-Induction Hyperthermia

*Y. Kotsuka, E. Hankui and Y. Shigematsu. "Development of Ferrite Core Applicator System for Deep-Induction Hyperthermia." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1803-1810.*

To achieve deep-induction hyperthermia, a ferrite core applicator system has been developed. The clinical goal is to produce a temperature rise of 7.5° C at 10 cm tissue depth. Deep heating becomes possible by introducing an auxiliary electrode to control an eddy current. The auxiliary electrode has been designed to optimize the eddy current with respect to the magnetic flux density. The optimization was performed by solving the fundamental equation using the finite element method (FEM). A flexible auxiliary electrode, which can be used for clinical treatments, has been manufactured. Heating tests have been conducted with the new applicator system, which operates at 4.0 MHz. The experimental results demonstrate that the system is capable of producing a temperature rise of 7.5° C at 10 cm depth, without heating an overlaying fat layer.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method

*J.-C. Camart, D. Despretz, M. Chive and J. Pribetich. "Modeling of Various Kinds of Applicators Used for Microwave Hyperthermia Based on the FDTD Method." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1811-1818.*

This paper presents the modeling using the finite difference time domain (FDTD) method of interstitial and endocavitary applicators which have been designed and developed for microwave hyperthermia treatments controlled by microwave radiometry. For each kind of applicators, the numerical results are given concerning the reflection coefficient S/sub 11/, the power deposition, and the heating patterns. These results are compared with the measurements performed on phantom models of human tissues and show a good agreement. Possibilities of future developments are discussed.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Helical Microwave Antenna for Welding Plaque During Balloon Angioplasty

*P. Liu and C.M. Rappaport. "A Helical Microwave Antenna for Welding Plaque During Balloon Angioplasty." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1819-1831.*

A catheter-based microwave helix antenna has been developed in an attempt to improve the long-term success of balloon angioplasty treatment of arteriosclerosis. When the balloon is inflated to widen vessels obstructed with plaque, microwave power is deposited in the plaque, heating it, and thereby fixing it in place. By optimizing the helix pitch angle and excitation frequency, the antenna radiation pattern can be adjusted to deposit microwave power preferentially in the plaque while avoiding overheating the healthy artery. The optimal power deposition patterns of helical antennas are analytically computed for four-layered concentric and four-layered nonconcentric cylindrical geometries, which model symmetric and asymmetric occluded arteries. Experiments were performed on occluded artery phantom models with a prototype antenna for both symmetric and asymmetric models, which matched the theoretical predictions well, indicating almost complete power absorption in the low-water-content simulated plaque.

# Abstracts

## Monopole Antennas for Microwave Catheter Ablation

*S. Labonte, A. Blais, S.R. Legault, H.O. Ali and L. Roy. "Monopole Antennas for Microwave Catheter Ablation." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1832-1840.*

We study the characteristics of various monopole antennas for microwave catheter ablation of the endocardium. The investigation is done with a computer model based on the finite-element method in the frequency domain. Three monopole geometries are considered: open-tip, dielectric-tip, and metal-tip. Calculations are made for the magnetic field, the reflection coefficient and the power deposition pattern of the antennas immersed in normal saline. The theoretical results are compared with measurements performed on prototypes and good agreement is obtained. The antenna characteristics suggest that the metal-tip monopole best fulfills the requirements of catheter ablation. The computer model is then used to compare metal-tip monopoles of different dimensions and to determine design trade-offs.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Method for the In Vitro Testing of Cardiac Ablation Catheters

*S.S. Hsu, L. Hoh, R.M. Rosenbaum, A. Rosen, P. Walinsky and A.J. Greenspon. "A Method for the In Vitro Testing of Cardiac Ablation Catheters." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1841-1847.*

We have developed a flow-phantom model in order to measure the temperature profile of radio frequency (RF) and microwave (MW) catheters. The model consists of a muscle equivalent phantom in a perfusion chamber with constant saline infusion of 4 L/miu immersed in a 37° C saline bath. RF (4 or 8 mm, 550 kHz) or MW (12 mm helical antenua, 915 MHz) catheters were placed on the surface of the phantom and various energies were applied. Temperature measurements were obtained with fiberoptic thermometry probes placed at various distances from the catheter. Temperature contours were generated, and lesion volumes were estimated using 47° C isotherm (DeltaT >= 10°C). The dosimetry of power versus DeltaT was linear. A 2.59 fold increase in power density was required to achieve a similar surface temperature with the 8 mm versus 4 mm electrode tip. The volumes of lesions created with an 8 mm electrode were 2.5x larger than those made with a 4 mm electrode at a similar surface temperature. The RF phantom data compared favorably with the lesion volumes seen in the in vivo canine left ventricular model. The temperature profile of the microwave electrode showed heating along the length of the catheter due to imperfect tuning of the antenna. Deeper heating was seen with 8 mm RF and MW electrodes than with an RF 4 mm electrode given the same surface temperature. Measurements obtained with both a static and flow-phantom model demonstrated the cooling effects of flow on surface temperature measured during power delivery. Conclusions: The flow-phantom model accurately predicts the lesion geometry but underestimates the lesion volume at higher temperature when compared to the in vivo left ventricular canine model. Static phantom models will overestimate lesion size due to the surface cooling effects of cardiac blood flow. Changes in microwave catheter design may be carefully analyzed with the flow-phantom model prior to in vivo testing.

# Abstracts

## A Finite Element Model of a Microwave Catheter for Cardiac Ablation

*Z. Kaouk, A. Khebir and P. Savard. "A Finite Element Model of a Microwave Catheter for Cardiac Ablation." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1848-1854.*

To investigate the delivery of microwave energy by a catheter located inside the heart for the purpose of ablating small abnormal regions producing cardiac arrhythmias, a numerical model was developed. This model is based on the finite element method and can solve both the electromagnetic field and the temperature distribution resulting from the radiated power for axisymmetrical geometries. The antenna, which is fed by a coaxial cable with a 2.4 mm diameter, is constituted by a monopole which is terminated by a metallic cylindrical cap. The heart model can be either homogeneous or constituted of coaxial cylindrical shells with different electrical and thermal conductivities representing the intracavitary blood masses, the heart, and the torso. Experimental measurements obtained in an homogeneous tissue equivalent medium, such as the reflection coefficient of the antenna at different frequencies and for different monopole lengths, the radial and axial steady-state temperature profiles, and the time course of the temperature rise, were all in close agreement with the values computed with the model. Accurate modeling is a useful prerequisite for the design of antennas, and these results confirm the validity of the catheter-heart model for the investigation and the development of microwave catheters.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Study of the Handset Antenna and Human Body Interaction

*M. Okoniewski and M.A. Stuchly. "A Study of the Handset Antenna and Human Body Interaction." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1855-1864.*

The antenna radiation pattern and other characteristics are significantly altered by the presence of the human body. This interaction as well as the resultant deposition of microwave power in the body (specific absorption rate--SAR) are of particular interest for cellular telephones and similar communication devices. This paper builds on and extends the previous analyses of parameters that influence the antenna-user interaction. Computer tomography (CT) and magnetic resonance imaging (MRI)-derived, high-resolution models of the human bead are used. The numerical analysis is performed with the finite-difference time-domain (FDTD) method. The specific findings are: 1) a box model of a human head provides grossly distorted and unreliable results for the antenna radiation pattern; 2) a spherical model of the human head provides results that are relatively close to those obtained with a relatively simple, but more realistic, head model; 3) the SAR values obtained with spherical or simplified head models, that do not include the ear, are greater than those for a realistic head model that includes the ear; and 4) a hand holding the handset absorbs significant amount of antenna output power, which can be considerably decreased by modifying the geometry of the handset metal box.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz

*V. Hombach, K. Meier, M. Burkhardt, E. Kuhn and N. Kuster. "The Dependence of EM Energy Absorption Upon Human Head Modeling at 900 MHz." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1865-1873.*

In this paper the dependence of electromagnetic energy absorption at 900 MHz in the human head on its anatomy and its modeling are investigated for RF-sources operating in the very close proximity of the head. Different numerical head phantoms based on MRI scans of three different adults were used with voxel sizes down to 1 $mm^3$. Simulations of the absorption were performed by distinguishing the electrical properties of up to 13 tissue types. In addition simulations with modified electric parameters and reduced degrees of complexity were performed, Thus, the phantoms greatly differ from each other in terms of shape, size, and internal anatomy. The numerical results are compared with those of measurements in a multitissue phantom and two homogeneous phantoms of different shapes and sizes. The results demonstrate that size and shape are of minor importance. Although local SAR values depend significantly on local inhomogeneities and electric properties, the volume-averaged spatial peak SAR obtained with the homogeneous phantoms only slightly overestimates that of the worst-case exposure in the inhomogeneous phantoms.

# Abstracts

## Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio

*S.-I. Watanabe, M. Taki, T. Nojima and O. Fujiwara. "Characteristics of the SAR Distributions in a Head Exposed to Electromagnetic Fields Radiated by a Hand-Held Portable Radio." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1874-1883.*

This paper presents characteristics of the specific absorption rate (SAR) distributions calculated by the finite-difference time-domain (FDTD) method using a heterogeneous and realistic head model and a realistic hand-held portable radio model. The difference between the SAR distributions produced by a 1/4-wavelength monopole antenna and those produced by a 1/2-wavelength dipole antenna is investigated. The dependence of the maximum local SAR on the distance d/sub a/ between the auricle of the head and the antenna of the radio is evaluated. It is shown that the maximum local SAR decreases as the antenna length extends from 1/4 to 1/2 of the wavelength. The maximum local SAR's in a head model with auricles are larger than those in one without auricles. The dependence of the SAR on the electrical inhomogeneity of the tissues in the head model is not significant with regard to the surface distribution and the maximum local SAR when the radio is near the head. It is also shown that the maximum local SAR is not strongly dependent on the position of the hand when the hand does not shade the antenna. Furthermore, the SAR's experimentally measured in a homogeneous head phantom are compared with the calculated SAR's.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz

*O.P. Gandhi, G. Lazzi and C.M. Furse. "Electromagnetic Absorption in the Human Head and Neck for Mobile Telephones at 835 and 1900 MHz." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1884-1897.*

We have used the finite-difference time-domain method and a new millimeter-resolution anatomically based model of the human to study electromagnetic energy coupled to the head due to mobile telephones at 835 and 1900 MHz. Assuming reduced dimensions characteristic of today's mobile telephones, we have obtained SAR distributions for two different lengths of monopole antennas of lengths lambda/4 and 3lambda/8 for a model of the adult male and reduced-scale models of 10- and 5-year-old children and find that peak one-voxel and 1-g SAR's are larger for the smaller models of children, particularly at 835 MHz. Also, a larger in-depth penetration of absorbed energy for these smaller models is obtained. We have also studied the effect of using the widely disparate tissue properties reported in the literature and of using homogeneous instead of the anatomically realistic heterogeneous models on the SAR distributions. Homogeneous models are shown to grossly overestimate both the peak 1-voxel and 1-g SAR's. Last, we show that it is possible to use truncated one-half or one-third models of the human head with negligible errors in the calculated SAR distributions. This simplification will allow considerable savings in computer memory and computation times.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## 1990-1995 Advances in Investigating the Interaction of Microwave Fields with the Nervous System

*A. Vander Vorst and F. Duhamel. "1990-1995 Advances in Investigating the Interaction of Microwave Fields with the Nervous System." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1898-1909.*

After a short review of the nervous system and its constituents, recent data on microwave bioeffects are reviewed and evaluated, in particular, the effects on the brain and the spinal cord and under low-level irradiation. Special attention is paid to new results on the effects of modulated and pulsed waves with respect to both continuous wave (CW) irradiation, and, in particular, to the frequency of the modulation. The last section is devoted to modeling and simulation of the nervous system and nervous fibers, where significant progress has been made during the last years. Except for some tutorial aspects, the reviewed literature essentially covers the 1990-1995 period.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications

*S. Caorsi, G.L. Gragnani, M. Pastorino and M. Rebagliati. "A Model-Driven Approach to Microwave Diagnostics in Biomedical Applications." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1910-1920.*

In this paper, a model-driven approach to microwave diagnostics for biological bodies is presented. The approach is developed in the space domain and is based on a numerical solution of the equation for the scalar two-dimensional (2-D) inverse-scattering problem. The aim is to use "a prior" information on the biological body under test (homogeneous along the transverse axis) in order to focus the investigation process on only one subdomain of the body, with a considerable computational saving. The method requires the numerical computation of the Green's function for an unperturbed model of the body in order to apply reconstruction techniques to a reduced investigation domain, which can be changed inside the body, with a reduction in on-line computation. The paper defines the mathematical formulation for a 2-D TM and presents the reconstructions of some schematized scatterers corresponding to living tissues.

# Abstracts

## Image Reconstruction of a Complex Cylinder Illuminated by TE Waves

*C.-C. Chiu and P.-T. Liu. "Image Reconstruction of a Complex Cylinder Illuminated by TE Waves." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1921-1927.*

The electromagnetic inverse scattering of a complex cylinder illuminated by transverse electric (TE) waves is investigated. The complex cylinder is a conductor coated by dielectric materials. A group of various unrelated TE waves is incident upon the object and the scattered fields are measured outside. With prior knowledge of the conductor's shape, the complex permittivity distribution of the dielectric materials can be reconstructed. The algorithm is based on the moment method and the unrelated illumination method. Some numerical examples are given to demonstrate the capability of the algorithm. Numerical results show that the dielectric constant and the conductivity distribution of the materials can be reconstructed even when the scattered fields are contaminated by random Gaussian noise.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Comparative Study of Four Open-Ended Coaxial Probe Models for Permittivity Measurements of Lossy Dielectric/Biological Materials at Microwave Frequencies

*D. Berube, F.M. Ghannouchi and P. Savard. "A Comparative Study of Four Open-Ended Coaxial Probe Models for Permittivity Measurements of Lossy Dielectric/Biological Materials at Microwave Frequencies." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1928-1934.*

A comparative study of four open-ended coaxial probe models which relate the coaxial line end impedance to the complex permittivity of the material under test is presented. The accuracy of the models in measuring lossy dielectric/biological material and their robustness as a function of the calibration materials are investigated. The four open-ended coaxial probe models studied are: capacitive model, antenna model, virtual line model, and rational function model. Experimental results taken on saline solutions as lossy materials are obtained for the four models.

# Abstracts

## Evaluation of Pulsed Microwave Influence on Isolated Hearts

*M. Abbate, G. Tine and L. Zanforlin. "Evaluation of Pulsed Microwave Influence on Isolated Hearts." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1935-1941.*

Long-term effects of 2.45 GHz pulsed microwaves on the electrical activity of chick embryo isolated hearts were analyzed. A new analysis procedure, derived in part from deterministic chaos studies, was carried out in order to point out dragging and regularization phenomena of the cardiac frequency, induced by pulsed microwaves. When dragging phenomena occur, results show that cardiac frequency shift on the average towards pulse's repetition rate; this means that the heartbeat maintains its statistical characteristic of frequency distribution and thus, it keeps its natural beating behavior typical of a healthy heart. Moreover in case of arrhythmia, when the regularization is reached, the heart recovers its statistical characteristic of frequency distribution that last even after the end of the irradiation. Dragging effects were confirmed by means of a mathematical model simulating the electrical activity of the sinus-atrial cardiac cells that allowed to suggest an interaction mechanism.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord

*J. Teng, D.C. de Tournai, F. Duhamel and A. Vander Vorst. "No Nonthermal Effect Observed Under Microwave Irradiation of Spinal Cord." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1942-1948.*

The paper presents an in vivo experiment concerning cerebral evoked potentials in the presence and in the absence of microwaves irradiating the spinal cord. An electrical stimulus is applied on the peripheral nervous system of a rabbit while the impulse response (evoked potential) is measured by an electrode in the cortex. The spinal cord is irradiated at 4.2-GHz by an implanted micro-antenna. The purpose of the experiment is to distinguish between thermal and possible nonthermal effects. A statistical treatment of the recorded data shows that there is a microwave effect. Power deposition is calculated. The bioheat equation indicates that the microwave irradiation results in a temperature increase within the spinal cord. Nonthermal effects were not observed.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Soft and Dry Phantom Modeling Material Using Silicone Rubber with Carbon Fiber

*Y. Nikawa, M. Chino and K. Kikuchi. "Soft and Dry Phantom Modeling Material Using Silicone Rubber with Carbon Fiber." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1949-1953.*

New phantom models that can simulate the effect of electromagnetic waves on human tissues have been developed. These phantom models can be designed to fit a wide range of complex permittivities by using two types of carbon fiber within a silicone rubber base. Tissues with low water content, such as fat and bone, and tissues with high water content, such as skin and muscle, can both be modeled using the phantom models discussed in this paper. When using conventional phantom model materials, care must be taken to prevent decomposition and dehydration during storage. The materials used for these new phantom models do not dry out and can be used repeatedly with reliable results.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Broadband Calibration of E-Field Probes in Lossy Media

*K. Meier, M. Burkhardt, T. Schmid and N. Kuster. "Broadband Calibration of E-Field Probes in Lossy Media." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1954-1962.*

A broadband calibration procedure for E-field probes that minimizes the overall uncertainties inherent in E-field measurements in lossy dielectric liquids has been developed. The analysis of the calibration requirements shows that probes that are symmetrical with respect to their axis greatly facilitate accurate calibration, since the calibration procedure can be divided into several discrete steps. Such a procedure is presented and analyzed with respect to its uncertainties. Absolute calibration is performed at three frequency bands utilized in Europe for mobile communications (450 MHz, 900 MHz, and 1.8 GHz) and in different tissue-simulating liquids. The parameters obtained are verified by numerical simulations of the probe in the surrounding media. Such simulations allow the assessment of some of the calibration parameters with sufficient accuracy in cases where the experimental determination would be too tedious and time consuming.

# Abstracts

## Induced EM Field in a Layered Eccentric Spheres Model of the Head: Plane-Wave and Localized Source Exposure

*N.C. Skaropoulos, M.P. Ioannidou and D.P. Chrissoulidis. "Induced EM Field in a Layered Eccentric Spheres Model of the Head: Plane-Wave and Localized Source Exposure." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1963-1973.*

The induced electromagnetic (EM) field in a layered eccentric spheres structure is determined through a concise analytical formulation based on indirect mode-matching (IMM). The exact analytical solution is applied to a six-layer model of the head. This model allows for eccentricity between the inner and outer sets of concentric spherical layers which simulate brain and skull, respectively. Excitation is provided by a nearby localized source or by an incident plane wave. The numerical application provides information about the total absorbed power, the absorption in each layer, and the spatial distribution of the specific absorption rate (SAR) at frequencies used by cellular phones. The effects of excitation frequency, eccentricity, exposure configuration, and antenna-head separation are investigated.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Call for Papers - PIERS 1997 (Oct. 1996, Part II [T-MTT])

*"Call for Papers - PIERS 1997 (Oct. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1974-1975.*

# Abstracts

## Call for Papers - The Applied Computational Electromagnetics Society (Oct. 1996, Part II [T-MTT])

*"Call for Papers - The Applied Computational Electromagnetics Society (Oct. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): 1976-1976.*

# Abstracts

## Back Cover (Oct. 1996, Part II [T-MTT])

*"Back Cover (Oct. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.10 (Oct. 1996, Part II [T-MTT] (Special Issue on Medical Application and Biological Effects of RF/Microwaves)): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Nov. 1996 [T-MTT])

*"Front Cover (Nov. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Full Wave Analysis of Microstrips by the Boundary Element Method

*S.-Y. Lin and C.C. Lee. "A Full Wave Analysis of Microstrips by the Boundary Element Method." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 1977-1983.*

In this paper, the boundary element method (BEM) is formulated to carry out a full wave analysis of microstrip lines. Numerical results for frequency dependence of effective dielectric constant and calculated longitudinal and transverse current distributions are presented. Fundamental and higher order modes supported by the microstrip are identified and characterized. Compared with other techniques, the present method requires less memory size without requiring intricate mathematical skills because of the inherent characterization of BEM in needing only to discretize the boundary of the structure. Through our simulation, it shows that this method can reduce memory size as well as the computation time. Numerical results also show good agreement with available data in literature.

