



Jabil Digital DFx Content Extract
DFx Glossary

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Revision	Revision 41 - Valid until January 29, 2025
Content Owner	Jabil (Jabil generic content)
IP	NDA is required for external sharing of this content.

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DFx Glossary

A

ABS Acrylonitrile Butadiene Styrene

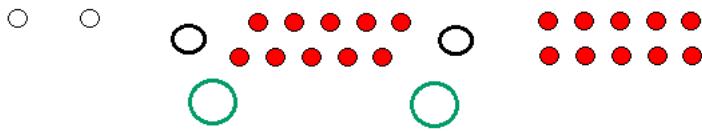
ACF Anisotropic Conductive Film

Active Components

Circuit element that switches the flow of current or has gain.

Additive Manufacturing See [3D Printing](#)

Adjacent Pin



■ Adjacent Pins

■ Non-Plated Through Hole

A **THMT** pin that has at least one other THMT pin whose center to center distance is $\leq 0.100"$ (2.5400mm).

Aerospace Standard 568

Specifies the inside diameters, cross-sections, tolerances, and size identification codes (dash numbers) for **O-rings** used in sealing applications and for straight thread tube fitting **bos gaskets**. The dimensions and tolerances specified in this standard are suitable for any **elastomeric** material provided that suitable tooling is available.

Al Aluminum

All Around

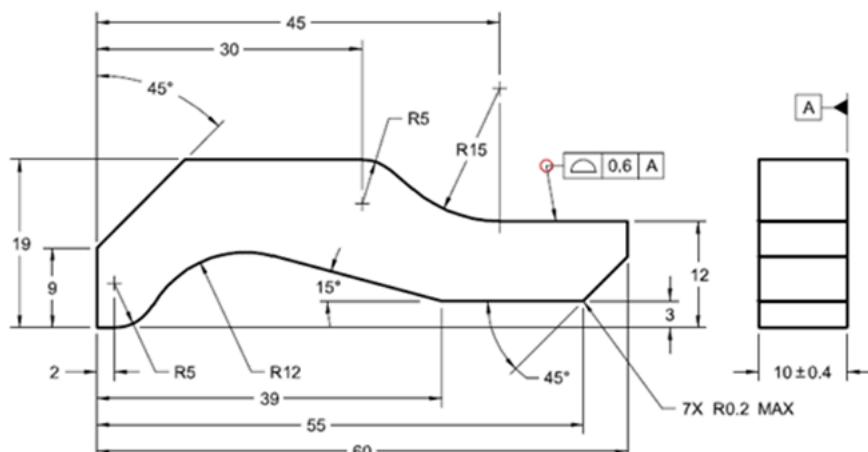
As relates to **GD&T** and **profile of a surface**, where a profile tolerance applies all around the **true profile** of the designated features of the part. The "ALL AROUND" tolerance applies to the contour or outer surfaces of the part. The "ALL AROUND" symbol (single circle) is placed on the leader from the **feature control frame** in the view where it is specified.

All around is closely related to [all over](#).

ALL AROUND

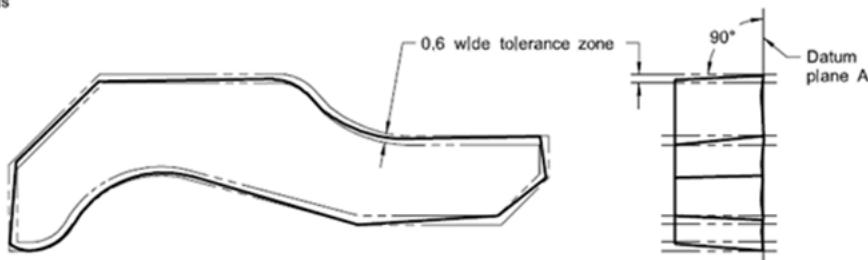


This on the drawing



UNTOLERANCED DIMENSIONS ARE BASIC

Means this



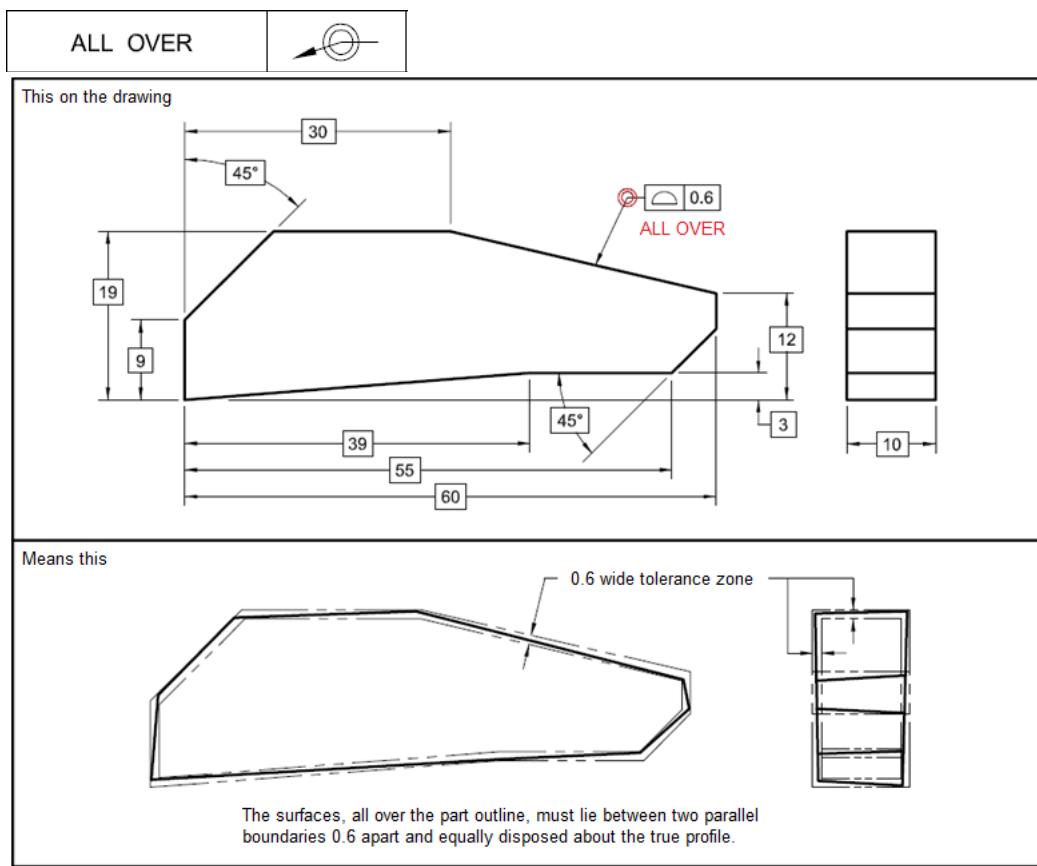
The surfaces, all around the part outline, must lie between two parallel boundaries 0.6 apart perpendicular to datum plane A and equally disposed about the true profile. Radii of part corners must not exceed 0.2.

All Over

As relates to **GD&T** and **profile of a surface**, a profile tolerance may be applied all over the 3 dimensional profile of a part. The "ALL OVER" tolerance applies to both the outer and inner surfaces of the part. It may be specified in one of the following ways:

- Place the "ALL OVER" symbol (double circle) on the leader from the **feature control frame**.
- Place the words "ALL OVER" beneath the feature control frame.

All over is closely related to all around.



Ambient Temperature

The temperature of the surrounding environment coming into contact with the system or component in question.

AML Approved Manufacturer's List

Amorphous

Having no definite or clear shape or form, lacking organization or unity, having no real or apparent crystalline form.



Amplifier

A device that increases the amplitude of a signal.

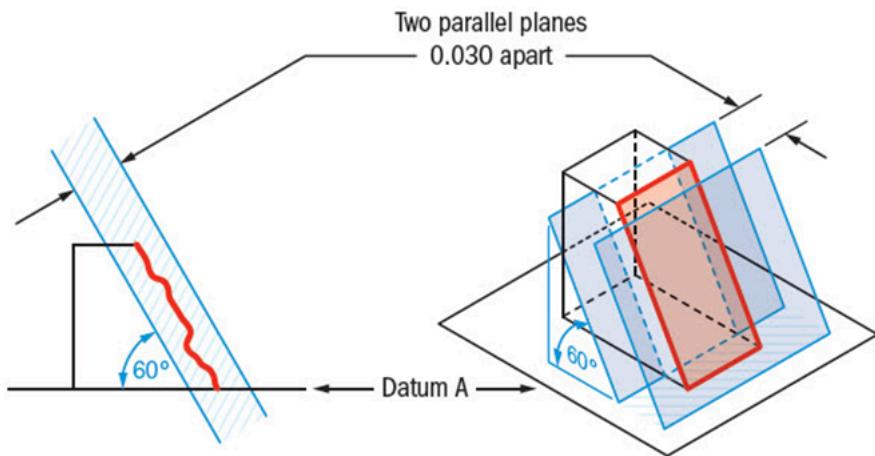
Anchor Pads

Additional pads on a printed circuit board used to solder additional component securing tabs to, ie. connectors.

Angularity

As relates to **GD&T**, the condition of a surface, a feature's **derived median plane** or a feature's **derived median line** at any specified angle from a datum plane or datum axis.

TYPE OF TOLERANCE	CHARACTERISTIC	SYMBOL
ORIENTATION	ANGULARITY	



Annular Ring

The circular area which surrounds any round feature.

Antenna

A structure to transmit or receive electromagnetic radiation. In PCB design tracks may be deliberately designed in lines, loops or spirals to provide such function. They may also be created unintentionally on high speed signals and generate interference, or on sensitive signals that makes a circuit sensitive to external electromagnetic radiation.

Anti-Pad

The clearance area on a plane layer around all holes that do not make an electrical connection to the signal resident on the plane layer.

AOI Automated Optical Inspection

Laser / video inspection of components and features on a [PCB](#).

Area Ratio

In stencil design this is the area of the floor of the aperture divided by the area of the walls of the aperture.

Array

This term is often used interchangeably with panel. See [entry 103](#).

A group of elements, circuits, or circuit boards arranged in rows and columns in a [panel](#).

A "Customer [PCB Array](#)", or simply a "PCB Array" is the array that is utilized by a Contract Manufacturer (CM) or PCB assembly house for PCB assembly, meaning, populating a PCB with [SMT](#) and / or [PTH](#) components and thus creating a [PCBA](#).

ASCII American Standard Code for Information Interchange

An ASCII file is a text file. It does not contain tabs, margins, or other text features typically associated with word processing tools.

ASIC Application Specific Integrated Circuit

Aspect Ratio

The depth or height of a feature divided by the width of the feature. A high aspect ratio indicates a feature is narrow relative to its height or depth.

Assembly Drawing

A drawing depicting the locations of components with their reference designators, mounting holes, board outline, special notes, etc... on a printed circuit board.

ASTM American Society for Testing and Materials

Au Gold

Auto-inserted

[THMT](#) lead components that are automatically placed through a [PCB](#) using a machine and clinched or secured in some way.

Aware Test

An Agilent software that allows the user to link the Automated X-ray and In-circuit test processes in order to develop an integrated test strategy.

Axial

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	axial
Definition	Axial components
Component	Axial
System Reference Image	

Picture Reference	
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B

Barrel

The cylinder formed by plating through a drilled hole.

Barrel Type (Crystal)

Cylindrical shaped component typically metal cased with two leads protruding from one end.

BGA Ball Grid Array

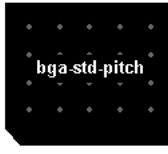
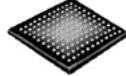
BGA Fine Pitch

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	bga-fine-pitch
Definition	BGA with ball to ball pitch less than or equal to 0.5000mm
Component	BGA, CSP , uBGA
System Reference Image	
Picture Reference	

BGA Standard Pitch

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	bga-std-pitch
Definition	BGA with ball to ball pitch greater than 0.5000mm
Component	BGA
System Reference Image	
Picture Reference	

Bi-directional Pin

A pin of the component that can both drive and sense the connected signal. The decisions to drive or sense the signal may be made by internal logic (e.g. a microprocessors data bus pins) or be instructed by an externally applied signal.

Bio-Sourced

Derived from biological sources such as plants, animals, micro-organisms, fungi, etc.

BIST Built-In Self Test

BIST, or Built-in Self Test, is the technique of designing additional hardware and software features into integrated circuits to allow them to perform self-testing, i.e., testing of their own operation (functionally, parametrically, or both) using their own circuits, thereby reducing dependence on external automated test equipment.

Blind Via

A conductive surface hole that connects an outer layer with an inner layer of a multi layer board without penetrating the entire board.

Block Fiducial

Global fiducial marks on a multiple printed circuit board fabrication panel that are located within the perimeter of an end-product printed circuit board.

BOM Bill of Material

Boss

A protruding feature on a part. To locate one object within a pocket or hole of another object.

Boundary Scan

(IEEE Std 1149.1) A test architecture that provides a means to test component interconnects and clusters of logic, memories etc. without using physical test probes.

Bow

The deviation from flatness of a board characterized by a roughly cylindrical or spherical curvature such that if the board is rectangular, its four corners are in the same plane.

BPO Bond Pad Opening

The un-passivated area of a [wire bond](#) pad where the bonds are welded.



BSDL Boundary-Scan Description Language

VHDL-type code describing the full JTAG/Boundary-scan capability of a component. Usually the BSDL files or "Models" are provided by the component vendor or can be downloaded from their web-sites.

Buried Via

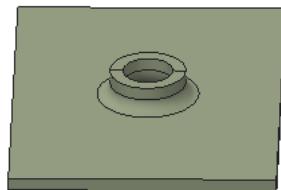
A via hole that does not extend to the surface of a printed board.

Burr

A ridge left on the outside copper surface after drilling.

Burring Hole

Holes in sheet metal are deformed by pressing the end of a rod that is larger than the hole through it to create walls around the hole.



Bus

Single signals that visit many circuit elements, often in a very regular pattern. e.g. Microprocessor address and data signals.

C

C-SET Compression Set Resistance

The ability of an [elastomer](#) to return to its original thickness after a compression load is released. Most materials will not regain 100% of their initial thickness after being subjected to constant compression for a specified time and temperature, but materials losing only a small percentage of their initial thickness are said to have good Compression Set Resistance.

CAD Computer Aided Design

Capacitance

The property of a system of conductors and dielectrics which permits storage of electricity when potential difference exists between conductors.

Capacitor

A device providing electrical capacitance. They are measured in Farads, but typical components have values measured in Pico-Farads and Micro-Farads. Depending on type they can be polarized, (requiring particular polarity with one end more positive than the other) or not. Typically used to filter out high frequencies, hum and noise (parallel configurations), pass high frequencies with DC isolation (in series with a signal) and form tuned circuits.

Carbon Footprint

The amount of greenhouse gases, generally carbon dioxide, emitted by a person's actions or a product's manufacture and transport.

Caret

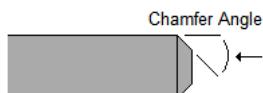
An indicator typically used to indicate pin one on a component (typically a BGA).

CBGA Ceramic Ball Grid Array

CE European Community Standard Conformance

Chamfer

A beveled edge connecting two surfaces or an edge of a structure that is not perpendicular to the faces of the piece.



Channeling

Channeling is to form a [gasket](#) in a specific shape for installation. This gasket can be used to wrap around the edge of a component.



U Channel Gasket

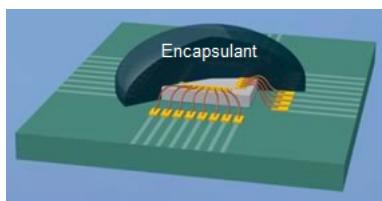
Check Item Number

Chip on Board Encapsulation

The process of covering [COB](#) components in a protective shell in order to prevent physical damage following [die attach](#) and [wire bonding](#). There are two basic types of encapsulation

Glob Top:

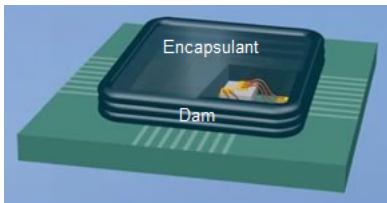
Glob top is the process of depositing the encapsulant on top of the component. The encapsulant is of a low viscosity which allows it to flow and conform to the shape of the component without damaging the fragile wires present in COB applications. Because of the low viscosity, the encapsulant can potentially run beyond the desired coverage area and into adjacent components before it is cured.



Dam and Fill:

Dam and fill encapsulation utilizes a dam around the periphery of the component for the purpose of preventing flow of the encapsulant to adjacent components. There are several different types of dams to choose from. Mechanical dams are essentially physical walls that are built into the substrate around the die placement area.

Silicone and double viscosity dams consist first of a line of silicone or high viscosity encapsulant that is dispensed around the periphery of the component. Next a low viscosity encapsulant is dispensed on top of the component and fills the area inside the dam.



Chip Shooter

Placement equipment with the primary purpose of placing chip type components onto printed circuit boards at high speed.

Chip Wave

A turbulent wave used primarily to solder secondary side components and Lambda or Contour waves.

CID Content Identification Number

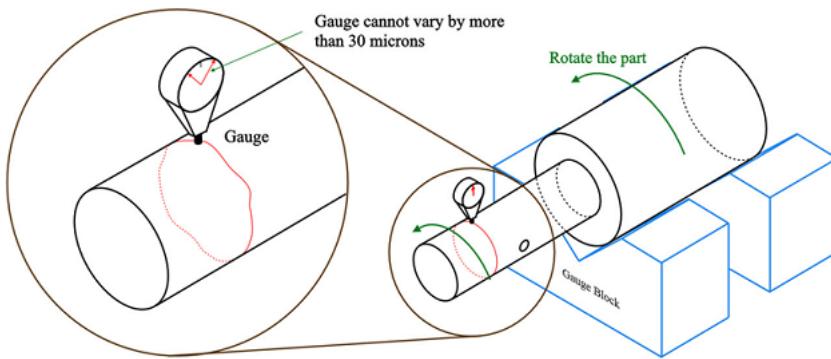
A sequential number assigned to a block of content within a glossary term, rule, guideline, or information page within the [KnowledgeBase](#). The CID is unique within an entry, and it is independent of the order of content blocks within the entry.

Circular Economy

An economic system that focuses on renewal and gradually separating economic growth from the consumption of finite resources.

Circular Runout

As relates to [GD&T](#), runout tolerance applied independently at each circular measuring position as the part is rotated the full angular extent of the surface about the simulated datum axis. Where applied to surfaces constructed around a datum axis, circular runout may be used to control the cumulative variations of [circularity](#) and [coaxiality](#). Where applied to surfaces constructed at right angles to the datum axis, circular runout controls circular elements of a plane surface (wobble). When verifying circular runout, the gauge is fixed in a position nor to the tolerated surface.



Circularity

As relates to [GD&T](#), a condition of a surface:

- For a feature other than a sphere - every point of the surface is intersected by any plane perpendicular to an axis or spine (curved line) are equidistant from that axis or spine.
- For a sphere - every point of the surface is intersected by any plane passing through a common center are equidistant from that center.

CHARACTERISTIC	SYMBOL
CIRCULARITY	○

CLASP Column Last Attach Solder Process

Closed Cell

A [gasket](#) / seal product whose cells are totally enclosed by its walls and hence not interconnecting with other cells.

Cluster

Circuitry that is not directly testable via Boundary Scan is considered a cluster. Often the input and output signals for such clusters, which may involve one or more individual components, are connected to Boundary Scan I/O pins.

Cluster Test

Circuitry that is not directly testable via Boundary Scan can be considered a cluster. Often the input and output signals for such clusters, which may involve one or more individual components, are connected to Boundary Scan I/O pins. By utilizing these Boundary Scan I/O pins to stimulate the cluster inputs and to observe the cluster outputs, it is often possible to create a basic functional test for the cluster.

CMOS Complimentary Metal Oxide Semiconductor

CMT Complex Mixed Technology

CNC Computer Numeric Control

A computer is programmed with commands for the movements of a machine. Most modern CNC machines are automated via computer aided design / computer aided manufacturing where a 3D program file is created and uploaded to the machine.

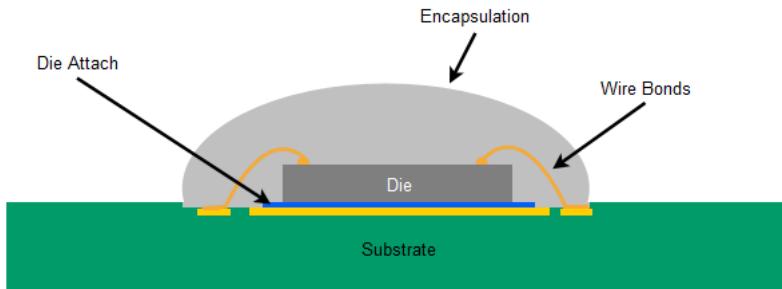
Coaxial

Coaxial describes a type of cable with an inner conductor surrounded by a tubular insulating layer typically of a flexible material with a high dielectric constant, all of which are surrounded by a conductive layer (typically of fine woven wire for flexibility, or of a thin metallic foil). Coaxial cable is usually used to transmit radio frequency signals, in applications such as connecting radio transmitters and receivers with their antennas.

COB Chip On Board

A hybrid technology in which a bare die is mounted directly onto a [PCB](#) or substrate.

The bare [die is attached](#) to the substrate, the die is electrically connected to the substrate using [wire bonding](#), and in some cases the die and its wire bonds are [encapsulated](#) in order to protect and insulate them.



Collaboration See [Digital DFx Collaboration](#)

Collaborator

Internal Jabil employees who can access a [Collaboration](#) both before and after it has been published to help with preparing it for the [customer](#).

There are two types of Collaborators, Lead Collaborators and general Collaborators. Lead Collaborators have some administrative privileges and the authority to perform some additional functions.

If a Collaborator has the "WriteAccess" setting on their account turned off, they will not have the ability to edit but can view the entire Collaboration and download attached files.

Command Line Interface (CLI)

A command-line interface (CLI) is a method for interacting with a computer operating system or software by typing commands (as in a DOS window) to perform specific tasks. This type of interface contrasts with the use of mouse click selections with a graphical user interface (GUI).

Component

A physical part to be mounted on a PCB. Examples include an Integrated Circuit (IC), Discrete Transistor, Resistor, Capacitor, Inductor, Transformer, Connector assembly, Fuse holder, etc.

Component Types

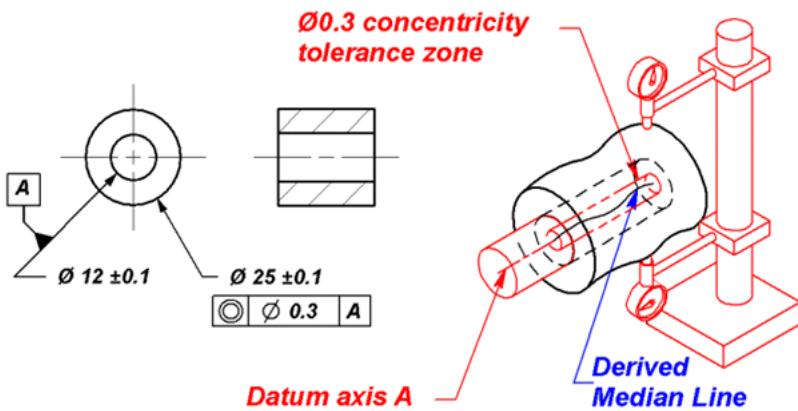
The following component types are currently defined for use with [Automated Rule Checking](#):

- axial
- bga-fine-pitch
- bga-std-pitch
- connector-pressfit
- connector-ptn
- connector-smt
- dip
- discrete-01005
- discrete-0201
- discrete-0402
- discrete-0603
- discrete-0805
- discrete-other
- discrete-tall
- flipchip
- melf
- network
- nonphysical
- plc
- printed
- pth-covering
- pth-misc-short
- pth-misc-tall
- qfn-cwrap
- qfn-leadless
- qfp-fine-pitch
- qfp-std-pitch
- radial
- smt-covering
- smt-misc-short
- smt-misc-tall
- soic-fine-pitch
- soic-std-pitch
- sot
- tantalum

Concentric

As relates to [GD&T](#), sharing a common center. Examples include circles, cylinders and spheres.

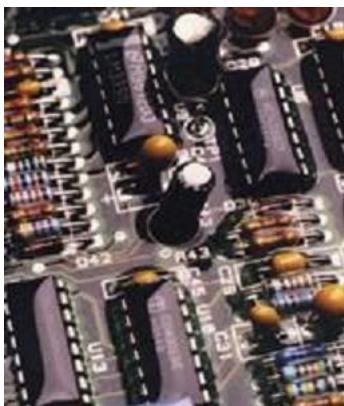
TYPE OF TOLERANCE	CHARACTERISTIC	SYMBOL
LOCATION	CONCENTRICITY	



Conductive

Material that allows the flow of electric current in one or more directions.

Conformal Coating



Material applied to electronic circuitry to act as protection against moisture, dust, chemicals, and temperature extremes that if unprotected could result in a failure of the product.

Connector - Pressfit

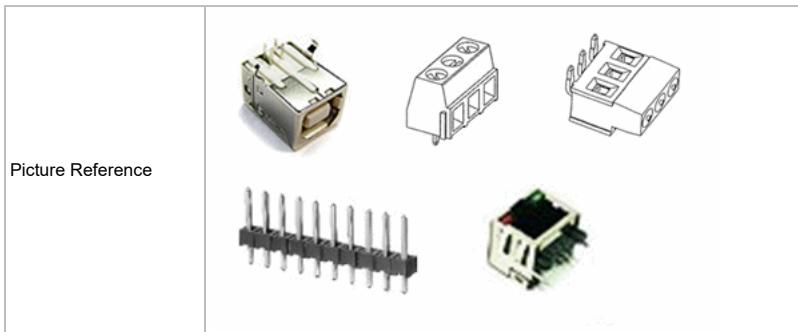
One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	connector-pressfit
Definition	Press fit connectors
Component	Connector - press fit
System Reference Image	
Picture Reference	

Connector - PTH

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	connector-pth
Definition	PTH connectors
Component	THMT connector
System Reference Image	



Connector - SMT

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	connector-smt
Definition	SMT connectors
Component	Connector - surface mount
System Reference Image	
Picture Reference	

Contour Wave

A smooth laminar wave used to solder the printed board assembly.

