

Glossary of Probing Terms & Acronyms



Term Definition

I over F	1/f noise occurs in almost all electronic devices (referred to as flicker noise). When designing or working with circuits for use with extremely weak (low level) signals, Noise is an important consideration. As the switching voltage on devices reduces the percentage of this signal become larger. Flicker noise is more prominent in FETs, and bulky resistors. A "real world" amplifier will not only amplify the noise at its input, but will contribute its own noise to signal. Devices such as hearing aids this noise creates a popping sound not unlike the sound of popping corn.
3D Packaging	3D packaging is a type of MEMS packaging that involves two or more components stacked vertically in a package in order to achieve a higher level of integration while using a smaller footprint. The integrated components may be either stacked packages or stacked chips. In the later case, the chips are either wire-bonded along their edges or interconnected by way of Through-Silicon Via (TSV) technology.

A

AAGR	Average Annual Growth Rate
Abrasive	A hard and wear-resistant material (such as a ceramic) used to wear, grind, or cut away other material.
Accelerated Lifetime Test (ALT)	Accelerated Lifetime Testing stresses devices beyond actual operating conditions to physically and/or chronologically accelerate any potential causes of degradation. In this way, device lifetime and failure rates can be determined, and failure mechanisms can be analyzed. This type of test is referred to as an accelerated lifetime test. Such tests are used to shorten the evaluation period and analyze mechanisms in detail.
Accuracy	Accuracy - Determined on 1 Axis of motion by moving a specified distance measuring how accurately the device moved that distance. Ex: Direct a Move in "X" of 15mm. Actual movement is 15.001mm. Accuracy would be ± 0.001mm
ADC	End of Text. An 8-bit superset of the standard ASCII codes is often used today



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AFM	An instrument that allows for the measurement and high resolution mapping of both conducting and non-conducting surfaces. The instrument operates by scanning the sample with a sharp tip (typically micromachined silicon nitride) attached to the underside of a microscale cantilever.
Anechoic Chamber	A test chamber that performs 2 basic functions as part of an overall EMC (electromagnetic-compatibility) measurement system. They shield the DUT from ambient signals and absorb reflected signals generated inside the chamber.
Atomic Resolution Storage AIS	Devices that use individual atoms to represent bits of logic (0's and 1's) to store data. called Extended ASCII Character Sets.
Algorithm	A set of well-defined mathematical rules or operations for solving a problem in a finite number of steps.
AM 1	The air mass 1 spectrum of a light source is equivalent to that of sunlight at the earth's surface when the sun is at zenith.
Ampere (amp) [A]	Measure of electric current: 1A = 1 coulomb/second.
Amperometric Sensor	Amperometric sensors involve a heterogeneous electron transfer as a result of an oxidation/reduction of an electro-active species at a sensing electrode surface. A current is measured at a certain imposed voltage of the sensing electrode with respect to the reference electrode. Analytical information is obtained from the current-concentration relationship at that given applied potential.
Angstrom [Å]	Measure of length: 1 Å= 1x10 ⁻¹⁰ m.
Anisotropic	Exhibiting different values of a property in different crystallographic directions.
Anneal	A process to alter wafer properties by heating. An example is a bond anneal where wafers are heated in a furnace to form strong bonds between the handle and device wafers in the formation of SOI.
Anode	The electrode in an electrochemical cell or galvanic couple that experiences oxidation, or gives up electrons.

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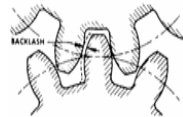
Anodic Bonding	A technique of hermetically joining glass to silicon by applying heat and electric field. The silicon and glass wafers are heated to a temperature, typically in the range of 200-500 deg. C, and are applied with a high voltage, typically in the range of 500 to 1,500 V, across them. This causes the mobile alkali cations in the glass to migrate from the interface resulting in a depletion layer with high electric field strength. The resulting electrostatic attraction joins the silicon and glass wafers together. Anodic wafer bonding is often used to fabricate MEMS pressure sensors, inertia sensors, RF and microfluidic devices.
AOI	Automated Optical Inspection - Systems for inspecting electronic circuits (products, assemblies), identifying defects during the manufacturing cycle. CDC cameras are used to capture images which are compared to the characteristics of a known good products facilitating the identification of problems and allowing repair at earliest point and the lowest possible cost. (See WIS)
AOQ	Average Outgoing Quality
AQL	Acceptable quality Level
ARPA	Advanced Research Projects Agency
Arrhenius Equation	In accelerated lifetime modeling, when the stress parameter is the temperature the acceleration factor may follow an Arrhenius equation where the acceleration factor is proportional to $\exp(-E_a/kT)$ with E_a being the activation energy, k the Boltzmann constant and T the temperature
ASCII	American Standard Code for Information Interchange. A 7-bit binary code representing the English alphabet, decimal numbers and common punctuation marks. Also includes "control characters" such as Carriage Return or End of Text. An 8-bit superset of the standard ASCII codes is often used today to include foreign characters and other symbols. These supersets are often called Extended ASCII Character Sets.
ASIC	Application Specific Integrated Circuit
Assembly Test Chip	A chip designed to evaluate the reliability and effect of assembly materials and processes, usually by electrical measurements made on terminals connected to the chip within the packages that are tested. The test chip may contain a variety of sensors to evaluate thermomechanical stresses, moisture, and other associated degradations.
ATE	Automatic Test Equipment - Equipment designed to automatically analyze functional or static parameters of electronic assemblies in order to evaluate performance degradation. It may also be designed to perform fault isolation.
ATM	Atmospheres or Automatic Teller Machine
Atomic mass unit (a.m.u.)	A unit of mass used to express relative atomic masses. It is equal to 1/12 of the mass of an atom of the isotope carbon-12 and is equal to 1.66033×10^{-27} kg

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- Atomic number (also proton number Z) The number of protons within the atomic nucleus of a chemical element.
- Atomic weight The weighted average mass of the atoms in a naturally occurring element.
- AXI Automated X-Ray Inspection - Systems measure the shadowing (gray scale) of penetrating x-rays to inspect the internal structure of material contained in electronics to identify defects created during the manufacturing process. These systems find wide use in the inspection of solder joints on BGA, CSP, and other area array packages.

B

- Back-End Processing The back-end of semiconductor processing commonly refers to the operations that take place after the processes that build multiple microdevices on a silicon wafer (front-end processing). Back-end processing typically involves the separation of the silicon wafer into individual die (singulation), followed by the addition of electrical wiring, die packaging and final testing. In some cases, wafer bonding may be required before singulation.
- Backlash Backlash is the “slop” in a mechanical system which results in delaying motion when the direction of motion is changed on an axis. Looseness in bearings or following nut may accentuate. Backlash creates a time lag between the reverse motion input to the system actually starting the reverse movement.
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- A technical diagram illustrating backlash in a gear system. It shows two meshing gears. A horizontal line with an arrow indicates the input motion. A second horizontal line with an arrow indicates the output motion, which is delayed relative to the input. The delay is labeled "BACKLASH". The diagram uses hatching to show the teeth of the gears.

- Balanced Input A differential input circuit pair with equal impedance to ground on each side. See Differential Input. The advantages as opposed to single-ended transmission are noise rejection over long distances of cabling.
- Balanced Output A differential output circuit pair with equal source impedance on each side. See Differential Output.
- Band gap energy (E_g) For semiconductors and insulators, the energies that lie between the valence and conduction bands; for intrinsic materials, electrons are forbidden to have energies within this range.
- Bandwidth The measure of a circuit's ability to pass a full amplitude signal over a range of signal frequencies. Normally measured between the point or points where the signal amplitude falls to -3dB below the pass band frequency.

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Baud Rate	<p>The signaling or symbol rate of a digital transmission path or device. A symbol can represent more than one bit of information, depending on the encoding or modulation scheme used to create the symbol. Often used interchangeably with bits per second (BPS), although incorrectly. See BPS.</p>
BAW	<p>Bulk acoustic wave.</p>
Behavioral Model	<p>A high-level representation of an electronic or electromechanical design that describes the behavior of various components in the system, usually without regard to the underlying technology used to implement the design.</p>
Bilayer lipid membrane (BLM)	<p>The structure found in most biological membranes, in which two layers of lipid molecules are so arranged that their hydrophobic parts interpenetrate, whereas their hydrophilic parts form the two surfaces of the bilayer.</p>
Binary	<p>Numbering system based on powers of 2 using only the digits 0 and 1, called "bits".</p>
BGA	<p>Ball Grid Array or Bumped Grid Array - A surface mount microelectronic package that uses an array of solder balls to provide electrical interconnect and physical mount to the next level of package such as a printed circuit board.</p>
Biochip	<p>A miniature silicon, glass or plastic piece consisting of a large number of microstructures containing special probes of biologically active molecules to be used as an analytical and diagnostic tool. For example, the biochip make it possible to identify very large numbers of genes or proteins (protein chip) in relative short time.</p>
BioMEMS	<p>Biological or Biomedical Micro Electro Mechanical Systems are microsystems with applications for biological, biomedical and analytical instrumentation fields. Examples of BioMEMS include devices and microsystems for drug delivery, DNA/protein analysis, molecular manipulation/assembly, microfluidics as well as biosensors and micro total analysis systems.</p>
Biosensor	<p>The term "biosensor" is a general designation that denotes either a sensor to detect a biological substance or a sensor which incorporates the use of biological molecules such as antibodies or enzymes. Biosensors are a subcategory of chemical sensors.</p>
Bit	<p>see binary.</p>
BJT	<p>Bipolar (junction) transistors - A bipolar (junction) transistor (BJT) is a three-terminal electronic device constructed of doped semiconductor material and may be used in amplifying or switching applications. <i>Bipolar</i> transistors are so named because their operation involves both electrons and holes. Charge flow in a BJT is due to bidirectional diffusion of charge carriers across a junction between two regions of different charge concentrations.</p>
BLP	<p>Bottom Leaded Packages</p>
Bluetooth	<p>A wireless technology that specifies how mobile devices, peripherals and computers that are in close proximity to communicate with each other. The technology enables data connections between electronic devices in the 2.4 GHz range. Bluetooth would replace cable or infrared connections for such devices. MEMS displays, microphones and RF devices are emerging for Bluetooth-based applications.</p>