# Abstracts

## Monolithic Millimeter Wave Optical Receivers

*J. Burm, K.I. Litvin, G.H. Martin, W.J. Schaff and L.F. Eastman. "Monolithic Millimeter Wave Optical Receivers." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 1984-1989.*

A single stage monolithic millimeter wave optical receiver circuit was designed and fabricated using a metal-semiconductor metal (MSM) photodetector and a pSeudomorphic Modulation Doped Field Effect Transistors (SMODFET) on a GaAs substrate for possible applications in chip-to-chip and free space communications. The MSM photodetector and the SMODFET epitaxial material were grown by molecular beam epitaxy (MBE). Device isolation was achieved using an epitaxially grown buffer between the MSM detector layers and SMODFET. The photodetector was designed for maximum absorption at optical wavelength of 770 nm light and the SMODFET impedance matching network was optimized for 44 GHz. The monolithic millimeter wave optical receiver circuit achieved 3 dB gain over a photodetector at 39 GHz, which was the limit of the measurement system. TOUCHSTONE model of the circuit indicated 6.6 dB gain over the photodetector and 5.7 dB total gain including the insertion loss of the photodetector at 44 GHz.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A New Solution for TE Plane-Wave Scattering from a Symmetric Double-Strip Grating Composed of Equal Strips

*D. Filipovic. "A New Solution for TE Plane-Wave Scattering from a Symmetric Double-Strip Grating Composed of Equal Strips." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 1990-1996.*

The paper presents a new rigorous solution for the problem of TE plane-wave scattering from a periodic planar symmetric double-strip grating, i.e., the grating which has two equal strips per unit cell. The grating is placed at a dielectric interface and is assumed to be perfectly conductive and infinite in length and width. The formulation is based on a multimode equivalent network representation and the relevant integral equation defined on two separate intervals is rigorously solved by reducing to two simpler equations with known solutions. From this a new simple analytic expression is obtained for the coupling matrix elements which involves no integration. Some computations based on this new expression are carried out and the results are compared to those obtained by the Riemann-Hilbert method and also to some of the previously obtained single-strip results in the limiting case.

# Abstracts

## A Novel General Approach for the Optimum Design of Microwave and Millimeter Wave Subharmonic Mixers

*A. Madjar. "A Novel General Approach for the Optimum Design of Microwave and Millimeter Wave Subharmonic Mixers." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 1997-2000.*

The design of subharmonic mixers is complicated and involves separation of signals and application of correct loading at the important idler frequencies. In this paper we present a novel general approach, which enables the designer to establish the optimum loading conditions for the different signals to get low conversion loss and good matching simultaneously. The method is demonstrated by a design example using a 30 GHz X2 subharmonic mixer. In this example it is shown that a nonoptimal design can yield conversion loss of up to 13.5 db, while an optimal design yields a conversion loss of 3.6 db.

# Abstracts

## A New Large Signal HBT Model

*Q.M. Zhang, H. Hu, J. Sitch, R.K. Surridge and J.M. Xu. "A New Large Signal HBT Model." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2001-2009.*

Several effects important for large signal operations of heterojunction bipolar transistor (HBT's) were not included in the previous HBT models used in most commercial circuit simulators. Exclusion of these effects resulted in large discrepancies between modeled and measured device characteristics. This paper presents a new large signal HBT model which takes into account those important effects for the device operation. The effects have been identified from measured device characteristics and can be justified from first principles. To make it easy to use, the model is made up of the elements available from SPICE. During the course of the model development, an extraction procedure for the model parameters has been established to minimize the uncertainty of the extracted parameter values. The new model has been applied to HBT's with various emitter sizes and excellent agreement has been achieved between modeled and measured data over a wide range of bias conditions and signal frequencies.

# Abstracts

## Analysis of an N-Way Radial Cavity Divider with a Coaxial Central Port and Waveguide Output Ports

*M.E. Bialkowski and V.P. Waris. "Analysis of an N-Way Radial Cavity Divider with a Coaxial Central Port and Waveguide Output Ports." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2010-2016.*

A field matching technique is used to analyze an N-way divider which includes a radial cavity with a coaxial central port and H-plane coupled rectangular waveguide output ports. Dielectric coated and disc ended probes at the central port are considered. The analysis is divided into two parts. Part one is associated with the modeling of the central port and part two is concerned with the modeling of the waveguide peripheral ports. The analysis is simplified by assuming that the interaction between the central port and the peripheral ports is by means of axially symmetric radial waves which are uniform with cavity's height. Based on this analysis, algorithms are developed for calculating the scattering parameters of this structure using a PC. These algorithms show good agreement when tested against a finite element package (HFSS) and against measurements.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring

*Q. Han, Y. Kogami, Y. Tomabechi and K. Matsumura. "Coupling Characteristics of Eccentric Arranged Dielectric Disk and Ring." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2017-2024.*

An analysis is presented for a novel coupling configuration in which a circular dielectric disk and ring are arranged eccentrically. Whispering gallery (WG) mode coupling characteristics between the dielectric disk and ring are investigated. In this paper, a coupled-mode equation based on the Lorentz's reciprocity theorem is utilized. Distributed coupling coefficients and electric field distributions around the coupling region are obtained numerically through solving the coupled-mode equation. The theory described in this paper is confirmed by comparing measured electric field distributions with calculated ones. Electromagnetic powers flowed along the disk are also calculated. It is shown that coupling quantity of the eccentric configuration would be easily controlled by changing a radius of the disk or ring. The results obtained here will be used to design a WG mode coupled resonator for millimeter wave integrated circuits.

# Abstracts

## L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications

*M. Madihian, K. Imai, H. Yoshida, Y. Kinoshita and T. Yamazaki. "L-C-Band Low-Voltage BiCMOS MMIC's for Dual-Mode Cellular-LAN Applications." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2025-2031.*

This paper is concerned with the design considerations and performance results for low-voltage Si monolithic microwave/millimeter-wave integrated circuits (MMIC'S) developed for mobile and personal communications applications. A 0.4 µm ECL-BiCMOS process technology was employed to develop bipolar-based RF amplifiers, MOS-based IF amplifiers, BiCMOS-based simplified Gilbert mixers, and monolithic down-converter as well as upconverter IC'S incorporating these elements. These converters are designed to operate at a bias voltage of 2 V over 1.8-6.2 GHz exhibiting a conversion gain of 35-15 dB with a variable IF frequency of up to several 100 MHz. Chip size for both the downconverter and upconverter IC'S is 1.0 mm x 0.7 mm.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## The Anti-Circuit Concept for the Characterization of Active Circuits Using Electromagnetic Simulations

*S. Ooms and D. De Zutter. "The Anti-Circuit Concept for the Characterization of Active Circuits Using Electromagnetic Simulations." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2032-2038.*

The anti-circuit is introduced as a new concept in network theory. A new technique based thereupon, for the combination of electromagnetic field simulations of planar circuits and the analysis of complex active circuits is proposed. This technique allows the incorporation of passive lumped elements as well as the passive metallization of active components into electromagnetic simulations and provides a simple interface for active and nonlinear simulations.

# Abstracts

## Free-Space Power Combining and Beam Steering of Ultra-Wideband Radiation Using an Array of Laser-Triggered Antennas

*E.E. Funk and C.H. Lee. "Free-Space Power Combining and Beam Steering of Ultra-Wideband Radiation Using an Array of Laser-Triggered Antennas." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2039-2044.*

A mode-locked laser is used to synchronize jitter-free ultrawideband (UWB) pulse generation at an array of UWB antenna elements. The jitter-free pulses radiated by each element add together in free space to produce a radiated field pattern that is steerable via optical true-time-delay techniques. The results from a three element array experiment are presented and used to develop a model for an N-element phased array. A transmission-line model is presented for a single array element, which includes the functions of energy storage, as well as UWB pulse generation and radiation.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Applications of the Finite Difference Techniques to the Compensated VIP 3 dB Directional Coupler

*C. Zhao and I. Awai. "Applications of the Finite Difference Techniques to the Compensated VIP 3 dB Directional Coupler." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2045-2052.*

A new and simple compensated structure for a vertically installed planar (VIP) 3 dB directional coupler has been studied theoretically as well as experimentally by combining an improved 2-D-general finite difference (2-D-GFD) design procedure with a three-dimensional finite difference time domain (3-D-FDTD) method. The obtained full wave analysis results agree well with the measured ones. The investigations have shown that with this planar compensated structure, a better performance of the VIP coupler in the L-band can be realized by only using the same kind of dielectric substrate for its vertical and horizontal one.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Characteristics of an Area-Variable Varactor Diode

*D.-W. Kim, J.-J. Lee, Y.-S. Kwon and S.-C. Hong. "Characteristics of an Area-Variable Varactor Diode." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2053-2057.*

Photoresponses and microwave characteristics of an area-variable varactor diode are investigated in the frequency range of 1-7 GHz. The on/off ratio of the capacitance as large as 18.5 at 1 GHz is demonstrated and it is shown that the ratio strongly depends upon the access resistance between the cathode and the floating contacts. The capacitance of the diode is significantly altered by optical illuminations. The change increases nonlinearly with the input light power and the maximum value of 450% is achieved at 1 GHz with 1045 nW light power. These microwave and optical characteristics are described with a simple equivalent circuit model.

# Abstracts

## Broadband Overlaid Inset Dielectric Guide Coupler with Very Flat Coupling

*Z. Fan and Y.M.M. Antar. "Broadband Overlaid Inset Dielectric Guide Coupler with Very Flat Coupling." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2058-2063.*

In this paper overlaid parallel coupled inset dielectric guides are proposed for broadband applications to directional couplers. This structure provides much flatter and higher coupling than the conventional one without an overlay. The propagation and coupling characteristics of the coupled guides are obtained by using the integral equation formulation and Galerkin's procedure. Numerical results for two limiting cases are compared with available measured data, showing good agreement. Effects of thickness and dielectric constant of the overlay are examined on coupling and bandwidth. It is found that by suitable choice of these parameters very flat coupling can be achieved for a wide frequency range which is still within the fundamental-mode bandwidth. Examples of couplers with the bandwidth exceeding 45% for the coupling of 3 ± 0.25 dB are presented.

# Abstracts

## Properties of and Generalized Full-Wave Transmission Line Models for Hybrid (Bi)(an)isotropic Waveguides

*F. Olyslager. "Properties of and Generalized Full-Wave Transmission Line Models for Hybrid (Bi)(an)isotropic Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2064-2075.*

In this contribution single and coupled equivalent transmission lines are developed for the propagation of modes in reciprocal and nonreciprocal, anisotropic, bi-isotropic and bi-anisotropic waveguides. The transmission lines are described by the generalized telegrapher's equations. In order to develop these transmission line models some properties, related to reciprocity, hi-directionality, and mirroring, of general waveguides and generalized transmission lines are investigated. The transmission line models are based on the reciprocity theorem and are valid for arbitrary frequencies.

# Abstracts

## 0-40 GHz GaAs MESFET Distributed Baseband Amplifier IC's for High-Speed Optical Transmission

*S. Kimura and Y. Imai. "0-40 GHz GaAs MESFET Distributed Baseband Amplifier IC's for High-Speed Optical Transmission." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2076-2082.*

We describe distributed amplifiers built using advanced circuit design techniques to improve gain and noise performance at low frequencies. Using these techniques, we have developed an amplifier IC with a 0-36 GHz bandwidth and a noise figure of 4 dB at low frequencies. This frequency range starting from 0 Hz makes it possible to use the IC as a baseband amplifier for SDH optical transmission systems and this noise figure is about 1 dB better than conventional distributed amplifiers. We also present another amplifier IC built using our loss compensation technique to improve high-frequency performance of the amplifier. This IC has a 0-44-GHz bandwidth, which is the widest among all reported GaAs MESFET baseband amplifiers.

# Abstracts

## Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"

*P. Arcioni, M. Bressan, G. Conciauro and L. Perregrini. "Wideband Modeling of Arbitrarily Shaped E-Plane Waveguide Components by the "Boundary Integral-Resonant Mode Expansion Method"." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2083-2092.*

The boundary integral-resonant mode expansion method is used for the solution of the eigenvalue problem involved in the determination of the poles and the residues of the Y-parameters of arbitrarily shaped E-plane waveguide junctions. Using this method, the frequency response and its sensitivity to deformations of the boundary can be calculated much faster than by other more conventional methods for arbitrary shapes. Therefore, the described algorithm is eligible for setting up very efficient CAD tools to produce optimized designs of complex E-plane components in reasonable times. Some examples demonstrate the efficiency of the method in the modeling of components of practical interest.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A 16-Element Subarray for Hybrid-Circuit Tile-Approach Spatial Power Combining

*M.A. Gouker, J.T. Delisle and S.M. Duffy. "A 16-Element Subarray for Hybrid-Circuit Tile-Approach Spatial Power Combining." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2093-2098.*

Three designs for a 4-by-4 subarray are described for use in a spatial power-combined transmitter. The subarrays are constructed using a hybrid-circuit, tile-approach architecture and are composed of 16 cavity-backed, proximity-coupled microstrip antennas, each fed by a 0.5 watt amplifier. Both linearly and circularly polarized subarrays have been constructed for operation over a 10% band centered at 10 GHz. The linearly polarized subarray showed the following peak performance: EIRP greater than 27 dBW, effective transmitter power greater than 5 watts, de-RF efficiency greater than 20%, and excellent graceful degradation performance.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Couplings of Microstrip Square Open-Loop Resonators for Cross-Coupled Planar Microwave Filters

*J.-S. Hong and M.J. Lancaster. "Couplings of Microstrip Square Open-Loop Resonators for Cross-Coupled Planar Microwave Filters." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2099-2109.*

A new type of cross-coupled planar microwave filter using coupled microstrip square open-loop resonators is proposed. A method for the rigorous calculation of the coupling coefficients of three basic coupling structures encountered in this type of filters is developed. Simple empirical models are derived for estimation of the coupling coefficients. Experiments are performed to verify the theory. A four-pole elliptic function filter of this type is designed and fabricated. Both the theoretical and experimental performance is presented.

# Abstracts

## Cutoff Frequencies of Transmission Lines Consisting of Pair of Cylinders (Short Papers)

*B.N. Das, S.B. Chakrabarty and S. Das. "Cutoff Frequencies of Transmission Lines Consisting of Pair of Cylinders (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2110-2112.*

The paper presents a method of evaluation of cutoff frequencies of higher-order modes of transmission line of parallel cylinders by transforming them into a parallel plate configuration using cotangent hyperbolic transformation. Application of the method of finite difference to the weighted Helmholtz equation leads to a set of simultaneous equations. The eigenvalues related to cutoff frequencies are determined from the characteristic equation expressed in terms of matrices obtained from the simultaneous equations. Numerical data are presented.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Schottky Diodes for Analogue Phase Shifters in GaAs MMIC's (Short Papers)

*P.R. Shepherd and M.J. Cryan. "Schottky Diodes for Analogue Phase Shifters in GaAs MMIC's (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2112-2116.*

A simple Schottky diode structure, which is easily implemented in a foundry gallium arsenide (GaAs) process, is described. This structure occupies very much less area than the usual technique of realising Schottky diodes, using standard FET structures. Two variations of the diode have been characterized and modeled using a standard equivalent circuit. This has been used to design a simple analogue phase shifter based on a loaded-line configuration. The phase shifter was manufactured using a standard foundry process and has shown excellent results in terms of phase shift linearity with tuning voltage, combined with low insertion loss, over the range 2-8 GHz.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Permeability Measurement on Composites Made of Oriented Metallic Wires from 0.1 to 18 GHz (Short Papers)

*P.-M. Jacquart and O. Acher. "Permeability Measurement on Composites Made of Oriented Metallic Wires from 0.1 to 18 GHz (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2116-2120.*

In this paper, we study the microwave properties of strongly anisotropic materials made of orientated conducting wires. We have developed a broad band method to determine their permeability μ // parallel to the direction of the wires. We investigate the magnetic properties of strongly anisotropic composites made of different types of paramagnetic and ferromagnetic wires. A simple model is proposed to account for the skin effect, and agrees with our observations. This leads to a unique broad band method for measuring the permeability of thin conducting wires.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Dispersion Characteristics of Cylindrical Coplanar Waveguides (Short Papers)

*H.-C. Su and K.-L. Wong. "Dispersion Characteristics of Cylindrical Coplanar Waveguides (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2120-2122.*

A full-wave analysis of the coplanar waveguide (CPW) printed on a cylindrical substrate is presented, and the dispersion characteristics of the cylindrical CPW are studied. Numerical results of the effective relative permittivity are calculated using a Galerkin's moment-method calculation. Experiment is also conducted, and the measured data are in good agreement with the theory.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Determining Q Using S Parameter Data (Short Papers)

*J.M. Drozd and W.T. Joines. "Determining Q Using S Parameter Data (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2123-2127.*

A method is presented for determining frequency selectivity (Q) of a network using scattering (S) parameter data, data that is readily available from network measurements or analysis. The approach is based on a formulation for Q that uses the change in reactance of the resonant circuit with frequency. The method yields accurate Q results for both high and low Q resonators. Furthermore, the method is easy to implement and to understand. An example is given for calculating the Q of a tapped-stub resonator. Using this example, the new method is compared to the critical points (CP) method, an approach based on a Foster network type of formulation.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Call for Papers - 1997 Topical Symposium on Millimeter Waves (Nov. 1996 [T-MTT])

*"Call for Papers - 1997 Topical Symposium on Millimeter Waves (Nov. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): 2128-2128.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Nov. 1996 [T-MTT])

*"Back Cover (Nov. 1996 [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.11 (Nov. 1996 [T-MTT]): b1-b2.*

# Abstracts

## Front Cover (Dec. 1996, Part I [T-MTT])

*"Front Cover (Dec. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Development of a General Symmetrical Condensed Node for the TLM Method

*V. Trenkic, C. Christopoulos and T.M. Benson. "Development of a General Symmetrical Condensed Node for the TLM Method." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2129-2135.*

A general symmetrical condensed node (GSCN) for the transmission line modeling (TLM) method, with six different link line characteristic impedances, six stubs, and six lossy elements is described for the first time. It unifies all the currently available condensed nodes into a single formulation and provides the basis for the derivation of an infinite set of new nodes, including nodes with improved numerical characteristics. The GSCN is derived in two ways: 1) from an equivalent network model and 2) directly from Maxwell's equations using central differencing and averaging. The direct correspondence established between the GSCN TLM and a finite difference scheme for Maxwell's equations provides a rigorous theoretical foundation for all available TLM methods with condensed nodes.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Modeling and Performance of a 100-Element pHEMT Grid Amplifier

*M.P. De Lisio, S.W. Duncan, D.-W. Tu, C.-M. Liu, A. Moussessian, J.J. Rosenberg and D.B. Rutledge. "Modeling and Performance of a 100-Element pHEMT Grid Amplifier." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2136-2143.*

A 100-element hybrid grid amplifier has been fabricated. The active devices in the grid are custom-made pseudomorphic high electron mobility transistor (pHEMT) differential-pair chips. We present a model for gain analysis and compare measurements with theory. The grid includes stabilizing resistors in the gate. Measurements show the grid has a peak gain of 10 dB when tuned for 10 GHz and a gain of 12 dB when tuned for 9 GHz. The maximum 3-dB bandwidth is 15% at 9 GHz. The minimum noise figure is 3 dB. The maximum saturated output power is 3.7 W, with a peak power-added efficiency of 12%. These results are a significant improvement over previous grid amplifiers based on heterojunction bipolar transistors (HBT's).

