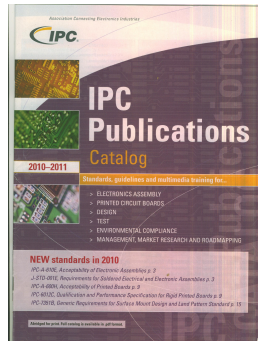


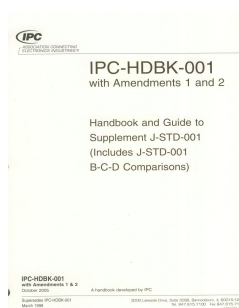
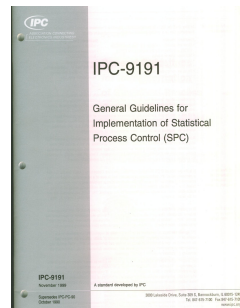
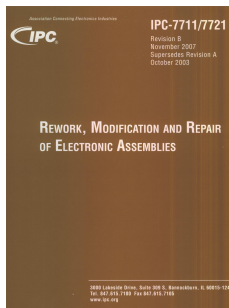
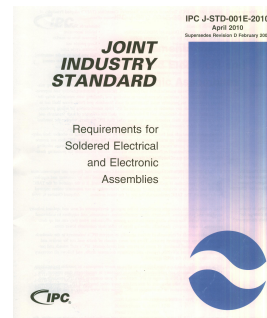
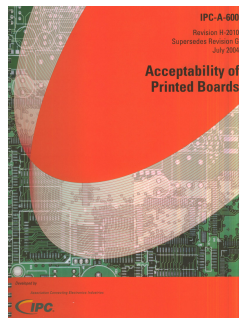
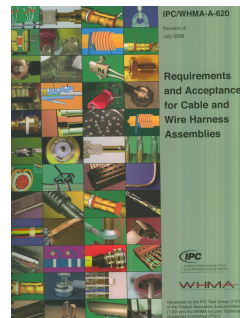
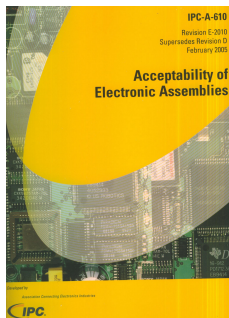
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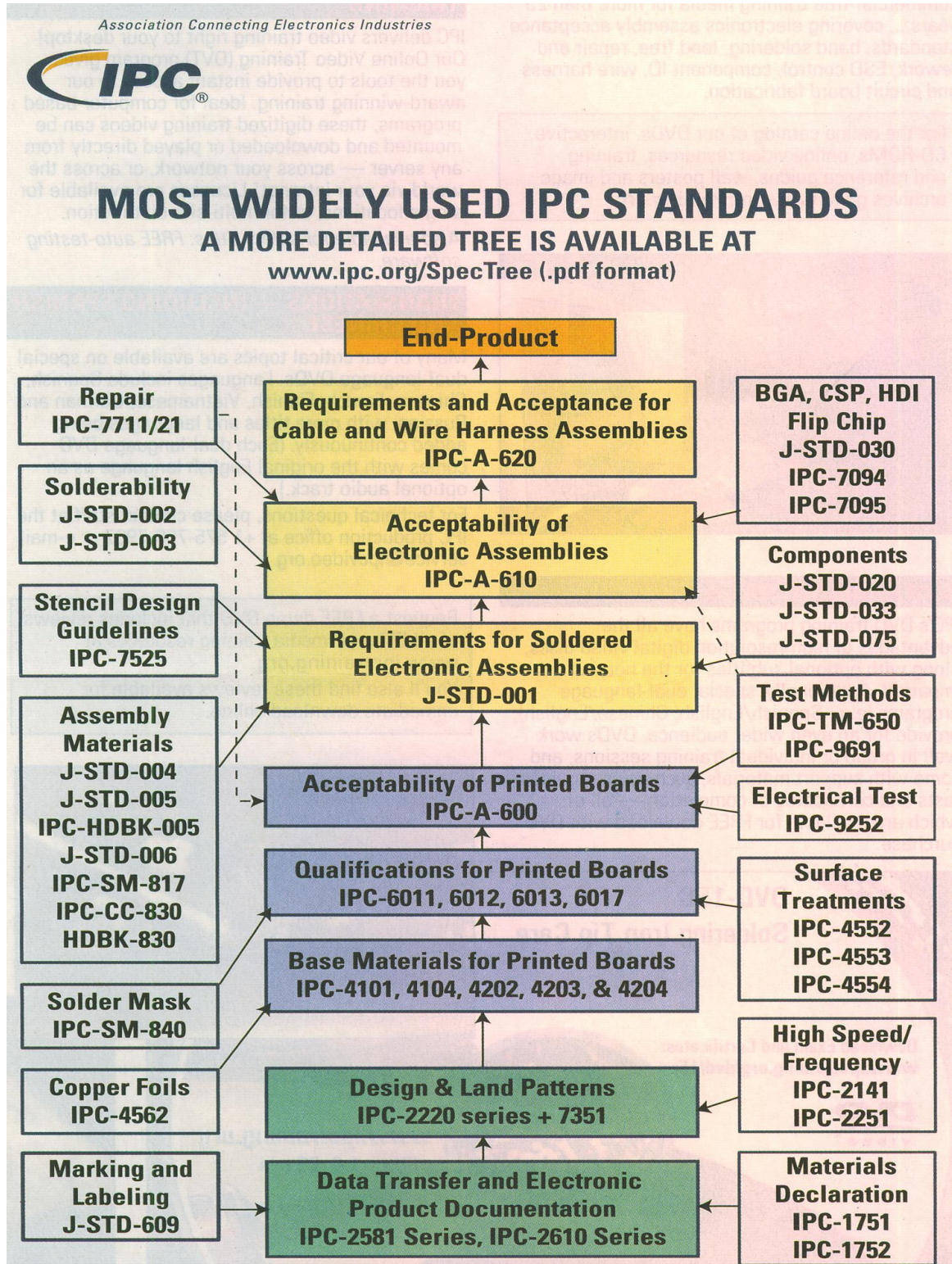


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## קטלוג מפרטי IPC מעודכן לשנת 2010-2011

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<b>GENERAL PUBLICATIONS</b>	
<p><b>NEW IPC-C-1000</b>  <b>IPC Essential Document Collection for Board Design, Assembly and Manufacture</b></p> <p>IPC's largest document collection is offered at the largest discount of all. Create an instant library that includes all of the C-10X segment collections, plus selected additional documents. Documents were reviewed and recommended for inclusion by IPC's technical staff. Contains 108 documents, including the widely used IPC-A-600, IPC-A-610, J-STD-001 and IPC-A-620. Visit the online store for the most up-to-date list of included documents and pricing. Get the complete collection and save 60% off of individual document prices.</p>	<p><b>NEW IPC-T-50H</b>  <b>Terms and Definitions for Interconnecting and Packaging Electronic Circuits</b></p> <p>This essential industry standard provides descriptions and illustrations of electronics interconnect industry terminology to help users and their customers break down language barriers. Revision H contains more than 200 new or revised terms, including new terminology for ball grid array and chip scale packaging, via protection, conductor patterns, assembly processes, base materials and selective plating processes. Includes commonly used industry acronyms and an index of terms by technology types for easy searching. 141 pages. Released July 2008.</p>
<p><b>IPC-9591</b>  <b>Performance Parameters (Mechanical, Electrical, Environmental and Quality/Reliability) for Air Moving Devices</b></p> <p>19 pages. Released April 2006.</p>	<p><b>NEW IPC-9592A</b>  <b>Requirements for Power Conversion Devices for the Computer and Telecommunications Industries</b></p> <p>Expected release April 2010.</p>
<p><b>IPC-TM-650</b>  <b>Test Methods Manual</b></p> <p>Updated regularly as test methods are revised or developed.</p>	

