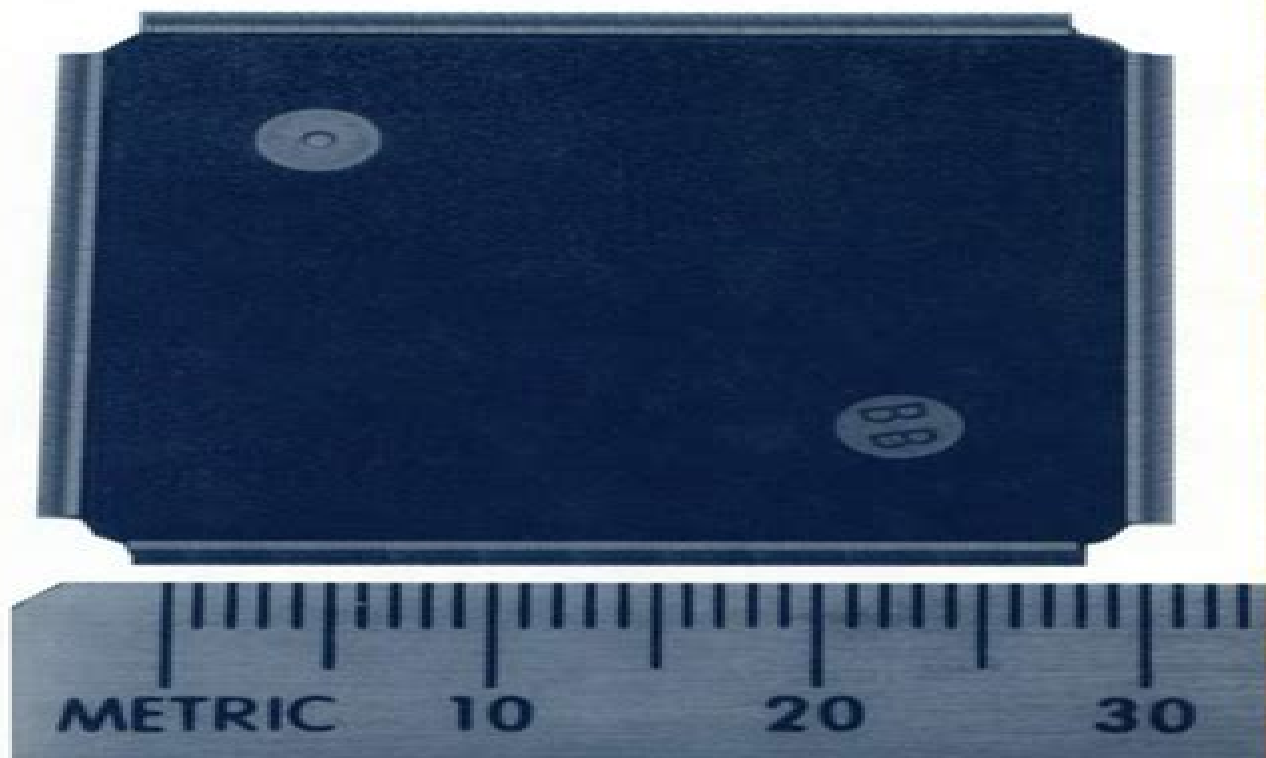


HANDBOOK OF FINE PITCH SURFACE MOUNT TECHNOLOGY



EDITED BY JOHN H. LAU

Handbook Of Fine Pitch Surface Mount Technology

Richard C. Dorf



Handbook Of Fine Pitch Surface Mount Technology:

Handbook of Fine Pitch Surface Mount Technology John H. Lau, 1994 Surface mount technology SMT is a mature technology SMT allows placement of more surface mount components SMC into smaller and tighter printed circuit board PCB areas This increased density means increased performance and power in smaller packaging systems and allows manufacturing of smaller and higher performance products at lower cost The advance of integrated circuit IC technology and the requirements of high density for high speed circuitry is driving the design of SMC to higher pin count and smaller package size In general the higher pin count and smaller package size are accomplished by reducing the bond pad size and spacing pitch on the chip level and the lead pin solder dimensions and pitch on the chip carrier module level The last few years have witnessed an explosive growth in the research and development efforts devoted to FPT as a direct result of the rapid growth of SMT and miniaturization Some examples are hand held lightweight video recorders that can take sharp pictures hand held lightweight devices that can track the worldwide package movements and portable computers with tiny yet powerful microprocessors and large memory capability that can fit into a briefcase or into the palm of your hand Fine Pitch Surface Mount Technology Phil Marcoux, 2013-11-27 Fine pitch high lead count integrated circuit packages represent a dramatic change from the conventional methods of assembling electronic components to a printed interconnect circuit board To some these FPT packages appear to be an extension of the assembly technology called surface mount or SMT Many of us who have spent a significant amount of time developing the process and design techniques for these fine pitch packages have concluded that these techniques go beyond those commonly used for SMT In 1987 the present author convinced of the uniqueness of the assembly and design demands of these packages chaired a joint committee where the members agreed to use fine pitch technology FPT as the defining term for these demands The committee was unique in several ways one being that it was the first time three U S standards organizations the IPC Lincolnwood IL the EIA Washington D C and the ASTM Philadelphia came together to create standards before a technology was in high demand The term fine pitch technology and its acronym FPT have since become widely accepted in the electronics industry The knowledge of the terms and demands of FPT currently exceed the usage of FPT packaged components but this is changing rapidly because of the size performance and cost savings of FPT I have resisted several past invitations to write other technical texts However I feel there are important advantages and significant difficulties to be encountered with FPT **Soldering Handbook For Printed Circuits and Surface Mounting** Howard H. Manko, 1995-10-31 Soldering Handbook for Printed Circuits and Surface Mounting Second Edition covers every aspect of this packaging technology and contains the latest information on design presolder operations materials equipment surface mount technology cleaning quality and inspection touch up and repair process economy line management and more *SMT Soldering Handbook* RUDOLF STRAUSS, 1998-02-24 Surface Mount Technology has had a profound influence on the electronics industry and has led to the use of new materials techniques and

manufacturing processes Since the first edition of this book was written electronic assemblies have continued to become still smaller and more complex while soldering still remains the dominant connecting technique This is a comprehensive guide to current methods of soldering components to their substrates written by one of the founding fathers of the technology It also covers component placement the post CFC technology of cleaning after soldering and the principles and methods of quality control and rework New sections deal with Ball Grid Array BGA technology lead free solders no clean fluxes and the current standard specifications for solders and fluxes Dr Rudolf Strauss has spent most of his working life with a leading manufacturer of solders and fluxes He was responsible for a number of innovations including the concept of wave soldering and for many years has been active as lecturer consultant and technical author His book explains the principles of soldering and surface mount technology in practical terms and plain language free from jargon It is addressed to the man or woman who has to do the job but it will also be of help in planning manufacturing strategy and in making purchasing decisions relating to consumables and equipment Written by founding father of SMT technology Standard specifications have been fully updated New chapter covering Ball Grid Array BGA technology *Microelectronics Packaging Handbook* Rao Tummala, Eugene J. Rymaszewski, Alan G. Klopfenstein, 1997-01-31 This thoroughly revised and updated three volume set continues to be the standard reference in the field providing the latest in microelectronics design methods modeling tools simulation techniques and manufacturing procedures Unlike reference books that focus only on a few aspects of microelectronics packaging these outstanding volumes discuss state of the art packages that meet the power cooling protection and interconnection requirements of increasingly dense and fast microcircuitry Providing an excellent balance of theory and practical applications this dynamic compilation features step by step examples and vital technical data simplifying each phase of package design and production In addition the volumes contain over 2000 references 900 figures and 250 tables Part I Technology Drivers covers the driving force of microelectronics packaging electrical thermal and reliability It introduces the technology developer to aspects of manufacturing that must be considered during product development Part II Semiconductor Packaging discusses the interconnection of the IC chip to the first level of packaging and all first level packages Electrical test sealing and encapsulation technologies are also covered in detail Part III Subsystem Packaging explores board level packaging as well as connectors cables and optical packaging *Ceramic Interconnect Technology Handbook* Fred D. Barlow, III, Aicha Elshabini, 2018-10-03 Ceramics were among the first materials used as substrates for mass produced electronics and they remain an important class of packaging and interconnect material today Most available information about ceramic electronics is either outdated or focused on their materials science characteristics The Ceramic Interconnect Technology Handbook goes beyond the traditional approach by first surveying the unique properties of ceramics and then discussing design processing fabrication and integration as well as packaging and interconnect technologies Collecting contributions from an outstanding panel of experts this book offers an up to date overview of modern

ceramic electronics from design and material selection to manufacturing and implementation Beginning with an overview of the development properties advantages and applications of ceramics coverage spans electrical design testing simulation thermomechanical design screen printing multilayer ceramics photo defined and photo imaged films copper interconnects for ceramic substrates and integrated passive devices in ceramic substrates It also offers a detailed review of the surface thermal mechanical and electrical properties of various ceramics as well as the processing of high and low temperature cofired ceramic HTCC and LTCC substrates Opening new vistas and avenues of advancement the Ceramic Interconnect Technology Handbook is the only source for comprehensive discussion and analysis of nearly every facet of ceramic interconnect technology and applications *The Electrical Engineering Handbook - Six Volume Set* Richard C.