Control Pin

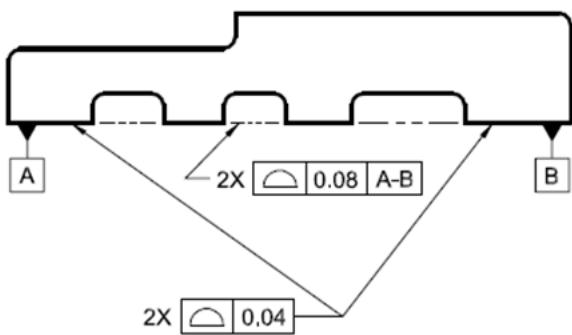
The pin on an Integrated Circuit (IC) that is delegated for a control function, ie.. mode, direction, output, etc.

Coplanar Surfaces

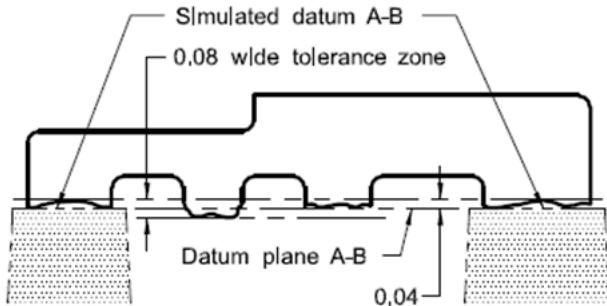
As relates to [GD&T](#) and [profile of a surface](#), the condition of two or more surfaces having all elements in one plane. A profile of a surface tolerance may be used where it is desired to treat two or more surfaces as a single interrupted or non-continuous surface, similar to a [flatness tolerance](#) applied to a single plane surface. The profile of a surface tolerance establishes a tolerance zone defined by two parallel planes within which the considered surfaces must lie.

Where two or more surfaces are involved, it may be desirable to identify which specific surface(s) are to be used as the datum feature(s). Datum feature symbols are applied to these surfaces with the appropriate tolerance for their relationship to each other. The datum reference letters are added to the [feature control frame](#) for the features being controlled.

This on the drawing



Means this



The datum features A and B must lie between two common planes 0.04 apart. The two designated surfaces must lie between two parallel planes equally disposed about datum plane A-B.

Coplanarity

Each lead of a multileaded item being at the same level or plane. This is important to ensure that all lead are properly soldered and or placed evenly (examples are HASL coating on PCB's, component leads).

Copper Feature

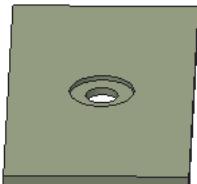
Conductive metal features such as [traces](#), [planes](#), component land patterns, [PTHs](#), and any other metal elements in a [PCB](#).

Copper Weight

Copper weight on a printed circuit board is typically expressed in ounces. This weight is the weight of one square foot of copper material in sheet form.

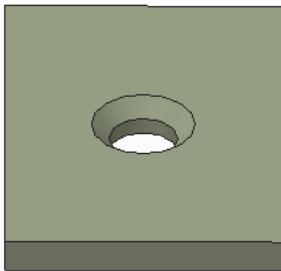
Counterbore

A cylindrical flat-bottomed hole that enlarges another coaxial hole. A common use is to allow a hex head bolt, when placed in the hole, to sit flush with or below the surface of the surrounding material.



Countersink

A conical hole that enlarges another coaxial hole. A common use is to allow the head of a countersunk bolt or screw, when placed in the hole, to sit flush with or below the surface of the surrounding material.



CPLD Complex Programmable Logic Device

Complex Programmable Logic Device (CPLD) is a programmable logic device with a complexity between that of PALs and FPGAs, and architectural features of both. CPLDs typically have the equivalent of tens of thousands of logic gates, allowing implementation of moderately complicated data processing devices.

CSA Canadian Standards Association

CSP Chip Scale Package

Chip Scale Package, or CSP, based on [IPC/JEDEC J-STD-012](#) definition, is a single-die, direct surface mountable package with an area of no more than 1.2 X the original die area. Another criterion that is often applied to qualify these packages as CSPs is that the chip pads and ball pitch should be no more than 1 mm. The IPC/JEDEC definition likewise doesn't define how a chip scale package is to be constructed, so any package that meets the surface mountability and dimensional requirements of the definition is a CSP, regardless of structure. For this reason, CSP's come in many forms - flip-chip, non-flip-chip, wire-bonded, ball grid array, leadless, etc. Typically there are no additional under-fill encapsulation material bond wires or interposer connections.

CTE Coefficient of Thermal Expansion

Cullet

Recycled broken or waste glass used in glass-making.

Custom Simulation Vectors

Custom Simulation Vectors are a series of logical vectors that are applied to the inputs of a device. These logical vectors known as "Test Vectors" are mostly used to stimulate the device inputs and check the outputs against the expected values. The generation of custom test vectors can be time consuming and are usually not available from the device vendor.

Customer

The intended recipient of a completed [design review](#) in the form of a [Collaboration](#). Customers may be either Internal Customers (Jabil employees) or External Customers who are employees of another company.

Internal Customers access the Collaboration via the Jabil intranet while External Customers access the Collaboration using the [Jabil Digital DFx Portal](#) after the Collaboration has been published. This allows them to review and respond to the design issues identified in the Collaboration.

Customers only have access to the Collaborate side of a Collaboration.

Customer Group

A collection of [collaborators](#) and / or [customers](#) that are available for assignment to a [Collaboration](#). Each Collaboration is created for and only available to a specific customer group.

Cyanoacrylates

Cyanoacrylate is the generic name for cyanoacrylate based fast-acting glues commonly sold under trade names like The Original Super Glue® and Krazy Glue.

Cycle Rate Gate

The slowest process step within the manufacturing process.

Cycle Time

The amount of time it takes an assembly to complete a process.

Cylindricity

As relates to [GD&T](#), a condition of a surface of revolution in which all points of the surface are equidistant from a common axis. A cylindricity tolerance specifies a tolerance zone bounded by two concentric cylinders within which the surface must lie.

CHARACTERISTIC	SYMBOL
CYLINDRICITY	

GD&T Coaxial

As relates to [GD&T](#), two or more three dimensional linear forms share a common axis. A [coaxial cable](#), as a common example, is a [concentric](#) three dimensional linear structure.

D

D-Pak

A Surface Mount Technology package type used for Surface Mount Technology power transistors and voltage regulators. It is a three terminal device, with one lead being a large tab to dissipate heat into the Printed Circuit Board.

Datum

The point, axis or plane that is the origin from which the location of geometric characteristics of features of a part are established.

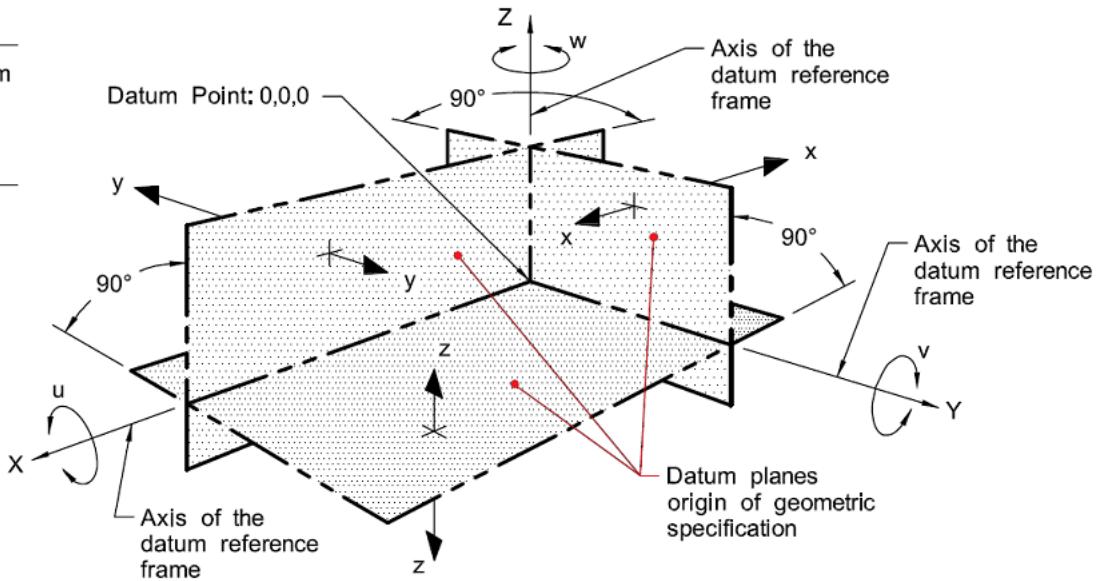
Degrees of Freedom

Translational Freedom

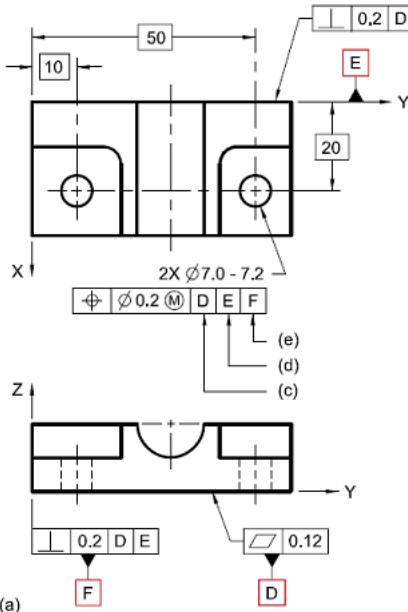
x = Along X Axis
y = Along Y Axis
z = Along Z Axis

Rotational Freedom

u = About X Axis
v = About Y Axis
w = About Z Axis

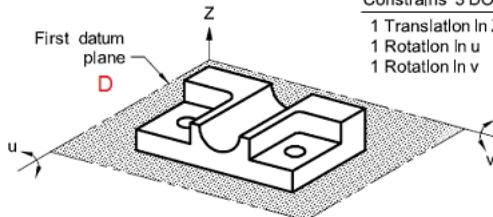


This is on the drawing



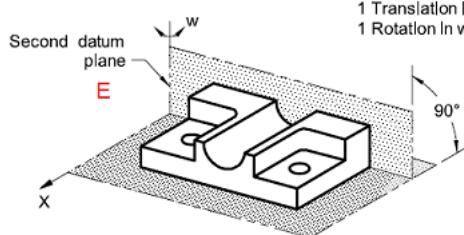
Means this

Constrains 3 DOF
1 Translation in Z
1 Rotation in u
1 Rotation in v



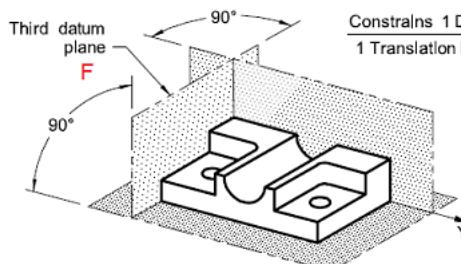
(c)

Constrains 2 DOF
1 Translation in X
1 Rotation in w



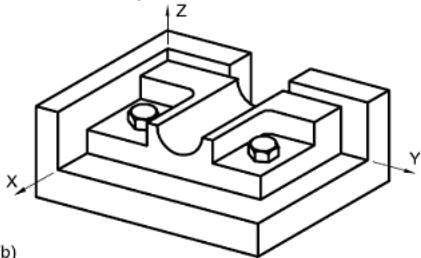
(d)

Constrains 1 DOF
1 Translation in Y

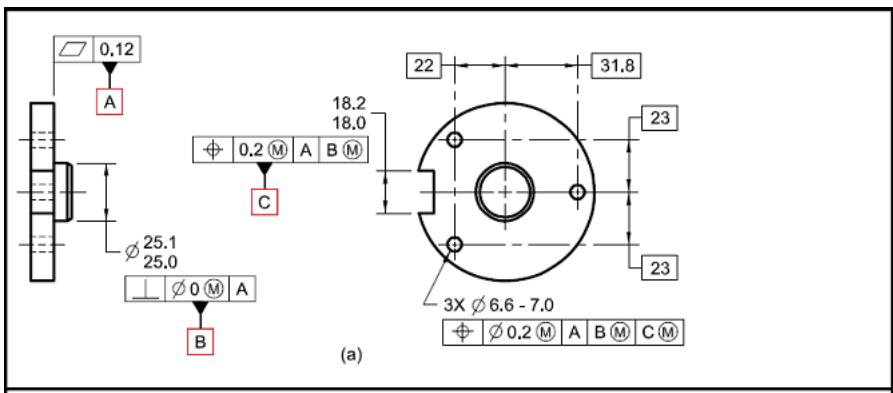


(e)

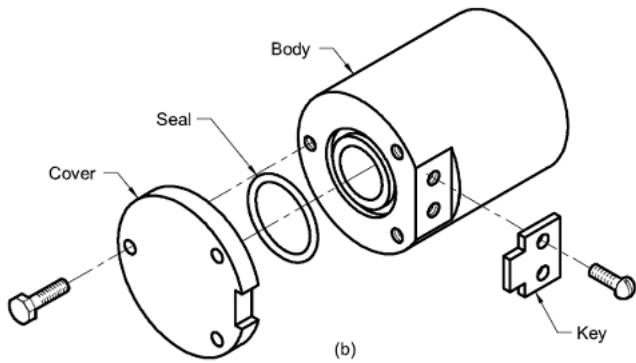
Functional assembly



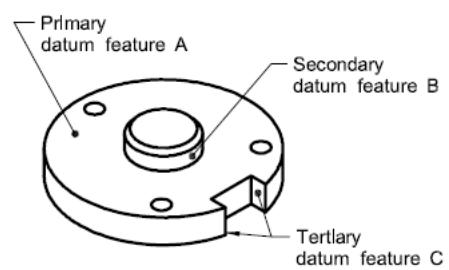
Datum definition for a [derived median line](#) (cylindrical part) and the purpose to have these datum defined (b) and the [derived median plane](#) defined at datum C.



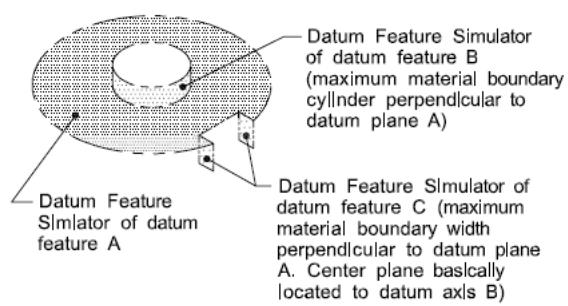
(a)



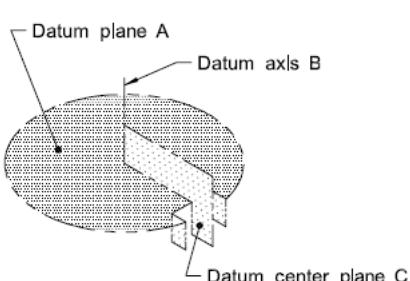
(b)



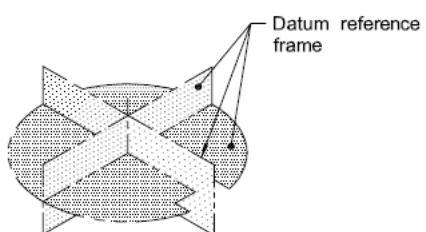
(a) Datum features



(b) Datum Feature Simulator



(c) Datum planes and axis established from the datum feature simulator

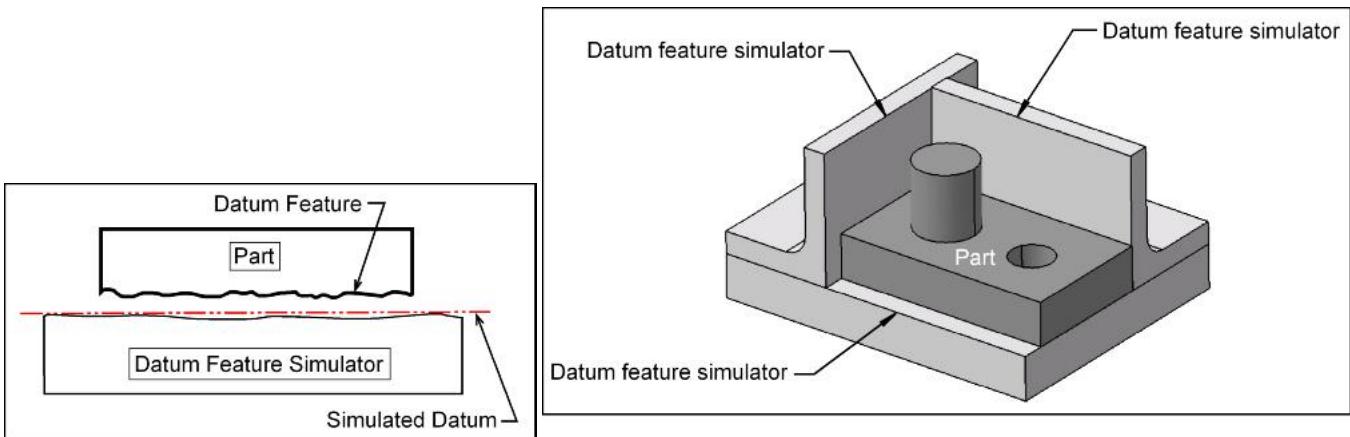


(d) Datum reference frame

4.10.4
4.8
4.7
4.4

Datum Feature Simulator

As relates to **GD&T**, the physical boundary used to establish a simulated **datum** from a specified datum feature.



De-Ionized Water (DI)

Deionized water, also known as demineralized water, is water that has had its mineral ions removed, i.e. cations such as sodium, calcium, iron, copper and anions such as chloride and bromide. Deionization is a physical process using ion exchange resins which bind to and filter out the mineral salts from water. Because the majority of water impurities are dissolved salts, deionization produces a high purity water that is generally similar to distilled water. However, deionization does not significantly remove uncharged organic molecules, viruses or bacteria, except by incidental trapping in the resin.

Deionized water is used in the wash process to clean PCB's.

Delamination

The condition of printed board layers losing their ability to maintain the bonding properties between fiberglass, copper, and resin.

Delay Lines

A delay line is a device where the input signal reaches the output of the device after a known period of time has elapsed.

Depanel

The process of removing individual printed circuit boards from a multi-up array of boards in a common panel.

Derived Median Line (DML)

As relates to **GD&T**, an imperfect (abstract) line formed by the center points of all cross sections of a feature. These cross sections are normal (perpendicular) to the axis of the **unrelated actual mating envelope**.

Derived Median Plane (DMP)

As relates to **GD&T**, an imperfect (abstract) plane formed by the center points of all line segments bounded by the feature. These line segments are normal (perpendicular) to the **cen** plane of the **unrelated actual mating envelope**.

Deviation

A customer directed, supplier requested, or internal Jabil authorized temporary departure from a defined process, procedure, or product requirement.

DFA Design For Assembly

Integration of components into the final assembly and other assembly technologies such as **3D Printing** and **Injection Molding**.

DFM Design For Manufacturability

Assembly of parts onto printed circuit boards and other technologies such as **Chip On Board** and **Printed Electronics**.

DFN Dual Flat No Leads

DFS Design For Sustainability

Optimization of a product design to reduce its negative impact on the environment, such as reducing carbon footprint, increasing recyclability, etc.

DFT Design For Test

Software or electrical assembly or testing.

DFx Docs

Documentation of **KnowledgeBase** processes, **DFx review processes**, definitions, glossary terms, help pages, general knowledge on various topics, etc.

DFX File

A universal Computer Aided Design file format. Commonly used as an output file from one Computer Aided Design system to another via a conversion media.

DI Water See **De-Ionized Water**

Diagnostics

A software that tests the functionality of an electronic assembly to a set of specifications and helps determine the cause of a system or board level failure.

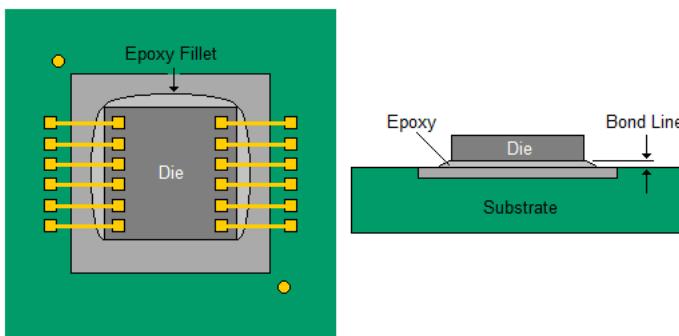
Die Attach

Also known as die bonding. The process of attaching a die to a substrate, package or another die for **COB**.

Epoxy Die Attach:

An epoxy bond is formed by attaching the die to the substrate with the use of epoxy glue. A drop of epoxy is dispensed on the substrate and the die is placed on top. The assembly needs to be heated to an elevated temperature to cure the epoxy properly.

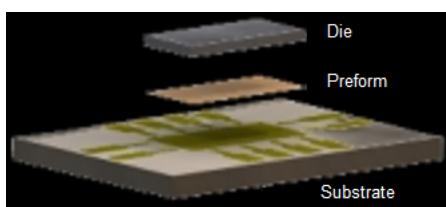
This process uses adhesives such as polyimide, epoxy and silver filled glass as die attach materials to mount the die on the die pad area. The mass of epoxy climbing the edges of the die is known as the die attach fillet. Excess die attach fillet results in contamination of the top die surface and not enough fillet may result in die lifting or die cracking. Epoxy bonding is preferred due to low curing temperature, can be used for a wide range of die sizes, and can be reworked easily.



Eutectic Die Attach:

Eutectic bonding describes a die attach technique with an intermediate metal layer ([Au / Al](#)) that can produce a eutectic system.

The bond is formed by partial melting and compression of a preform consisting of a mixture or alloy of two or more dissimilar metals in the joint between the die and substrate. Gold is very common preform material.



Dielectric

An electrical insulator that does not allow electric charges to flow through the material as they do in an electrical conductor.

Digital DFx Collaboration

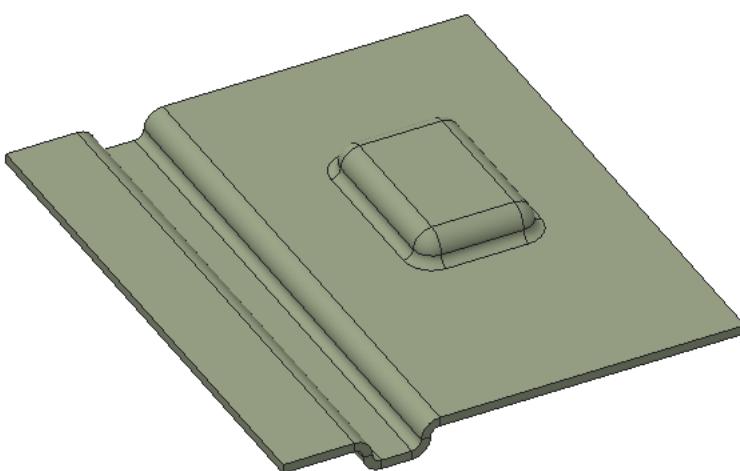
Contains the results of a [DFx review](#) that is used to interactively communicate and collaboratively resolve design issues for a product. A Collaboration may contain design issues derived from the [KnowledgeBase](#), the [Automated Rule Checking](#) review and / or [reviewer](#) generated custom items.

Also generically refers to the application, processes and tools integrated into the Jabil Digital DFx KnowledgeBase for the purposes of identifying and resolving design issues for a given product.

DIMM Dual Inline Memory Module

Dimple

Very similar to a [dowel](#), a deformation pressed into sheet metal that can have various shapes such as linear, rectangular or asymmetrical.



Dimpling

A small indentation in a surface. A few examples of dimpling can be seen as pin one indicators on components or may occur in via in pad applications.

Diode

An electrical device that allows current to flow in only one direction.

DIP Dual Inline Package

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	dip
Definition	THMT IC device
Component	DIP
System Reference Image	
Picture Reference	

Direction of Travel

Direction of travel is considered the direction that the board/assembly travels in during manufacture (typically left to right or right to left).

Disable Pins

IC component pin/s that when active stops or prevents a function.

Discrete 01005

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	discrete-01005
Definition	01005 chip components
Component	Chip capacitor, chip resistor, diode
System Reference Image	
Picture Reference	

Discrete 0201

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	discrete-0201
Definition	0201 chip components
Component	Chip capacitor, chip resistor, diode
System Reference Image	
Picture Reference	

Discrete 0402

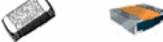
One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	discrete-0402
Definition	0402 chip components
Component	Chip capacitor, chip resistor, diode
System Reference Image	
Picture Reference	

Discrete 0603

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	discrete-0603
Definition	0603 chip components
Component	Chip capacitor, chip resistor, diode
System Reference Image	

Picture Reference	
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Discrete 0805

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	discrete-0805
Definition	0805 chip components
Component	Chip capacitor , chip resistor , diode
System Reference Image	
Picture Reference	

Discrete Components

An electronic component with just one circuit element, either passive (resistor, capacitor, inductor, diode) or active (transistor or vacuum tube).

Discrete Other

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	discrete-other
Definition	Chip components larger than 0805s and less than 0.250" (6.3500mm) tall
Component	1206 discrete , ceramic capacitor / resistor , diode , inductor , SMB, SOD
System Reference Image	
Picture Reference	

Discrete Tall

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	discrete-tall
Definition	Square or rectangular electrolytics and / or discrete types greater than 0.250" (6.3500mm) tall.
Component	SMT electrolytic capacitors , coils , inductors
System Reference Image	
Picture Reference	

Disturbed Solder

A disturbed solder joint is characterized by stress lines induced by movement of the connection during soldering.



DOE Design Of Experiments

Design Of Experiments. A statistical approach to experimental design.

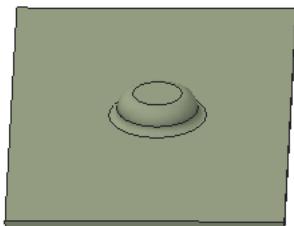
Double Shot

[Multi-injection molding](#) combines two or more materials injected into the mold to form a single part.



Dowel

A circular deformation pressed into sheet metal using the end of a pin or rod.

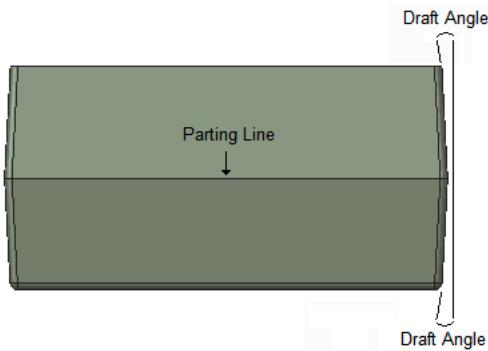


DPM(O) Defects per million (Opportunities)

A method of reporting or quantifying defects.

Draft Angle

An angle incorporated into the wall of an injection mold perpendicular to the [parting line](#) so that the opening of the cavity is wider than its base. Draft angles allow for easier ejection of the part from the mold.



