

SEMICONDUCTOR MEMORIES A Handbook of Design,

A Handbook of Design, Manufacture, and Application SECOND EDITION

Betty Prince



 \mathbf{O}

Δ

Find authenticated court documents without watermarks at docketalarm.com.



利用

Semiconductor Memories

A Handbook of Design, Manufacture and Application Second Edition

> . با ما يون

Betty Prince Texas Instruments, USA

JOHN WILEY & SONS Chichester • New York • Brisbane • Toronto • Singapore

DOCKET

Δ

LARM Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

Second edition of the book Semiconductor Memories by B. Prince and G. Due-Gundersen

Copyright (© 1983, 1991 by John Wiley & Sons Ltd. Baffins Lane, Chichester West Sussex PO19 1UD, England

Reprinted with corrections February 1995 Reprinted January 1996 Reprinted June 1996 Reprinted June 1997

All rights reserved.

No part of this book may be reproduced by any means, or transmitted, or translated into a machine language without the written permission of the publisher.

Other Wiley Editorial Offices

John Wiley & Sons, Inc., 605 Third Avenue, New York, NY 10158-0012, USA

Jacaranda Wiley Ltd, G.P.O. Box 859, Brisbane, Queensland 4001, Australia

John Wiley & Sons (Canada) Ltd, 22 Worcester Road, Rexdale, Ontario M9W 1L1, Canada

John Wiley & Sons (SEA) Pte Ltd, 37 Jalan Pemimpin #05-04, Block B, Union Industrial Building, Singapore 2057

Transferred to digital printing British Library Cataloguing-in-Publication Data

A catalogue record for the book is available from the British Library

DOCKET

Δ

ISBN 0 471 92465 2 ; 0 471 94295 2 (pbk)

Typeset by Techset Composition Limited, Salisbury, Wiltshire Printed and bound by Antony Rowe Ltd, Chippenham, Wiltshire

LARM Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

CONTENTS

	Introduction	xix
	Acknowledgements	xxi
1	The Strategic Nature of Semiconductor Memories	1
1.1	Twenty years of memories	1
1.2	The largest and most volatile integrated circuit market	5

.

1.3 Structural and economic factors affecting volatility	6
1.3.1 Structural supply factors	6
1.3.2 General economic factors	9
1.3.3 Interactions of short term and long term factors	10
1.3.4 Stabilizing factors	11
1.4 A strategic component in advanced electronic systems	11
1.5 A major trade issue	12
1.5.1 Supply shifts in memory trade	14
1.5.2 Demand shifts in memory trade	14
1.6 An essential factor in MOS technological development	15
1.7 A key to low cost MOS manufacturing technology	16
1.8 The new memory revolution	16
Bibliography	16

2 The Basics of Memories: Market, Technology and Product

2.1	A brief history of the bulk memory storage market	17
2.2	A marketing view of memories and the learning curve	20
2.3	A marketing view of memory product life cycle theory	22
2.4	A technology view of life cycles and learning curves	
2.5	Standardization of memories	26
2.6	An overview of various data storage devices	27
2.7	Charge coupled devices	28
2.8	Bipolar memories	30
2.9	MOS memories	31
2.9	0.1 Read-write memories	33
2.9	0.2 Non-volatile memories	36
2.10	Alternatives to semiconductor memories	39
2.1	0.1 Magnetic bubbles	39
2.1	0.2 Magnetic disk	.40
2.1	0.3 Optical disk	40
2.1	0.4 Holographic storage	40

17

DOCKET ALARM Find authenticated court documents without watermarks at <u>docketalarm.com</u>.

DOCKET A L A R M



Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.