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Terms and Definitions for Interconnecting and Packaging Electronic Circuits

Supersedes IPC-T-50M
May 2015

An international standard developed by IPC

Association Connecting Electronics Industries



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Terms and Definitions for Interconnecting and Packaging Electronic Circuits

Developed by the Terms and Definition Committee (2-30) of IPC

Supersedes:

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Users of this publication are encouraged to participate in the development of future revisions.

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Acknowledgment

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Terms and Definitions for Interconnecting and Packaging Electronic Circuits

Scope This document is designed to provide definitions for terms commonly used in the electronics industry. The definitions are intended to provide sufficient clarity of detail such that a reader utilizing English as a second language could understand the subtleties of the meaning. Terms which have a specialized meaning or usage within a single IPC document may be defined differently within that document. Commonly used English language terms which do not change meaning when applied to electronics are not defined here.

Acronyms commonly used in electronics are defined in Appendix A.

Note: Throughout this document many terms contain a definition that only refers to another term. An example would be the term “Printed Circuit Board”, whose definition reads as “See ‘Printed Board’”. In such cases, the term being referred to (in this example “Printed Board”) is the preferred industry term, and the term whose definition contains the reference (in this example “Printed Circuit Board”) is considered an historic or legacy term.

Note: Changes made to this revision of the IPC-T-50 are indicated throughout by gray-shading of the term and definition and/or Figure header.

A

AABUS (As Agreed Between User and Supplier)

Indicates additional or alternate requirements that **shall** be negotiated between the user and the supplier in the procurement documentation. Examples include contractual requirements, modifications to purchase documentation and information on the drawing. Agreements can be used to define test methods, conditions, frequencies, categories or acceptance criteria within a test, if not already established.

Abrasion Resistance

The ability of a material to withstand surface wear.

Absolute Maximum Ratings

The range of voltages, currents, temperatures, etc., beyond which a device may suffer degradation in performance or reliability, may cease functioning or may suffer irreversible damage.

Absorption Coefficient

A measure of the absorption of radiant energy from an incident beam as it transverses an absorbing medium.

Absorptivity, Infrared

The ratio (or percentage) of the amount of energy absorbed by a substrate as compared with the total amount of incident energy.

Accelerated Aging

The artificial exposure, over a relatively short period, of a representative material, component or system to environmental

or other conditions that are increased above normal operating values. The intent is to produce changes that may occur during its expected operating life. Aging conditions may include salt spray, vibration, power conditions, steam aging, etc.

Accelerated Equivalent Soak (Plastic Encapsulated SMDs)

An environmental soak of a component at a higher temperature for a shorter time (compared to the standard soak), to provide roughly the same amount of moisture absorption. See also “Soak.”

Accelerated Life Test

See “Accelerated Aging”.

Accelerated Test

A test of an electronic component or electronic assembly in a shorter period of time by applying severe condition(s).

Acceleration Factor (AF)

The ratio of stress in reliability testing to the normal operating condition.

Acceptable Condition

This condition, while not necessarily perfect, will maintain the integrity and reliability of the assembly in its service environment.

Acceptance Quality Level (AQL)

An index that, when accompanied by a C=0 sampling plan, denotes the minimum number of samples required for lot inspection.

Acceptance Tests

Those tests deemed necessary to determine the acceptability of a product and AABUS.

Acceptance Inspection (Criteria)

An inspection that determines conformance of a product to design specifications as the basis for acceptance.

Access Hole (Lamination)

A blind hole that is made in a multi-layer board through one or more layers to provide access to the surface of a land on the inner layer of the board. (See Figure A-1.)

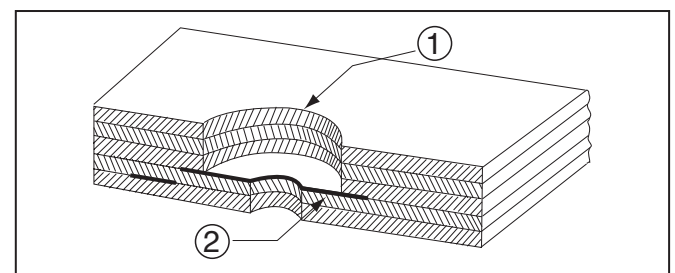


Figure A-1 Access Hole
1. Access Hole
2. Land



Access Protocol

An agreed principle for establishing how nodes in a network communicate electronically.

Accordion Contact

A type of connector contact that consists of a flat spring formed into a "Z" shape in order to permit high deflection without overstress.

Acid Flux

A solution of an acid and an inorganic, organic, or water soluble organic flux. (See also "Inorganic Flux," "Organic Flux," and "Water-Soluble Flux.")

Acid Number

The amount of potassium hydroxide in milligrams that is required to neutralize one gram of an acid medium.

Acid Value

See "Acid Number."

Acid-Core Solder

Wire solder with a self-contained acid flux.

Acoustic Microscope

Equipment that creates an image using ultrasound to view a specimen's surface or subsurface features, including defects and damage.

Actinic Radiation

Light energy that reacts with a photosensitive material in order to produce an image.

Activating (Bonding)

A treatment that modifies a material surface to promote improved adhesion.

Activating (Plating)

A treatment that renders nonconductive material receptive to electroless deposition.

Activating Layer

A layer of material that renders a nonconductive material receptive to electroless deposition.

Activator

A substance that improves the ability of a flux to remove surface oxides from the surfaces being joined.

Active Desiccant

Desiccant that is either fresh (new) or has been baked according to the manufacturer's recommendations to renew desiccant to original specifications.

Active Device

An electronic component that can change a signal or respond to the signal in a way that is dependent upon the nature of the signal and/or other controlling factors. (This includes diodes, transistors, amplifiers, thyristors, gates, ASIC's and other integrated circuits that are used for the rectification, amplification, switching, etc., of analog or digital circuits in either monolithic or hybrid form.)

Active Metal

A metal that has a very high electromotive force.

Active Trimming

Adjusting the value of a film circuit element in order to obtain a specified functional output from the circuit while it is electrically activated. (See Also "Laser Trimming.")

Additive Process

A process for obtaining conductive patterns by the selective deposition of conductive material on clad or unclad base material. (See also "Semi Additive Process" and "Fully Additive Process.")

Add-On Component

Discrete or integrated packaged or chip components that are attached to a film circuit in order to complete the circuit's function.

Adhesion (Pressure Sensitive Tape)

The bond produced by contact between pressure-sensitive adhesive and a surface.

Adhesive

A substance such as glue or cement used to fasten objects together. In surface mounting, an epoxy adhesive is used to adhere SMDs to the substrate.

Adhesive Failure

The separation of an adhesive bond at the interface between two materials.

Adhesion Layer

The metal layer that adheres a barrier metal to a metal land on the surface of an integrated circuit.

Adhesion Promotion

The process of preparing a surface to enhance its ability to be bonded to another material.

Adhesive Coated Substrate

A base material upon which an adhesive coating is applied, for the purpose of retaining the conductive material (either additively applied or attached as foil for subtractive processing), that becomes part of a metal-clad dielectric.

Adhesive-Coated Catalyzed Laminate

A base material with a thin polymer coating, that contains a plating catalyst, that is subsequently treated in order to obtain a microporous surface.

Adhesive-Coated Uncatalyzed Laminate

A base material with a thin polymer coating, that does not contain a plating catalyst, that is subsequently treated in order to obtain a microporous surface.

Adhesive Transfer (Pressure Sensitive Tape)

The transfer of adhesive from its normal position on the pressure sensitive tape to the surface to which the tape was attached, either during unwind or removal.

Adsorbed Contaminant

A contaminant attracted to the surface of a material that is held captive in the form of a gas, vapor or condensate.

Aging

The change of a property, e.g., solderability, with time. (See also "Accelerated Aging.")

Alignment Mark

A stylized pattern that is selectively positioned on a substrate material to assist in alignment. (See Figure A-2).

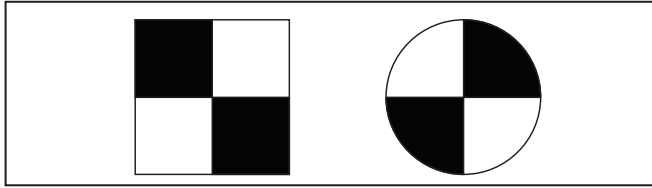


Figure A-2 Alignment Mark

Aliphatic Solvents

"Straight chain" solvents, derived from petroleum, of low solvent power.

Alkaline Cleaner

A material blended from alkali hydroxides and alkaline salts.

All Metal Package

A hybrid circuit package made solely of metal, without glass or ceramic.

Allowable Temperature

The temperature range that an electronic circuit or component can perform its intended functions.

Alloy 42

A ferrous alloy, nominally 41% or 42% nickel, with a low and nearly constant coefficient of thermal expansion up to 300 °C [572 °F]. It is commonly used in semiconductor lead frames and electronic component terminations to form a tight mechanical or hermetic seal with glass or ceramic. (See also "Kovar.")

Alpha Particle

A He4 nucleus generated from a nuclear decay that is capable of generating hole-electron pairs in microelectronic devices and switching cells causing soft errors in some devices.

Alumina Substrate

Aluminum oxide used as a ceramic substrate material.

American Wire Gauge (AWG)

One of several standard systems for designating solid or stranded wire diameter that is primarily used for electrical conductors in the United States.

Amorphous Polymer

A polymer with a random and unstructured molecular configuration.

Analog Circuit

Electronic circuits with continuously variable signals, where there is a proportional relationship comprised of either a voltage or current driving the signal.

Anchoring Spur

An extension of a land on a flexible printed board that extends beneath the coverlay to assist in holding the land to the base material. (See Figure A-3.)

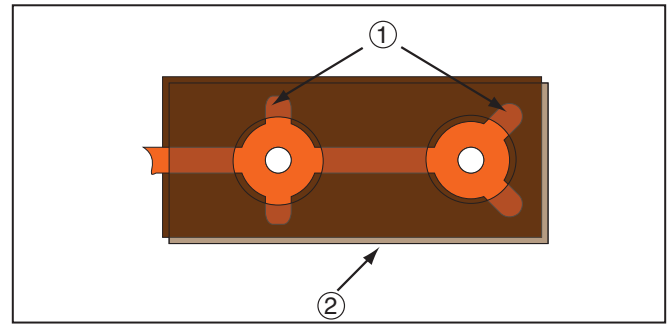


Figure A-3

1. Anchoring Spurs
2. Cover Layer

Anisotropic /Anisotropy

The condition for a substance having differing values for properties, such as permittivity, depending on the direction within the material.

Anisotropic Conductive Contact

An electrical connection using an anisotropic conductive film or paste wherein conductive particles of gold, silver, nickel, solder, etc. are dispersed. When it is compressed, an electrical connection is attained only in the direction of compression.

Annealing

A heat treatment that alters the microstructure of a material causing changes in properties such as strength and hardness, to induce ductility and relieve internal stresses.

Annular Ring (Annular Width)

That portion of conductive material completely surrounding a hole. (See Figure A-4).

