DOWNLOAD PDF SURFACE MOUNT TECHNOLOGY GLOSSARY

Chapter 1 : Surface Mount Technology (SMT) terminology

Surface-mount technology (SMT) is a method for producing electronic circuits in which the components are mounted or placed directly onto the surface of printed circuit boards (PCBs). An electronic device so made is called a surface-mount device (SMD).

Component usually refers to passive items such as resistors, capacitors, ect. MELF Metalized electrode face or most end up lying on floor. Cylindrical and usually color-coded resistors or solid-colored diodes. SOIC Small outlined integrated circuit. This smaller version of the DIP has leads that are gull-wing shaped to allow connection to the board surface. PLCC Plasitc leaded chip carrier. Normally a four-sided quad package in which an IC is installed with J-type leads extending out from the sides of the package then downand rolled under the body of the device. A plastic leaded component in which diodes and transistors are packaged. Gull-wing leads are used. The rate of expansion or contraction of a material when its temperature is increased or decreased. Coplanarity Each lead of a multileaded item being at the same level or plane. This is extremely important to ensure that all lead are properly soldered. LCCC Leadless ceramic chip carrier. A ceramic package with an IC mounted to form a surface mount device. Its termination areas for soldering are built into the ceramic material and do not allow for TCE of the device versus the substrate, especially if the component and board materials are different. QFP Quad Flat pack. Four-sided device normally with extended gull-wingtype leads. TSOP Thin shrink small outline package. Similiar to SOIC but smaller packaging and closer lead spacing 8 to 24 leads with leads protruding from the ends of the package. Reflow soldering The reflowing of the solder paste. Measling The damage to a circuit board caused by ovberheating. Usually shows as small white dots on fiberglass epoxy boards around the overheated area. This is the weave of the fiberglass seperating inside the board. Blind via Surface mount connection hole where the board is multilayered and the hole is attached to the surface top or bottom and only goes partway through the board. Buried via Similar to a blind via, except that it connects internal layers only and is not exposed to top or bottom suraces. Ball grid array A large IC carrier with small solder protrusions on the bottom of the package for attaching to the appropriate pads on the circuit board.

Chapter 2 : Download PDF EPUB Surface Mount Technology Terms And Concepts - PDF and ePub Down

PCB Glossary. TG. Glass transition temperature. The point at which rising temperatures cause the solid base laminate to start to exhibit soft, plastic-like symptoms.

SMT or Surface Mount Technology is relatively new technology in electronics and provides state-of-art, miniature electronics products at reduced weight, volume and cost. Here I explain SMT acronyms and abbreviations. The condition of low molecular weight of a resin polymer during which the resin is readily soluble and fusible. A material fillet 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 Z axis adhesive. The conductive material around a drilled hole. A water-based cleaning methodology which may include the addition of the following chemicals: May also use DI Deionized water only. A ratio of the thickness of the board to its preplated diameter. A via hole with aspect ratio greater than 3 may be susceptible to cracking. A blend of two or more polar and non polar solvents that behaves as a single solvent or remove polar and nonpolar contaminants. It has one boiling point like any other single component solvent, but it boils at a lower temperature than either of its constituents. The constituents of the azeotrope cannot be separated. Integrated circuit package in which the input and output points are solder balls arranged in a grid pattern. A via extended from an inner layer to the surface. A large void in a solder connection created by rapid outgassing during the soldering process. Solder that bridges across two conductors that should not be electrically connected, thus causing an electrical short. A via hole connecting internal layers that does not extend to the board surface. A surface mount device lead that is sheared, so that the end of the leads contacts the board and land pattern. A resin in a final stage of cure. The combination of force, adhesion, and cohesion which causes liquids such as molten metal to flow between closely spaced solid surfaces against the force of gravity. Castellations are typically found on four edges of a leadless chip carrier. Each lies within the termination area for direct attachment to the land patterns. Chlorinated fluorocarbon, cause depletion of ozone layer and scheduled for restricted use by the environmental protection agency. The voltage-to-current ratio in a propagation wave, i. In printed wiring its value depends on the width of the conductor to ground plane s and the dielectric constant to the media between them. Generic term for any two-terminal leadless surface mount passive devices, such as resistors and capacitors. Generic term for any component assembly technology in which an unpackaged silicon die is mounted directly on the printed wiring board. Connections to the board can be made by wire bonding, tape automated bonding TAB , or flip-chip bonding. Ceramic leaded chip carrier. A solder connection exhibiting poor wetting and a grayish, porous appearance due to insufficient heat or excessive impurities in the solder. Integrated Circuit IC package in which the input and output points are high temperature solder cylinders or columns arranged in a grid pattern. A term used in through-hole technology to indicate the component side of the PWB. A general term referring to condensation heating where the part to be heated is submerged into a hot, relatively oxygen-free vapor. The part, being cooler than the vapor, causes the vapor to condense on the part transferring its latent heat of vaporization to the part. Also known as vapor phase soldering. A composite printed wiring board consisting of epoxy-glass layers bound to a low thermal-expansion core material, such as copper-incar-copper, graphite-epoxy, and aramid fiber-epoxy. The core constrains the expansion of the outer layers to match the expansion coefficient of ceramic chip carriers. The angle of wetting between the solder fillet and the termination or land pattern. A contact angle is measured by constructing a line tangent to the solder fillet that passes through a point of origin located at the place of intersection between the solder fillet and termination or land pattern. Contact angles of less than 90 Degrees Celsius Positive wetting angles are acceptable. Contact angles less than 90 Degree Celsius Negative wetting angles are unacceptable. A chart that tracts process performance over time. Trends in chart are used to identify process problems that may require corrective action to bring the process under control. The maximum distance between the lowest and the highest pin when the package rests on a perfectly flat surface. An internal condition that occurs in the laminated base material in which the glass fibers are separated from the resin at the weave intersections. The ratio of the change in dimensions to a unit change in temperature. A separation between plies within the base

