



IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES

OCTOBER 1973

VOLUME MTT-21

NUMBER 10

A PUBLICATION OF THE IEEE MICROWAVE THEORY AND TECHNIQUES GROUP



PAPERS

Normal Transmission-Line Networks and Their Lumped <i>LC</i> Presentation.....	<i>K. K. Pang</i>	601
Design of Microwave Filters by Sine-Plane Approach.....	<i>K. K. Pang</i>	607
Design of Acoustic Surface-Wave Devices Using an Admittance Formalism.....	<i>A. S. Burgess and P. H. Cole</i>	611
Nonlinear Behavior and Bias Modulation of an IMPATT Diode Oscillator.....	<i>C. Chao and G. I. Haddad</i>	619

SHORT PAPERS

Waveguide and Stripline 4-Port Single-Junction Circulators.....	<i>J. Helszajn</i>	630
The Circular Waveguide Step-Discontinuity Mode Transducer.....	<i>W. J. English</i>	633
Radiation Loss from Open-Circuited Dielectric Resonators.....	<i>J. Watkins</i>	636
A Numerical Method for the Solution of the Junction of Cylindrical Waveguides.....	<i>H. Oraizi and J. Perini</i>	640
The Effect of Surface Metal Adhesive on Slot-Line Wavelength.....	<i>J. B. Knorr and J. Saenz</i>	642
The Limiting Value of the Interaction Between Symmetrical Fringing Capacitances.....	<i>H. J. Riblet</i>	644
Swept Frequency Impedance Indicator Using Directional Couplers.....	<i>S. Egami</i>	647
High-Power Frequency Multiplier Using MIS Varactors.....	<i>F. Schumacher</i>	648
Metallic Frame Beam Waveguide.....	<i>P. F. Checcacci and A. M. Scheggi</i>	649
Bandwidth Enhancement in Dielectric-Lined Circular Waveguides.....	<i>G. N. Tsandoulas</i>	651

LETTERS

Comments on "Accurate Determination of Varactor Resistance at UHF and its Relation to Parametric Amplifier Noise Temperature".....	<i>A. Uhler, Jr.</i>	654
--	----------------------	-----

CONTRIBUTORS.....	655
-------------------	-----

INFORMATION FOR AUTHORS.....	656
------------------------------	-----



IEEE MICROWAVE THEORY AND TECHNIQUES GROUP

The Microwave Theory and Techniques Group 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 Group and will receive this TRANSACTIONS upon payment of the annual Group membership fee of \$7.00. Affiliate membership is available upon payment of the annual affiliate fee of \$16.00. For information on joining write to the IEEE at the address below.

ADMINISTRATIVE COMMITTEE

J. B. HORTON, <i>President</i>		R. A. RIVERS, <i>Vice President</i>		JAMES L. ALLEN, <i>Secretary-Treasurer</i>	
F. R. ARAMS	H. W. COOPER	N. LIPETZ	G. P. RODRIGUE	J. J. TAUB	
R. W. BEATTY	R. V. GARVER	S. OKWIT*	F. J. ROSENBAUM	L. R. WHICKER	
J. H. BRYANT*	G. I. HADDAD	H. G. OLTMAN	S. W. ROSENTHAL	D. F. WAIT	
A. CLAVIN*	R. M. KNOX	D. PARKER	H. SOBOL		