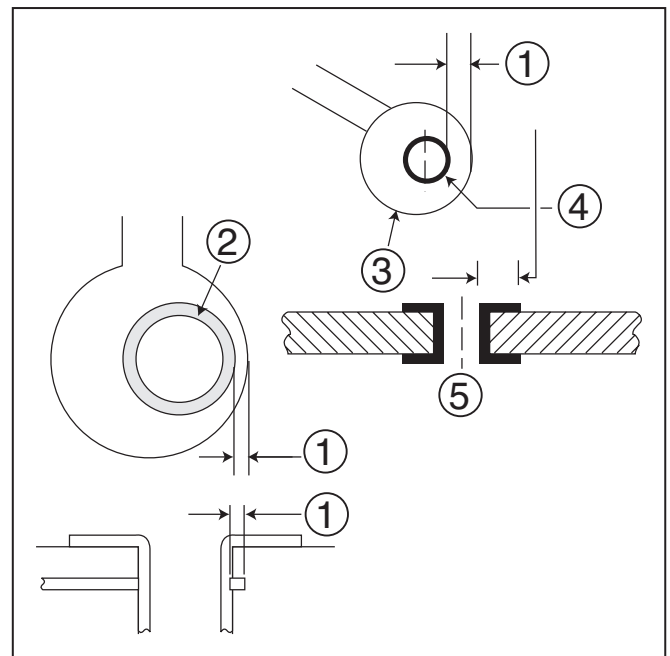


Figure A-4 Annular Ring (Annular Width)

1. Minimum Annular Ring
2. Hole Plating
3. Land
4. Plated Through-Hole
5. External Annular Ring

Anode (BGA)

The electrode from which the forward current flows within the device.

Anodic Cleaning

The removal of foreign substances from a metallic surface by electrolysis with the metal as the anode.

Anti-pad

A clearance in a conductive plane surrounding a hole, intended to prevent connection to the plane (for plated holes) or to keep copper away from the edge (for non-plated holes).

Aperture

An opening that limits the amount of light used to expose film in a photoplotter.

Aperture (Stencil)

An opening in the stencil-foil.

Apparent Field-of-View Angle

The angular subtense of the field-of-view in the image space of an optical system.

Application Specific Integrated Circuit (ASIC)

A custom built integrated circuit component that is designed for a unique, specific application.

Aqueous Flux

See "Water-Soluble Flux."

Aramid

See "Para-aramid."

Arc Resistance

A measure of the durability of an insulating or dielectric material to the effects of a high voltage, low current arc (under prescribed conditions) passing across the surface of the material. (The resistance is stated as a measure of total elapsed time at that voltage required to form a conductive path on the surface-material carbonized by the arc).

Area Array Package

See "Grid-Array Package."

Area Array Tape Automated Bonding

Tape Automated Bonding where some carrier tape terminations are made to lands within the perimeter of the die.

Area Ratio

The ratio of the area of aperture opening to the area of aperture walls.

Array

A group of elements or circuits arranged in rows and columns on a base material.

Array Type

A rectangular or square shaped body with or without chamfered corners with perpendicular sides. The sides do not taper outwards or inwards as in a Small Outline or a Flat Pack Package Outline.

Artwork

An accurately-scaled configuration that is used to produce the "Artwork Master" or "Production Master." (See Figure A-5.)

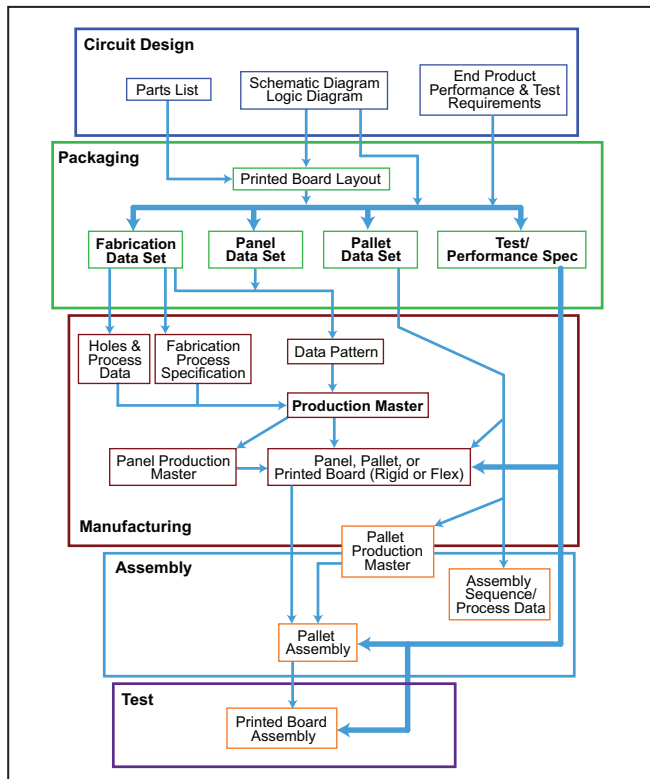


Figure A-5 Artwork (Simplified Flow Chart of Printed Board Design/Fabrication Sequence)

Artwork Master

An accurately-scaled, usually 1:1, pattern that is used to produce the "Production Master." (See Figure A-6.)

As-Fired

The condition (values) of thick-film components or the surface condition of ceramic base materials, after they have been processed in a firing furnace and prior to trimming or polishing.

Aspect Ratio (Film)

The ratio of the length of a film component to its width.

Aspect Ratio (Hole)

The ratio of the length or depth of a hole to its preplated diameter. (See Figure A-6).

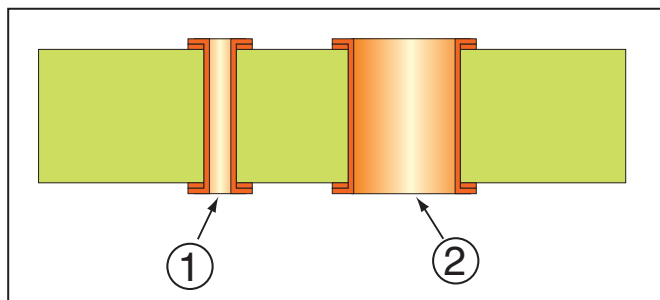


Figure A-6 Aspect Ratio (Hole)

1. Higher Aspect Ratio
2. Lower Aspect Ratio

Aspect Ratio (Stencil)

The ratio of the width of the aperture to the thickness of the stencil-foil.

Assembled Board

See "Assembly."

Assembly

A number of parts, subassemblies or combinations thereof joined together. (Note: This term can be used in conjunction with other terms listed herein, e.g., "Printed Board Assembly.")

Assembly (Pallet) Array

The printed board image or patterns supplied to the assembler, including one or more printed boards in a specific arrangement or cluster, to facilitate economic assembly and testing in the next level of manufacturing. This may include breakaway tabs, fiducials, tooling holes, etc.

Assembly Manufacturer

The individual, organization, or company responsible for the assembly process and verification operations necessary to ensure full compliance of assemblies.

Assignable Cause

An identifiable, specific cause of variation in a given process or measurement that affects only some of the individual values of process output. Also known as "Special Cause". (See also "Common Cause").

Asymmetric Stripline

A stripline signal conductor that is embedded, but not centered, between two ground planes. (See Figure A-7).

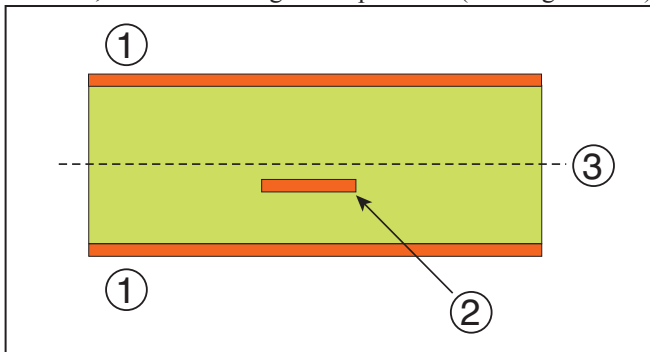


Figure A-7 Asymmetric Stripline

- 1. Ground
- 2. Signal
- 3. Center Line

Attachment Density

The average number of surface mount or through-hole solder joints, based on pitch and land size, that may be accommodated in a prescribed unit area e.g., cm², considering land size within the unit area to accommodate solder joint attachment.

Attenuation (Signal)

A general term that refers to any reduction in the strength of a signal. Attenuation occurs with any type of signal, whether digital or analog. Sometimes called loss, attenuation is a natural consequence of signal transmission over long distances. The extent of attenuation is usually expressed in units called decibels (dBs).

Attributes Data

Qualitative data that can be counted, but not measured, for recording and analysis purposes.

Audit

A systematic, independent examination of procedures, processes and practices to evaluate compliance with requirements.

Automated Component Insertion

The act or operation of assembling discrete components to printed boards by means of electronically-controlled equipment.

Automatic Component Placement

Software that automatically optimizes the layout of components on a printed board.

Automatic Conductor Routing

Software that automatically determines the placement of interconnections on a printed board.

Automatic Control

A system in which mechanized guidance or manipulation is used to achieve a prescribed value of a variable.

Automatic Dimensioning

A computer-aided drafting function that automatically generates dimensions, leaders, arrowheads, etc., that make up a complete set of documented dimensions.

Automated Optical Inspection (AOI) Equipment

A programmed device for visually inspecting a surface.

Automatic Test Equipment

Equipment that automatically analyzes functional or static parameters in order to evaluate performance.

Automatic Test Generation

Computer generation of a test program based solely on circuit topology with little or no manual programming effort.

AWG Equivalent

The American Wire Gauge (AWG) round-conductor number that is used to designate a flat conductor with an equal cross-sectional area.

Axial Lead

Lead wire extending from a component or module body along its longitudinal axis. (See Figure A-8).

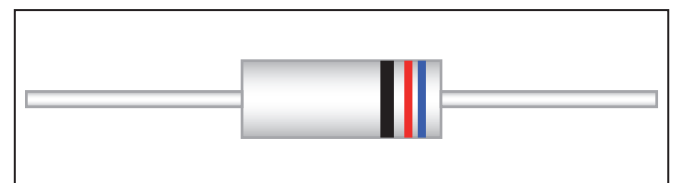


Figure A-8 Axial Lead

Azeotrope

See "Azeotropic Mixture."

Azeotropic Mixture (Azeotrope)

A liquid mixture of two or more substances that behaves like a single substance. The vapor produced has the same composition as the liquid.

evaporization of the liquid has the same composition as the liquid.

B

B-Stage

An intermediate state in the curing process of a thermosetting resin, in which the material is only partially polymerized. (See also “C-Staged Resin.”)

B-Staged Material

See “Prepreg.”

B-Staged Resin

A thermosetting resin that is in an intermediate state of cure. (See also “C-Staged Resin.”)

Back Annotation

The process of extracting appropriate information from a printed board design and inserting it on the board’s schematic diagram.

Back Bonding

Attaching a die to a base material with its circuitry facing away from the base material. (See Figure B-1).