material, or between the base material and the conductive foil, or both. Metallic filament growth between conductors in the presence of condensed moisture and electrical bias. Designing a product to be produced in the most efficient manner possible in terms of time, money, and resources taking into consideration how the product will be produced, utilizing the existing skill base and avoiding the learning curve to achieve the highest yields possible. A condition that occurs when molten solder has coated a surface and then receded, leaving irregularly shaped mounds of solder separated by areas covered with a thin solder film. Voids may also be seen in the dewetted areas. Dewetting is difficult to identify since solder can be wetted at some locations and base metal may be exposed at other locations. A package intended for through-hole mounting that has two rows of leads extending at right angles from the base with standard spacing between leads and row. A condition that results from motion between the joined members during solder appearance, although they may also appear lustrous. A solder open condition during reflow in which chip resistors and capacitor resemble a draw bridge. A wave soldering process that uses a turbulent wave with a subsequent laminar wave. The turbulent wave ensures complete solder coverage in tight areas and the laminar wave removes bridges and icicles. Designed for soldering surface mount devices glued to the button of the board. Copper plating deposited from a plating solution as a result of a chemical reaction and without the application of an electrical current. Copper plating deposited from a plating solution by the application of an electrical current. The controlled removal of all components of base material by a chemical process on the side walls of holes in order to expose additional internal conductor areas. The alloy of two or more metals that has a lower melting point than either of its constituents. Eutectic alloys, when heated, transform directly from a solid to a liquid and do not show pasty regions. A geometric shape incorporated in the artwork of a printed wiring board, and used by a vision system to identify the exact artwork location and orientation. Generally three fiducial marks are used per board. Fiducial marks are necessary for the accurate placement of fine pitch packages. Both global and local fiducials can be used. Global fiducials generally three locate the overall circuitry pattern to the PCB, whereas local fiducials one or two are used at component locations, typically fine pitch patterns, to increase the placement accuracy. Also known as alignment target. A center to center lead distance of surface mount packages of 0. An integrated circuit package with gull wing or flat leads on two or four sides, with standard spacing between leads. Commonly the leads pitches are at 50 mil centers, but lower pitches may also be used. The packages with lower pitches are generally referred to as fine pitch packages. A chip-on-board technology is which the silicon die is inverted and mounted directly to the printed wiring board. Solder is deposited on the bonding pads in vacuum. When inverted, they make contact with the corresponding board lands and the die rests directly above the board surface. It provides the ultimate is densification also known as C4 controlled collapse chip connection. A nonpreferred term for Land Pattern. A electrical test of an entire assembly that stimulates the intended function of the product. The temperature at which a polymer changes from a hard and relatively brittle condition to a viscous or rubbery condition. This transition generally occurs over a relatively narrow temperature range. It is not a phase transition. In this temperature region, many physical properties undergo significant and rapid changes. Some of those properties are hardness, brittleness, thermal expansion, and specific heat. A lead configuration typically used on small outline packages where leads bend and out. An end view of the package resembles a gull in flight. A sharp point of solder that protrudes out of a solder joint, but does not make contact with another conductor. Icicles are not acceptable. A electrical test of an assembly in which each component is tested individually, even though many electronic components are soldered to the board. An instrument designed to measure board cleanliness the amount of ions present on a surface. It extracts ionizable materials from the surface of the part to be measured and records the rate of extraction and the quantity. Joint Electronic Devices Engineering Council. A lead configuration typically used on plastic chip carrier packages which have leads that are bent underneath the package body. Semiconductor die that has been tested and is known to function to specification. A smoothly flowing solder wave with no turbulence. A portion of a conductive pattern usually, but not exclusively, used for the connection, or attachment, or both of components. Component mounting sites located on the substrate that is intended for the interconnection of a compatible Surface Mount Component. A ceramic, hermetically-sealed, integrated circuit IC package commonly used for military applications.