DRAM Dynamic Random Access Memory

Drilled Breakaway See [Mouse Bite](#)

DSP Digital Signal Processor

DSP (Digital Signal Processor) - is a specialized microprocessor designed specifically for digital signal processing, generally in real-time computing.

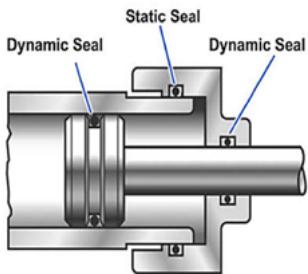
DSSR Double Sided Single Reflow

Dwell-time

The amount of time an assembly stays at a specific state and refers to a specific temperature the assembly must "dwell" or stay at for a period of time. Sometimes associated to the ESS (Environmental Stress Screening) process, wave soldering, or reflow soldering.

Dynamic Seal

A seal required to prevent leakage past parts that have linear or rotational motion.



Dyne

A unit of force specified in the centimeter-gram-second (CGS) system of units, a predecessor of the modern SI. One dyne is equal to 10 micronewtons. Equivalently, the dyne is defined as "the force required to accelerate a mass of one gram at a rate of one centimeter per second squared". The dyne per centimeter is the unit traditionally used to measure surface tension.

E

EAU Estimated Annual Usage

The estimated number of units to be required-produced in one year.

ECA Electrically Conductive Adhesive

ECN Engineering Change Notice

eCollaborator See [Customer](#)

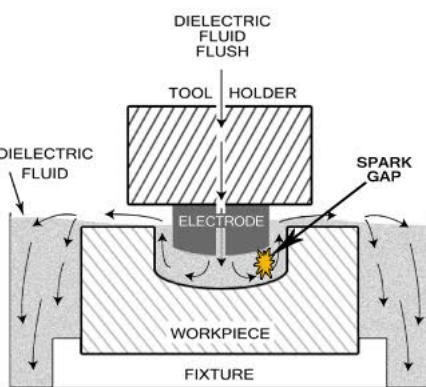
ECT Zoom See [Test Fixture - Rigid Pin \(ECT Zoom\)](#)

Edge Connector

A connector type that utilizes gold-fingers on the edge of a board to mate with a connector.

EDM Electrical Discharge Machining

Metal is removed from the work piece by fast recurring discharges from an electrode while covered by a dielectric fluid. The electrode has the negative shape of the desired one in the work piece.



EEPROM Electrically Erasable Programmable Read-Only Memory

EIAJ Electronic Industry Association Japan

EID Entry Identification Number

A sequential number permanently assigned to a glossary term, rule, guideline, or information page within the [KnowledgeBase](#). It is a unique identifier that will never be used again even if the original entry has been archived.

Elastomer

Derived from the words "elastic [polymer](#)". A material having both viscosity and elasticity with very weak inter-molecular forces. An example would be flexible materials such as rubber that are capable of recovering their original shape after being stretched.

Electroformed Stencil (EFAB)

A nickel [stencil](#) that is "grown" on a mandrel and has excellent [solderpaste](#) release characteristics.

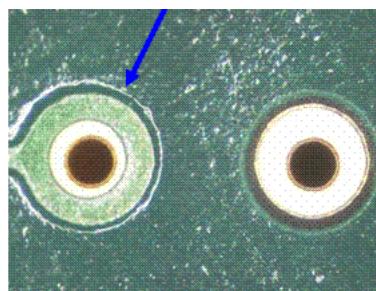
EMI Electromagnetic Interference

Encapsulation

The process of covering components in a protective shell in order to prevent physical and environmental damage following assembly. The encapsulant is a low viscosity liquid that allows it to flow and conform to the shape of the component prior to curing.

Encroached Via

The [soldermask](#) opening for a [via](#) is larger than the hole but smaller than the pad. Soldermask will overlap onto the via pad but not into the hole, typically used to prevent via pad to via pad shorts during assembly.

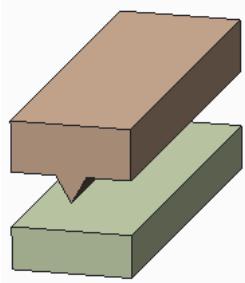


End of Life

In the context of manufacturing and product lifecycles, the final stage of a product's existence when it is no longer able to meet its intended function.

Energy Director

A v-shaped elevation on one of the two contact surfaces of parts to be [ultrasonically welded](#). It concentrates the energy as the ultrasonic vibrations begin to melt the material. As the melt progresses, the energy director turns fluid and flows to fill the space between the two parts. The downward force of the [horn](#) causes the melted material to spread over the entire contact surface forming a mechanical bond.



Engineering Change Notice (ECN)

A document or record authorizing [BOM](#) or other product changes (e.g. drawings, specification changes, etc.) throughout the lifecycle phases of a product. When Jabil generated, typically changes to Jabil partially or fully designed products.

ENIG Electroless Nickel/Immersion Gold

Electroless Nickel Immersion Gold. It is a type of surface plating commonly used for Printed Circuit Boards and consists of an Electroless nickel plating covered with a thin layer of immersion gold for protecting the nickel from oxidation.

EPBGA Electrically Enhanced Plastic Ball Grid Array

EPDM Ethylene Propylene Diene Monomer

M class rubber under [ASTM](#) standard D-1418, the M class comprises [elastomers](#) having a saturated chain of the polyethylene type (the M deriving from the more correct term polymethylene). Made from ethylene, propylene, and a diene comonomer that enables crosslinking via sulfur vulcanization. Often used when a component must prevent fluid flow while remaining flexible. It can also be used to provide cushioning or elasticity.

EPROM Erasable Programmable Read Only Memory

Equidistant

At equal distances.

ESD Electrostatic Discharge

ESS Environmental Stress Screen

This refers to the process of exposing a newly manufactured product or component to stresses such as thermal cycling and vibration in order to force latent defects to manifest themselves by failure during the screening process.

Ethernet

A family of frame-based computer networking technologies for local area networks (LANs).

Eutectic

An alloy or mixture whose melting point is lower than that of any other alloy or mixture of the same ingredients.

EXO External Overmolding

[Injection molding](#) technology that enables materials like fabric, leather and wood in the form of a 3D shape to be incorporated into a high volume [insert molding](#) manufacturing process.

F

FAB Drawing Fabrication Drawing

A single or set of dimensioned diagrams or drawings used to describe a printed circuit board as well as the detailed requirements for it.

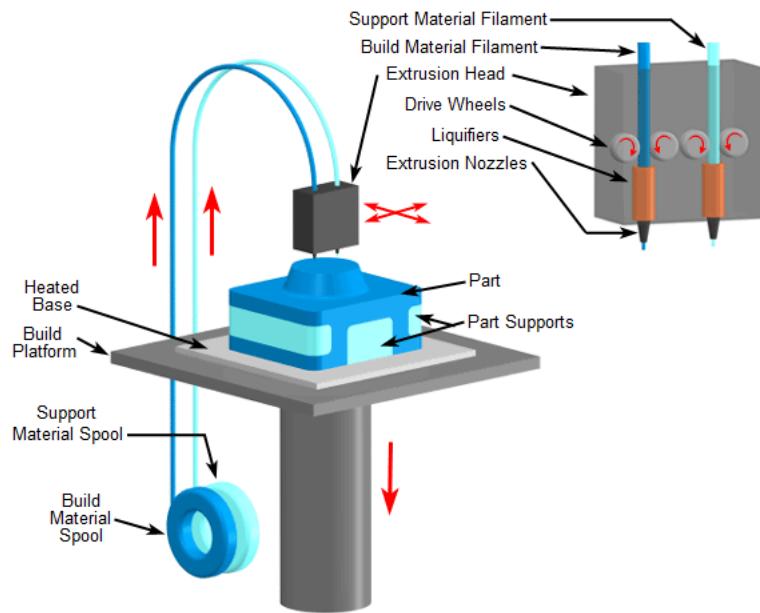
FAB Note Fabrication Note

Detailed requirement notes within a FAB Drawing for a printed circuit board.

FDM Fused Deposition Modeling

The term FDM is a trademark of Stratasys Ltd. and is also known generically as Fused Filament Fabrication (FFF). FDM is a [3D printing](#) process that works on an additive principle by laying down material in layers. A plastic filament is unwound from a coil and supplies material to an extrusion nozzle that can turn the flow on and off. The nozzle is heated to melt the material and can be moved in both horizontal and vertical directions and controlled by a Computer Aided Manufacturing (CAM) software package.

The model or part is produced by extruding small beads of [thermoplastic](#) material to form layers as the material hardens immediately after extrusion from the nozzle. There can be two extrusion nozzles, one to dispense the part material and one to dispense the support material.

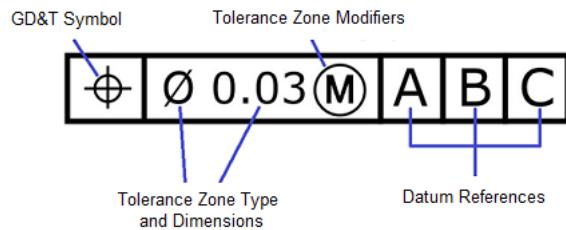


Feature Control Frame

As relates to [GD&T](#), expresses the required conditions and tolerances of a geometric control on a part's feature.

The feature control frame consists of four pieces of information:

- GD&T symbol or control symbol
- Tolerance zone type and dimensions
- Tolerance zone modifiers: [features of size](#), [max material condition](#)...
- Datum references (if required by the GD&T symbol)



Feature of Size (FOS)

As relates to [GD&T](#), a numerical value expressed in appropriate units of measure and used to define the size, location and geometric characteristics or surface texture of a part or part feature.

Feedstock

Material generated from plants, animals, microorganisms, and fungi, such as oils and gases, that can be used as ingredients in plastic resins and other products.

Ferrous

Iron (Fe) or metals containing iron.

FFF See [FDM](#)

FHS Finished Hole Size

Fiducial

Printed artwork features that are created in the same process as land patterns and provide a common measurable point for alignment during component mounting and printing layers

Finding

Fine Pitch Device

Generally refers to components with leads or balls as contacts that are very close together, less than or equal to 0.5000mm, and may require special processing or have additional requirements.

Fine Pitch Guided X-Probe Test Fixture

See [Test Fixture - Fine Pitch Guided X-Probe](#)

Firmware

The basic program of a computer or peripheral device stored in some sort of permanent memory, e.g. a PC BIOS, CD-ROM drive manager. Modern firmware is often stored in updateable flash memory, rather than requiring chip exchange.

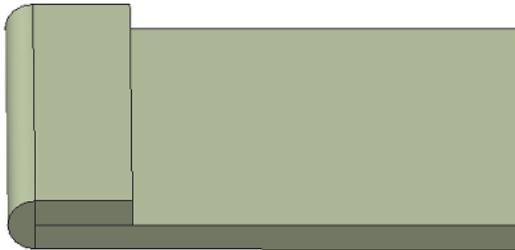
Flash

In manufacturing: This is excess material attached to a molded, forged, or cast product, which must usually be removed.

In electronics: It is a specific type of EEPROM (Electrically Erasable Programmable Read-Only Memory) that is erased and programmed in large blocks.

Flat Hem

The edge of a sheet metal part is bent over and then flattened to provide a rigid edge to the part.



Flatness

As relates to [GD&T](#), the condition of a surface or [derived median plane](#) having all elements in one plane. A flatness tolerance specifies a tolerance zone defined by two parallel planes within which the surface or derived median plane must lie.

CHARACTERISTIC	SYMBOL
FLATNESS	

Flex

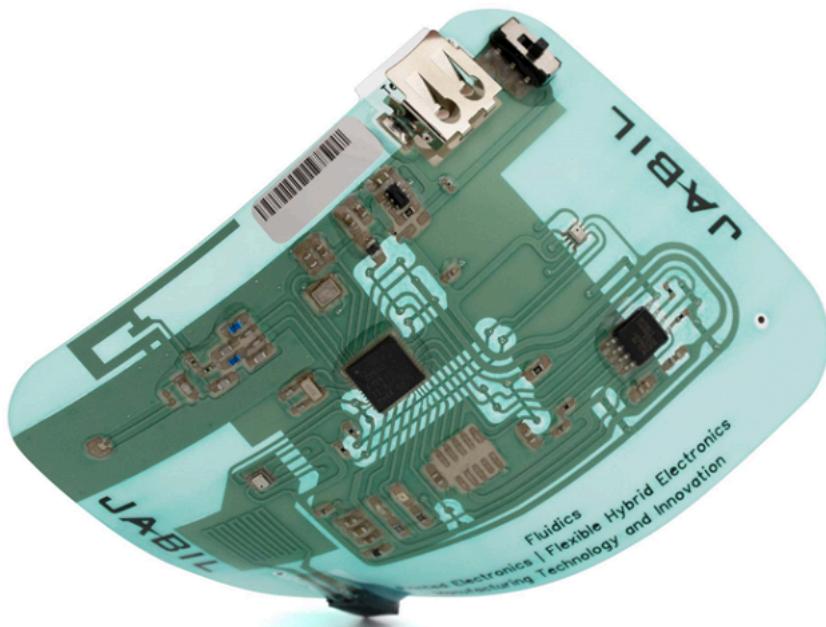
See [FPC](#)

Flex Printed Circuit

Designs on a flexible Substrate that allows the circuitry to be bent to fit a particular enclosure and or provide displays and control on different planes without the need for connectors to separate rigid boards.

Flexible Hybrid Electronics (FHE)

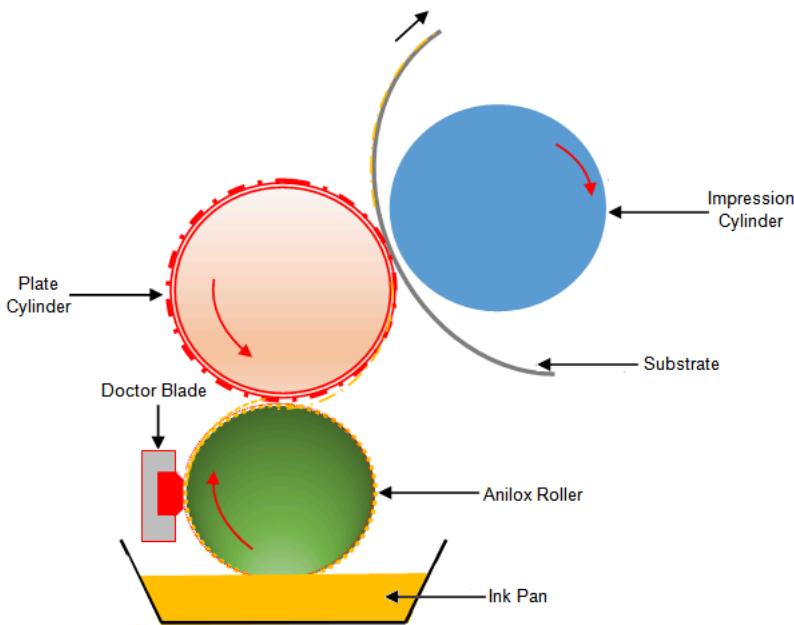
A combination of [printed electronics](#) and traditional [SMT](#) components. Commercial printing methods are used to deposit electrically functional inks as patterned traces on the substrate. Off-the-shelf components are then attached to form functional, flexible, and / or conformable electronic assemblies.



Flexo

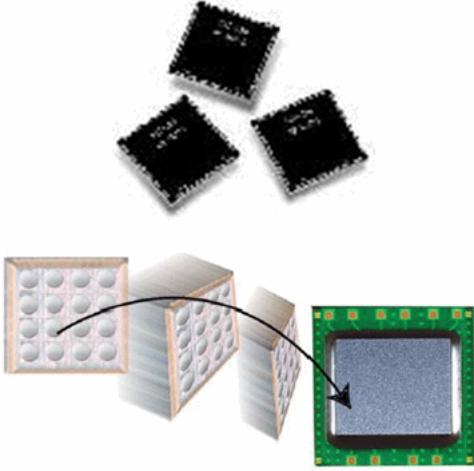
See [Flexography](#)

This printing technique is known for depositing a wide range of thicknesses with the same resolution. This is an indirect printing process and can use the same nominal resolution plates with anilox rolls of different cell volumes. The impression cylinder, plate, anilox roller, doctor blade and ink pan are the main parts of flexographic printing. The material used for the doctor blade and anilox is usually stainless steel. The plate is made of either a photopolymer or rubber. The image areas of the plate cylinder are raised with respect to the surface of the plate. The anilox roller transfers the ink from the inking unit to the image areas of the plate cylinder. Transferring the ink from the image areas onto the substrate is assisted by the impression cylinder.



Flip Chip

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	flipchip
Definition	An IC with no package that has solder balls / bumps on the bond pads.
Component	Flipchip, chip type package
System Reference Image	
Picture Reference	

Flooding

During the wave soldering process, solder that flows or "floods" up to the top-side of the PCB causing shorting and or damage to the components and or circuitry.

Footprint

Generally refers to the land pattern or [pad](#) layout of a component on a [PCB](#).

Form Factor

The physical size and shape of a Printed Circuit Board as defined by its peripheral dimensions.

FPC Flexible Printed Circuit

Also known as flex circuits, FPCB or Flex is a technology for assembling electronic circuits by mounting electronic devices on flexible plastic substrates, such as polyimide, PEEK (Polyether Ether Ketone) or transparent conductive polyester film. Flex circuits are often used as connectors in various applications where flexibility, space savings, or production constraints limit the serviceability of rigid circuit boards or hand wiring.

FPGA Field Programmable Gate Array

A field-programmable gate array (FPGA) is a semiconductor device that can be configured after manufacturing —hence the name "field-programmable". FPGAs are programmed using a logic circuit diagram or a source code in a hardware description language (HDL) to specify its function.

Functional Test

A test process that generally involves running a suite of tests on a completed assembly or system. Each individual test exercises a particular function of the end user's environment or feature of the system. The test environment is usually designed to be identical, or as close as possible, to the anticipated user's environment, including extremes of such.

Fusion Splicing

The act of joining two [optical fibers](#) end to end using heat.

G

Gasket

Mechanical seal which fills the space between two or more mating surfaces, generally to prevent leakage from or into the joined objects while under compression.

A material (such as rubber), or a part (such as an O-ring) utilized to make a joint fluid-tight.

GD&T Geometric Dimensioning and Tolerancing

A system for defining and communicating engineering tolerances. It uses a symbolic language on engineering drawings and computer generated three dimensional models that explicitly describes nominal geometry and its allowable variation.

Generator

Jabil employee who creates a [Collaboration](#), often also the [Collaboration Reviewer](#). Only the Generator can publish a Collaboration they created.

Gerber File

The machine tool code to drive a gerber photo plotter. The aperture list used to create the gerber data must also be supplied. The aperture list associates the size and shape of each aperture used in the machine tool code.

GIM Glass Insert Molding

[Insert molding](#) process that joins plastic and glass during [injection molding](#) that results in a seamless uni-body structure with increased bonding strength.

Global Fiducial

Fiducial marks that are used to locate the position of all of the land patterns on a printed circuit board.

GND Ground

Gold Board

An electronic assembly usually provided by the customer that is utilized as the standard for a particular activity. (ie Mechanical design, In-circuit test, Functional test, etc.)

Gold Finger

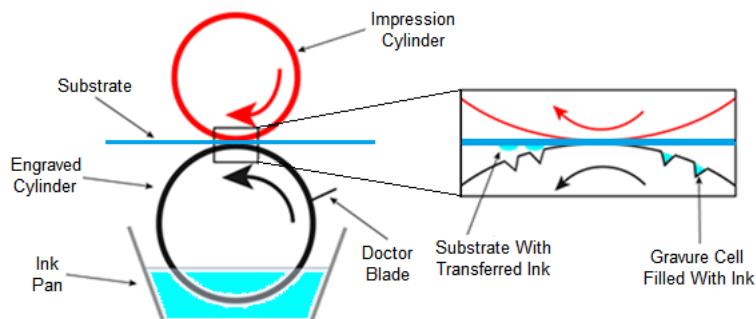
Gold plated printed circuit board fingers that form the traces of the edge connector which plug into matching sockets.

GPAX

Name of the reel that holds the connectors.

Gravure

This printing technique offers significant advantages through its high quality printing, high print speeds, variable ink film thickness, use of low viscosity inks and the simplicity of its process in transferring the ink onto the substrate. The gravure cylinder (engraved cylinder), doctor blade, impression roller and ink pan are the main components of the typical gravure printing process. The impression roller is made of rubber. Steel is the material used for the doctor blade. Chromium and copper coated steel is used for making the gravure cylinder. The image carrier is etched electromechanically, chemically or by laser to form an image area that is usually made up of small gravure cells. The gravure printing transfers large amounts of ink to the print area at high speeds with nominal distortion. As the cylinder rotates it picks up ink in the small cells and transfers it to the substrate with the impression cylinder, then the doctor blade wipes off the excess ink remaining on the cylinder. The angle of the doctor blade also plays a key role in printing. Transferring the ink from the cells onto the substrate is assisted by the impression cylinder.



Gravure Printing Process

Ground Plane

A layer of a board that is solid conductive material except for either anti-pads or thermal reliefs around the holes and has the signal ground resident.

Guided Probe See [Test Fixture - Guided Probe](#)

Gull Wing

A term used to describe leads such as those used on Small Outline Integrated Circuit and Quad flat pack packages. A gullwing lead extends out from the side of the component and has an L-shape bend at its end, extending down to the board surface.

H

HAF Heat Activated Film Adhesive

Double sided thermal adhesive film.

Half-Shear

The process of pressing part way but not completely through sheet metal. Often used for locating buttons, spot welding locations etc.



HASL Hot Air Solder Level

HDI High Density Interconnect

Header

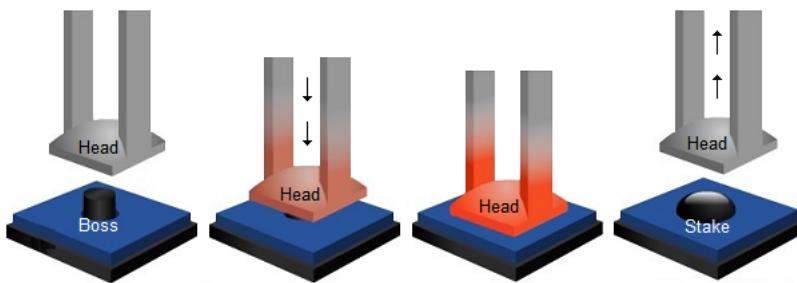
A primarily male style of electrical connector mounted on printed circuit boards

Heat Sink

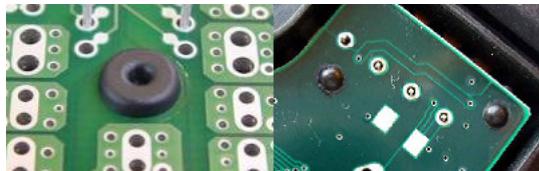
1. A specially constructed item with large surface area fixed to a component to cool it. May vary from a small piece of metal to a major construction incorporating cooling fans. An area of copper on a PCB in thermal contact with a high dissipation device to provide for cooling.
2. An area of copper on a PCB in thermal contact with a high dissipation device to provide for cooling.

Heat Staking

Heat staking joins two or more parts where at least one is made out of plastic. Often the other part is made from a different material. The plastic part has **bosses** that protrude through holes in the other part. The bosses are then compressed using heat and force to form a stake that mechanically locks the two parts together.



Examples:

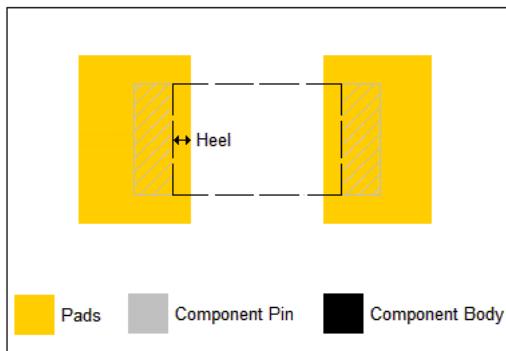


Heavy Metals

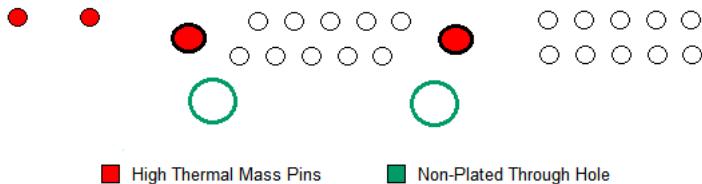
Heavy metals are generally defined as metals with relatively high densities, atomic weights, or atomic numbers. Some of these may be harmful to the environment such as lead, mercury, arsenic, cadmium, and chromium.

Heel

The distance between the inner edge of a component **pin (lead)** and the inner edge of a **PCB pad**. Also, the pad side closest to the component body.



High Thermal Mass Pin



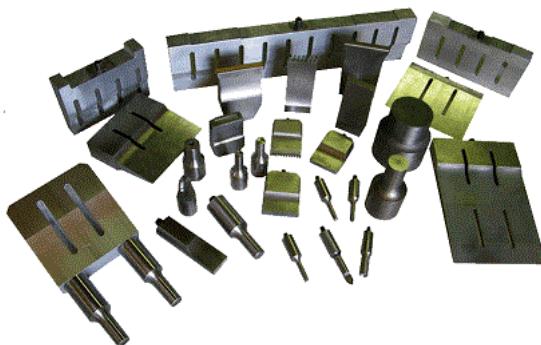
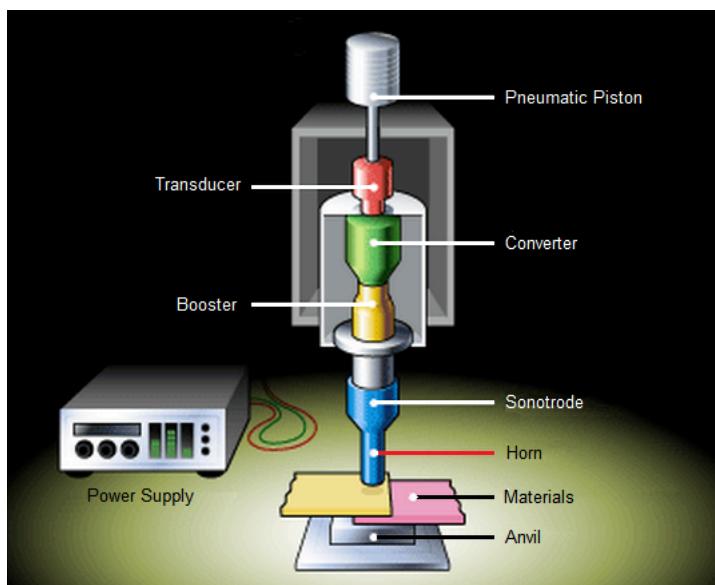
■ High Thermal Mass Pins ■ Non-Plated Through Hole

A **THMT** pin that is either attached to a conductive part of the component that will transfer significant heat away from the pin, or is a very large thermal mass by itself.

