



# IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES

MARCH 1983

VOLUME MTT-31

NUMBER 3

(ISSN 0018-9480)

A PUBLICATION OF THE IEEE MICROWAVE THEORY AND TECHNIQUES SOCIETY



---

## PAPERS

- A Fast Computational Technique for Accurate Permittivity Determination Using Transmission Line Methods ..... *L. P. Ligthart* 249
- Nondestructive Measurement of a Dielectric Layer Using Surface Electromagnetic Waves ..... *W. Ou, C. G. Gardner, and S. A. Long* 255
- Determination of Loaded, Unloaded, and External Quality Factors of a Dielectric Resonator Coupled to a Microstrip Line ..... *A. Khanna and Y. Garault* 261
- Large-Signal, Dynamic, Negative Conductance of Gunn Devices in Sharpless Flanges ..... *M. R. Lakshminarayana and L. D. Partain* 265
- Hold-In Characteristics of an Extended Range Gunn Oscillator System ..... *B. N. Biswas, S. K. Ray, K. Pramanik, M. Sadhu, and D. Bandyopadhyay* 271
- Design and Performance of *W*-Band Broad-Band Integrated Circuit Mixers ..... *R. S. Tahim, G. M. Hayashibara, and K. Chang* 277
- An Ideal Six-Port Network Consisting of a Matched Reciprocal Lossless Five-Port and a Perfect Directional Coupler ..... *E. R. B. Hansson and G. P. Riblet* 284
- Microwave Circuit Models of Semiconductor Injection Lasers ..... *R. S. Tucker and D. J. Pope* 289
- Analysis and Modeling of "Two-Gap" Coaxial Line Rectangular Waveguide Junctions ..... *A. G. Williamson* 295
- 

## SHORT PAPERS

- Optimization of an Electrodynamics Basis for Determination of the Resonant Frequencies of Microwave Cavities Partially Filled with a Dielectric ..... *J. Krupka* 302
- Propagation in Longitudinally Magnetized Compressible Plasma Between Two Parallel Planes ..... *H. Unz* 305
- A Broad-Band Traveling-Wave Maser for the Range 40–46.5 GHz ..... *N. T. Cherpak and T. A. Smirnova* 306
- A Note Concerning Modes in Dielectric Waveguide Gratings for Filter Applications ..... *G. L. Matthaei* 309
- Temperature Stabilization of GaAs MESFET Oscillators Using Dielectric Resonators ..... *C. Tsironis and V. Pauker* 312
- 

## LETTERS

- Corrections to "Dual Mode Dielectric Resonator Loaded Cavity Filters" ..... *S. J. Fiedziuszko* 315
- Corrections to "Waveguide Electrooptic Modulators" ..... *R. C. Alferness* 315
- 

- PATENT ABSTRACTS ..... *N. R. Dietrich* 316
-



# IEEE MICROWAVE THEORY AND TECHNIQUES SOCIETY

The Microwave Theory and Techniques Society is an organization, within the framework of the IEEE, of members with principal professional interest in the field of microwave theory and techniques. All members of the IEEE are eligible for membership in the Society and will receive this TRANSACTIONS upon payment of the annual Society membership fee of \$8.00. Affiliate membership is available upon payment of the annual affiliate fee of \$22.00. For information on joining write to the IEEE at the address below.

## ADMINISTRATIVE COMMITTEE

C. T. RUCKER, *President*

H. G. OLTMAN, JR., *Vice President*

N. W. COX, *Secretary-Treasurer*

S. F. ADAM\*

H. HOWE, JR.

Y. KONISHI

J. M. ROE

J. E. DEGENFORD, JR.

T. ITOH

H. J. KUNO

F. J. ROSENBAUM\*

V. G. GELNOVATCH

F. IVANEK

S. L. MARCH

R. A. SPARKS\*

P. T. GREILING

G. JERINIC

D. N. MCQUIDDY, JR.

B. F. SPIELMAN

R. B. HICKS

R. H. KNERR

E. C. NIEHENKE

\* *Ex officio (past presidents)*

*Honorary Life Members*

*Distinguished Lecturers*

A. C. BECK  
S. B. COHN

D. D. KING  
W. W. MUMFORD

A. A. OLINER  
T. S. SAAD

K. TOMIYASU  
L. YOUNG

J. A. GIORDMAINE  
S. ADAM

## S-MTT Chapter Chairmen

Albuquerque: R. L. GARDNER

Atlanta: J. A. FULLER

Baltimore: D. BUCK

Benelux: A. GUISSARD

Boston: G. THOREN

Boulder/Denver: C. T. JOHNS

Buffalo: INACTIVE

Canaval: G. G. RASSWEILLER

Central Illinois: G. E. STILLMAN

Chicago: R. M. HARGIS

Columbus: E. WALTON

Connecticut: M. GILDEN

Dallas: M. H. BEASLEY, JR.

Florida West Coast: M. MOCZYNSKI

Houston: W. L. WILSON, JR.