## Electronics Assembly

<b>ADVANCED</b>	
<p><b>IPC-J-STD-012</b>  <b>Implementation of Flip Chip and Chip Scale Technology</b></p> <p>ANSI Approved. 113 pages. Released January 1996.</p>	<p><b>IPC-SM-784</b>  <b>Guidelines for Chip-on-Board Technology Implementation</b></p> <p>ANSI Approved. 37 pages. Released November 1990</p>
<p><b>IPC/EIA J-STD-026</b>  <b>Semiconductor Design Standard for Flip Chip Applications</b></p> <p>40 pages. Released August 1999.</p>	<p><b>IPC-J-STD-027</b>  <b>Mechanical Outline Standard for Flip Chip and Chip Size Configurations</b></p> <p>Establishes mechanical outline requirements for devices supplied in flip chip or chip size package (CSP) formats, including die surface, die terminals, interconnection balls/bumps/ lands to the next level. 13 pages. Released February 2003.</p>
<p><b>IPC/EIA J-STD-028</b>  <b>Performance Standard for Construction of Flip Chip and Chip Scale Bumps</b></p> <p>36 pages. Released August 1999.</p>	<p><b>IPC-J-STD-013</b>  <b>Implementation of Ball Grid Array and Other High Density Technology</b></p> <p>96 pages. Released July 1996.</p>

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<p><b>IPC-C-103</b>  <b>Electronics Assembly Standards Collection</b></p> <p>It takes a lot to be successful in electronics assembly. Get the reference documents you need on all aspects of the job — including solder materials, component characteristics, manufacturing and quality requirements, and acceptability of the final assembly for both leaded and lead-free assemblies. This collection includes 38 key documents for SMT and through-hole assembly, including the widely used IPC-A-610, J-STD-001 and IPC-A-620.</p>	<p><b>IPC-C-108</b>  <b>Cleaning Guides and Handbooks Collection</b></p> <p>This complete set of 12 documents includes the latest editions of every IPC cleaning guide and handbook. It is an invaluable tool for manufacturing engineers making decisions on cleaning products and processes. Also provides guidance for troubleshooting. Visit the online store for a complete list of included documents.</p>
<p><b>ACCEPTABILITY</b></p>	
<p><b>NEW - IPC-J-STD-001E</b>  <b>Requirements for Soldered Electrical and Electronic Assemblies</b></p> <p><b>Pb</b> J-STD-001 is recognized worldwide as the sole industry-consensus standard for soldering processes and materials. Revision E has expanded support for lead-free manufacturing, in addition to easier-to-understand criteria for materials, methods and verification for producing quality soldered interconnections and assemblies. The requirements for all three classes of construction are included. Full color illustrations are provided for clarity. This standard fully complements IPC-A-610D. Published April 2010.</p>	<p><b>NEW - IPC-A-610E</b>  <b>Acceptability of Electronic Assemblies</b></p> <p><b>Pb</b></p> <p>IPC-A-610 has been endorsed by the IEC as the only internationally accepted electronics assembly standard. A must for all quality assurance and assembly departments, IPC-A-610E illustrates industry-accepted workmanship criteria for electronics assemblies through nearly 800 updated and expanded full-color photographs and illustrations. Topics include lead free, component orientation and soldering criteria for through-hole, SMT and discrete wiring assemblies, cleaning, marking, coating, and laminate requirements. IPC-A-610 is invaluable for all inspectors, operators and trainers. Revision E has been critically reviewed for clarity and accuracy. Hole fill criteria has changed and there is additional SMT support. The document remains synchronized to the requirements expressed in other industry consensus documents and is used with the material and process standard IPC J-STD-001. Published April 2010.</p>
<p><b>IPC/WHMA-A-620A</b>  <b>Requirements and Acceptance for Cable and Wire Harness Assemblies</b></p> <p><b>Pb</b> Revision A, with improved readability and usability, is now available for the only industry consensus standard for requirements and acceptance of cable and wire harness assemblies. IPC and the Wire Harness Manufacturers Association (WHMA) developed this significant update, adding lead-free acceptance criteria, a new chapter devoted to electrical and mechanical testing and enhanced criteria for molding and splicing. Contains 599 color pictures and illustrations. Its 19 chapters include: criteria for wire prep, soldering to terminals, crimping of stamped and formed contacts and machined contacts, insulation displacement connectors, ultrasonic welding, splicing, connectors, molding, marking, coax/twinax cables, wrapping/lacing, shielding, assembly and wire-wrap terminations. 368 pages. Released July 2006.</p>	<p><b>NEW IPC-7094</b>  <b>Design and Assembly Process Implementation for Flip Chip and Die Size Components</b></p> <p>Implementing flip chip technology in a direct chip attach (DCA) assembly presents unique challenges for design, assembly, inspection and repair personnel. The standard provides information on system level issues, flip chip and die size assembly and the requirements for board and module level reliability. In addition to guidelines for flip chip inspection, IPC-7094 addresses the design of the initial element and how the die can be evaluated during its development process with a goal toward simplification of the final assembly. Other issues included are outsourcing manufacturing and the procurement of known good die. 75 pages. Released February 2009.</p>

## Electronics Assembly

<p><b>IPC-7095B</b>  <b><i>Design and Assembly Process Implementation for BGAs</i></b></p> <p><b>Pb</b> ANSI Approved. This document delivers useful and practical information to design, assembly, inspection and repair personnel. The major emphasis of Revision B is to provide information to companies transitioning from the standard tin-lead reflow processes to those that use lead-free materials in the assembly of BGA type components. In addition to providing guidelines for BGA inspection and repair, IPC-7095B also addresses reliability issues and the use of lead-free joint criteria associated with BGAs. It also features many new photographs of X-ray or endoscope illustrations to identify some of the characteristics that the industry is experiencing in the implementation of BGA assembly processes, as well as void process indicators. 152 pages. Released March 2008.</p>	<p><b>IPC/EIA J-STD-032</b>  <b><i>Performance Standard for Ball Grid Array Balls</i></b></p> <p>This standard, developed jointly by IPC and the Electronic Industries Association (EIA), establishes the construction requirements for balls and other terminal structures on ball grid array (BGA) packages. It also establishes a set of designations and expectations for product performance. A wide variety of terminal structures are recognized for a broad range of applications — from highest reliability computer, space and military applications to disposable commodity applications. 10 pages. Released June 2002.</p>
<p><b>C L E A N I N G</b></p>	
<p><b>IPC-CH-65B</b>  <b><i>Assembly Cleaning Handbook</i></b></p> <p>The handbook takes the following four cleaning handbooks and combining into one comprehensive Assembly Cleaning Handbook: IPC-SC-60A, <i>Post Solder Solvent Cleaning Handbook</i>; IPC-SA-61A, <i>Post Solder Semi-Aqueous Cleaning Handbook</i>; IPC-AC-62A, <i>Aqueous Post Solder Cleaning Handbook</i>; and IPC-CH-65, <i>Guidelines for Cleaning of Printed Boards and Assemblies</i>. This handbook includes description and discussion of various cleaning methods. It explains the relationship between materials, processes and contaminants in assembly operations. 250 Pages. Expected release April 2010.</p>	<p><b>IPC-SC-60A</b>  <b><i>Post Solder Solvent Cleaning Handbook</i></b></p> <p>40 pages. Released August 1999.</p> <hr/> <p><b>IPC-SA-61A</b>  <b><i>Post Solder Semi-Aqueous Cleaning Handbook</i></b></p> <p>32 pages. Released June 2002.</p>
<p><b>IPC-AC-62A</b>  <b><i>Aqueous Post Solder Cleaning Handbook</i></b></p> <p>75 pages. Revised January 1996.</p>	<p><b>IPC-TR-476A</b>  <b><i>Electrochemical Migration: Electrically Induced Failures in Printed Circuit Assemblies</i></b></p> <p>14 pages. Revised 1997.</p>
<p><b>IPC-TR-582</b>  <b><i>Cleaning &amp; Cleanliness Test Program for Phase 3 — Low Solids, Fluxes and Pastes Processed in Ambient Air</i></b></p> <p>163 pages. Released November 1994.</p>	<p><b>IPC-9201A</b>  <b><i>Surface Insulation Resistance Handbook</i></b></p> <p>Surface insulation resistance (SIR) testing is a tool not only for characterization testing of production processes (such as solder masks, soldering flux and conformal coatings), but also for examining the electrochemical reactions at each stage of the electronic assembly production process. This handbook covers the terminology, theories, test procedures and test vehicles of SIR testing, including temperature-humidity (TH) and temperature-humidity-bias (THB). Discussions on failure modes and troubleshooting are also included. Revision A significantly expands on the discussion of available industry test vehicles for SIR as well as test chamber set-up. 86 pages. Released August 2007.</p>