Examples would be the pins of electrolytic capacitors or the pins attached to the casing of an RJ45 connector.

Horn

The tip on an [ultrasonic welding](#) machine that makes physical contact with the part to be welded and transmits the high frequency acoustic vibrations.



Hot Air Knife (HAK)

The hot air knife is used following the wave soldering process to debridge or eliminate shorts on the printed circuit board. This is done using super heated air or gas flowing out of a nozzle against the underside of the pcb.

Hot Runner / Cold Runner

In a "hot runner" system, plastic is heated and the molten plastic is injected into the cavities of the mold. When the mold opens, there is no plastic waste from the runner system.

In a "cold runner" system, a channel between the two halves of the mold carries plastic from the [injection molding](#) machine nozzle to the mold cavities. Each time the mold opens to eject the newly formed plastic parts, the material in the runner is ejected as well, resulting in waste.

Hot-swaged

Process used to join dissimilar materials when one of the materials is a thermoplastic material (also called heat staking).

|

IC Integrated Circuit

iCollaborator See [Collaborator](#)

ICT In-Circuit Test

IEC International Electro-technical Commission

IMD See [IMR](#)

IMF See [IML](#)

A decorated 2D or 3D plastic foil is placed in the mold and bonds with the material during the [injection molding](#) process.

IML is a (2D) decorated foil [insert molding](#) process where the foil is an image that is overlayed on the part during injection molding.

IMF is a 3D decorated foil insert molding process where the foil is formed to a shape prior to injection molding.



Impedance

A measure of opposition to time-varying electric current in an electric circuit.

IMR In-Mold Rolling

Automated roll to roll foil feeding system; ink is printed onto a carrier then transferred to the first surface through [injection molding](#).

Inductance

The property in an electrical circuit where a change in the current flowing through that circuit induces an electromotive force (EMF) that opposes the change in current

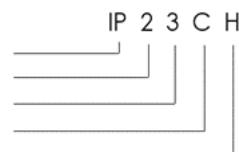
Inductor

A Thru-Hole Mount Technology or Surface Mount Technology device used for filtering noise or energy storage. Typically composed of a wire wound around a core made of ferrite or powdered iron.

Ingress Protection

Ingress Protection Codes are a set of standard rules and regulations published by [NEMA](#) for dust and water resistance.

Arrangement of the IP code



First Characteristic Numeral

Degrees of protection against solid foreign objects indicated by the first characteristic numeral		
First characteristic numeral	Degree of protection	
	Brief description	Definition
0	Non-protected	-
1	Protected against solid foreign objects of 50 mm diameter and greater	The object probe, sphere of 50 mm diameter, shall not fully penetrate
2	Protected against solid foreign objects of 12.5 mm diameter and greater	The object probe, sphere of 12.5 mm diameter, shall not fully penetrate
3	Protected against solid foreign objects of 2.5 mm diameter and greater	The object probe of 2.5 mm diameter shall not penetrate at all
4	Protected against solid foreign objects of 1 mm diameter and greater	The object probe of 1 mm diameter shall not penetrate at all
5	Dust-protected	Ingress of dust is not totally prevented, but dust shall not penetrate in a quantity to interfere with satisfactory operation of the apparatus or to impair safety
6	Dust-tight	No ingress of dust

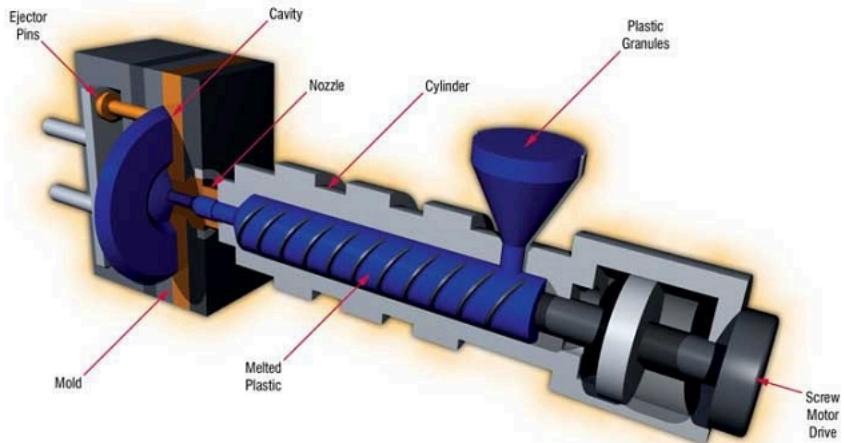
Second Characteristic Numeral

Degrees of protection against water indicated by the second characteristic numeral		
Second characteristic numeral	Degree of protection	
	Brief description	Definition
0	Non-protected	-
1	Protected against vertically falling water drops	Vertically falling drops shall have no harmful effects
2	Protected against vertically falling water drops when enclosure tilted up to 15°	Vertically falling drops shall have no harmful effects when the enclosure is tilted at any angle up to 15° on either side of the vertical
3	Protected against spraying water	Water sprayed at an angle up to 60° on either side of the vertical shall have no harmful effects
4	Protected against splashing water	Water splashed against the enclosure from any direction shall have no harmful effects
5	Protected against water jets	Water projected in jets against the enclosure from any direction shall have no harmful effects
6	Protected against powerful water jets	Water projected in powerful jets against the enclosure from any direction shall have no harmful effects
7	Protected against the effects of temporary immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is temporarily immersed in water under standardized conditions of pressure and time
8	Protected against the effects of continuous immersion in water	Ingress of water in quantities causing harmful effects shall not be possible when the enclosure is continuously immersed in water under conditions which shall be agreed between manufacturer and user but which are more severe than for numeral 7

Additional letter	Degree of protection
A	Protected against access with the back of the hand
B	Protected against access with a finger
C	Protected against access with a tool
D	Protected against access with a wire
Supplementary letter	Significance
H	High-voltage apparatus
M	Tested for harmful effects due to the ingress of water when the movable parts of the equipment (e.g. the rotor of a rotating machine) are in motion
S	Tested for harmful effects due to the ingress of water when the movable parts of the equipment (e.g. the rotor of a rotating machine) are stationary
W	Suitable for use under specified weather conditions and provided with additional protective features or processes

Injection Molding

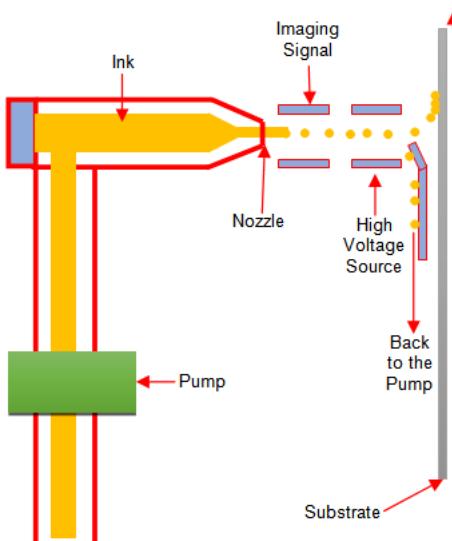
A thermoplastic, thermoset or elastomer material is fed into a heated barrel, mixed and forced into a metal mold cavity where it cools and hardens to the configuration of the cavity before being ejected.



Inkjet Printing

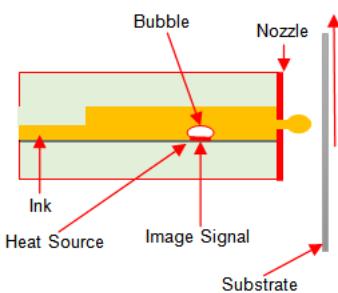
The main advantage of an inkjet printing process is the lack of need for a physical mask or image carrier, using a direct deposition technique. Inkjet printing is known for thin ink deposits. Inkjet is classified into continuous inkjet and drop on demand inkjet based on the ink transfer method.

A continuous stream of ink is generated in continuous inkjet printing. The ink is deflected towards the substrate by the use of a voltage source. The non-deflected ink is fed back into the cartridge.

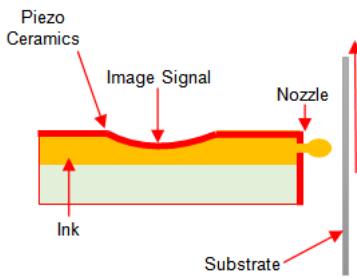


Continuous Inkjet Printing

Drop on demand inkjet is further classified as thermal inkjet and piezo inkjet printing processes. Drop on demand inkjet generates ink droplets with respect to image signals.



Thermal Inkjet Printing



Piezo Inkjet Printing

Insert Molding

An [injection molding](#) process in which [thermoplastic](#) material is molded around an insert piece or pieces placed in the molding cavity. This results in a single strongly bonded, integrated assembly with the insert or inserts encapsulated by the plastic. Inserts can be another plastic, metal, ceramic or just about any substance that can withstand the injection molding process.



Insertion Loss

The loss of signal power resulting from the insertion of a device in a transmission line or [optical fiber](#). Usually expressed as a ratio in dB relative to the transmitted signal power, it can also be referred to as attenuation.

Interference Joint See [Shear Joint](#)

Intrusive Reflow

A reflow process that allows [THMT](#) components to be soldered without the need for wave soldering, instead utilizing [solderpaste](#) or preforms.

IP Intellectual Property

IPA Isopropyl Alcohol

IPC Institute for Interconnecting and Packaging Electronic Circuits

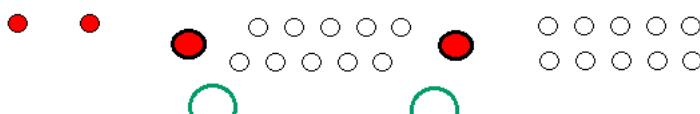
A trade association whose aim is to standardize the assembly and production requirements of electronic equipment and assemblies. It was founded in 1957 as the Institute of Printed Circuits. Its name was later changed to the Institute for Interconnecting and Packaging Electronic Circuits to highlight the expansion from bare boards to packaging and electronic assemblies. In 1999, the organization formally changed its name to IPC with the accompanying tagline, Association Connecting Electronics Industries.

IPC is accredited by the American National Standards Institute (ANSI) as a standards developing organization and is known globally for its standards. It publishes the most widely used acceptability standards in the electronics industry.

IR Infrared

For production, often refers to ovens that utilize infrared lamps as the heat source.

Isolated Pin



■ Isolated Pins ■ Non-Plated Through Hole

A [THMT](#) pin that does not have any other adjacent THMT pins whose center to center distance is $\leq 0.100"$ (2.5400mm).

J

J-Leaded

A J-Lead package is a Surface Mount Technology device that consists of J type leads as opposed to gullwing leads. This defines the "J" shape of the lead used to connect the package to the board pad for a Surface Mount Technology device.

JEDEC Joint Electronic Device Engineering Council

JIT Just-In-Time

JTAG Joint Test Action Group

Joint Test Action Group (JTAG) is the common name used for the IEEE 1149.1 standard entitled Standard Test Access Port and Boundary-Scan Architecture for test access ports used for testing printed circuit boards using boundary scan. JTAG is often used as an IC debug or probing port.

K

Kapton

A polyimide film/tape by DuPont exhibiting outstanding thermal, mechanical, chemical and electrical properties. This material allows labels to sustain high temperatures during the reflow and wave solder process.

Keep-out

An area of a PCB, on one, some or all layers, in which any of routing, VIAs or components may not appear. e.g. Areas to be cut-out or near mounting points, or areas under components where pin-through will be required.

KnowledgeBase

The knowledge management database that contains Jabil design guidelines in addition to documentation of KnowledgeBase processes, design review processes, definitions, glossary terms, help pages, general knowledge on topics, etc.

KOHM Kilo-ohm (1000 ohms)

L

Lambda Wave See [Contour Wave](#)

Lamination

The fabrication step to unite the layers of fiberglass, copper, and resin into a printed board.

Land See [Pad](#)

Layer Stack

The order in which the individual layers of a board are put together to form the finished board.

LCCC Leadless Ceramic Chip Carrier

Lead See [Pin](#)

Lead-Free

A generic term for any solder alloy that does not include lead in its composition. They were developed in response to the RoHS legislation banning lead in electronic products.

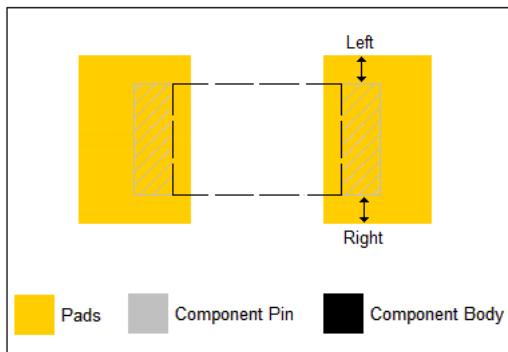
Least Material Condition (LMC)

As relates to [GD&T](#), the condition in which a feature of size contains the least amount of material within the stated limits of size (e.g. maximum hole diameter, minimum shaft diameter).

LED Light Emitting Diode

Left and Right

The distance between the side of a component [pin \(lead\)](#) and the side of a [PCB pad](#). The left or right of a pad moving outward from the component body.



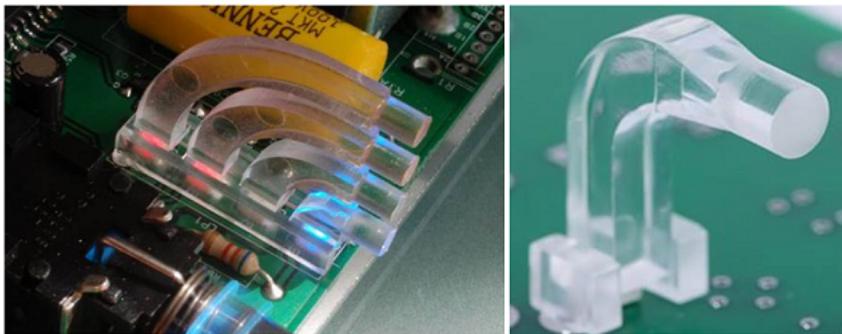
LIF Low Insertion Force

The maximum allowable insertion force into a socket for LIF is less than one (1) ounce per pin.

Light Pipe

Clear tubes that transmit light from a light source, such as an [LED](#) on a [PCB](#), to a user interface. Designed to carry light short distances with high efficiency, light pipes can bend light around corners and tight spaces delivering excellent visual indication with minimal loss of light intensity.

An [optical fiber](#) or a solid transparent plastic rod for transmitting light lengthwise.

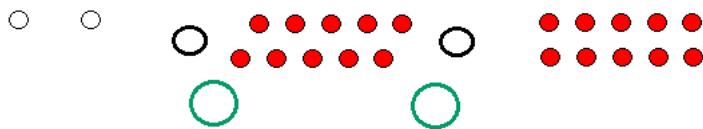


LMB See [Material Boundary](#)

Local Fiducial

A fiducial mark (or marks) used to locate the position of an individual land pattern on a printed circuit board.

Low Thermal Mass Pin



■ Low Thermal Mass Pins ■ Non-Plated Through Hole

A THMT pin that is not attached to any other conductive part of the component that would transfer significant heat away from the pin, nor is a large thermal mass by itself.

Examples would be the pins that are not attached to the casing of an RJ45 connector or the pins of a standard 10 pin header.

LPI Liquid Photo Imageable

M

Mask Pallet

Mask pallets are used to protect certain areas of [PCBs](#) while exposing others. These are used in various processes including [wave soldering](#), [selective soldering](#), [reflow soldering](#), [conformal coating](#), etc.

They are also known as masked pallets, selective pallets, or pallets.

Material Boundary

Maximum Material Boundary (MMB) and Least Material Boundary (LMB) are boundaries that the datum feature of size will not violate. The Regardless Material Boundary (RMB) only applies when MMB or LMB are not specified.

The MMB is calculated by combining the [maximum material condition](#) size with any applicable geometric tolerance on the datum feature of size. The MMB is always outside the material.

The LMB is calculated by combining the [least material condition](#) size with any applicable geometric tolerance on the datum feature of size. The LMB is always inside the material.

The RMB is in affect when there are no modifiers in the [feature control frame](#).

Material Change Notice (MCN)

The notice or approval process required to change a Manufacturer's Part Number (MPN) within the customer Approved Manufacturer's Parts List (AMPL) that does not drive a change in the Jabil Part Number (JPN) or [BOM](#).

Max Material Condition (MMC)

As relates to [GD&T](#), the condition in which a feature of size contains the maximum amount of material within the stated limits of size (e.g. minimum hole diameter, maximum shaft diameter).

MCAD Mechanical Computer Aided Design

MELF Metal Electrical Face

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	melf
Definition	Cylindrical or tubular shaped SMT packages, often used for diodes .
Component	MELF
System Reference Image	
Picture Reference	

Mentor

A computer aided design system used for physical design of Printed Circuit Boards.

Metal Features

Traces, planes, area fills, vias, and test points.

Metal-cased Components

Components that have a metal exterior, these components may require additional review. Examples are some crystals (both [SMT](#) and Leaded types, Transistors, etc).

Micro-Hole Molding

[Insert molding](#) process that integrates plastic mechanical sub-features with a decorated metal cover during [injection molding](#). Micro-hole undercuts are present on the metal surface so that the plastic fills the undercut and forms a strong bond with the metal during molding.

Micro-Vias

Laser drilled or mechanically drilled [blind](#) or [buried](#) vias, typically 1 to 2 [PCB](#) layers deep.

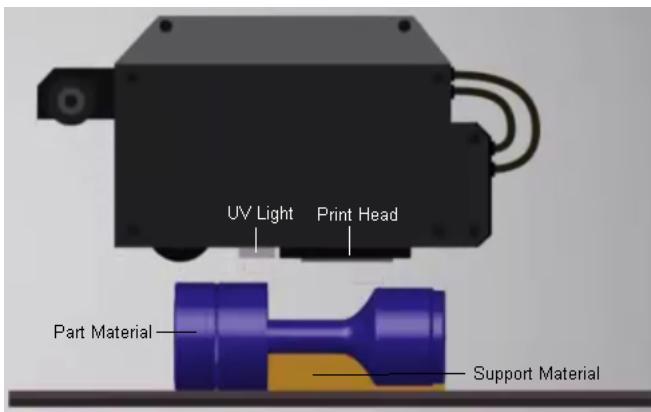
Microorganism

An organism too small to be viewed by the unaided eye that can be single-celled or a colony of cells. Examples include bacteria, protozoa, some fungi, and some algae.

Mid Chip See [Solder Ball](#)

MJP MultiJet 3D Printing

An inkjet [3D printing](#) process that prints resin and support material layer by layer while the resin is cured with UV light. The print head and UV light are both contained within a single cross piece that moves back and forth across the work area so printing and curing occur in a single pass. The next layer is printed and cured, fusing with the previous layer.



MLCC Multilayer Ceramic Capacitor

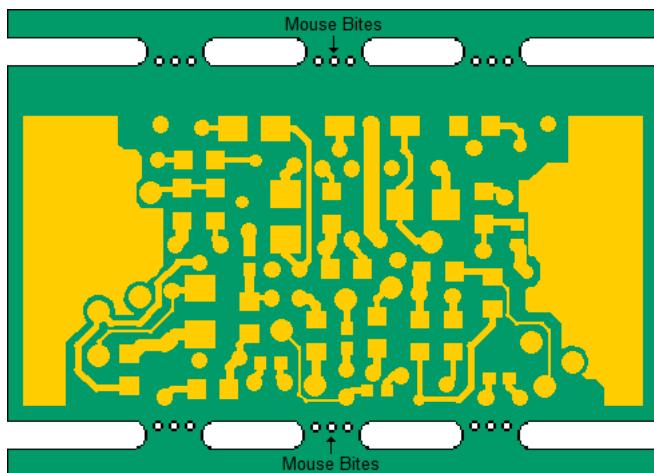
MMB See [Material Boundary](#)

Mounting Hole

Mounting holes are used within the board area as a means of attaching the printed circuit board to the assembly.

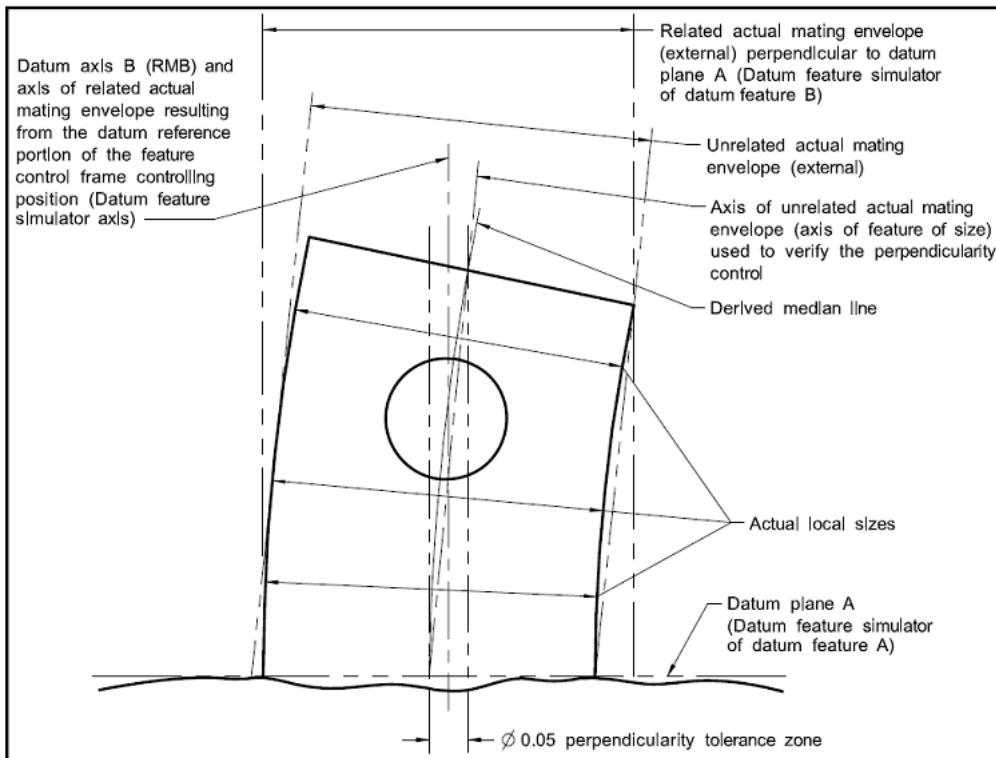
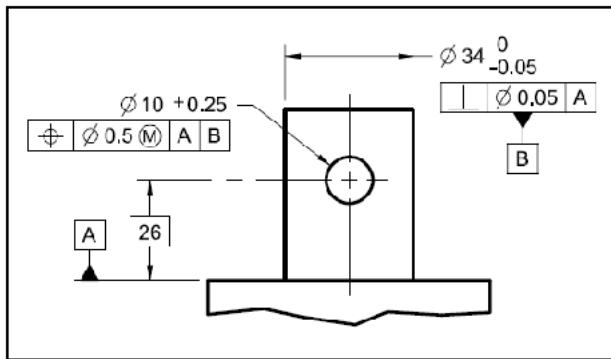
Mouse Bite

Mouse bite or drilled breakaway tabs consist of a series of holes drilled side by side along a flat section of the circuit board between rout cut-outs. The tabs can then be broken off from the board after manufacturing processes are complete.



Related Actual Mating Envelope

As relates to [GD&T](#), a similar perfect feature counterpart expanded within an internal feature or contracted about an external feature while constrained either in orientation or location both to the applicable datum.



N

NBR Nitrile Butadiene Rubber

An oil-resistant synthetic rubber produced from a copolymer of acrylonitrile and butadiene. Its main applications are in fuel hoses, [gaskets](#), rollers, and other products in which oil resistance is required.

Negative Layer See [Power and Ground Layers](#)

NEMA National Electrical Manufacturer's Association

Net List

A list of point to point electrical connectivity comprised of net name, component reference designator, and component pin number.

Nets

Nets are the "wires" that connect things together in the circuit. There may or may not be any special attributes associated with the nets in a design, depending on the particular language the netlist is written in.

Network

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	network
Definition	Multiple capacitors or resistors within a single package.
Component	Network component
System Reference Image	
Picture Reference	

NIC Card Network Interface Card

A personal computer Add In Card that provides a personal computer with a network connection.

No-Clean Flux

Many fluxes fall into this category because the flux residues are not harmful to assemblies and can be left on the printed circuit board. It does not mean there will be no residues.

Non-conveyed PCB Edge

The edges of the [PCB](#) that are not in contact with the rails of the manufacturing or conveying equipment. They are sometimes referred to as the leading and trailing edges.

Non-Ferrous

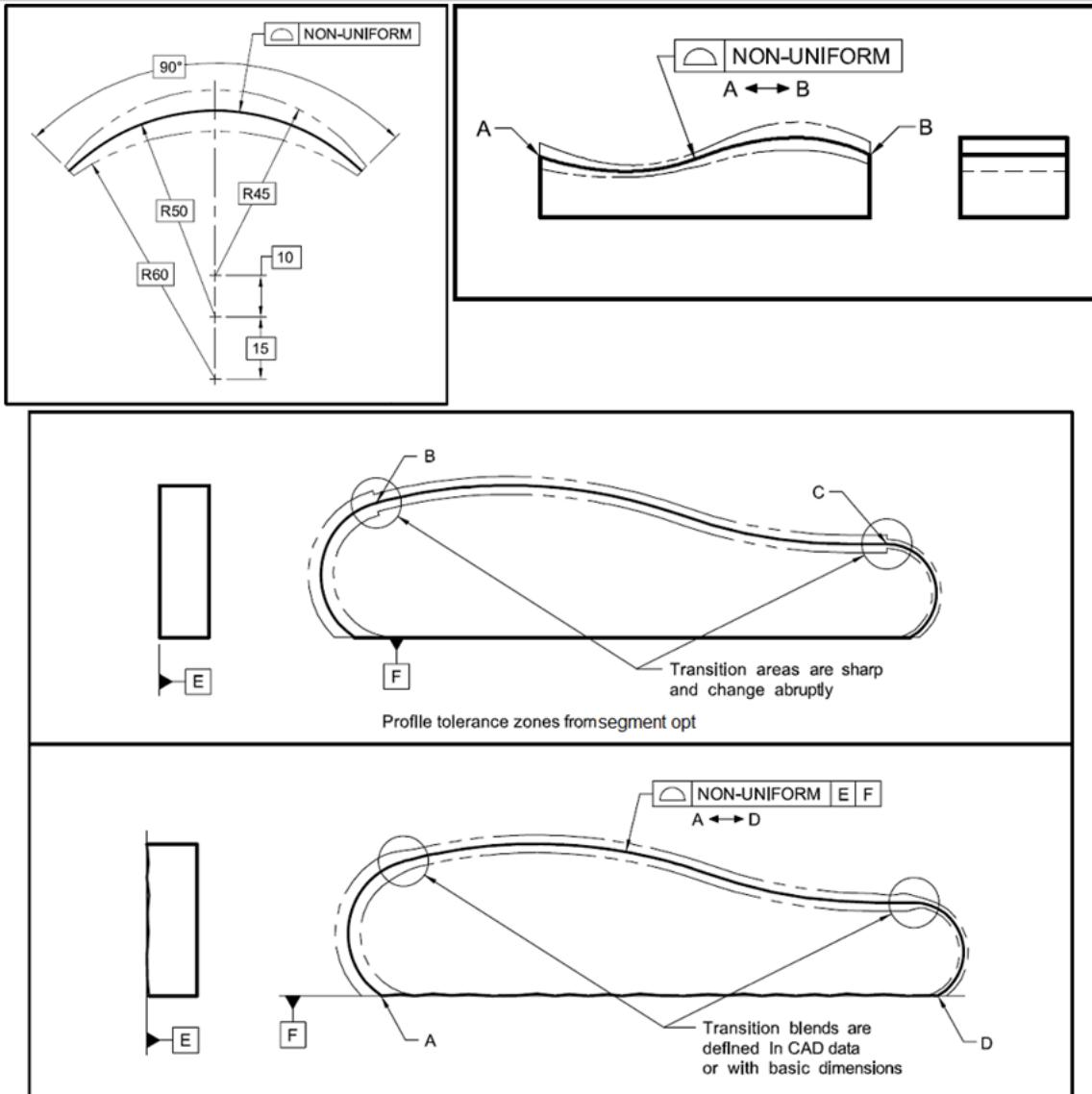
Metals that do not contain iron (Fe).

