

EMC and System-ESD Design Guidelines for Board Layout

About this document

Scope and purpose

This document provides information for EMC optimized PCB design and system ESD design. The topics covered include PCB Design considerations regarding the routing of high speed signals, selecting stack-up of the PCB, selecting decoupling components, impedance controlled design of the traces, and termination of high speed signal paths. Special considerations for microcontrollers are also provided.

Attention: This application note contains design recommendations from Infineon Technologies point of view. Effectiveness and performance of the final application implementation must be validated by the customer, based on their specific implementation choices.

Intended audience

This document is intended for anyone who needs to design EMC optimized application boards using micro-controllers and other components from Infineon Technologies AG.

Table of Contents

About this document	1
Table of Contents	1
1 Overview	3
1.1 Noise Sources	4
1.2 Coupling paths	6
1.2.1 Common-mode and differential-mode	6
2 PCB considerations	9
3 Design measures	12
3.1 Power Supply	13
3.1.1 Layout Structures	14
3.1.1.1 Two-layer boards	18
3.1.1.2 Multilayer boards	19
3.1.2 Components	22
3.1.2.1 Capacitors	22
3.1.2.2 Inductors and Ferrite Beads	29
3.2 Signals	32
3.2.1 Layout structures for two-layer and multi-layer boards	33
3.2.2 Components	41
3.2.2.1 Resistors	41
3.2.2.2 EMI Filters	42
4 System-Level ESD	43
4.1 General	43

Emc And System Esd Design Guidelines For Board Layout

Arturo Cuomo



Emc And System Esd Design Guidelines For Board Layout:

Applied Embedded Electronics Jerry Twomey,2023-11-14 And Conclusions Further Reading Chapter 3 Robust Digital Communication Digital Signals Physical Considerations and Connections Limitations of Ground Referenced Digital Signals Low Voltage Differential Signaling Organizing Interconnects for Speed and Signal Integrity Lumped Versus Distributed Networks Clock Distribution Digital Communication Parallel Versus Serial Ports Clocking Methods for Serial Ports Starting Edge Synchronization Parallel Clock Manchester Code Self Clocking Embedded Clock and Run Length Limited Codes

Bits on Chips Harry Veendrick,2018-06-21 This book provides readers with a broad overview of integrated circuits also generally referred to as micro electronics The presentation is designed to be accessible to readers with limited technical knowledge and coverage includes key aspects of integrated circuit design implementation fabrication and application The author complements his discussion with a large number of diagrams and photographs in order to reinforce the explanations The book is divided into two parts the first of which is specifically developed for people with almost no or little technical knowledge It presents an overview of the electronic evolution and discusses the similarity between a chip floor plan and a city plan using metaphors to help explain concepts It includes a summary of the chip development cycle some basic definitions and a variety of applications that use integrated circuits The second part digs deeper into the details and is perfectly suited for professionals working in one of the semiconductor disciplines who want to broaden their semiconductor horizon

Electronic Systems Maintenance Handbook Jerry C. Whitaker,2017-12-19 The days of troubleshooting a piece of gear armed only with a scope voltmeter and a general idea of how the hardware works are gone forever As technology continues to drive equipment design forward maintenance difficulties will continue to increase and those responsible for maintaining this equipment will continue to struggle to keep up The Electronic Systems Maintenance Handbook Second Edition establishes a foundation for servicing operating and optimizing audio video computer and RF systems Beginning with an overview of reliability principles and properties a team of top experts describes the steps essential to ensuring high reliability and minimum downtime They examine heat management issues grounding systems and all aspects of system test and measurement They even explore disaster planning and provide guidelines for keeping a facility running under extreme circumstances Today more than ever the reliability of a system can have a direct and immediate impact on the profitability of an operation Advocating a carefully planned systematic maintenance program the richly illustrated Electronic Systems Maintenance Handbook helps engineers and technicians meet the challenges inherent in modern electronic equipment and ensure top quality performance from each piece of hardware