## Electronics Assembly

<b>COMPONENTS</b>	
<p><b>IPC/JEDEC J-STD-020D-1</b>  <i>Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Surface Mount Devices</i></p> <p><b>Pb</b> Updated with extended support for components used in lead-free assembly, this standard identifies the classification levels of nonhermetic solid state surface mount devices that are sensitive to moisture-induced stress. Use it to determine which classification level should be used for initial reliability qualification. These devices can be properly packaged, stored and handled to avoid subsequent thermal/mechanical damage during solder reflow attachment. Developed by IPC and JEDEC. 13 pages. Released June 2007.</p>	<p><b>IPC/JEDEC J-STD-033B</b>  <i>Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices — Includes Amendment 1</i></p> <p><b>Pb</b> Updated for lead-free processing, this document provides surface mount device manufacturers and users with standardized methods for handling, packing, shipping and using moisture/reflow sensitive SMDs. These methods help avoid damage from moisture absorption and exposure to solder reflow temperatures that can degrade yield and reliability. Use these procedures to help achieve safe and damage-free reflow with the dry packing process providing a minimum shelf life of 12 months from the seal date when using sealed, dry bags. Amendment 1 includes updates to Table 4-3 and corrects Figure 3-2, as shown in new Appendix C Summary of Amendment 1 Changes. Developed by IPC and JEDEC. 17 pages. Revision B released October 2005; Amendment 1 released January 2007.</p>
<p><b>EIA/IPC/JEDEC J-STD-075</b>  <i>Classification of Non-IC Electronic Components for Assembly Processes</i></p> <p>J-STD-075 picks up where J-STD-020 left off by providing test methods to classify worst-case thermal process conditions for electronic components. Classification is referenced to common industry wave and reflow solder profiles. The classifications represent maximum process sensitivity levels and do not establish rework conditions or recommended conditions for an assembler. It outlines a process to classify and label non-semiconductor electronic component's Process Sensitivity Level (PSL) and Moisture Sensitivity Level (MSL) consistent with the semiconductor industry's classification levels (J-STD-020, <i>Moisture/Reflow Sensitivity Classification for Nonhermetic Solid State Devices</i> and J-STD-033, <i>Handling, Packing, Shipping and Use of Moisture/Reflow Sensitive Surface Mount Devices</i>). This standard supersedes IPC-9503. 12 pages. Released August 2008.</p>	<p><b>IPC/JEDEC J-STD-035</b>  <i>Acoustic Microscopy for Non-Hermetic Encapsulated Electronic Components</i></p> <p>16 pages. Released April 1999.</p>
<b>GENERAL</b>	
<p><b>IPC-TA-724</b>  <i>Technology Assessment Series on Clean Rooms</i></p> <p>Released April 1998.</p>	<p><b>IPC-SM-780</b>  <i>Component Packaging and Interconnecting with Emphasis on Surface Mounting</i></p> <p>138 pages. Released March 1988.</p>
<p><b>IPC-SM-785</b>  <i>Guidelines for Accelerated Reliability Testing of Surface Mount Attachments</i></p> <p>50 pages. Released November 1992.</p>	

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GENERAL	
<p><b>IPC-9701A</b>  <b>Performance Test Methods and Qualification Requirements for Surface Mount Solder Attachments</b></p> <p>Provides specific test methods to evaluate the performance and reliability of surface mount solder attachments of electronic assemblies. Establishes levels of performance and reliability of the solder attachments of surface mount devices to rigid, flexible and rigid-flex circuit structures. When used with IPC-SM-785, it provides an understanding of the physics of SMT solder joint failure and an approximate means of relating performance tests results to the reliability of solder attachments in their use environments. Revision A includes Appendix B which provides recommended changes to the thermal cycling profiles given in the document when utilizing lead-free solder joints. 24 pages. Released February 2006.</p>	<p><b>IPC/JEDEC-9702</b>  <b>Monotonic Bend Characterization of Board-Level Interconnects</b></p> <p>17 pages. Released June 2004.</p> <hr/> <p><b>NEW IPC/JEDEC-9703</b>  <b>IPC/JEDEC Mechanical Shock Test Guidelines for Solder Joint Reliability</b></p> <p>42 pages. Released March 2009</p> <hr/> <p><b>IPC-9704</b>  <b>IPC/JEDEC Printed Wiring Board Strain Gage Test Guideline</b></p> <p>22 pages. Released June 2005.</p>
<p><b>NEW IPC-9850A-K</b>  <b>Surface Mount Placement Equipment Characterization</b></p> <p>This standard has been updated to standardize the parameters, measurement procedures, and methodologies used for the specification, evaluation, and continuing verification of assembly equipment characterization parameters. It establishes the procedures to characterize and document machine placement capability of surface mount assembly equipment while maintaining a placement accuracy to placement throughput relationship. Kit includes one printed copy of the standard and a CD with the support spreadsheet, forms and the drawing files (Gerber format) necessary to make the test materials (these are not read-only). 30 Pages. Expected release April 2010.</p>	<p><b>IPC-PD-335</b>  <b>Electronic Packaging Handbook</b></p> <p>470 pages. Released December 1989.</p> <hr/> <p><b>IPC-7525A</b>  <b>Stencil Design Guideline</b></p> <p>Updated to include support for stencils used with lead-free processes, this document provides guidelines for the design and fabrication of stencils for solder paste and surface-mount adhesives. Stencil design for various surface-mount technology, as well as mixed technology with through-hole or flip chip components is discussed. This includes differences for tin-lead and lead-free solder paste, overprint, two-print and step stencil designs. A sample order form plus a user inspection checklist are also included. 28 pages. Released February 2007.</p>
<p><b>IPC-TR-581</b>  <b>IPC Phase III Controlled Atmosphere Soldering Study</b></p> <p>90 pages. Released August 1994.</p>	



## Electronics Assembly

M A T E R I A L S	
<p><b>IPC-J-STD-004B</b>  <b>Requirements for Soldering Fluxes</b></p> <p>ANSI Approved. The purpose of this standard is to classify and characterize tin lead and lead-free soldering flux materials. Soldering flux materials include: liquid flux, paste flux, solder paste, solder cream and flux-coated and flux-cored solder wires and preforms. 20 pages. Released December 2008.</p>	<p><b>IPC/EIA J-STD-005</b>  <b>Requirements for Soldering Pastes — Includes Amendment 1</b></p> <p>Lists requirements for qualification and characterization of solder paste. Test methods and criteria for metal content, viscosity, slump, solder ball, tack and wetting of solder pastes are included. Supersedes QQ-S-571. Developed by IPC and EIA. 24 pages. Released January 1995.</p>
<p><b>IPC-HDBK-005</b>  <b>Guide to Solder Paste Assessment</b></p> <p>This handbook is a companion to the solder paste standard J-STD-005 and should be considered to be a guide to help assess the applicability of a solder paste for its use in surface mount technology (SMT) processes. This document also suggests some test methods that can help with designing and testing solder pastes. It is intended for use by both vendors and users of solder paste. This document has been written as a guide to assess the applicability of a solder paste for a specific process, given the tremendous number of permutations of different materials, atmospheres and process variables currently available. 50 pages. Released January 2006.</p>	<p><b>NEW IPC-J-STD-006B</b>  <b>Requirements for Electronic Grade Solder Alloys and Fluxed and Non-Fluxed Solid Solders for Electronic Soldering Applications — Included Amendments 1 and 2</b></p> <p>This standard prescribes the nomenclature, requirements and test methods for electronic grade solder alloys; for fluxed and non-fluxed bar, ribbon, and powder solders, for electronic soldering applications; and for "special" electronic grade solders. This is a quality control standard and is not intended to relate directly to the material's performance in the manufacturing process. 29 pages. Released October 2008.</p>
<p><b>IPC J-STD-030</b>  <b>Guideline for Selection and Application of Underfill Material for Flip Chip and Other Micropackages</b></p> <p>33 pages. Released September 2005.</p>	<p><b>IPC-SM-817</b>  <b>General Requirements for Dielectric Surface Mounting Adhesives</b></p> <p>22 pages. Released November 1989.</p>
<p><b>SPVC2005</b>  <b>Round Robin Testing and Analysis of Lead-Free Solder Pastes with Alloys of Tin, Silver and Copper</b></p> <p>50 pages. Released 2005</p>	<p><b>JEDEC/IPC-JP002</b>  <b>JEDEC/IPC Current Tin Whiskers Theory and Mitigation Practices Guideline</b></p> <p>This document provides insight into the theory behind tin whisker formation as it is known today and, based on this knowledge, potential mitigation practices that may delay or prevent tin whisker formation. The potential effectiveness of various mitigation practices will also be briefly discussed. References behind each of the theories and mitigation practices are provided. Note: <i>Due to additional performance requirements, the mitigation methods in this document may not be sufficient for certain applications with special needs (e.g., military or aerospace).</i> 26 pages. Released March 2006.</p>
<p><b>IPC-CA-821</b>  <b>General Requirements for Thermally Conductive Adhesives</b></p> <p>18 pages. Released January 1995.</p>	
<p><b>IPC-3406</b>  <b>Guidelines for Electrically Conductive Surface Mount Adhesives</b></p> <p>15 pages. Released July 1996.</p>	<p><b>IPC-3408</b>  <b>General Requirements for Anisotropically Conductive Adhesive Films</b></p> <p>25 pages. Released November 1996.</p>