Non-Renewable Energy Sources

Natural resources that cannot be replaced by natural means, at a pace quick enough to keep up with consumption. Examples include fossil fuels and nuclear power.

Non-Uniform Zone Profile of a Surface – Non-Uniform Zone

As relates to [GD&T](#) and [profile of a surface](#), a [maximum material](#) boundary and a [least material](#) boundary of a unique shape that encompasses the [true profile](#). These boundaries are defined in a [CAD](#) file or by basic dimensions on a 2D drawing with phantom lines to indicate the tolerance zone. The term "NON-UNIFORM" replaces the tolerance value within the feature control frame.



Nonphysical

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	nonphysical
Definition	Dummy placements: fiducials , mounting holes , test points , etc. not relying on no-pop attribute that can be deleted by user.
Component	N/A
System Reference Image	N/A
Picture Reference	N/A

NPI New Product Introduction

NPTH Non-plated Through Hole

NRE Non-Recurring Expenses

NRE as applied to a board product typically includes all new product introduction costs. Examples of NRE would include product design, manufacturing assembly instructions, and tooling.

O

O-ring

Also known as a packing or [toric](#) joint, is a mechanical gasket in the shape of a torus. It is a loop of [elastomer](#) with a round cross-section, designed to be seated in a groove and compressed during assembly between two or more parts creating a seal at the interface.

OA Organic Acid

A type of water-soluble flux.

OCC Organic Coated Copper

OCI Odd Component Insertion

OEM Original Equipment Manufacturer

Omegameter Test

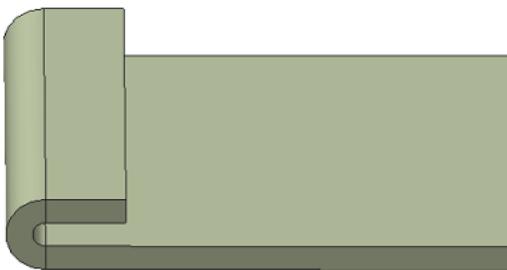
A post assembly cleanliness test used to ensure flux and other residue materials that may have been applied during the assembly process is sufficiently removed.

Open Cell

A [gasket](#) / seal product whose cells are not totally enclosed by it's walls and open to the surface, either directly, or by interconnecting with other cells. Open cell materials typically res compression set and force relaxation better than [closed cell](#) materials, but are not as effective at resisting water absorption in an uncomressed state.

Open Hem

The edge of a sheet metal part is bent over to form a "U" shape. This type of hem is often used to attach one sheet metal part to another.



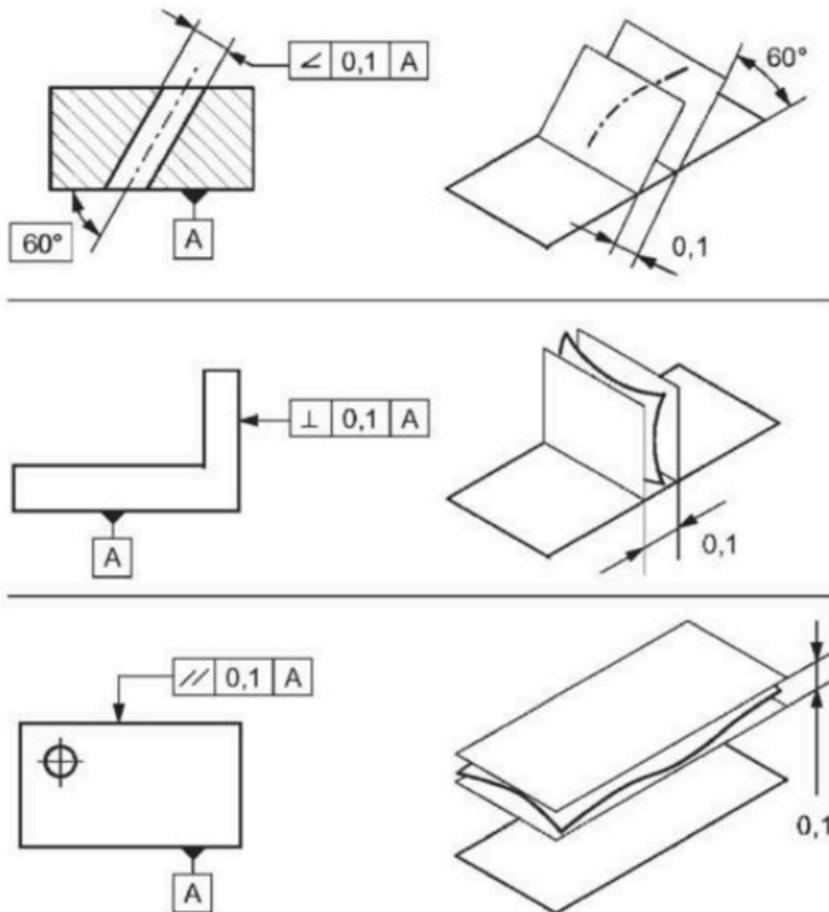
Optical Fiber

A flexible, transparent fiber made by drawing glass (silica) or plastic into a very fine diameter. Optical fibers are used most often as a means to transmit light between the two ends of fiber and find wide usage in fiber optic communications. They permit transmission over longer distances and at higher bandwidths (data rates) than wire cables. Fibers are used instead of metal wires because signals travel along them with lesser amounts of loss.

Orientation

As relates to [GD&T](#), a complex tolerance that controls parallel, perpendicular and all other [angular](#) relationships relative to a datum reference.

TYPE OF TOLERANCE	CHARACTERISTIC	SYMBOL
ORIENTATION	ANGULARITY	∠
	PERPENDICULARITY	⊥
	PARALLELISM	//



OSP Organic Solder Preservative

Copper on (PWB's) oxidizes, one way of protecting it is to coat it with an Organic Solderability Preservative, or OSP. OSP coated copper is different from the other surface finishes because it covers the solderable surface and is eliminated during soldering, rather than consumed. OSP copper has some issues since it is a non-metallic coating, the test probes cannot pierce the coating to get to the copper underneath. One way around this is to apply [solderpaste](#) to the test probe pads, and allow the solder to wet through the OSP.

OTP One Time Programmable Read-Only Memory

Overprint

Solderpaste printing process where the [stencil](#) aperture (opening) for a component pad is larger than the boards pad area for the same component.

P

Pad

Sometimes referred to as a toeprint or land, the end of a circuit line on the [PCB](#) for the attachment of a component [pin \(lead\)](#) via soldering. [SMT pads](#) are usually rectangular. Pads surrounding plated through holes are usually circular and include the mount types [THMT](#) and [press fit](#).

PAL Programmable Array Logic

Pallet See [Mask Pallet](#)

Panel

This term is often used interchangeably with array. See entry 189.

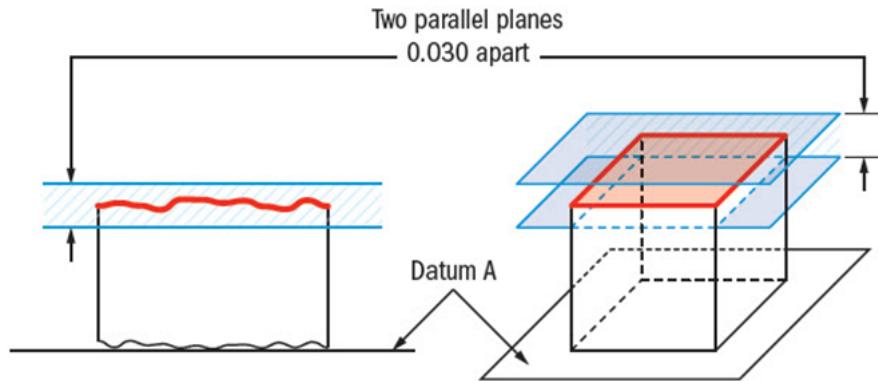
Multiple [PCBs](#) linked together.

The "PCB Shop Fabrication Panel" is the panel that a PCB fab house uses to fabricate boards and arrays. It usually contains several "customer PCB arrays" and / or it may contain "loose" customer PCBs, also referred to as "single PCBs".

Parallelism

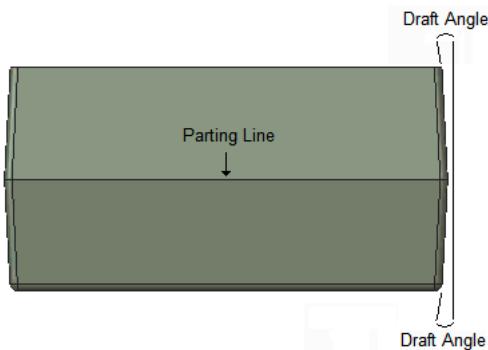
As relates to [GD&T](#), the condition of a surface or feature's [derived median plane](#), equidistant at all points from a datum plane; or a feature's [derived median line](#), equidistant along its length from one or more datum planes or datum axes.

TYPE OF TOLERANCE	CHARACTERISTIC	SYMBOL
ORIENTATION	PARALLELISM	//



Parting Line

The plane in which the two halves of an injection mold meet and the draft angles change direction. A line or seam appearing on a molded part.



Passive Components

Capacitors and resistors.

PB Printed Board

PBA Printed Board Assembly

PBGA Plastic Ball Grid Array

PBT Polybutylene Terephthalate

PC Printed Circuit

PCB Printed Circuit Board

PCBA Printed Circuit Board Assembly

PE Polyethylenes

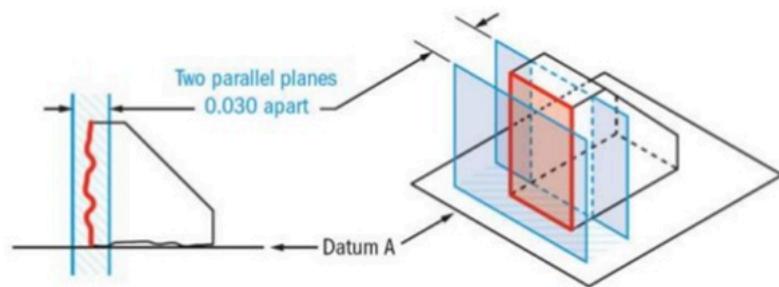
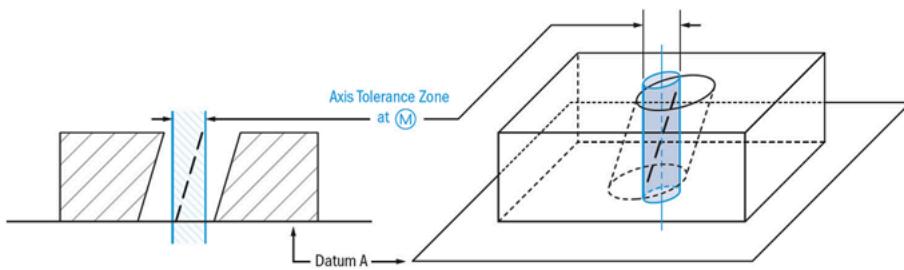
PEEK Polyetheretherketone

PEI Polyether Imide

Perpendicularity

As relates to **GD&T**, the condition of a surface, a feature's **derived median plane** or a feature's **derived median line** at a right angle to a datum plane or datum axis.

TYPE OF TOLERANCE	CHARACTERISTIC	SYMBOL
ORIENTATION	PERPENDICULARITY	



PES Polyether Sulfone

PET Polyethylene Terephthalate

Pin

Sometimes referred to as a lead, the end of a circuit in a component for the attachment to a **PCB pad**. **SMT** pins rest on the surface of the PCB pad. **THMT** and **press fit** pins are inserted into the barrel of plated through holes.

Pin-in-paste

A reflow process that allows through hole components to be soldered without the need for wave soldering utilizing **solderpaste** or pre-forms.

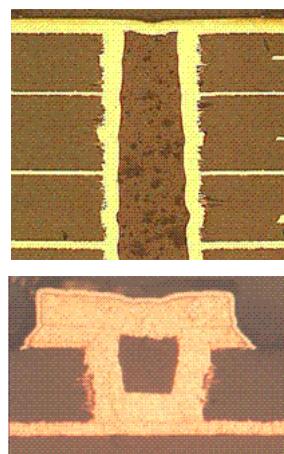
Pitch

The shortest distance between the center of a **pin** and the center of the closest adjacent pin.

Pad pitch is defined in the same way as pin pitch but considering only those pads on the **PCB** that are directly underneath the component's pins.

Plated Over Filled Via (POFV)

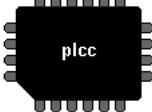
Via is plated, filled, and then plated over the top of the planarized fill material. A non-conductive epoxy is typically used as fill material and done prior to the external layer circuitry formation.



PLCC Plastic Leaded Chip Carrier

One of the component types used for **Automated Rule Checking (ARC)**.

ARC Comp Type	plcc
---------------	------

Definition	A square or rectangular SMT package for ICs with J-leads on all four sides. Also J-leaded sockets, X1 sockets.
Component	PLCC, PLCC sockets
System Reference Image	

Picture Reference	
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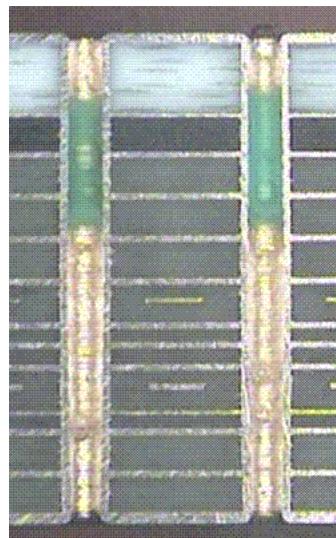
PLD Programmable Logic Device

Plugged Via

Via plugging is normally used to either prevent solder from wicking through the holes, providing a planar pad contact, or a good seal for a vacuum application. Methods include: mask plugging, conductive/nonconductive epoxy, silver, and variations of these.

A secondary [soldermask LPI](#) operation, [vias](#) are plugged within the barrel and no soldermask is present on either the top or bottom surfaces at the via site.

The purpose is to impede solder flow during assembly but the fill percentage and depth to the soldermask surface from either side is not specified.



PMMA Polymethyl Methacrylate

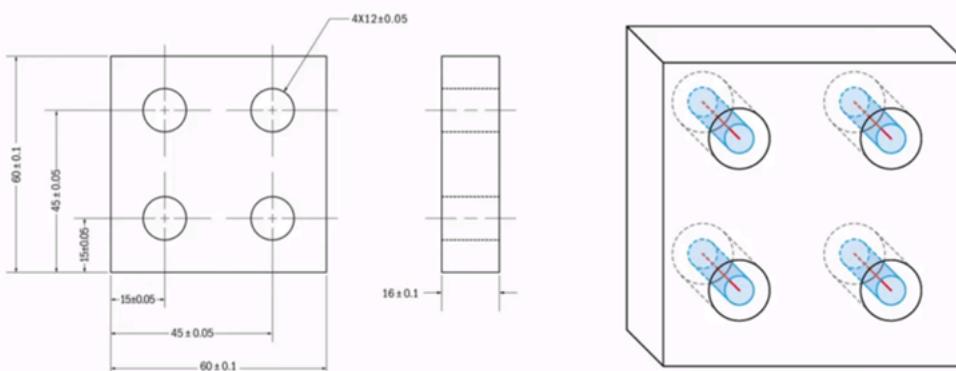
Polyester See [PET](#)

Polymer

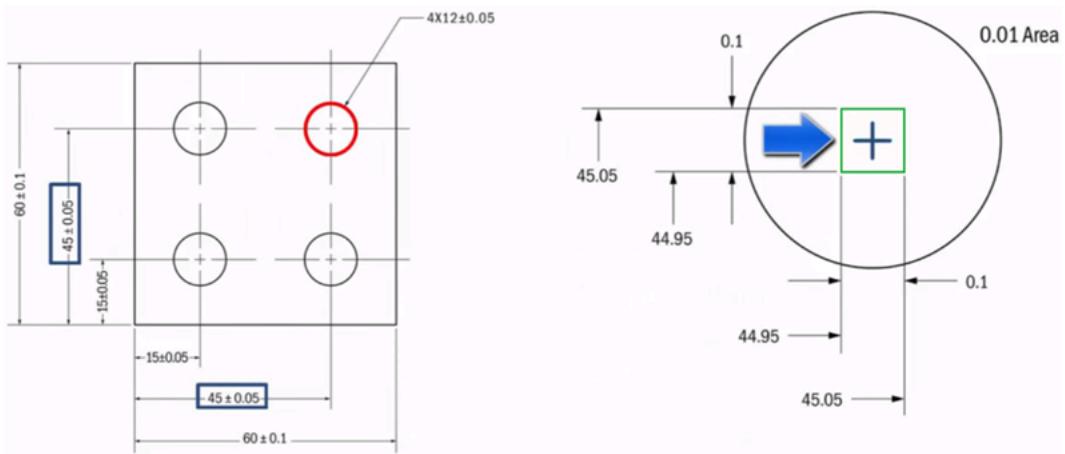
A chemical compound that is made of small molecules that are arranged in a simple repeating structure to form a larger molecule.

Position Tolerance

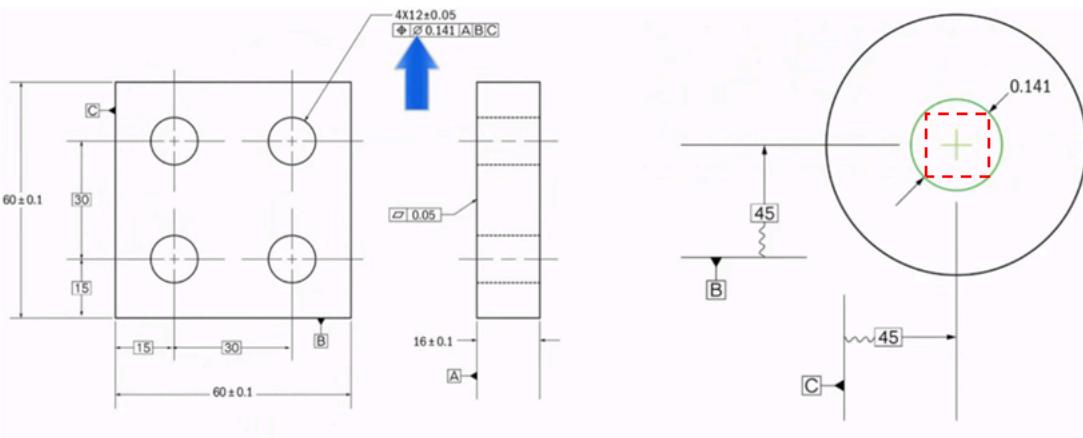
As relates to [GD&T](#), a versatile geometric tolerance that can be utilized to control the location, [perpendicularity](#), [coaxiality](#), [parallelism](#), orientation or axis offset of a part feature or [derived median plane](#). The position tolerance is mostly applied to ensure the ability to assemble features like holes or slots and it is often included when performing a [tolerance stack](#). Notice the red line and the blue tolerance zone around the line.



A bilateral tolerance (\mp) can be specified directly on a two dimensional drawing or specification to define the location of a feature. On the next image, the dimensions 60 ∓ 0.1 , 45 ∓ 0.05 and 15 ∓ 0.05 are used to locate the hole's center with the dimension 45 ∓ 0.05 , the bilateral tolerance zone will look like a square as seen on the right:



If a tolerance zone is specified using a [feature control frame](#) for the same drawing, a three dimensional cylinder using the symbol \emptyset will be used as seen in the image on the right:



Positive Layer See [Signal Layer](#)

POST Power On Self Test

Power and Ground Layers

In [PCB](#) design, a ground plane is a layer of copper that appears to most signals as an infinite ground potential. This helps reduce noise and helps ensure that all integrated circuits within a system compare different signals' voltages to the same potential.

A power plane is the counterpart to the ground plane and behaves as an AC signal ground, whilst providing DC voltage for powering circuits mounted on the PCB.

In electronic design automation (EDA) design tools, power planes (and ground planes) are usually drawn automatically as a negative layer. Adding primitives on such a layer produce negative of those primitives, placing copper wherever there is no track or via.

PP Polypropylene

PPA Polyphthalamide

PPO Polyphenylene Oxide

PPS Polyphenylene Sulfide

PQFP Plastic Quad Flat Pack

Press Fit

An interference or force fit where the leads of a component or individual pins are inserted into holes through the use of a manual or automated press.

Primary Side

The side of the Printed Circuit Board on which Thru-Hole Mount Technology components are mounted. On a board with no Thru-Hole Mount Technology components or on a board w Thru-Hole Mount Technology on both sides such as a backplane, one side is designated as the primary side.

Printed

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	printed
Definition	Printed labels or markings.
Component	Labels, markings
System Reference Image	printed



Printed Electronics (PE)

A set of printing methods used to create electrical devices on various substrates. The process involves using common printing equipment suitable for defining patterns on material such as [screen printing](#), [flexography](#), [rotogravure](#) and [inkjet](#). Electrically functional inks are deposited on the substrate creating active or passive devices such as thin film transistors, capacitors, coils and resistors.

Priority

The following definitions indicate the relative level of importance for an item within a [Collaboration](#).

Critical - Serious risk to personnel, quality, cost, product may not function or may create non-compliance with government or other regulations.

- Must have review and design change prior to fabrication of parts for either [NPI](#) or production. [Customer approved process deviation](#) is required for those issues that are not solved.

Hot - High risk to quality, cost, product may have to be scrapped, may cause field / latent failures, poor yield, throughput and process impact.

- Review and design change required prior to fabrication of parts for either [NPI](#) or production. Customer approved process deviation is required for those issues that are not solved.

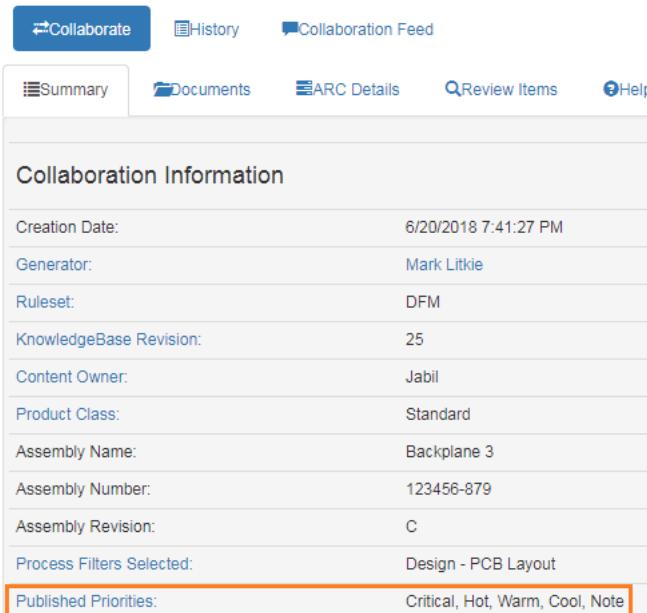
Warm - Impact to quality levels and processes. Rework may be necessary, mitigation costs potentially required.

- Highly recommend review and resolution prior to production. Customer approved process deviation is required for those issues that are not solved.

Cool - Will not be noticeable to the customer, very minor impact to fabrication or manufacturing process.

- Suggested review prior to production.

Note - Will not be noticeable to the customer, no impact to fabrication or manufacturing process, provided as additional information only.



Content	Value
Creation Date:	6/20/2018 7:41:27 PM
Generator:	Mark Littie
Ruleset:	DFM
KnowledgeBase Revision:	25
Content Owner:	Jabil
Product Class:	Standard
Assembly Name:	Backplane 3
Assembly Number:	123456-879
Assembly Revision:	C
Process Filters Selected:	Design - PCB Layout
Published Priorities:	Critical, Hot, Warm, Cool, Note

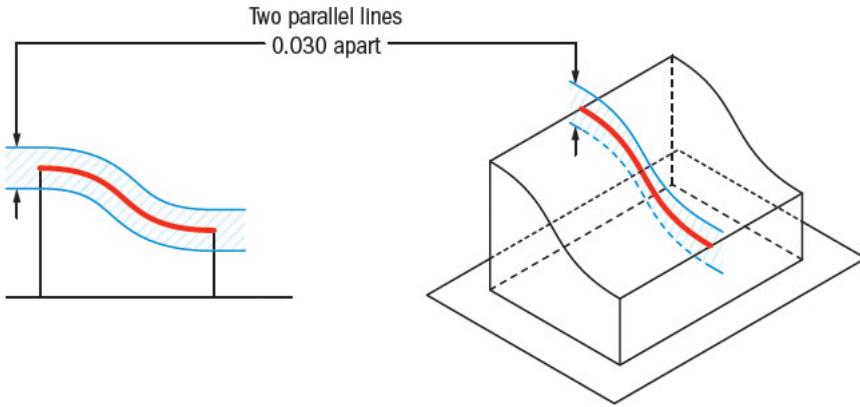
Published Priorities indicate what priority level items will be visible to the customer in a [Collaboration](#).

