

Printed Board Handling and Storage Guidelines

1 INTRODUCTION

1.1 Background Historically, the printed board industry has relied on military specifications and guidelines to define packaging methods to preserve the quality and reliability of printed boards during shipment and storage. However, many of these documents are obsolete, incomplete, do not address Pb-free assembly processes, or do not cover newer laminates or final finishes.

1.2 Scope This document provides suggestions for proper handling, packaging materials and methods, environmental conditions, and storage for printed boards. These guidelines are intended to protect printed boards from contamination, physical damage, solderability degradation, electrostatic discharge (ESD) (when necessary), and moisture uptake. Moisture absorbed in printed board laminates expands at soldering temperatures, and in some cases, the resulting vapor pressure can cause internal delamination or excessive strain on plated-hole walls and other structures. This is especially challenging with the higher temperatures used for Pb-free soldering.

This document covers all phases from the manufacture of the bare printed board, through delivery, receiving, stocking, assembly, and soldering. As a guideline, this information is to be used with, and is secondary to, established requirements in such documents as the IPC-4550 series for final finishes.

1.3 Application The target audience includes those involved in all phases of printed board design, manufacture, assembly, shipping, storage, and possible warranty activities. Information herein has been supplied for all of these functions.

1.4 Terms and Definitions The definition of all terms used herein are as specified in IPC-T-50 and as defined in 1.4.1 through 1.4.6.

1.4.1 Humidity Indicator Card (HIC) An indicator of relative humidity in the form of a card with printed deposits of moisture-sensitive chemicals, usually as round dots arranged in sequence, each changing color at a higher relative humidity. Color will change (depending on the chemicals, either from blue to pink or from brown to azure) when humidity exceeds the value printed on the dot. When humidity decreases, color will change back (to blue or brown).

1.4.2 Moisture Barrier Bag (MBB) A bag designed to restrict the transmission of water vapor and used to pack moisture sensitive devices. An MBB is made of material with a low Water Vapor Transmission Rate (WVTR) (see 4.2.1). An MBB includes a metallized layer (aluminum), making the bag appear shiny and opaque.

1.4.3 Subcomposite In sequential lamination, a structure composed of more than two layers that have been laminated together, and which will subsequently be laminated with other layers into a complete printed board.

1.4.4 Water Vapor Transmission Rate (WVTR) A measure of the permeability of plastic film or metallized plastic film material to moisture, an important rating for moisture barrier bags (MBBs).

1.4.5 Sulfur Free Materials that are unlikely to express corrosive sulfur compounds like H_2S or SO_2 .

1.4.6 Dry Packaging Packaging that consists of desiccant material and a Humidity Indicator Card (HIC) sealed with the printed boards inside a Moisture Barrier Bag (MBB) (See 4.3.1).

1.5 Revision Level Changes Changes incorporated into the current revision of this standard are indicated throughout by gray shading of the relevant subsection(s). Changes to a figure or table are indicated by gray shading of the figure or table header and applicable content.

Printed Board Handling And Storage Guidelines Ipc

RD Boyd



Printed Board Handling And Storage Guidelines Ipc:

Lead-Free Solder Process Development Gregory Henshall, Jasbir Bath, Carol A. Handwerker, 2011-03-29 Discusses the growth mechanisms of tin whiskers and the effective mitigation strategies necessary to reduce whisker growth risks This book covers key tin whisker topics ranging from fundamental science to practical mitigation strategies The text begins with a review of the characteristic properties of local microstructures around whisker and hillock grains to identify why these particular grains and locations become predisposed to forming whiskers and hillocks The book discusses the basic properties of tin based alloy finishes and the effects of various alloying elements on whisker formation with a focus on potential mechanisms for whisker suppression or enhancement for each element Tin whisker risk mitigation strategies for each tier of the supply chain for high reliability electronic systems are also described Discusses whisker formation factors including surface grain geometry crystallographic orientation dependent surface grain boundary structure and the localization of elastic strain strain energy density distribution Examines how whiskers and hillocks evolve in time through real time studies of whisker growth with the scanning electron microscope focused ion beaming milling SEM FIB Covers characterization methods of tin and tin based alloy finishes such as transmission electron microscopy TEM scanning electron microscopy SEM and electron backscatter diffraction EBSD Reviews theories of mechanically induced tin whiskers with case studies using pure tin and other lead free finishes shown to evaluate the pressure induced tin whiskers Mitigating Tin Whisker Risks Theory and Practice is intended for the broader electronic packaging and manufacturing community including manufacturing engineers packaging development engineers as well as engineers and researchers in high reliability industries

