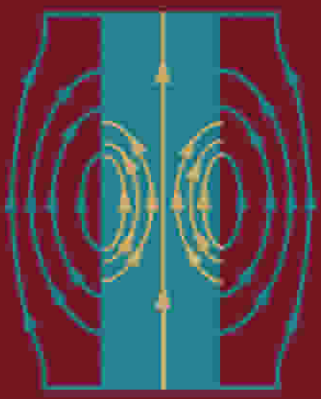
Handbook of Microwave Technology

VOLUME I

Components and Devices



Edited by

T. Koryu Ishii

Handbook of Microwave Technology

VOLUME I

This page intentionally left blank

Handbook of Microwave Technology

VOLUME I

Components and Devices

Edited by

T. Koryu Ishii

Department of Electrical and Computer Engineering
Marquette University
Milwaukee, Wisconsin

ACADEMIC PRESS

San Diego New York Boston London Sydney Tokyo Toronto

This book is printed on acid-free paper. ♾

Academic Press, Inc.
A Division of Harcourt Brace & Company
525 B Street, Suite 1900, San Diego, California 92101-4495

United Kingdom Edition published by
Academic Press Limited
24-28 Oval Road, London NW1 7DX

Library of Congress Cataloging-in-Publication Data

Handbook of microwave technology / edited by T. Koryu Ishii.
p. cm.
Includes index.
Contents: v. 1. Components and devices -- v. 2 Applications.
ISBN 0-12-374696-5 (v. 1). -- ISBN 0-12-374697-3 (v. 2)
1. Microwave devices--Handbooks, manuals, etc. I. Ishii, T. Koryu (thomas Koryu), date.
TK7876.H345 1995
621.381'3--dc20 94-48777
CIP

PRINTED IN THE UNITED STATES OF AMERICA
95 96 97 98 99 00 MM 9 8 7 6 5 4 3 2 1

Contents of Volume 1

CHAPTER 2

Microstrip Lines

J. K. Kwon

CHAPTER 3

Microwave Resonators

Robert A. Strangeway

CHAPTER 4

Microstrip Line Components

R. K. Hoffmann

CHAPTER 7

Directional Couplers

Stephen Jon Blank and Charles Buntschuh

CHAPTER 8

Microwave Ferrite Devices

Jerzy Krupka and Wojciech Glogier

CHAPTER 14

Electron Beam Formation, Focusing, and Collection in Microwave Tubes

Richard True

CHAPTER 17

Microwave Impedance Matching Techniques

S. N. Prasad

Contents of Volume 2

CHAPTER 2

Magnetrons

Wayne Love

CHAPTER 3

Traveling-Wave Thermionic Devices

Jeffrey D. Wilson

CHAPTER 5

The Peniotron

David Gallagher and Günter Döhler

CHAPTER 6

Thermodynamics of Microwave Devices

K. Fricke, V. Krozer, and H. L. Hartnagel

CHAPTER 7

Microwave Antennas

John Hill and Mary Lynn Smith

CHAPTER 8

Propagation at Microwave Frequencies

Ernest K. Smith

CHAPTER 9

Consumer Applications of Microwaves: Microwave Ovens and Accessories

Koji Iwabuchi, Ichiro Fukai, and Tatsuya Kashiwa

CHAPTER 10

Industrial Applications of Microwaves

T. Koryu Ishii

CHAPTER 12

Chemical Applications of Microwaves

Thomas C. Ehlert

CHAPTER 14

Microwave Navigational Aides

G. Stephen Hatcher and Goson Gu

Part A: THE GLOBAL POSITIONING SYSTEM

Part B: DOPPLER NAVIGATION SYSTEM

CHAPTER 15

Microwave Applications for Law Enforcement

John Tomerlin and John Fuhrman

CHAPTER 16

Microwave Radio Communication

George Kizer

CHAPTER 17

Microwave Instrumentation and Measurements

Aksel Kiiss