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Bonded Silicon-on-Insulator (SOI) Wafer	SOI wafer formed by bonding a device quality silicon wafer to a handle silicon wafer. Either or both of the two silicon wafers may have an oxide layer to form the buried oxide layer, which is the oxide layer between the handle and device wafers.
Bonding	The process of joining, two or more entities, components or wafers to each other by means of various chemical and physical effects -- such as adhesive, anodic, eutectic and thermal compression bondings.
BNC	A type of coaxial connector used in situations requiring shielded cable for signal connections and/or controlled impedance applications.
BPS	The amount of binary data sent in bits per second. Not to be confused with baud rate. Modern data and fax modems, for example, transmit at 14,400 bits per second using a baud rate of 2,400 baud. This is accomplished by complex encoding methods. Also used as a general term to define any rate that digital data flows (see Mbps).
Breakdown	Failure of a material resulting from an electrical overload. The resulting damage may be in the form of thermal damage (melting or burning) or electrical damage (loss of polarization in piezoelectric materials).
Bulk Micromachining	An subtractive micro-fabrication process where MEMS devices are built by etching into the interior of the substrate, such as a piece of a silicon or a glass wafer, to form the micro electro mechanical structures. The etching techniques can be either a wet etching in a solution or dry etching in a plasma system.
Bump	A raised conductive feature on a die or wafer that facilitates inner-lead bonding
Buried oxide (BOX)	Buried oxide layer- the insulating layer between the handle and device wafers.
Burn-In	The process of electrically stressing a device, usually at an elevated temperature and voltage environment, for an adequate period of time in order to force component infant mortality failures or other latent defects before the unit is delivered to a customer. (See WLR)
Bus	Transmission medium for electrical or optical signals that perform a particular function, such as computer control.
Byte	A group of eight bits that can represent any of $2^8 = 256$ different entities.



C

C4	Controlled Collapsed Chip Connection
C5	Controlled Collapsed Chip Carrier Connection
Calibration	A process of adapting a sensor output to a known physical quantity to improve sensor output accuracy.
Capacitance (C)	The charge-storing ability of a capacitor, defined as the magnitude of charge stored on either plate divided by the applied voltage. A 1-F capacitor charged to 1 V contains C of charge (see also capacitor) and 1 C is an amount of charge equal to that

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of about 6.24×10^{18} electrons.

Capacitor	Energy storage circuit element having two conductors separated by an insulator.
Carbon Nanotubes	Boast incredible strength (100 times stronger than steel at only 1/6th the weight), and have the ability to be semiconducting, conducting or insulating. They are much better conductors of heat than silicon, making them ideal for nanoelectronics.
Cathode	The electrode in an electrochemical cell or galvanic couple at which a reduction reaction occurs; in other words the electrode receiving electrons from an external circuit.
CAFM	Computer Aided Facilities Management
CAM	Computer Aided Manufacturing
Cap wafer	A wafer that is bonded to a device wafer intended to provide encapsulation to the devices.
CAPP	Computer Aided Process Planning
Capping	The process of bonding a cap to a MEMS device. Capping may be done either at wafer level or at die level.
CAR	Computer Aided Repair
CAT	Computer Aided Testing
CBGA	<p>Ceramic Ball Grid Array - Integrated circuit package in which the input and output points are solder bumps arranged in a grid or area array pattern. CBGA devices utilize ceramic materials because of their low loss qualities, long life characteristics, and ability to withstand high operating temperatures and heat shock.</p> <p>For general application, the aluminum oxide substrate (alumina) is preferred because of its availability, low cost, good thermal expansion coefficient to most inks. Beryllia substrates with a high thermal conductivity may be used in high power circuitry.</p>
CCA	Circuit Card Assembly
CCAPS	Circuit Card Assembly and Processing System
CCGA	Ceramic Column Grid Array
CDR	Convection Domanint Reflow
Ceramic	An inorganic, nonmetallic material, such as alumina and beryllia, whose final characteristics are produced by subjection to high temperatures. Ceramic materials are commonly used as substrates for packaging microelectronic devices.


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Ceramic Ball Grid Array (CBGA)	A ceramic surface-mount package that uses an array of solder balls to provide electrical interconnect and physical mount to the next level of package such as a printed circuit board.
CFM	Continuous Flow Manufacturing
CGA	Column Grid Array - An integrated circuit package in which the input and output points are high temperature solder cylinders or columns arranged in a grid pattern.
Channel Crosstalk	Coupling of a signal from one channel to another or any other output by conduction or radiation. Crosstalk is expressed in decibels (dB) at a specified load impedance and over a specific frequency range or ranges.
Chemical Mechanical Planarization (CMP)	The use of an abrasive slurry to polish a wafer's surface to eliminate topological layer effects in the manufacturing of semiconductors. In the process the chemicals in the slurry reacts with the material to be removed to assist the mechanical polishing
Chemical Vapor Deposition (CVD)	A film deposition process onto heated silicon wafers based on a chemical vapor reaction in a vacuum chamber. Commonly deposited film materials by CVD include silicon nitride, silicon dioxide and poly-silicon.
Chip	An uncased and normally leadless form of a microelectronic component that is either passive or active, discrete or integrated. It is the square or rectangular portion of a wafer sectioned from the wafer when the wafer processing is completed. Also referred to as a die.
Chip Scale Package (CSP)	According to IPC/JDEC J-STD-012 standard, CSP is a single-die, direct surface mountable package with an area of no more than 1.2 X the original die area. CSPs are constructed from individual die with lead frame or substrates and are also fabricated at the wafer level. CSPs have the advantage of small size, low mass, reduced electrical parasitics and they can be fully tested.
C/IR	Convection/Infrared - Heat transfer that occurs at the interface of a solid and fluid or gas due to temperature differences. A type of reflow oven which uses a combination of convection and radiation to transfer heat.
CIM	Computer Integrated Manufacturing
CIS	Condensation Inert Soldering
CMOS	Complementary metal oxide semiconductor - integrated circuit containing n-channel and p-channel MOSFETs.

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Conductor	Material such as the metals copper or aluminum that conducts electricity via the motion of electrons.
Coaxial Cable	<p>A cable that has one conductor (shield) completely surrounding the other (center conductor), the two being coaxial and separated by an insulator. Standard industry types have a braided shield, or a semi-rigid copper or stainless steel shield material. Braided shield coaxial cable offers more physical flexibility but less shielding.</p> 
COB	<p>Chip on Board -A hybrid technology exclusively employing face-up-bonded chip devices interconnected to the substrate conventionally, i.e., by flying wires. A generic term for mounting an unpackaged silicon die directly onto the PCB. Connections can be made by wire bonding, tape automated bonding (TAB), or flip-chip bonding.</p> <p>Chip: A single substrate on which all the active and passive circuit elements have been fabricated using one or all of the semiconductor techniques of diffusion, passivation, masking, photoresist, and epitaxial growth. A chip is not ready for use until packaged and provided with external connectors.</p>
COC	Certificate of Compliance
CODEC	A codec is a device or computer program capable of encoding and/or decoding a digital data stream or signal.
Coefficient of Thermal Expansion (CTE)	A thermal property of a material defined as the ratio of the change in length to the original length per degree C of temperature change. CTE is also referred to as Temperature Coefficient of Expansion (TCE)
COF	Chip on Flex
Cold Switching	Closing the relay contacts before applying voltage and current, plus removing voltage and current before opening the contacts. (Contacts do not make or break current.) Also see Dry Circuit Switching. Larger currents may be carried through the contacts without damage to the contact area since contacts will not .arc. when closed or opened.
Contact Resistance	Excess electrical resistance in series with the bulk conductor resistance of two contacting electrical conductors arising from the nature of contact geometry and properties of the contact surfaces.
Component Video	A three-channel video signal wherein the luminance, hue and color saturation information are carried as R, G and B (Red, Green and Blue) signals or as one of several variations of color difference signals.
Composite Video	A single video signal carrying combined luminance, chrominance and raster synchronizing information.
Corrosion	Deteriorative loss of a metal as a result of dissolution environmental reactions.
Coulomb [C]	Measure of electrical charge: 1 C is an amount of charge equal to that of about 6.24×10^{18} electrons.

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Covalent bond	A primary interatomic bond that is formed by the sharing of electrons between neighboring atoms.
CP	Capability Performance
CPI	Continuous Process Improvement
Creep	Non-recoverable deformation proceeding at relative low strain rates, usually associated with high temperature to allow sufficient rates of diffusion.
Crosstalk	The undesirable interference caused by the coupling of energy between signal paths.
Cross-sensitivity	The influence of one measurement on the sensitivity of a sensor, another measurement.
Cryogenic	Cryogenics is the study of the production of very low temperature (below $-150\text{ }^{\circ}\text{C}$, $-238\text{ }^{\circ}\text{F}$ or 123 K) and the behavior of materials at those temperatures. Rather than the familiar temperature scales of Fahrenheit and Celsius, cryogenicists use the Kelvin (and formerly Rankine) scales.
CSP	Chip Scale Package - An IC package which is physically no larger in horizontal area than 1.5 times than that of the die itself.
Curing Cycle	For a polymeric material, such as a die-bonding adhesive for pressure sensor chip, the curing cycle is the combination of total time-temperature profile in the heat treatment to achieve the desired results of bonding.
Current [A]	Measure of rate of flow of electric charge: a one-ampere current is a flow of 1 C of charge per second.
Cutoff	Condition in a diode or bipolar junction transistor in which the potential across a p-n junction prevents current flow.
CV/IV	IV (current vs voltage) and CV (capacitance vs voltage) measurements. Capacitance-Voltage (CV) Measurement is one the very basic measurements that can be done to characterize semiconductor devices. What is normally done is the device is hooked up to the parametric analyzer instrument and CV graphs are plotted. With that data we can conclude the type of device, whether it's a p type or an n type device and many other parameters. The main aim of the CV measurement is to extract the doping information of the diode.

