



# **Flash Memories: Economic Principles of Performance, Cost and Reliability Optimization (Springer Series in Advanced Microelectronics)**

*Detlev Richter*

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The subject of this book is to introduce a model-based quantitative performance indicator methodology applicable for performance, cost and reliability optimization of non-volatile memories. The complex example of flash memories is used to introduce and apply the methodology. It has been developed by the author based on an industrial 2-bit to 4-bit per cell flash development project. For the first time, design and cost aspects of 3D integration of flash memory are treated in this book.

Cell, array, performance and reliability effects of flash memories are introduced and analyzed. Key performance parameters are derived to handle the flash complexity. A performance and array memory model is developed and a set of performance indicators characterizing architecture, cost and durability is defined.

Flash memories are selected to apply the Performance Indicator Methodology to quantify design and technology innovation. A graphical representation based on trend lines is introduced to support a requirement based product development process.

The Performance Indicator methodology is applied to demonstrate the importance of hidden memory parameters for a successful product and system development roadmap.

*Flash Memories* offers an opportunity to enhance your understanding of product development key topics such as:

- Reliability optimization of flash memories is all about threshold voltage margin understanding and definition;
- Product performance parameter are analyzed in-depth in all aspects in relation to the threshold voltage operation window;
- Technical characteristics are translated into quantitative performance indicators;
- Performance indicators are applied to identify and quantify product and technology innovation within adjacent areas to fulfill the application requirements with an overall cost optimized solution;
- Cost, density, performance and durability values are combined into a common factor – performance indicator - which fulfills the application requirements

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