

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.

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TD Snyder



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IPC-1601A-JP Printed Board Handling and Storage Guidelines (Japanese) IPC International,2022-09-30

Printed Board Handling and Storage Guidelines ,2010 **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 **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 **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

Catalog of American national standards. 1994 ,1994 **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 *Index and Directory of U.S. Industry Standards* ,1987 **Regional Industrial Buying Guide** ,1996 [Design Standard for Rigid Printed Boards and Rigid Printed Board Assemblies](#) American National Standards Institute,1991 **IPC-1602 Standard for Printed Board Handling and Storage** Ipc,2020-04-15 **Design and Reliability of Solders and Solder Interconnections** Rao K. Mahidhara,1997 The reliability of solders and solder joints is an important factor in the durability and design of electronic packages This volume addresses issues of reliability such as microstructural stability in service creep fatigue creep fatigue interactions and thermomechanical fatigue of bulk solders and solder joints *ASABE Standards* American Society of Agricultural and Biological Engineers,2007 **Printed Board Handling and Storage Guidelines (German Language), 1601- De** ,2010-08-01 **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 *Printed Board Handling and Storage Guidelines (Chinese Language), 1601-CN* ,2011 **Control Engineering** ,1965 Instrumentation and automatic control systems **Solid State Technology** ,1987 **Insulation/circuits** ,1977 *Electronic Packaging and Production* ,1995

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