D

DARPA	Defence Advanced Research Projects Agency
DCA	Direct Chip Attachment - Techniques for connecting electronic integrated circuits to PCB's or substrates without the use of additional P/I structure such as wirebonds or leadframes. This includes packages commonly referred to as Flip Chip.
DC Servo Motor	A motion control motor that typically requires a feedback system.
Decibels (dB)	The logarithmic ratio between two signal levels. In video and audio, it is normally defined as: $\text{dB}=20 \log_{10}(V2/V1)$

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Deep Reactive Ion Etching (DRIE)	A “dry” vertical etching process used to create deep, steep-sided structures, cavities and trenches in silicon wafers. The process involves the alternating modes of ion etching and passivation-layer deposition in order to create a near vertical etching profile. It is commonly used to form high-aspect-ratio features in MEMS, trenches for high-density capacitors for DRAM, and through-silicon via (TSV) technology.
Degradation	A term used to describe the deteriorative processes that occur with polymeric materials, including swelling, dissolution, and chain scission.
Design For Manufacturability (DFM)	A product design approach that includes a set of techniques conducted at the early stage of the development cycle to make the product more manufacturable, i.e. to achieve the optimization for the cost, quality, reliability and manufacturing capabilities of a product.
Design for Testability (DFT)	A product design approach, which includes a set of techniques to incorporate testable features and/or circuitry to the design in order to make it easier to develop and to aid in the testing of the fabricated product.
Device Layer	Single crystal silicon layer of silicon on insulator (SOI) wafers on which devices are fabricated.
DFA	Design for Assembly
DFMAG	Design for Manufacturability and Assembly Guidelines
DFT	Design for Test
DFX	Design For Excellence
Die	An uncased and normally leadless form of a microelectronic component that is either passive or active, discrete or integrated. It is a square or rectangular portion of a wafer sectioned from the wafer when the wafer processing is completed. Also referred to as a chip.
Die Attachment	The mechanical bonding of a die to a base material usually by solder, epoxy, silicone rubber, gold-silicon eutectic or other bonding agent. Also referred to as Die Bonding.
Die Bonder	A die bonder, in contrast to a wafer bonder, handles electronic components that have already been separated from the wafer. The component is then either bonded to another wafer or to another diced component before final packaging.
Die Bonding	The mechanical attachment of a die to a base material usually by solder, epoxy, silicone rubber, gold-silicon eutectic or other bonding agent. Also referred to as Die Attachment.
Dielectric	Any material that is electrically insulating.
Dielectric (breakdown) strength	The magnitude of an electric field necessary to cause significant current passage through a dielectric material.
Dielectric constant (ϵ)	The ratio of the permittivity of a medium to that of a vacuum. Also called the relative dielectric constant or relative permittivity.
Dielectric displacement	The magnitude of charge per unit area of capacitor plate.

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Diffusion	A thermochemical process whereby controlled dopants are introduced into a substrate.
Diffusion coefficient	The constant of proportionality between the diffusion flux and the concentration gradient in Fick's first law. Its magnitude is indicative of the rate of atomic diffusion.
Digital	Refers to systems employing only quantized (discrete) states to convey information (also see "analog").
DIN	Does not specify any particular connector only that it meets a standard.
Diode	A two-terminal device that conducts current well in one direction and poorly in the other.
Dip	Dual In-line Package - common ceramic or plastic enclosure for an integrated circuit.
Dipole (electric)	A pair of equal yet opposite electrical charges that are separated by a small distance.
Doping	Impurity doping is the introduction of controlled amounts of impurity dopants into semiconductors either by diffusion or ion implantation. For silicon, boron and phosphorus are the most common dopants for p- and n-type materials, respectively.
DPM	Defects per Million
DPMO	Defects per Million Opportunities
DRAM	Dynamic Random Access Memory -- memory in which each stored bit must be refreshed periodically.
Drift	Gradual departure of the instrument output from the calibrated value. An undesired slow change of the output signal.
DSP	Double Sided Prober or Digital Signal Processing
DUT	Device Under Test
Dual-in-Line Package (DIP)	A type of package with two rows of leads extending at right angles from the base and having standard spacing between leads and between rows of leads. DIP is a through-hole mounting package. DIPs can be made of ceramic and plastic, referring to as Cerdip and PDIP respectively.
Dynamic characteristics	A description of an instrument's behavior between the time a measured quantity changes value and the time the instrument obtains a steady response.
Dynamic error	The error that occurs when the output does not precisely follow the transient response of the measured quantity.
Dynamic range	The ratio of the largest to the smallest values of a range, often expressed in decibels.

E

ECAD	Electronic Computer Aided Design
ECN	Engineering Change Notice
ECO	Engineering Change Order

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EDP	Ethylene diamine pyrocatechol or Electronic Data Processing
EELD	Edge Emitting Laser Diode
EIS	Engineering Information Service
Electroplating	The deposition of an adherent metallic coating on to a conductive object placed into an electrolytic bath composed of a solution of salt of the metal to be plated.
Electric field [V/m]	In simplest form, the potential difference between two points divided by the distance between the two.
Electrical breakdown	Condition in which, particularly with high electric field, a nominal insulator becomes electrically conducting.
Electroluminescence	In electrical engineering: the emission of visible light by a p-n junction across which a forward-biased voltage is applied. In electrochemistry: emission of light by a molecule which is being reduced or oxidized on a biased electrode. If the exciting cause is a photon, rather than an electron, the process is called photoluminescence. This is the theory behind Emission microscopy.
Electrolyte	A solution through which an electric current may be carried by the motion of ions.
Electron	Elementary negative particle whose charge is 1.602×10^{-19} coulombs.
EMI	Electromagnetic Interference. A term that defines unwanted electromagnetic radiation from a device which could interfere with desired signals in test or communication equipment. RFI (Radio Frequency Interference) and EMI are often used interchangeably.
EMPA	Engineering Manufacturing Process Audit
Energy [J]	Capacity for performing work or to cause heat flow. Like work itself, it is measured in Joules.
EOT	End of Test
EMPC	Engineering Manufacturing Process Certification
Encapsulation	Sealing up or covering a circuit or electromechanical element for mechanical and environmental protection.
Encoders	Linear or rotary encoders determine positions for a motion control system.
Epitaxial or epi	A single-crystal semiconductor layer grown upon a single-crystal substrate having the same crystallographic characteristics as the substrate material.
Epitaxial (epi) Wafer	A wafer with a single-crystal semiconductor layer grown upon a single-crystal substrate having the same crystallographic characteristics as the substrate material.
EPROM	Electrically Programmable Read-Only Memory --- nonvolatile memory device.

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ESD	Electrostatic Discharge - A transfer of electrostatic charge between bodies (materials, components, etc.) at different electrostatic potentials caused by direct contact or induced by an electrostatic field.
ESD	Electrostatic Discharge
ESS	Environmental Stress Screening
Etching	Process by which material is removed from the wafer in a pattern already transferred lithographically. This may be achieved chemically in a process referred to as "wet" etching using chemical solutions, or with a "dry" etch in a plasma, where a controlled gas flow is ionized and reacts with surface material on the wafer with a physical bombardment of particles.
Eutectic	The melting point of a mixture of two or more solids, such as an alloy, depends on the relative proportions of its constituents. An eutectic or eutectic mixture is a mixture whose melting point is lower than that of any other alloy composed of the same constituents in different proportions. This temperature is referred to as the eutectic temperature of the alloy.
Eutectic Bonding	A technique of hermetically joining work pieces, such as silicon wafers, together by using eutectic material such as Si-Au alloy. Eutectic wafer bonding requires precise application of force and temperature to control the reflow of the eutectic material and is being used in hermetic packaging, 3D integration, compound semiconductor and MEMS fabrication.
Extrinsic	Characterizes doped, rather than pure, semiconductor.
F	
FA	Failure Analysis
FAB	For "fabrication", a term referring to the semiconductor manufacturing facility or the making of semiconductor devices such as microprocessors.
F-Type Connector	A threaded medium performance coaxial signal connector typically used in consumer applications (TV.s and VCR.s). This connector is typically usable as high as 1GHz. It is inexpensive since the pin of the connector is actually the center conductor of the coaxial cable.
fA	Femto Amp
Fabless	A company that does not manufacture its own integrated circuits or MEMS devices but outsources its manufacturing to an outside foundry.
FAC	Forced Air Convection - A type of reflow oven in which the principle heat transfer mechanism is convection, though some IR (infrared) or conduction may be present. Also known as forced convection.
Failure Mechanism	A physical, chemical or other processes that leads to failure. Some examples of failure mechanisms in MEMS include: stiction, creep, fatigue, wear, dielectric charging and breakdown.
Failure Mode	A failure mode is the manner whereby a failure is observed. Generally, it describes the way in which the failure happens and its impact on device or system operation.