* *Ex officio (past chairmen)*

Honorary Life Members

A. C. BECK

W. W. MUMFORD

National Lecturer

JOHN L. ALLEN

G-MTT Chapter Chairmen

Atlanta	H. A. ECKER	Houston	H. C. BOURNE, JR.	St. Louis	J. A. ZIEGLER
Baltimore	L. K. STALEY	Huntsville	O. C. WILLIAMS	San Diego	J. E. BOYNS
Boston	R. LEVY	NY/Long Island	M. A. BALFOUR	San Francisco	D. E. MESSNER
Boulder-Denver	R. L. GALLAWAY	Los Angeles Council	D. E. KREINHEDER	Schenectady	I. W. PENCE, JR.
Chicago	R. N. HARGIS	Milwaukee	R. H. FARMER	Seattle	R. J. COE
Columbus	G. A. THIELE	N. J. Coast	W. B. GLENDINNING	S. E. Michigan	W. G. JAECKLE
Connecticut	M. GILDEN	North Jersey	S. ANGHEL	Syracuse	D. H. KUHN
Dallas	J. LANGE	Orange County	J. A. SANGUINET	Tel Aviv	A. I. MADJAR
Fort Worth	S. D. COLEMAN	Orlando	E. E. ERICKSON	Tokyo, Japan	S. SAITO
		Ottawa	W. J. STEENAART	Tucson	E. P. PIERCE
		Philadelphia	J. E. MULHOLLAND	Washington, D. C.	B. E. SPIELMANN
		Phoenix	T. A. DE MASSA		

IEEE TRANSACTIONS® ON MICROWAVE THEORY AND TECHNIQUES

Editor

F. J. ROSENBAUM

Associate Editors

H. G. OLTMAN

(*Institutional Listings*)

J. W. BANDLER

(*Computer Program
Descriptions*)

M. CAULTON

(*Special Issues*)

T. OKOSHI

(*Abstracts Editor—Asia*)

Address all manuscripts to the Editor, F. J. Rosenbaum, Dep. Elec. Eng., Washington Univ., St. Louis, Mo. 63130. Submission of three copies of manuscripts, including figures, will expedite the review.

THE INSTITUTE OF ELECTRICAL AND ELECTRONICS ENGINEERS, INC.

Officers

HAROLD CHESTNUT, *President*

J. J. GUARRERA, *Vice President*

SEYMOUR CAMBIAS, JR., *Vice President, Regional Activities*

J. K. DILLARD, *Vice President, Technical Activities*

ROBERT F. COTELLESA, *Vice President, Publication Activities*

WILLIAM H. THOMPSON, *Secretary*

ARTHUR P. STERN, *Treasurer*

Headquarters Staff

DONALD G. FINK, *Executive Director*

ELWOOD K. GANNETT, *Director, Publishing Services*

WILLIAM J. KEYES, *Director, Administrative Services*

JOHN M. KINN, *Director, Educational Services*

CHARLES F. STEWART, JR., *Director, Member Services*

BETTY J. STILLMAN, *Executive Assistant to the Executive Director*

RICHARD M. EMBERSON, *Director, Technical Services*

EDWIN D. MACDONALD, *Conference Services*

SAVA I. SHERR, *Standards*

Editorial Department

H. JAMES CARTER, *Manager, Editorial Services*

Senior Editors: ANN H. BURGMAYER, CAROLYNE ELENOWITZ, GAIL S. FERENC*

Associate Editors: NANCY B. BUDDE, HELEN S. GOLDMAN, ROSEMARIE HALVERSON, RUTH MELNICK, NELA RYBOWICZ

* *Responsible for this Transactions.*

IEEE TRANSACTIONS ON MICROWAVE THEORY AND TECHNIQUES is published monthly by The Institute of Electrical and Electronics Engineers, Inc., 345 East 47 Street, New York, N. Y. 10017. Responsibility for the contents rests upon the authors and not upon the IEEE, the Group, or its members. This journal is available in either microfiche or printed form. Individual copies may be purchased at \$3.00 (first copy only) by IEEE members and \$6.00 per copy by nonmembers. Annual subscription price: IEEE members, dues plus Group fee. Price for nonmembers available on request. Abstracting is permitted with mention of source. All rights, including translation, are reserved by the IEEE. Requests for republication permission should be addressed to the IEEE Editorial Department, 345 East 47 Street, New York, N. Y. 10017. Copyright © 1973 by The Institute of Electrical and Electronics Engineers, Inc. Printed in U.S.A. Second-class postage paid at New York, N. Y. and at additional mailing offices.