# Abstracts

## A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)

*T. Roy, T.K. Sarkar, A.R. Djordjevic and M. Salazar-Palma. "A Hybrid Method Solution of Scattering by Conducting Cylinders (TM Case)." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2145-2151.*

The finite element or finite difference techniques are well known for the solution of Maxwell's equation in differential form. But terminating the mesh accurately at a finite distance from the body in case of an open problem is a major challenge. Previously, the method has been applied for only electrostatic problems. This hybrid method is applied for TM scattering problems and results are documented in this paper. This new approach, as in the electrostatic case, allows for the terminating surface to encapsulate the body very tightly. As before, the finite element technique is used for open region problems whereas the integral equation solution approach using Green's function is applied to enforce the radiation condition. At each iteration cycle, the induced currents on the conducting cylinder are evaluated and their scattered fields at the terminating surface is calculated. Using this method for TM cases, the computational efficiency of the finite element method can be increased. It can be generalized for the case of inhomogeneous and nonlinear media. In this paper numerical results are presented for the solution of Helmholtz's equation to illustrate the accuracy of the technique.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Analytical Dispersion Analysis of Loaded Periodic Circuits Using the Generalized Scattering Matrix

*W.S. Best, R.J. Riegert and L.C. Goodrich. "Analytical Dispersion Analysis of Loaded Periodic Circuits Using the Generalized Scattering Matrix." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2152-2158.*

The dispersion characteristics of periodic circuits are typically determined analytically using idealized circuit models. Idealized circuit models exclude the effects that circuit asymmetries, such as those created by coupling ports, have on accurately determining the system normal mode dispersion characteristics for physically loaded periodic circuits. A new analytical dispersion analysis technique has been developed to accurately predict the dispersion characteristics for loaded periodic circuits. The loaded periodic circuit dispersion analysis problem is resolved using the frequency dependent mode matching algorithm, which yields regional normal mode scattering information for the circuit in the form of the generalized scattering matrix (GSM). The GSM is manipulated to determine the normal mode amplitudes for each region of the periodic circuit, where the resulting regional normal mode amplitude information is used to construct electro-magnetic field maps for the length of the periodic circuit. Spatial Fourier analysis of a frequency-dependent field map determines the periodicity of the spatially dependent field. The resulting frequency-dependent spatial Fourier harmonic information is used to construct three-dimensional (3-D) and two-dimensional (2-D) system normal mode dispersion diagrams for loaded periodic circuits. The 2-D and 3-D dispersion diagrams define the phase, frequency, and relative amplitude characteristics of the periodic circuit system normal modes excited by the coupling ports. The system normal mode amplitude information defines the relative level of excitation for a given mode in comparison to other modes on the dispersion diagram.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Dynamic Shape of the Depletion Layer of a Submillimeter-Wave Schottky Varactor

*J.T. Louhi and A.V. Raisanen. "Dynamic Shape of the Depletion Layer of a Submillimeter-Wave Schottky Varactor." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2159-2165.*

Most frequency multipliers at submillimeter wavelengths are based on the Schottky varactor. The main problem of these multipliers is the output power, which remains low at frequencies above 500 GHz. The aim of this work is to help the situation by studying the usability of the conventional equivalent circuit during a fast voltage modulation. The anode edge effects play an important role in this voltage modulation. While the fringing fields, due to the edge effects, reduce the capacitance modulation in small submillimeter-wave varactors, the edge effects also lessen the effect of electron velocity saturation compared with an ideal varactor with a pure parallel plate capacitance. The usefulness of the static model can be estimated by comparing the three-dimensional shape of the depletion layer to the shape given by the dynamic model. The dynamic shape can be obtained by solving the potential and electron conduction currents in the epitaxial layer of the Schottky varactor. In this work the potential and the electron currents have been calculated from simplified device physics by using numerical methods.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Order-Recursive Gaussian Elimination (ORGE) and Efficient CAD of Microwave Circuits

*P. Misra and K. Naishadham. "Order-Recursive Gaussian Elimination (ORGE) and Efficient CAD of Microwave Circuits." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2166-2173.*

Planar circuit elements in millimeter-wave integrated circuits (MMIC's) typically consist of one or more discontinuities (e.g., stubs) connected to a number of transmission lines. In the computer-aided design (CAD) and optimization of such passive elements using the method of moments, it is necessary to iteratively simulate many subproblems involving dimensional changes to various parts of the circuit. On examining the simulation problem closely, it can be seen that there is a considerable overlap of data in various subproblems. In practice, each subproblem is solved independent of others, without taking into account the duplication of data. This leads to an inefficient design technique. In this paper, we present a design technique that effectively exploits the duplication of data by employing a recursive variant of Gaussian elimination, called order-recursive Gaussian elimination (ORGE). The potential utility of ORGE in microwave circuit simulation and CAD is demonstrated by applying it to the design of a microstrip filter.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Coaxial 0.5-18 GHz Near Electric Field Measurement System for Planar Microwave Circuits Using Integrated Probes

*T.P. Budka, S.D. Waclawik and G.M. Rebeiz. "A Coaxial 0.5-18 GHz Near Electric Field Measurement System for Planar Microwave Circuits Using Integrated Probes." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2174-2184.*

This paper reports on the basic theory of operation and experimental results obtained from an electric field imaging system for planar microwave circuits that employs the method of modulated scattering with monolithically integrated probes. The low-cost system is capable of mapping the normal and tangential electric field intensities and electrical phase delays above reciprocal microwave circuits in the frequency range of 0.5-18 GHz with a spatial electric field resolution of better than 100 µm. Monolithic probes incorporating silicon Schottky diodes integrated with electrically small dipole and monopole antenna scatterers on a 40-µm-thick high-resistivity silicon substrate are used. Electric field intensity and electrical phase delay images are presented for a 55-Omega coplanar waveguide line (CPW), a three-turn microstrip meander line at 8.8, 11.7, and 13.4 GHz, a microstrip coupled-line directional coupler at 10 GHz, and a microstrip patch antenna at 12.85 GHz. The results demonstrate that the modulated scattering technique is a valuable low-cost tool for microwave circuit diagnostics.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Numerical Simulation of the Power Density Distribution Generated in a Multimode Cavity by Using the Method of Lines Technique to Solve Directly for the Electric Field

*H. Zhao, I. Turner and F.-W. Liu. "Numerical Simulation of the Power Density Distribution Generated in a Multimode Cavity by Using the Method of Lines Technique to Solve Directly for the Electric Field." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2185-2194.*

In this paper, a new numerical method is presented in order illustrate how the Method of Lines technique can be used to obtain the power density distribution in a dielectric material by solving directly for the electric field in three-dimensional space. A detailed analysis of the treatment of the boundary conditions at the interfaces that exist between air and the material, as well as at absorbing boundary and input planes, are also given in this paper. The method is tested and verified on some simple waveguide examples for which analytic solutions are available. The technique is subsequently applied to the more complicated cavity problem and the solutions for the power density distribution are compared directly with those obtained in previous research using the finite-difference time-domain (FDTD) method. The results of all tests conducted in this research indicate that the Method of Lines technique is a robust numerical tool which can be used to readily handle the hyperbolic nature of the Maxwell equations. Finally, in order to demonstrate the versatility of the developed model, the power density distribution generated inside a dielectric material loaded in a cavity that has multiple input waveguides is presented. The chosen examples exhibit the complicated electromagnetic phenomena which arise inside the cavity and provides some idea of the effect of multiple waveguide input on the power density distribution.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides

*S.G. Garcia, T.M. Hung-Bao, R. Gomez Martin and B.G. Olmedo. "On the Application of Finite Methods in Time Domain to Anisotropic Dielectric Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2195-2206.*

This paper presents some general ideas for the construction of explicit finite algorithms to study wave propagation in dielectric anisotropic waveguides.The goal is to facilitate the development of different finite schemes through the extension of the finite-difference time-domain (FDTD) method to study anisotropic media. Some of these schemes are particularized and applied to the simulation of the propagation of electromagnetic waves through planar dielectric anisotropic waveguides.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique

*P. Ciampolini, P. Mezzanotte, L. Roselli and R. Sorrentino. "Accurate and Efficient Circuit Simulation with Lumped-Element FDTD Technique." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2207-2215.*

A three-dimensional (3-D) implementation of the lumped-element finite-difference time-domain (FDTD) algorithm has been carried out. To accomplish proper description of device dynamic responses, the code incorporates accurate models of lumped bipolar devices, including nonlinear capacitances associated with pn and Schottky junctions. The nonlinear system arising from discretized lumped-element equations is solved by means of an iterative Newton-Raphson aigorithm, the convergence properties of which are sensitive to the value of the simulation time step. The computational efficiency of the algorithm (as well as its robustness) has significantly been enhanced by introducing an adaptive time-step algorithm, which dynamically adjusts the time-step itself to ensure convergence during the simulation. Several simulation examples are compared with conventional analysis techniques and demonstrate the algorithm reliability as well as its increased efficiency.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Generalized Perfectly Matched Layer for the Absorption of Propagating and Evanescent Waves in Lossless and Lossy Media

*J. Fang and Z. Wu. "Generalized Perfectly Matched Layer for the Absorption of Propagating and Evanescent Waves in Lossless and Lossy Media." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2216-2222.*

The perfectly matched layer (PML), proposed by Berenger, has been proved very effective in absorbing propagating waves in lossless media. However, it has been found that the original construction of PML cannot effectively absorb evanescent waves. Also, significant reflection can appear as PML is applied to terminate lossy media. This paper describes a generalized perfectly matched layer (GPML) that extends the original PML to absorb both propagating and evanescent waves in lossless and lossy media. The generalized perfectly matched layer is derived from the Maxwell's equations in stretched coordinates and can be easily implemented in finite-difference time-domain (FDTD) programs. This paper also presents proper selection of parameters in the numerical implementation of the generalized perfectly matched layer to achieve good performance in absorption.

# Abstracts

## Analytical Expansion of the Dispersion Relation for TLM Condensed Nodes

*V. Trenkic, C. Christopoulos and T.M. Benson. "Analytical Expansion of the Dispersion Relation for TLM Condensed Nodes." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2223-2230.*

A method for obtaining analytical solutions of the general transmission line modeling (TLM) dispersion relation for condensed node schemes is described. Exact analytical forms of the dispersion relation for currently available nodes are derived, enabling the efficient study of dispersion solutions without resorting to a numerical solver. Using these analytical relations, the range and behavior of propagation errors is fully explored and visualized, not only for propagation along the axes and diagonals or in a coordinate plane, but for arbitrary angles of propagation in three-dimensional space. Comparisons are presented of the numerical performance of different TLM condensed node schemes.

# Abstracts

## Scattering of Millimeter Waves by Metallic Strip Gratings on an Optically Plasma-Induced Semiconductor Slab

*K. Nishimura and M. Tsutsumi. "Scattering of Millimeter Waves by Metallic Strip Gratings on an Optically Plasma-Induced Semiconductor Slab." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2231-2237.*

This paper presents the scattering characteristics of a TE electromagnetic plane wave by metallic strip gratings on an optically induced plasma slab in silicon at millimeter-wave frequencies. The characteristics were analyzed by using the spectral domain Galerkin method and estimated numerically. We examined how to control the resonance anomaly by changing the optically induced plasma density for metallic strip grating structures fabricated on highly resistive silicon. The optical control characteristics of the reflection and the forward scattering pattern of the grating structures were measured at Q band and are discussed briefly with theory.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Electric Screen Jauman Absorber Design Algorithms

*L.J. du Toit and J.H. Cloete. "Electric Screen Jauman Absorber Design Algorithms." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2238-2245.*

The electric screen Jauman absorber is a stratified cascade of dielectric spacers, interlaced with resistive sheets, which is effective in reducing specular reflection from flat or moderately curved conducting surfaces. A literature survey of the period up to 1993 may be found in [2], while the topic has also received more recent attention, e.g., [3]-[9]. Usually, the dielectric constant of the identical spacers is assumed known a priori, and the design problem is to find the sheet surface resistivities that will yield an absorption behavior which meets certain design criteria. This paper presents detail on three efficient and dedicated synthesis algorithms that synthesize absorbers with Butterworth, Equiripple, and Chebyshev absorption properties and should be seen as complementary to the introductory discussion in [2]. To the authors' knowledge, the Chebyshev solutions solve the fundamental problem for the first time.

# Abstracts

## Analysis and Linearization of a Broadband Microwave Phase Modulator Using Volterra System Approach

*P. Celka, M.J. Hasler and A. Azizi. "Analysis and Linearization of a Broadband Microwave Phase Modulator Using Volterra System Approach." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2246-2255.*

In this paper, a Volterra system approach is employed to analyze a nonlinear delay line that is used as a broadband phase modulator. Computed response waveform of the modulator in the time domain is compared with experimental results in order to confirm the Volterra system approach. The phase versus voltage characteristics of the modulator is then linearized using a predistortion circuit in which the parameters are derived from the Volterra kernels. Harmonic and intermodulation distortions are calculated with and without the predistortion circuit. It is shown that the use of the predistortion circuit results in a considerable reduction of these distortions.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Application of a Coupled-Integral-Equations Technique to Ridged Waveguides

*S. Amari, J. Bornemann and R. Vahldieck. "Application of a Coupled-Integral-Equations Technique to Ridged Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2256-2264.*

Cut-off frequencies of all TE and TM modes of a ridged rectangular wave guide are accurately determined using a coupled-integral equations technique (CIET). The technique analyzes both symmetric and asymmetric situations in one step. Basis functions, which include the edge conditions and mirror images in the waveguide walls, are used in the moment method solution of the integral equations. One or two basis functions are found sufficient to accurately determine the spectrum. The limiting case of a zero-thickness metallic ridge is also presented. Results from the present technique are compared with available data; excellent agreement is documented.

# Abstracts

## Oscillator-Type Active-Integrated Antenna: The Leaky-Mode Approach

*G.-J. Chou and C.-K.C. Tzuang. "Oscillator-Type Active-Integrated Antenna: The Leaky-Mode Approach." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2265-2272.*

This paper describes basic research carried out to design a microwave source module employing the concept of an active-integrated leaky-mode antenna. The novel active-antenna source module utilizes a microstrip as the radiating element while adopting uniplanar technology for the active circuit design. The microstrip is operated in the first higher order odd mode, which is a leaky mode, and excited by a proximity-coupled center-fed slotline on the same surface of the uniplanar microwave-integrated circuit. The measured performance of an X-band transmission-type injection-locked active-integrated antenna source module demonstrated that such a design approach was suitable for linear array integration for quasi-optical power combining. The harmonic-balance (HB) analysis of the proposed active-integrated antenna agrees with the measurements in both free-running frequency and power level. The measured radiation patterns of the active-integrated antenna also agree well with the theoretical predictions.

# Abstracts

## Intermodulation Distortion in Kahn-Technique Transmitters

*F.H. Raab. "Intermodulation Distortion in Kahn-Technique Transmitters." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2273-2278.*

The Kahn Envelope Elimination and Restoration (EER) technique implements a linear RF power amplifier (PA) by combining nonlinear, but efficient, RF and AF power amplifiers. For signals with high peak-to-average ratios, the average efficiency of a Kahn-technique transmitter can be three to four times that of a transmitter that employs conventional linear RF PA's. Since switching-mode amplifiers are employed, the linearity of an EER transmitter depends upon parameters such as the bandwidth of the envelope modulator and the differential delay between envelope and phase signals. This paper determines the relationship between these parameters and IMD levels and verifies the predictions by laboratory measurements. The results can be used to determine the requirements for the components of a Kahn-technique transmitter.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## An Analytical Model for the Photodetection Mechanisms in High-Electron Mobility Transistors

*M.A. Romero, M.A.G. Martinez and P.R. Herczfeld. "An Analytical Model for the Photodetection Mechanisms in High-Electron Mobility Transistors." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2279-2287.*

The use of microwave high-electron mobility transistors (HEMT's) as photodetectors or optically controlled circuit elements have attracted interest. A model of the optical characteristics of HEMT's, which takes into account carrier transport as well as the quantum mechanical nature of the two-dimensional (2-D) electron gas channel, is presented. It is shown that the effect of illumination is equivalent to a shift in the gate to source bias voltage, referred to as the internal photovoltaic effect. The theoretical model is supported by experimental results that demonstrate that the HEMT photoresponse is a nonlinear function of light intensity with very high responsivity at low optical power levels.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Stokes Phenomenon in the Development of Microstrip Green's Function and its Ramifications (Short Papers)

*D. Chatterjee and R.G. Plumb. "Stokes Phenomenon in the Development of Microstrip Green's Function and its Ramifications (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2288-2290.*

In this paper we examine the effect of truncating an infinite asymptotic series for the Hankel function used in microstrip antenna calculations. In particular, the accuracy of this truncated asymptotic expansion of the Hankel function is examined from a numerical viewpoint. This expansion has been used in the literature to obtain closed-form expressions for the microstrip Green's function for subsequent use in calculating mutual coupling between elements in a microstrip array. In this paper, we show that truncating the asymptotic series for the Hankel function could lead to severe unexpected errors for those values of the argument where the asymptotic expansion is normally expected to be valid. This is known as the Stokes phenomenon and has generally remained obscure in the literature. Since the large argument of the Hankel function is shown to he related to the lateral separation between two antennas, the results presented here have a particular bearing in calculating mutual coupling between widely separated elements in electrically large microstrip arrays.

# Abstracts

## A Fast Algorithm for Computing Field Radiated by an Insulated Dipole Antenna in Dissipative Medium (Short Papers)

*L.-K. Wu, D.W.-F. Su and B.-C. Tseng. "A Fast Algorithm for Computing Field Radiated by an Insulated Dipole Antenna in Dissipative Medium (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2290-2293.*

A fast algorithm for determining the near-field characteristics of an insulated dipole antenna (IDA) embedded in a homogenons dissipative medium is described in this paper. A thin-wire-approximation type of analysis is followed here. In this case, radiation is considered to originate from a filamentary current flowing along the axis of the dipole, which is surronnded immediately hy the ambient dissipative medium. The translational symmetry inherent in the resultant radiation integrals is then exploited to speed up the computation. In one case studied, the basic thin-wire approach that uses no symmetry property is found to yield accurate results in approximately 380 times less CPU time than the traditional King-Casey approach. In another case, use of symmetry property further reduces the CPU time by a factor of 7; additional reduction in CPU time is possible by taking into account the near-field nature of the problem.

# Abstracts

## A Fast Integral Equation Technique for Shielded Planar Circuits Defined on Nonuniform Meshes (Short Papers)

*G.V. Eleftheriades, J.R. Mosig and M. Guglielmi. "A Fast Integral Equation Technique for Shielded Planar Circuits Defined on Nonuniform Meshes (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2293-2296.*

In this contribution, the groundwork is laid out for the realization of efficient integral-equation/moment-method techniques, with arbitrary types of basis functions, for the computer-aided design (CAD) of geometrically complex packaged microwave and millimeter-wave integrated circuits (MMIC's). The proposed methodology is based on an accelerated evaluation of the Green's functions in a shielded rectangular cavity. Since the acceleration procedure is introduced at the Green's function level, it becomes possible to construct efficient shielded moment method techniques with arbitrary types of basis-functions. As an example, a Method of Moments (MoM) is implemented based on the mixed potential integral equation formulation with a rectangular, but nonuniform and nonfixed, mesh. The entire procedure can be extended to multilayer substrates.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Analysis of Electromagnetic Boundary-Value Problems in Inhomogenous Media with the Method of Lines (Short Papers)

*A. Kornatz and R. Pregla. "Analysis of Electromagnetic Boundary-Value Problems in Inhomogenous Media with the Method of Lines (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2296-2299.*

In this paper we will show how the method of lines can be generalized for the analysis of inhomogenous media. The inhomogeneity is completely arbitrary; the permittivity of the investigated structures may vary in all three coordinate directions. Subjects under investigation are isolated dielectric resonators, microstrip filters with dielectric and metallic lossy resonators, and planar capacities.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## New Reciprocity Theorems for Chiral, Nonactive, and Biisotropic Media (Short Papers)

*C. Monzon. "New Reciprocity Theorems for Chiral, Nonactive, and Biisotropic Media (Short Papers)." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2299-2301.*

Two generalized reciprocity theorems for homogeneous bi-isotropic media are presented that do not invoke a complementary space. One of them is eminently crosspolarized involving real sources and fields, while the other is a generalization of the Lorentz theorem and is therefore eminently copolarized, invoking generalized sources or fields. These theorems constitute the foundation for new variational expressions leading to a reaction-type development with capabilities to handle biisotropic/nonactive/chiral/isotropic materials.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - Interconnections and Packaging (Dec. 1996, Part I [T-MTT])

*"Call for Papers - Interconnections and Packaging (Dec. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2302-2302.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Call for Papers - 1997 Topical Symposium on Millimeter Waves (Dec. 1996, Part I [T-MTT])

*"Call for Papers - 1997 Topical Symposium on Millimeter Waves (Dec. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2303-2303.*

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Information for Authors (Dec. 1996, Part I [T-MTT])

*"Information for Authors (Dec. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): 2304-2304.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Dec. 1996, Part I [T-MTT])

*"Back Cover (Dec. 1996, Part I [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part I [T-MTT]): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (Dec. 1996, Part II [T-MTT])

*"Front Cover (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): f1-f2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Table of Contents (Dec. 1996, Part II [T-MTT])

*"Table of Contents (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2305-2307.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Guest Editors' Overview (Dec. 1996, Part II [T-MTT])

*S.J. Fiedziuszko and J.M. Schellenberg. "Guest Editors' Overview (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2308-2310.*

The Substantial number of papers accepted for presentation at the 1996 IMS in San Francisco resulted in record submissions of expanded papers for the Special Symposium Issue of the IEEE Transactions on Microwave Theory and Techniques. A total of 139 IMS papers + 7 MMWMCS papers were submitted and 55 papers + 3 MMWCS papers were selected for publication (40% acceptance). At this time the acceptance rate for these papers was dictated not by the page allocation (previous special issues were somewhat constrained by this factor) but by the quality of the papers. Per directions from ADCOM and from Regular Editors of the IEEE Transactions on Microwave Theory and Techniques, we made sure that all highly qualified papers, deserving wider circulation, were included in this Special Issue.