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Failure Mode and Effect Analysis (FMEA)	A systematic method for evaluating potential product or process failure modes and their impact on the product or process. FMEA is normally done on a form which facilitates the prioritization and management of remedial actions to reduce the occurrence of failure modes or minimize their effects.
FAR	Failure Analysis Report
Farad	The unit of capacitance (see "capacitance").
Faraday	A constant representing the charge on one mole of electrons; 96,485 coulombs.
Fatigue	Used to describe the failure of any structure caused by repeated application of stress over a period of time.
Ferroelectric material	A dielectric material such as Rochelle salt and barium titanate with a domain structure containing dipoles (asymmetric distributions of electrical charge) which spontaneously align. Their domain structure makes them analogous to ferromagnetic materials. They exhibit hysteresis and usually the piezoelectric effect.
FCC	Flat Conductor Cable
FCIP	Flip Chip in Package - An IC package in which the die is interconnected to the lead structure of the package as a Flip Chip.
FEA	Finite Element Analysis
FET	Field Effect Transistor - The FET relies on an electric field to control the shape and hence the conductivity of a channel of one type of charge carrier in a semiconductor material. FETs are sometimes called <i>unipolar transistors</i> to contrast their single-carrier-type operation with the dual-carrier-type operation of bipolar (junction) transistors (BJT). The field-effect transistor (FET) relies on an electric field to control the shape and hence the conductivity of a channel of one type of charge carrier in a semiconductor material. FETs are sometimes called <i>unipolar transistors</i> to contrast their single-carrier-type operation with the dual-carrier-type operation of bipolar (junction) transistors (BJT).
Finite Element Analysis (FEA)	A computational intensive numerical modeling tool in which the body is discretized into small regular shaped elements. Also referred to as Finite Element Modeling.
Flip Chip	A leadless, monolithic structure containing microelectronic elements that is designed to electrically and mechanically interconnect to a base material through the use of conductive bumps located on its face.
Flip-flop	Binary device whose outputs change value only in response to an input pulse.
Floating	The condition where a common mode voltage exists, or may exist between earth ground and the instrument or circuit of interest. Low side of circuit is not at earth potential.
FLT	Full Liquidus Temperature The temperature at which the molten solder reaches its maximum liquidity and best viscosity for good wetting, typically 15 - 20 degrees C above the solder alloy melting point. or Flight for you road warriors!

Glossary of Probing Terms & Acronyms



FOOW	Fiber Optic Operational Wavelengths 850 nm - multimode fiber 1310 nm - multi and single mode fiber 1550 nm - single mode long haul and transoceanic fiber 1625 nm - proposed for in service monitoring
FOP	Fineness of Print (Stencil)
Foundry	A micro-fabrication business operation that provides services for prototyping and volume production of integrated circuits and/or MEMS microchips. Foundry services typically offer a set of standard fabrication process, however, some may offer specialized and/or customized services including the design and simulation of MEMS devices.
FM	Frequency Modulation - information coding scheme in which the frequency of a steady wave is changed.
Forward bias	The conducting bias for a p-n junction rectifier that assures electron flow to the n side of the junction.
FPT	Fine Pitch Technology
Frequency Spectrum	Relationships and Typical Applications 108 nm - 3 x 10 ⁹ Hz (microwave radio frequencies) 109 nm - 3 x 10 ⁸ Hz (UHF frequencies) 1010 nm - 3 x 10 ⁷ Hz (VHF frequencies) 3 x 10 ¹¹ nm - 1000 kHz (AM Broadcast radio frequencies) 1014 nm - 3000 Hz (audio frequencies) 5 x 10 ¹⁵ nm - 60 Hz (electrical power frequency)
Fullerene (a.k.a “Buckyball”)	A nanospherical phase of carbon in which 60 carbon atoms are arranged like a soccer-ball. Named after geodesic dome creator Buckminster Fuller.
Front-End Processing	The front-end of semiconductor process refers to the operation of forming repeated microdevices built on the silicon wafer. Front-end processes typically involve repeated steps of photolithography, oxidation, ion implantation, diffusion, film deposition, and etching. The outcome is a silicon wafer that contains multiple units microdevices prior to separating into chips.
G	
Gbit	Gbit - a unit of information equal to 1000 megabits or 10 ⁹ (1,000,000,000) bits.
GDS II	2-D mask layout binary file format used to generate masks for photolithography processes during the fabrication of microelectronic circuits and MEMS devices.



Glossary of Probing Terms & Acronyms



Getter	Getters are materials which, when properly activated, can remove traces of gas in a vacuum package by reacting with gas molecules.
Glass Frit	Glass composition ground into a powder form. It melts upon firing to yield adhesion of other materials. Glass frit is a common material used as an intermediate layer for wafer bonding.
Glass Scale	A scale used in precision motion control systems.
Glass Transition Temperature	The glass transition temperature, T_g , is a transition temperature that below which an amorphous solid (such as glass or a polymer) becomes relatively hard and brittle; whereas above which the object becomes viscous or rubbery.
GUI	Graphical User Interface

H

HAL	Hot Air Leveling
HALT	Highly Accelerated Life Testing
HASL	Hot Air Solder Leveling
Hermeticity	Refers to a condition where a unit is sealed and gas tight. A conventional test for hermiticity is to fill the unit with a test gas, such as helium, and measure the leak rates when placed in vacuum. For MEMS vacuum packages with a very small volume, on-chip sensors such as a resonator have been used to evaluate the hermitic encapsulation by monitoring the quality factor of the resonator.
HF	High Frequency

I

I/O	Input/Output
IC	Integrated Circuit
ICAM	Integrated Computer Aided Manufacturing
ICT	In Circuit Test - Component by component test to verify proper component placement and orientation and to ensure that components meet specifications.
IEC	International Electrotechnical Commission
IGBT	The insulated gate bipolar transistor or IGBT is a three-terminal power semiconductor device, noted for high efficiency and fast switching. It switches electric power in many modern appliances: electric cars, variable speed refrigerators, air-conditioners, and even stereo systems with switching amplifiers. Since it is designed to rapidly turn on and off, amplifiers that use it often synthesize complex waveforms with pulse width modulation and low-pass filters.
ILB	Inner Lead Bonding

Glossary of Probing Terms & Acronyms



Insertion Loss	The attenuation of signals due to routing them through a switching module or system. Specified as a decibel value (dB) over a frequency range. Loss could be due to the resistive, inductive or capacitive features of the signal path, or a combination of all of these.
Insulation Resistance	The ohmic resistance of insulation. It degrades quickly as humidity increases. Lower insulation resistance provides a path for leakage current to ground. This is very critical when making measurements on semiconductor components where picoamp measurements are being made.
IMC	Intermetallic Compound
Inductor	An inductor or a reactor is a passive electrical component that can store energy in a magnetic field created by the electric current passing through it. An inductor's ability to store magnetic energy is measured by its inductance, in units of henries.
Intellectual Property (IP)	IP has to do with property that is produced by effort of the mind. Industrial IPs are those created and used for industrial or commercial purposes including inventions (patents), copy rights, trademarks, trade secrets and others. For the MEMS industry, IP may include copyrights of masks, patents for device or system design and methods of fabrication, as well as trade secrets such as process recipes.
Intelligent Sensor	A sensor possessing advanced features such as self-calibrating, self-diagnostics, and the ability to compensate for variations in ambient conditions. The key factor of an intelligent sensor is to have adequate information from which the sensor can assure validity of the measurement and the ability to communicate with other intelligent devices.
Interposer	An intermediate layer in packaging, used for purposes such as fanning out or matching electrical interconnects from one device to another, or relieving any potential stress issues.
IR	Infrared - Part of the electromagnetic spectrum between the visible light range and the radar range. Used for heating operations in electronic assembly such as reflow soldering, preheating in wave soldering, adhesive curing, etc.

J

JEDEC	Joint Electronic Device Engineering Council
JIT	Just in Time (Manufacturing Inventory Control)

K

Ka-band	The K_a band (Pronounced: "Kay-A Band") covers the frequencies of 26.5-40GHz ^[1] . The K_a band is part of the K band of the microwave band of the electromagnetic spectrum. This symbol refers to "K-above" – in other words, the band directly above the K-band. The so-called 30/20 GHz band is used in communications satellites, uplink in either the 27.5 GHz and 31 GHz bands ^[2] , and high-resolution, close-range targeting radars aboard military airplanes. Some frequencies in this radio band are used for vehicle speed detection by law enforcement
K-Type Connector	A small type of threaded coaxial signal connector typically used in higher frequency applications. This connector is typically usable as high as 40GHz. It may be mated by an SMA connector with much lower performance.

Glossary of Probing Terms & Acronyms



KGB	Known Good Board
KGD	Known Good Die - The semiconductor dice (die) that have been tested and are known to function to specification. Typically used as a referee in testing other dice produced. (See SemiProbe KGD Systems)
KOH Etch	Process used for performing an angular etch where by a heated Potassium Hydroxide (KOH) solutions is used for preferential crystallographic etching of Silicon (Si). The etch rate depends on the doping and crystallographic orientation of the Si and the type (concentration) of KOH used
kV	Kilovolts (kV), 1,000 volts

L

Lab-on-a-Chip (LOC)	A miniature analytical system, that contains microfluidic channels to allow minute liquid of gas to be separated and analyzed by integrated microdevices including pumps, valves, microfluidic controllers, and detectors. LOCs are typically made of silicon, glass or plastic and are the size of a credit card. These miniature labs can perform tasks such as drug discovery, genetic testing and the separation of cells.
Laser Drilling	Method used to create three-dimensional structures in materials (such as silicon, glass, plastics, etc.) by focusing a highly collimated, monochromatic, coherent light beam at the work-piece
Latching	In relay or switching technology, this refers to the ability to keep the contact status in place even if power is removed from the equipment.
Latchup	A failure condition in which a transistor switches state when it is not supposed to. Often caused by nearby circuitry in a specific condition.
Leakage Current	Error current that can degrade sensitive measurements. Even high resistance paths between low current conductors and nearby voltage sources can generate significant leakage currents. Leakage in insulating material, micro-contamination on insulating surfaces, and moisture (humidity) can have catastrophic effects on picoamp and sub-picoamp (femtoamp) measurements.
LCCC	Leadless Ceramic Chip Carrier - A package in which an integrated circuit chip can be mounted to form a surface mounted component. It is made of a ceramic material which can withstand high temperatures and can be hermetically sealed. It does not have leads but has pads around its perimeters (called castellations) for connection to the PCB footprint.
LDT	Liquidus Dwell Time
LFEA	Lead Free Electronic Assembly
LFM	Lead Free manufacturing
LGA	Land Grid Array