## Electronics Assembly

<b>M A T E R I A L S</b>	
<p><b>IPC-CC-830B</b>  <b>Qualification and Performance of Electrical Insulating Compound for Printed Wiring Assemblies — Includes Amendment 1</b></p> <p>This is the industry standard for qualification and quality conformance of conformal coating. Includes requirements and evaluations of material properties using standardized test vehicles. Amendment 1 updates include new qualification, retention and conformance inspection requirements for FTIR, MIR and hydrolytic stability. 18 pages. Released October 2008.</p>	<p><b>IPC-HDBK-830</b>  <b>Guidelines for Design, Selection and Application of Conformal Coatings</b></p>
<p><b>IPC-SM-840D</b>  <b>Qualification and Performance Specification of Permanent Solder Mask</b></p> <p>Now updated to incorporate resistance requirements to lead-free soldering processes, this document covers qualification and quality performance requirements for liquid and dry-film solder mask material. It addresses two classes of requirements: T (telecommunications) and H (high reliability), to reflect functional performance needs and testing severity based on industry/end-use requirements. Topics include adhesion, material qualification, resistances to solvents and electrical requirements. 16 pages. Released April 200</p>	<p><b>HDBK-840</b>  <b>Solder Mask Handbook</b></p> <p>This must-have supplement to the solder mask requirements established in IPC specifications (such as IPC-SM-840 and IPC-6012) provides detailed information on solder mask types, application processes, pre- and post-assembly processes, characteristics and properties that are useful in the selection and use of the most appropriate mask type for a given application. Applicable to solder mask manufacturers, processing equipment manufacturers, PCB manufacturers, assembly manufacturers and ancillary chemical suppliers. This document is available only in a single-user electronic format. 72 pages. Released September 2006.</p>
<b>O P T O E L E C T R O N I C S</b>	
<p><b>IPC-0040</b>  <b>Optoelectronics Assembly and Packaging Technology</b></p> <p>ANSI Approved. 161 pages. Released May 2003.</p>	<p><b>IPC-8413-1</b>  <b>Specification for Process Carriers Used to Handle Optical Fibers in Manufacturing</b></p> <p>15 pages. Released April 2003.</p>
<p><b>IPC-8497-1</b>  <b>Cleaning Methods and Contamination Assessment for Optical Assembly</b></p> <p>38 pages. Released January 2006.</p>	
<b>P R O C E S S S U P P O R T</b>	
<p><b>IPC-TP-1114</b>  <b>The Layman's Guide to Qualifying a Process to J-STD-001</b></p> <p>13 pages. Released January 1998.</p>	<p><b>N E W IPC-AJ-820A</b>  <b>Assembly and Joining Handbook</b></p> <p>This document provide supporting "how-to" and "why" fundamentals for assembly processes. The handbook includes information on printed boards, components, solderability, mounting, assembly and joining materials, cleaning and coatings. 200 pages.</p>

## Electronics Assembly


PROCESS SUPPORT	
<p><b>IPC-7530</b>  <b>Guidelines for Temperature Profiling for Mass Soldering (Reflow and Wave) Processes</b></p> <p>During mass soldering, it is important that all solder joints reach the minimum soldering (reflow) temperature to assure metallurgical bonding of the solder alloy and the base metals to be soldered. Metallurgical bonding requires that both surfaces to be soldered, as well as the solder, reach this minimum soldering temperature for a sufficient time to allow the wetting of the solder surfaces. This document provides guidelines for the construction of appropriate profiling test vehicles and various techniques and methodologies for temperature profiling. 18 pages. Released May 2001.</p>	<p><b>PC-TP-1090</b>  <b>The Layman's Guide to Qualifying New Fluxes</b></p> <p>18 pages. Released July 1996.</p> <p><b>IPC-TP-1115</b>  <b>Selection and Implementation Strategy for a Low-Residue No-Clean Process</b></p> <p>120 pages. Released December 1998.</p> <p><b>IPC-S-816</b>  <b>SMT Process Guidelines and Checklist</b></p> <p>38 pages. Released July 1993.</p>
<p><b>IPC-CM-770E</b>  <b>Component Mounting Guidelines for Printed Boards</b></p> <p>This revision provides effective guidelines in the preparation and attachment of components for printed circuit board assembly and reviews pertinent design criteria, impacts and issues. It contains techniques for assembly (both manual and machines including SMT, BGA and flip chip) and consideration of, and impact upon, subsequent soldering, cleaning, and coating processes. 150 pages. Revised January 2004.</p>	<p><b>IPC-7912A</b>  <b>End-Item DPMO for Printed Circuit Board Assemblies</b></p> <p>ANSI Approved. 12 pages. Released January 2004.</p> <p><b>IPC-9261A</b>  <b>In-Process DPMO and Estimated Yield for PCAs</b></p> <p>12 pages. Released October 2006.</p>
<p><b>IPC-DPMO-202</b>  <b>IPC-7912/9261 End Item and In-Process DPMO Set</b></p> <p>Set includes IPC-7912A, <i>End-Item DPMO for Printed Circuit Board Assemblies</i> and IPC-9261, <i>In-Process DPMO and Estimated Yield for PWAs</i>.</p>	<p><b>N E W WP-009</b>  <b>A Summary of Tin Whisker Research References</b></p> <p>15 pages. Released March 2009.</p>
REWORK / REPAIR	
<p><b>IPC-7711/21B</b>  <b>Rework, Modification and Repair of Electronic Assemblies</b></p> <p>Featuring a major update for lead-free support plus enhanced inspection guidelines for repairs and modifications, this fully revised guide includes everything needed for repair and rework of electronic assemblies and printed circuit boards. In addition to a complete, procedure-by-procedure update to assure applicability to both lead-free and tin-lead soldered assemblies, this document includes all previously published changes plus several new procedures for BGAs (including reballing) and flex-print repair. Part 1 (General Requirements) has also been updated for ease of use and provides important direction and guidelines for all procedures.</p>	<p><b>IPC-7711/21B (CONT)</b></p> <p>This section includes procedures common to rework, repair and modification. Part 2 (IPC-7711B) includes tools, materials and methods to be used in removing and replacing surface mount and through-hole components. Part 3 (IPC-7721B) covers procedures for modifying assemblies and accomplishing laminate can conductor repairs. Furnished in a three-ring binder for easy updating and customizing. 325 pages. Released November 2007</p>