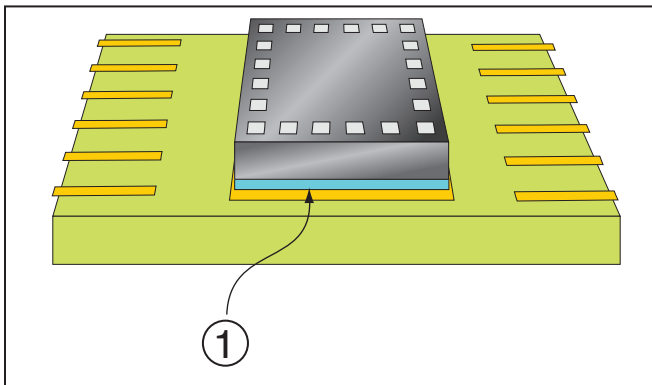


Figure B-1 Back Bonding

1. Back Bond

Back-Drilling

A method of reducing the overall length of any plated hole by drilling out a portion of the plated hole from either side to a predetermined depth, for purposes of signal integrity or circuit isolation.

Back Mounting

See “Back Bonding.”

Back Taper(s)

The constant decrease in diameter along the length of the body of a drill, from the cutting tip to the end of the drill shank.

Back-Bared Land

A land in flexible printed wiring that has a portion of the side normally bonded to the base dielectric material exposed by a clearance hole. (See Figure B-2).

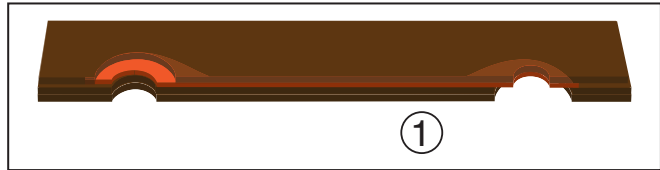


Figure B-2 Back-Bared Land

1. Back Side Access

Backdriving

An in-circuit testing technique that drives digital circuitry outputs to a given logic level, by supplying pulses of sufficient electrical current magnitude in parallel with the outputs, in order to overdrive the logic state conditions of the next digital device inputs.

Backfill (Gas)

Filling a hybrid circuit package with a dry inert gas prior to hermetic sealing.

Backfill (Liquid)

The act of sealing the edge of a component with an adhesive or encapsulant to prevent intrusion of liquids or other contaminants.

Background (Artwork)

The nonfunctional area of a phototool.

Backlighting

Placing an object between the light source and the eye or recording medium for illumination.

Backpanel

See “Backplane.”

Backplane

A printed board assembly that serves as a backbone to connect application specific printed board assemblies that share common I/O and power distribution. For additional information see also “Motherboard” and “Daughterboard”.

Backup Pin

A supporting pin that is located under a printed board to prevent deflection of the board during component mounting.

Bake

Exposing a product to heat, normally in an oven, for a specific period of time to cure and/or drive moisture from a part. Can be IR, convection or conduction.

Bake Out

Subjecting a product to an elevated temperature in order to remove moisture and unwanted gasses prior to performing certain processes in printed board manufacturing, assembly, repair or final coating.

Balanced Construction

The symmetrical arrangement of metal and dielectric layers about the center of a printed board stack-up.

Balanced Transmission Line

A transmission line that has distributed inductance, capacitance, resistance, and conductance elements that are equally distributed between its conductors.

Ball

A hemispherical-shaped solder termination attached to the bottom of a package.

Ball Bond

The welded connection of a bond wire to the bond pad of an integrated circuit die. The bond wire is melted to form a ball and the ball is bonded by use of thermocompression or thermosonic techniques.

Ball Grid Array (BGA)

A surface mount package wherein the balls for terminations are formed in a grid on the bottom of a package. (See Figure B-3)

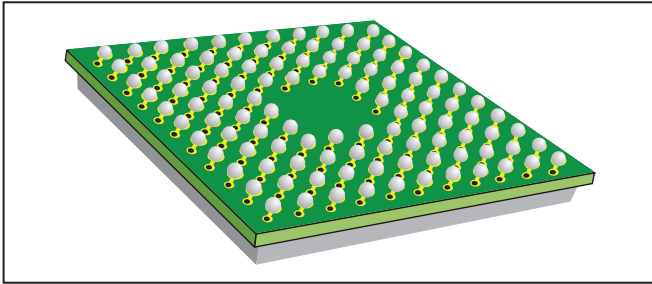


Figure B-3 Ball Grid Array (BGA)

Ball Lift

A category of ball bond failure in which the ball lifts from the surface of the integrated circuit die bond pad metallization or lifts the metallization from the surface of the underlying oxide or silicon.

Bare Board

An unassembled (unpopulated) printed board. (See also "Printed Board").

Bare Die

Completely processed discrete semiconductor or integrated circuit device to a stage where the die is suitable for interconnection to a component package configuration.

Bare Die (with Connection Structures)

See "Uncased Chip".

Bare Copper

Copper without any additional surface finish or treatment.

Barrel Crack

A crack of the plated metal on the internal wall of a through-hole. (See also "Circumferential Separation.") (See Figure B-4).

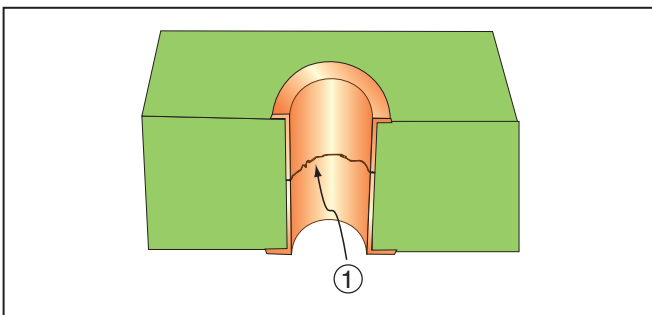


Figure B-4 Barrel Crack

Barrier Metal

A plated layer designed to prevent solid diffusion of other dissimilar metals, for example nickel between copper and gold.

Base Film (Flexible Circuits)

The film that is the base material for the flexible printed board and on the surface of which the conductive pattern can be formed. When the heat resistance is required, polyimide film is mostly used, and polyester film is usually used when the heat resistance is not required.

Base Material

The insulating material upon which a conductive pattern may be formed. (The base material may be rigid or flexible. It may be a dielectric or insulated metal sheet.)

Base Material Thickness

The thickness measured excluding conductive foil or material deposited on the dielectric surfaces.

Base Metal

See "Basis Metal."

Base Plane

The plane that includes the lowest point of the mounting surface of the package, except for packages using stand-offs.

Base Solderability

The ease with which a metal or metal alloy surface can be wetted under typical soldering conditions.

Baseline Dimensioning

The dimensioning of feature positions from the origin of the coordinate system. (See Figure B-5.)

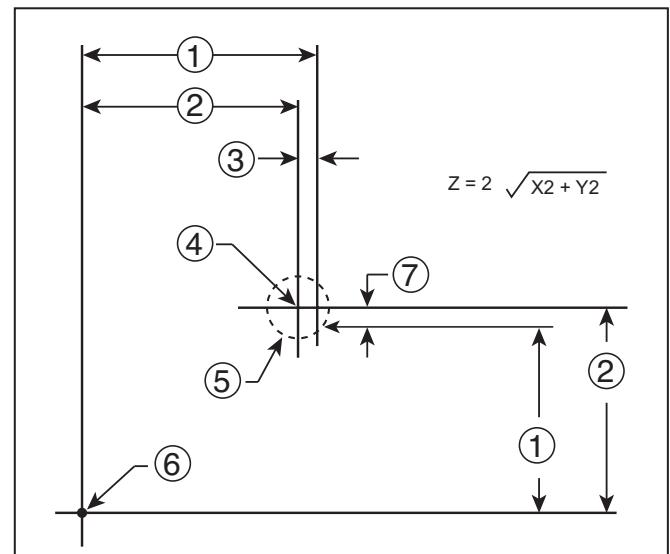


Figure B-5 Example of feature location using baseline dimensions

1. Actual Measurement (Part)
2. Basic Dimension (Drawing)
3. X (Difference)
4. True Position
5. Actual Positional Diameter
6. Datum
7. Y (Difference)

Basic Dimension

A theoretically exact dimension, given from a datum to a feature of interest. It represents an ideal case and as such, has no tolerance.

Basic Dimensioning and Tolerancing

A system of dimensioning, tolerancing and related requirements used on engineering drawings. It is the basis from which permissible variations are established given in notes or as feature control symbols.

Basis Metal

A metal upon which solder or other coatings are deposited.

Batch Oven

A temperature-controlled oven used for drying, baking, curing, etc. where the material being processed is stationary.

Batch Size

See “Lot Size.”

Bathtub Curve

The form of a graph where the functional relationship is initially high, then low for a period of time, and then high. This curve is frequently found in the life cycle analysis of components. This behavior is initially caused by infant mortality and finally by product deterioration. (See Figure B-6).

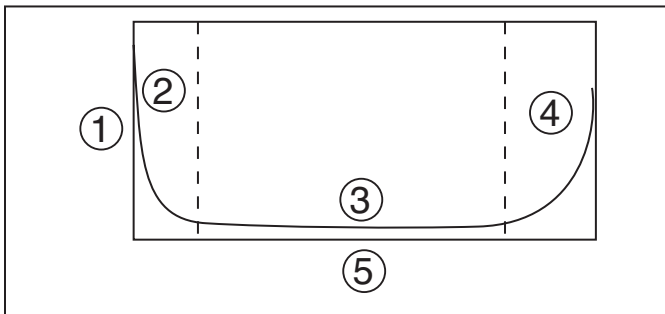


Figure B-6 Bathtub Curve

1. Failure Rate
2. Infant Failure
3. Intrinsic Failure
4. Wear Out Failure
5. Time

Baumé Scale

An arbitrary gradation scale of specific gravities used in hydrometers.

Bead (Discrete Wiring)

The external (surface) annular ring of copper plating around a plated-through hole on a fully additive circuit board which functions to conduct heat and promote solder wicking during the soldering of components.

Beaming

The operation in which yarn from several section beams is combined on the final warp beam.

Beam-Lead Device

An active or passive chip component with beam leads for interconnecting it to lands on a base material. (See Figure B-7).

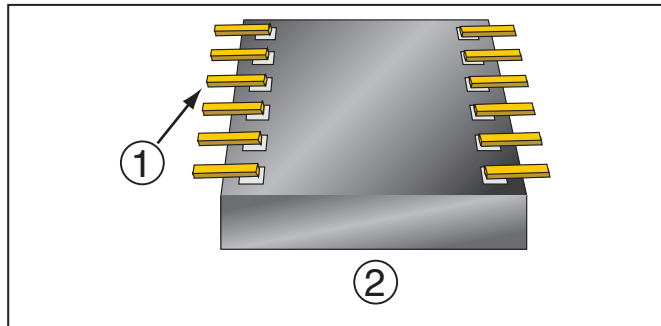


Figure B-7 Beam-Lead Device

1. Beam Lead
2. Beam Lead Device

Bed-of-Nails Fixture

A test fixture consisting of a frame and a holder containing a field of spring-loaded pins that make electrical contact with a planar test object.

Bellmouth

A flared portion at the front and/or back of the wire barrel crimp that provides a gradual entrance and exit for the wire strands to avoid causing damage.