Chapter 3 : Surface-mount technology - Wikipedia

Surface Mount Technology Terms and Concepts is an invaluable reference containing over terms and definitions used in the SMT field. Each term is followed by a paragraph or two explaining the meaning and how it fits into the surface mount industry.

The same effect can be achieved using commercially available breakout boards Various SMD chips, desoldered SMD capacitors on the left with two through-hole capacitors on the right Example of typical metric sizes grey squares shown for reference Main article: The electronics industry has standardized package shapes and sizes the leading standardisation body is JEDEC. Two-terminal packages Rectangular passive components mostly resistors and capacitors: Developed by Motorola to house higher powered devices. Shrink Small-Outline Package, pin spacing of 0. Thin Shrink Small-Outline package. Quarter-Size Small-Outline package, with pin spacing of 0. Plastic Leaded Chip Carrier, square, J-lead, pin spacing 1. Low-profile Quad Flat Package, 1. Leadless Chip Carrier, contacts are recessed vertically to "wick-in" solder. Common in aviation electronics because of robustness to mechanical vibration. Ball Grid Array, with a square or rectangular array of solder balls on one surface, ball spacing typically 1. An array of bare lands only. Similar to in appearance to QFN , but mating is by spring pins within a socket rather than solder. Low profile Fine pitch Ball Grid Array, with a square or rectangular array of solder balls on one surface, ball spacing typically 0. Thin Fine pitch Ball Grid Array, with a square or rectangular array of solder balls on one surface, ball spacing typically 0. Column Grid Array, circuit package in which the input and output points are high temperature solder cylinders or columns arranged in a grid pattern. Ceramic Column Grid Array, circuit package in which the input and output points are high temperature solder cylinders or columns arranged in a grid pattern. The body of the component is ceramic. Lead Less Package, a package with metric pin distribution 0. Non-packaged devices although surface-mount, these devices require specific process for assembly: Chip-On-Board; a bare silicon chip, that is usually an integrated circuit, is supplied without a package usually a lead frame overmolded with epoxy and is attached, often with epoxy, directly to a circuit board. The chip is then wire bonded and protected from mechanical damage and contamination by an epoxy "glob-top". There are often subtle variations in package details from manufacturer to manufacturer, and even though standard designations are used, designers need to confirm dimensions when laying out printed circuit boards. These are quite often white lettering on a black background, but other coloured backgrounds and lettering can be used. The black or coloured coating is usually only on one face of the device, the sides and other face simply being the uncoated, usually white ceramic substrate. The coated surface, with the resistive element beneath is normally positioned face up when the device is soldered to the board although they can rarely be seen mounted with the uncoated underside face up, whereby the resistance value code is not visible. The materials used to fabricate the capacitors, such as Nickel Tantalate, possess different colours and these can give an approximate idea of the capacitance of the component. Light grey body colour indicates a capacitance which is generally less than pF. Medium Grey colour indicates a capacitance anywhere from 10pF to 10nF. Light brown colour indicates a capacitance in a range from 1nF to nF. An inductor will measure a low resistance to a multimeter on the resistance range whereas a capacitor, out of the circuit, will measure a near infinite resistance. Generally the larger the physical size, the larger the capacitance or voltage rating will be when all other ratings are held constant. For example, a nF 50v capacitor may come in the same package as a 10nF v device. If both appear on the same board, the two can be told apart by their usage context. The device rated V will typically be designed into a high voltage or high energy circuit, whereas the 50v rated device would be found in the small signal part of the circuit. SMD non electrolytic capacitors, which are usually monolithic ceramic capacitors, exhibit the same body colour on all four faces not covered by the end caps. Some film or tantalum electrolytic types are unmarked and possess red, orange or blue body colours with complete end caps, not metal strips. Smaller inductances with moderately high current ratings are usually of the ferrite bead type. They are simply a metal conductor looped through a ferrite bead and almost the same as their through-hole versions but possess SMD end caps rather than leads. They appear dark grey and are magnetic,