Process Change Notice (PCN)

The method for evaluating a process change for potential risk and then mitigate risk prior to approving the implementation of the change. Required for a change to a process after the [NPI](#) validation build has been completed and approved.

Profile

As relates to [GD&T](#), the tolerance zone for an outline of a surface, a shape made up of one or more features or a two dimensional element of one or more features.



Profile Curves See [Skinned Surface](#)

Profile of a Line

As relates to [GD&T](#), establishes a two dimensional tolerance zone that controls individual line elements of a feature or surface, often aerodynamic surfaces. Profile of a line is usually applied to parts with varying cross sections, or to specific cross sections critical to a part's function.

CHARACTERISTIC	SYMBOL
PROFILE OF A LINE	⌒

Profile of a Surface

As relates to [GD&T](#), describes a 3 dimensional tolerance zone around a surface, usually an advanced curve or shape. Often used for contoured surfaces that can be mathematically defined to ensure that the surface functions properly. Can be complex geometric features like ergonomic or aesthetic surfaces involving lofts and sweeps, irregular surfaces and aerodynamic features.

CHARACTERISTIC	SYMBOL
PROFILE OF A SURFACE	⌒

Profile of a Surface - Unilateral

As relates to [GD&T](#), profile of a surface tolerance applied from the [true profile](#) in the direction that adds or removes material. The location of the tolerance numbers, either on the left indicating inside or on the right indicating outside the true profile.

CHARACTERISTIC	SYMBOL
PROFILE OF A SURFACE - UNILATERAL	(U)

PS Polystyrene

PSA Pressure Sensitive Adhesive

A type of adhesive that forms a bond with a surface when pressure is applied. It is not necessary to use solvent, water or heat to activate the adhesive. It is used in pressure sensitive tapes, labels or glue dots. PSAs are usually designed to form a bond and hold properly at room temperatures.

PSM Personalized Solder Mask

The intentional reduction in the solder-side [soldermask](#) opening on a [PTH](#) annular ring with the purpose of reducing and / or eliminating solder bridging in the soldering processes. Whereas the soldermask opening is typically larger than the annular ring (resulting in a copper defined [fillet](#)), it now covers up most of the PTH annular ring resulting in a soldermask defined solderable area / fillet. This results in a smaller fillet while increasing the copper to copper distance between pins, both of which decrease the tendency to bridge. The new opening diameter should be no smaller than the [FHS](#) + 0.008" (0.2032mm) ensuring that the soldermask will never encroach into the hole.

All [PCB](#) vendors that Jabil uses should be able to meet a +/- 0.003" (0.0762mm) soldermask to drill registration specification. It should be noted that the copper design of the board is not changed in any way causing minimal work for the designer to make the change, therefore the change can easily be implemented on an assembly already in production.

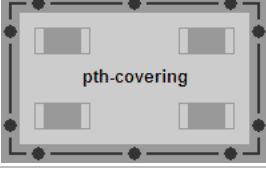


PTH Plated Thru-Hole

PTH Covering

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	pth-covering
Definition	PTH component that covers other components

Component	Shields, DC-DC converters, etc.
System Reference Image	
Picture Reference	

PTH Misc. Short

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	pth-misc-short
Definition	Miscellaneous PTH components < 0.250" (6.3500mm) tall
Component	Switches, connectors, modules, LEDs , optical connectors, contacts, etc.
System Reference Image	
Picture Reference	Multiple

PTH Misc. Tall

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	pth-misc-tall
Definition	Miscellaneous PTH components >= 0.250" (6.3500mm) tall
Component	Potentiometer, encoder, switches, modules, LED assy, optical connectors, contacts, etc.
System Reference Image	
Picture Reference	

PUR Polyurethanes

PVC Polyvinyl Chloride

PWA Printed Wiring Assembly

PWB Printed Wiring Board

Q

QFN Quad Flat No leads

QFN C-Wrap Leads

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	qfn-cwrap
Definition	QFN with leads on the bottom and wrapped around the body sides, castellated lead type
Component	QFN, LCC , filters, modules, VCXO, arrays, resonators
System Reference Image	
Picture Reference	

QFN Leadless

One of the component types used for [Automated Rule Checking \(ARC\)](#).

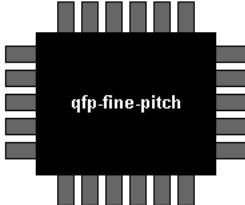
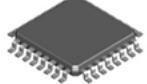
ARC Comp Type	qfn-leadless
Definition	QFN with leads on the bottom only, not the sides.
Component	QFN, LCC , LGA, DFN, LLP
System Reference Image	



QFP Quad Flat Pack

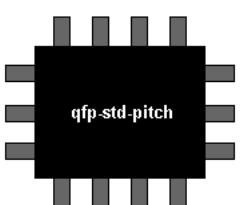
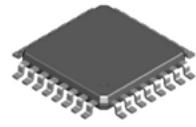
QFP Fine Pitch

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	qfp-fine-pitch
Definition	QFP with lead to lead pitch less than or equal to 0.5000mm
Component	QFP
System Reference Image	
Picture Reference	

QFP Standard Pitch

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	qfp-std-pitch
Definition	QFP with lead to lead pitch greater than 0.5000mm
Component	QFP
System Reference Image	
Picture Reference	

Quad-Ring

A double acting four lip seal for static and dynamic applications. Quad-rings (also known as X-rings) are available in a wide range of [elastomer](#) compounds. Provides higher seal efficiency and lower friction than conventional O-rings.

The sealing principle of the quad-ring is nearly the same as an O-ring. The initial sealing is achieved by the diametrical squeeze in a right angled groove. The system pressure itself creates a positive sealing force.



Quote Only

DFx design review performed for quoting purposes on products not currently scheduled for production. This design review does not require follow up on open items. A separate, full design review will be required if and when opportunity is awarded, and the product moves into production.

R

R-Paks Resistor Paks

Ra Surface Roughness

A component of surface texture. It is quantified by the deviations in the direction of the normal vector of a real surface from its ideal form. If these deviations are large, the surface is rough. If they are small, the surface is smooth.

Radial

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	radial
Definition	Radial leaded components
Component	Radial, radial transistor, electrolytic TH
System Reference Image	
Picture Reference	

Radial Leaded Capacitor

A capacitor of any technology (ceramic, electrolytic, etc.) that is through hole mounted, with the leads exiting the body at the bottom.

Rare Metals

Any metal that is difficult to extract from ore and is commercially expensive.

Recommendation

In a [Collaboration](#), may contain what the impact of a [Finding](#) could be and a suggestion for how to resolve the issue. For informational items, may describe the purpose of the communicated information.

Reference Designator

The unique identifier assigned to each component on a board.

Reflow Soldering

A forced air convection heating process used to melt [solderpaste](#) to form a solder joint.

Regardless of Feature Size (RFS)

As relates to [GD&T](#), indicates a geometric tolerance applies at any increment of size of the actual mating envelope of the [feature of size](#). Whatever [GD&T](#) callout is made is controlled independently of the size dimension of the part.

Renewable

A natural resource, such as wood, that can be replaced through natural processes before it is completely depleted.

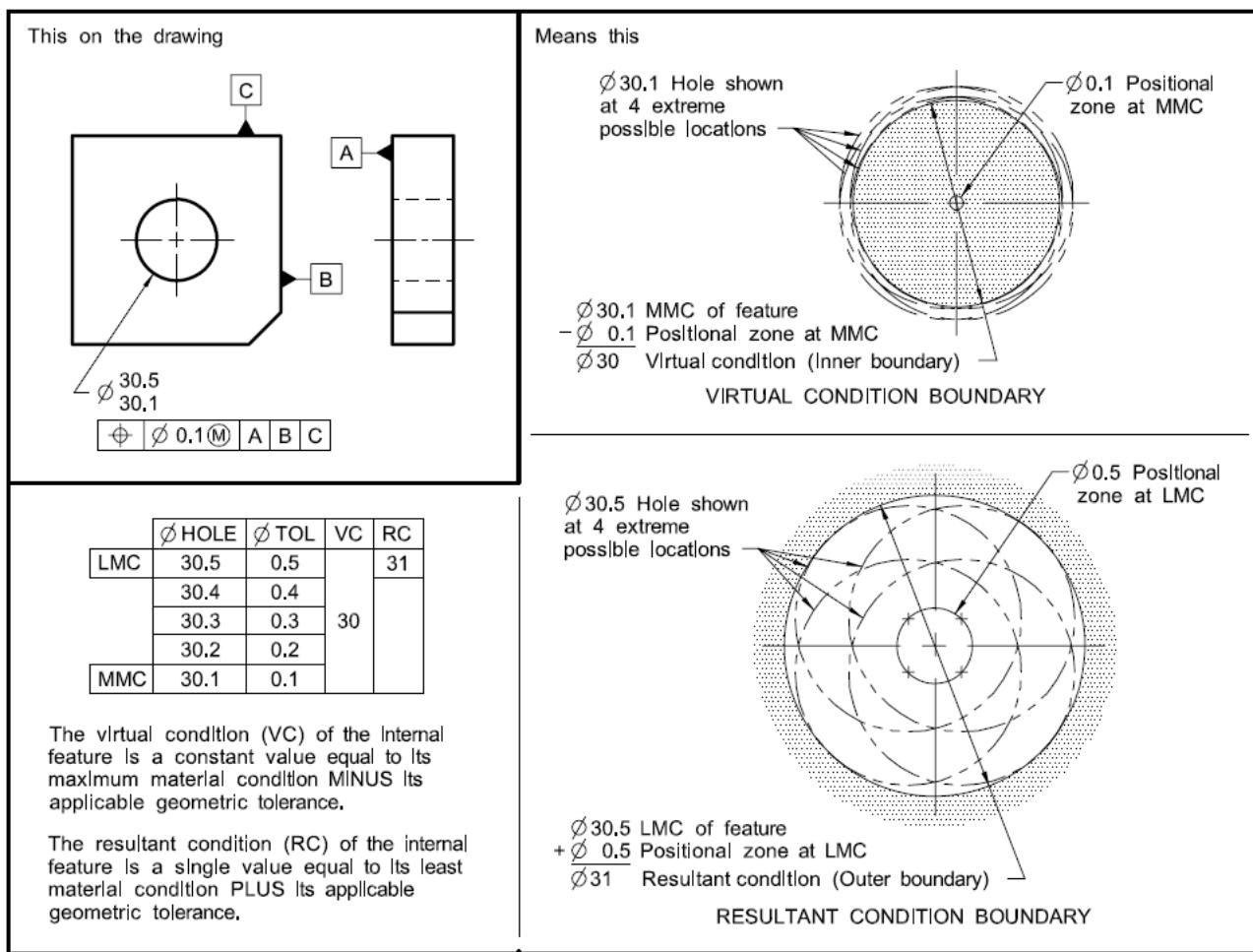
A source of energy that does not become depleted when used, e.g. solar energy, wind energy, hydroelectricity, etc.

Resistor Pak

A number of resistors, packaged together as one device. Thru-Hole Mount Technology Resistor Paks (or R-Paks) are available in Small Inline Packages and Dual Inline Packages. Surface Mount Technology Resistor Paks are available in Small Outline Integrated Circuit packages and chip packages.

Resultant Condition (RC)

As relates to [GD&T](#), the single worst case boundary condition caused by the collective effects of a feature of size's [MMC](#) or [LMC](#), the geometric tolerance for that material condition, t size tolerance and the additional geometric tolerance derived from the feature's departure from its specified material condition.



Retention Force

The maximum allowable axial load which can be applied without dislodging the item. usually stated in Pounds of force or (Newtons) and is related to connectors, wires in terminations etc.

Reviewer

Jabil employee who performs the [design review](#) for a Collaboration, often also the [Collaboration Generator](#).

RF Radio Frequency

Rigid Pin See [Test Fixture - Rigid Pin \(ECT Zoom\)](#)

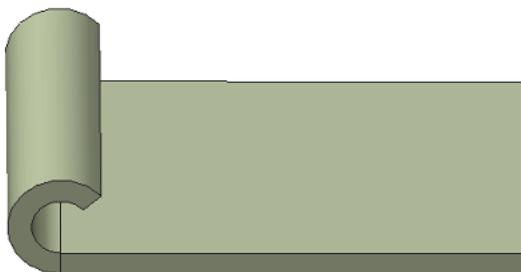
RMA Flux

Rosin mildly activated (RMA) fluxes contain rosin combined with an activating agent, typically an acid, which increases the wettability of metals to which it is applied by removing oxides.

RMB See [Material Boundary](#)

Rolled Hem

The edge of a sheet metal part is bent over to form a circular shape. This type of hem is used to attach one sheet metal part to another, often in the form of hinges.



ROM Read-Only Memory

Rosin

Rosin is extracted from pine sap. The purified product is known as "Water White Rosin". It is used in some types of flux.

RS232

RS232 is a common interface standard for serial data communications equipment.

Runout

As relates to **GD&T**, a complex tolerance that controls a feature's **straightness**, **profile**, angularity and other geometric variation.

TYPE OF TOLERANCE	CHARACTERISTIC	SYMBOL
RUNOUT	CIRCULAR RUNOUT	
	TOTAL RUNOUT	

S

SAN Styrene Acrylonitrile

Saponifier

A chemical designed to react with organic fatty acids, such as rosin, to form a water-soluble soap. This is a solvent-free method of defluxing and degreasing many parts.

Scarf Cut

As relates to [gaskets](#), a single turn with an angle cut.

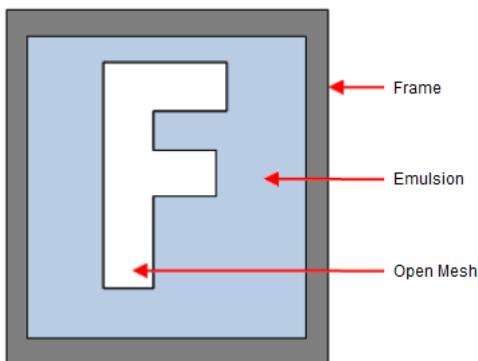


Scored Breakaway See [V-Score](#)

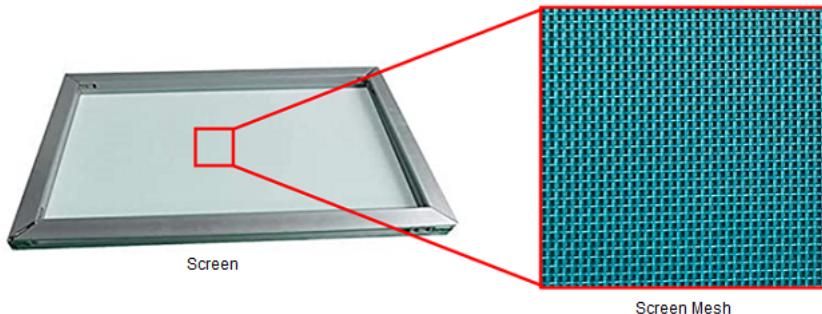
Screen Printed Electronics

A push through process that provides thicker ink deposits compared to other [printed electronics](#) methods. A squeegee and screen are the main components of the screen printing process.

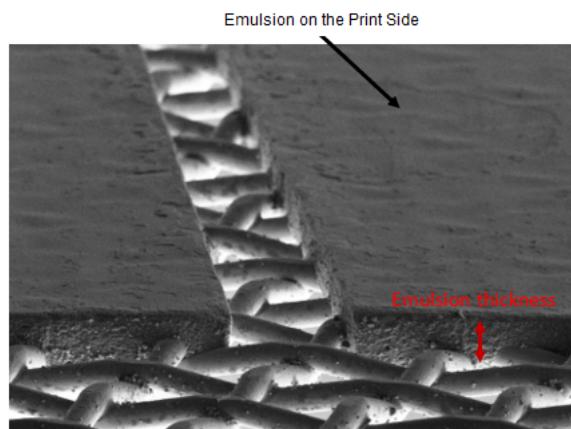
Screen: A screen consists of mesh, emulsion, and a frame. The materials used for the mesh and emulsion vary depending upon the use of solvents, cleaning agents, and target design specifications.



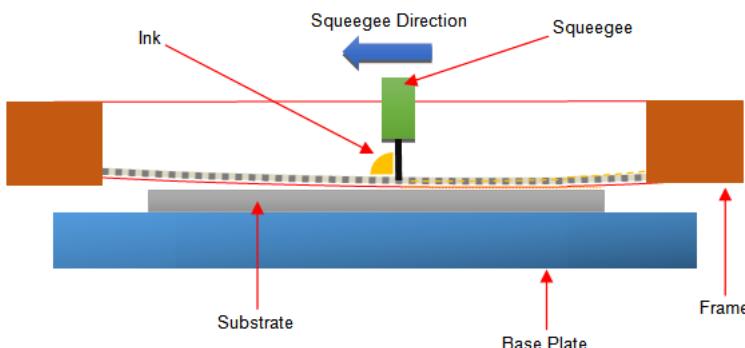
Mesh: a woven, knit, or knotted material structured as an even grid, tightly attached to the frame. Typical materials used for mesh are stainless steel and polyester.



Emulsion: material coated on the mesh to prevent ink from making contact with the [substrate](#). The areas not covered by emulsion allow ink to be dispensed through the mesh onto the substrate, forming the desired pattern / image.



Process: Polyurethane is the usual material used for the squeegee. Ink is applied to the top of the screen. The squeegee is used to sweep the ink across the top of the screen with h pressure. The ink passes through the openings in the mesh and is transferred onto the substrate.

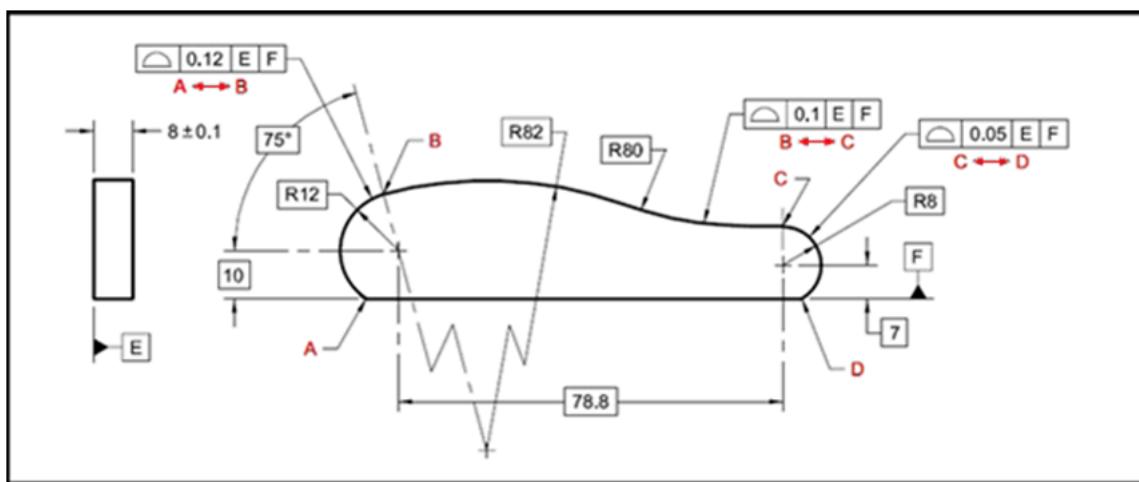


Secondary Side

The side of a Printed Circuit Board which is not the primary side. Often referred to as the wave solder side for printed board assemblies that require wave soldering. On boards which not require wave soldering, one side is designated the primary side, the other is designated as the secondary side.

Segment Profile of a Surface – Segment

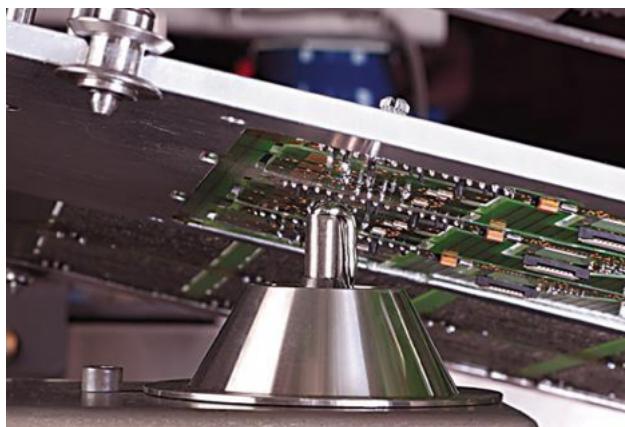
As relates to **GD&T** and **profile of a surface**, where different portions of a profile have different tolerances, the extent of each profile tolerance may be indicated by the use of reference letters to identify the extremities or limits of each requirement accompanied with the between symbol for each profile tolerance.



Selective Pallet See Mask Pallet

Selective Soldering

The process of pumping molten solder up through nozzles so that they contact the bottom side of a **PCB** at targeted areas forming **PTH** solder joint connections with the excess solder returning down the sides of the nozzle back to the solder pot. The PCB is typically soldered by programming a series of positional steps so that the pins are soldered sequentially or it may be possible to use expensive tooling in the form of a plate that solders all joints in a single step. It offers advantages over traditional **wave soldering** in that it can access small areas that may be difficult to reach, does not require **wave solder pallet** tooling and solder contact time can be varied on a pin to pin basis enabling it to be customized for thermally sensitive components and challenging joints. Its disadvantages include high soldering cost per joint and slow throughput resulting from the sequential nature of its soldering process.



Self-Tapping Screw

A screw that can "tap" its own hole as it is driven in. A tap is what cuts the female portion of the mating pair.

Setup Time

The total time required to change settings, tooling and components from one production run to another.

Shadowing

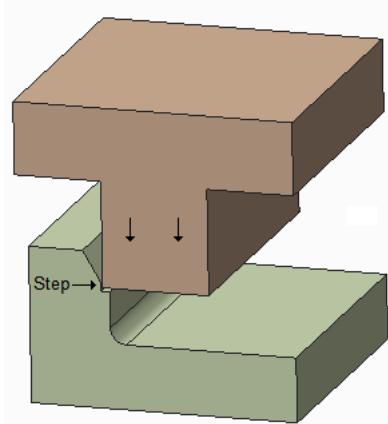
The effect of a larger component diverting the flow of the wave solder or air convection preventing the proper soldering of trailing components.

Shape-Memory Resin

Resins that produce [polymers](#) that can return to their original shape after they have been deformed, if a particular stimulus is applied. A couple of common stimuli are heat and light.

Shear Joint

[Ultrasonic welding](#) first melts the small initial contact area that focuses the energy, usually a recess or step in either of the parts. The vibration from the welder generates heat and simultaneously presses down causing the contact area on the parts to melt and slide into each other. The melted materials merge forming a mechanical bond.



Signal Layer

Any electrical layer on the [PCB](#) can be defined as a signal layer. This means that the layer will consist of a solid area of conductive material (copper) which will connect to electrical [tracks](#) and terminals on other layers using [vias](#) and pads.

Related to [power and ground layers](#).

Silkscreen

The image applied with non-conductive ink to a [PCB](#) that contains the reference designators and other informational markings.

SIMM Single In-line Memory Module

Single-up

A single-up refers to a single board panelized for production.

Sink Marks

Areas in [injection molded](#) parts where the surface is deformed into a depression. Material in thick areas, such as ribs or [bosses](#), can cool at different rates. The surface hardens but leaves the thicker areas in the center still molten that then contract as they cool and create the depressions in the surface of the part.



Sintering

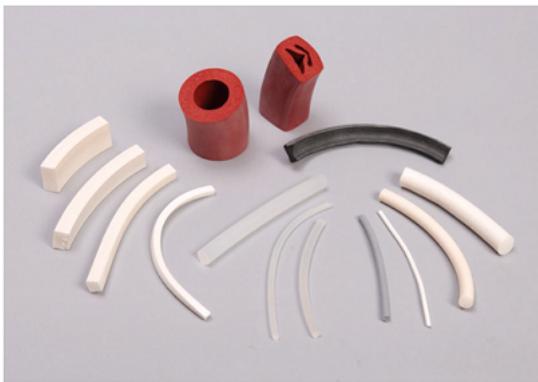
The process of compacting and forming a solid mass of material by heat and / or pressure without melting it to the point of liquefaction.

SIP Small Inline Package

SIR Surface Insulation Resistance

Skinned Surface

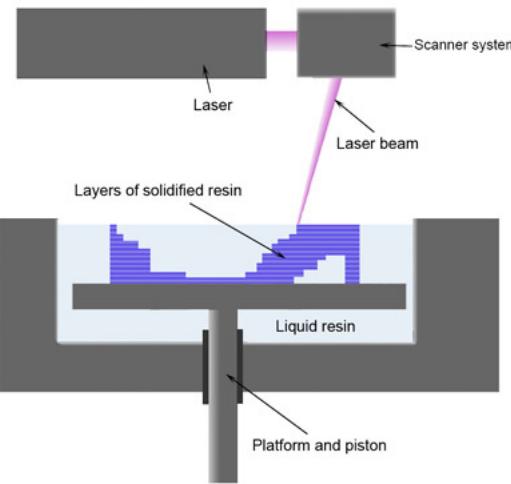
A surface that contains a given set of curves. The given curves describe the shape of the desired surface, and are also referred to as profile curves.



SLA Stereolithography 3D Printing

3D printing process that utilizes a vat of liquid ultraviolet curable photopolymer resin and a laser to build parts one layer at a time. For each layer, the laser beam traces a cross section of the part pattern on the surface of the liquid resin. Exposure to the laser cures and solidifies the pattern traced on the resin.

After the pattern has been traced, the elevator platform descends by a distance equal to the thickness of a single layer. Then a resin filled blade sweeps across the cross section of the part, re-coating it with fresh material. On this new liquid surface, the next layer pattern is traced fusing with the previous layer. A complete 3D part is formed by this process.



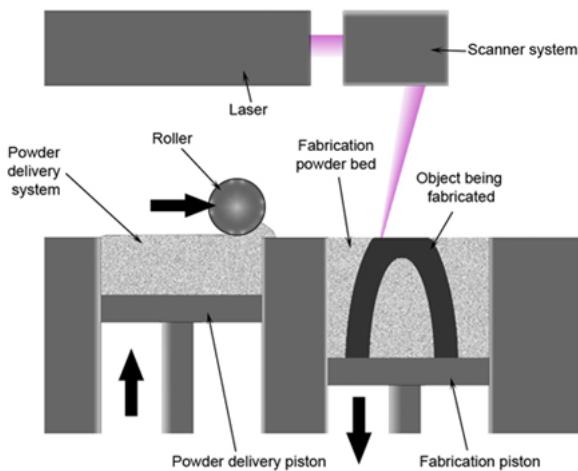
Sliver

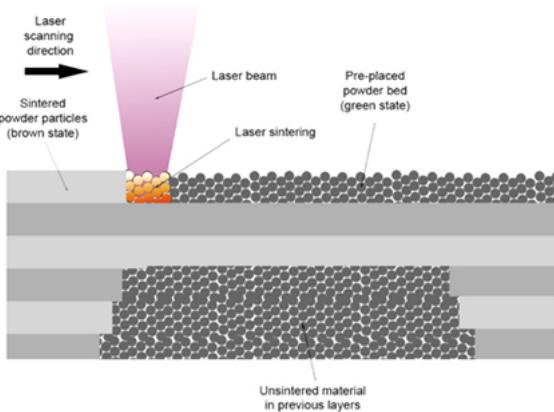
Narrow wedges of copper or photoresist produced during the PCB manufacturing process.

