

Mechanical Design of Electronic Systems, by James W. Dally, Pradeep Lall, and Jeffrey C. Suhling. College House Enterprises, LLC, Knoxville, TN, 2008

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This book entitled “*Mechanical Design of Electronic Systems*” is written from a mechanical design perspective to introduce basic concepts on electronic packaging technologies in electronic systems, and related engineering analysis techniques for design and reliability engineering applications. The book consists of four parts (1 to 4) with a total of 15 chapters.

Part 1 on Mechanical Design of Electronic Systems has three chapters (1 to 3). Chapter 1 introduces the mechanical design aspects of packaging in electronic systems. Chapter 2 deals with background information on semiconductor devices, chip and wafer fabrication, and IC chip integration trends. Chapter 3 provides theory on electrical design and circuit analysis.

Part 2 on Packaging consist of five chapters (4 to 8). Chapter 4 provides a summary with illustration of the first level packaging trends, types of packages, chip interconnection methods, and discrete component packaging. Chapter 5 deals with the second level packaging features for substrates and printed circuit boards, circuit board materials, footprint design, layer count, design rules for routing and wiring. Chapter 6 summarizes the production processes for printed circuit boards. Chapter 7 elaborates on electron-

ics manufacturing and surface mount assembly processes, lead-free solder alloys, paste, and fluxes materials. Chapter 8 covers briefly third level packaging and systems issues on connectors, cables, module, card cages, and cabinet design.

Part 3 on Analysis Methods consist of five chapters (9 to 13). Chapter 9 provides details on thermal analysis methods by conduction, heat transfer and thermal resistance in chip carriers, and conduction and cooling in circuit boards. Chapter 10 deals with thermal analysis methods by radiation, convection heat transfer, air-flow in electronic enclosures, and heat pipe design. Chapter 11 introduces stress analysis (beam and plate analysis) and failure analysis (yield and fatigue) concepts. Chapter 12 addresses thermo-mechanical analysis (CTE mismatch and solder joint shear strain analysis) of a chip carrier assembly on a PCB. Chapter 13 deals with analysis of vibration and shock loading on circuit boards.

Part 4 on Reliability consist of two chapters (14 to 15). Chapter 14 introduces the theory of reliability, accelerated testing, and reliability models. Chapter 15 concludes with some discussions on design to improve reliability, specific failure mechanisms, screening, and accelerated testing approach.

Overall, this book provides a broad collection of engineering topics which is useful as a reference material for early career engineers and engineering students working on projects related to the electronic packaging industry. The book provides industry related information on electronic systems. The focus on the mechanical design aspects could do better with more specific worked problems and case studies.

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