unlike capacitors with a similar dark grey appearance. These ferrite bead type are limited to small values in the nH, nano Henry , range and are often used as power supply rail decouplers or in high frequency parts of a circuit. Larger inductors and transformers may of course be through-hole mounted on the same board. SMT inductors with larger inductance values often have turns of wire or flat strap around the body or embedded in clear epoxy, allowing the wire or strap to be seen. Sometimes a ferrite core is present also. These higher inductance types are often limited to small current ratings, although some of the flat strap types can handle a few amps. Like capacitors, component values and identifiers are not usually marked on the component itself; if not documented or printed on the PCB, measurement, usually removed from the circuit, is the only way of determining them. Discrete semiconductors Discrete semiconductors, such as transistors, diodes and F. Many of these codes, used because the devices are too small to be marked with more traditional numbers used on through-hole equivalent devices, correlate to more familiar traditional part numbers when a correlation list is consulted.

Chapter 4 : Welcome to the Surface Mount Technology Association

To accommodate surface mount technology, SMT, a completely new set of components was needed. New SMT outlines were required, and often the same components, e.g. ICs were sold in both traditional leaded packages and SMT packages.

Assembly line with SMT placement equipment Where components are to be placed, the printed circuit board normally has flat, usually tin -lead, silver, or gold plated copper pads without holes, called solder pads. Solder paste , a sticky mixture of flux and tiny solder particles, is first applied to all the solder pads with a stainless steel or nickel stencil using a screen printing process. It can also be applied by a jet-printing mechanism, similar to an inkjet printer. After pasting, the boards then proceed to the pick-and-place machines , where they are placed on a conveyor belt. Some large integrated circuits are delivered in static-free trays. Numerical control pick-and-place machines remove the parts from the tapes, tubes or trays and place them on the PCB. They first enter a pre-heat zone, where the temperature of the board and all the components is gradually, uniformly raised. The boards then enter a zone where the temperature is high enough to melt the solder particles in the solder paste, bonding the component leads to the pads on the circuit board. The surface tension of the molten solder helps keep the components in place, and if the solder pad geometries are correctly designed, surface tension automatically aligns the components on their pads. There are a number of techniques for reflowing solder. One is to use infrared lamps; this is called infrared reflow. Another is to use a hot gas convection. Another technology which is becoming popular again is special fluorocarbon liquids with high boiling points which use a method called vapor phase reflow. Due to environmental concerns, this method was falling out of favor until lead-free legislation was introduced which requires tighter controls on soldering. At the end of , convection soldering was the most popular reflow technology using either standard air or nitrogen gas. Each method has its advantages and disadvantages. Component location is less restricted if the designer knows that vapor phase reflow or convection soldering will be used in production. Following reflow soldering, certain irregular or heat-sensitive components may be installed and soldered by hand, or in large-scale automation, by focused infrared beam FIB or localized convection equipment. If the circuit board is double-sided then this printing, placement, reflow process may be repeated using either solder paste or glue to hold the components in place. If a wave soldering process is used, then the parts must be glued to the board prior to processing to prevent them from floating off when the solder paste holding them in place is melted. After soldering, the boards may be washed to remove flux residues and any stray solder balls that could short out closely spaced component leads. Rosin flux is removed with fluorocarbon solvents, high flash point hydrocarbon solvents, or low flash solvents e. Water-soluble fluxes are removed with deionized water and detergent, followed by an air blast to quickly remove residual water. However, most electronic assemblies are made using a "No-Clean" process where the flux residues are designed to be left on the circuit board, since they are considered harmless. This saves the cost of cleaning, speeds up the manufacturing process, and reduces waste. Another reason to remove no-clean residues is to improve adhesion of conformal coatings and underfill materials. Proper cleaning removes all traces of solder flux, as well as dirt and other contaminants that may be invisible to the naked eye. No-Clean or other soldering processes may leave "white residues" that, according to IPC, are acceptable "provided that these residues have been qualified and documented as benign". Additionally, in some applications, such as low-end electronics, such stringent manufacturing methods are excessive both in expense and time required. Finally, the boards are visually inspected for missing or misaligned components and solder bridging. If needed, they are sent to a rework station where a human operator repairs any errors. This technology has proven highly efficient for process improvements and quality achievements. As of [update] smallest component is metric measuring 0. Components can be placed on both sides of the circuit board. Higher density of connections because holes do not block routing space on inner layers, nor on back-side layers if components are mounted on only one side of the PCB. Small errors in component placement are corrected automatically as the surface tension of molten solder pulls components into alignment with solder pads. On the other hand, through-hole components cannot be slightly misaligned,