Glossary of Probing Terms & Acronyms



LIGA	LIGA is the German acronym for Lithographie, Galvanofomung and Abformung, meaning Lithography, Electroforming and Molding. It is a micromachining technique used to create a very tall, straight-walled (high-aspect ratio) photoresist microstructure followed by electroplating to form a metal microstructure. The metal microstructure may be may be the final product or serve as a mold insert for precision plastic injection molding.
Linearity	The degree to which the calibration curve of a device conforms to a straight line.
LOC	Lead on Chip
Logic Gate	An elementary building block of a digital circuit. Always in one of the two binary conditions: low (0) or high (1). Change is controlled by voltage levels.
Low Level Measurements	Low-level measurements in research, metrology, nanotechnology, superconductivity, and other low-voltage and low-resistance applications require a special breed of test equipment.
LSI	Large Scale Integration
LWD	Long Working Distance (Objectives)

M

Manipulator	A small 3 axis stage used for precision placement of probes
Mask	Pattern on glass, like a photographic negative, for producing integrated-circuit elements on semiconductor wafer.
Matrix	An arrangement of signal circuits in which input buses are represented by parallel vertical lines and output buses as overlapping horizontal lines (or visa versa), forming a grid-like array. Crosspoint switches at each crossing point connect inputs to outputs. Also referred to as a switching array, or crosspoint switch. (As in switching matrix)
Mbps	Megabits per second (millions of bits per second). A measure of digital data transmission rate.
MCM	Multi Chip Module - A circuit comprised of two or more silicon devices (IC) mounted directly to a substrate within a single component package.
MCT	Machine Capability test
MCU	Microcontroller
Mean Time To Failure (MTTF)	MTTF is a characterization of reliability for non-repairable systems. It is the mean time expected until the first failure of a part of the system. MTTF is a statistical value and is supposed to be the mean over a long period of time and large number of units.
MTBF	An abbreviation of Mean Time Between Failure, a theoretical period of time between failures in equipment based on stresses in environment, temperature, levels of quality and other parameters.
MTTR	An abbreviation for Mean Time To Repair, a theoretical period of time need to repair a piece of equipment given certain circumstances.

Glossary of Probing Terms & Acronyms



MELF	Metal Electrode Leadless Face
MEMS	Microelectromechanical systems (MEMS) (also written as <i>micro-electro-mechanical</i> , <i>MicroElectroMechanical</i> or "microelectronic and microelectromechanical systems") is the technology of the very small, and merges at the nano-scale into nanoelectromechanical systems (NEMS) and nanotechnology.
MEMS Device Taxonomy	An aid in the classification of MEMS device with respect to their reliability. The taxonomy consists of four classes of MEMS devices: • Class I: Parts may flex but no moving parts for excited displacement nor vibration (e.g. pressure sensors, Ink jet print head) ;• Class II: Moving parts with no contact (e.g. comb-drive accelerometers, resonators);• Class III: Moving parts with contact (e.g. switches, fluidic valves)• Class IV: Moving parts with rubbing and/or contact (e.g. gears, rotary hubs).
MEMS Packaging	Packaging of MEMS needs to meet the basic functional requirements, including electrical signal/power interconnections, heat dissipation, mechanical integrity, and environmental protection. In addition, it also has to provide an interface with the environment in order to perform sensing or actuation.
Micro Electro Mechanical System (MEMS)	An enabling microfabrication technology that use manufacturing processes similar to that of semiconductors and integrated circuits to create discrete or integrated microdevices such as mechanical structures, microsensors, microactuators, and circuitry on a substrate material including silicon, glass or ceramic. MEMS products find wide applications in instrumentation, industrial automation, automotive, telecommunications, optoelectronics, information technology and consumer electronics. In referring to this technology, MEMS is the term commonly used in North America whereas Microsystem Technology (MST) and Micromachines are commonly used in Europe and Japan respectively.
Microfluidics	Microfluidic systems comprised of nozzles, pumps, reservoirs, mixers, valves, etc., can be used for a variety of applications including drug dispensing, ink-jet printing and general transport of liquid, gases and their mixtures
Micromachine	Structures and machines with micron feature sizes. It also refers to a microfabrication technology that uses manufacturing processes similar to that of semiconductors and integrated circuits to create discrete or integrated microdevices such as mechanical structures, microsensors, microactuators, and circuitry on a substrate material including silicon, glass or ceramic. MST products find wide applications in instrumentation, industrial automation, automotive, telecommunications, optoelectronics, information technology and consumer electronics. In referring to this technology, the term Micromachine is commonly used in Japan whereas MEMS and Microsystem Technology (MST) are commonly used in North America and Europe respectively.
Micromirror	Mirrors of micro feature size fabricated on a chip. Micromirrors are commonly actuated by electrostatic, thermal, or magnetic means steer and/or scan a light beam with applications for displays, scanners, optical switches and other optoelectronics components.
Micron	One micron is 1/1000th of a millimeter. 1 micron is equal to 1,000 nanometers.

Glossary of Probing Terms & Acronyms



Micro-Optical-ElectroMechanical Systems (MOEMS)	MOEMs generally refer to microfabricated optic components or optoelectronics devices and systems including waveguides, diffraction gratings, moving mirrors and other products that alter or modulate the path of a light beam, or spectrally modify the light beam. It is also known as optical MEMS.
Microsystem Technology (MST)	An enabling microfabrication technology that uses manufacturing processes similar to that of semiconductors and integrated circuits to create discrete or integrated microdevices and systems. MST products find wide applications in instrumentation, industrial automation, automotive, telecommunications, optoelectronics, information technology and consumer electronics. In referring to this technology, MST is the term commonly used in Europe whereas MEMS and Micromachine are commonly used in North America and Japan respectively.
Microwave	Microwaves are electromagnetic waves with wavelengths ranging from as long as one meter to as short as one millimeter, or equivalently, with frequencies between 300 MHz (0.3 GHz) and 300 GHz. ^[1] This broad definition includes both UHF and EHF (millimeter waves), and various sources use different boundaries. ^[2] In all cases, microwave includes the entire SHF band (3 to 30 GHz, or 10 to 1 cm) at minimum, with RF engineering often putting the lower boundary at 1 GHz (30 cm), and the upper around 100 GHz (3mm).
MIL-STD	A United States Defense Standard, often called a military standard, "MIL-STD", "MIL-SPEC", or (informally) "MilSpecs", is used to help achieve standardization objectives by the U.S. Department of Defense.
MLB	Multi-Layered Board
MLPWB	Multi-Layered Printed Wiring Board - A multi-layer board formed by sequentially laminating single and double sided circuit panels (interlayers). The interlayers are interconnected with interstitial via holes and/or through-hole connections.
MMC	Multimedia card
MMIC	MMICs, or Monolithic Microwave Integrated Circuits, are a type of integrated circuit (IC) device that operates at microwave frequencies (300 MHz to 300 GHz).
mm-wave	Milimeter wave - generally acknowledged to be the frequencies exceeding 20 Ghz.
Modeling	Simulation and rendering of matter to let nanotechnology researchers more accurately understand nanoscale phenomena.
Module	A chip carrier on which the chip terminals are fed out by various means to terminals spaced to suit the spacing and dimensions of wires on the level higher level of package such as a board.
Modulus of Elasticity	A measure of the stiffness of a material in the elastic range. It is determined from the slope of a stress-strain curve obtained during tensile tests on a sample of the material. Modulus of Elasticity is also known as Young's Modulus.
Molecular Computing	Uses individual molecules as the components of logic devices including switches, transistors and capacitors.
Molecular Electronics	Any system with electronic devices of nanometer dimensions, especially if made of discrete molecular parts rather than the continuous materials found in today's semiconductor devices.

Glossary of Probing Terms & Acronyms



Moore's Law	Conceived by Gordon Moore (Intel Founder) in 1965. States that computing processing power (more specifically the number of transistors packed on a microchip) doubles every 12-18 months.
MOS	Metal-Oxide Semiconductor - A traditional metal-oxide-semiconductor (MOS) structure is obtained by growing a layer of silicon dioxide (SiO ₂) on top of a silicon substrate and depositing a layer of metal or polycrystalline silicon (the latter is commonly used). As the silicon dioxide is a dielectric material, its structure is equivalent to a planar capacitor, with one of the electrodes replaced by a semiconductor.
MOEMS	Micro-opto-electromechanical systems (MOEMS) are a special class of Micro-electro-mechanical systems (MEMS) which involves sensing or manipulating optical signals on a very small size scale using integrated mechanical and electrical systems. MOEMS includes a wide variety of devices including optical switch, optical cross-connect, tunable VCSEL, microbolometers amongst others. MOEMS are the combination of micro-optics and MEMS.
Moore's Law	The observation made in 1965 by Gordon Moore, co-founder of Intel, that the number of transistors density on integrated circuits had doubled every 18 months since the integrated circuit was invented. Moore predicted that this trend would continue for the foreseeable future.
MOSFET	A metal-oxide-semiconductor field-effect transistor (MOSFET) is based on the modulation of charge concentration by a MOS capacitance between a body electrode and a gate electrode located above the body and insulated from all other device regions by a gate dielectric layer which in the case of a MOSFET is an oxide, such as silicon dioxide.
MRP	Manufacturing Resource Planning
MSD	Moisture Sensitive Device
Multichip Module (MCM)	A module of package capable of supporting several microelectronic chips in a single package. Most multichip packages are made of ceramic.
Multichip Package (MCP)	A small enclosed module with an external form factor that matches a single chip package and typically contains two to five chips. MCPs are commonly low lead count combinations of simple IC's.
Multiplexer	Being able to connect a single sources to any multiple destinations (one at a time), or the opposite. Also referred to as a Scanner.
MUMPs (Multi-User MEMS Processes)	A commercially available service that provides customers with cost-effective access to a set of 3-layer polysilicon surface-micromaching MEMS prototyping processes with wafers being share among multiple users.