# Abstracts

## The 1996 IEEE MTT-S International Microwave Symposium/Exhibition: "Bridging the Spectrum" (Dec. 1996, Part II [T-MTT])

*E.J. Crescenzi, Jr. and J. Barrera. "The 1996 IEEE MTT-S International Microwave Symposium/Exhibition: "Bridging the Spectrum" (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2311-2316.*

The 40th successive annual MTT-Society symposium was held on June 18-20, 1996, in San Francisco, California. This year's Symposium/Exhibition clearly lived up to the reputation of being the preferred conference for presenting technical papers and for exhibiting the newest products involving microwave and "wireless" (a popular marketing term of the current era) technology.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## 1996 IEEE MTT-S International Microwave Symposium Steering Committee

*"1996 IEEE MTT-S International Microwave Symposium Steering Committee." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2317-2317.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## 1996 IMS Technical Program (Dec. 1996, Part II [T-MTT])

*S.J. Fiedziuszko and D. Hornbuckle. "1996 IMS Technical Program (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2318-2318.*

The 1996 International Microwave Symposium Technical Program was enormously successful. Records were set in a number of areas, including number of papers, workshops, technical attendees, and workshop attendees. Qualitative feedback was extremely positive as well. Innovations to better serve members included longer technical program hours in order to avoid additional parallel sessions, more Sunday workshops, the first ever ARFTG/IMS joint session, two daytime student-paper competition sessions, and post-workshop sales of extra workshop handouts. Thanks are due to the participants, authors, session chairs, Technical Program Committee, Steering Committee, Local Arrangements Steering Group, and Technical Steering Group for making the technical program such a success.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Awards (Dec. 1996, Part II [T-MTT])

*"Awards (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2320-2327.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Status of InP HEMT Technology for Microwave Receiver Applications (Dec. 1996, Part II [T-MTT])

*P.M. Smith. "Status of InP HEMT Technology for Microwave Receiver Applications (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2328-2333.*

The current status of InP-based high electron mobility transistor (HEMT) technology for low noise amplification at frequencies up to more than 100 GHz is presented. Following a review of recent advances industry-wide in both device and circuit performance, two issues which will pace the rate at which this new technology can be inserted into microwave systems--material/process maturity and long-term reliability--are discussed.

# Abstracts

## Design and Implementation of a Direct Digitization GPS Receiver Front End

*D.M. Akos and J.B.Y. Tsui. "Design and Implementation of a Direct Digitization GPS Receiver Front End." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2334-2339.*

A direct digitization approach greatly reduces the hardware requirements in traditional front end design. Further, the hardware that has been eliminated is typically the source of a number of potential difficulties including age-based, temperature-based, and/or nonlinear performance. This paper presents a case study on the design and implementation of direct digitization Global Positioning System (GPS) receiver front end. First, sensitivity and dynamic range issues for a generic front end are discussed with particular attention given to the unique requirements in the direct digitization approach. Second, two GPS front end implementations are compared. The first is the direct digitization of the input signal at radio frequency (RF) as is the case in the true digital receiver or software radio. The second uses a more standard approach of downconverting the input signal to an intermediate frequency (IF) for further processing or digitization. Experimental data is presented which characterizes the relative signal-to-noise ratio for both implementations as well as the results of initial acquisition processing of true GPS data.

# Abstracts

## Highly Integrated Three-Dimensional MMIC Single-Chip Receiver and Transmitter (Dec. 1996, Part II [T-MTT])

*I. Toyoda, T. Tokumitsu and M. Aikawa. "Highly Integrated Three-Dimensional MMIC Single-Chip Receiver and Transmitter (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2340-2343.*

The three-dimensional monolithic microwave/millimeter wave integrated circuits (MMIC) structure that places thin polyimide-film layers on wafers significantly increases the integration level of MMIC'S. We newly develop 9.2-12 GHz receiver and 9.5-14 GHz transmitter chips with 20 dB gain using the three-dimensional MMIC technology. The receiver chip includes a four-stage front-end amplifier, a local oscillator (LO) amplifier, and an image-rejecton mixer in a 2 x 2 mm chip. The transmitter chip also includes an IF amplifier with balanced outputs, an LO amplifier, an RF buffer amplifier, and a balanced upconverter in a 1.9 x 1.9 mm chip. The integration levels of these chips are nearly three times higher than those of conventional planar devices. The design method of each function block, such as the amplifier and mixer, is also described.

# Abstracts

## Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's

*K. Onodera, M. Hirano, M. Tokumitsu, I. Toyoda, K. Nishikawa and T. Tokumitsu. "Folded U-Shaped Microwire Technology for Ultra-Compact Three-Dimensional MMIC's." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2347-2353.*

A microwire technique has been developed for fabricating three-dimensional (3-D) structures for use in ultra-compact GOAS monolithic microwave/millimeter wave integrated circuits (MMIC). By folding metal into a U-shaped wall and burying it in a relatively thick polyimide insulator, vertical microwires can be made with greatly reduced process complexity. This technique also offers process compatibility with multilevel interconnects. In this paper, the fundamental characteristics of the proposed U-shaped microwire are discussed and its applications to 3-D passive elements and circuits are demonstrated. The characteristics of the U-shaped microwires are almost the same as those of I-shaped microwires and can be accurately estimated and designed by using numerical analysis. The fabricated and designed transmission lines are one-half to one-third the size of conventional lines with the same transmission loss, and if the microwire is also used as a shielding wall, the occupied area can be made much smaller. Miniature inductors made of vertical U-shaped microwires exhibit a self-resonance frequency as high as that of conventional inductors, with one-half the size and offer a great advantage in L- or S-band applications. A fabricated miniature wideband 3-D balun had an insertion loss of 1.5 + 1 dB at frequencies from 10 to 30 GHz, and an amplitude and phase balance of 2 dB and 5°, respectively.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems

*K. Ohata, T. Inoue, M. Funabashi, A. Inoue, Y. Takimoto, T. Kuwabara, S. Shinozaki, K. Maruhashi, K. Hosaya and H. Nagai. "Sixty-GHz-band Ultra-Miniature Monolithic T/R Modules For Multimedia Wireless Communication Systems." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2354-2360.*

The development of 60 GHz-band ultra-miniature FM/frequency-shift keying (FM/FSK) transmitter/receiver modules fabricated with a complete monolithic-microwave integrated circuits (MMIC) chip set, including dielectrically stabilized fundamental-frequency oscillators for multimedia wireless communication systems, is reported. The 0.9 cc transmitter module, which consists of a voltage controlled oscillator (VCO) and two power amplifiers, exhibits 11.5 MHzJV modulation sensitivity, 10.2 dBm output power, and -2.4 ppm/° C frequency stability. With the receiver module, which consists of low noise amplifier (LNA), a mixer, and a local oscillator (LO), 5.4 dB double-side band (DSB) noise figure with 10.8 dB downconversion gain has been achieved. The 60 GHz-band monolithic dielectric-resonator (DR) stabilized oscillators offer a practical approach to ultra-miniature transmitter/receiver modules for high-speed wireless LAN systems with data rates greater than 10 Mbps and for video-signal and compressed HDTV-signal (MUSE) transmission systems.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS

*Y. Umeda, T. Enoki, K. Osafune, H. Ito and Y. Ishii. "High-Yield Design Technologies for InAlAs/InGaAs/InP-HEMT Analog-Digital ICS." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2361-2368.*

Sixty-GHz-band two-stage monolithic low-noise amplifiers and ultrahigh-speed SCFL static frequency dividers have been fabricated using the same InAlAs/InGaAs/fnP HEMT process. This process assures uniformity by taking advantage of a O.1-µm T-shaped gate and an InP recess-etch stopper. Circuits are designed with priorities on stable operation, high yield, and uniformity. For the low-noise amplifier, the stabilization is optimized so as to minimize noise for the design gain while maintaining stability at all frequencies. The resultant amplifiers show a fabrication yield of 75% and at 62 GHz have a noise figure of 4.3 + 0.19 dB and a gain of 11.8 ± 0.25 dB. For the frequency divider, the load resistance is set to be large enough to assure stable operation (circuit simulation shows that increasing the load resistance has little effect on the maximum toggle frequency). Frequency dividers designed with the optimum load resistance for stable and high-speed operation show a fabrication yield of 63% and have a maximum toggle frequency of 36.7 ± 0.55 GHz. These results demonstrate the feasibility of using this HEMT process to monolithically integrate analog and digital circuits on one chip.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter

*H. Hayashi, M. Muraguchi, Y. Umeda and T. Enoki. "A High-Q Broad-Band Active Inductor and its Application to a Low-Loss Analog Phase Shifter." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2369-2374.*

This paper demonstrates a high-Q broad-band active inductor and its application to a low-loss analog phase shifter. The proposed high-Q broad-band active inductor utilizes frequency-insensitive negative resistance to compensate constant internal losses caused by the drain-to-source conductance of the field-effect transistors (FET's), the dc bias circuit and several other factors. The measured frequency range of the fabricated In-AIAs, lnGaAs/InP HEMT active inductor is 6 to 20 GHz for Q values greater than 100, and 7 to 15 GHz for Q values greater than 1000. A low-loss analog phase shifter is also fabricated at C-band. This is constructed with the active inductors, the varactor diodes and the low-loss multilayer broad-side coupler in a MIC structure. Since the constant negative resistance of the active inductors also compensates the line loss of the coupler and the varactor diodes' series resistance, the measured results show a good insertion loss performance with a large phase shift. A phase shift of more than 225° within a 0.8 dB insertion loss from 4.7 to 6.7 GHz, another of more than 180° within 1.3 dB insertion loss from 3.7 to 8.5 GHz, and one more of more than 90° within 1.4 dB insertion loss from 3.5 to 10.6 GHz were obtained.

# Abstracts

## L-band Internally Matched Si-MMIC Front-End

*N. Suematsu, M. Ono, S. Kubo, Y. Iyama and O. Ishida. "L-band Internally Matched Si-MMIC Front-End." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2375-2378.*

A 1.9 GHz-band internally matched Si-MMIC front-end, fabricated in standard 0.8 pm BiCMOS process, was developed. This IC front-end contains a MOSFET T/R switch, a two-stage BJT low noise amplifier (LNA), and a down converter BJT mixer. Since the circuits are monolithically integrated on a low resistivity Si substrate, the coplanar waveguide (CPW) type spiral inductors are used to reduce the dielectric loss of on-chip matching circuits. The T/It switch has measured insertion loss of 2.5 dB and isolation of 25.5 dB at 0/3 V control voltage. The two-stage LNA has gain of 17.1 dB and noise figure (NF) of 2.9 dB at 2 V, 4 mA dc supply. The mixer has conversion gain of 5.9 dB and NF of 15 dB at 2 V, 1.7 mA dc supply. The measured performance of the fabricated Si-MMIC front-end indicates the possibility of application to mobile communication handset terminals.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])

*M. Schefer, H.-P. Meier, B.-U. Klepser, W. Patrick and W. Bachtold. "Integrated Coplanar MM-Wave Amplifier with Gain Control Using a Dual-Gate InP HEMT (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2379-2383.*

Variable gain mm-wave amplifiers, based on InP high-electron mobility transistor (HEMT) devices, are demonstrated. The two-stage circuits consist of a single-gate (SG) and dual-gate (DG) transistor. The influence of the gate recess depth on the gain control range is investigated. A maximum gain control range of 32 dB is achieved which is the largest reported in the mm-wave range for a monolithically integrated variable gain amplifier (VGA). The maximum gain is 25.7 dB at 48.5 GHz with a 3-dB bandwidth of 10.5 GHz. The circuits were fabricated in coplanar technology

# Abstracts

## A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE

*K.W. Kobayashi, D.C. Streit, A.K. Oki, D.K. Umemoto and T.R. Block. "A Novel Monolithic HEMT LNA Integrating HBT-Tunable Active-Feedback Linearization by Selective MBE." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2384-2391.*

For the first time, a novel heterojunction bipolar transistor (HBT) active-feedback circuit is employed with a high electron mobility transistor (HEMT) low noise amptifier (LNA) which improves the linearity or third-order intercept point (IP3) and gain-bandwidth performance without significantly impacting noise figure. The HEMT and HBT circuits are monolithically integrated using selective molecular beam epitaxy (MBE). The use of HBT active feedback provides several advantages over field-effect transistor (FET) active feedback such as smaller size, lower dc power consumption, active self-bias, and direct-coupled performance. Applied to a 1-11 GHz HEMT LNA design, the HBT active feedback has resulted in a 50 % improvement in gain-bandwidth performance and a 4-10 dB improvement in IP3 without degrading noise figure compared to an equivalent resistive-feedback design. In addition, the HBT active feedback consumes only 15% additional dc power and has provided as much as a 20-dB reduction in third-order (two-tone) intermodulation products (IM3's) over a narrow band. Thk HBT active-feedback linearization technique is a compact, cost-effective means of improving the linearity of HEMT-based LNA/receiver monolithic microwave/millimeter wave integrated circuits (MMIC's) for use in wireless multicarrier communications systems requiring a wide dynamic range.

# Abstracts

## A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor

*P.A. Potyraj, K.J. Petrosky, K.D. Hobart, F.J. Kub and P.E. Thompson. "A 230-Watt S-Band SiGe Heterojunction Bipolar Transistor." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2392-2397.*

Large-area Si/Si/sub 1-x/ Ge/sub x/ heterojunction bipolar transistors (HBT's) have been demonstrated with record output power at S-Band. Under pulsed conditions in class C operation, a saturated power in excess of 230 W was achieved at 2.8 GHz. At 200 W the devices exhibited a collector efficiency of 46% and a power gain of 6.9 dB. Devices with implanted Si bases had comparable gain, but only 3570 efficiency at 150 W, and saturated at 180 W. In class A operation, 13.5 dB gain was demonstrated at 3.1 GHz on smaller devices. For high f/sub max/, a self-aligned silicided polysilicon-emitter structure was used in conjunction with a graded Si/sub1-x/. Ge/sub x/ base. Variable temperature dc tests and accelerated life tests have indicated no reliability problems. The results indicate for the first time that Si/SiGe HBT's are suitable for high-power, high-frequency applications.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion

*H. Yamada, S. Ohara, T. Iwai, Y. Yamaguchi, K. Imanishi and K. Joshin. "Self-Linearizing Technique for L-Band HBT Power Amplifier: Effect of Source Impedance on Phase Distortion." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2398-2402.*

L-band power amplifiers operating with high efficiency and high linearity at a single and low supply voltage are in strong demand for mobile communication systems. This paper presents a new self-linearizing technique for power heterojunction bipolar transistors (HBT's). Utilizing the nonlinear input conductance of the device itself and setting the source impedance to the self-linearizing impedance, the phase distortion and the adjacent channel leakage power (ACP) for pi/4-shift QPSK modulated signal of our InGaP/GaAs power HBT's have been greatly improved. As a result, the HBT exhibited the ACP at 50 kHz offset frequency of -49.2 dBc with a power-added efficiency (PAE) of 56 % at an output power (P/sub out/) of 31 dBm under a supply voltage of 3.5 V.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])

*J.-G. Yook, L.P.B. Katehi, R.N. Simons and K.A. Shalkhauser. "Experimental and Theoretical Study of Parasitic Leakage/Resonance in a K/Ka-Band MMIC Package (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2403-2410.*

In this paper, electromagnetic (EM) leakage and spurious resonances in a K/Ka-Band (18-40 GHz) MMIC hermetic package designed for a phase shifter chip are studied using the finite element method (FEM) and the numerical simulation results are compared with the measured data. Both the measured and calculated data indicate several spurious resonances in the 1S-24 GHz region and the origin of this phenomenon is identified by virtue of the modeling capability of the FEM. Moreover, the effect of dc bias lines, bond wires, shielding, and the asymmetry of the package on electrical performance are closely examined. In addition, the effect of adding a resistive coating to the inside surface of the package lid and also the use of dielectric packaging materials with very high loss tangent are studied in view of the suppression of the spurious resonances. Finally, design guidelines for the improved package are presented.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Uniplanar Power Dividers Using Coupled CPW and Asymmetrical CPS for MIC's and MMIC's

*L. Fan and K. Chang. "Uniplanar Power Dividers Using Coupled CPW and Asymmetrical CPS for MIC's and MMIC's." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2411-2420.*

Uniplanar coplanar waveguide (CPW), coplanar strip (CPS), and slotline on dielectric substrates have many applications in microwave integrated circuit (MIC) and monolithic microwave/millimeter wave integrated circuit (MMIC) designs. New power dividers using one-section and two-section coupled CPW have been developed. These circuits provide substantially improved performance over a wider bandwidth than conventional microstrip power dividers. Measured results show that the one-section CPW power divider has greater than 20-dB isolation, less than 0.3-dB insertion loss, a 0.2-dB power dividing imbalance, and a 2° phase imbalance over a bandwidth of more than 30% centered at 3 GHz. The two-section CPW power divider has greater than 24-dB isolation, less than 0.5-dB insertion loss, a O.1dB power dividing imbalance, and a 1.6° phase imbalance over a bandwidth of more than 66% centered at 3 GHz. Experimental results agree well with calculated ones. In-phase and 180° out-of-phase power dividers constructed by the circuit configuration method are described in this paper. The even-odd mode excited method is used to analyze the power dividers. Also two other power dividers using asymmetrical coplanar strip (ACPS) have been developed with good performance. A 180° out-of-phase power divider is demonstrated with an amplitude imbalance of 0.4 dB and a phase difference of 180° ± 1° over a wide bandwidth.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Novel Active Antenna with Self-Mixing and Wideband Varactor-Tuning Capabilities for Communication and Vehicle Identification Applications

*C.M. Montiel, L. Fan and K. Chang. "A Novel Active Antenna with Self-Mixing and Wideband Varactor-Tuning Capabilities for Communication and Vehicle Identification Applications." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2421-2430.*

A cavity-backed, Gunn-diode-driven, self-mixing active inverted stripline circular patch antenna has been developed. The antenna provides good radiation performance with cross-polarization levels 18 dB below copolarization at boresight. The self-mixing performance shows that the circuit has a 2dB conversion gain, for IF's up to 450 MHz and a single-sideband noise figure of 12 dB at 200 MHz. The self-mixing antenna is also capable to mix signals with its second-harmonic, providing a conversion loss of 3.7 dB, Also, a varactor diode has been incorporated with a inverted stripline circular patch active antenna to allow for electronic tuning. A 1370 tuning bandwidth with a power variation of ±1.0 dB was achieved. A simple equivalent circuit his been used to model the active antenna, and the calculated results agree well with the experimental results. The circuit should have many commercial applications in wireless communications, radar, and sensors, but is particularly suitable for use as a transceiver for short communications links or as a microwave identification transceiver.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Multifrequency Microstrip Antennas Using Alumina-Ceramic/Polyimide Multilayer Dielectric Substrate

*K. Kamogawa, T. Tokumitsu and M. Aikawa. "Multifrequency Microstrip Antennas Using Alumina-Ceramic/Polyimide Multilayer Dielectric Substrate." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2431-2437.*

A novel microstrip antenna using an alumina-ceramic/polyimide multilayer dielectric substrate is presented. The multilayer configuration, in which two different multilayer materials with much different permittivities and thicknesses are stacked together, can be used for designing an antenna with selective substrate thickness, thus providing the optimum substrate thickness for the desired frequency. Both 10 GHz-band and 18 GHz-band antennas are designed and fabricated on the same substrate to demonstrate the feature. They achieve perfect matching and acceptable radiation characteristics. Furthermore, for application to array antennas, power combining circuits such as a 90° hybrid and a four-port divider are demonstrated. Finally, the possibility of applying this technology to active antenna systems is discussed. The measurement results confirm that the proposed multilayer substrate is extremely suitable for building active array systems integrated with active devices and monolithic microwave/millimeter wave integrated circuits (MMIC), as well as for constructing multifrequency antennas.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])

*J.I. Alonso, J.M. Blas, L.E. Garcia, J. Ramos, J. de Pablos, J. Grajal, G.G. Gentili, J. Gismero and F. Perez. "Low Cost Electronically Steered Antenna and Receiver System for Mobile Satellite Communications (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2438-2449.*

The design, construction, and basic characteristics of an electronically steered, adaptive phased array antenna for land mobile satellite communications are described here. The antenna system includes an array of six microstrip stacked patch antennas, each one connected to an RF channel, which include a monolithic microwave/millimeter wave integrated circuit (MMIC) low noise amplifier and a commercial silicon monolithic I-Q modulator. A six-way microstrip combiner adds the six channels so that the resulting signal is introduced in a global positioning system (GPS) receiver, constructed with two commercial application specific integrated circuits (ASIC ‘s). The receiver has a PC interface which include control boards, specifically designed for this application, that allow the setting of the amplitude and phase of each RF channel. Acquisition and tracking algorithms have been programmed in C-language for working in real time using as input data the signal levels provided by the receiver.