IPC-1601A-JP Printed Board Handling and Storage Guidelines (Japanese) IPC International, 2022-09-30 *Long-Term Non-Operating Reliability of Electronic Products* Judy Pecht, 2019-07-23 In today's electronic environment operating reliability for continued daily use of electronic products is essential This book discusses the reliability of products that lie dormant for long periods of time and are subject to stresses such as humidity ionic contaminants temperature radiation shock and vibration Non operating reliability is especially critical for life saving electronic products such as fire alarm systems standby power sources and burglar alarms Air bags in automobiles earthquake alarm systems and radiation warning systems in nuclear power plants are also covered This physics of failure approach is also important to maintaining defense hardware such as missiles and munitions systems which often lie dormant for years before being deployed on very short notice *Design for Excellence in Electronics Manufacturing* Cheryl Tulkoff, Greg Caswell, 2021-03-22 DESIGN FOR EXCELLENCE IN ELECTRONICS MANUFACTURING An authoritative guide to optimizing design for manufacturability and reliability from a team of experts Design for Excellence in Electronics Manufacturing is a comprehensive state of the art book that covers design and reliability of electronics The authors noted experts on the topic explain how using the DfX concepts of design for reliability design for manufacturability design for environment design for testability and more reduce research and

development costs and decrease time to market and allow companies to confidently issue warranty coverage By employing the concepts outlined in Design for Excellence in Electronics Manufacturing engineers and managers can increase customer satisfaction market share and long term profits In addition the authors describe the best practices regarding product design and show how the practices can be adapted for different manufacturing processes suppliers use environments and reliability expectations This important book Contains a comprehensive review of the design and reliability of electronics Covers a range of topics establishing a reliability program design for the use environment design for manufacturability and more Includes technical information on electronic packaging discrete components and assembly processes Shows how aspects of electronics can fail under different environmental stresses Written for reliability engineers electronics engineers design engineers component engineers and others Design for Excellence in Electronics Manufacturing is a comprehensive book that reveals how to get product design right the first time

Printed Board Handling and Storage Guidelines, 2010

Handbook of Physical Vapor Deposition (PVD) Processing Donald M. Mattox, 2010-04-29 This updated version of the popular handbook further explains all aspects of physical vapor deposition PVD process technology from the characterizing and preparing the substrate material through deposition processing and film characterization to post deposition processing The emphasis of the new edition remains on the aspects of the process flow that are critical to economical deposition of films that can meet the required performance specifications with additional information to support the original material The book covers subjects seldom treated in the literature substrate characterization adhesion cleaning and the processing The book also covers the widely discussed subjects of vacuum technology and the fundamentals of individual deposition processes However the author uniquely relates these topics to the practical issues that arise in PVD processing such as contamination control and film growth effects which are also rarely discussed in the literature In bringing these subjects together in one book the reader can understand the interrelationship between various aspects of the film deposition processing and the resulting film properties The author draws upon his long experience with developing PVD processes and troubleshooting the processes in the manufacturing environment to provide useful hints for not only avoiding problems but also for solving problems when they arise He uses actual experiences called war stories to emphasize certain points Special formatting of the text allows a reader who is already knowledgeable in the subject to scan through a section and find discussions that are of particular interest The author has tried to make the subject index as useful as possible so that the reader can rapidly go to sections of particular interest Extensive references allow the reader to pursue subjects in greater detail if desired The book is intended to be both an introduction for those who are new to the field and a valuable resource to those already in the field The discussion of transferring technology between R D and manufacturing provided in Appendix 1 will be of special interest to the manager or engineer responsible for moving a PVD product and process from R D into production Appendix 2 has an extensive listing of periodical publications and professional societies that relate to PVD processing The extensive Glossary of

Terms and Acronyms provided in Appendix 3 will be of particular use to students and to those not fully conversant with the terminology of PVD processing or with the English language Fully revised and updated to include the latest developments in PVD process technology War stories drawn from the author s extensive experience emphasize important points in development and manufacturing Appendices include listings of periodicals and professional societies terms and acronyms and material on transferring technology between R D and manufacturing **Handbook of Electronic Package Design** Michael Pecht,2018-10-24 Both a handbook for practitioners and a text for use in teaching electronic packaging concepts guidelines and techniques The treatment begins with an overview of the electronics design process and proceeds to examine the levels of electronic packaging and the fundamental issues in the development **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 *Printed Board Handling and Storage Guidelines (German Language), 1601- De* ,2010-08-01 **Printed Circuits Handbook** Clyde Coombs,2007-08-29 The World s 1 Guide to Printed Circuit Boards Now Completely Updated with the Latest Information on Lead Free Manufacturing The best reference in the field for over 30 years the Printed Circuits Handbook equips you with definitive coverage of every facet of printed circuit assemblies_from design methods to fabrication processes Now completely revised and updated the Sixth Edition presents the latest information on lead free manufacturing including lead free PCB design and fabrication techniques lead free materials and lead free reliability models The new edition also explores best practices for High Density Interconnect HDI as well as flexible printed circuits Written by a team of experts from around the world the Sixth Edition of this renowned handbook contains cutting edge material on engineering and design of printed circuits fabrication methods assembly processes solders and soldering test and repair waste minimization and treatment quality and reliability of printed circuit processes and much more The updated Printed Circuits Handbook provides you with