N

Nano	The prefix "nano" refers to a billionth of something, usually a unit of measurement (e.g., nanosecond, nanometer).
Nanocrystal	A nanometer sized crystal, typically less than 10 nanometers. Currently used as fluorescent markers for the study of biological materials, but potentially could be used as components in magnetic storage devices.

Glossary of Probing Terms & Acronyms



Nanodots (a.k.a. “Quantum Dot”)	A nanoscale device containing a single unit of charge. It emits different colors of light depending on its size. Useful for biological labeling.
Nanofluidics	The science of designing, manufacturing and formulating nanoscale devices and processes that deal with controlling volumes of fluid on the order of nanoliters or picoliters (one millionth of one millionth of a liter).
Nanometer	One billionth of a meter.
Nanoscale	Refers to all things that exist or may occur at the size of several nanometers.
Nanotube	A one-dimensional fullerene (see “Fullerene”) with a cylindrical shape. Can act as conductors or semiconductors.
Nanotechnology	Nanotechnology, shortened to “nanotech”, is the study of the controlling of matter on an atomic and molecular scale. Generally nanotechnology deals with structures of the size 100 nanometers or smaller in at least one dimension, and involves developing materials or devices within that size. Nanotechnology is very diverse, ranging from extensions of conventional device physics to completely new approaches based upon molecular self-assembly, from developing new materials with dimensions on the nanoscale to investigating whether we can directly control matter on the atomic scale.
Nanowires	A wire with nanoscale width and height (or diameter). Nanowires differ from larger wires in that the conductivity changes in a stepwise fashion in response to a change in voltage.
N-Type Connector	A larger threaded coaxial connector with high power handling and good high frequency characteristics. Typically usable to 12.5GHz, but some manufacturers offer connectors usable to 18GHz.
NEMA	National Electronics Manufacturers Association
NEMI	National Electronics Manufacturing Initiative
NEMS	The term Nanoelectromechanical systems or NEMS is used to describe devices integrating electrical and mechanical functionality on the nanoscale. NEMS form the logical next miniaturization step from so-called microelectromechanical systems, or MEMS devices. NEMS typically integrate transistor-like nanoelectronics with mechanical actuators, pumps, or motors, and may thereby form physical, biological, and chemical sensors. The name derives from typical device dimensions in the nanometer range, leading to low mass, high mechanical resonance frequencies, potentially large quantum mechanical effects such as zero point motion, and a high surface to volume ratio useful for surface-based sensing mechanisms. ^[1] Uses include accelerometers, or detectors of chemical substances in the air.
Noise	Any unwanted electronic signal, or an unwanted audible sound (from fans or cooling devices).
NPI	New Product Introduction
O	
OA	Organic Acid - A flux system utilizing organic acids as activators, typically water soluble.
OE	Opto Electronic

Glossary of Probing Terms & Acronyms



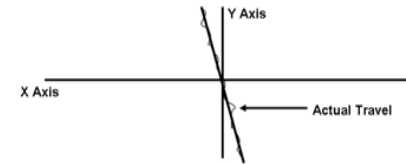
OIS	Optical Image Stabilization
OLB	Outer Lead Bonding
Op Amp	An operational amplifier, which is often called an op-amp, is a DC-coupled high-gain electronic voltage amplifier with differential inputs and, usually, a single output. ^[1] Typically the op-amp's very large gain is controlled by negative feedback, which largely determines the magnitude of its output ("closed-loop") voltage gain in amplifier applications, or the transfer function required (in analog computers). Without negative feedback, and perhaps with positive feedback for regeneration, an op-amp essentially acts as a comparator. High input impedance at the input terminals (ideally infinite) and low output impedance at the output terminal(s) (ideally zero) are important typical characteristics.
Optical Resolution	The capability of an optical system to distinguish find, and/or record details.
Open-Cavity Package (OCP)	Packages that have been fabricated in advance with an open cavity to accept a MEMS or IC chip as a fast turn-around and cost-effective packaging solution for prototyping, sampling, and low-volume production. Open access to the chip within the package enables special inspection, testing, probing, and even repair. OCP options include QFP, BGA and other package types which match the standard packages from those families.
Oxidation	Process by which SiO ₂ is thermally grown on silicon.
P	
P/I	Packaging and Interconnection
Path Resistance	The resistance of a complete signal path, including the switching element's contact resistance, any PC board circuit resistance and connector terminal resistance and or cabling. Also see Contact Resistance.
P/IA	Packaging and Interconnecting Assembly
P/IS	Packaging and interconnecting Structure
Piezoelectric Currents	The current caused by mechanical stress to the insulating materials or connectors. To minimize this problem in low current or voltage measurements, the stress must be removed from the insulators, and materials with a low piezoelectric effect must be used.
Propagation Delay	The specified amount of time for a signal to pass through a previously closed signal path. The delay must be considered, for example, when the signal is used to synchronize other signals, or is being used in a Clock/ Data configuration. This is due to both the electrical length of the signal path, and any active components in the signal path.
PAC	Pad Array Carrier
Passivation	The formation of an insulation layer over the surface of a microelectronic element to serve as a barrier to further oxidation or corrosion. It also protects the surface from contaminants, moisture, or particles.
PBGA	Plastic Ball Grid Array

Glossary of Probing Terms & Acronyms



PCB Printed Circuit Board
PCBA Printed Circuit Board Assembly
PCH Probe Card Holder
PCMCIA Personal Computer Memory Card International Association

Perpendicularity Perpendicularity or Squareness - The imperfection of motion between the X and Y axis as a result of angular displacement.



PGA Pin Grid Array

Photolithography (also called optical lithography) is a process used in microfabrication to selectively remove parts of a thin film (or the bulk of a substrate). It uses light to transfer a geometric pattern from a photomask to a light-sensitive chemical (photoresist, or simply "resist") on the substrate

Photonics The science and technology of generating, manipulating, transmitting, and detecting light. It is a field that encompasses optics, quantum optics, lasers, optoelectronics, imaging, optical information processing, materials science, and their applications.

Piezoelectric Material A ferroelectric material in which an electrical potential difference is created due to mechanical deformation, or conversely, in which the application of a voltage causes dimensional changes in the material.

Pin to Pad A process that automatically aligns a probe card to the DUT. Required for vertical Probe card technologies.

Pinhole The term pinhole embraces a wide variety of oxide defects and is used in a broad sense today. Listed in this category are cracks caused by thermal contraction after oxidation or by handling, and regions of oxide with low dielectric strength caused by dust particles, inadequate masking, contamination, or poor resist adhesion.

Pin-Out Diagram showing for electronic components the relations between connecting pins and internal components.

Pitting A form of very localized corrosion wherein small pits or holes form, usually in a vertical direction.

Platen The flat surface of the prober used to mount individual manipulators or a probe card.

PLCC Plastic Leaded Chip Carrier

PNP Pick and Place - A programmable machine usually utilizing a robot arm which picks up components from an automatic feeder, moves to a specified location on a carrier, wafer frame or PCB, and places or inserts the component onto or into the correct location.

Glossary of Probing Terms & Acronyms



Polysilicon	Polycrystalline silicon used as conductor in integrated circuits, and especially FETs.
Probe Card	A probe card is an interface between an electronic test system and a semiconductor wafer. Its purpose is to provide an electrical path between the test system and the circuits on the wafer, thereby permitting the testing and validation of the circuits at the wafer level, usually before they are diced and packaged. It consists, normally, of a printed circuit board (PCB) and some form of contact elements, usually metallic, but possibly of other materials as well. Probe cards are broadly classified into needle type, vertical type, and MEMS(Micro Electro-Mechanical System) type depending on shape and forms of contact elements. MEMS type is the most advanced technology currently available. The most advanced type of probe card currently can test an entire 12" wafer with one touchdown.
PS4L	Probe System for Life - a unique modular system for configuring and upgrading test systems.
PTH	Plated Thru Hole
PWB	Printed Wiring Board
PWI	Process Window Index - A versatile indicator of the robustness of a process, by calculating, on a percentage scale, how the entire process is operating relative to all applicable Specification Limits. This indicates how much deviation in the process can occur before defects are generated.

Q

QFP	Quad Flat Pack
Quad Flat Package (QFP)	A microelectronic package with leads extending from each of its four sides. It is used primarily for surface mounting and its variations include Low-Profile QFP (LQFP) and Thin QFP (TQFP).
Quality Factor (Q Factor)	A figure of merit for assessing the performance or quality of a resonator, the quality factor, is a measure of energy loss or dissipation per cycle as compared to the energy stored in the fields inside the resonator. It is defined as the ratio of the reactance to the effective series resistance of a component at resonance. For example, a MEMS resonator with a high Q factor has a sharp, large magnitude, well-defined peak in the resonance curve.
Quality Function Deployment (QFD)	A structured methodology that begins in the product design process and conducted by a cross-functional team to capture and to reach consensus on appropriate technical requirements based on customer-desired expectations and definitions of quality.
Quantum computing	Area of study focused on developing computer technology based on quantum theory. The quantum computer, following the laws of quantum physics (atomic and subatomic), would gain enormous processing power through the ability to be in multiple states, and to perform tasks using all possible permutations simultaneously. Current leading centers of research in quantum computing include MIT, IBM, Oxford University and the Los Alamos National Laboratory.