# Abstracts

## Efficient FDTD/Matrix-Pencil Method for the Full-Wave Scattering Parameter Analysis of Waveguiding Structures

*J. Ritter and F. Arndt. "Efficient FDTD/Matrix-Pencil Method for the Full-Wave Scattering Parameter Analysis of Waveguiding Structures." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2450-2456.*

A combined finite-difference time-domain/matrix-pencil method is presented for the efficient and rigorous calculation of the full-wave modal S-parameters of waveguide components including structures of more general shape or high complexity. The application of the S-parameter definition for unmatched ports requires merely standard Mur's absorbing boundaries for reliable results, and a nonaorthogonal or contour path mesh formulation allows the convenient inclusion of curved boundaries. The efficiency of the method is demonstrated at the analysis of waveguide and monolithic microwave millimeter wave integrated circuit (MMIC) components of practical importance, such as the twisted waveguide, the twisted waveguide bend, the post compensated magic T, the waffle-iron filter, and the MMIC spiral inductor including an air bridge. The method is verified by excellent agreement with measurements, with finite element method (FEM) or moment method results.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Optimization of Aperture Transitions for Multiport Microstrip Circuits

*C. Chen, M.-J. Tsai and N.G. Alexopoulos. "Optimization of Aperture Transitions for Multiport Microstrip Circuits." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2457-2465.*

The introduction of printed aperture into multiport microstrip circuits as a vertical transition proves to be practical in the design as well as manufacturing process of multilayered circuits. With the mixed-potential integral equation-based moment method, it becomes possible to analyze and optimize the performance of this arbitrary shape aperture transition for multiport circuit applications. Bandwidth enhancement is obtained by changing the shape of the slot for two-port and three-port microstrip transitions. Also, the influence of slot size, orientation, and mutual coupling have been thoroughly studied in order to reach an optimal circuit performance. Using the transition, a three-port power divider with 180 degree phase difference and a directional coupler with various degree of coupling have been designed.

# Abstracts

## Use of Frequency Derivatives in the Three-Dimensional Full-Wave Spectral Domain Technique

*J.E. Pekarek and T. Itoh. "Use of Frequency Derivatives in the Three-Dimensional Full-Wave Spectral Domain Technique." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2466-2473.*

Rational function approximations are used to extrapolate the frequency response of the scattering coefficients of three-dimensional (3-D) structures. The rational functions are constructed by applying Pade approximation techniques to single frequency solutions of the currents and the derivatives of the currents with respect to frequency. ‘The currents and current derivatives are computed using a modified spectral domain technique. The efficiency of the method, along with the direct determination of the poles and zeros of the transfer function, make the method well-suited for model-based parameter estimation (MBPE). Multiple-frequency-point Pade approximations are also investigated.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Advanced Node Formulations in TLM--The Adaptable Symmetrical Condensed Node

*V. Trenkic, C. Christopoulos and T.M. Benson. "Advanced Node Formulations in TLM--The Adaptable Symmetrical Condensed Node." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2473-2478.*

The paper describes the development of a class of adaptable symmetrical condensed (ASCN) transmission-line modeliing (TLM) nodes. The parameters and numerical properties of the ASCN are expressed in terms of arbitrary weighting functions which can be selected in a manner that minimizes dispersion and improves accuracy. It is shown that this approach is effective and can be used to optimize nodal properties according to problem requirements.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Application of the Eigenmode Transformation Technique for the Analysis of Planar Transmission Lines (Dec. 1996, Part II [T-MTT])

*C. Rieckmann, A. Jostingmeier and A.S. Omar. "Application of the Eigenmode Transformation Technique for the Analysis of Planar Transmission Lines (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2479-2486.*

The eigenmode transformation technique is formulated for the analysis of inhomogeneously filled shielded waveguides containing metal inserts. The permittivity of the filling medium may be an arbitrary function of the transverse coordinates. The method is based on expanding the electromagnetic field in terms of the eigemnodes of the corresponding empty shielding waveguide. The metal inserts have first the effect of linearly transforming the eigenmodes of the empty guide into those of the shielded waveguide containing the metal inserts (including the TEM-modes). Next the inhomogeneity of the filling medium is taken into account which leads to a proper matrix eigenvalue problem. In addition an alternative formulation is derived from a variational approach. Results of both formulations are compared for a shielded circular dielectric waveguide. The eigenmode transformation technique is applied to various types of planar transmission lines, i.e., coupled microstrip lines, finlines, and coplanar lines. The results are compared with those of other methods.

# Abstracts

## Rigorous Analysis of Mode Propagation and Field Scattering in Silicon-Based Coplanar MIS Slow Wave Structures with Abrupt Transitions to Transmission Lines on Normal Substrate

*S. Chen, R. Vahldieck and J. Huang. "Rigorous Analysis of Mode Propagation and Field Scattering in Silicon-Based Coplanar MIS Slow Wave Structures with Abrupt Transitions to Transmission Lines on Normal Substrate." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2487-2494.*

This paper presents a rigorous field theoretical analysis of slow wave mode propagation in coplanar waveguide (CPW) metal-insulator-semiconductor (MIS) transmission lines with a laterally confined doping profile, Two types of transmission line structures are investigated--bulk silicon and semiconductor on-insulator (S01). In both cases a Gaussian profile of the doping depth is assumed. It was found that an optimum lateral width of the doping region exists for which both structures exhibit a much better slow wave factor at lower losses than traditional thin-film MIS transmission lines. The abrupt transition between MIS, CPW, and CPW on a normal insulating substrate was investigated as well. It was found that the reflection coefficient increases significantly with frequency and when the lateral width of the doping region is extended over the whole cross section of the CPW. The investigation was carried out using the frequency-domain transmission tine modeling (TLM) (FDTLM) method.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## EM-ANN Models for Microstrip Vias and Interconnects in Dataset Circuits

*P.M. Watson and K.C. Gupta. "EM-ANN Models for Microstrip Vias and Interconnects in Dataset Circuits." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2495-2503.*

A novel approach for accurate and efficient modeling of monolithic microwave/millimeter wave integrated circuit (MMIC) components by using electromagnetically trained artificial neural network (EM-ANN) software modules is presented. Full-wave EM analysis is employed to characterize MMIC components. Structures for simulation are chosen using design of experiments (DOE) methodology. EM-ANN models are then trained using physical parameters as inputs and S-parameters as outputs. Once trained, the EM-ANN models are inserted into a commercial microwave circuit simulator where they provide results approaching the accuracy of the EM simulation tool used for characterization of the MMIC components without increasing the analysis time significantly. The proposed technique is capable of providing simulation models for MMIC components where models do not exist or are not accurate over the desired region of operation. The approach has been verified by developing models for microstrip vias and interconnects in dataset circuits. A new hybrid (AS) modeling approach which makes use of existing approximate models for components is introduced and shown to be a more efficient method for developing EM-ANN models. An example of using EM-ANN models to optimize the component geometry is included.

Click on title for a complete paper.

# Abstracts

## Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])

*M.-J. Tsai, C. Chen, N.G. Alexopoulos and T.-S. Horng. "Multiple Arbitrary Shape Via-Hole and Air-Bridge Transitions in Multilayered Structures (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2504-2511.*

A methodology for the design of multiple via-hole and air-bridge transitions of arbitrary shape in multilayered multiport microstrip circuits is presented in this paper. Application of multiple via holes to the design of microstrip filters and other devices will be discussed. To properly describe the current along the vertical post, the simple pulse function with a triangular cross section is used in the moment method analysis. Circularly and rectangularly shaped vertical transitions are analyzed for several practical applications. Comparisons of numerical results with experimental and available analytical data show good agreement.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Accuracy of TLM Solutions of Maxwell's Equations (Dec. 1996, Part II [T-MTT])

*L.R A.X. de Menezes and W.J.R. Hoefer. "Accuracy of TLM Solutions of Maxwell's Equations (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2512-2518.*

This work investigates the physical origin of the coarseness and dispersion errors influencing TLM solutions of Maxwell's equations. The study is performed by solving the difference equations of the numerical method analytically. The results confirm a reduction of the accuracy of the discrete solution near field singularities. This effect is a consequence of the finite number of spatial modes supported by the discretized domain. The solution of partially filled waveguide is also investigated. The results show that TLM can have positive or negative dispersion, depending on the dielectric filling, excited lmode and the geometry. These results are also valid for the finite difference time domain method (FDTD).

# Abstracts

## A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])

*L. Cascio, G. Tardioli, T. Rozzi and W.J.R. Hoefer. "A Quasi-Static Modification of TLM at Knife Edge and 90° Wedge Singularities (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2519-2524.*

A common drawback of numerical techniques such as transmission line method (TLM) and finite-difference time-domain method (FDTD) resides in the difficulty to accurately describe the electromagnetic field in structures with singularities. In this paper a local modification of the two-dimensional (2-D) TLM algorithm for the nodes surrounding a knife edge and a 90° wedge is proposed. A quasi-static approximation of the field is used to derive an equivalent circuit of the edge. The proposed theory is then extended to the characterization of infinitely thin septa, the vertex of which is located anywhere between the nodes of the TLM mesh. The proposed corner correction is compared with the uncorrected TLM results and with data available in the literature, revealing a marked enhancement in the accuracy and convergence of the results.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Simulation of Dispersive Multiconductor Transmission Lines by Pade Approximation via the Lanczos Process

*M. Celik and A.C. Cangellaris. "Simulation of Dispersive Multiconductor Transmission Lines by Pade Approximation via the Lanczos Process." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2525-2535.*

A mathematical model for dispersive, multiconductor transmission lines is introduced that makes possible the utilization of the Pade approximation via the Lanczos (PVL) process to the analysis of linear networks that contain transmission line systems. The mathematical model is based on the use of Chebyshev polynomials for the representation of the spatial variation of the transmission-line voltages and currents. A simple collocation procedure is used to obtain a matrix representation of the transmission line equations with matrix coefficients that are first order polynomials in the Laplace-transform variables and in which terminal transmission-line voltages and currents appear explicitly. Thus, the model is compatible with both the PVL algorithm and the modified nodal analysis formalism. Results from the numerical simulation of both digital interconnect-type and microwave circuits are presented to demonstrate the validity and discuss the efficiency of the proposed model.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Full-Wave Modeling of Generalized Double Ridge Waveguide T-Junctions

*C. Wang and K.A. Zaki. "Full-Wave Modeling of Generalized Double Ridge Waveguide T-Junctions." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2536-2542.*

A rigorous technique for full wave modeling of the generalized double ridge waveguide T-junction has been developed. Eigen modes in each ridge waveguide region are obtained using mode-matching technique. Based on the eigen mode expansion method, combining the cascading, procedure and computation of the magnetic fields of each mode at the shorted ports, the generalized admittance matrices and scattering matrices of all three ports are obtained. The method is general and very efficient. The accuracy and versatility of the method are verified through several numerical examples. The computed dominant mode's S-parameters are compared with that by finite element method (HFSS) and shown to be in good agreement.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## An Accurate Equivalent Circuit Model of Flip Chip and via Interconnects

*H.H.M. Ghouz and E.-B. El-Sharawy. "An Accurate Equivalent Circuit Model of Flip Chip and via Interconnects." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2543-2554.*

In this paper, the transition discontinuities of flip chip circuits are modeled and investigated using finite-difference time-domain (FDTD) method to predict the S-parameters of different packages. This includes transition between two coplanar lines on the chip and mother board and transition between two striplines in a package. The computed S-parameter of the fllp chip package using the FDTD model are used to develop an equivalent circuit for the transition discontinuity over a wide frequency band. A general and accurate equivalent circuit model of the interconnect has been developed and presented. In this circuit model, a statistical analysis is used to compute the value of the circuit elements. Also, losses in the flip chip package are represented by a simple function versus frequency. These losses include substrate loss of the chip and the mother board due to excitation of surface wave and radiation loss due to the bump. Conductor and material substrate losses are not included in this circuit model. Good agreement has been obtained between the S-parameters of the FDTD model and the equivalent circuit model over a wide frequency band of up to 50 GHz. Furthermore, the effects of the bump dimensions on the equivalent circuit model has been also evaluated and presented. The results show important issues in the design of the flip chip interconnect. The bump dimensions can be used as impedance matching parameters to achieve minimum losses over a wide frequency band. The presented equivalent circuit model can be used in commercial circuit simulators to predict monolithic microwave/millimeter wave integrated circuit (MMIC) performance including the package.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## GT-PML: Generalized Theory of Perfectly Matched Layers and its Application to the Reflectionless Truncation of Finite-Difference Time-Domain Grids (Dec. 1996, Part II [T-MTT])

*L. Zhao and A.C. Cangellaris. "GT-PML: Generalized Theory of Perfectly Matched Layers and its Application to the Reflectionless Truncation of Finite-Difference Time-Domain Grids (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2555-2563.*

A new mathematical formulation is presented for the systematic development of perfectly matched layers from Maxwell's equations in properly constructed anisotropic media. The proposed formulation has an important advantage over the original Berenger's perfectly matched layer in that it can be implemented in the time domain without any splitting of the fields. The details of the numerical implementation of the proposed perfectly matched absorbers in the context of the finite-difference time-domain approximation of Maxwell's equations are given. Results from three-dimension (3-D) simulations are used to illustrate the effectiveness of the media constructed using the proposed approach as absorbers for numerical grid truncation.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits

*A. Weisshaar, M. Mongiardo, A. Tripathi and V.K. Tripathi. "CAD-Oriented Fullwave Equivalent Circuit Models for Waveguide Components and Circuits." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2564-2570.*

New multimode equivalent circuit models for single and cascaded E-plane and H-plane step discontinuities in rectangular waveguides are presented. The computer-aided design (CAD)-oriented equivalent circuit models enable rigorous and efficient fullwave analysis of waveguide components and circuits entirely by circuit simulation. The method has been implemented on the microwave circuit simulator Libra and applied to waveguide structures containing single and cascaded irises and stub discontinuities. Comparisons of circuit simulation results for single and cascaded inductive irises as well as a single and three E-plane stubs with the standard mode-matching method show perfect agreement. Results of a Ka-Band bandpass filter analysis are in good agreement with a mode-matching solution that includes the correct edge condition.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Nonlinear System and Subsystem Modeling in Time Domain

*M.I. Sobhy, E.A. Hosny, M.W.R. Ng and E.A. Bakkar. "Nonlinear System and Subsystem Modeling in Time Domain." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2571-2579.*

Nonlinear models of microwave subsystems are identified from time domain measurements. Scattering functions in the form of nonlinear time domain functions are used to derive a system identification model instead of an equivalent circuit. The advantage being the simplicity of the measurement and the developed models and the speed and accuracy of the simulation of the entire system.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Hybrid Analysis of Three-Dimensional MMIC Elements by the Method of Lines

*L. Vietzorreck and R. Pregla. "Hybrid Analysis of Three-Dimensional MMIC Elements by the Method of Lines." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2580-2586.*

A new eigenmode algorithm, based on the method of lines, is presented for full-wave analysis of real three-dimensional (3-D) MMIC elements. Finite conductor thickness, finite substrate, dielectric or ohmic losses are rigorously modeled. The analytical calculation in the direction of propagation enables the analysis of structures with very short or long interconnections between the single discontinuities. To demonstrate the generality of the proposed algorithm several completely different structures were analyzed. Examinations of the convergence were performed. Scattering parameters of filters and planar transmission line interconnects like air bridges, via holes and bead transitions were investigated. The calculated results agree very well with computed and measured results published in literature.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])

*K. Guillouard, M.-F. Wong, V. Fouad Hanna and J. Citerne. "A New Global Finite Element Analysis of Microwave Circuits Including Lumped Elements (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2587-2594.*

A new fullwave global analysis of complex inhomogeneous microwave structures including passive or active, linear or nonlinear lumped elements is presented. For a given structure, only one electromagnetic simulation of the distributed part, by a three-dimensional (3-D) finite element method using edge elements, is needed correspondhg to the insertion of variable lumped elements placed at the same position. Simulation results of various test cases, containing either resistor, diode, or active component, are compared with those provided by a commercial circuit analysis software or with measurements results. Our validated electromagnetic simulator is then used for analyzing a planar balanced mixer operating in the millimetric range.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Order Recursive Method of Moments (ORMoM) for Iterative Design Applications

*K. Naishadham and P. Misra. "Order Recursive Method of Moments (ORMoM) for Iterative Design Applications." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2595-2604.*

The method of moments (MoM) continues to be the most frequently used full-wave electromagnetic simulation technique for application to CAD and optimization of microwave circuits. In this paper, we present an order-recursive variant of standard LU decomposition for the efficient solution of moderately large linear systems arising in the application of MoM to iterative design problems. In comparison with the existing solution methods suitable to matrices of size such that direct resolution of the linear systems by Gaussian elimination or LU decomposition becomes feasible, the proposed order-recursive MoM (ORMoM) allows a very large portion of repetitive computations (from scratch) at each design iteration to be avoided, leading to extremely efficient design cycles. Specifically, it is shown that ORMoM results in an order of magnitude reduction in the solution time for typical microwave design tasks. Therefore, this contribution is a major advance toward EM simulation-based CAD and optimization of microwave circuits.