because once the leads are through the holes, the components are fully aligned and cannot move laterally out of alignment. Better mechanical performance under shock and vibration conditions partly due to lower mass, and partly due to less cantilevering Lower resistance and inductance at the connection; consequently, fewer unwanted RF signal effects and better and more predictable high-frequency performance. Better EMC performance lower radiated emissions due to the smaller radiation loop area because of the smaller package and the lesser lead inductance. Drilling PCBs is time-consuming and expensive. Lower initial cost and time of setting up for mass production, using automated equipment. Simpler and faster automated assembly. Some placement machines are capable of placing more than , components per hour. Many SMT parts cost less than equivalent through-hole parts. A surface mount package is favored where a low profile package is required or the space available to mount the package is limited. As electronic devices become more complex and available space is reduced, the desirability of a surface mount package increases. Concurrently, as the device complexity increases, the heat generated by operation increases. If the heat is not removed, the temperature of the device rises shortening the operational life. It is therefore highly desirable to develop surface mount packages having high thermal conductivity. It is common to combine SMT and through-hole construction, with transformers , heat-sinked power semiconductors, physically large capacitors, fuses, connectors, and so on mounted on one side of the PCB through holes. SMT is unsuitable as the sole attachment method for components that are subject to frequent mechanical stress, such as connectors that are used to interface with external devices that are frequently attached and detached. Manual prototype assembly or component-level repair is more difficult and requires skilled operators and more expensive tools, due to the small sizes and lead spacings of many SMDs. Whereas through-hole components will stay in place under gravitational force once inserted and can be mechanically secured prior to soldering by bending out two leads on the solder side of the board, SMDs are easily moved out of place by a touch of a soldering iron. Without expert skill, when manually soldering or desoldering a component, it is easy to accidentally reflow the solder of an adjacent SMT component and unintentionally displace it, something that is almost impossible to do with through-hole components. Many types of SMT component packages cannot be installed in sockets, which provide for easy installation or exchange of components to modify a circuit and easy replacement of failed components. Virtually all through-hole components can be socketed. SMDs cannot be used directly with plug-in breadboards a quick snap-and-play prototyping tool , requiring either a custom PCB for every prototype or the mounting of the SMD upon a pin-leaded carrier. For prototyping around a specific SMD component, a less-expensive breakout board may be used. Additionally, stripboard style protoboards can be used, some of which include pads for standard sized SMD components. For prototyping, " dead bug " breadboarding can be used. The reliability of solder joints becomes more of a concern, as less and less solder is allowed for each joint. Voiding is a fault commonly associated with solder joints, especially when reflowing a solder paste in the SMT application. The presence of voids can deteriorate the joint strength and eventually lead to joint failure. This is a disadvantage for prototyping, repair, or rework, and possibly for production set-up.

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Chapter 5 : Surface Mount Technology | SRC, Inc.

The bulk of our assembly work is performed within Surface Mount Technology (SMT). Our Surface Mount Technology Department is equipped with the latest manufacturing tools including Solder Paste Inspection and Juki's high-speed placement machines.