Dorf,2018-12-14 In two editions spanning more than a decade The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering Our knowledge continues to grow and so does the Handbook For the third edition it has grown into a set of six books carefully focused on specialized areas or fields of study Each one represents a concise yet definitive collection of key concepts models and equations in its respective domain thoughtfully gathered for convenient access Combined they constitute the most comprehensive authoritative resource available Circuits Signals and Speech and Image Processing presents all of the basic information related to electric circuits and components analysis of circuits the use of the Laplace transform as well as signal speech and image processing using filters and algorithms It also examines emerging areas such as text to speech synthesis real time processing and embedded signal processing Electronics Power Electronics Optoelectronics Microwaves Electromagnetics and Radar delves into the fields of electronics integrated circuits power electronics optoelectronics electromagnetics light waves and radar supplying all of the basic information required for a deep understanding of each area It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics Sensors Nanoscience Biomedical Engineering and Instruments provides thorough coverage of sensors materials and nanoscience instruments and measurements and biomedical systems and devices including all of the basic information required to thoroughly understand each area It explores the emerging fields of sensors nanotechnologies and biological effects Broadcasting and Optical Communication Technology explores communications information theory and devices covering all of the basic information needed for a thorough understanding of these areas It also examines the emerging areas of adaptive estimation and optical communication Computers Software Engineering and Digital Devices examines digital and logical devices displays testing software and computers presenting the fundamental concepts needed to ensure a thorough understanding of each field It treats the emerging fields of programmable logic hardware description languages and parallel computing in detail Systems Controls Embedded Systems Energy and Machines explores in detail the fields of energy devices machines and systems as well as control systems It provides all of the fundamental concepts needed for thorough in depth understanding of each area

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Area Array Interconnection Handbook Karl J. Puttlitz, Paul A. Totta, 2012-12-06 Microelectronic packaging has been recognized as an important enabler for the solid state revolution in electronics which we have witnessed in the last third of the twentieth century Packaging has provided the necessary external wiring and interconnection capability for transistors and integrated circuits while they have gone through their own spectacular revolution from discrete device to gigascale integration At IBM we are proud to have created the initial simple concept of flip chip with solder bump connections at a time when a better way was needed to boost the reliability and improve the manufacturability of semiconductors The basic design which was chosen for SLT Solid Logic Technology in the 1960s was easily extended to integrated circuits in the 70s and VLSI in the 80s and 90s Three I/O bumps have grown to 3000 with even more anticipated for the future The package families have evolved from thick film SLT to thin film metallized ceramic to co-fired multi-layer ceramic A later family of ceramics with matching expansivity to silicon and copper internal wiring was developed as a predecessor of the chip interconnection revolution in copper multilevel submicron wiring Powerful server packages have been developed in which the combined chip and package copper wiring exceeds a kilometer All of this was achieved with the constant objective of minimizing circuit delays through short efficient interconnects

The Electronic Packaging Handbook Glenn R. Blackwell, 2017-12-19 The packaging of electronic devices and systems represents a significant challenge for product designers and managers Performance efficiency cost considerations dealing with the newer IC packaging technologies and EMI/RFI issues all come into play Thermal considerations at both the device and the systems level are also necessary The Electronic Packaging Handbook a new volume in the Electrical Engineering Handbook Series provides essential factual information on the design manufacturing and testing of electronic devices and systems Co-published with the IEEE this is an ideal resource for engineers and technicians involved in any aspect of design production testing or packaging of electronic products regardless of whether they are commercial or industrial in nature Topics addressed include design automation new IC packaging technologies materials testing and safety Electronics packaging continues to include expanding and evolving topics and technologies as the demand for smaller faster and lighter products continues without signs of abatement These demands mean that individuals in each of the specialty areas involved in