Click on title for a complete paper.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Transient Propagation in Lossy Coplanar Waveguides

*C.-L. Liao, Y.-M. Tu, J.-Y. Ke and C.H. Chen. "Transient Propagation in Lossy Coplanar Waveguides." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2605-2611.*

Propagation of picosecond Gaussian and rectangular pulses along a lossy coplanar waveguide is investigated in detail. To this end, a new empirical formula for attenuation constant is proposed for discussing the conductor and leakage losses associated with the coplanar waveguide in which the thickness and conductivity of signal strip and ground planes are finite. This formula is obtained by comparing the results by the modified spectral-domain approach with those by the previous empirical formulas. Based on this new empirical formula, an efficient time-domain propagation model is established and applied to analyze the transient characteristics of Gaussian and rectangular pulses propagated along a lossy coplanar waveguide. In particular, the transient propagated pulses calculated by different empirical formulas are discussed and compared with those of the experimental data.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Computer-Aided Design of Step Recovery Diode Frequency Multipliers

*J. Zhang and A.V. Raisanen. "Computer-Aided Design of Step Recovery Diode Frequency Multipliers." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2612-2616.*

Through the study of the step recovery diode (SRD) models, a method for improving the efficiency of CAD of SRD frequency multipliers is proposed. By reducing the nonlinearity of the SRD model to an appropriate extent, the simulation and optimization of SRD frequency multipliers can be carried out more easily and faster. Systematic design and optimization of an SRD frequency multiplier is described. Simulation results of this SRD frequency multiplier are compared with experimental results.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Optimization of Active Microwave Frequency Multiplier Performance Utilizing Harmonic Terminating Impedances (Dec. 1996, Part II [T-MTT])

*D.G. Thomas, Jr. and G.R. Branner. "Optimization of Active Microwave Frequency Multiplier Performance Utilizing Harmonic Terminating Impedances (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2617-2624.*

A primary factor affecting optimum performance of microwave multipliers employing nonlinear devices is the proper termination of the fundamental and other harmonic frequency components. The objective of the paper is to present a quantitative analysis leading to the assessment of optimum terminating impedances in the design of active frequency multipliers with special attention given to harmonics other than those desired. The analysis includes computer modeled HEMT data and supporting measured data for corresponding circuit realizations. Circuit designs are presented utilizing HEMT transistors as the active element to verify modeled results. Based on available literature, the results demonstrate, for the first time, the quantitative effects of harmonic termination on active multiplier conversion gain and fundamental and higher harmonic suppression. An experimental design reveals an improvement in multiplier gain of 124% over the conventional approach and data is presented which quantitatively illustrates the advantages of impedance termination considerations under optimal bias conditions.

# Abstracts

## Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's

*J.A. Reynoso-Hernandez, F.E. Rangel-Patino and J. Perdomo. "Full RF Characterization for Extracting the Small-Signal Equivalent Circuit in Microwave FET's." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2625-2633.*

The basic cell for linear, nonlinear, and noise models is the intrinsic transistor. To determine the intrinsic device elements a de-embedding of the parasitic elements is needed. A good extraction of the extrinsic device elements along with a suitable topology leads to the true values of the intrinsic transistor and therefore to good models. In this paper, three methods for access resistances computation are investigated. Two of them are based on DC measurements with floating drain or source and they use a modified Schottky model for determining the gate resistance. The third method is an improved cold-FET technique based on RF measurements with floating drain instead of the V/sub ds/ = O condition. The originality of the proposed RF method is the use of the floating drain configuration which overcomes the inconsistencies between DC and RF methods. On the other hand, extended expressions for parasitic inductances calculation are presented. These expressions take into account the influence of different factors such as parasitic capacitances and access resistances. Based on both, the improved cold-FET technique for access resistances computation, and the extended equations for parasitic inductances, this paper presents also an alternative method for extracting the small-signal equivalent circuit on PHEMT's by means of RF measurements only, with no optimization procedures.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Conditionally Stable Amplifier Design Using Constant µ-Contours (Dec. 1996, Part II [T-MTT])

*M.L. Edwards and S. Cheng. "Conditionally Stable Amplifier Design Using Constant µ-Contours (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2634-2640.*

Conditionally stable amplifiers (O < k < 1) can be an attractive design option for commercial applications where increased gain can be achieved by accepting a measured risk of instability. A procedure is presented for designing amplifier input and output matching networks which permits an a-priori, quantitative trade-off between gain and the stability parameter, µ (or µ'). Analytical results have been derived suitable for CAD implementation.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's

*C.-J. Wei, J.C.M. Hwang, W.-J. Ho and J.A. Higgins. "Large-Signal Modeling of Self-Heating, Collector Transit-Time, and RF-Breakdown Effects in Power HBT's." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2641-2647.*

A large-signal heterojunction bipolar transistor (HBT) model has been developed which includes self-heating, collector transit-time, and RF-breakdown effects. The model has a compact form which is based on a compromise between accuracy and utility. As such, the model can be readily extracted and verified with the aid of RF waveform measurements. Using the model in simulations, it was found that RF breakdown was dependent on base biasing and loading conditions. Therefore, with proper circuit design, the maximum output power of the HBT can significantly exceed the limit of open-base breakdown voltage.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Optimization of a Lumped Element Circulator Based on Eigenvalue Evaluation and Structural Improvement

*T. Miura, M. Kobayashi and Y. Konishi. "Optimization of a Lumped Element Circulator Based on Eigenvalue Evaluation and Structural Improvement." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2648-2654.*

An optimization technique for a lumped element circulator has been established from the point of view of theoretical characteristic design and structural improvement. A theoretical design based on the evaluation of the eigenvalues of an inductance matrix made it possible to optimize the isolation bandwidth characteristic of a structurally improved circulator. Structural optimization was achieved by the application of multilayer ceramic technology and novel conductor formation methods to increase the isolation bandwidth of the circulator and to decrease its insertion loss. The 20 dB isolation bandwidth of 5.8 % obtained by this circulator exceeded the characteristics of a conventional circulator of the same size by 29%, while an insertion loss of 0.35 dB was maintained. In view of the present status of ceramic technology, it is believed that this circulator has been ultimately close to the preferred structure for lumped element circulators.

## Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K

*R. Sloan, C.K. Yong and L.E. Davis. "Broadband Theoretical Gyroelectric Junction Circulator Tracking Behavior at 77 K." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2655-2660.*

The perfect circulation conditions for the gyroelectric circulator are given for a gyroelectric ratio with magnitude in the range zero to two. Values of this ratio above unity given in the paper correspond to the frequency regions where the effective permittivity is negative. The subsequent Green's function analysis employs the modified Bessel function. In accordance with the Drude model of semiconductors, a theoretical low-loss GRAS design is presented with a 20 dB isolation bandwidth of approximately 90% at an operating temperature of 77 K. The theoretical broadband circulation tracking behavior of this design is demonstrated for gyroelectric ratios which may exceed a magnitude of unity. The operating frequency range for this particular circulator design is below the extraordinary wave resonance frequency. In order to measure the microwave properties of the magnetised semiconductor disk, a two port analysis is performed based upon the Drude model of semiconductors.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Full Wave Analysis of Edge-Guided Mode Microstrip Isolator (Dec. 1996, Part II [T-MTT])

*T.M.F. Elshafiey, J.T. Aberle and E.-B. El-Sharawy. "Full Wave Analysis of Edge-Guided Mode Microstrip Isolator (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2661-2668.*

This paper presents a full-wave analysis of three edge-guided mode microstrip isolator structures. Galerkin's technique in the spectral domain is used to calculate the insertion loss and the isolation of the structures. The paper presents figures of merit of different multilayer structures. A multilayer structure resulted in increased isolation and lower insertion loss.

# Abstracts

## L-Resonator Bandstop Filters (Dec. 1996, Part II [T-MTT])

*H.C. Bell. "L-Resonator Bandstop Filters (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2669-2672.*

A design procedure is presented for narrow bandstop filters using TEM transmission line L resonators, which are intermediate of the gap and parallel-coupled resonators typically used. In the configuration, parallel coupling occurs over a portion of the resonator length, with the remaining resonator length forming a stub. The grounded end of the resonator may be in either the coupled or stub portion of the resonator.

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Quarter Wavelength Ceramic Combline Filters

*H.-W. Yao, C. Wang and K.A. Zaki. "Quarter Wavelength Ceramic Combline Filters." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2673-2679.*

A rigorous method for analysis of coupled dielectric quarter wavelength combline resonators is presented. The resonant frequencies and coupling coefficients of the resonators coupled by different coupling structures are investigated. A filter design technique based on the results of numerical analysis is described. A slot coupled filter and a monoblock elliptic function filter are designed. Excellent experimental results verify the theory.

# Abstracts

## A Four-Pole Dual Mode Elliptic Filter Realized in Circular Cavity without Screws (Dec. 1996, Part II [T-MTT])

*L. Accatino, G. Bertin and M. Mongiardo. "A Four-Pole Dual Mode Elliptic Filter Realized in Circular Cavity without Screws (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2680-2687.*

A four-pole dual mode elliptic filter is realized in circular cavity without screws. The desired coupling and tuning actions are achieved by using a novel arrangement consisting in the insertion of a short section of inclined rectangular waveguide in the middle of the cavity body. In this way we realize dual-mode filters by using only junctions of waveguides with rectangular and circular cross sections, thus enabling a very efficient CAD of such filters. This arrangement also proves particularly convenient from the manufacturing viewpoint. Measured response of a bread-board channel filter operating at Ku-Band shows good agreement with theoretical simulations; a sensitivity analysis confirms the validity of the proposed design.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Finite Difference Analysis of 2-D Photonic Crystals

*H.Y.D. Yang. "Finite Difference Analysis of 2-D Photonic Crystals." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2688-2695.*

In this paper, a finite difference method is developed to analyze the guided-wave properties of a class of two-dimensional photonic crystals (irregular dielectric rods). An efficient numerical scheme is developed to deal with the deterministic equations resulting from a set of finite difference equations for inhomogeneous periodic structures. Photonic band structures within an irreducible Brillouin zone are investigated for both in-plane and out-of-plane propagation. For out-of-plane propagation, the guided waves are hybrid modes; while for in-plane propagation, the guided waves are either TE or TM modes, and there exist photonic bandgaps within which wave propagation is prohibited. Photonic bandgap maps for squares, veins, and crosses are investigated to determine the effects of the filling factor, the dielectric contrast, and lattice constants, on the band-gap width and location. Possible applications of photonic bandgap materials are discussed.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Two-Dimensional Fiber-Optic Control of a True Time-Steered Array Transmitter (Dec. 1996, Part II [T-MTT])

*M.Y. Frankel, P.J. Matthews and R.D. Esman. "Two-Dimensional Fiber-Optic Control of a True Time-Steered Array Transmitter (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2696-2702.*

We report a first demonstration of a fiber-optic beamformer for independent two-dimensional (2-D) true time-delay steering of a transmitter array. The fiber-optic beamformer is based on a simple dispersive prism optical delay approach, with separate azimuth and elevation control stages. The azimuth dispersive prism stage includes an amount of dispersion in each link proportional to the corresponding column position in the array. The microwave signals, properly time-delayed for azimuth steering, are amplified and serve as inputs to identical dispersive prisms feeding the elements in each column. The elevation dispersive prism stages include an amount of dispersion in each link proportional to the corresponding row position in the array. Each time-delayed microwave signal feeds a single flared-notch element in a 4 x 4 array. The 2-D array pattern measurements in an anechoic chamber clearly demonstrate independent ±30° azimuth and ±30° elevation steering. There is no observed squint over the microwave-component determined bandwidth of 6-18 GHz.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Hybrid Lidar-Radar Ocean Experiment

*L.J. Mullen, P.R. Herczfeld and V.M. Contarino. "Hybrid Lidar-Radar Ocean Experiment." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2703-2710.*

This paper concerns a novel hybrid lidar-radar system for underwater surveillance. Simulations and labora-tory measurements incorporating the hybrid detection scheme revealed a 17-dB suppression of the water backscatter signal (clutter) and corresponding target contrast enhancement. These results led to the design, implementation and testing of a lidar-radar system for ocean experimentation. Details of the system, in addition to the goals and results of the ocean experiment, are presented.

# Abstracts

## A New Measurement Approach for Phase Noise at Close-In Offset Frequencies of Free-Running Oscillators (Dec. 1996, Part II [T-MTT])

*X. Zhang, B.J. Rizzi and J. Kramer. "A New Measurement Approach for Phase Noise at Close-In Offset Frequencies of Free-Running Oscillators (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2711-2717.*

This paper presents a new measurement approach which has been developed as a practical method for quick, accurate and low cost measurements of close-in offset phase noise of microwave free-running oscillators. To overcome the shortcomings of conventional measurement methods, the approach utilizes the injection locking technique to stabilize the free-running oscillator and down-convert the oscillator noise to baseband. Theoretical and experimental studies clearly demonstrate the accuracy, the effectiveness and the flexibility of the measurement technique. The phase noise of voltage controlled oscillators (VCO's) at 2.5 and 9.3 GHz have been measured to verify the new approach.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Pulsed Device Measurements and Applications

*J. Scott, J.G. Rathmell, A. Parker and M. Sayed. "Pulsed Device Measurements and Applications." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2718-2723.*

A pulsed measurement system can provide more than just isothermal characteristic data. An off-the-shelf system can determine rapidly the timing necessary for both pulsed-1-V and pulsed-S-parameter measurements to be isothermal and iso-dynamic. Instantaneous channel temperature may be determined. Thermal and charge-trapping effects can be separated and time constants measured. Full gain-derivative surfaces can be ob-tained far more efficiently than by spectral sweep measurements. Characteristics and transient effects following excursions beyond the safe-operating-area and into breakdown may be observed nondestructively.

# Abstracts

## Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer

*C.J. Clark, A.A. Moulthrop, M.S. Muha and C.P. Silva. "Transmission Response Measurements of Frequency-Translating Devices Using a Vector Network Analyzer." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2724-2736.*

A new method for accurately determining the transmission response of frequency-translating devices (FTD's) is presented. The absolute amptitude and phase of the FTD under test is obtained using a vector network analyzer (VNA) and two test FTD's, where one FTD must have reciprocal frequency response characteristics. The characterization of single-sideband (SSB) FTD's is obtained in a straightforward manner by combining data from three VNA two-port swept measurements. The characterization of double-sideband (DSB) FTD's can be performed in the same manner as for SSB FTD's, or, more accurately, by combining data from six two-port swept baseband measurements. A complete analysis of the characterization method using low-pass equivalent (LPE) signals and systems is presented, along with the development of the appropriate data reduction procedures needed to arrive at the de-embedded LPE FTD transmission responses. The validation and accuracy of the method is demonstrated with results for both SSB and DSB FTD's operating at 20 GHz.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])

*F. Sinnesbichler, A. Ebberg, A. Felder and R. Weigel. "Generation of High-Speed Pseudorandom Sequences Using Multiplex-Techniques (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2738-2742.*

We report on the design and performance of high-speed pseudorandom sequence generators for nonreturn-to-zero (NRZ)-signals. The hardware is based on multiplexer circuits that multiply the data rate of a 5 Gb/s pseudorandom sequence to, respectively, 10 and 20 Gb/s. We employ multiplex-techniques based on the"cycle-and-add property" of pseudorandom sequences. The circuitry incorporates special high-speed silicon chips and is fabricated in both microstrip and coplanar waveguide technology. The experimental results demonstrate the feasibility of our approach.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Effects of Nonlinear Distortion on CDMA Communication Systems (Dec. 1996, Part II [T-MTT])

*S.-W. Chen, W. Panton and R. Gilmore. "Effects of Nonlinear Distortion on CDMA Communication Systems (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2743-2750.*

We report a rigorous approach to analyze the effects of nonlinear distortion on code division multiple access (CDMA) wireless communication systems based on time-domain analysis and band-pass nonlinearity theory. Given AM-AM and AM-PM characteristics of a nonlinear device, this technique is capable of predicting adjacent channel power rejection (ACPR), noise power ratio (NPR), two-tone intermodulation products, CDMA waveform quality, and baseband signal vector constellation at the output of the nonlinear device. To demonstrate and verify the capability of this technique, an L-band power amplifier was designed, built, tested with CDMA waveforms, and compared with the simulated results. Excellent agreement between the measured and predicted results has been achieved.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras

*G.R. Huguenin, E.L. Moore, S. Bandla and J.J. Nicholson. "A Millimeter-Wave Monolithic Load Switching Twist Reflector for Compact Imaging Cameras." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2751-2757.*

A monolithic load switching twist reflector (LSTR) has been built and tested for use in 94 GHz passive imaging cameras. In this paper, we describe the LSTR component, which switches between the dual roles of load comparison in a radiometer and reducing the length of the camera. Radiometric and quasioptical tests show that the array has an insertion loss of 0.25 dB and a switching ratio of >=20 dB. This active array of p-i-n diodes can replace the mechanical choppers often used in load comparison.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Bleustein-Gulyaev-Shimizu Wave Resonator Having Resonances for TV and VCR Traps (Dec. 1996, Part II [T-MTT])

*M. Kadota, J. Ago and H. Horiuchi. "A Bleustein-Gulyaev-Shimizu Wave Resonator Having Resonances for TV and VCR Traps (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): 2758-2762.*

A Bleustein-Gulyaev-Shimizu (BGS) wave has only a shear horizontal (SH) wave showing a complete reflection at a free edge of a substrate. By utilizing this property, a small BGS resonator having one resonance without reflector electrodes is realized. In the paper, using the responses exited by a weighted interdigital transducer (IDT) and generated by the 2N ±2th mode's complete reflections at free edges of a ceramic substrate, we realized a new type of BGS resonator having resonances without reflector electrodes. This resonator showed sufficient trap attenuations for practical use at both adjacent picture carrier frequency (f/sub ap/) and adjacent sound carrier one (f/sub as/) in the TV and VCR video intermediate frequency (VIF) circuit.

# Abstracts

## Index, IEEE [T-MTT] 1996, Volume 44, and MTT-S Sponsored Conferences

*"Index, IEEE [T-MTT] 1996, Volume 44, and MTT-S Sponsored Conferences." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): i1-bm1.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Your One-Stop Sourcebook on Microstrip Antennas and Microwave Systems (Advertisement) (Dec. 1996, Part II [T-MTT])

*"Your One-Stop Sourcebook on Microstrip Antennas and Microwave Systems (Advertisement) (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): bm1-bm1.*

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Gain a Complete Understanding of Antenna Structure Analysis (Advertisement) (Dec. 1996, Part II [T-MTT])

*"Gain a Complete Understanding of Antenna Structure Analysis (Advertisement) (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): bm2-bm2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## We're on the Web (Advertisement) (Dec. 1996, Part II [T-MTT])

*"We're on the Web (Advertisement) (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): bm3-bm3.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (Dec. 1996, Part II [T-MTT])

*"Back Cover (Dec. 1996, Part II [T-MTT])." 1996 Transactions on Microwave Theory and Techniques 44.12 (Dec. 1996, Part II [T-MTT] (1996 Symposium Issue)): b1-b2.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Front Cover (1996 [MCS])

*"Front Cover (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): fc1-fc1.*

# Abstracts

## Schedule of Events (1996 [MCS])

*"Schedule of Events (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): fc2-fc2.*

# Abstracts

## IEEE 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest of Papers (1996 [MCS])

*"IEEE 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest of Papers (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): i-i.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Copyright (1996 [MCS])

*"Copyright (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): ii-ii.*

# Abstracts

## Message from the General Chairman (1996 [MCS])

*M. Kumar. "Message from the General Chairman (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): iii-iii.*

Welcome to the 1996 IEEE Microwave and Millimeterwave Monolithic Circuits (MMWMC) Symposium. Together with the MTT-IMS, we have organized an outstanding technical program featuring MMIC applications for wireless, satellite, military, automotive, and other applications. This program combined with many social activities in the wonderful city of San Francisco will provide you with a truly outstanding week of technology and fun.

# Abstracts

## MMWMC Committees (1996 [MCS])

*"MMWMC Committees (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): iv-iv.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Message from the Technical Program Chairman (1996 [MCS])

*L.C.T. Liu. "Message from the Technical Program Chairman (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): v-v.*

On behalf of the Technical Program Committee, I would like to welcome you to the 1996 IEEE Microwave & Millimeter-wave Monolithic Circuits Symposium (MMWMC). My sincere gratitude goes to the many authors who submitted outstanding papers to the symposium. Due to the limit number of sessions, we were not able to accommodate many good papers. However, I would like to encourage you to continue to submit papers to this symposium in the future. As you know, the success of the symposium is determined by the quality of the papers.

# Abstracts

## MMWMC Steering Committee (1996 [MCS])

*"MMWMC Steering Committee (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): vi-vi.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## MMWMC Technical Program Committee (1996 [MCS])

*"MMWMC Technical Program Committee (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): vii-vii.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium Schedule (1996 [MCS])

*"IEEE Microwave and Millimeter-Wave Monolithic Circuits Symposium Schedule (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): viii-viii.*

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Table of Contents (1996 [MCS])

*"Table of Contents (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): ix-xvi.*

# Abstracts

## Workshop (1996 [MCS])

*"Workshop (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): xvii-xvii.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Panel (1996 [MCS])

*"Panel (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): xviii-xviii.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Session I -- MMIC Advancements for Military and Commercial Applications

*"Session I -- MMIC Advancements for Military and Commercial Applications." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): xix-xix.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Affordability Strategies in Military Microwave Systems

*L.A. Glasser. "Affordability Strategies in Military Microwave Systems." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 1-1.*

Applications of advanced microwave and millimeter wave integrated circuits have long been dominated by military users. As these technologies have matured, in part because of programs such as MIMIC, commercial users are beginning to apply these components to volume and cost-driven applications. While continuing to use the highest performance GaAs and InP in many applications, we anticipate that the military user will increasingly try to exploit much lower cost dual-use microwave technologies and manufacturing methods. These include, the use of SiGe, microelectromechanical switches and phase shifters, low-cost flip chip packaging, microwave photonics, and computer-aided engineering tools and environments for first-pass design success.