R

RA	Rosin Fully Activated
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Glossary of Probing Terms & Acronyms



RGB	A three-component video signal in which all the colors in a scene or image are conveyed as three primary colors (Red, Green and Blue) on three separate channels. Some times, the Green signal also carries the Sync information as well. Many high resolution video monitors have RGB inputs.
Radio Frequency Identification (RFID)	A method of identifying unique items using radio waves. Typically, a reader communicates with a tag, which holds digital information in a microchip. But there are chipless forms of RFID tags that use materials to reflect back a portion of the radio waves beamed at them.
Repeatability	<p>Repeatability is the inability of the device to move from any position to an exact designated point. The error in movement is Repeatability error.</p> <div style="text-align: right; margin-top: 10px;"> </div>
Resolution	Resolution is the smallest incremental step size the device is capable of moving. Ex: If the stage on a prober is capable of moving 1cm or greater the the resolution is said to be 1cm.
Reverse Engineering	The deprocessing and analysis of a competing product in order to gain insights of its technology features as well as its comparative strengths and weaknesses
RF	Radio Frequencies
RFID	Radio-frequency identification (RFID) is the use of an object (typically referred to as an RFID tag) applied to or incorporated into a product, animal, or person for the purpose of identification and tracking using radio waves. Some tags can be read from several meters away and beyond the line of sight of the reader. Most RFID tags contain at least two parts. One is an integrated circuit for storing and processing information, modulating and demodulating a radio-frequency (RF) signal, and other specialized functions. The second is an antenna for receiving and transmitting the signal. There are generally three types of RFID tags: active RFID tags, which contain a battery and can transmit signals autonomously, passive RFID tags, which have no battery and require an external source to provoke signal transmission, and battery assisted passive (BAP) which require an external source to wake up but have significant higher forward link capability providing great read range.
RIE	Reactive Ion Etch. Plasma process technology for etching pre-patterned structures into substrates.
RMA	Rosin Mildly Activated or Return Merchandise Authorization
ROSE	Resistivity of Solvent Extraction
RS-232	An asynchronous serial data interchange standard. RS-232 links between equipment are normally limited to 50 feet (16 meters). Also referred to as RS-232C or simply as a serial port connection (most popular revision).

Glossary of Probing Terms & Acronyms



RS-422	A more robust serial digital data interchange standard utilizing individual differential signal pairs for data transmission in each direction. Depending on data transmission rates, RS-422 can be used at distances to 4,000 feet (1,275 meters). Also referred to as RS-422A (the most popular revision).
RS-485	A very robust serial data interchange standard. An RS-485 communications channel is a party-line (multi-drop) digital signal and, like RS-422, is balanced. It is very immune to interference, making it more reliable in demanding environments. It is usable at distances of 4,000 feet and beyond.
Return Loss	A measure of the undesirable signal reflections from an imperfectly- terminated transmission line. Expressed in dB. Also see VSWR.
RTP (Rapid Thermal Processing)	A semiconductor manufacturing processing that uses radiant heating from halogen-quartz lamps to rapidly heat up the wafers

S

Sacrificial Layer	A temporary layer used in surface micromachining to form MEMS structures but etched at later stage of the wafer fabrication to release the MEMS structures.
Scanning Probe Microscope (SPM)	Creates images of two dimensional surfaces by scanning a sharp tip (the probe) over a surface.
Scanning Tunneling Microscope (STM)	A type of SPM able to image and topographically map surfaces that conduct electricity to atomic accuracy. Invented by IBM in 1981.
SCRS	Single Center Reflow Soldering
SD	Secure Digital
SDIO	Secure Digital I/O
Self-assembly	The spontaneous formation of an ordered structure from a given material or object without external direction.
Self-Assembled Monolayer (SAM)	Self-assembled monolayer is a coating commonly applied to the MEMS to reduce moisture-induced stiction of the parts
SFAA	Design for Automated Assembly
SFDR	Spurious-Free Dynamic Range (SFDR) is a specification for an ADC used in a communications application. The SFDR of an ADC is defined as the ratio of the rms signal amplitude to the rms value of the peak spurious spectral content (measured over the entire first Nyquist zone, dc to $f_s/2$). SFDR is generally plotted as a function of signal amplitude and may be expressed relative to the signal amplitude (dBc) or the ADC full-scale (dBFS)
Sheet Resistance	The electrical resistance of thin sheet of a material with uniform thickness as measured across opposite sides of a unit square pattern. It is expressed in ohms per square.

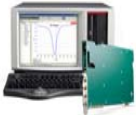
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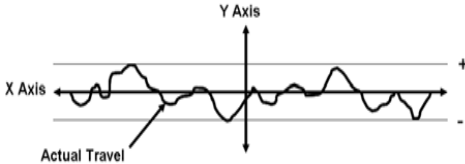
SiC	Silicon Carbide - Electronic applications of silicon carbide include light emitting diodes and detectors. SiC is widely used in high-temperature semiconductor electronics. Large single crystals of silicon carbide can be grown by the Lely method.
Silicon Fusion Bonding	A process for bonding two silicon wafers using special chemical treatments of the bonding surfaces, often to be followed by an annealing process at high temperature.
Silicon on Insulator (SOI)	A process where a single-crystal silicon layer is created by insulating a substrate. SOI wafers may be fabricated by deposition, oxygen ion implantation or wafer bonding and grinding techniques.
Silicon on Sapphire (SOS)	A process where SOI is formed by bonding a device quality Sapphire wafer is bonded to a silicon handle wafer. Either or both of the two substrates may have an oxide layer to form the buried oxide layer.
Simulation	The use of a computer-aided-design tool that mimics the behavior of the actual system through a collection of sub-system models enabling designers to test, verify, and debug circuits before layout and fabrication.
SIR	Surface Insulation Resistance
SMA	Surface Mount Assembly or A small type of threaded coaxial signal connector typically used in higher frequency applications. This connector is typically usable to 26GHz.
SSMA	Microminiature coaxial connectors with excellent electrical performance up to 26 GHz.
Settle Time	The time required for establishing relay connections and stabilizing user circuits. For relay contacts, this includes contact bounce.
SMB / SMC	Types of small coaxial signal connectors typically used in high frequency applications. SMC threads to the mating connector while the SMB snaps to the mating connector.
Shielding	A metal enclosure or gasket for a circuit, or a metal shield surrounding wire conductors (coaxial or triaxial cable) to lessen interference, interaction, or current leakage. The shield is usually grounded.
Small Outline Integrated Circuit (SOIC)	A type of microelectronic package which is smaller than the normal dual-in-line package. The pins are closer together and are bent flat so that the package may be soldered to the surface of a substrate or a circuit board.
SMART	Surface Mount and Related Technologies
Smart Cap	In a MEMS packaging concept, the smart cap refer to the cap on a MEMS die that contains circuitry which is interconnected to the MEMS die.
Smart Sensor	A sensor in which the electronics that process the output from the sensor, and forms the modifier, are partially or fully integrated on a single chip.
SMC	Surface Mount Component
SMD	Surface Mount Device
SMEMA	Surface Mount Equipment Manufacturers Association
SMOBC	Solder Mask Over Bare Copper

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SMT	Surface Mount Technology - SMT or Surface Mount Technology is a rapidly evolving field in the manufacture of electronic components, involving either active (transistors, integrated circuits, diodes, etc.) or passive (capacitors, resistors, coils, etc.) which do not have leaded connections. Terminal leads on the device are part of the component body, thus allowing direct mounting on the surface of printed circuit boards (PCBs). Leaded devices are mounted by passing interconnection leads through holes drilled and then plated in the PCBs. In both cases, the components are held in place, both mechanically and electrically, by solder. Surface mounted components usually are smaller than an equivalent through hole leaded device and, in some cases, less expensive. Equipment and design engineers can save valuable wiring board area by mounting surface mounted leadless components on the underside of a board, and conventional leaded components on the top side of boards.
SMTA	Surface Mount Technology Association
SNR	Signal-to-noise ratio (often abbreviated SNR or S/N) is an electrical engineering measurement, also used in other fields (such as scientific measurement or biological cell signaling), defined as the ratio of a signal power to the noise power corrupting the signal. A ratio higher than 1:1 indicates more signal than noise.
SMU	 Source Measurement Unit - The SMU is a special kind of instrument that can work as a constant current source or as a constant voltage source. It simultaneously sources to a pair of terminals at the same time measuring the current or voltage across those terminals. Typically when an SMU sources constant voltage it measures current through the terminals. When it sources constant current through the terminals, it measures the voltage built up across those terminals
Syntax	The language "spoken" by devices communicating with each other.
Source	The equipment providing a signal to the input of a routing switcher, crosspoint switch, or switching array. See Destination.
SOIC	Small Outline Integrated Circuit
SOP	Standard Operating Procedure
SOP (System-on-Package)	SoP refers to the integration of a wide variety of component types (such as RF, digital, analog, optical and MEMS) in one package to achieve system-level functions. It uses thin-film component technology and is often built on a multi-layer package substrate by lateral and vertical integration to achieve a multi-function system-level package. It goes further than System-in-Package (SiP) by incorporating multi-domain components based-on materials beyond silicon. It can include systems-on-chips (SoC), SiP, multi-chip module (MCM) and 3D chip-stacking for both IC and package integration as well incorporate multi-domain devices such sensors, optoelectronics, RF and MEMS (including Bio-MEMS, microfluidics, etc) components for system-level integration.
SOT	Small Outline Transistor
Spectral Resolution	The capability of an optical system to distinguish different frequencies.