Huntsville: M. D. FAHEY

India: S. R. K. ARORA

Israel: A. MADJAR

Kitchener-Waterloo: Y. L. CHOW

Los Angeles: F. J. BERNUES

Milwaukee: C. J. KOTLARZ

Montreal: J. L. LEIZEROWICZ

New Jersey Coast: M. V. SCHNEIDER

New York/Long Island: J. HAUSNER

North Jersey: R. SNYDER

Orange County: J. C. AUKLAND

Orlando: C. F. SCHUNEMANN

Ottawa: J. WIGHT

Philadelphia: C. C. ALLEN

Phoenix: H. GORONKIN

Portland: INACTIVE

Princeton: C. UPADHYAYULA

San Diego: J. H. ZICKGAF

Santa Clara Valley: J. CRESCENZI

Schenectady: R. A. DEHN; J. BORREGO

Seattle: C. K. CHOU

Southeastern Michigan: P. I. PRESSEL

St. Louis: W. P. CONNORS

Syracuse: B. MITCHELL

Tokyo: T. OKOSHI

Tucson: E. P. PIERCE

Washington, DC: J. H. DOUGLAS

## IEEE TRANSACTIONS® ON MICROWAVE THEORY AND TECHNIQUES

### Editor

T. ITOH

### Associate Editors

N. R. DIETRICH  
(*Patent Abstracts*)

F. IVANEK

E. YAMASHITA  
(*Abstracts Editor—Asia*)

Address all manuscripts to the Editor, T. Itoh, Dept. of Electrical Engineering, University of Texas at Austin, Austin, TX 78712. Submission of three copies of manuscripts, including figures, will expedite the review. *Publication Policy:* All papers will be reviewed for their technical merit, and decisions to publish will be made independently of an author's ability or willingness to pay charges. Voluntary page charges of \$95 per printed page will be requested for papers of five pages or less. Page charges of \$100 per page are mandatory for each page in excess of five printed pages. Also, the MTT-S Administrative Committee has established a quota for the number of pages printed in each issue of this TRANSACTIONS whose costs are not defrayed by payment of page charges. Papers not covered by page charges may be delayed until space in an issue is available. The Editor can waive the quota requirement for exceptional papers or because of other extenuating circumstances.

## THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

### Officers

JAMES B. OWENS, *President*

RICHARD J. GOWEN, *President-Elect*

CHARLES A. ELTON, *Executive Vice President*

CYRIL J. TUNIS, *Treasurer*

V. PRASAD KODALI, *Secretary*

J. BARRY OAKES, *Vice President, Educational Activities*

EDWARD J. DOYLE, *Vice President, Professional Activities*

G. P. RODRIGUE, *Vice President, Publication Activities*

MERRILL W. BUCKLEY, JR., *Vice President, Regional Activities*

JOSE B. CRUZ, JR., *Vice President, Technical Activities*

EMERSON W. PUGH, *Division IV Director*

### Headquarters Staff

ERIC HERZ, *Executive Director and General Manager*

ELWOOD K. GANNETT, *Deputy General Manager*

THOMAS W. BARTLETT, *Controller*

DONALD CHRISTIANSEN, *Editor of Spectrum*

IRVING ENGELSON, *Staff Director, Technical Activities*

LEO FANNING, *Staff Director, Professional Activities*

SAVA SHERR, *Staff Director, Standards*

DAVID L. STAIGER, *Staff Director, Publishing Services*

CHARLES F. STEWART, JR., *Staff Director, Administration Services*

DONALD L. SUPPERS, *Staff Director, Field Services*

THOMAS C. WHITE, *Staff Director, Public Information*

JOHN F. WILHELM, *Staff Director, Professional Activities*

### Publications Department

*Production Managers:* ANN H. BURGMAYER, CAROLYN ELENOWITZ, GAIL S. FERENC\*,

*Associate Editors:* MARY E. GRANGEIA, THOMAS R. GRECO,

JEFFREY S. MARTIN, MONA MITTRA, NELA RYBOWICZ, BARBARA A. SOMOGYI

\* *Responsible for this Transactions*

IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES is published monthly by The Institute of Electrical and Electronics Engineers, Inc. **Headquarters:** 345 East 47 Street, New York, NY 10017. Responsibility for the contents rests upon the authors and not upon the IEEE, the Society, or its members. **IEEE Service Center** (for orders, subscriptions, address changes, Region/Section/Student Services): 445 Hoes Lane, Piscataway, NJ 08854. **Telephones:** Headquarters 212-705 + extension: Information -7900, General Manager -7910, Controller -7748, Educational Services -7860, Publishing Services -7560, Standards -7960, Technical Services -7890. **IEEE Service Center** 201-981-0060. **Professional Services:** Washington Office 202-785-0017. **NY Telecopier:** 212-752-4929. **Telex:** 236-411 (International messages only). Individual copies: IEEE members \$6.00 (first copy only), nonmembers \$12.00 per copy. Annual subscription price: IEEE members, dues plus Society fee. Price for nonmembers on request. Available in microfiche and microfilm. **Copyright and Reprint Permission:** Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limits of U.S. Copyright law for private use of patrons: (1) those post-1977 articles 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, 21 Congress Street, Salem, MA 01970; (2) pre-1978 articles without fee. Instructors are permitted to photocopy isolated articles for noncommercial classroom use without fee. For other copying, reprint or republication permission, write to Director, Publishing Services at IEEE Headquarters. All rights reserved. Copyright © 1983 by The Institute of Electrical and Electronics Engineers, Inc. Printed in U.S.A. Second-class postage paid at New York, NY and at additional mailing offices. **Postmaster:** Send Address changes to IEEE, 445 Hoes Lane, Piscataway, NJ 08854.