# Abstracts

## MMICs for Commercial Applications the Low-Cost High Volume Production Techniques

*R. Hess. "MMICs for Commercial Applications the Low-Cost High Volume Production Techniques." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 3-6.*

This presentation will cover the new and expanding commercial markets and applications for Microwave and Millimeter-Wave Integrated Circuits. Topics will include the market demand and growth, as well as examples of how the many companies addressing these demands are approaching the new volume requirements. A discussion of volume/cost relationships will be presented, along with techniques for reducing the cost and increasing functionality of Microwave and Millimeter-Wave Integrated Circuits. Specific examples from different companies will be explored with lessons learned.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Microwave Radar for Vehicular Applications

*S.D. Thompson. "A Microwave Radar for Vehicular Applications." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 7-9.*

A Commercial Side Detection System (SDS) sensor based on microwave radar technology for commercial vehicular applications is introduced. The design, manufacture, and function of the SDS sensor are described. Some important aspects of the use of microwave radar on vehicles are discussed and the benefits to the vehicle operator are summarized.

# Abstracts

## Session II -- Power Amplifiers

*"Session II -- Power Amplifiers." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 11-11.*

# Abstracts

## A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones

*S. Makioka, S. Enomoto, H. Furukawa, K. Tateoka, N. Yoshikawa and K. Kanazawa. "A Miniaturized GaAs Power Amplifier for 1.5 GHz Digital Cellular Phones." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 13-16.*

An extremely miniaturized GaAs PA has been developed for the application in 1.5-GHz Japanese digital cellular phones. By using MuMIC (i.e. multilayer microwave integrated circuit) technology, the half sized (0.2cc) PA with 1.1W output power has successfully been implemented. The 48-% power-added efficiency has been obtained with drain supply voltage of 3.5-V.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## High Efficiency Power HFETS for Low Power Wireless Applications

*V. Nair, S. Tehrani, D. Halchin, E. Glass, E. Fisk and M. Majerus. "High Efficiency Power HFETS for Low Power Wireless Applications." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 17-20.*

This paper discusses the development of depletion mode Heterojunction FETs (HFETs) for high efficiency power amplifiers. At 850 MHz, a 12 mm HFET achieved power added efficiency of 72 % and an output power of +31.5 dBm at Vds = 3.0V. An optimized HFET achieved 73% pwer added efficiency and 30 dBm output power at Vds = 2.0V. These devices also exhibited a 12 dB improvement in out-of-band noise performance compared to ion implanted MESFETs.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Performance Comparison of 1 Watt Ka-Band MMIC Amplifiers Using Pseudomorphic HEMTs and Ion-Implanted MESFETs

*R. Yarborough, P. Saunier and H.Q. Tserng. "Performance Comparison of 1 Watt Ka-Band MMIC Amplifiers Using Pseudomorphic HEMTs and Ion-Implanted MESFETs." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 21-24.*

We have demonstrated a high-gain, high-efficiency Ka-band three-stage MMIC power amplifier providing >1 watt CW output power, >20 dB power gain, with an average 35% power-added efficiency (37% peak) over a 26.5 to 28 GHz band using 0.25µm AlGaAs/InGaAs pseudomorphic HEMT (pHEMT) process technology. The pHEMT amplifiers exhibit third-order intermodulation products >29 dBc with the output power backed off by 5 dB. As an alternate low-cost solution, we processed three wafers of the Ka-band monolithic amplifier designed with pHEMT technology using direct ion-implanted 0.2µm GaAs MESFETs achieving >1 watt CW output power, >18 dB power gain, with an average 24% power-added efficiency (27% peak) over the band. The MESFET amplifiers demonstrate third-order intermodulation products >21 dBc with the output power backed off by 5 dB. All amplifier results reported here contain no de-embedding of fixture and connector losses. This paper presents 0.25µm pHEMT and 0.2µm MESFET device results, as well as amplifier design and performance over a 26.5 to 28 GHz band.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## An Ion-Implanted 13 Watt C-Band MMIC with 60% Peak Power Added Efficiency

*W.L. Pribble and E.L. Griffin. "An Ion-Implanted 13 Watt C-Band MMIC with 60% Peak Power Added Efficiency." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 25-28.*

A GaAs MMIC power amplifier that produces in excess of 13 watts of RF power at 60% peak power added efficiency operating in C-band has been developed. Output power over 12 watts at better than 52% PAE has been measured over a 23% fractional bandwidth. The nominal circuit has been designed using non-linear modeling techniques and optimized empirically through fabrication and analysis of an 18-element Taguchi orthogonal array of circuits. The array circuits have been fabricated using ITT-GTC's Multi-Function Self Aligned Gate process.

# Abstracts

## K through Ka-Band Driver and Power Amplifiers

*K.M. Simon, R.M. Wohlert, J.P. Wendler, L.M. Aucoin and D.W. Vye. "K through Ka-Band Driver and Power Amplifiers." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 29-32.*

First pass low, medium, and high power MMIC amplifiers operating over the 17 to 40 GHz band have been demonstrated. The low power driver amplifier delivers 8 dBm output power with 8 dB associated gain and the medium power driver amplifier delivers a minimum of 13 dBm with 8 dB associated gain across the band. The high power amplifier delivers 24 dBm output power from 17 to 35 GHz and greater than 22 dBm from 35 to 40 GHz with a minimum of 17.5 dB associated gain. The low power driver amplifier and the high power amplifier were combined to demonstrate a minimum of 22.5 dBm output power with greater than 24.5 dB associated gain across the 17 to 40 GHz band.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Session III -- Signal Generation and Control

*"Session III -- Signal Generation and Control." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 33-33.*



Contents
Publications
Issues
Papers
Authors

# Abstracts

## A 15/60 GHz One-Stage MMIC Frequency Quadrupler

*K. Shirakawa, Y. Kawasaki, Y. Ohashi and N. Okubo. "A 15/60 GHz One-Stage MMIC Frequency Quadrupler." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 35-38.*

We have developed a 15/60 GHz one-stage MMIC frequency quadruple using a 0.25-µm AlGaAs/GaAs HEMT. The HEMT was characterized by our empirical large-signal model, in which charge conservation and dispersion are taken into consideration. We included this model in a commercially-available harmonic balance circuit simulator, and designed the one-stage quadruple. The fabricated MMIC quadruple has a conversion gain of -5 dBm with -5 dBm of output power for a 0 dBm input signal.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A GaAs Single Chip 2.4 GHz PLL Frequency Multiplier

*W. Baumberger and M.L. Schmatz. "A GaAs Single Chip 2.4 GHz PLL Frequency Multiplier." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 39-42.*

A monolithic GaAs frequency synthesizer/ multiplier for the 2.4 GHz ISM band is presented. The single chip device consists of a VCO, a prescaler ÷ 16, a phase detector and a loop filter. Measured phase noise is -102 dBc/Hz at 100 kHz offset while the frequency of operation covers 2.3 GHz to 2.55 GHz. The device runs from a single 5 V supply and delivers +3 dBm of RF output power. The chip was mounted in a plastic package and a ready to use demonstrator board was designed.

# Abstracts

## A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure

*K. Miyatsuji, H. Ishida, T. Fukui and D. Ueda. "A Technique for Improving the Distortion of GaAs Variable Attenuator IC Using Squeezed-Gate FET Structure." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 43-46.*

This paper describes a novel technique for improving the distortion of the GaAs attenuator IC using squeezed-gate structure of MESFETS. We found that the distortion was originated from the steep cutoff Id-Vgs curve of conventional FETs. To obtain smooth cutoff characteristics, we devised the squeezed-gate structure where the FETs with different threshold voltages are connected in parallel making use of the short channel effect. Fabricated IC shows 10 dB reduction of the 3rd order intermodulation distortion by optimizing the ratio of the gate widths.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications

*F. Cardinal, H. An, I. Mag and R. Smith. "A High-Performance Broadband MMIC PHEMT Resistive Drain Mixer for 28-40 GHz Band PCN Applications." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 47-50.*

A high performance broadband millimeterwave MMIC upconvertor is reported in this paper. The MMIC mixer has a singly balanced configuration and uses two 0.18 µm PHEMT transistors working at resistive drain mixing mode, in which the LO signal is injected to drains, IF to gate via DC bias circuits, and RF signal output from gates. The mixer presents 1-6 dB conversion loss including all losses in the test board (made of 10 mil Duroid substrate) for 27.5-41 GHz LO band and 0.1-1.2 GHz IF band. The P/sub 1dB/ of IF input power is 0 dBm, and good LO-RF suppression with 50 dB at 37.5 GHz. The mixer has been successfully integrated into a 38 GHz PCN demonstrative system in which 64 QAM modulation-demodulation was realized.

# Abstracts

## A Broadband Planar Monolithic Ring Mixer

*S. Maas, M. Kintis, F. Fong and M. Tan. "A Broadband Planar Monolithic Ring Mixer." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 51-54.*

This paper reports the development of a mixer having RF and LO bands of 3 to 11 GHz and an overlapping IF of 1 to 11 GHz. This was achieved through the use of novel planar spiral RF and LO baluns and a new type of four-wire IF balun. We believe that this is the broadest-bandwidth planar monolithic mixer having an overlapped IF reported to date.

# Abstracts

## Session IV -- BiCMOS and HBT MMIC Technologies (Invited Session)

*"Session IV -- BiCMOS and HBT MMIC Technologies (Invited Session)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 55-55.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Low-Voltage Broadband BiCMOS MMICs for Low-Cost High-Speed Wireless Networks Applications

*M. Madihian. "Low-Voltage Broadband BiCMOS MMICs for Low-Cost High-Speed Wireless Networks Applications." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 57-60.*

This paper describes low-voltage BiCMOS MMICs for wireless personal communication applications. Design considerations and performance results for a developed 2V 1.6- 6.2 GHz MMIC family including bipolar-based RF amplifiers, MOS- based IF amplifiers, BiCMOS-based simplified Gilbert mixers, and downconverter as well as upconverter IC's will be presented.

# Abstracts

## Advances in GaAs HBT Power Amplifiers for Cellular Phones and Military Applications (Invited Paper)

*F. Ali, A. Gupta and A. Higgins. "Advances in GaAs HBT Power Amplifiers for Cellular Phones and Military Applications (Invited Paper)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 61-66.*

This paper provides a synopsis of the research and development efforts in the USA in power amplifiers designed with GaAs Heterojunction Bipolar Transistor (HBT) technology. Design issues, performance and reliability of power amplifiers using AlGaAs/GaAs HBTs for RF, microwave and millimeter-wave applications are discussed. Key device parameters influencing different frequency applications are highlighted.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Session V -- Receiver Technology

*"Session V -- Receiver Technology." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 67-67.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications

*M. Nakayama, K. Mori, N. Ogata, Y. Mitsui, H. Yuura, Y. Yoshii, K. Yamamoto, K. Maemura and O. Ishida. "A 1.9GHz Single-Chip RF Front-End GaAs MMIC for Personal Communications." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 69-72.*

A single-chip RF front-end GaAs MMIC for the 1.9GHz Japanese Personal Handy-phone System (PHS) is presented. RF circuits of a high power amplifier (HPA), a T/R switch (SW), two attenuators (ATTs), and a low-noise amplifier (LNA) are integrated, with digital circuits of a negative voltage generator (NVG) for HPA and SW gate bias, and a logic circuit to control RF circuits. The HPA has an output power of 21.5dBm and a high efficiency of 35% with sufficient linearity. The T/R SW combined with receive step-ATT (0/20dB) has loss of 1.2dB (include ATT 's loss) . The LNA has a gain of 11dB with noise figure of 1.7dB, which is self-biased to sleep negative voltage generator during receive mode. The IC needs only single voltage (+3V) DC power supply, and has logic interface to control each modes for TDMA/TDD scheme.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications

*W. Titus, M. Shifrin, V. Aparin and B. Bedard. "A Silicon BiCMOS Transceiver Front-End MMIC Covering 900 and 1900 MHz Applications." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 73-76.*

A Silicon BiCMOS transceiver front-end consisting of a low noise amplifier, power amplifier, and SPDT switch is described. The chip runs off a 5 V supply and requires a single CMOS/TTL control line for switch control. The LNA path has a 22 dB gain and 4 dB noise figure at 900 MHz. The PA has a gain of 22 dB and a output power of 15 dBm. The SPDT switch has an insertion loss of 1.3 dB, and an isolation of 22 dB at 900 MHz.

# Abstracts

## A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment

*J. Itoh, T. Nakatsuka, M. Nishitsuji, T. Uda and O. Ishikawa. "A 1.0V GaAs Receiver Front-End IC for Mobile Communication Equipment." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 77-80.*

A 1.0V operation GaAs receiver front-end IC has been developed by using novel combination of an E-FET and a D-FET for the amplifiers and mixer, high performance GaAs BP-MESFET and on-chip high-epsilon/sub r/ capacitors. The IC shows conversion gain (CG) of 23dB, noise figure (NF) of 2.8dB, the 3rd order output intercept point (IP3out) of 3dBm, image rejection ratio (IRR) over 20dB and LO to RF isolation over 25dB, operating at 880MHz and 6.8mA. At 1.9GHz, the IC also has excellent RF characteristics at dissipation current of 6.5mA. The IC chip has the small size of 0.75mm x 0.75mm, and is molded in a mini-6pin package.

# Abstracts

## Low DC Power Monolithic Low Noise Amplifier for Wireless Applications at 5 GHz

*U. Lott. "Low DC Power Monolithic Low Noise Amplifier for Wireless Applications at 5 GHz." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 81-84.*

A two stage monolithic integrated low noise amplifier for applications in the wireless data frequency range of 5 to 6 GHz has been designed. A noise figure of 3.5 dB with a gain of 15 dB has been achieved using enhancement MESFETs only. The LNA draws 3 mA from a 3.3 V supply, achieving a gain/P/sub DC/ figure of merit of 1.5 dB/mW.

# Abstracts

## Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC

*T. Tokumitsu, K. Nishikawa, K. Kamogawa, I. Toyoda and M. Aikawa. "Three-Dimensional MMIC Technology for Multifunction Integration and its Possible Application to Masterslice MMIC." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 85-88.*

We first verified that the integration level of multifunction MMIC's can be easily increased three-fold by using three-dimensional (3-D) MMIC structure, in comparison to planar ones. The technology was used to build high-density masterslice MMIC's on a single footprint in 2 x 2 mm by incorporating two levels of ground metals in the 3-D structure.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies

*M.V. Aust, T.W. Huang, M. Dufault, H. Wang, D.C.W. Lo, R. Lai, M. Biedenbender and C.C. Yang. "Ultra Low Noise Q-Band Monolithic Amplifiers Using InP- and GaAs-Based O.1µm HEMT Technologies." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 89-92.*

Design and development of ultra low noise MMIC Q-band LNAs using both InP and GaAs-based 0.1-µm HEMT technologies with state-of-art noise figures are reported in this paper. For InAIAs/InGaAs/InP HEMT LNAs, we have achieved noise figure performance as low as 1.6 dB with 10-dB associated gain for a one-stage LNA. With a two-stage design, 20 dB gain with 1.8-dB noise figure was obtained. Single- and multistage MMIC LNAs were also designed and fabricated using a production 0.1-µm AIGaAs/InGaAs/GaAs HEMT process. A four-stage LNA also demonstrated 2.5dB noise figure with 28-dB gain, which is the best MMIC LNA result ever reported for on GaAs-based HEMTs.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band

*M. Joao Rosario, J. Bernardino, F. Fortes, R. Kulke, T. Sporkman and J. Costa Freire. "Monolithic Single FET Mixers with Coplanar Technology to Convert Between V and C Band." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 93-96.*

In this paper the design of single FET coplanar mixers to convert signals between V and C band is presented. A step by step design technique was used, based on harmonic balance simulation. The mixer non-linear device is a PMHFET with a 0.15µm T-gate. Two different topologies were designed, fabricated and tested: cold mixer and drain mixer. The mixers were optimised for minimum conversion losses on the widest possible bandwidth in order to be used on a large number of applications. The experiments show: for the cold mixer, a conversion loss on a 8GHz band in the range of 8 to 10dB both as up and downconverter; and 2.5dB on a 4GHz band for the drain mixer as down converter.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Session VI -- Small Signal IC's and Passive Components

*"Session VI -- Small Signal IC's and Passive Components." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 97-97.*

Click on title for a complete paper.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's

*Y. Sun, H. van Zeijl, J.L. Tauritz and R.G.F. Baets. "Suspended Membrane Inductors and Capacitors for Application in Silicon MMIC's." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 99-102.*

This paper considers the fabrication and modelling of suspended membrane inductors and capacitors on ordinary Silicon substrates. A single post-processing etching step was added to an otherwise standard process. For both components, parasitic capacitances to ground are drastically reduced, enabling high frequency operation. Furthermore, the measured quality factor Q is demonstrably improved with respect to normally fabricated thin film components.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors

*H. Hayashi, M. Muraguchi, Y. Umeda and T. Enoki. "A Novel Loss Compensation Technique for High-Q Broad-Band Active Inductors." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 103-106.*

A novel loss compensation technique for high-Q broad-band active inductors is proposed. This yields frequency-insensitive negative resistance to compensate constant internal losses. Measured frequency range is 6 to 20 GHz for Q values greater than 100, and 7 to 15 GHz for Q values greater than 1,000.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures

*K.W. Kobayashi, D.M. Smith, C.P. Kau, A.K. Oki, A.K. Sharma, B.R. Allen and D.C. Streit. "A Quenchable GaAs HBT X-Band VCO for Switched Band Synthesizer Architectures." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 107-110.*

Here we have achieved the lowest phase noise reported for an HBT VCO at X-band. The VCO employs an off-chip quarter-wave open stub microstrip resonator fabricated on a 50 mil quartz substrate and a shunt-varactor diode for frequency tuning. At a center frequency of 8.9 GHz, the VCO achieves -103 to -105 dBc/Hz at 100 KHz over a tuning bandwidth of 140 MHz (1.6%). By reducing the unloaded Q of the microstrip resonator, a 770 MHz tuning bandwidth (8.6%) can be achieve with a phase noise ranging from -98.5 to -100.5 dBc/Hz. Without a tuning varactor, a record minimum phase noise of -112 dBc/Hz was achieved at a center frequency of 8.3 GHz which benchmarks the lowest reported phase noise achieved for an HBT oscillator at X-band. The HBT VCO MMIC features a monolithically integrated PIN diode quench circuit which enables the VCO to be used in switch-band synthesizer applications.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## 60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems

*K. Ohata, T. Inoue, M. Funabashi, A. Inoue, Y. Takimoto, T. Kuwabara, S. Shinozaki, K. Maruhashi, K. Hosoya and H. Nagai. "60 GHz-Band Ultra-Miniature Monolithic T/R Modules for Multimedia Wireless Communication Systems." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 111-114.*

60GHz-band ultra-miniature FM/FSK transmitter/receiver modules utilizing a complete MMIC chip set including dielectrically stabilized VCO and local oscillator for wireless LANs and video signal transmission systems are reported. The 0.9cc transmitter module exhibits 11.5MHz/V modulation sensitivity and 10.2dBm output power with -2.8ppm/°C frequency stability. The receiver module has 9.2dB downconversion gain and 5.4dB DSB noise figure.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS

*Y. Umeda, T. Enoki, K. Osafune, H. Ito and Y. Ishii. "InAlAs/InGaAs/InP-HEMT Technologies for High-Yield Analog/Digital ICS." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 115-118.*