Unsurpassed guidance on printed circuits_from design to manufacturing Over 500 illustrations charts and tables for quick access to essential data New to this edition New coverage of lead free PCB design and manufacturing techniques lead free materials lead free reliability models best practices for High Density Interconnect HDI and flexible printed circuits Inside This State of the Art Printed Circuits Guide Introduction to Printed Circuits Engineering and Design of Printed Circuits Fabrication Processes Assembly Processes Solders and Soldering Test and Repair Waste Minimization and Treatment Quality and Reliability of Printed Circuit Processes Flexible Circuits Printed Circuit Engineering Raymond H. Clark,2012-12-06 I would like to present some definitions which will be helpful in understanding the purpose of this book From The American Heritage Dictionary of the English Language Engineer 1 A person who skillfully or shrewdly manages an enterprise 2 To plan construct and manage as an engineer 3 To plan manage and put through by skillful acts or contrivance Engineering 1 The application of scientific principles to practical ends as the design construction and operation of efficient and economical structures equipment and systems 2 The profession of or work performed by an engineer Some words encountered in the definitions of engineer and engineering are Skillfully Plan and Manage This book is concerned with engineering the manufacture of printed circuit boards and is dedicated to those people engaged in designing planning manufacturing and achieving quality assurance in printed circuits In The Handbook of Printed Circuit Manufacturing Van Nostrand Reinhold 1985 I presented detailed practical and theoretical information on the operations involved in manufacturing printed circuits It is possible to perform each operation in an optimum fashion and still leave room for improvement Much of that room for improvement requires the skillful application of scientific principles planning and management It is the goal of this book to provide a sound background in industry standards and specifications blueprint comprehension artwork inspection processes and tolerances planning and quality assurance *Perfecting Engineering and Technical Drawing* Ron Hanifan,2014-09-11 This concise reference helps readers avoid the most commonplace errors in generating or interpreting engineering drawings Applicable across multiple disciplines Hanifan's lucid treatment of such essential skills as understanding and conveying data in a drawing exacting precision in dimension and tolerance notations and selecting the most appropriate drawing type for a particular engineering situation Perfecting Engineering and Technical Drawing is an valuable resource for practicing engineers engineering technologists and students Provides straightforward explanation of the requirements for all common engineering drawing types Maximizes reader understanding of engineering drawing requirements differentiating the types of drawings and their particular characteristics Elucidates electrical reference designation requirements geometric dimensioning and tolerancing errors Explains the entire engineering documentation process from concept to delivery

Catalog of American national standards. 1994 ,1994 1989-1990 Catalog of American National Standards American National Standards Institute,1989 **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

An Index of U.S. Voluntary Engineering Standards. Supplement William J. Slattery, 1972 **ASM Handbook** ASM International. Handbook Committee, 1990 These volumes cover the properties processing and applications of metals and nonmetallic engineering materials They are designed to provide the authoritative information and data necessary for the appropriate selection of materials to meet critical design and performance criteria An Index of U.S. Voluntary Engineering Standards William J. Slattery, 1971 **Desenvolvendo Projetos Eletrônicos no Brasil** Newton C. Braga, Fábio Souza, Renato Paiotti, Thiago Lima, 2021-08-09 Um livro criado por 4 especialistas da área de eletrônica este livro visa mostrar ao leitor todas as etapas de produção de produtos eletrônicos da ideia prateleira passando pelas etapas de prototipagem testes homologação e importação pesquisa de mercado marketing técnico suporte ao atendimento técnico de reparos e visão de mercado tecnológico Uma obra para ter uma visão global de quais as técnicas corretas para desenvolver produtos eletrônicos para o mercado Brasileiro **Testing of Chemicals and Reporting and Retention of Information Under TSCA Sections 4 and 8** United States. Congress. House. Committee on Energy and Commerce. Subcommittee on Environment and the Economy, 2014

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