The Art of Hardware Architecture Mohit Arora,2011-10-09 This book highlights the complex issues tasks and skills that must be mastered by an IP designer in order to design an optimized and robust digital circuit to solve a problem The techniques and methodologies described can serve as a bridge between specifications that are known to the designer and RTL code that is final outcome

reducing significantly the time it takes to convert initial ideas and concepts into right first time silicon Coverage focuses on real problems rather than theoretical concepts with an emphasis on design techniques across various aspects of chip design

Design for Environment ,1995 *Embedded Systems Design and Applications with the 68HC12 and HCS12* Steven

Frank Barrett,Daniel J. Pack,2005 For a second microprocessor course for students enrolled in Electrical Computer Engineering Microcontroller courses Designed for a senior or graduate level embedded systems design course Embedded Systems Design and Applications with the 68HC12 introduces readers to unique issues associated with designing testing integrating and implementing microcontroller microprocessor based embedded systems **The Electronics Handbook**

Jerry C. Whitaker,1996-12-23 The superb organization of The Electronics Handbook means that it is not only a comprehensive and fascinating reference but also a pleasure to use Some of these organizational features include

Symposium Record ,2003 *Electrical & Electronics Abstracts* ,1997 **Science Abstracts** ,1995 *Printed Circuit Board Design Techniques for EMC Compliance* Mark I. Montrose,IEEE Electromagnetic Compatibility Society,1996 Presents simple techniques for designing and laying out circuits that meet the most stringent domestic and international regulations on electromagnetic compatibility for high technology products Includes sample designs in every stage of the product development cycle information on the latest suppression techniques and a checklist of layout techniques Annotation copyrighted by Book News Inc Portland OR *EMC and the Printed Circuit Board* Mark I. Montrose,2004-04-05 This accessible new reference work shows how and why RF energy is created within a printed circuit board and the manner in which propagation occurs With lucid explanations this book enables engineers to grasp both the fundamentals of EMC theory and signal integrity and the mitigation process needed to prevent an EMC event Author Montrose also shows the relationship between time and frequency domains to help you meet mandatory compliance requirements placed on printed circuit boards Using real world examples the book features Clear discussions without complex mathematical analysis flux minimization concepts Extensive analysis of capacitor usage for various applications Detailed examination of components characteristics with various grounding methodologies including implementation techniques An in depth study of transmission line theory A careful look at signal integrity crosstalk and termination [EMC Made Simple](#) Mark I. Montrose,2014-07-01 This book simplifies the complex field of electromagnetic compatibility into easy concepts without the need for complicated math or extensive computational analysis Learn how to design printed circuit boards and systems quickly with just five easy equations Electromagnetic compatibility requirements are easily achieved with the author's unique approach by transforming Maxwell's Equations calculus into Ohm's Law algebra in a visual manner Everyone regardless of experience will benefit from learning a new way of solving complex field problems using an oscilloscope instead of a spectrum analyzer Signal propagation is based on transmission line theory If one can visualize losses in a transmission line it becomes easy to achieve EMC at low cost as well as enhanced signal integrity Easy to read chapters simplify theoretical concepts for those who never took a