Bellows Contact

A type of contact that consists of a flat spring that has been folded to provide a very uniform spring rate over the full range of contact with the mating part.

Bending Resistance

The ability of a material to withstand repeated bending to specified parameters without producing cracks and breaks in excess of the specification allowance.

Bias

Constant offset from the true value – In practice, bias is measured as the difference between a known value (traceable reference standard; e.g., NIST) and the average of a set measurement of the standard.

Bias (Fabric)

Filling yarn that is off-square with the warp ends of a fabric.

BiCMOS

Transistor fabrication technology, resulting in the creation of both bipolar and CMOS devices.

Bifurcated Contact

A type of connector contact that usually consists of a flat spring that has been slotted length-wise in order to provide independent contact points with the mating part.

Bifurcated Solder Terminal

A post or stud mount terminal with a slot or slit opening through which one or more wires are placed prior to soldering. (See Figure B-8 and “Post (Stud) Mount”).

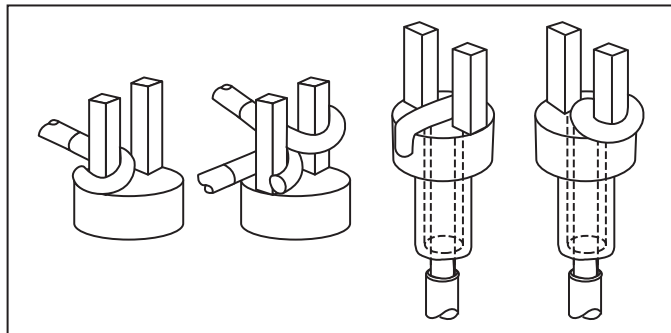


Figure B-8 Bifurcated Solder Terminal

Bilateral Tolerance

A tolerance in which variation is permitted in both directions from the specified dimension.

Billboarding

A discrete component with both terminations soldered on its narrow edge. This may be an unacceptable condition. (See Figure B-9.)

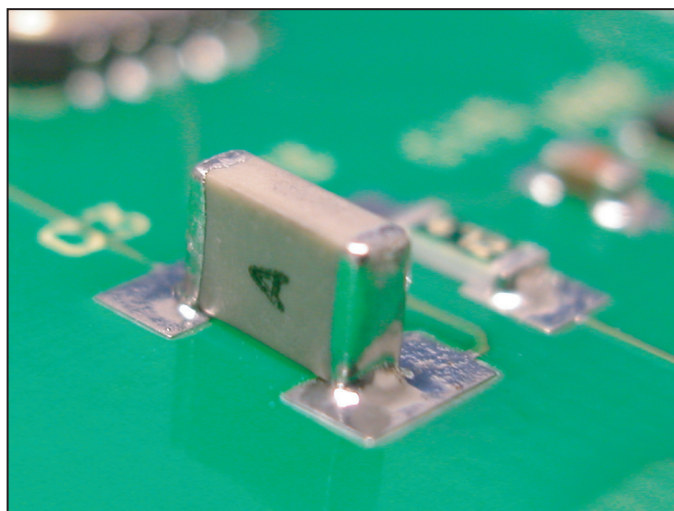


Figure B-9 Billboarding

Binder

Material added to thick-film compositions and unfired base materials to give them additional strength for pre-fire handling. (See also “Glass Binder.”)

Biocide

A general name for any substance that kills or inhibits the growth of micro-organisms.

Bipolar Device

A device in which both majority and minority carriers are present. Bipolar and Metal-Oxide Semi-conductor (MOS) are the two most common device types.

Birdcage

Stranded wire whereby the strands in the stripped portion between the covering of an insulated wire and a soldered

connection, or an end-tinned lead, have separated from the normal lay of the strands.

Bismaleimide

A resin that has the generic chemical structure of an aromatic chemical group that is attached to two (or “Bis”) maleimide groups.

Bismaleimide Triazine

A resin that contains a mixture of bismaleimide and triazine resins.

Blank

An unprocessed or partially processed piece of base material or metal clad base material that has been cut from a sheet.

Blanking

Cutting a sheet of material into pieces, usually using a die, to the specified blank dimensions.

Bleeding

A condition in which a product or part, e.g. a plated hole of a printed board, discharges water, process materials or solutions from crevices or voids, or a condition in which a resist or paint migrates beyond the image area.

Blend

A mixture of different substances or different types of the same substance, e.g. a mixture of resins in board manufacturing.

Blind Via

A via that connects an outer layer to one or more inner layers, but does not go through the entire printed board. (See Figure B-10.)

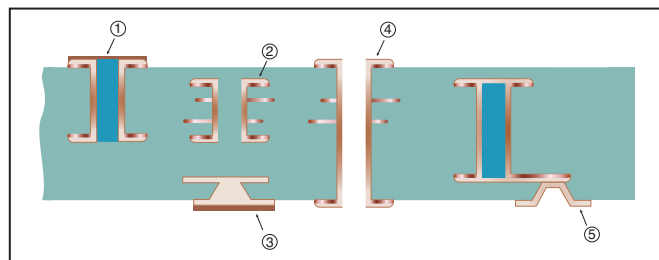


Figure B-10 Blind and Buried Vias

1. Blind Via (Material Fill)
2. Buried Via
3. Blind Via (Copper Filled)
4. Through-Hole
5. Offset (Staggered) Blind and Buried Via Structure

Blister

Delamination in the form of a localized swelling and separation between any of the layers of a laminated base material, or between base material and conductive foil or protective coating, or solder mask. (See also “Delamination.”)

Blow Hole

A void caused by outgassing.

Blow Through

Any condition where the mold material migrates through or around the connector insert/contact or is present on the electrical mating surface and/or prevents proper mating or function of the connector.

Board

See “Printed Board,” and “Multilayer Printed Board.”

Board Fabricator

The individual, organization, or company responsible for the fabrication of the bare printed board, including all process and verification operations necessary to ensure full compliance with customer requirements.

Board Thickness

The overall thickness of the metal-clad or unclad base material or printed board as defined by the user.

Bond

An interconnection that performs a permanent electrical and/or mechanical function.

Bond Deformation

The plastic-flow change in the form of a lead caused by a bonding tool during a termination process.

Bond Enhancement Treatment

A treatment or coating on a metal foil to enhance the adhesion of the foil to a resin system.

Bond Envelope

The range of termination parameters within which acceptable bonds may be formed.

Bond Interface

The common area between a lead and a land to which it has been terminated.

Bond Land

See “Bonding Area.”

Bond Pad

See “Bond Site.”

Bond Pull Test

Test involving the pulling of the die bond wires to failure to determine the strength of the bonds.

Bond Schedule

Parameters to establish/make an electrical connection using wire (e.g. temperature, force, and/or ultrasonic power).

Bond Separation

Lifting of the bond foot from a pad or metallization, or failure at the interface between a wire and the surface it is bonded to.

Bond Site

The metallized area on a die or substrate that is used for temporary or permanent electrical connection (bonding).

Bond Strength

The force perpendicular to a surface required to separate two adjacent surfaces, expressed as force per unit area.

Bond Surface

See “Bonding Area.”

Bond-to-Bond Distance

The distance from the bonding site on a die to the corresponding bonding site on a lead frame, interconnecting base material, etc.

Bond-to-Die Distance

The distance from the heel of the bond of a beam lead to the die.

Bonding Area

The area defined by the extent of a land or portion of a terminal to which a lead is to be bonded.

Bonding, Die

See “Die Bonding.”

Bonding Island

See “Bonding Area.”

Bonding Layer

A thermoplastic or thermoset film, reinforced thermoplastic, or thermoset prepreg used as an adhesive layer in bonding together other discrete layers of a multilayer printed board during lamination.

Bonding Pad (IC)

An area of metallization on an integrated circuit die that permit connection of fine wires or circuit element to the die.

Bonding Time

The time duration from the commencement of thermo heat-up until the reflow profile is completed.

Bonding Tool

The instrument used to position leads or discrete wires over a land and to impart sufficient energy to complete the termination.

Bonding Wire

Fine gold or aluminum wire used for making electrical connections between lands, lead frames, and terminals.

Boot

A protective housing usually made from a resilient material to prevent entry of moisture or other contaminants into the wire entry to a connector.

Border (Stencil)

Peripheral tensioned mesh, either polyester or stainless steel which keeps the stencil foil flat and taut. The border connects the foil to the frame.

Border Area

The region on a base material that is external to that of the end-product being fabricated within it.

Border Data

Patterns that appear in the border area, such as tooling features, test patterns, and registration marks.

Boss (Connector)

A raised section on a connector that fits into a specific slot in the positive polarization or keying feature of a mating connector.

Bottom Termination Components (BTC)

Surface mountable electronic components whose external connections consist of metallized terminations on the underside that are an integral part of the component body. BTC includes, for example, QFN, DFN, SON, LGA, MLP, and MLFP.

Bounce Pad (Discrete Wiring)

An isolated area in a copper plane which acts solely as a stop for the laser drilling operation.

Bow (Fabric)

Filling yarn that lies in an arc across the width of a fabric.

Bow (Sheet, Panel, or Printed Board)

The out of plane distance when all corners are in the same plane. (See Figure B-11.) (See also “Twist.”)

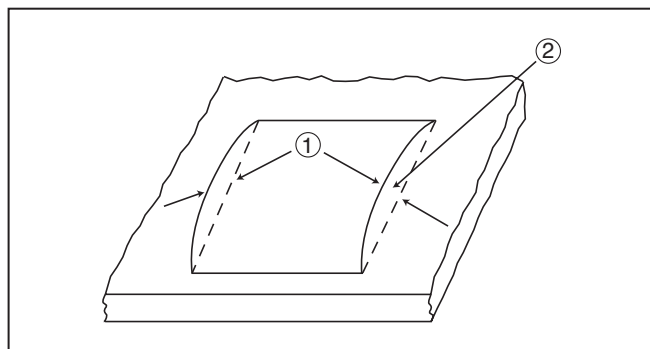


Figure B-11 Bow

1. Deflection from Surface Plane
2. Bow

Braid Angle

The smaller of the two angles formed by the shielding strand and the axis of the cable being shielded.

Braid Carrier

A spool or bobbin on braiding equipment which holds one group of strands or filaments consisting of a specific number of wire ends. The carrier revolves during the braiding operation.

Braid Ends

The strands used to make up one carrier. The strands are wound side by side on the carrier bobbin and lie parallel in the finished braid.

Braid Fold Back

That portion of the braid that is folded back to allow a solder connection between the braid and another conductor.

Braided Conductor

Woven bare metallic or tinned copper conductor used as a ground wire for batteries or heavy industrial equipment.

Braided Shield

A woven copper wire used as shielding for wires or woven fibrous protective outer covering over a conductor or cable.

Breakaway

The function of excising printed boards or printed board assemblies from their panel structure after all processing has been completed. (See Figure B-12).