## Electronics Assembly

SOLDERABILITY	
<p><b>NEW IPC/ECA J-STD-002C</b>  <b>Solderability Tests for Component Leads, Terminations, Lugs, Terminals and Wires — Includes Amendment 1</b></p> <p>This standard prescribes test methods, defect definitions, acceptance criteria and illustrations for assessing the solderability of electronic component leads, terminations, solid wires, stranded wires, lugs and tabs. It addresses visual acceptance and force measurement solderability criteria for tin-lead and lead free. The standard includes a test method for the resistance to dissolution/dewetting of metallization to verify that metallized terminations will remain intact throughout the assembly process. Amendment 1 adds a protocol for wetting balance testing and also allows use of production solder pastes for SMT simulation testing. 63 pages. Released November 2008.</p>	<p><b>IPC/EIA J-STD-003B</b>  <b>Solderability Tests for Printed Boards</b></p> <p>Suitable for use by suppliers as well as users, this standard prescribes test methods, defect definitions and illustrations for assessing the solderability of printed board surface conductors, attachment lands and plated-through holes using tin-lead or lead-free solders. Use the solderability test methods described in this standard to determine whether printed board surface conductors, attachment lands and plated-through holes wet easily with solder, as well as whether they can withstand the rigors of printed board assembly processes. 36 pages. Released March 2007.</p>
<p><b>IPC-TR-462</b>  <b>Solderability Evaluation of Printed Boards with Protective Coatings Over Long-Term Storage</b>                      63 pages. Released October 1987.</p>	<p><b>IPC-TR-464</b>  <b>Accelerated Aging for Solderability Evaluations</b>                      39 pages. Released December 1987.</p>
<p><b>IPC-TR-465-1</b>  <b>Round Robin Test on Steam Ager Temperature Control Stability</b>                      20 pages. Released 1993.</p>	<p><b>IPC-TR-465-2</b>  <b>The Effect of Steam Aging Time and Temperature on Solderability Test Results</b>                      51 pages. Released July 1996.</p>
<p><b>IPC-TR-465-3</b>  <b>Evaluation of Steam Aging on Alternative Finishes, Phase 11A</b>                      15 pages. Released July 1996.</p>	<p><b>IPC-TR-466</b>  <b>Technical Report: Wetting Balance Standard Weight Comparison Test</b>                      16 pages. Released April 1995.</p>
TRAINING & REFERENCE GUIDES	
<p><b>IPC-DRM-18H</b>  <b>Component Identification Training and Reference Guide</b></p> <p>Ideal for training and as a quick reference, this comprehensive component identification resource is a must for electronics assembly operators and inspectors. It contains color photographs, computer graphics, schematic symbols and detailed descriptions of more than 50 through-hole and surface mount components. The new Revision H contains updated info on SSOP, TSOP, QFP, LQFP, PQFP, LCC, QFN and BGA-related packages. The guide also features a new section stressing the dangers of cross contamination when using lead-free components and assemblies. It also contains quick facts on polarity, orientation, lead styles, component reference designators (CRDs) and a section on reading component values. 73 pages. Released December 2007.</p> 	<p><b>IPC-DRM-SMT-D</b>  <b>Surface Mount Solder Joint Evaluation Training &amp; Reference Guide</b></p> <p>Help your workforce understand and apply the surface mount acceptance criteria from IPC standards. DRM-SMT-D contains 3-D color illustrations for chip component, gull wing and J-lead solder joints. Drawings clearly show the minimum acceptable condition for each type of component misalignment and the minimum solder connections. All three classes of product are color-coded to make it convenient to use as a reference guide. Manual also contains high-quality color photographs of the major solder defects and conditions, with the appropriate specification/ paragraph reference to IPC-A-610D and J-STD-001D.</p> 

## Electronics Assembly

### TRAINING & REFERENCE GUIDES

<p><b>IPC-DRM-PTH-D</b> <b><i>Through-Hole Solder Joint Evaluation Training &amp; Reference Guide</i></b></p> <p>Includes computer-generated 3-D graphics, as well as close-up photography, to help users understand IPC standards A-610D and J-STD-001D. Provides illustrations of component, barrel and solder-side coverage per requirements in the standards. Covers solder fillet, contact angle, wetting, vertical fill, land coverage and numerous defect conditions for Class 1, 2 and 3 solder joints. Also includes a terminology section.</p>	<p><b>IPC-DRM-WHA-A</b> <b><i>Wire Harness Assembly Training &amp; Reference Guide</i></b></p> <p>Designed for use by wire harness assemblers, crimp operators and even QA personnel, this newly updated guide illustrates and explains the most important acceptance criteria found in IPC/WHMA-A-620A, the industry standard on wire harness acceptability. Using easy-to-understand computer-generated graphics and simple language, this handy guide covers: wire types, gauges, insulation stripping, wire tinning, terminals and contact types, coaxial cables, IPC product categories and acceptance criteria, wire preparation, strand and insulation damage, conductor deformations, open and closed barrel crimp definitions and criteria, crimp deformations, cut-off tabs, punctures, insulation support crimps, inspection windows, bellmouth, conductor crimp requirements, conductor brush, closed barrel crimps, insulation damage, ribbon cable, discrete wire and cup terminals. A glossary of related terminology is also included. 59 pages.</p> 
<p><b>IPC-DRM-53</b> <b><i>Introduction to Electronics Assembly Training &amp; Reference Guide</i></b></p> <p>Learning resource for new hires, operators, sales, purchasing, human resources, administrative personnel, students or anyone interested in understanding the basic processes for both through hole and surface mount assembly. Explains electronics assembly to the uninitiated in easy-to-understand language and includes more than 70 color photographs and graphic drawings to clearly illustrate assembly technologies. Key terms are defined in a glossary to help simplify the industry lexicon. Also explains how electronics assembly fits into the electronics industry. Each section includes references for additional training and industry specifications that provides further information. 31 pages.</p>	

## Printed Circuit Boards

<b>COLLECTIONS</b>	
<p><b>IPC-C-102</b> <b><i>Flexible Printed Board Standards Collection</i></b></p> <p>Manufacturers and designers of flexible printed boards need unique information on materials, manufacturing and design for these specialized interconnections. Put it all at your fingertips with this comprehensive collection of IPC's 13 key documents for flexible printed boards. (Visit the online store for a complete list of included documents.) Purchase the collection and save 55% on individual document prices.</p>	<p><b>IPC-C-105</b> <b><i>Rigid Printed Board Standards Collection</i></b></p> <p>Here are the latest standards addressing the dimensioning, tolerancing, qualifying and performance aspects of rigid printed boards. An in-depth focus on solderability testing, plating requirements, conductor thickness and lot acceptance makes this document set an invaluable tool for anyone requiring the design and performance characteristics of rigid printed boards. Includes 39 documents. (Visit the online store for a complete list of included documents.) Purchase the collection and save 55% on individual document prices.</p>
<p><b>IPC-C-107</b> <b><i>Printed Board Materials Standards Collection</i></b></p> <p>With global materials restrictions adding to all the different recipes used in manufacturing board laminate, board specifiers and manufacturers need all the tools available. This collection of 19 documents contains the requirements for the various reinforcements, foils, laminates and prepregs. (Visit the online store for a complete list of included documents.) Purchase the collection and save 55% on individual document prices.</p>	
<b>ACCEPTABILITY</b>	
<p><b>IPC-6010 SERIES</b> <b><i>IPC-6010 Qualification and Performance Series</i></b></p> <p>Series includes IPC-6011, <i>Generic Performance Specification for Printed Boards</i>; IPC-6012, <i>Qualification and Performance Specification for Rigid Printed Boards</i>; IPC-6013, <i>Qualification and Performance Specification for Flexible Printed Boards</i>; IPC-6015, <i>Qualification and Performance Specification for Organic Multichip Module (MCM-L) Mounting and Interconnecting Structures</i>; IPC-6016, <i>Qualification and Performance Specification for High Density Interconnect (HDI) Layers or Boards</i>; and IPC-6018A, <i>Microwave End Product Board Inspection and Test</i>. Purchase the series and save 20% on individual document prices.</p>	<p><b>IPC-6011</b> <b><i>Generic Performance Specification for Printed Boards</i></b></p> <p>This specification establishes the general requirements and responsibilities for suppliers and users of printed boards. Serving as the foundation for the IPC-6010 Qualification and Performance series, it describes quality and reliability assurance requirements that must be met. For use with IPC-6012 through IPC-6018. Supersedes IPC-RB-276, IPC-SC-320, IPC-TC-500, IPC-ML-950C. 15 pages. Released July 1996.</p>
<p><b>IPC-6012C</b> <b><i>Qualification and Performance Specification for Rigid Printed Boards</i></b></p> <p>This specification covers qualification and performance of rigid printed boards, including single-sided, double-sided, with or without plated-through holes, multilayer with or without blind/buried vias and metal core boards. It addresses final finish and surface plating coating requirements, conductors, holes/vias, frequency of acceptance testing and quality conformance as well as electrical, mechanical and environmental requirements. Revision C provides new acceptance criteria for surface and hole plating, laminate imperfections, etchback and smear removal, annular ring, via fill, and copper wrap and copper cap plating of holes/vias, as well as new requirements for thermal stress testing.</p>	<p><b>IPC-6015</b> <b><i>Qualification and Performance Specification for Organic and Multichip Module Mounting and Interconnecting Structures</i></b></p> <p>25 pages. Released February 1998.</p>