Slivers can be either conductive (copper) or nonconductive (photoresist). Conductive slivers that break off can create an electrical short either at the fabricator, or worse, in the field. Non-conductive slivers can also impact solderability if they detach and redeposit on an area requiring solder, preventing the connection. Moreover, the acid used during the etching process may become trapped between two closely positioned copper edges and result in a slow reduction of copper, leading to latent field failures.

SLS Selective Laser Sintering

3D printing process where a laser is used to fuse small particles of plastic, metal, ceramic or glass powders into a 3D shape. The laser selectively fuses powdered material by scanning cross sections of a 3D model of the part on the surface of a powder bed. After each cross section is scanned, the powder bed is lowered one layer thickness, a new layer of powder is applied on top, the laser fuses the next layer to the previous and the process is repeated until the part is completed. The physical process can be full melting, partial melting, or liquid phase sintering.





SMC Surface Mount Components

SMEMA Surface Mount Equipment Manufacturers Association

SMIA-Standard (SMIA) Industry Standard for camera modules

SMT Surface Mount Technology

SMT Covering

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	smt-covering
Definition	SMT component that covers other components
Component	Shields, DC-DC converters, etc.
System Reference Image	
Picture Reference	

SMT Misc. Short

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	smt-misc-short
Definition	Miscellaneous SMT components < 0.250" (6.3500mm) tall
Component	Contacts, D-Paks , encoders, LEDs , modules, potentiometers, shields, switches, etc.
System Reference Image	
Picture Reference	Multiple

SMT Misc. Tall

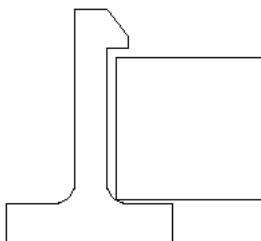
One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	smt-misc-tall
Definition	Miscellaneous SMT components >= 0.250" (6.3500mm) tall
Component	Potentiometers, encoders, switches, modules, shields, contacts, etc.
System Reference Image	



Snap Fit

Snap fits are commonly used as an assembly method for injection molded parts. Cantilever snap fits are the most widely used type.



SnPb See [Tin-Lead](#)

SO Small Outline

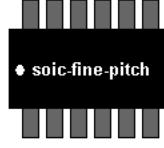
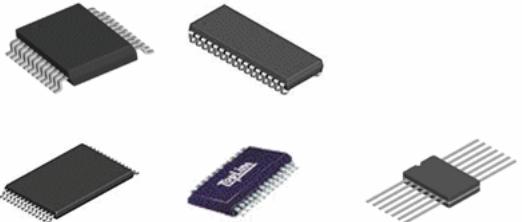
Generally refers to [gullwing](#) style [SMT](#) components such as [SOICs](#).

SOD Small Outline Diode

SOIC Small Outline Integrated Circuit

SOIC Fine Pitch

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	soic-fine-pitch
Definition	SOIC with lead to lead pitch less than or equal to 0.5000mm
Component	SOIC, SSOP, SOJ, TSOP
System Reference Image	
Picture Reference	

SOIC Standard Pitch

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	soic-std-pitch
Definition	SOIC with lead to lead pitch greater than 0.5000mm
Component	SOIC, SOJ

System Reference Image	
Picture Reference	

SOJ Small Outline J-Bend

Solder Ball

A solder ball is the tiny globe of solder that provides the contact between the chip package and the printed circuit board. Typically on BGA type packages.

A solder ball is also referred to as a potential defect on a printed circuit board and appears as a sphere of solder either attached to the PCB or loose on the board. These spheres of solder can become a source of shorts on the board if they are loose or become dislodged.

Solder Fillet

The solder joint that forms between the solder pads on the [PCB](#) and the component lead.

Solder Thieving Pads

A [pad](#) used on the [wave solder](#) side of a [PCB](#) to draw solder away from the next to last pin and pad of a [THMT](#) component or the last pad of a [SMT](#) component while being processed through the wave solder process. To effectively remove solder bridges, the solder thief must be close to the edge of the last SMT pad or connected to the last THMT pad.

See [Entry 1082](#) for details.

Solder Zone

The area in the wave solder machine where soldering occurs. It is composed of a Chip wave.

Soldermask

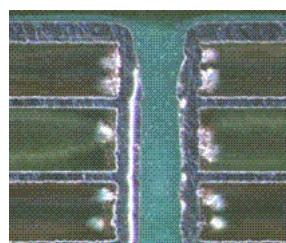
A layer of material that is applied to the outer layers of a board, by the Printed Circuit Board manufacturer, to resist the adhesion of solder.

Soldermask Dam

See [Soldermask Web](#)

Soldermask Filled Via

[Vias](#) are filled entirely with [soldermask](#) during the primary [LPI](#) soldermask operation.



Soldermask Relief

The space between the solder pad and mask. Also referred to as pullback.

Soldermask Web

A narrow strip of material. Sometimes refers to [soldermask](#) material, [copper](#) and [V-score](#).

Solderpaste

Material used in the manufacture of [PCBs](#) to connect [SMT](#) components to the copper [traces](#) of the board. The paste is applied to the board by screen printing and then the component are put in place by a pick and place machine. The paste holds the components in place by being sticky. It is then heated (along with the rest of the board) melting the paste and forming a mechanical connection as well as an electrical connection.

Sonotrode

Applies the mechanical vibration to the parts to be [ultrasonically welded](#).

SOT Small Outline Transistor

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	sot
Definition	Three + leads in a SOT type package, leadless packages
Component	SOT223, SOT343, SOT89, SOT26, SOT25, SOT23

System Reference Image	
Picture Reference	

Span

The distance between leads or rows of leads. Examples are [DIP](#) packages, or [axial](#) components.

Splice Protector

A heat shrinkable tube that provides mechanical protection for the [splice](#) connection. Some contain a strength feature, often a stainless steel rod. Used to protect [optical fiber fusion splices](#).

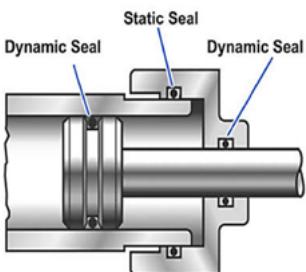


Spray Fluxer

Spray fluxers consist of a robotic arm which travels from side to side while spraying a fine mist of flux onto the bottom side of the board. Other spray fluxers consist of a stationary bar with a series of nozzles that spray a fine mist. There are also additional ones that can consist of a single stationary ultrasonic head and/or an oscillating ultrasonic head.

Static Seal

A seal between two stable and immovable parts.



Status

The following definitions indicate the current state of an item within a [Collaboration](#).

The available options are:

- Open - this item has not been addressed. A comment is optional.
- More Data Required - this item needs clarification or additional supporting data to determine what should be the appropriate resolution. A comment is required.
- Closed With [Customer Waiver](#) - a document has been signed by the customer authorizing a [permanent departure](#) from a customer product or process requirement or specification, or from a regulatory or statutory requirement applicable to the product, or from a Jabil requirement at the customer request. The tracking number is required, a comment is optional.
- Closed With Product Design Change - this item has been corrected with a fundamental change to the product design. This option does not apply for process related changes such as a [solderpaste stencil](#) modification, a custom [pallet](#), etc. A comment is required.
- [Customer Deviation](#) - a customer directed / authorized [temporary departure](#) from a defined process, procedure, or product requirement. The tracking number is required, a comment is optional.
- [Internal Deviation](#) - an internal Jabil authorized [temporary departure](#) from a defined process, procedure, or product requirement. The tracking number is required, a comment optional.
- [Process Change Notice](#) - the method for evaluating a process change for potential risk and then mitigate risk prior to approving the implementation of the change. The tracking number is required, a comment is optional.
- [Engineering Change Notice](#) - a document or record authorizing [BOM](#) or other product changes (e.g. drawings, specification changes, etc.). The tracking number is required, a comment is optional.
- [Material Change Notice](#) - the notice or approval process required to change a Manufacturer's Part Number (MPN) within the customer Approved Manufacturer's Parts List (AM that does not drive a change to the Jabil Part Number (JPN) or BOM. The tracking number is required, a comment is optional.
- No Action Required - no change necessary, generally reserved for informational items. A comment is optional. **Note:** not available for items with a [Priority](#) of Critical, Hot, or Warm. Only items with a Priority of Cool or Note can be closed using No Action Required.

When changing Status, a popup will appear. Tracking numbers are required, comments may be required or optional based on the Status selected.

Status Change: Item 78

Deviation / Waiver Number:

Add Comment:

Shared with customers

Stencil

A stencil is a metal foil (stainless steel, nickel, brass, other alloys) into which apertures (holes) are precisely cut using multiple methods including laser cutting, chemical etch and electroforming.

Step-Stencil

A step stencil is a metal foil (stainless steel, nickel, brass, other alloys) into which apertures (holes) are precisely cut using multiple methods including laser cutting, chemical etch and electroforming.

The step stencil also includes one or more additional thicknesses within a single foil to increase the solderpaste deposit around specific components.

Stop-on-fail

Relating to a diagnostic software ability to stop on a failed test.

Straightness

As relates to **GD&T**, a condition where an element or points of a surface, or [derived median line](#), must be a straight line. A straightness tolerance specifies a tolerance zone within which the considered element must lie. A straightness tolerance symbol with the corresponding values is included in the drawing near the feature to be controlled.

CHARACTERISTIC	SYMBOL
STRAIGHTNESS	—

Stripline Filter

A stripline filter is an impedance-matched low-pass filter that uses a "stripline" geometry, a flat strip of metal which is sandwiched between two parallel ground planes. The insulating material of the substrate forms a dielectric. The width of the strip, the thickness of the substrate and the relative permittivity of the substrate determine the characteristic impedance of the strip which is usually in a transmission line.

Styling

A "styling" surface is one that is finished as a functional portion of an assembly. An example would be an LCD screen or a cover over the screen, these are considered styling components. Another term for styling is aesthetics or appearance.

Sub Assembly

Several parts milled together are described as a subassembly. A subassembly will likely be part of a larger assembly.

Substrate

Substrate is a term used in materials science to describe the base material on which processing is conducted to produce new film or layers of material. Examples would be glass optics where a coating is applied or a ceramic base material onto which a circuit is deposited.

Surface Mapping

Usually associated to Agilent 5DX automated x-ray, which uses a predefined laser surface map to bring the PCB into the plane of focus (depth of field) so that a slice of the component joints can be taken.

SVF File Simple Vector Format File

Swarf

Shavings and chippings of metal. The debris or waste resulting from metalworking operations like drilling, turning, tapping, milling, etc.

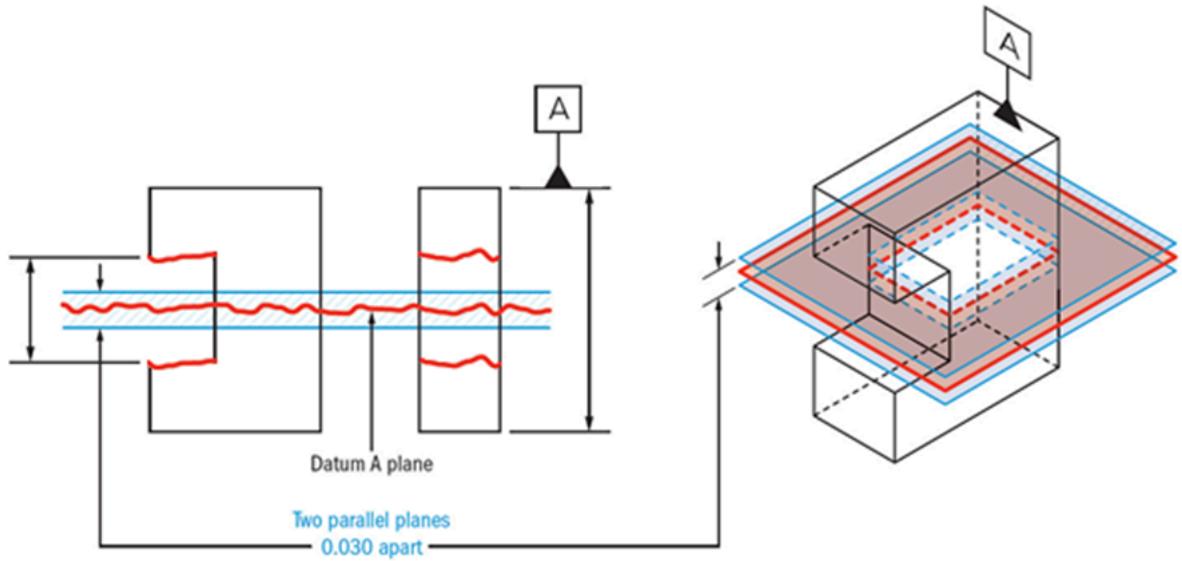
Symmetrical

A well-defined concept of balance or "patterned self-similarity" that can be demonstrated or proved according to the rules of a formal system.

Symmetry

As relates to **GD&T**, the condition where the median points of all opposed or correspondingly located elements of two or more feature surfaces are congruent with a datum axis or center plane.

TYPE OF TOLERANCE	CHARACTERISTIC	SYMBOL
LOCATION	SYMMETRY	—



T

Tack

Adhesiveness, a technical measure of the stickiness of a material. Typically [solderpaste](#), glue, etc.

Tantalum

Electrolytic [capacitors](#) that use tantalum as the anode material and passivated tantalum pentoxide as the dielectric. The advantages include greater capacitance per unit area and a more stable voltage and temperature characteristic than large capacitance ceramic capacitors.

One of the component types used for [Automated Rule Checking \(ARC\)](#).

ARC Comp Type	tantalum
Definition	Tantalum capacitor
Component	Tantalum capacitor
System Reference Image	
Picture Reference	

TAP Test Access Port

TBGA Taped Ball Grid Array

TCK Test Clock

TDI Test Data In

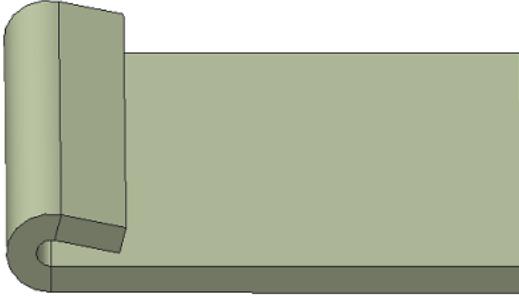
TDO Test Data Out

Tear Drop

A teardrop refers to the shape of a pad which tapers evenly into its associated track. This is used to reduce the possibility of the drilling operation breaking the trace to pad connector

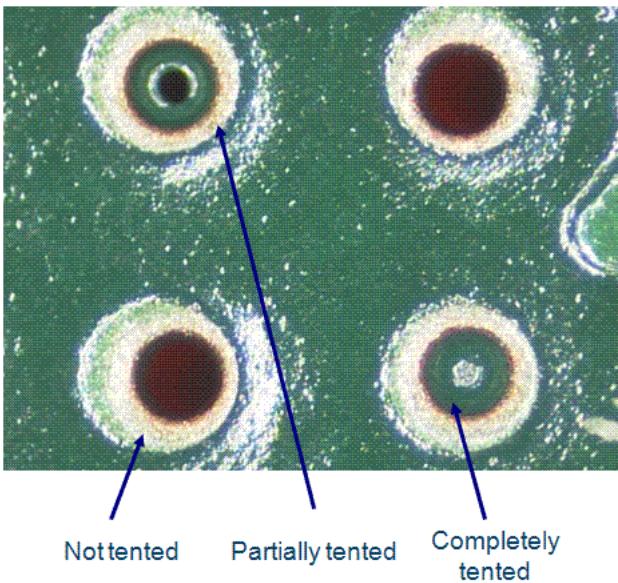
Teardrop Hem

The edge of a sheet metal part is bent over to form a teardrop shape. This type of hem is used to attach one sheet metal part to another and the flange locks them into place.



Tented Vias

[Vias](#) that have no primary [soldermask](#) data file clearance aperture on one or both sides. Soldermask will coat the via pad and be present in the via but can be inconsistent due to vary manufacturing processes and via diameter, sometimes tenting the via and sometimes not.

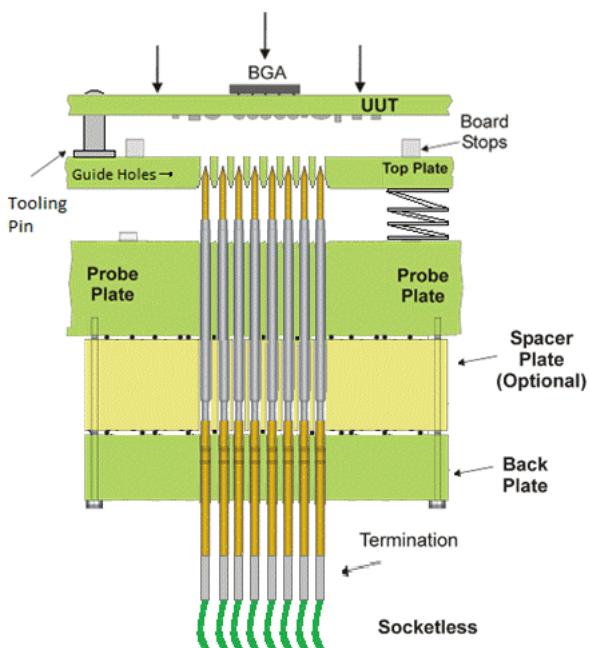


Termination

Electrical termination of a signal involves providing a terminator at the end of a wire or cable to prevent an RF signal from being reflected back from the end, causing interference. sometimes refers to manufacturing operations which connect wires together. This includes crimping, soldering, and related operations.

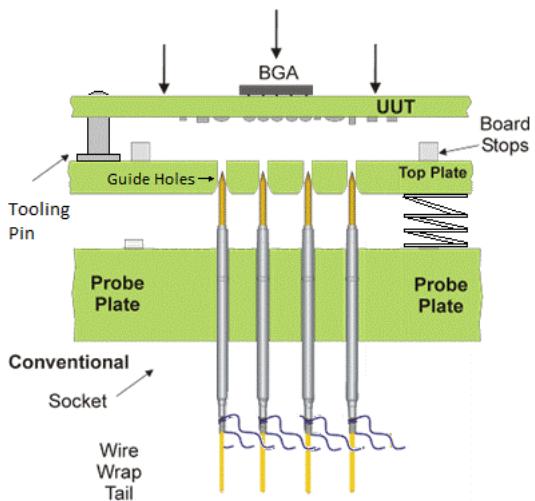
Test Fixture - Fine Pitch Guided X-Probe

A device that interfaces between test equipment and the unit under test. Fine pitch guided X-Probe fixtures are basically the same as the normal [Guided X-Probe Fixture](#) except for o capability. It utilizes the Q.A. X31 product. The Q.A. X31 product allows the user to probe [test points](#) on 0.030" (0.7620mm) centers. The reason fine pitch guided probe fixtures are s apart from normal X-Probe guided probe fixtures is due to the drilling challenges the fixture vendor must overcome to be able to drill the tight hole pitch requirements accurately. Befo utilizing this type of fixture a vendor should be chosen that already has the skill set required to drill G10 plates for the X31 probe product.



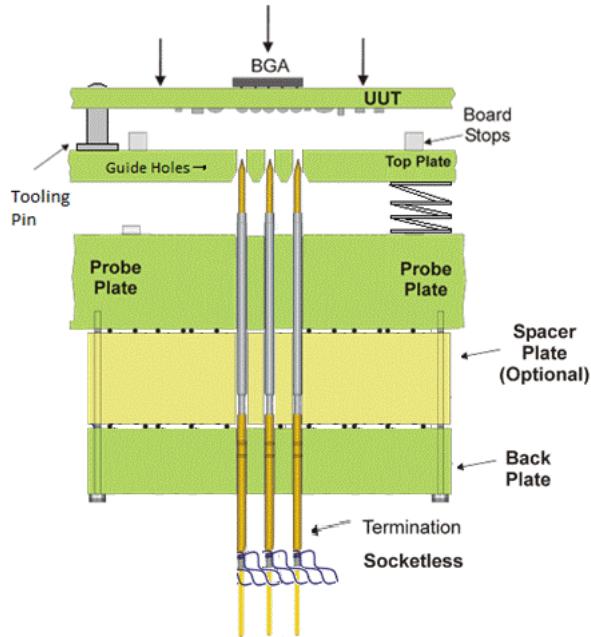
Test Fixture - Guided Probe

A device that interfaces between test equipment and the unit under test. Guided probe fixtures are designed to offer enhanced test probe accuracy as compared to a [standard fixture](#). Guided probe fixtures utilize a funnel drill feature in the top plate that guides the probe to the [test point](#). The through hole drill on the top plate is also smaller / tighter than the probe plunger. The funnel drill is designed to guide the probe to the test point X, Y coordinate. The tooling pins are moved to the top plate as the top plate is now the plate that determines registration accuracy. The accuracy of a standard fixture is sometimes compromised by the probe socket installation. The probe socket could be installed bent or at an angle biasing t probe off target. Guided probe fixtures fix this issue.



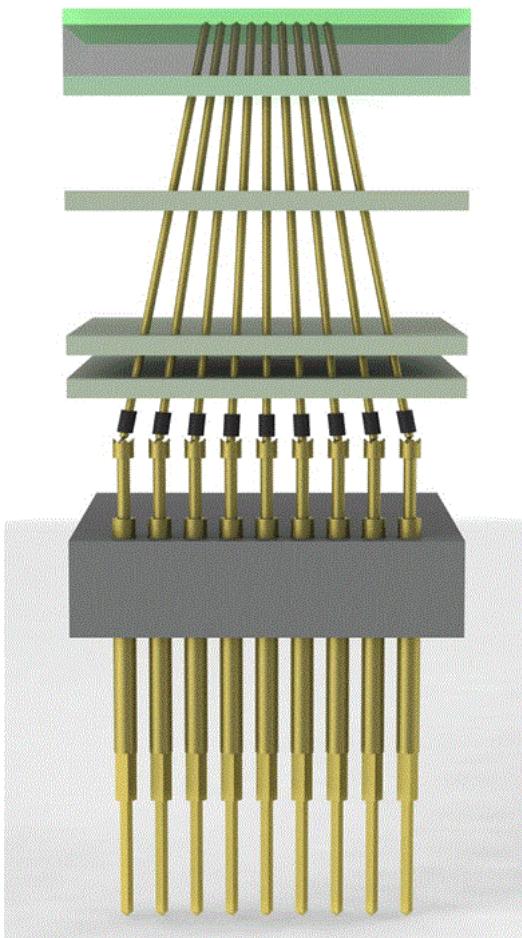
Test Fixture - Guided X-Probe

A device that interfaces between test equipment and the unit under test. Guided X-Probe fixtures have all the same mechanical features as normal guided probe fixtures. However guided X-Probe fixtures utilize the Q.A X-Probe product. The X-Probe product no longer utilizes the standard probe socket. Instead it has an interconnect housing on the bottom of the probe tube. The interconnect housing installs onto a male pin plug that is installed in a back plate underneath the probe. The main advantage of the X-Probe product is that it allows larger more robust probes to be mounted on closer centers. By eliminating the socket from the system, a 0.100" (2.5400mm) center probe can be mounted on 0.075" (1.9050mm) centers (X75 Series) and a 0.075" (1.9050mm) center probe can be mounted on 0.050" (1.2700mm) centers (X50 Series), etc. Guided X-Probe fixtures are usually employed when a unit under test has a large number of 0.039" (0.9906mm) center test points. The Guided X-Probe fixture will allow the use of the more robust 0.050" (1.2700mm) center size probe on 0.039" (0.9906mm) centers by utilizing the (X39 Series).



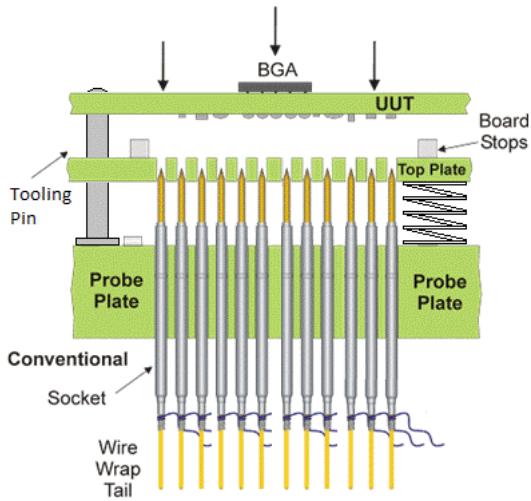
Test Fixture - Rigid Pin (ECT Zoom)

A device that interfaces between test equipment and the unit under test. Rigid pin fixtures, also known as "tilt pin" fixtures, utilize rigid steel pins that are accurately positioned to the [test point](#) X,Y locations by a series of stacked plates. The holes in the stacked plates serve as guides. The rigid pin is usually tilted to contact high density test points on a very small pitch. The spring force and travel are provided by the bottom side interface spring probes usually placed on a 0.100" (2.5400mm) center to center spacing.



Test Fixture - Standard

A device that interfaces between test equipment and the unit under test. A standard fixture contains socketed style spring probes. The unit under test is registered to the spring probe by tooling pins installed in the probe plate. The spring probes are installed into sockets. The sockets are either pressed into the probe plate or tapped in with a hammer.



Test Pad

Contact area designated for probing by automatic test systems or a test probe.

Test Patterns

A test pattern is exercised to locate defective memory.

Test Point

An exposed metal area of the board (usually a pad of bare copper area on a PCB) that provides contact for a Bed of Nails tester or an engineers test probe.

Test Vectors

In order to stimulate a component, a series of logical vectors must be applied to the device inputs. These vectors are called test vectors and are mostly used to stimulate the design inputs and check the outputs against the expected values.

TestJet

The vectorless test technique used to detect manufacturing defects. TestJet utilizes an external sensor plate, suspended above a digital part. The plate is separated from the lead frame of the device by the plastic or ceramic material of the device housing. The lead frame and the external plate form a small capacitor that can be measured by stimulation with an ac source. Each pin (inputs, outputs and power) consists of a part of the lead frame, and so each can be detected as a separate capacitance.