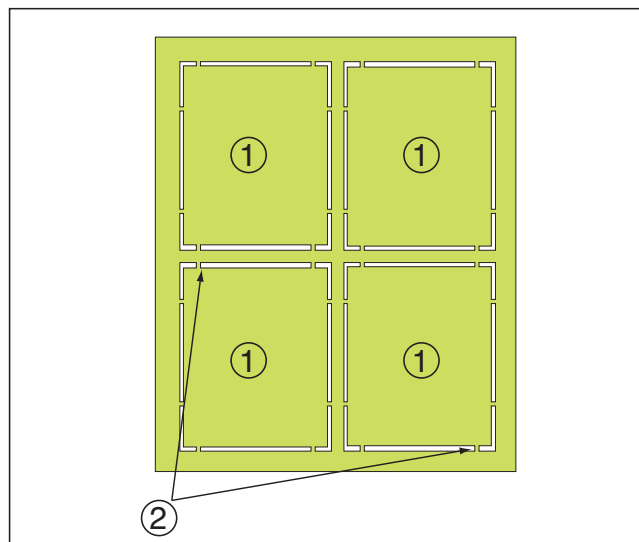


Figure B-12 Breakaway

1. Printed Board
2. Breakaway Tabs

Breakaway Tab

Material left on the array/panel in the form of a rail which continues to hold the finished board within the panel during subsequent processing.

Breakdown Voltage

The voltage at which the dielectric material between two conductors fails.

Breakout

See “Hole Breakout.”

Breakout (Harness)

The point at which a conductor or group of conductors is separated from a multi-conductor cable or wiring harness to complete circuits at other points.

Bridging (Conformal Coating)

Fillet or meniscus formation of coating joining the leads of a component.

Bridging (Electrical)

The formation of a conductive path between conductors. (See also “Solder Bridging.”)

Broken Pick

A filling yarn that is missing from a portion of the width of a fabric.

Brominated Epoxy

An epoxy resin containing chemically-bound bromine which is added to act as a flame retardant.

Brown Streak (Base Materials)

A thin vein or stain seen in the reinforcement that can range from light amber to nearly chocolate brown. It usually runs within a fiber bundle for 3.0 to 3.0 mm [0.13 to 0.512 in]. It

is most commonly found in the warp yarns and may appear singly or in multiples, or in a pattern. It is due to the remnants of the glass binder agent, which the weaver did not remove.

Buffer Material

A resilient material that is used to protect a crack-sensitive component from the stresses generated by a conformal coating.

Build-up Process

See “Sequential Lamination.”

Bulk Packaging

A method for collecting a quantity of loose parts into a bag or other container, for transport or storage.

Bulls-Eye

A stylized pattern that is located in the border area in order to aid in alignment.

Bump (Collapsing)

A rounded protrusion of melting conductive material used to make interconnections between a package body and a printed board during controlled-collapse soldering.

Bump (Non-collapsing)

A means of providing an electrical connection to the terminal area of a device by employing a small mound of non-melting conductive material on the device.

Buried Via

A via that does not extend to the surface of a printed board. (See Figure B-10.)

Burn-In

The process of electrically stressing a device at an elevated temperature, for a sufficient amount of time to cause the failure of marginal devices (Infant Mortality).

Burn-In, Dynamic

Burn-in at high temperatures that simulates the effects of actual or simulated operating conditions.

Burn-In, Static

Burn-in at high temperatures with unvarying voltage, either forward or reverse bias.

Burn-Off

See “Flame-Off.”

Burr

Small lumps or masses with an irregular shape, convex to a surface, which occur as a result of a machine process such as drilling or gouging.

Bus

One or more conductors used for transmitting power or data signals, such as, address signals, control information, etc.

Bus Bar

A conduit, such as a component or conductor on a printed board, that is used for distributing electrical energy.

Butt Terminal

A terminal designed for through-hole applications but mounted without a hole, sometimes with modified end connections. Terminal connections are formed perpendicular to the land surface (See Figure B-13).

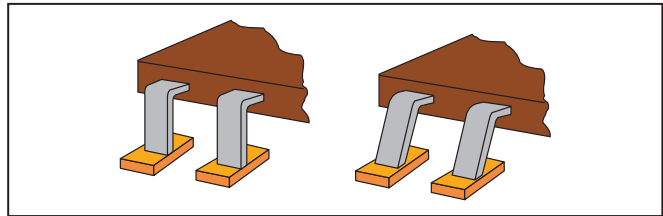


Figure B-13 Butt Terminal

Butt Plating Joint

A joint between two or more conductors of a printed board, at the end of one or both, and either at right angles or oblique to the grain of the conductors, with no overlap of the conductors.

Butt Plating Joint (Wrap Plating)

The consequent via structure of a surface interconnect termination with the absence of wrap plating. (See Figure B-14).

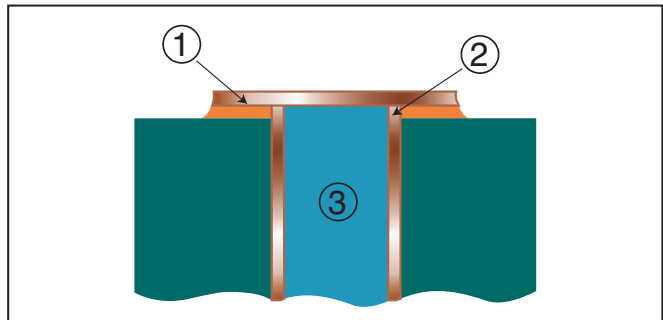


Figure B-14 Butt Plating Joint (Wrap Plating)

1. Panel Plating
2. Butt Plating Joint
3. Via Fill

Butt Splice

A technique for joining conductors end to end.

Butter Coat

An increased amount of resin on the outer surface of a base material.

Button Plating

A selective plating technique in which copper is plated only in the holes and/or on artwork defined pads. (See Figure B-15).

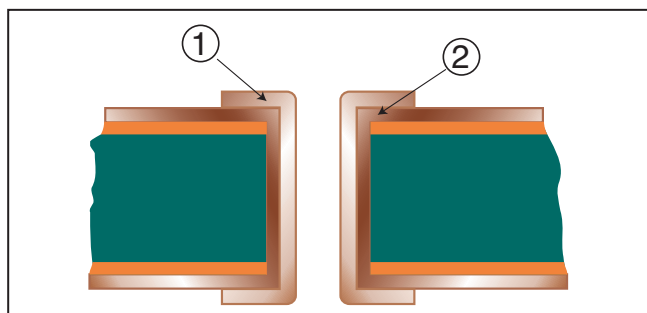


Figure B-15 Button Plating

1. Button Plating
2. Wrap Plating

C

C-bend

Compliant terminal extending from the sides of the body, bending down and forming a flat contact area with the board under the package body. It is similar to a J-bend except that the bottom of the terminal is flat, and not rounded up under the package body.

C-Staged Resin

A resin in its final state of cure. (See also “B-Staged Resin.”)

Cable

A group of individually insulated conductors in twisted or parallel configuration.

Cable Clamp

A device used to give mechanical support to a wire bundle or cable.

CAGE Code (The Commercial and Government Entity Code)

A five character identifier assigned to suppliers to the Federal Government of the United States of America in order to provide a standardized method of identifying a given facility or specific location.

Camber

A deviation in the form of a flat cable or a flexible material from a plane.

Cant

The angle between the bottom mounting surface of a component and the top surface of the printed board.

Cap Lamination

A process for making multilayer printed boards using one-sided metal clad base material for the external layers. (See also “Foil Lamination.”)

Capability Detail Specification (CapDS)

A document that establishes the specific requirements, noted in a detailed specification, in order to establish the level of capability that a manufacturer possesses when he has demonstrated that he has met those requirements.

Capability Index (Cp)

See “Cpk Index.”

Capability Performance Index (Cp)

Relationship of the allowable process spread to the actual process spread (natural tolerance).

Cpk Index (Cpk)

A measure of the relationship between the scaled distance between the process mean value and the closest specification limit.

Capability Performance, Lower (Cpkl)

A measure of the relationship between the performance of a process and the lower specification limit. (See also “Capability Performance, Upper.”)

Capability Performance, Upper (Cpku)

A measure of the relationship between the performance of a process and the upper specification limit. (See also “Capability Performance, Lower.”)

Capability Test Board (CTB)

A printed board specifically designed to act as a capability qualifying component (CQC), or to be used by manufacturer to evaluate process variation, process control, or continuous improvement procedures.

Capability Test Segment (CTS)

A segment or portion of a capability test board (CTB), containing a set or group of individual test patterns (ITP), intended to be used to demonstrate a specific level of printed board complexity or manufacturing capability.

Capacitance Density (Embedded)

The amount of stored energy available per unit of the conductor area.

Capacitive Coupling

The electrical interaction between two conductors that is caused by the stored energy between them.

Capillary Tool

A tube with a very small inner diameter or a hollow, often used in assembly to guide wire to the bonding site and to be used to apply pressure during bonding cycle.

Capture Land

The copper feature on the top of a blind or buried microvia. (See Figure C-1).

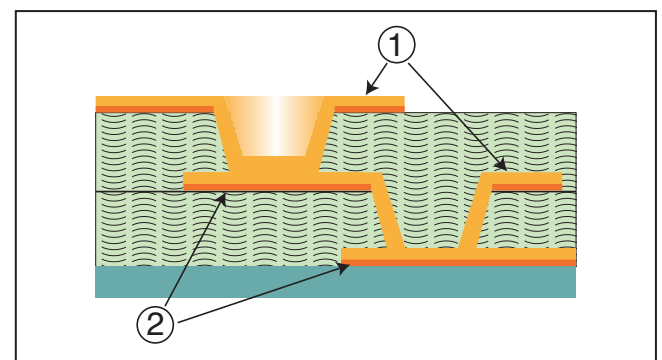


Figure C-1 Capture and Target Land

1. Capture Land
2. Target Land

Card

See “Printed Board.”

Card-Edge Connector

See “Edge-Board Connector.”

Card-Insertion Connector

See “Edge-Board Connector.”

Carrier (Component)

Container that directly holds components, such as a tray, tube, or tape and reel.

Carrier (Foil)

A temporary support medium that facilitates the handling of thin and soft-metal foils.

Carry-Out

The curved back portion of the flute of a drill.

Cartridge

A container for components that facilitates the loading and unloading of them.

Castellation

A recessed metallized feature on the edge of a leadless chip carrier that is used to interconnect conducting surfaces or planes within or on the chip carrier. (See Figure C-2).

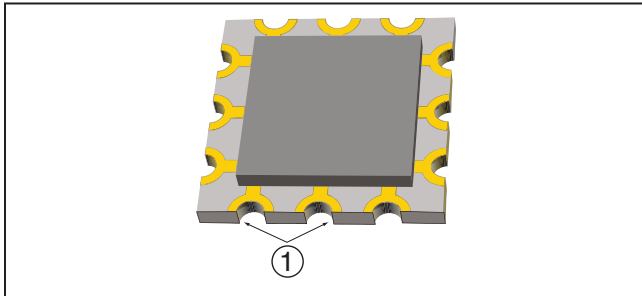


Figure C-2 Castellation
1. Castellations

Casting

The application of an organic compound, such as adhesive or resin, where the casting mold is removed.