electronics packaging such as electronic mechanical and thermal designers and manufacturing and test engineers are all interdependent on each others knowledge The Electronic Packaging Handbook elucidates these specialty areas and helps individuals broaden their knowledge base in this ever growing field 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 A Beginners Guide to Surface Mount Technology RATAN SENGUPTA,2022-12-30 Surface mount technology SMT is a method for producing electronic circuits in which the components are mounted or placed directly onto the surface of printed circuit boards PCBs An electronic device so made is called a surface mount device SMD In the industry it has largely replaced the through hole technology THT SMT comes into existence because our earlier version of Through Hole Manufacturing Technology THT were having following limitations 1 Large in Size 2 Only one side of PCB can be used 3 Lesser functions 4 Automation of PCB Assembly restricted 5 Cross Talk becomes predominating factor at Higher Frequency restricting evolution of Mobile Technology **Solder Joint Reliability of BGA, CSP, Flip Chip, and Fine Pitch SMT Assemblies** John H. Lau,Yi-hsin Pao,1997 The explosive growth of high density packaging has created a tremendous impact on the electronic assembly and manufacturing industry Ball grid array BGA chip scale package CSP and solder bumped flip chip technologies are taking the lead in this advanced manufacturing process Many major equipment makers and leading electronic companies are now gearing up for these emerging and advanced packaging technologies For these technologies solder is the electrical and mechanical glue and thus solder joint reliability is one of the most critical issues in the development of these technologies This book is a one stop guide to the state of the art of solder joint reliability problem solving methods or choose a creative high performance robust and cost effective design and high yield manufacturing process for their interconnect systems will be able to do so with this unique sourcebook It meets the reference needs of design material process equipment manufacturing quality control product assurance reliability component packaging vendor marketing and system engineers and technical managers working in electronic packaging and interconnection This book is structured to provide readers with the necessary know how for practical on the job problem solving guidance The book covers the solder joint reliability of BGA CSP flip chip and FPT assemblies completely proceeding from the theoretical basics to applications Specific areas covered include Definition of reliability life distribution failure rate mean time to failure etc Some well known life distributions Accelerated testing Parameter estimation of life distributions Acceleration factors for solders Solder mechanics plasticity creep and constitutive equations Design material and manufacturing processes of BGA CSP flip chip and FTP Failure analysis and root cause of failure for BGA CSP flip chip and FPT solder joints Design for reliability of BGA CSP flip chip and FPT solder joints Solder joint reliability of CBGA PBGA DBGA and TBGA assemblies under thermal fatigue mechanical bending and twisting and shock and vibration conditions solder joint reliability of flip chip e g high temperature and eutectic solder

bumped flip chips on ceramic and PCB assemblies under thermal fatigue mechanical pulling shearing bending and twisting and shock and vibration conditions Solder joint reliability of CSP e g LG Semicon s Mitsubishi s Motorola s Tessera s NEC s nitto Denko s and Toshiba s assemblies under thermal fatigue and mechanical bending conditions Solder joint reliability of PQFP and TSOP assemblies under thermal fatigue mechanical bending and twisting and vibration conditions

Microelectronics Packaging Handbook R.R. Tummala,Eugene J. Rymaszewski,Alan G. Klopfenstein,2012-12-06

Electronics has become the largest industry surpassing agriCulture auto and heavy metal industries It has become the industry of choice for a country to prosper already having given rise to the phenomenal prosperity of Japan Korea Singapore Hong Kong and Ireland among others At the current growth rate total worldwide semiconductor sales will reach 300B by the year 2000 The key electronic technologies responsible for the growth of the industry include semiconductors the packaging of semiconductors for systems use in auto telecom computer consumer aerospace and medical industries displays magnetic and optical storage as well as software and system technologies There has been a paradigm shift however in these technologies from mainframe and supercomputer applications at any cost to consumer applications at approximately one tenth the cost and size Personal computers are a good example going from 500IMIP when products were first introduced in 1981 to a projected IIMIP within 10 years Thin light portable user friendly and very low cost are therefore the attributes of tomorrow s computing and communications systems Electronic packaging is defined as interconnection powering cool ing and protecting semiconductor chips for reliable systems It is a key enabling technology achieving the requirements for reducing the size and cost at the system and product level

The Electrical Engineering Handbook,Second Edition

Richard C. Dorf,1997-09-26 In 1993 the first edition of The Electrical Engineering Handbook set a new standard for breadth and depth of coverage in an engineering reference work Now this classic has been substantially revised and updated to include the latest information on all the important topics in electrical engineering today Every electrical engineer should have an opportunity to expand his expertise with this definitive guide In a single volume this handbook provides a complete reference to answer the questions encountered by practicing engineers in industry government or academia This well organized book is divided into 12 major sections that encompass the entire field of electrical engineering including circuits signal processing electronics electromagnetics electrical effects and devices and energy and the emerging trends in the fields of communications digital devices computer engineering systems and biomedical engineering A compendium of physical chemical material and mathematical data completes this comprehensive resource Every major topic is thoroughly covered and every important concept is defined described and illustrated Conceptually challenging but carefully explained articles are equally valuable to the practicing engineer researchers and students A distinguished advisory board and contributors including many of the leading authors professors and researchers in the field today assist noted author and professor Richard Dorf in offering complete coverage of this rapidly expanding field No other single volume available today offers this

combination of broad coverage and depth of exploration of the topics The Electrical Engineering Handbook will be an invaluable resource for electrical engineers for years to come *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