TH Thru-Hole

Thermal Excursion

A thermal excursion is a change in temperature and can be related to testing or normal processing of an object. An example of a thermal excursion is the processing of a PCB through reflow oven.

Thermal Pad

A pad on a printed circuit board designed to transfer heat away from a component.

A thermal pad can also be a material placed between components and heatsinks to help transfer heat away from a component or area to the heatsink.

Thermal Relief

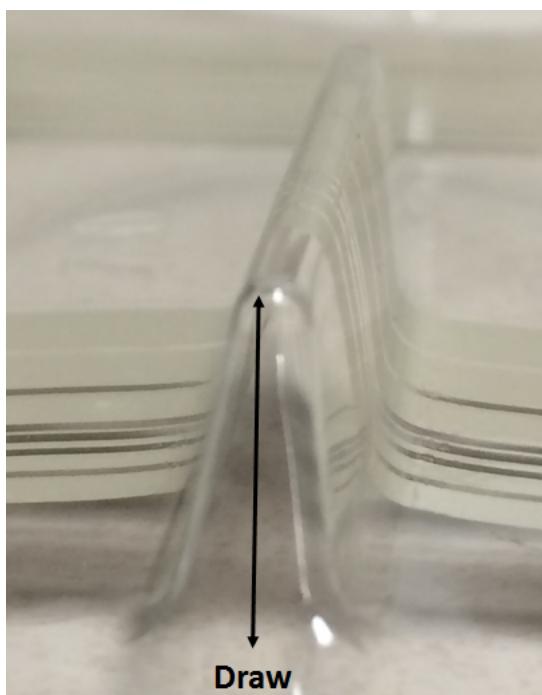
A space or reduction of copper around pads or vias that reduces the heat transfer away from a joint during soldering.

Thermoforming

The process of heating a thin substrate until it is pliable then using air pressure or vacuum to form it into the shape of a mold.

Thermoforming Draw

The amount of deformation of the substrate that occurs during [thermoforming](#).



Thermoplastic

Material that becomes liquid when heated above a specific temperature and solidifies when cooled. Unlike [thermoset materials](#), thermoplastics can be re-melted.

Thermoset

Materials that are joined together by chemical bonds, acquiring a highly crosslinked [polymer](#) structure. This structure is mechanically strong and can withstand high loads or stress at high temperatures.

When formed during part manufacturing, thermoset plastics undergo an irreversible chemical change and cannot be reformed using heat and pressure.

THMT Thru-Hole Mount Technology

Tin-Lead

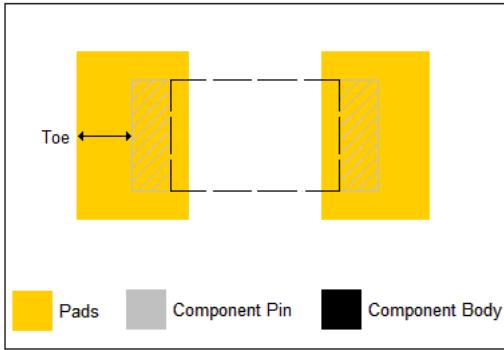
A generic term for any solder alloy consisting of tin (Sn) and lead (Pb). Sn63Pb37 is almost exclusively used, meaning the alloy consists of 63% tin and 37% lead. Due to RoHS legislation banning the use of lead in electronic products, this family of alloys is being phased out.

TMF Thermal Mechanical Fatigue

TMS Test Mode Select

Toe

The distance between the outer edge of a component [pin \(lead\)](#) and the outer edge of a [PCB pad](#). Also, the pad side farthest from the component body.



Toeprint See [Pad](#)

Tombstone

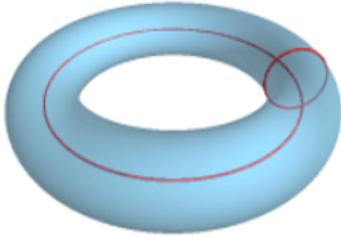
In reflow soldering where one component's electrode soldering takes place before the other. The wetting force between the first electrode and pad cause the part to lever up creating a tombstone defect.

Tooling Holes

Non-plated through holes on a board, used in the manufacturing process to align the board during various processes steps, such as: pick and place (HSP), auto-route, In-Circuit Test and Functional Test.

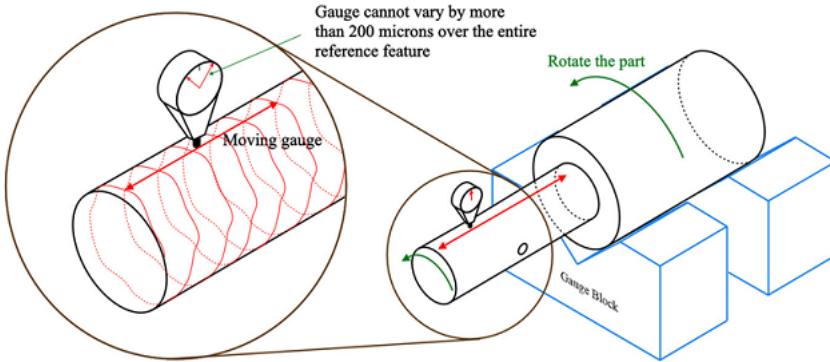
Toric

In geometry, a torus (plural tori) is a surface of revolution generated by revolving a circle in three dimensional space about an axis that is coplanar with the circle.



Total Runout

As relates to [GD&T](#), runout tolerance applied simultaneously to all circular and profile measuring positions as the part is rotated 360 degrees about the datum axis. When verifying total runout, the gauge is fixed in normal orientation and translates along the tolerated surface.



TPE Thermoplastic Elastomer

TPU Thermoplastic Polyurethane

TQFP Thin Quad Plastic Flat Package

Trace

A line of conductive material that connects component pins/vias on external and internal signal layers intended for carrying functional signals and special voltage supply voltages.

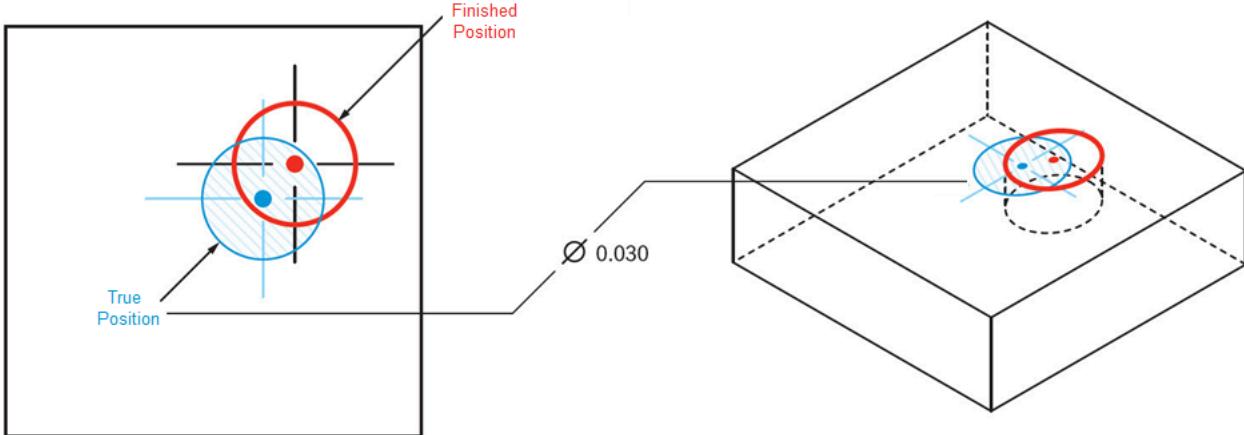
Tribology

The study of science and engineering of interacting surfaces in relative motion. It includes the study and application of the principles of friction, lubrication and wear.

TRST Test Reset

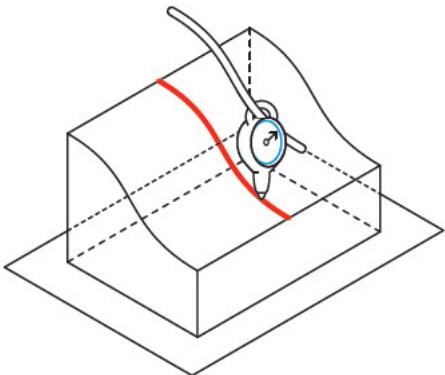
True Position

As relates to [GD&T](#) and the location of a feature - a two dimensional cylindrical zone or more commonly a three dimensional cylinder centered at the specified location referenced by [datums](#). If the location is a hole, the cylindrical tolerance zone would extend all the way through the part. For a three dimensional tolerance zone in a hole, the entire hole's axis will need to be located within this cylinder.



True Profile

As relates to **GD&T**, the exact outline of a part feature as described by basic dimensions.



A gauge can be used to measure the true profile.

TSA Tolerance Stackup Analysis

Process to address over all mechanical fit and mechanical performance requirements. A tolerance stack up analysis represents the cumulative effect of part tolerance with respect to assembly requirements. The idea of tolerances "stacking up" refers to adding up multiple part tolerances to find the total part tolerance then comparing that to the available gap or performance limits in order to see if the design will work properly. This method is also referred to as a worst case analysis where failures would impact the assembly process.

TSOP Thin Straight Outline Package

U

uBGA Micro BGA

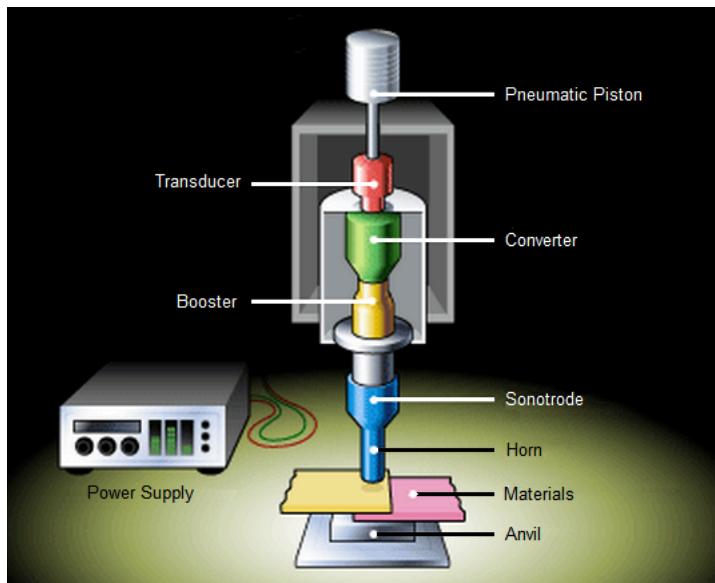
A chip scale package that comprises a die, a wiring board, multiple solder balls, and a package body.

UL Underwriter's Laboratory

Ultrasonic Welding

Uses high frequency acoustic vibrations to bind parts together. The parts are rubbed together under pressure generating heat from the friction. An [energy director](#) or [shear joint](#) on one of the parts focuses and directs the ultrasonic energy into the mating part. The parts melt together creating a mechanical bond.

Ultrasonic welding eliminates the need for connective bolts, nails, soldering materials or adhesives necessary to bind the materials together.



Underfill

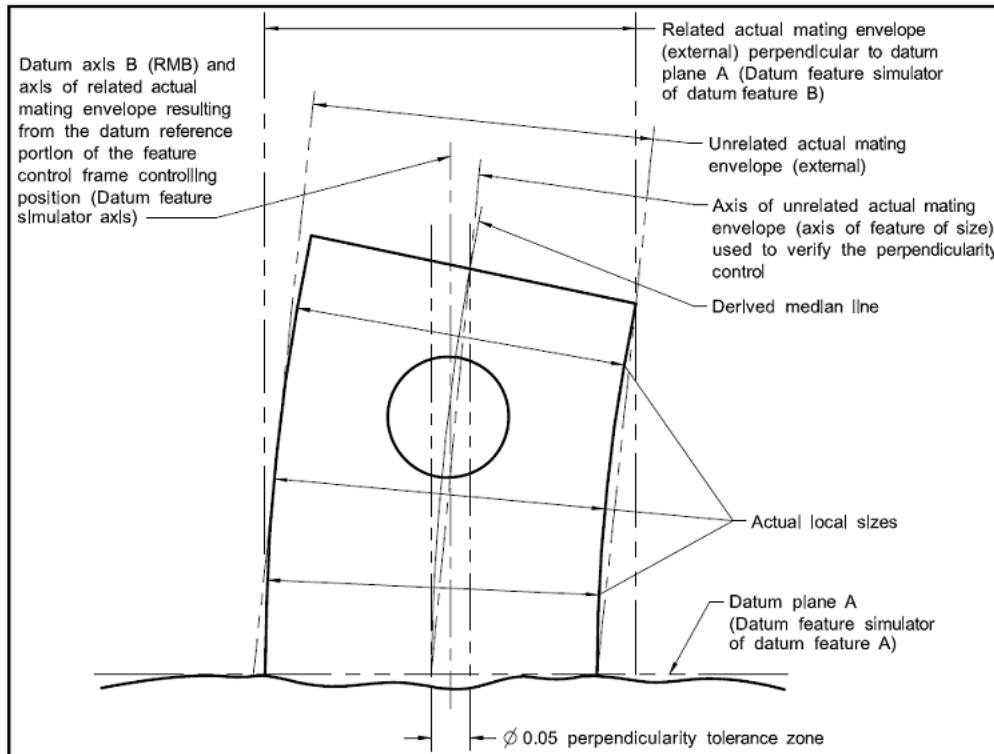
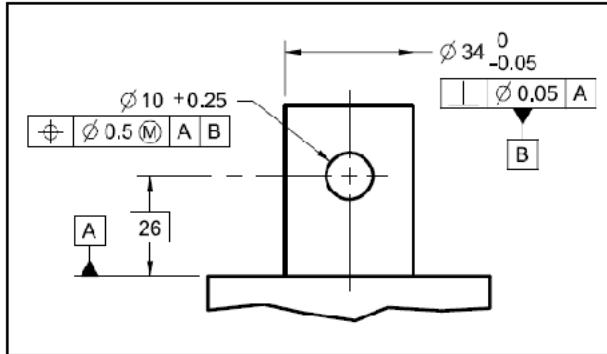
Underfill is applied during assembly of flipped die or array packages onto boards, is an epoxy-based material that flows under and into small spaces then cures to a hardened state.

Unrecovered Waste Stream

All waste that does not serve another useful purpose, such as being recycled or incinerated for the purposes of generating energy. Waste that goes into a landfill.

Unrelated Actual Mating Envelope

As relates to [GD&T](#), a similar perfect feature counterpart expanded within an internal feature or contracted about an external feature and not constrained to any datum.



uPVC Unplasticized Polyvinyl Chloride

USB Universal Serial Bus

UUT Unit Under Test

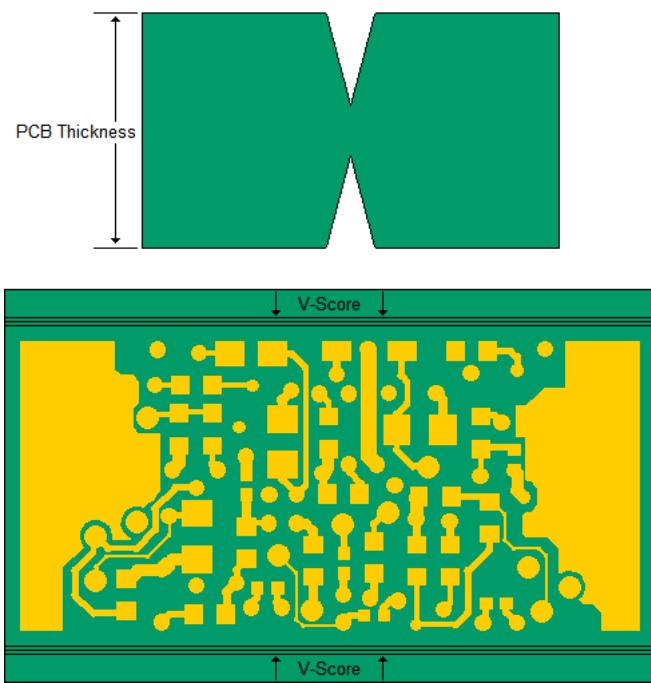
UV Ultraviolet

Ultraviolet light is electromagnetic radiation with a wavelength shorter than that of visible light, but longer than X-rays. It is so-named because the spectrum consists of electromagnetic waves with frequencies higher than those that humans identify as the color violet.

V

V-Groove See [V-Score](#)

A board separation technology that utilizes two V shaped cuts in the top and bottom of a [PCB](#) to "breakaway" boards or excess material from an array.



Vacuum Plate

A tool specific to each product used to pull the Printed Circuit Board flat during the screen printing process.

VCD Variable Center Distance

Vectorless Test

A test method that does not use test vectors to stimulate the component inputs to produce a certain output. Methods such as TestJet and Vtep are considered vectorless tests because they are measuring a capacitance not stimulating an input.

Veribest

A computer aided design system used for physical design of Printed Circuit Boards.

Vernier

A registration pattern applied to a printed circuit board that is used to verify the soldermask registration accuracy.

VGC Voltage Ground Collector

Via

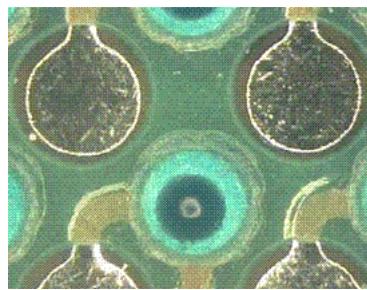
A plated through hole in a Printed Circuit Board used to electrically interconnect signals on different layers. This excludes plated through holes used for mounting Thru-Hole Mount Technology components.

Via Cap

A secondary [soldermask](#) application that covers [vias](#) and via pads on the top or bottom side of the board after the conductor surface finish is applied. It only deposits a small amount of soldermask in the barrel of the via. Typically used to prevent assembly shorts or solder loss through the via, when the spacing between solder pad and via pad is too tight for a traditional [soldermask web](#). Can be done on the front or back sides, but cannot cap the same via from both sides.

The via cap can be up to 0.0025" (0.0635mm) taller than adjacent soldermask and is typically done on the secondary side. It can add cost as this is an additional mask application .





Via Farm

A via farm is a group or matrix of vias in close proximity.

Via Plug See [Plugged Via](#)

VIP Via-In-Pad

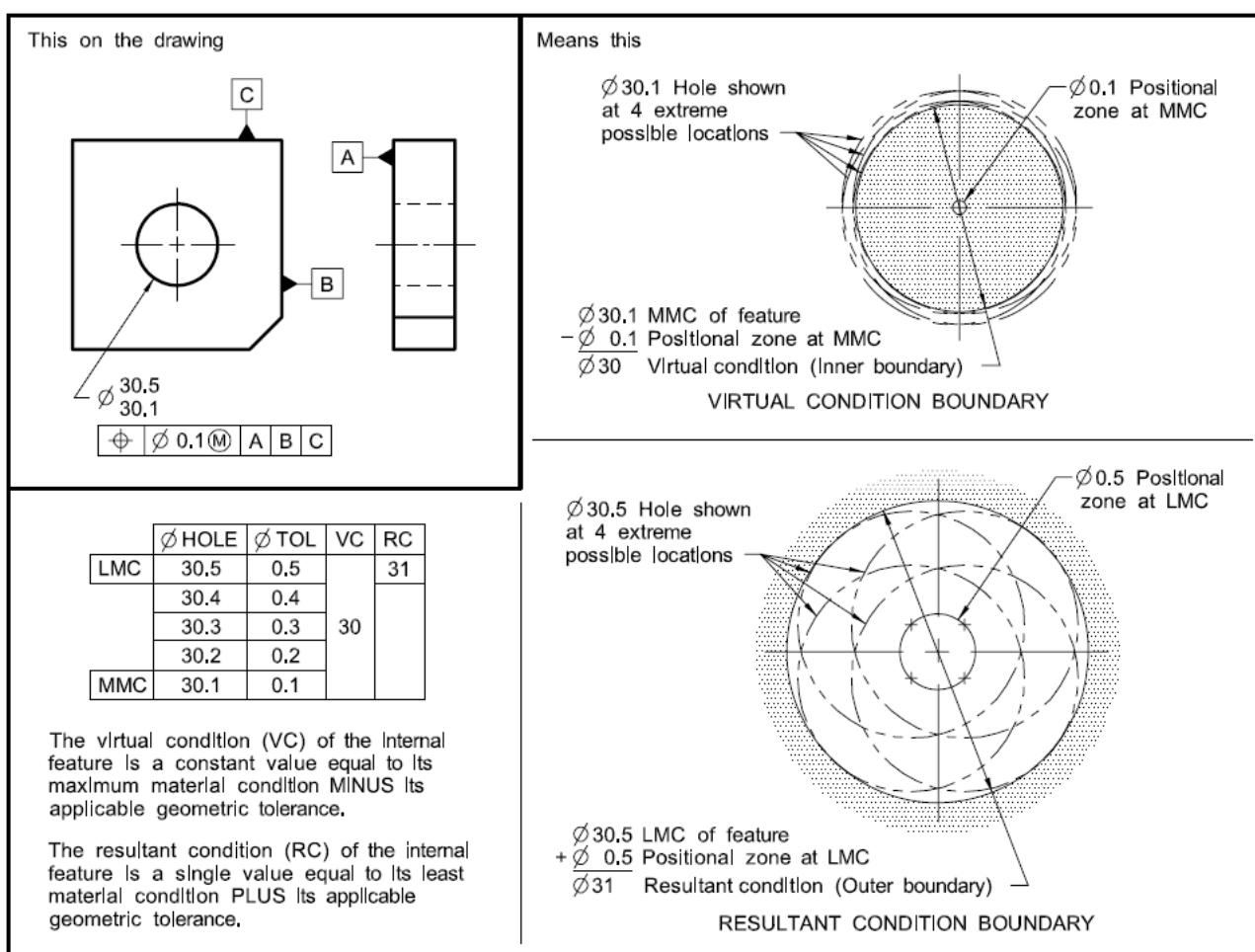
Refers to via-in-pad design, whereas vias are placed in the pads of Surface Mount Technology components.

VIPPO Via-In-Pad Plated Over

Plugged vias that are plated over with the surface finish of the [PCB](#).

Virtual Condition (VC)

As relates to [GD&T](#), a constant boundary generated by the collective effects of a considered feature of the sizes specified [max material condition](#) or [least material condition](#) and the geometric tolerance for that material condition.



Virtual Test Points

Virtual test points describe the Boundary Scan strategy of testing nets that one or more boundary-scan output pins can drive and whose logic state one or more boundary-scan input pins can capture. Such a configuration provides high levels of fault coverage, and precise fault isolation without the need for all physical test points.

VLSI Very Large Scale Integrated circuits

VTEP Vectorless Test Extended Performance

W

Customer Waiver

A document signed by the customer authorizing a permanent departure from a customer product or process requirement or specification, or from a regulatory or statutory requirement applicable to the product, or from a Jabil requirement at the customer request.

Warpage

Warpage is a distortion where the surfaces of a part does not follow the intended shape of the design. Part warpage results from residual stresses, which, in turn, are caused by differential shrinkage of material in the part.

Wash

A process used to clean and dry printed circuit boards following soldering.

Wave Solder (WS)

The making of a solder joint on a board by passing the board over a wave of molten solder. The process is used in soldering through hole and secondary side surface mount components.

Wetting Out

Adhesive flows and covers a surface to maximize the contact area and the attractive forces between the adhesive and bonding surface.

Wire Bond Finger

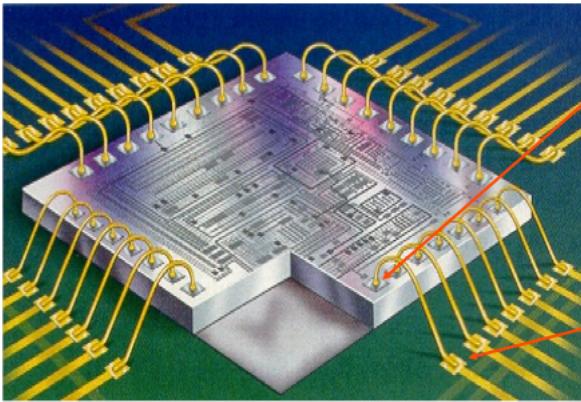
PCB outer layer copper pad or trace for bonding a wire. In wire bonding terminology, sometimes referred to as leads.

Wire Bond Housing

Parts placed on the PCB to protect sensitive assemblies or a chip on board (COB) bare die and bonded wires that are not encapsulated.

Wire Bonding

Assembly process used to connect the internal circuitry of a die to the external world using extremely fine wires. This process is used in COB applications.

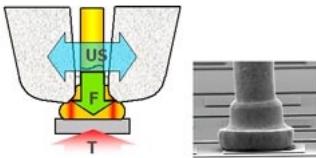


Wire Bonding Cycle

- A wire is fed through a [wire bonding capillary](#) and an electrode touches the tip of the wire, melting the wire to form a ball.



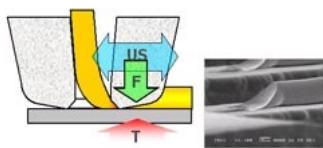
- The capillary is lowered and the ball makes contact with the die pad. Power, force, time and temperature are applied to weld the ball to the pad forming a ball bond.



- The capillary raises and the wire is released as the capillary travels to the second bonding site forming a wire loop.



- The capillary is lowered and the wire makes contact with the die pad. Power, force, time and temperature are applied to weld the wire to the pad forming a wedge bond and severing the wire.



- The capillary raises completing the wire bond and prepares for the next bonding cycle.

Wire Bonding Capillary

A hollow [wire bonding](#) tool used to guide the wire during the bonding cycle. Also applies a combination of heat, pressure, mechanical energy or ultrasonic energy during the bonding cycle.



X

X-out

In the [PCB](#) industry, the term X-out identifies a defective board or boards in [panel arrays](#). The defective boards typically have an X marked on the top, indicating it is defective.

X-ray

X-ray is primarily used for diagnostic purposes where inspection of solder joints is required. It can be two dimensional or three dimensional based on the inspection equipment used.

X-Ray 5DX

Three dimensional X-ray solder joint inspection equipment capable of inspecting both sides of a double-sided panel in one pass.

X-ring

See [Quad-Ring](#)

X-Y Data

Component coordinate information provided by the [PCB CAD](#) tool.

Z

Z-axis

The third axis in a 3-dimensional coordinate system.

ZIF Zero Insertion Force

3D Printing

A method of manufacturing also known as "additive manufacturing" because instead of removing material to create a part as is normally done in a machine shop, the process instead adds material in successive layers to create the desired shape.

There are a variety of 3D printing technologies including [FDM](#), [MJP](#), [SLA](#) and [SLS](#).



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