Cathodic Cleaning

Electrolytic cleaning in which the work is the cathode.

Cation Exchange

See "Ion Exchange."

Cationic Reagent

Surface-active substances that have the active constituent in the positive ion.

Cause-and-Effect Diagram

A problem solving tool that uses a graphic description of various process elements in order to analyze potential sources of process variation. Also called fishbone diagram (after its appearance) or Ishikawa diagram (after its developer).

Center-to-Center Spacing

The nominal distance between the centers of adjacent features on any single layer of a printed board. (See Figure C-3.) (See also "Pitch.")

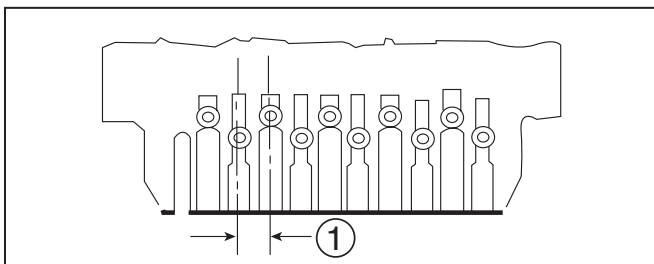


Figure C-3 Center-to-Center Spacing (pitch)
1. Pitch

Centering Force

The force that the molten solder exerts to center a component on the land pattern.

Centerwire Break

A fracture mode in a wire pull test whereby the wire fractures at approximately its midspan.

Central Line

The line on a control chart that depicts the average or median value of the items being plotted.

Ceramic Package

A component body of ceramic material hermetically sealed by metal or glass.

Certification

The verification that specified training or testing has been performed and that required proficiency or parameter values have been attained.

Chain Dimensioning

A method of dimensioning features so that a subsequent measurement will start from the preceding measurement and so on. The tolerances are additive.

Chalking (Cured Solder Mask)

When the solder mask is degraded such that fine particulates can be removed from the surface.

Char

Carbon ash residue.

Character (Bar Code)

A letter, digit, or other special form that is used to represent data in a bar code symbol.

Characteristic Impedance

The resistance of a transmission line structure to the flow of alternating current (AC) or signal, usually applied to high speed circuits, and normally consisting of a constant value over a wide range of frequencies.

Characterization

A description of the characteristics of a product or process by mathematical modeling, design of experiments, or statistical data evaluation.

Check Plot

An interim drawing used for graphical data verification.

Chelate Compound

A compound in which metal is contained as an integral part of a ring structure.

Chelating Agent

A compound capable of forming a chelate compound with a metal ion.

Chemical Conversion Coating

A protective coating produced by the chemical reaction of a metal with a chemical solution.

Chemical Resistance

The resistance of an insulating material to the degradation of surface characteristics, such as surface roughness, swelling, tackiness, blistering or color change, beyond the specified allowance by exposure to chemicals such as acids, alkalis, salts, or solvents.

Chemical Vapor Deposition

The deposition of a film onto the surface of a substrate by the chemical reduction of a vapor on contact with the base material.

Chemical Wire Stripping

The process of removing insulation from wire using chemical compounds.

Chemically-Deposited Printed Circuit

See “Additive Process.”

Chemically-Deposited Printed Wiring

See “Additive Process.”

Chemisorption

The formation of bonds between the surface molecules of a metal, or other material of high surface energy, and another gas or liquid substance in contact with it.

Chessman

A disk, knob or lever used to manually control the position of a bonding tool with respect to land.

Chill Mark (Knit or Weld Line)

A location where two flow fronts meet during the injection mold process.

Chip

See “Die.”

Chip-and-Wire

An assembly method that uses discrete wires to interconnect back-bonding die to lands, lead frames, etc.

Chip-in-Board (CIB)

An electronic component where a chip is inserted into a cavity in a ceramic or glass-epoxy substrate and bonded by wire bonding or TAB techniques. The object of this technique is to reduce the thickness of the COB assembly. The chip may be covered by a resin after bonding.

Chip-on-Board (COB)

A printed board assembly technology that places unpackaged semiconductor dice and interconnects them by wire bonding or similar attachment techniques. Silicon area density is usually less than that of the printed board. (See Figure C-4).

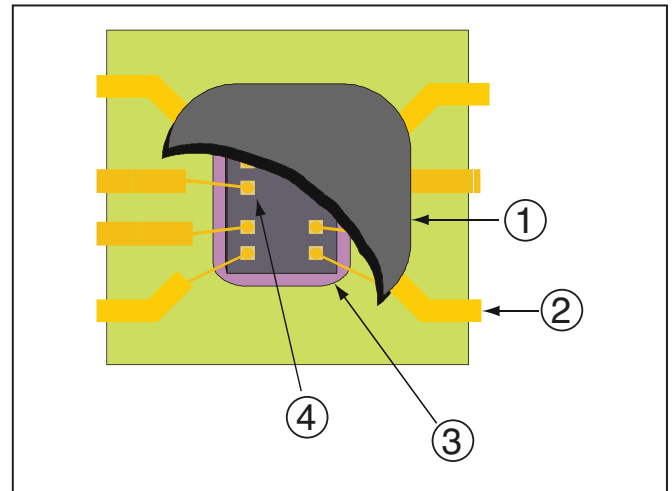


Figure C-4 Chip-on-Board (COB)

1. Encapsulant (Glob Top)
2. I/o Pitch Translation (Substrate)
3. Die Attach
4. Wire Bonds

Chip-on-Flex (COF)

Semiconductor chip mounted directly onto flexible printed board.

Chip-on-Glass (COG)

An assembly technology that uses an unpackaged semiconductor die mounted directly on a glass substrate such as a glass plate for liquid crystal display (LCD).

Chip Scale Package (CSP)

Packages that are no more than 1.2X the area of the internal die size.

Chipped Point

A condition whereby the amount of chips on the leading edge of a drill point exceeds an allowable value.

Chipping

A piece of a panel or board that has broken away.

Chisel

A tool used for wedge and ultrasonic bonding.

Circuit Board

See “Printed Board.”

Component Assembly Density

The average quantity of electronic components (prefabricated or part of the interconnecting structure) on a unit area of a printed board considering one or both sides for component mounting.

Circuitry Layer

A layer of a printed board containing conductors, including ground and power planes.

Circular Mill

A unit of measurement for the area of a one mil [0.001 in] (0.0254 mm) diameter circle; 7.845×10^{-7} sq. in (5.066×10^{-6} sq. cm). Used to express wire cross sectional area.

Circumferential Crimp

Final configuration of a terminal barrel made when crimping dies completely surround the barrel and form symmetrical indentations.

Circumferential Separation

A crack or void in the plating extending around the entire circumference of a plated through hole, a solder fillet around lead wire or eyelet, or the interface between a solder fillet and a land.

Clad (adj.)

A condition of the base material to which a relatively-thin layer or sheet of metal foil has been bonded to one or both of its sides, e.g. “a metal-clad base material.”

Clamped Package (Press-Pack)

A package for high-current devices, in the form of a cylinder with a flat, circular high-current terminal on each end, that is intended to be clamped between two bus bars acting as heat sinks.

Classification Temperature (T_c) (Plastic Encapsulated SMDs)

The maximum body temperature at which the component manufacturer guarantees the component MSL as noted on the caution and/or bar code label.

Clearance Hole (Device)

A hole in the device designed with a clearance for the fastener.

Clearance Hole (Printed Board)

A hole in a conductive pattern that is larger than, and coaxial with a hole in the base material of a printed board. (See Figure C-5.)

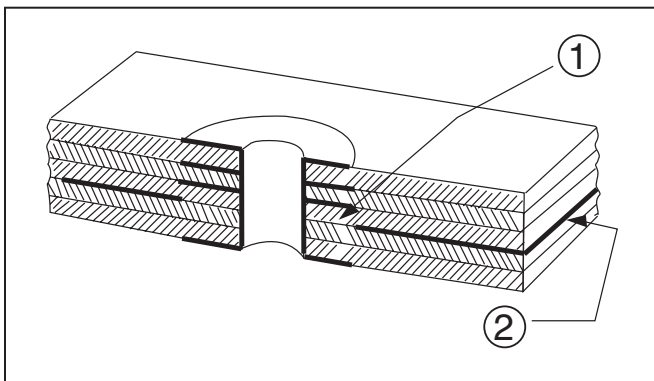


Figure C-5 Clearance Hole

1. Clearance Hole
2. Conductive Pattern

Clinched Lead

A component lead that is inserted through a hole in a printed board and is then formed in order to retain the component in place and in order to make metal-to-metal contact with a land prior to soldering. (See also “Partially-Clinched Lead”)

Clinched-Wire Interfacial Connection

See “Clinched-Wire Through Connection.”

Clinched-Wire Through Connection

A connection made by a bare wire that has been passed through a hole in a printed board and subsequently formed (clinched) and soldered to the conductive pattern on each side of the board. (See Figure C-6 and Figure C-7.)

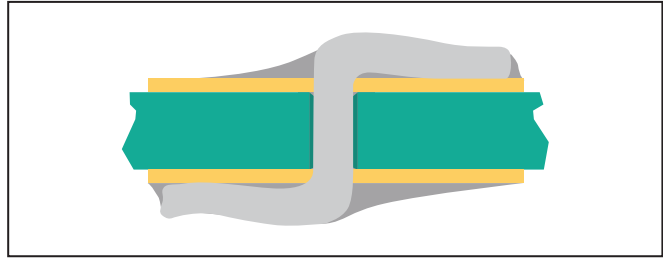


Figure C-6 Fully Clinched-Wire Through Connection

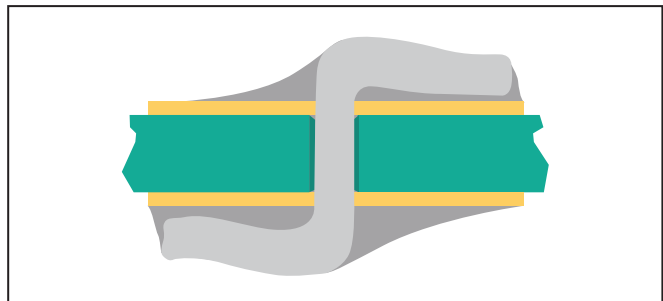


Figure C-7 Partially Clinched-Wire Through Connection

Closed-Entry Contact

A type of female connector contact that prevents the entry of an oversized mating part. (See also “Open-Entry Contact.”)

Closing, Wire

An operation where all leads are to be covered and the jacket insulation is captured by a type of hood or cover.

Co-Firing

The simultaneous firing of thick-film circuit elements during one cycle.

Coaxial Cable

A cable in the form of a central wire surrounded by a conductor tubing or sheathing, separated by a dielectric, which serves as a shield and return.

Cocoon or Pouch

A removable protective cover over the flexible section of a rigid flex printed board to prevent processing chemicals from being entrapped between the flexible layers during fabrication.

Coefficient of Thermal Expansion (CTE)

The linear dimensional change of a material per unit change in temperature. (See also “Thermal Expansion Mismatch.”)

Cohesion (Pressure Sensitive Tape)

The ability of a pressure sensitive adhesive to resist splitting.