Softening Range The range of temperature in which a thermoplastic changes from a rigid to a soft state. Solids Content The metal powder content as a percentage of the mass of the wet solder paste. Solvent A solution capable of dissolving a solute. Solvent Cleaning A cleaning method employing chlorinated and fluorinated hydrocarbon liquids. Solvent Extraction The removal of one or more components from a liquid mixture by intimate contact with a secondary liquid that is nearly insoluble in the first liquid and which dissolves the impurities and not the substance to be purified. Specific Gravity The ratio of the weight of any volume of a mass or substance to the weight of an equal volume of water at given temperature. The specific gravity of a substance times the density of water equals the density of the substance. Spread The distance a substance e. Stencil A metal mask in which patterns or apertures matching the component locations on the PCB are made so a suitable material can be forced through the apertures by a squeegee onto a substrate. Stencil Printing Deposition of a specific material, such as solder paste, using a stencil. Storage life The period of time during which a packaged epoxy or curing agent can be stored under specific temperature conditions and remain stable for use. Sometimes called shelf life. Stress An applied force or pressure, as tension or shear, exerted on a body which produces a resultant strain on the material. The ability of material to withstand a stress depends on the strength of its cohesive force or molecular resistance. Substrate A material upon the surface of which an epoxy is spread for any purpose, such as bonding or coating. Substrate Geometry Substrate dimensions, typically dimensions critical to implement a successful bonding process, including the following Surface Mount Technology A method of assembling printed circuit boards where the components are mounted onto the surface of the board rather than being inserted into holes in the board. Surface Resistivity The resistance to a current flow along the surface of an insulator material. Surface Tension The property of a liquid which causes the surface to pull into the smallest area for a maximum volume, hence, drops are spherical. The fact that water drops on a wax surface do not spread out due to surface tension. If a wetting agent were to be added to the water the round droplet would spread out into a film because of the lowered surface tension. Simple and inexpensive, with emission spread over a wide angle.

Chapter 6 : What is SMT | Surface Mount Technology | Devices SMD | calendrierdelascience.com

Glossary Selecting the optimum chip technology necessary to best match the performance requirements Surface mount resistors are main key of electronic components composed electronic circuit.

The associated surface mount devices, SMDs provide many advantages over their leaded predecessors in terms of manufacturability and often performance. Once SMT started to be used, the change from conventional leaded components to surface mount devices, SMDs took place quickly in view of the enormous gains that could be made using SMT. Mass produced electronic circuit boards need to be manufactured in a highly mechanised manner to ensure the lowest cost of manufacture. The traditional leaded electronic components do not lend themselves to this approach. Although some mechanisation was possible, component leads needed to be pre-formed. Also when the leads were inserted into boards automatically problems were often encountered as wires would often not fit properly slowing production rates considerably. It was reasoned that the wires that had traditionally been used for connections were not actually needed for printed circuit board construction. Rather than having leads placed through holes, the components could be soldered onto pads on the board instead. This also saved creating the lead holes in the boards which added cost to the production of the bare PCBs. Typical SMT board with transistors, and passive components As the components were mounted on the surface of the board, rather than having connections that went through holes in the board, the new technology was called surface mount technology or SMT and the devices used were surface mount devices, SMDs. The idea for SMT was adopted very quickly because it enabled greater levels of mechanisation to be used, and it considerably saved on manufacturing costs. To accommodate surface mount technology, SMT, a completely new set of components was needed. New SMT outlines were required, and often the same components, e. ICs were sold in both traditional leaded packages and SMT packages. Despite this, the gains of using SMT proved to be so large that it was adopted very quickly. Surface mount devices, SMDs by their nature are very different to the traditional leaded components. They can be split into a number of categories: There is quite a variety of different packages used for passive SMDs. However the majority of passive SMDs are either resistors or capacitors for which the package sizes are reasonably well standardised. Other components including coils, crystals and others tend to have more individual requirements and hence their own packages. Resistors and capacitors have a variety of package sizes. These have designations that include: The figures refer to the dimensions in hundreds of an inch. In other words the measures 12 hundreds by 6 hundreds of an inch. The larger sizes such as and were some of the first that were used. They are not in widespread use now as much smaller components are generally required. However they may find use in applications where larger power levels are needed or where other considerations require the larger size. The connections to the printed circuit board are made through metallised areas at either end of the package. These components are often contained in a small plastic package. The connections are made via leads which emanate from the package and are bent so that they touch the board. Three leads are always used for these packages. In this way it is easy to identify which way round the device must go. There is a variety of packages which are used for integrated circuits. The package used depends upon the level of interconnectivity required. Many chips like the simple logic chips may only require 14 or 16 pins, whereas other like the VLSI processors and associated chips can require up to or more. In view of the wide variation of requirements there is a number of different packages available. The VLSI chips require a different approach. Typically a package known as a quad flat pack is used. This has a square or rectangular footprint and has pins emanating on all four sides. Pins again are bent out of the package in what is termed a gull-wing formation so that they meet the board. The spacing of the pins is dependent upon the number of pins required. For some chips it may be as close as 20 thousandths of an inch. Great care is required when packaging these chips and handling them as the pins are very easily bent. Other packages are also available. Instead of having the connections on the side of the package, they are underneath. The connection pads have balls of solder that melt during the soldering process, thereby making a good connection with the board and mechanically attaching it. As the whole of the underside of the package can be used, the pitch of the connections is wider and it is found to be much more reliable. As