High-yield and high-performance digital/analog ICs have been fabricated using the same InAlAs/InGaAs/InP-HEMT process. SCFL static frequency dividers show a fabrication yield of 63% and operate at 36.7 ±0.55 GHz. Two-stage MMIC-LNAs show a yield of 75% and at 62 GHz a noise figure of 4.3 ±0.19 dB and a gain of 11.8 ±0.25 dB.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## An Investigation of IM3 Distortion in Relation to Bypass Capacitor of GaAs MMIC's

*H. Kawasaki, T. Ohgihara and Y. Murakami. "An Investigation of IM3 Distortion in Relation to Bypass Capacitor of GaAs MMIC's." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 119-122.*

IM3 distortion in relation to a bypass capacitor of a GaAs MMIC has been investigated. Through non-linear simulation and the measurement of a 1-stage MMIC amplifier, it was shown that only IM3 performance depended on the bypass capacitor. A new analytical model of IF amplitude modulation for the 2-tone RF carrier outputs is proposed. Based upon this model, the RF carrier outputs were distorted from the amplitude modulation by IF of the 2-tone carriers when the output matching circuit was of high impedance at the IF.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A Novel MMIC Source Impedance Tuner for On-Wafer Microwave Noise Parameter Measurements

*C.E. Collins, R.D. Pollard and R.E. Miles. "A Novel MMIC Source Impedance Tuner for On-Wafer Microwave Noise Parameter Measurements." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 123-126.*

A novel MMIC source impedance tuner is reported which can be incorporated into a wafer probe tip. This eliminates the effect of cable and probe losses on reflection coefficient, which enables higher magnitudes to be synthesized at the test device input than for conventional tuners, potentially increasing noise parameter measurement accuracy.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Session VII -- Low Noise Millimeter Wave MMICs (Joint with IMS)

*"Session VII -- Low Noise Millimeter Wave MMICs (Joint with IMS)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 127-127.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Status of InP HEMT Technology for Microwave Receiver Applications (Invited)

*P.M. Smith. "Status of InP HEMT Technology for Microwave Receiver Applications (Invited)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 129-132.*

The current status of InP-based high electron mobility transistor (HEMT) technology for low noise amplification at frequencies up to more than 100 GHz is presented. Following a review of recent advances industry-wide in both device and circuit performance, two issues which will pace the rate at which this new technology can be inserted into microwave systems--material/process maturity and long-term reliability--are discussed.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])

*L. Tran, R. Isobe, M. Delaney, R. Rhodes, D. Jang, J. Brown, L. Nguyen, M. Le, M. Thompson and T. Liu. "High Performance, High Yield Millimeter-Wave MMIC LNAs Using InP HEMTs (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 133-136.*

A millimeter-wave MMIC low noise amplifier chip set has been developed. Based on the InP HEMT technology, these LNAs provide state-of-the-art performance as well as excellent yield and repeatability. With greater than 50% chip yield, a three-stage Q-band LNA design achieved 26 to 31 dB of gain from 42 to 50 GHz and 1.8 dB average noise figure from 43.3 to 45.7 GHz. In addition, there are six other LNA designs including a four-stage V-band LNA with 28 dB of gain and 2.3 dB noise figure and a two-stage balanced Q-band LNA that provided 17 dB of gain and has greater than 61% yield.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])

*K. Maruhashi, M. Funabashi, T. Inoue, M. Madihian and M. Kuzuhara. "A 60 GHz-Band Low Noise HJFET Amplifier Module for Wireless LAN Applications (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 137-140.*

A 60 GHz-band low noise amplifier (LNA) module has been developed based on 0.15µm AlGaAs/InGaAs heterojunction FET(HJFET) technologies. A two-stage MMIC amplifier was designed and fabricated, which exhibited a noise figure less than 3dB with a gain higher than 10dB over 59.5 to 61.5GHz range. For the module fabrication, two MMIC chips were mounted in a WR-15 waveguide housing. The four-stage amplifier module demonstrated a noise figure of 4dB and a gain higher than 24dB from 59 to 60GHz. To our knowledge, this is the best reported noise figure including a microstrip-to-waveguide transition loss, using GaAs-based MMICs operating at this frequency range. The measured output power for the module at 1dB gain compression point was 4dBm. Temperature test from -20 to 70°C revealed very small noise figure and gain variations of 0.35dB and 0.62dB, respectively.

# Abstracts

## A Ka-Band GaInP/GaAs HBT Four-Stage LNA (1996 [MCS])

*A.P. Freundorfer, Y. Jamani and C. Falt. "A Ka-Band GaInP/GaAs HBT Four-Stage LNA (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 141-144.*

A Ka-band GaInP/GaAs HBT four-stage LNA has been designed and fabricated. This circuit is to be used in a multifunction T/R module for local multipoint distribution systems (LMDS) which include both analog and digital transmission. An average noise figure of 6 dB from 27 GHz to 30 GHz, and a gain of greater than 15 dB were measured. These results are the best reported at Ka-band for a LNA using transistors from digital HBT library.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Development of 44 GHz GaAs MMIC-Based Low-Noise Amplifiers for EHF Nulling Antenna

*C.C. Yang and J. Lin. "Development of 44 GHz GaAs MMIC-Based Low-Noise Amplifiers for EHF Nulling Antenna." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]).*

Manuscript not available at time of publication.

# Abstracts

## A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)

*U. Guttich, J.-M. Dieudonne, A. Klaassen, H. Sledzik, K.-E. Schmegner, U. Goebel and M. Boheim. "A Low Noise Heterodyne 89 GHz MMIC Module for the Multifrequency Imaging Microwave Radiometer (MIMR)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 145-148.*

The contribution describes the topology of the heterodyne 89 GHz channel of the Multifrequency Imaging Microwave Radiometer (MIMR). Several components such as double sideband 89 GHz mixer, 44.5 GHz local oscillator, frequency doubler, and IF low noise amplifier are realized using monolithic millimeter- and microwave technology. Detector and band-defining low-pass filter are lumped element assemblies. The frontend concept yields a compact low power consuming module with a proposed overall noise figure of about 5.5 dB. A gain of 52 dB is expected between the 89.1 GHz ± 2.7 GHz RF input and the 0.1 GHz - 2.7 GHz IF output.

# Abstracts

## A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])

*H. Yoshinaga, Y. Kashiwabara, B. Abe and K. Shibata. "A Technique for Deriving Noise-Parameters of Millimeter-Wave Low-Noise HEMTs and its Application to MMIC LNA Design (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 149-152.*

An on-wafer tuning method has been applied to derive noise parameters of pseudomorphic HEMTs measured at W-band and K-band. As an application of the method, a K-band MMIC LNA with 1.6 dB NF and greater than 32 dB gain has been successfully developed.

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Session VIII -- Large Signal Generation and Application (Joint with MTT)

*"Session VIII -- Large Signal Generation and Application (Joint with MTT)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 153-153.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Monolithic VCO Using a Novel Active Inductor (1996 [MCS])

*Y. Cho, S. Hong and Y. Kwon. "Monolithic VCO Using a Novel Active Inductor (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 155-158.*

A novel high-Q tunable active inductor utilizing a common-source cascode FET with a lossy active inductor feedback is described. Using this active inductor, we propose a monolithic VCO with a frequency tuning range from 1.66 GHz to 2.2 GHz in a compact area of 0.7 x 1.2 mm².

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])

*H. Uda, K. Nogawa, T. Hirai, T. Sawai, T. Higashino and Y. Harada. "A High-Performance and Miniaturized Dual-Use (Antenna/Local) GaAs SPDT Switch IC Operating at +3V/0V (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 159-162.*

We have developed an ultra-compact dual-use (antenna/local) switch IC for PHS operating at +3/0 V. This IC has a circuit configuration which utilizes MESFETs with two kinds of pinch-off voltages. Additional applied techniques include a circuit design method that employed electromagnetic field analysis, a pull-up method which utilizes forward current flowing in order through the gates of MESFETs, and high isolation characteristic obtained by use of a chip inductor. The insertion loss and isolation characteristics of this IC are, respectively, 0.54 dB and 28.4 dB at 1.9 GHz and 0.48 dB and 30.0 dB at 1.65 GHz. Furthermore, we were able to suppress adjacent channel leakage power to 61.5 dBc at 600-kHz offset during input power of 22 dBm QPSK modulated signals.

# Abstracts

## High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])

*M. Cardullo, C. Page, D. Teeter and A. Platzker. "High Efficiency X-Ku Band MMIC Power Amplifiers (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 163-166.*

MMIC power amplifiers with 3.5 W nominal output power and 49.5% peak power added efficiency over the 8-14 GHz band are described. Efficiency in excess of 40% is obtained over much of the band. The amplifiers utilize Raytheon's power PHEMT technology. Details of the device performance, circuit design, and evaluation are given. The results presented represent state of the art performance for MMIC circuits over X-Ku band.

# Abstracts

## Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])

*Y. Hwang, P.D. Chow, J. Lester, J. Chi, D. Garske, M. Biedenbender and R. Lai. "Fully-Matched, High-Efficiency Q-Band 1 Watt MMIC Solid State Power Amplifier (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 167-170.*

A fully-matched, high-efficiency Q-band 1 watt MMIC power amplifier has been developed. This chip utilized 2 mil-thick GaAs substrate to improve amplifier gain, power added efficiency and heat dissipation. 1 watt output power and 30% efficiency was achieved at 44 GHz.

# Abstracts

## Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])

*J.A. Lester, Y. Hwang, J. Chi, R. Lai, M. Biedenbender and P.D. Chow. "Highly Efficient Compact Q-Band MMIC Power Amplifier Using 2-mil Substrate and Partially-Matched Output (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 171-173.*

Presented is an 850 mW Q-Band PHEMT MMIC power amplifier with a peak efficiency of 34% at 45.5 GHz, believed to be the highest reported at this power level and frequency. The compact amplifier (3.6 mm by 1.6 mm) features the use of a thinned 2-mil GaAs substrate and off-chip output matching and combining on a 5-mil alumina substrate.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Practical MMIC Negative Resistance Structure for X and Ku Band Applications (1996 [MCS])

*M.R. Moazzam and M. Darvishzadeh. "A Practical MMIC Negative Resistance Structure for X and Ku Band Applications (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 175-178.*

This paper presents the mathematical analysis and measured results of a novel practical MMIC negative resistance structure. This structure operates at X and Ku bands. The measured results show a negative resistance (down to -50 Omega) over a 6 GHz bandwidth centered at 11 GHz.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])

*A. Dehe, H. Klingbeil, V. Krozer, K. Fricke, K. Beilenhoff and H.L. Hartnagel. "GaAs Monolithic Integrated Microwave Power Sensor in Coplanar Waveguide Technology (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 179-182.*

We present the fabrication technology, theoretical and experimental results of a novel MMIC compatible broadband power sensor. With a 50 Omega coplanar waveguide design, integrated AlGaAs thermoelectric sensor and GaAs bulk micromachined membrane for increased sensitivity this sensor is capable of detecting RF power with a sensitivity of 1.1V/W without any waveguide coupling structure.

# Abstracts

## Session IX -- MMIC Systems Components (Joint with IMS)

*"Session IX -- MMIC Systems Components (Joint with IMS)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 183-183.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])

*M.D. Pollman, P. Katzin, B. Bedard, V. Aparin, W. Grammer and R. Orgusaar. "A MMIC Radar Chip for Use in Air-to-Air Missile Fuzing Applications (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 185-188.*

The next generation of air-to-air missiles will require Target Detecting Devices (TDD) that must utilize directional target sensing to optimize weapon effectiveness. Conventionally, a centralized radar proximity sensor is switched sequentially between fixed directional antennas elements to provide the required directionality. This implementation involves expensive and bulky RF cabling and switching circuits to connect the TDD to each antenna element. By utilizing Microwave Monolithic Integrated Circuit (MMIC) technology, a single radar chip has been developed which allows for the simultaneous operation of ultra-miniature, low-cost fuze sensors which are mounted onto the backside of each antenna element, obviating the need for RF switches and cabling. The MMIC described includes all the RF circuitry required to operate each radar sensor synchronously (phased-locked) to a common low frequency clock signal. This allows all directional fuze sensors to be operated simultaneously without mutual interference, and results in an attractive, low-cost, miniaturized TDD electronic package.

# Abstracts

## A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])

*C. Dragon, J. Costa, D. Lamey, D. Ngo, W. Burger and N. Camilleri. "A Silicon MOS Process for Integrated RF Power Amplifiers (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 189-192.*

A silicon-based technology is presented which integrates passive components with a silicon Power MOSFET for use in Integrated Power Amplifiers at UHF, VHF, and RF frequencies. This low-cost process incorporates capacitors, inductors, resistors, ground vias, transmission lines, and an ESD protection diode. A design library containing models and layouts for the active and passive components was compiled.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])

*L. Tran, M. Delaney, R. Isobe, D. Jang and J. Brown. "Frequency Translation MMICs Using InP HEMT Technology (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 193-196.*

Frequency translation circuits are key elements in communication systems. This paper presents three different frequency multipliers and a frequency mixer designed using the InP HEMT technology. These successful first iteration MMICs are highlighted by a V-band frequency quadrupler that has 14.25 dB conversion gain with +3.25 dBm output power and a V-band mixer that has 10dB conversion loss over a 12 GHz bandwidth.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])

*R. Kremer, S. Redlich, L. Brings and D. Jager. "A Novel Type of Constant Impedance Traveling Wave Phase Shifter for InP-Based MMICs (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 197-200.*

The paper presents a novel type of externally controllable phase shifter based on periodic coplanar transmission lines consisting of Schottky contact (SCCPL) and coplanar sections on passive substrate. The modeling of the devices is carried out by utilizing a four-pole representation of the underlying pi-sections. An optimized InP/InGaAs/InAlAs layer structure for the SCCPL is developed providing an external electronic control. Measured phase shifts up to 60°/mm at 20GHz with a line impedance of 48 ± 1.2Omega agree well with theoretical calculations.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

# Abstracts

## Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])

*R. Kulke, T. Sporkmann, I. Wolff, M.J. Rosario and F. Fortes. "Active Coplanar Up-Converter for High Gain V-Band Applications (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 201-204.*

This paper reports on the design of a coplanar up-converter from C- to V-band on GaAs. An optimum conversion gain (62-64 GHz: G/sub c/>4 dB) has been achieved from a non-linear optimisation, utilising a modified Tajima model for the PM-HFETs and an accurate library for the coplanar elements integrated into the CAD tool Libra. Due to the use of coplanar lumped elements, a very compact circuit size of 2.1 mm² has been obtained. The evaluation of the circuit demonstrates the excellent agreement of the linear and non-linear measured and simulated mixer behaviour up to 64 GHz.

# Abstracts

## 26 GHz Coplanar SiGe MMICS (1996 [MCS])

*C. Rheinfelder, K. Strohm, F. Beisswanger, J. Gerdes, F.J. Schmuckle, J.-F. Luy and W. Heinrich. "26 GHz Coplanar SiGe MMICS (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 205-208.*

First results on coplanar MMICs with SiGe HBTs are presented. The circuits are fabricated on high-resistivity Si substrates using a double-mesa HBT process. In the Ka-band, an oscillator output power of 1 dBm and 4.4 dB gain for a one-stage amplifier are achieved. This demonstrates the potential of SiGe transistors for applications in the higher microwave range.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## MMICs for Sensor Applications (1996 [MCS])

*R. Tempel, W. Lutke, J. Herrmann and I. Wolff. "MMICs for Sensor Applications (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 209-212.*

A set of three commercial MMICs in coplanar environment have been developed, realized and tested successfully as cost effective basis for application in 25 GHz sensors. The circuits are designed using a coplanar component library which has been developed at the IMST and was seamless integrated into a commercially available circuit design program (HP-EEsof LIBRA).

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Session WE3F -- MMWMC Open Forum Papers (Joint with IMS)

*"Session WE3F -- MMWMC Open Forum Papers (Joint with IMS)." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 213-213.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A Linear Class AB Single-Ended to Differential Transconverter Suitable for RF Circuits (1996 [MCS])

*J. Durec and E. Main. "A Linear Class AB Single-Ended to Differential Transconverter Suitable for RF Circuits (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 215-218.*

A novel circuit topology is presented which converts a single-ended signal into differential output currents with improved linearity. This cell operates in Class AB, allowing an output current greater than the quiescent current. A configuration which allows for the nulling of the third order distortion is derived and the implications of third order nulling on third order intermodulation is explained. Measured results of this cell implemented in 0.4 µm silicon-bipolar technology is presented.

MTT®

IEEE®

Contents

Publications

Issues

Papers

Authors

Click on title for a complete paper.

# Abstracts

## Distributed Small Signal Model for Multi-Fingered GaAs PHEMT/MESFET Devices (1996 [MCS])

*S.J. Nash, A. Platzker and W. Struble. "Distributed Small Signal Model for Multi-Fingered GaAs PHEMT/MESFET Devices (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 219-222.*

A fully distributed equivalent circuit PHEMT and MESFET model is presented in closed form expressions for single finger end-fed FET geometry. The model includes self and mutual inductances and a new frequency dependent gate resistance. The model was used successfully to model multi-fingered devices which were subjected to equi-phase gate and drain excitations. Comparisons between measured data and model results are shown to be in excellent agreement for all S-parameters to 50GHz regardless of unit gate width. Scaling issues are also investigated for the new distributed model.

Click on title for a complete paper.

MTT

IEEE

Contents

Publications

Issues

Papers

Authors

# Abstracts

## A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])

*M. Singer, A. Stiller, K.M. Strohm, J.-F. Luy and E.M. Biebl. "A SIMMWIC 76 GHz Front-End with High Polarization Purity (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 223-226.*

An integrated active antenna with a polarization purity better than 28 dB and a radiated power of 8 dBm at 75.7 GHz is presented. The linearly polarized radiator consists of a planar resonant antenna and a transit-time diode monolithically integrated on a silicon substrate. This active antenna finds various applications in low-cost multi-channel sensor systems, e.g. for object classification. Guidelines for the design are discussed. The characterization of the fabricated SIMMWIC devices includes measurements of output power, polarization purity, and far-field pattern. Moreover, the oscillation frequency of the devices has been successfully stabilized using subharmonic injection locking. The FM noise behavior of the locked oscillator has been characterized. The measured results are presented and compared to theoretical calculations.

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

# Abstracts

## A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])

*E. Glass, J. Abrokwah, R. Lucero, E. Spears, J. Rollman, J.-H. Huang, B. Bernhardt and B. Ooms. "A High Efficiency Complementary GaAs Power FET Technology for Single Supply Portable Applications (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 227-230.*

A high efficiency enhancement mode power heterostructure FET has been developed for single supply portable applications. The device requires only a single 3V supply for operation, making it an ideal candidate for portable applications. At 850 MHz, a 1.0µm x 12 mm N-type FET exhibited a power output of +30.7 dBm, power gain of 10.6 dB, and a power-added efficiency of 60%, at a drain to source voltage of 3V, and drain to source quiescent current of 150 mA. This device was fabricated on a standard Complementary GaAs (CGaAs™) process flow, which is capable of simultaneously building low-voitage, low-power digital circuits (200 MHz), high-speed digital circuits (5 GHz), and RF power circuits (900 MHz).

MTT®
IEEE®
Contents
Publications
Issues
Papers
Authors

Click on title for a complete paper.

# Abstracts

## Index of Authors (1996 [MCS])

*"Index of Authors (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 231-232.*

Contents
Publications
Issues
Papers
Authors

# Abstracts

## Floor Plan, San Francisco Hilton & Towers (1996 [MCS])

*"Floor Plan, San Francisco Hilton & Towers (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 233-233.*

# Abstracts

## Floor Plan, Moscone Center (1996 [MCS])

*"Floor Plan, Moscone Center (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 234-234.*

# Abstracts

## IMS Hotels (1996 [MCS])

*"IMS Hotels (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): 235-235.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## IEEE/MTT-S IMS Microwave Week at a Glance (1996 [MCS])

*"IEEE/MTT-S IMS Microwave Week at a Glance (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): bc1-bc1.*

MTT
IEEE
Contents
Publications
Issues
Papers
Authors

# Abstracts

## Back Cover (1996 [MCS])

*"Back Cover (1996 [MCS])." 1996 Microwave and Millimeter-Wave Monolithic Circuits Symposium Digest 98. (1996 [MCS]): bc2-bc2.*