Cohesive Failure

The rupture of an adhesive bond such that the separation appears to be within the adhesive.

Coined Wire – Surface Mount

A terminal-wire whose ends are soldered horizontally to a surface mount pad. The bottom of the round wire has been deformed into a flat surface to facilitate mounting. (See Figure C-8).



Figure C-8 Coined Wire – Surface Mount

Coined Wraparound – Surface Mount

A terminal-wire formed by a wire wrapped around a package body to form a loop. The bottom of the loop is for soldering to a surface mount pad. Typically, the cross-section of the round wire is not flattened. (See Figure C-9)



Figure C-9 Coined Wraparound – Surface Mount

Cold Flow

The deformation, distortion or dimensional change of a material as a result of applied mechanical force or pressure over a period of time at ambient temperature.

Cold Flow (Pressure Sensitive Tape)

The tendency of some pressure sensitive adhesives to act like a heavy viscous liquid and exhibit a limited amount of flow over a period of hours or days at room temperature.

Cold Hand Cleaning

Cleaning with a soft brush and rinsing in a small open tank of chlorinated, non-chlorinated or isopropanol (2-Propanol) solvent.

Cold Machine Cleaning

Cleaning with a chlorinated or non-chlorinated solvent and an inline brush or wave cleaner.

Cold Soldered Connection

A solder connection that exhibits poor wetting, and that is characterized by a grayish, porous appearance. (This is due to excessive impurities in the solder, inadequate cleaning prior to soldering, and/or the insufficient application of heat during the soldering process.)

Color Selectivity

The preferential absorption of thermal radiation caused by emitted energy with wavelength frequencies in the visible band of from 0.39-0.78 microns.

Color Temperature

A measure of the energy distribution over the visible spectral range of a light source with a continuous spectrum, expressed in degrees Kelvin (K).

Column

Terminations are perpendicular to the seating plane of the package body and consist of solid or metallized extensions

Column Grid Array (CGA)

A surface mount package wherein the columns for termination are formed in a grid on the bottom of a package.

Comb Pattern

A set of interdigitated comb-like arrays of uniformly-spaced conductors. (See Figure C-10).

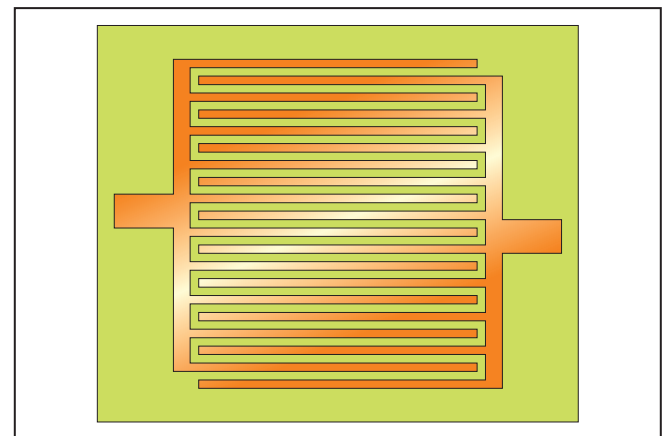


Figure C-10 Comb Pattern

Combination Mask

A type of screen mask that is composed of two areas wherein the one is located in the center of the screen mask and is made by a metal screen mesh with a printing image, and the other is located in the periphery of the screen mask and is made by a thin elastic material.

Common Cause

Variation caused by unknown factors resulting in a steady but random distribution of output around the average of the data, also referred to as noise. It is a measure of the process potential, or how well the process can perform when special cause variation is removed. (See also “Assignable Cause.”)

Compensated Artwork

Production master or artwork data that has been enlarged or reduced in order to meet the needs of subsequent processing requirements.

Compensation Circuit

An electrical circuit that alters the functioning of another circuit to which it is applied to achieve desired performance.

Compiler

A software module that analyzes and converts programs from a high-level language to binary machine codes.

Complementary Metal Oxide Semiconductor (CMOS)

A fabrication technology that results in the creation of both N and P type MOS FET devices.

Complex Ion

An ion composed of two or more ions or radicals that are capable of an independent existence.

Compliant Bond

A bond that uses an elastically- and/or plastically-deformable member to impart the required energy to the lead.

Compliant Press-fit Pin

A pin with at least one compliant press-fit zone, designed for insertion into a PTH.

Compliant Press-fit Zone

The area of a pin designed to be elastically and plastically deformed, creating an interference fit with the inside diameter of a PTH during insertion.

Compliant Press-fit Pin Connection

A solder-free electromechanical connection made by a compliant press-fit pin.

Component

An individual part or combination of parts that, when together, perform a design function(s). (See also “Discrete Component.”)

Component Density

The ratio of the area of all the component areas over the given surface area of the printed board.

Component Hole

A hole that is used for the attachment and/or electrical connection of component terminations, including pins and wires, to a printed board.

Component Lead

A lead is the portion on the part that makes contact with the printed board. The term includes terminals and pin, but it

also includes extrusions from the part body for which holes are required in the printed board, in order for the part to be assembled to the printed board. The term lead is often used when discussing the physical details of the part. (See also “Component Pin.”)

Component Mounting

The act of attaching components to a printed board, the manner in which they are attached, or both.

Component Mounting Orientation

The direction in which the components on a printed board or other assembly are lined up with respect to the polarity of polarized components, to one another, and/or to the board outline.

Component Mounting Site

The location on a printed board or mounting structure that consists of a land pattern and conductor fan-out to additional circuit features for testing or vias that are associated with the mounting of a single component.

Component Pin

See “Pin”.

Component Side

Traditionally, the side of a printed board that contained the most active components. (See also “Primary Side.”)

Component Thermal Masses

The quantity of heat energy that a component is able to absorb or retain; it is dependent on the mass of the component.

Component, Passive

A discrete electronic device that behaves in a fixed way in response to a signal of a given characteristic. This includes components such as resistors, capacitors, inductors and transformers.

Component, Active

An electronic device that can change a signal or respond to the signal in a way that is dependent upon the nature of the signal and/or other controlling factors. This includes diodes, transistors, amplifiers, thyristors, gates, ASIC's and other integrated circuits.

Composite (Phototool)

A photograph that consists of a combination of two separate (aligned) images.

Composite Record

A collection of records that make up an electrical pattern that is used repeatedly in a design. (The definition and relationship of such records are covered and referred to as “subroutine definition” and “subroutine definition call.”)

Composite Test Pattern (CTP)

A grouping of individual test patterns into specific arrangements, to reflect control and capability of a manufacturer or manufacturing process.

Compound Die Set

A set consisting of a punch and matching die used to punch holes, details or the outlines of panels and/or printed boards.

Compression Seal

A tight joint made between an component package and its leads that is formed as heated metal cools and shrinks around a glass insulator.

Computer Numerical Control (CNC)

A system that utilizes a computer and software as the primary numerical control technique.

Computer-Aided Design (CAD)

The interactive use of computer systems, programs, and procedures in the design process wherein the decision-making activity rests with the human operator and a computer provides the data manipulation function.

Concave Surface Terminal

A metallized contact area recessed into the side or corner of the package body to allow solder to wet the contact area. (See Figure C-11).

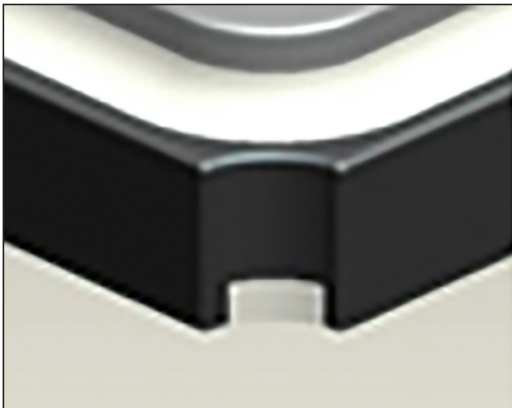


Figure C-11 Concave Surface Terminal

Concave Surface Terminal with Wettable Flanks

A concave surface terminal with plating on either side of the indentation. (See Figure C-12).



Figure C-12 Concave Surface Terminal with Wettable Flanks

Concentration Polarization

Polarization of an electrolytic component near an electrode caused by ion concentration changes at the metal-electrolytic interface due to passing current through the electrode body.

Condensation Soldering

See “Vapor Phase Soldering.”

Conditional End-of-Test

A command in a test program to stop the execution of the program when a particular condition, or set of conditions, is reached.

Conditioning

The time-related exposure of a test specimen to a specified environment(s) prior to or after testing and before evaluation.

Conducting Salt

A salt added to a plating solution in order to increase its conductivity.

Conductive Anodic Filament (CAF)

Conductive material along the resin/glass interface, typically grown through an electrochemical process from the anode toward the cathode.

Conductive Ink

A low viscosity liquid medium with a suspended powder of an electrically conductive material.

Conductive Medium

A material with a suspended powder of an electrically conductive material. (See also conductive paints, inks, pastes.)

Conductive Paint

A high viscosity liquid medium with a suspended powder of an electrically conductive material.

Conductive Paste

A conductive material used to make conductive patterns and through holes on a base material consisting of silver, copper, nickel, carbon, etc. in a cream-like form.

Conductive Pattern

The configuration or design of the conductors on a base material. (This includes traces, lands, vias, planes, and passive components when these are an integral part of the printed board manufacturing process.)

Conductor

A substance that allows the flow of electric current or thermal energy. Conductors intended for electric current are typically wires, traces, lands, planes or plated holes.

Conductor Base Spacing

The distance between conductors at the plane of the surface of a base material. (See Figure C-13).

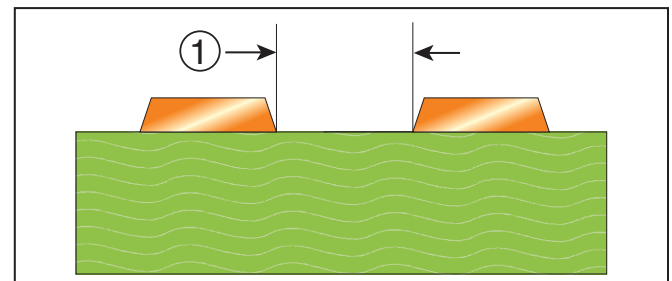


Figure C-13 Conductor Base Spacing
1. Conductor Spacing



Conductor Layer

Any layer of a printed board with a conductive pattern, including ground or power planes.

Conductor Line

See “Conductor Trace.”

Conductor Path

See “Conductor Trace.”

Conductor Pattern

See “Conductive Pattern.”

Conductor Pitch

The distance between the centers of adjacent conductor traces.

Conductor Side

The side of a single-sided printed board that contains the conductive pattern.

Conductor Spacing

The observable distance between adjacent edges (not center-to-center spacing) of conductive patterns within a conductor layer in the X and Y axes. (See Figure C-14.) (See also “Center-to-Center Spacing.”)