the name suggests it is a smaller version of the BGA. SMT in use SMT is used almost exclusively for the manufacture of electronic circuit boards these days. They are smaller, often offer a better level of performance and they can be used with automated pick and place machine that in many cases all bit eliminate the need for manual intervention in the assembly process. Wired components were always difficult to place automatically because the wires needed to be pre-formed to fit the relevant hole spacing, and even then they were prone to problems with placement. Although many connectors and some other components still require assisted placement, printed circuit boards are normally developed to reduce this to an absolute minimum, even to the extent of altering the design to use components that can be placed automatically. In addition to this, component manufacturers have developed some specialised surface mount versions of components that enable virtually complete automated assembly for most boards.

Chapter 7 : SMT abbreviation stands for Surface-mount technology

Surface Mount Technology (SMT) terminology. SMC/SMD Surface mount components/surface mount device. Component usually refers to passive items such as resistors, capacitors, ect.

An alkaline chemical added to water to improve its ability to dissolve rosin flux residues. Secondary Side That side of the packaging and interconnecting structure furthest from layer 1. In SMT, the secondary side may be either reflow soldered active component or wave soldered passive component. Self-alignment Due to the surface tension of molten solder, the tendency of slightly misaligned components during placement to self align with respect to their land pattern during reflow soldering. This kind of correction may take care of any minor mis-alignment only. Shadowing Infrared Reflow A condition in which component bodies block radiated infrared energy from striking certain areas of the board directly. Shadowed areas receive less energy than their surroundings and may not reach desired temperatures. Shadowing Solder A condition in which solder fails to wet the surface mount device leads during the wave soldering process. Generally the trailing terminations of a component are affected, because the component body blocks the proper flow of solder. Requires proper component orientation during wave soldering to correct the problem. Silk Screen A screen of a closely woven solid mesh stretched over a frame and used to hold an emulsion outlining a circuit pattern. Silk screens are used in screen printing solder paste. The term is used generically to describe any screen stainless steel or nylon used for screen printing. Single -Layer Board A printed wiring board that contains metallized conductors on only one side of the board. Single-Sided Assembly A packaging and interconnecting structure with components mounted only on the primary side. SMC, Surface Mounted Components A component designed to be mounted and soldered to lands on the surface of a packaging and interconnecting structure rather than inserted into though-holes in the structure. The term is similar to SMC, surface mount component. SMT, Surface Mount Technology A method of assembling printed wiring boards or hybrid circuits, where components are mounted onto the planar surface rather than inserted into through-holes. Snap-off distance is typically in the range of 0. On-contact printing would have a zero snap-off distance. SO, Small Outline Similar to miniature dual in-line package, but with gull wing lead forms for surface mounting. SOIC, Small Outline Integrated Circuit An integrated circuit surface mount package with two parallel rows of gull wing leads, with standard spacing between leads and rows. SOJ, Small Outline J Leaded An integrated circuit surface mount package with two parallel rows of J-leads, with standard spacing between leads and rows. Generally used for memory devices. Solder A metallic alloy which has a melting temperature below C F Solder Balls Small spheres of solder that remain on the board after wave or reflow soldering adhering to laminate, mask, or conductors. Solder balls are most often associated with the use of solder paste containing oxides or may be due to excessive moisture content. Baking of paste may minimize formation of solder balls, but overbaking may cause excessive balling. They are sources of electrical shorts.

Chapter 8 : SURFACE MOUNT TECHNOLOGY

SMT (Surface Mount Technology) is a packaging technology in electronics that mounts electronic components on the surface of a Printed Circuit Board / Printed Wiring Board (PCB / PWB) instead of inserting them through holes of the board.

Chapter 9 : List of integrated circuit packaging types - Wikipedia

The five-day hands-on course aims to provide participants with a thorough understanding of surface-mount technology and advanced packaging principles needed for supporting and troubleshooting the surface-mount process.