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SPRS	Single Pass Reflow Soldering- A process in which surface mount components populating both sides of a double sided substrate are reflow soldered in a single pass through a mass reflow soldering system.
Stage	The motion control system for moving a wafer chuck, packaged part holder or microscope on a probe station. Stages may offer X, Y, Z and Theta control.
Stepper Motor	A stepper motor (or step motor) is a brushless, synchronous electric motor that can divide a full rotation into a large number of steps. The motor's position can be controlled precisely without any feedback mechanism (see Open-loop controller), as long as the motor is carefully sized to the application.
Stiction	Short for "Static Friction." The friction that tends to prevent stationary surfaces from being set in motion. For MEMS devices, it refers to the tendency of surfaces to stick together caused by formation of weak hydrogen bonds or other physisorption surface bonds.
Straightness	<p>Straightness - refers to the ability of a mechanical device to travel in one direction along a straight line \pm the deviation from that line.</p> 
Strain	The amount of deformation of a body under load normalized by the dimensions of that body
Strain Gauge	An element (wire or foil) that measures a strain based on electrical resistance changes of the gauge that result from a change in length or dimension strain of the wire or foil.
Stress	The force per unit area acting on a plane within a body.
Surface Micromachining	An additive micro-fabrication process where MEMS devices are built by the deposition and selectively etching of thin films on a substrate. Often some of the films, referred to as sacrificial layers, are removed at the conclusion of the micro-fabrication process to release a freestanding movable MEMS structure.
Surface Mount Technology (SMT)	The technology for the assembly of hybrid circuits and printed circuit boards by soldering electronic components directly to a board substrate that uses less space than the pin-through-hole method.
System-in-Package (SiP)	SiP refers to multiple silicon chips enclosed in a single package or module to perform essentially the functions of a system. Examples of chips integrated in the package include processors, memories, wireless communications, RF-MEMS and discrete passive components. SiPs are typically used inside a mobile phone, digital music player, etc.
System-on-Chip (SoC)	A large, complex silicon integrated-circuit with high functionality and performance. Often characterized by the presence of embedded processors, memory, and a multiple number of other components.

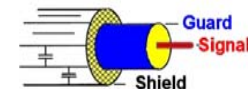
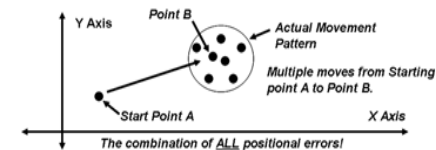
T

TAB	Tape Automated Bonding
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TBGA	Tape Ball Grid Array
Temperature Coefficient of Expansion (TCE)	A thermal property of a material defined as the ratio of the change in length to the original length per degree C of temperature change. TCE is also referred to as Coefficient of Thermal Expansion (CTE).
Tg	Glass Transition Temperature - The temperature at which an amorphous polymer (or the amorphous regions in a partially crystalline polymer) changes from a hard and relatively brittle condition to a viscous or rubbery condition. Typical amorphous polymers used in electronics are: FR-4 (epoxy), Polyimide, etc
Terminated/Termination/Terminator	An impedance used to terminate a transmission line. For example; cables used for video distribution should be terminated with a 75 ohm resistor (terminator) at the last connector on the receiving end if it is not already terminated internally.
Thermal Conductivity	A measure of the property of a solid to conduct heat in the unit of W/m ² K. For microelectronics, the higher the thermal conductivity of the substrate material, the higher the efficiency of the removal of heat is during device operation.
TNC	A threaded type of BNC coaxial connector.
Thermocompression Bond	The process involving the use of pressure and temperature to join two materials together by interdiffusion across the boundary. For example, thermocompression is commonly used for gold wire-bonding in microelectronics assembly and wafer-to-wafer boning in MEMS using gold as an intermediate layer.
Through-Silicon Via (TSV)	TSV is a vertical electrical connection passing completely through a silicon wafer or die. TSV technology is important in creating 3D packages and 3D integrated circuits. TSV involves the processes of via formation, insulator/barrier/seed deposition, via filling, surface metal removal, wafer thinning, bonding/stacking, inspection, test, etc. One of the few TSV-based products in the market is a CMOS image sensor. Other TSV devices are demonstrated by major companies, including memory houses and package service foundries.
THT	Thru Hole Technology
Total Positional Error	Total Positional Error - equal to 1/2 the resolution, plus the radius(average) of the repeatability, plus accuracy.
TQM	Total Quality Management
Triaxial Cable	A cable with three conductors: one conductor surrounded by an inner shield and an isolated outer shield. Generally, the inner shield is connected to a guard potential and the outer shield to signal LOW or ground.



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Trigger	An external stimulus that initiates one or more instrument functions. Trigger stimuli include : a front panel button (TAKE), an external input voltage pulse.
TTL Logic	Abbreviation for Transistor-Transistor Logic, a very typical medium speed digital technology. Often used to communicate directly between prober and instrument for simple commands such as EOT (End of Test).
TSOP	Thin Small Outline Package
TSSOP	Thin Shrink Small Outline Package
Twinaxial Cable	A cable with three conductors: one twisted pair of conductors surrounded by an outer shield.
TSV	Thru Silicon Via

U

UFPT	Ultra Fine Pitch Technology
ULR	Ultra Low Residue
Ultrasonic Bonding	A process that uses ultrasonic vibration energy and pressure to join two materials.
UUT	An abbreviation for Unit Under test. Also see DUT (device Under Test).
ULWD	Ultra Long Working Distance (Objectives)
UPS	An uninterruptible power supply, also uninterruptible power source, UPS or battery backup, is an electrical apparatus that provides emergency power to a load when the input power source, typically the utility mains, fails.

V

Vacuum Sealing	A process of encapsulation of MEMS device in vacuum. The dealing may be achieved in wafer fabrication by a film deposition process in vacuum to seal a chamber which is created with the removal of a sacrificial layer. Alternately, the vacuum sealing of MEMS device can be done by wafer capping in vacuum.
VXI	A newer electrical and mechanical standard (based on the VME standard, with Extensions for Instrumentation) mainly utilized in the ATE industry to assist different vendor's equipment to work together in a common control and packaging environment.
VSWR	Abbreviation for Voltage Standing Wave Ratio. The loss due to the mismatch introduced into the signal by the load or source signal path characteristics. Expressed as a ratio of the highest voltage to the lowest voltage found in the signal. Also expressed as Return Loss in dB. The Return Loss expression is the more modern term.
VCSEL	Vertical Cavity Surface Emitting Laser

W

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Wafer	A thin, circular piece of silicon, glass, sapphire or other substrate material onto which the integrated circuits, discrete or MEMS devices are fabricated. A wafer normally consists of an array of multiple devices which is referred to as a chip, or die, after separated from the wafer
Wafer Bonder	The wafer bonder is a processing tool to bond together two or more wafers under very precisely controlled condition. Wafer bonder is an essential tool for MEMS fabrication and 3D semiconductor integration.
Wafer Bonding	A process that bonds two or more wafers together using a wafer bonder in a controlled ambient and heating conditions with high precision of alignment and contact pressures.
Wafer-Level Capping	The process of physically capping the MEMS device at the wafer level before singulation.
Wafer-Level Chip-Scale Package (WLCSP)	WLCSPs are chip-scale microelectronic packages that are processed at the wafer level to form a fine-pitch I/O format which can be tested and surface mounted on a printed circuit board. For example, in one approach, a dielectrically-isolated redistribution layer connected to the die pads is created on the wafer and followed by the formation of solder ball bond pads, resulting in a package very close to the size of the silicon die.
Wafer-Level Packaging (WLP)	The technology of packaging an integrated circuit or a MEMS device at wafer level as oppose to the traditional packaging of individual device after wafer dicing. WLP accomplishes device interconnection and protection at wafer level involving processes such as interconnect redistribution layer, bumping, encapsulated metal conductors or wire bonding, through-silicon-via, wafer bonding, etc. WLP for MEMS such as imaging sensors and micromirror arrays has potential for cost reduction, size shrinkage and performance enhancement.
“Wet” Nanotechnology	Science and technology dealing with organic materials, such as DNA.
WI	Wetability Index
Wire Bonding	The process of providing electrical connection from the die to the package by bonding metal wires, such as gold and aluminum wires, from the conductive pads on the die to the leads of the package.
WIS	Wafer Inspection System
WLP	Wafer Level Packaging
WLR	Wafer Level Reliability - A process for determining the expected life cycle of a product while that product is still on the wafer. This improves reliability time to data to quickly isolate any product exhibiting a high infant mortality rate. (See SemiProbe.com WLR)
WSI	Wafer Scale Integration

X

X-ray Lithograph	Process that uses x-ray radiation to expose the resist through a mask which typically consists of a membrane of a material that has low x-ray absorption, with a pattern of highly absorbing material such as gold.
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Y

Glossary of Probing Terms & Acronyms



Yield	A measure of manufacturing efficiency expressed as the percentage of acceptable production units obtained from a specified manufacturing process. For example, die yield is the percentage of acceptable die compared to the total number of die on a processed wafer.
Young's Modulus	A measure of the stiffness of a material in the elastic range. It is determined from the slope of a stress-strain curve obtained during tensile tests on a sample of the material. Young's modulus is also known as Modulus of Elasticity.

Z

ZAF	Z-Axis Adhesive Film - A material filled with a low concentration of large conductive particles designed to conduct electricity in the Z-axis but not the X or Y axis. Also called an anisotropic adhesive.
ZigBee	ZigBee is a low-data-rate, short-range wireless communication standard for home automation and data networks. ZigBee is slower than Wi-Fi and Bluetooth, but is designed for low power so that batteries can last for months and years. The typical ZigBee transmission range is roughly 50 meters, but that can vary greatly depending on environment conditions. MEMS-based acceleration and pressure sensor ICs compatible with the ZigBee protocol are developed to enable the deployment of wireless sensor networks for industrial, medical, automotive or consumer electronics applications.