

**Microsemi-Watertown**

# **THE PIN DIODE CIRCUIT DESIGNERS' HANDBOOK**

The PIN Diode Circuit Designers' Handbook was written for the Microwave and RF Design Engineer. Microsemi Corp. has radically changed the presentation of this PIN diode applications engineering material to increase its usefulness to Microwave and RF Circuit Designers. A major part of this Handbook is devoted to the basic circuit applications of this unique device.

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# Preface

This PIN Diode Circuit Designers' Handbook was written for the Microwave and RF Design Engineer. A major part of this Handbook is devoted to the basic circuit applications of this unique device. In each chapter, a circuit function is treated in detail followed by specific selected applications. For example, in Chapter 2, the common PIN diode switch configurations are presented, followed by sections comparing those features of PIN diode switch designs for unique to high power microwave switches and high power lower frequency (RF-band) switches.

There are many unique market applications, such as the Wireless Communications Market, where new network applications and system designs outpace the component technology needed to support them. Therefore, there are sections that discuss the unique circuit functional requirements appropriate to these newer market applications. Wireless Telecommunications power control circuits are discussed in terms of the role PIN diodes play in providing low distortion, low Bit-Error-Rate (BER) performance for RF Channel components, particularly in next generation multimedia systems such as PCS and UMTS. Additionally, the characteristics of high power HF Band switches are treated in detail as well as those of switches designed for Magnetic Resonance Imaging (MRI) systems.

An appendix on distortion in PIN diode Switches and Attenuators has been included, because of the increased importance of this parameter to RF Channel performance of Wireless Communications Systems. The subject of driver circuits for PIN diode switches and Attenuator circuits is always relevant to any practical component design, and thus has been included in a separate appendix.

PIN Diode Physics topics, such as PIN diode forward and reverse bias operating characteristics and equivalent circuits, stored charge and lifetime, distortion and non-linearity, and thermal impedance, are contained in specific appendices for supplementary and reference material.

We hope that the organization of this material will be found useful by circuit and system designers, for whom this Handbook was written.

Any comments, additions, or deletions would be appreciated.

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