electromagnetics course in college or designers that seek to re learn and understand electromagnetic theory as it applies to both printed circuit boards and systems presented in a revolutionary manner This book contains the following chapters
Maxwell Made Simple Inductance Made Simple Transmission Line Theory Made Simple Power Distribution Networks Made Simple Referencing Made Simple a k a Grounding Shielding Gasketing and Filtering Made Simple [Interactive PCB Layout Design System for EMC/EMI Minimisation](#) Yi Han,1997 [ESD](#) Steven H. Voldman,2015-01-05 A comprehensive and in depth review of analog circuit layout schematic architecture device power network and ESD design This book will provide a balanced overview of analog circuit design layout analog circuit schematic development architecture of chips and ESD design It will start at an introductory level and will bring the reader right up to the state of the art Two critical design aspects for analog and power integrated circuits are combined The first design aspect covers analog circuit design techniques to achieve the desired circuit performance The second and main aspect presents the additional challenges associated with the design of adequate and effective ESD protection elements and schemes A comprehensive list of practical application examples is used to demonstrate the successful combination of both techniques and any potential design trade offs Chapter One looks at analog design discipline including layout and analog matching and analog layout design practices Chapter Two discusses analog design with circuits examining single transistor amplifiers multi transistor amplifiers active loads and more The third chapter covers analog design layout also MOSFET layout before Chapters Four and Five discuss analog design synthesis The next chapters introduce the reader to analog digital mixed signal design synthesis analog signal pin ESD networks and analog ESD power clamps Chapter Nine the last chapter covers ESD design in analog applications Clearly describes analog design fundamentals circuit fundamentals as well as outlining the various ESD implications Covers a large breadth of subjects and technologies such as CMOS LDMOS BCD SOI and thick body SOI Establishes an ESD analog design discipline that distinguishes itself from the alternative ESD digital design focus Focuses on circuit and circuit design applications Assessible with the artwork and tutorial style of the ESD book series PowerPoint slides are available for university faculty members Even in the world of digital circuits analog and power circuits are two very important but under addressed topics especially from the ESD aspect Dr Voldman s new book will serve as an essential and practical guide to the greater IC community With high practical and academic values this book is a bible for professionals graduate students device and circuit designers for investigating the physics of ESD and for product designs and testing [*PCB Design for Real-World EMI Control*](#) Bruce R. Archambeault,James Drewniak,2013-06-29 Proper design of printed circuit boards can make the difference between a product passing emissions requirements during the first cycle or not Traditional EMC design practices have been simply rule based that is a list of rules of thumb are presented to the board designers to implement When a particular rule of thumb is difficult to implement it is often ignored After the product is built it will often fail emission requirements and various time consuming and costly add ons are then required Proper EMC design does not require advanced degrees from

universities nor does it require strenuous mathematics It does require a basic understanding of the underlying principles of the potential causes of EMC emissions With this basic understanding circuit board designers can make trade off decisions during the design phase to ensure optimum EMC design Consideration of these potential sources will allow the design to pass the emissions requirements the first time in the test laboratory A number of other books have been published on EMC Most are general books on EMC and do not focus on printed circuit board is intended to help EMC engineers and design design This book engineers understand the potential sources of emissions and how to reduce control or eliminate these sources This book is intended to be a hands on book that is designers should be able to apply the concepts in this book directly to their designs in the real world *EMC for Printed Circuit Boards* Keith Armstrong,2010 This book is for electronic circuit designers as well as for PCB designers themselves and has full colour figures throughout All application areas are covered from household appliances commercial industrial and medical equipment through automotive to aerospace and military The techniques it describes save time and cost whilst reducing financial risks and improving performance

PCB Design and Layout Fundamentals for EMC Roger Hu,2019-07-22 When designing an electronic circuit it is necessary to take a number of precautions to ensure that its EMC performance requirements can be met Trying to fix the EMC performance once the circuit has been designed and built will be far more difficult and costly There are a number of areas that can be addressed during the circuit design and PCB layout stage to ensure that the EMC performance is optimized PCB Circuit design PCB Circuit partitioning PCB Grounding PCB Routing EMC Filters I O Filtering and ShieldingBy adopting these precautions the EMC performance of PCB layout can be greatly enhanced [PCB Design for Real-World EMI Control](#) Bruce Archambeault,James Drewniak,2014-01-15 **ESD** Steven H. Voldman,2011-04-04 Electrostatic discharge ESD continues to impact semiconductor components and systems as technologies scale from micro to nano electronics This book studies electrical overstress ESD and latchup from a whole chip ESD design synthesis approach It provides a clear insight into the integration of ESD protection networks from a generalist perspective followed by examples in specific technologies circuits and chips Uniquely both the semiconductor chip integration issues and floorplanning of ESD networks are covered from a top down design approach Look inside for extensive coverage on integration of cores power bussing and signal pins in DRAM SRAM CMOS image processing chips microprocessors analog products RF components and how the integration influences ESD design and integration architecturing of mixed voltage mixed signal to RF design for ESD analysis floorplanning for peripheral and core I O designs and the implications on ESD and latchup guard ring integration for both a bottom up and top down methodology addressing I O guard rings ESD guard rings I O to I O and I O to core classification of ESD power clamps and ESD signal pin circuitry and how to make the correct choice for a given semiconductor chip examples of ESD design for the state of the art technologies discussed including CMOS BiCMOS silicon on insulator SOI bipolar technology high voltage CMOS HVCMOS RF CMOS and smart power practical methods for the understanding of ESD circuit