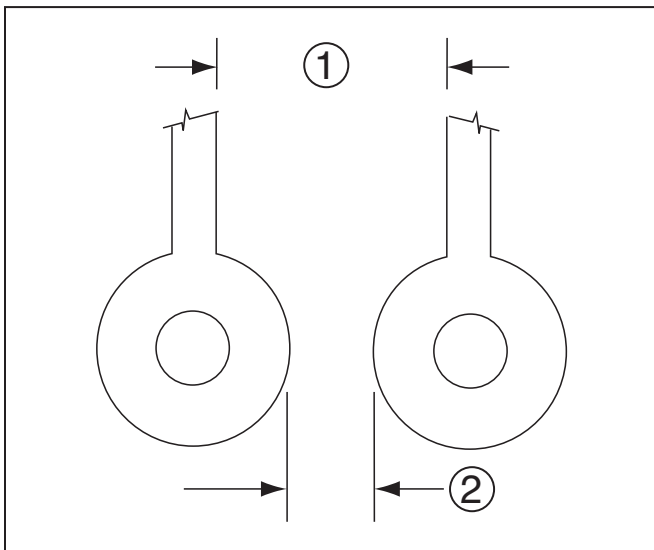


Figure C-14 Conductor Spacing

1. Spacing, Conductive Trace
2. Spacing, Conductive Pad

Conductor Trace

A single conductive linear entity (element) which has length, width and thickness.

Conductor Width

The observable distance across a conductor, measured at the plane of the surface of the base material. (See also “Design Width (Conductor Traces or Planes)”

Conduit

A tube in which insulated wires or cables are contained.

Confirmation Run

A test of an actual process to confirm the results that are obtained during a designed experiment, evaluating if the results are reliable and reproducible in an actual application.

Conformal Coating

An insulating protective covering that conforms to the configuration of the objects coated (e.g. Printed Boards, Printed Board Assembly) providing a protective barrier against deleterious effects from environmental conditions.

Conformance Test

A test to determine that relevant requirements for specific performance characteristics of a product specification (or representative samples thereof) are fulfilled.

Conformal Via

A type of build-up via in which the conductor layer of a uniform thickness is formed conforming to the shape of a hole in the insulating layer.

Connector

A package that physically and electrically joins or separates two component/printed board/interconnect structures, transferring electrical signals or current.

Connector, Plug

The unmounted half of a two-piece connector pair that mates with a receptacle connector.

Connector, Receptacle

The fixed or stationary half of a connector pair that mates with a plug connector.

Connector Area

That portion of a printed board used for the purpose of providing external connections.

Connector Contact

The conducting member of a connecting device that provides a separable connection.

Connector Housing

A plastic shell that holds electrical contacts in a specific field pattern that may also have polarization/keying bosses or slots.

Connector Latch

A device at both ends of a connector header that is used to hold in place and eject a mating receptacle connector.

Connector/Mold Interface

The location where the connector is in contact with the mold.

Connector Tang

The mating part of an edge printed board connector.

Constraining Core

A supporting plane that is internal to a packaging and interconnecting structure.

Contact Angle (Bonding)

The angle between the bonding lead or wire and the bonding land.

Contact Angle (Soldering)

The angle of a solder fillet that is enclosed between the basis metal surface and a plane that is tangent to the solder surface at the point of intersection of solder and metal. (See Figure C-15.)

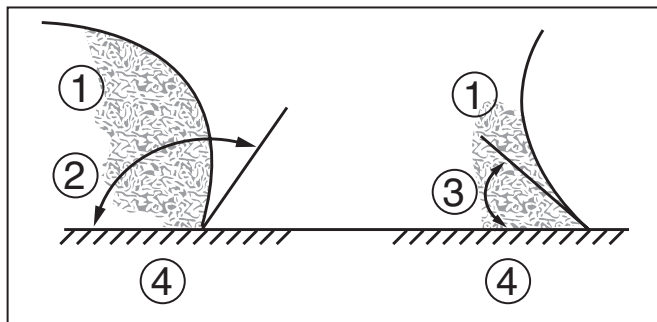


Figure C-15 Soldering Contact Angle

- 1. Solder
- 2. Large Contact Area
- 3. Small Contact Area
- 4. Base Metal Surface

Contact Area

The common conductive area between a conductor and a connector.

Contact Area Distance

The distance of travel made by a contact in touch with another during the insertion and removal of a connector.

Contact Corrosion

See “Crevice Corrosion.”

Contact Plating

The plating applied to the parts of a printed board that are used as the electrical contact to the circuit outside.

Contact Printing

A light-exposure process that transfers an image from a film to a photosensitive coating on a base material while both film and base material are in intimate physical contact.

Contact Resistance

The electrical resistance at the interface of two touching contact areas under specified conditions.

Contact Retention Force

The maximum axial load that can be applied to a contact inserted in its normal position in a connector, without separating the mated contacts.

Contact Size

Defines the diameter of the engagement end of the pin and controls the largest size wire that can be used with that contact.

Contact Spacing

See “Pitch.”

Contact Window

An opening that has been etched in the semiconductor oxide, nitride or other insulating layer, grown or deposited directly onto the die, so as to allow electrical contact to the underlying semiconductor material.

Contained Paste Transfer Head (Stencil)

A stencil printer head that holds, in a single replaceable component, the squeegee blades and a pressurized chamber filled with solder paste.

Continuity

An uninterrupted path for the flow of electrical current in a circuit.

Continuity Test

Resistance test to insure all the required points have electrical continuity.

Control Chart

A graphic representation of a characteristic of a process that shows plotted values of some statistic gathered from characteristic, a central line, and one or two statistically derived control limits.

Control Limit

The maximum allowable variation of a process characteristic.

Control Plan

Documented activities required to maintain expected levels of variation in process/product parameters.

Control System

A practice in which a desired output is achieved by operating on the various inputs to the system until the output falls within an acceptable range of values.

Controlled Area

An area within the property that has a defined perimeter and one or more types of access control.

Controlled Collapse, Component Connection

See “Controlled Collapse, Soldering.”

Controlled Collapse, Soldering

A technique for soldering a component (i.e., flip chip, chip scale package, BGA) to a substrate, where the component connection surface tension forces of the liquid solder supports the weight of the component and controls the height of the joint.

Convection

Heat transfer that occurs at the interface of a solid and a fluid or gas that is due to their differences in temperature.

Convection Controlled

Thermal transfer in which the characteristics, such as flow rate, velocity, and temperature are precisely controlled.

Convection Forced

Convection that occurs by forcing the fluid over the solid media.

Cooldown

The period of time during which the temperature of a material reduces to a targeted value.

Copper Cap Plating

A plated layer covering a filled via hole.

Copper Coated Solder Column (Column)

Solder column with a high melting temperature alloy covered by electroplated copper, and then coated with solderable finish.

Copper Island

A piece of copper generated during plane formation that is not connected to power, ground or a signal (active). When the term is used regarding a single layer of data, it may be connected using a via to another layer (see Figure C-16). Several methods of plane generation exist that can generate copper islands.

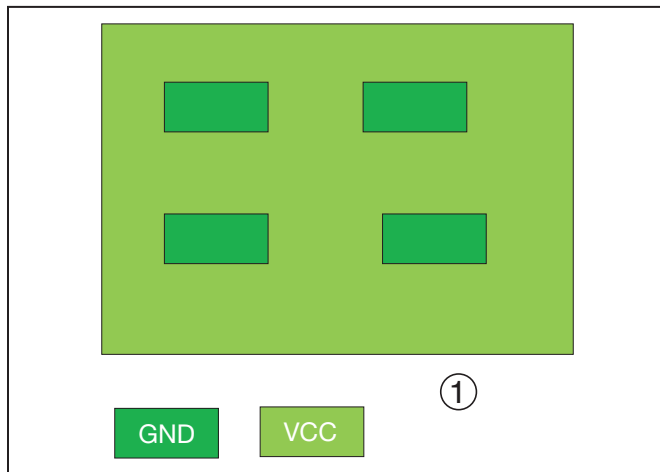


Figure C-16 Copper Island (Data)
1. Layer 4 (Split Plane)

Copper Weight

The mass of copper per unit area for a foil, typically expressed in ounces per square foot or grams per square centimeters (these units are not equivalent).

Copper-Mirror Test

A determination of the corrosivity of a flux on a copper film that is vacuum-deposited on a glass plate.

Core (Cable)

A component or assembly of components over which additional components (shield, sheath, etc.) are applied.

Corrosion (Chemical/Electrolytic) v.

The attack of chemicals, flux, and flux residues on metals.

Corrosive Flux

Flux that contains levels of halides, amines, or organic acids that cause corrosion of copper.

Coupling Ring

A device used on cylindrical connectors to lock a plug and receptacle together.

Coupon

See "Test Coupon."

Coupon (Breakaway)

Coupons made as an integral part of the deliverable panel and connected as one piece, except one edge of the coupon has perforations or a thin section connected to the panel which can be easily broken off without damaging either the coupon or the board.

Covercoat

Material deposited as a liquid onto the circuitry that subsequently becomes a permanent dielectric coating (See "Cover Material").

Coverfilm

Film made from *i)* a homogeneous, single component; *ii)* separate layers of generically similar chemistries; or *iii)* as a composite blend (See "Cover Material").

Coverlay

Film and adhesive made from separate layers of generically different chemistries. (See "Cover Material").

Coverlay Access Hole

The clearance area around a terminal hole or land of a printed board. See Figure C-17.

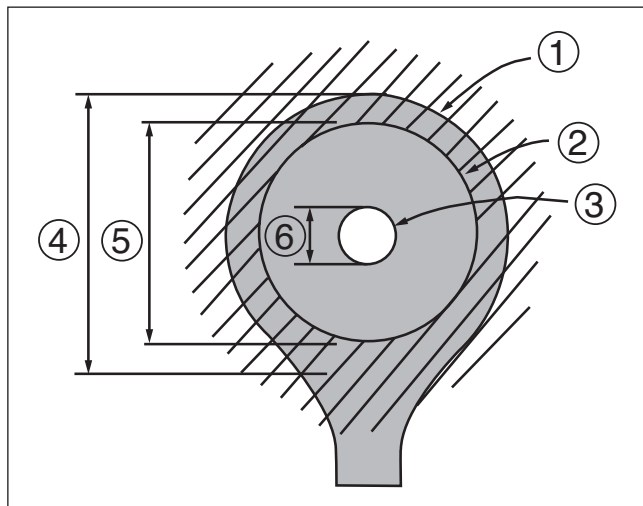


Figure C-17 Coverlay Access Hole

1. Land
2. Coverlay
3. Product Aperture
4. Pad Size
5. Coverlay Opening
6. Hole Opening

Cover Layer (Discrete Wiring)

A polymeric material which is applied to a circuit board over surface wired levels.

Cover Material

A thin dielectric material used to encapsulate circuitry, most commonly for flexible circuit applications.

Crack, Corner (Knee Crack)

A crack in the plated metal at the knee (the intersection of the hole barrel and the pad or land) of a plated through-hole.

Crack, Foil

A break or separation that extends partially or completely through a layer of metallic foil.

Crack, Plating

A break or separation that extends partially or completely through a metallic coating(s), its overplate, or both.

Cratering (CHIP-OUT)

A category of ball bond failure in which the ball lifts from the surface of the integrated circuit die bond and cracking occurs.