Handbook of Lead-Free Solder Technology for Microelectronic Assemblies Karl J. Puttlitz,Kathleen A. Stalter,2004-02-27 This reference provides a complete discussion of the conversion from standard lead tin to lead free solder microelectronic assemblies for low end and high end applications Written by more than 45 world class researchers and practitioners the book discusses general reliability issues concerning microelectronic assemblies as well as factors specific to the tin rich replacement alloys commonly utilized in lead free solders It provides real world manufacturing accounts of the introduction of reduced lead and lead free technology and discusses the functionality and cost effectiveness of alternative solder alloys and non solder alternatives replacing lead tin solders in microelectronics **Surface Mount Technology** Ray

Prasad,2013-11-27 A foreword is usually prepared by someone who knows the author or who knows enough to provide additional insight on the purpose of the work When asked to write this foreword I had no problem with what I wanted to say about the work or the author I did however wonder why people read a foreword It is probably of value to know the background of the writer of a book it is probably also of value to know the background of the individual who is commenting on the work I consider myself a good friend of the author and when I was asked to write a few words I felt honored to provide my view of Ray Prasad his expertise and the contribution that he has made to our industry This book is about the industry its technology and its struggle to learn and compete in a global market bursting with new ideas to satisfy a voracious appetite for new and innovative electronic products I had the good fortune to be there at the beginning or almost and have witnessed the growth and excitement in the opportunities and challenges afforded the electronic industries engineering and manufacturing talents In a few years my involvement will span half a century *Failure Modes and Mechanisms in*

Electronic Packages P. Singh, Puligandla Viswanadham, 2012-12-06 Those of us who grew up in the through hole age of electronic packaging are probably more amazed and appreciative than are our children at the incredible growth of electronic performance capability My son an electrical engineering student seems almost to take for granted the innovations that leave me somewhat awestruck at times Electronic circuit designers delight in packing more punch into less volume while reminding us that their job has become increasingly challenging The lay person also has learned from the media that the industry has been working wonders in shrinking the transistor and expanding the power of the chip Much attention is focussed on the silicon and on the marvelous production and entertainment tools we now see in our offices and homes Between the silicon and the end product lies the less publicized world of circuit level packaging We leave it to a cadre of technologists to take the schematics and parts lists and to develop the processes that turn the designers concepts into physical reality And while the silicon transistor is shrinking the engineering challenges of packaging multiple chips and associated components into increasingly dense subsystems are growing Further the transistor may have to function without failure through severe industrial or military environments over the lifetime of the product Fiber Optic Data Communication , 2002-04-13 This book is an authoritative review of current and future trends in the field of telecommunications Written by industry experts who are developing leading edge data communication networks Fiber Optic Data Communication provides professionals and students alike with a look at emerging technologies and their applications Four of the chapters have been revised from DeCusatis s best selling book Handbook of Fiber Optic Data Communications the remaining eight chapters are all new Seven helpful appendices a glossary and a list of technical acronyms are included This book can stand alone or as a companion volume to DeCusatis Handbook of Fiber Optic Data Communication Second Edition February 2002 ISBN 0 12 207891 8 Includes emerging technologies such as Infiniband 10 Gigabit Ethernet and MPLS Optical Switching Describes leading edge commercial products including LEAF and MetroCore fibers dense wavelength multiplexing and Small Form Factor transceiver packages Covers all major industry standards often written by the same people who designed the standards themselves Includes an expanded listing of references on the World Wide Web plus hard to find references for international homologation and type approval requirements Convenient tables of key optical datacom parameters and glossary with hundreds of definitions and acronyms Industry buzzwords explained including SAN NAS and MAN networking Datacom market analysis and future projections from industry leading forecasters The Boundary-Scan Handbook Kenneth P. Parker, 2015-11-11 Aimed at electronics industry professionals this 4th edition of the Boundary Scan Handbook describes recent changes to the IEEE1149 1 Standard Test Access Port and Boundary Scan Architecture This updated edition features new chapters on the possible effects of the changes on the work of the practicing test engineers and the new 1149 8 1 standard Anyone needing to understand the basics of boundary scan and its practical industrial implementation will need this book Provides an overview of the recent changes to the 1149 1 standard and the

effect of the changes on the work of test engineers Explains the new IEEE 1149 8 1 subsidiary standard and applications
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