power distribution ground rule development internal bus distribution current path analysis quality metrics ESD Design and Synthesis is a continuation of the author's series of books on ESD protection. It is an essential reference for ESD circuit and semiconductor engineers, design synthesis team leaders, layout design, characterisation, floorplanning, test and reliability engineers, technicians, and groundrule and test site developers in the manufacturing and design of semiconductor chips. It is also useful for graduate and undergraduate students in electrical engineering, semiconductor sciences, and manufacturing sciences, and on courses involving the design of ESD devices, chips, and systems. This book offers a useful insight into the issues that confront modern technology as we enter the nano electronic era.

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Table of Contents Emc And System Esd Design Guidelines For Board Layout

1. Understanding the eBook Emc And System Esd Design Guidelines For Board Layout
 - The Rise of Digital Reading Emc And System Esd Design Guidelines For Board Layout
 - Advantages of eBooks Over Traditional Books
2. Identifying Emc And System Esd Design Guidelines For Board Layout
 - Exploring Different Genres
 - Considering Fiction vs. Non-Fiction
 - Determining Your Reading Goals
3. Choosing the Right eBook Platform
 - Popular eBook Platforms
 - Features to Look for in an Emc And System Esd Design Guidelines For Board Layout
 - User-Friendly Interface
4. Exploring eBook Recommendations from Emc And System Esd Design Guidelines For Board Layout
 - Personalized Recommendations
 - Emc And System Esd Design Guidelines For Board Layout User Reviews and Ratings
 - Emc And System Esd Design Guidelines For Board Layout and Bestseller Lists
5. Accessing Emc And System Esd Design Guidelines For Board Layout Free and Paid eBooks
 - Emc And System Esd Design Guidelines For Board Layout Public Domain eBooks
 - Emc And System Esd Design Guidelines For Board Layout eBook Subscription Services
 - Emc And System Esd Design Guidelines For Board Layout Budget-Friendly Options

6. Navigating Emc And System Esd Design Guidelines For Board Layout eBook Formats
 - ePub, PDF, MOBI, and More
 - Emc And System Esd Design Guidelines For Board Layout Compatibility with Devices
 - Emc And System Esd Design Guidelines For Board Layout Enhanced eBook Features
7. Enhancing Your Reading Experience
 - Adjustable Fonts and Text Sizes of Emc And System Esd Design Guidelines For Board Layout
 - Highlighting and Note-Taking Emc And System Esd Design Guidelines For Board Layout
 - Interactive Elements Emc And System Esd Design Guidelines For Board Layout
8. Staying Engaged with Emc And System Esd Design Guidelines For Board Layout
 - Joining Online Reading Communities
 - Participating in Virtual Book Clubs
 - Following Authors and Publishers Emc And System Esd Design Guidelines For Board Layout
9. Balancing eBooks and Physical Books Emc And System Esd Design Guidelines For Board Layout
 - Benefits of a Digital Library
 - Creating a Diverse Reading Collection Emc And System Esd Design Guidelines For Board Layout
10. Overcoming Reading Challenges
 - Dealing with Digital Eye Strain
 - Minimizing Distractions
 - Managing Screen Time
11. Cultivating a Reading Routine Emc And System Esd Design Guidelines For Board Layout
 - Setting Reading Goals Emc And System Esd Design Guidelines For Board Layout
 - Carving Out Dedicated Reading Time
12. Sourcing Reliable Information of Emc And System Esd Design Guidelines For Board Layout
 - Fact-Checking eBook Content of Emc And System Esd Design Guidelines For Board Layout
 - Distinguishing Credible Sources
13. Promoting Lifelong Learning
 - Utilizing eBooks for Skill Development
 - Exploring Educational eBooks
14. Embracing eBook Trends
 - Integration of Multimedia Elements

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