## Printed Circuit Boards

<b>ACCEPTABILITY</b>	
<p><b>NEW IPC-A-600H</b>  <b>Acceptability of Printed Boards</b></p> <p>The definitive illustrated guide to printed circuit board acceptability! This four-color document provides photographs and illustrations of the target, acceptable and nonconforming conditions that are either internally or externally observable on bare printed boards. Make sure your operators, inspectors, and engineers have the most current industry consensus information. With over 80 new or revised photos and illustrations, revision H provides new coverage on cap plating of filled vias, copper wrap plating in holes/vias, conductor thickness, hole wall pullaway, and folds and bend marks for flexible printed boards, along with updated and expanded coverage for weave exposure, measing and crazing of printed boards, annular ring requirements, etchback, and stiffener bonding for flexible printed boards. The document synchronizes to the acceptability requirements expressed in IPC-6012C and IPC-6013B. Published March 2010.</p>	<p><b>IPC-QE-605A</b>  <b>Printed Board Quality Evaluation Handbook</b>                      52 pages. Released February 1999..</p> <p><b>IPC-HM-860</b>  <b>Specification for Multilayer Hybrid Circuits</b>                      66 pages. Released January 1987.</p> <p><b>IPC-TF-870</b>  <b>Qualification and Performance of Polymer Thick Film Printed Boards</b>                      59 pages. Released November 1989.</p>
<p><b>IPC-ML-960</b>  <b>Qualification and Performance Specification for Mass Lamination Panels for Multilayer Printed Boards</b></p> <p>ANSI Approved. 21 pages. Released July 1994.</p>	<p><b>IPC-TR-481</b>  <b>Results of Multilayer Tests Program Round Robin</b>                      86 pages. Released April 1981.</p>
<p><b>IPC-TR-551</b>  <b>Quality Assessment of Printed Boards Used for Mounting and Interconnecting Electronic Components</b></p> <p>104 pages. Released July 1993.</p>	<p><b>IPC-TR-579</b>  <b>Round Robin Reliability Evaluation of Small Diameter Plated-Through Holes in PCBs</b>                      80 pages. Released September 1988.</p>
<b>CLEANING</b>	
<p><b>IPC-5701</b>  <b>Users Guide for Cleanliness of Unpopulated Printed Boards</b></p> <p>6 pages. Released July 2003.</p>	<p><b>IPC-5702</b>  <b>Guidelines for OEMs in Determining Acceptable Levels of Cleanliness of Unpopulated Printed Boards</b></p> <p>Every electronics manufacturer, whether an original equipment manufacturer (OEM) or electronics manufacturing services (EMS) company, must determine if the unpopulated printed boards entering the assembly process have an adequate level of cleanliness. The question, "How clean is clean enough?" is one that has no definitive answer. Because the issue is very complex, a single methodology to determine acceptability does not exist. Recognizing this, IPC-5702 provides the printed board or printed board assembly professional guidance on how to correlate cleanliness-related data to electrical function and determine "acceptable" cleanliness levels. 15 pages. Released June 2007.</p>
<p><b>IPC-TP-1113</b>  <b>Circuit Board Ionic Cleanliness Measurement: What Does It Tell Us?</b></p> <p>8 pages. Released 1994.</p>	
<p><b>IPC-WP-008</b>  <b>Setting Up Ion Chromatography Capability</b></p> <p>12 pages. Released December 2005.</p>	

## Printed Circuit Boards

EMBEDDED PASSIVES	
<p><b>IPC-2316</b>  <i>Design Guide for Embedded Passive Device Printed Boards</i></p> <p>52 pages. Released March 2007.</p>	<p><b>IPC-4811</b>  <i>Specification for Embedded Passive Device Resistor Materials for Rigid and Multilayer Printed Boards</i></p> <p>26 pages. Released April 2008.</p>
<p><b>IPC-4821</b>  <i>Specification for Embedded Passive Device Capacitor Materials for Rigid and Multilayer Printed Boards</i></p> <p>34 pages. Released May 2006.</p>	<p><b>N E W IPC-6017</b>  <i>Qualification and Performance Specification for Printed Boards Containing Embedded Passive Devices</i></p> <p>This new standard supplements existing IPC-6010 series specifications with qualification and performance requirements for in-process and finished printed boards containing embedded passive circuitry (distributive capacitive planes and capacitive or resistive components). 10 pages. Released March 2009.</p>
F A B R I C A T I O N	
<p><b>IPC-4761</b>  <i>Design Guide for Protection of Printed Board Via Structures</i></p> <p>16 pages. Released July 2006.</p>	<p><b>IPC-4552</b>  <i>Specification for Electroless Nickel/Immersion Gold (ENIG) Plating for Printed Circuit Boards</i></p> <p>ANSI Approved. Containing full color photographs, this specification sets the requirements for the use of ENIG as a surface finish. It includes requirements for ENIG deposit thicknesses based on performance criteria. The Appendix includes a free copy of the technical paper <i>Standard Developments Efforts of Electroless Nickel Immersion Gold</i> by Milad and O'Brien. 29 pages. Released October 2002.</p>
<p><b>IPC-SM-839</b>  <i>Pre- &amp; Post-Solder Mask Application Cleaning Guidelines</i></p> <p>22 pages. Released April 1990.</p>	<p><b>IPC-4554</b>  <i>Specification for Immersion Tin Plating for Printed Circuit Boards</i></p> <p>This full color document provides performance criteria for the use of immersion tin (ISn), which is used primarily as a solderable surface. 57 pages. Released January 2007.</p>
<p><b>N E W IPC-4553A</b>  <i>Specification for Immersion Silver Plating for Printed Circuit Boards</i></p> <p>This specification sets requirements based on performance criteria for the use of Immersion Silver (IAG) as a surface finish. In this revision, both a single thickness range is in place and an upper limit for immersion silver thickness has been established. 36 pages. Released May 2009.</p>	<p><b>IPC-DR-572A</b>  <i>Drilling Guidelines for Printed Boards</i></p> <p>12 pages. Released March 2007.</p>
<p><b>IPC-4781</b>  <i>Qualification and Performance Specification of Permanent, Semi-Permanent and Temporary Legend and/or Marking Ink</i></p> <p>Here is the industry's first specification for the evaluation of a legend and/or marking ink material for the determination of acceptability of use in a standard printed board system. IPC-4781 provides coverage for adhesion, material qualification and testing, resistances to solvents, requirements for resistance to lead-free solders and electrical requirements. 17 pages. Released May 2008.</p>	<p><b>IPC-IT-95080</b>  <i>Improvements/Alternatives to Mechanical Drilling of PCB Vias</i></p> <p>76 pages. Released August 1995.</p>



## Printed Circuit Boards

FLEXIBLE CIRCUITS	
<p><b>IPC-4202A</b>  <b>Flexible Base Dielectrics for Use in Flexible Printed Circuitry</b></p> <p>This document provides comprehensive data to help users more easily determine both material capability and compatibility. It includes flexible base material specification sheets that have been updated with the newest properties for the specific material types. Use with IPC-4203 and IPC-4204. 32 pages. Released March 2010.</p>	<p><b>IPC-4203</b>  <b>Adhesive Coated Dielectric Films for Use as Cover Sheets for Flexible Printed Circuitry and Flexible Adhesive Bonding Films</b></p> <p>ANSI Approved. 45 pages. Released May 2002.</p>
<p><b>IPC-4204</b>  <b>Flexible Metal-Clad Dielectrics for Use in Fabrication of Flexible Printed Circuitry</b></p> <p>ANSI Approved. 57 pages. Released May 2002.</p>	<p><b>IPC-6013B</b>  <b>Qualification and Performance Specification for Flexible Printed Boards</b></p> <p>Covers qualification and performance requirements for flexible printed boards designed to IPC-2221 and IPC-2223. The flexible printed boards may be single-sided, double-sided, multilayer or rigid-flex multilayer with stiffeners, plated-through holes (PTH) or blind/buried vias. Revision B includes new requirements for surface plating, measles, foreign inclusions, adhesive squeeze-out, solderable annular ring, PTH copper wrap, plating folds, microsection evaluations, acceptance testing frequency and more. 45 pages. Released January 2009.</p>
<p><b>IPC/JPCA-6202</b>  <b>IPC/JPCA Performance Guide Manual for Single- and Double-Sided Flexible Printed Wiring Boards</b></p> <p>96 pages. Released February 1999.</p>	
<p><b>IPC-FA-251</b>  <b>Guidelines for Assembly of Single- and Double-Sided Flex Circuits</b></p> <p>ANSI Approved. 30 pages. Released February 1992.</p>	
<p><b>IPC-FC-234</b>  <b>PSA Assembly Guidelines for Single- and Double-Sided Flexible Printed Circuits</b></p> <p>30 pages. Released December 1997.</p>	
GENERAL	
<p><b>IPC-D-325A</b>  <b>Documentation Requirements for Printed Boards</b></p> <p>ANSI Approved. 94 pages. Revised May 1995.</p>	<p><b>IPC-D-326A</b>  <b>Information Requirements for Manufacturing Printed Circuit Boards and Other Electronic Assemblies</b></p> <p>5 pages. Released January 2004.</p>
<p><b>IPC-PE-740A</b>  <b>Troubleshooting for Printed Board Manufacture and Assembly</b></p> <p>388 pages. Released December 1997.</p>	

## Printed Circuit Boards

HIGH DENSITY / FINE PITCH	
<p><b>IPC/JPCA-4104</b>  <i>Specification for High Density Interconnect (HDI) and Microvia Materials</i></p> <p>92 pages. Released May 1999.</p>	<p><b>IPC-6016</b>  <i>Qualification &amp; Performance Specification for High Density Interconnect (HDI) Layers or Boards</i></p> <p>55 pages. Released May 1999.</p>
<p><b>IPC/JPCA-6801</b>  <i>IPC/JPCA Terms &amp; Definitions, Test Methods, and Design Examples for Build-Up/High Density Interconnect (HDI) Printed Circuit Boards</i></p> <p>32 pages. Released January 2000.</p>	<p><b>IPC-DD-135</b>  <i>Qualification Testing for Deposited Organic Interlayer Dielectric Materials for Multichip Modules</i></p> <p>42 pages. Released August 1995.</p>
<p><b>IPC-IT-30101</b>  <i>High Density PCB Microvia Evaluation, Phase 1, Round 3</i></p> <p>83 pages. Released March 2000.</p>	<p><b>IPC-IT-96060</b>  <i>High Density PCB Microvia Evaluation (October Project) Phase 1, Round 1</i></p> <p>76 pages. Released June 1996.</p>
<p><b>IPC-IT-97071</b>  <i>High Density PCB Microvia Evaluation, Phase 1, Round 2</i></p> <p>11 pages. Released July 1997.</p>	<p><b>IPC-IT-98123</b>  <i>Microvia Manufacturing Technology Cost Analysis Report</i></p> <p>67 pages. Released December 1998.</p>
HIGH SPEED / HIGH FREQUENCY	
<p><b>IPC-2141A</b>  <i>Design Guide for High-Speed Controlled Impedance Circuit Boards</i></p> <p>53 pages. Released March 2004.</p>	<p><b>IPC-2251</b>  <i>Design Guide for the Packaging of High Speed Electronic Circuits</i></p> <p>99 pages. Released December 2003.</p>
<p><b>IPC-2252</b>  <i>Design Guide for RF/Microwave Circuit Boards</i></p> <p>30 pages. Released June 2002.</p>	<p><b>IPC-4103</b>  <i>Specification for Base Materials for High Speed/High Frequency Applications</i></p> <p>ANSI Approved. 40 pages. Released January 2002.</p>
<p><b>IPC-6018A</b>  <i>Microwave End Product Board Inspection and Test</i></p> <p>ANSI Approved. Establishes requirements for qualification and performance of high frequency (microwave) printed wiring boards. Covers both end product inspection and test of microwave boards for microstrip, stripline, mixed dielectric and multilayer stripline applications. Enhancements over previous revision include updated tables for surface finish requirements and annular ring, as well as revised requirements for microsectioned test specimen and production boards. 34 pages. Released January 2002.</p>	

## Printed Circuit Boards

MATERIALS GENERAL	
<p><b>IPC-MI-660</b>  <b><i>Incoming Inspection of Raw Materials Manual</i></b></p> <p>150 pages. Released February 1984.</p>	
MATERIALS/FOILS and LAMINATE	
<p><b>NEW IPC-4101C</b>  <b><i>Specification for Base Materials for Rigid and Multilayer Printed Boards</i></b></p> <p>This document contains 66 individual specification sheets along with key words to help find similar materials. Eleven new specification sheets add laminate and prepreg materials that have improved or additional properties including one or more of the following: low-halogen content, lead-free applications, high thermal performance or high speed/high frequency</p>	<p><b>IPC-4121</b>  <b><i>Guidelines for Selecting Core Construction for Multilayer Printed Wiring Board Applications</i></b></p> <p>ANSI Approved. 12 pages. Released January 2000.</p>
<p><b>IPC-4562A</b>  <b><i>Metal Foil for Printed Board Applications</i></b></p> <p>This specification covers metal foils supported by carrier films and unsupported foils suitable for subsequent use in only printed boards, and addresses the requirements for procurement of these same metal foils. Unless otherwise agreed upon between user and supplier (AABUS), metal foils shall be considered acceptable as long as the requirements in this specification are met. 27 pages. Released April 2008.</p>	<p><b>IPC-4563</b>  <b><i>Resin Coated Copper Foil for Printed Boards Guideline</i></b></p> <p>19 pages. Released November 2007.</p>
<p><b>IPC-TR-485</b>  <b><i>Results of Copper Foil Rupture Strength Round Robin Study</i></b></p> <p>27 pages. Released March 1985.</p>	<p><b>IPC-CF-152B</b>  <b><i>Composite Metallic Materials Specification for Printed Circuit Boards</i></b></p> <p>39 pages. Revised March 1997.</p>
MATERIALS REINFORCEMENTS	
<p><b>IPC-4412A</b>  <b><i>Specification for Finished Fabric Woven from "E" Glass for Printed Boards</i></b></p> <p>Exhaustively covers the classification and requirements for finished fabrics woven from "E" glass fiber yarns. These yarns are formed from filaments of electrical-grade glass and are intended as reinforcing materials in laminated plastics for electrical and electronic uses. The fabrics covered by this specification are all of a plain-weave construction. Includes two extensive tables of finished fabric glass styles, one in SI units and the other in US units. Supersedes IPC-4412, IPC-EG-140 with Amendments 1 and 2 .</p>	<p><b>IPC-4130</b>  <b><i>Specification and Characterization Methods for Nonwoven "E" Glass Mat</i></b></p> <p>14 pages. Released September 1998.</p>
	<p><b>IPC-4110</b>  <b><i>Specification and Characterization Methods for Nonwoven Cellulose Based Paper for Printed Boards</i></b></p> <p>11 pages. Released August 1998.</p>

## Printed Circuit Boards

M A T E R I A L S   R E I N F O R C E M E N T S	
<p><b>IPC-4411A</b>  <i>Specification and Characterization Methods for Nonwoven Para-Aramid Reinforcement</i></p> <p>22 pages. Released November 2003.</p>	<p><b>IPC-SG-141</b>  <i>Specification for Finished Fabric Woven from "S" Glass for Printed Boards</i></p> <p>12 pages. Released February 1992.</p>
<p><b>IPC-A-142</b>  <i>Specification for Finished Fabric Woven from Aramid for Printed Boards</i></p> <p>9 pages. Released June 1990.</p>	<p><b>IPC-QF-143</b>  <i>Specification for Finished Fabric Woven from Quartz (Pure Fused Silica) for Printed Boards</i></p> <p>13 pages. Released February 1992.</p>
Q U A L I T Y   a n d   T E S T	
<p><b>IPC-9691A</b>  <i>User Guide for the IPC-TM-650, Method 2.6.25, Conductive Anodic Filament (CAF) Resistance Test (Electrochemical Migration Testing)</i></p> <p>23 pages. Released August 2007.</p>	<p><b>IPC-9191</b>  <i>General Guidelines for Implementation of Statistical Process Control (SPC)</i></p> <p>ANSI Approved. 43 pages. Released November 1999.</p>
<p><b>IPC-9194</b>  <i>Implementation of Statistical Process Control (SPC) Applied to Printed Board Assembly Manufacture Guidelines</i></p> <p>36 pages. Released September 2004.</p>	<p><b>IPC-9199</b>  <i>Statistical Process Control (SPC) Quality Rating</i></p> <p>41 pages. Released September 2002.</p>
<p><b>N E W   IPC-9252A</b>  <i>Requirements for Electrical Testing of Unpopulated Printed Boards</i></p> <p>13 pages. Released December 2008.</p>	<p><b>IT-97061</b>  <i>PCB Hole to Land Misregistration: Causes and Reliability</i></p> <p>11 pages. Released June 1997.</p>
<p><b>IT-98103</b>  <i>Reliability of Misregistered and Landless Innerlayer Interconnects in Thick Panels</i></p> <p>180 pages. Released October 1998.</p>	<p><b>IPC-MS-810</b>  <i>Guidelines for High Volume Microsection</i></p> <p>31 pages. Released October 1993.</p>
<p><b>IPC-QL-653A</b>  <i>Certification of Facilities that Inspect/Test Printed Circuit Boards, Components and Materials</i></p> <p>15 pages. Released November 1997.</p>	<p>74 pages. Revised March 1991.</p>
<p><b>IPC-TR-486</b>  <i>Report on Round Robin Study to Correlate IST and Microsectioning Evaluations for Detecting the Presence of Inner-Layer Separation.</i></p>	

## D E S I G N

<b>COLLECTIONS</b>	
<p><b>IPC-C-106</b>  <b>Printed Board Design Standards Collection</b></p> <p>As a designer considering physical design principles, customer reliability requirements and surface mount and high-speed logic design, you will want to add this compilation of standards to your library. This collection brings sharp focus to multiple aspects of printed board technology, including high density interconnects, flexible printed board design, controlled impedance and Design for Reliability (DFR) procedures. Includes 19 documents. (Visit the online store for a complete list of included documents.) Purchase the collection and save 55% on individual document prices.</p>	
<b>CERTIFICATION</b>	
<p><b>IPC-PWBADV</b>  <b>PCB Advanced Designer Certification Study Guide</b></p> <p>293 pages. Released January 2002.</p>	<p><b>IPC-PWB-CRT-SGA</b>  <b>PCB Designer Certification Study Guide</b></p> <p>On CD, this item is IPC-PWBCERTCDACD.            174 pages. Released April 2007.</p>
<b>DATA TRANSFER</b>	
<p><b>N E W IPC-2611</b>  <b>Generic Requirements for Electronic Product Documentation</b></p> <p>This standard establishes the generic requirements for a document set describing electronic products, and the methodology used for revision control and configuration management of the information. It permits different grades or completeness of documentation, as well as identifying the various products, packaging and interconnection techniques for which unambiguous documentation is required. 25 Pages. Released November 2009.</p>	<p><b>N E W IPC-2612</b>  <b>Sectional Requirements for Electronic Diagramming Documentation (Schematic and Logic Descriptions)</b></p> <p>30 pages. Released November 2009.</p>
<p><b>N E W IPC-2614</b>  <b>Sectional Requirements for Board Fabrication Documentation.</b></p> <p>59 Pages. Released November 2009.</p>	<p><b>N E W IPC-2612-1</b>  <b>Sectional Requirements for Electronic Diagramming Symbol Generation Methodology</b></p> <p>25 Pages. Released November 2009.</p>
<p><b>N E W IPC-2152</b>  <b>Standard for Determining Current Carrying Capacity in Printed Board Design</b></p> <p>The sole industry standard for determining appropriate internal and external conductor sizes on printed boards as a function of the current carrying capacity required and the acceptable conductor temperature rise. This document provides guidance on how thermal conductivity, vias, copper planes, power dissipation and printed board material and thickness all factor into the relationship between current, conductor size, and temperature. 97 pages. Released August 2009.</p>	

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GUIDELINES	
<p><b>IPC/JPCA-2315</b>  <b>Design Guide for High Density Interconnects and Microvias</b></p> <p>33 pages. Released June 2000.</p>	<p><b>IPC-2615</b>  <b>Printed Board Dimensions and Tolerances</b></p> <p>66 pages. Released July 2000.</p>
<p><b>IPC-A-311</b>  <b>Process Controls for Phototool Generation and Use</b></p> <p>6 pages. Released March 1996.</p>	<p><b>PC-D-279</b>  <b>Design Guidelines for Reliable Surface Mount Technology Printed Board Assemblies</b></p> <p>137 pages. Released July 1996.</p>
<p><b>IPC-D-310C</b>  <b>Guidelines for Phototool Generation and Measurement Techniques</b></p> <p>68 pages. Revised June 1991.</p>	<p><b>IPC-D-322</b>  <b>Guidelines for Selecting Printed Wiring Board Sizes Using Standard Panel Sizes</b></p> <p>4 pages. Reaffirmed September 1991.</p>
<p><b>IPC-D-422</b>  <b>Design Guide for Press Fit Rigid Printed Board Backplanes</b></p> <p>17 pages. Revised September 1982.</p>	
REQUIREMENTS	
<p><b>IPC-2220</b>  <b>Design Standards Series</b></p> <p>Series includes IPC-2221, <i>Generic Standard on Printed Board Design</i>; IPC-2222, <i>Sectional Design Standard for Rigid Organic Printed Boards</i>; IPC-2223, <i>Sectional Design Standard for Flexible Printed Boards</i>; IPC-2224, <i>Sectional Standard for Design of PCBs for PC Cards</i>; IPC-2225, <i>Sectional Design Standard for Organic Multichip Modules (MCM-L) and MCM-L Assemblies</i>; and IPC-2226, <i>Sectional Design Standard for High Density Interconnect (HDI) Printed Boards</i>. Purchase the series and save up to \$20 on individual document prices.</p>	<p><b>IPC-2221A</b>  <b>Generic Standard on Printed Board Design</b></p> <p>IPC-2221A is the foundation design standard for all documents in the IPC-2220 series. It establishes the generic requirements for the design of printed boards and other forms of component mounting or interconnecting structures. Among the many updates to Revision A are new criteria for surface plating, internal and external foil thicknesses, component placement and hole tolerances. Expanded coverage is provided for material properties, dimensioning and tolerancing rules, and via structures as well as updated coupon designs for quality assurance. 112 pages. Released May 2003.</p>
<p><b>IPC-2222</b>  <b>Sectional Standard on Rigid Organic Printed Boards</b></p> <p>Used in conjunction with IPC-2221A. Key concepts in this document are: rigid laminate properties, designer/end user materials section map, and scoring parameters. IPC-2221A and IPC-2222 together supersede IPC-D-275. 35 pages. Released February 1998.</p>	<p><b>IPC-2223B</b>  <b>Sectional Design Standard for Flexible Printed Boards</b></p> <p>Used in conjunction with IPC-2221A, IPC-2223B. Enhancements within Revision B include updated adhesive and adhesiveless constructions, updated coverage for selective plating requirements, new definitions for cover materials, new requirements for the plated-through hole to rigid-flex interface and expanded coverage for nonfunctional lands. 30 pages. Released May 2008.</p>

# DESIGN

REQUIREMENTS	
<p><b>IPC-2224</b>  <b>Sectional Standard on Design of PCBs for PC Cards</b>                      26 pages. Released January 1998.</p>	<p><b>IPC-2225</b>  <b>Sectional Design Standard for Organic Multichip Modules (MCM-L) and MCM-L Assemblies</b>                      44 pages. Released May 1998.</p>
<p><b>IPC-2226</b>  <b>Sectional Design Standard for High Density Interconnect (HDI) Printed Boards</b>                      49 pages. Released April 2003.</p>	<p><b>IPC-D-859</b>  <b>Design Standard for Thick Film Multilayer Hybrid Circuits</b>                      80 pages. Released December 1989.</p>
<p><b>IPC-7351B</b>  <b>Generic Requirements for Surface Mount Design and Land Pattern Standard</b>                      This popular document covers land pattern design for all types of passive and active components, including resistors, capacitors, MELFs, SSOPs, TSSOPs, QFPs, BGAs, QFNs and SONs. Board designers will appreciate the intelligent land pattern naming convention, zero component rotations for CAD systems and three separate land pattern geometries for each component that allow the user to select a land pattern based on desired component density.                      Revision B now includes land pattern design guidance for new component families such as column and land grid array packages, flat lead diodes and transistors (SODFL and SOTFL), aluminum electrolytic capacitors, and dual flat no-lead (DFN) devices. Consideration is given to the variations in multiple paste mask apertures relative to the varying size of thermal pads. Also included is a new padstack naming convention that represents the shape or dimensions of lands on different layers.                      A CD-ROM with a land pattern calculator is included with the standard. Purchasers also receive a 30-day trial of the IPC-7351 Land Pattern Wizard developed by PCB Matrix Corp., which enables users to save their land patterns and also to instantly export them to their preferred CAD format.</p>	