VTI1J2 – Bengkel Elektronika

Pertemuan#3

Pengenalan Komponen Elektronika II

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Doa sebelum belajar

الصَّالِحِيْنَ مِنَ وَاجْعَلْنِيْ فَهْمًا وَارْزُقْنِيْ عِلْمًا،زِدْنِي رَبِّ

الْعَالَمِيْنَ رَبَّ يا آمين

ROBBII ZIDNII 'ILMAA WARZUQNII FAHMAA WAJ'ALNII MINASH-SHOOLI_HIIN AMIIN YA ROBBAL 'AALAMIIN

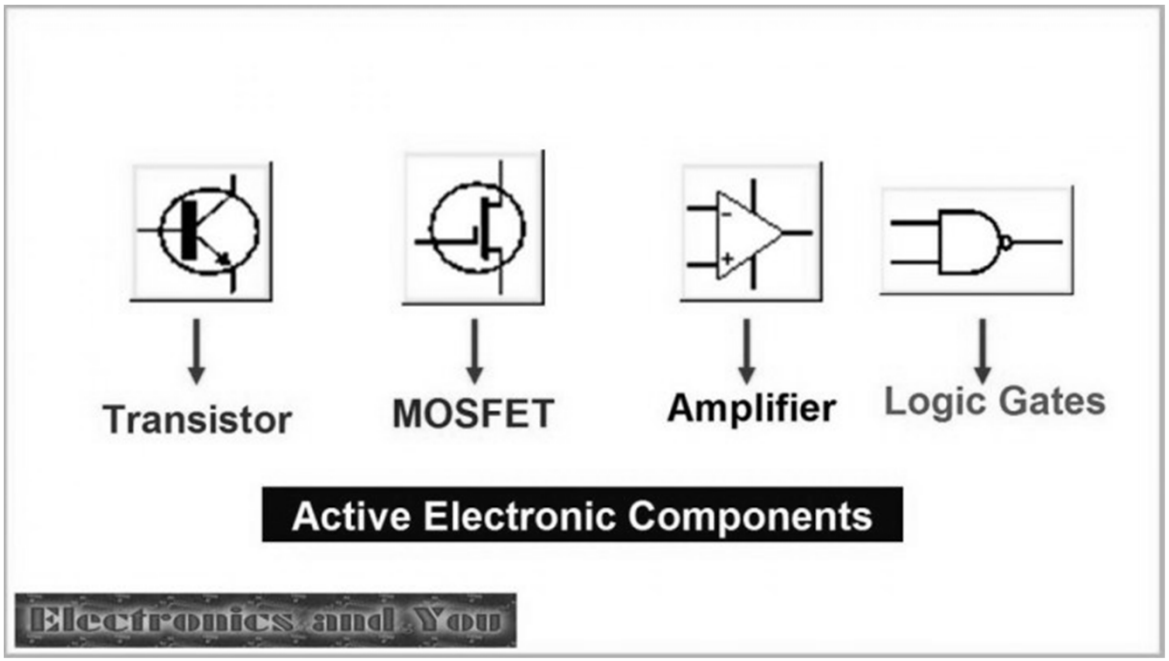
Terjemahan artinya :

Ya Allah Tambahkanlah aku ilmu, serta berilah aku karunia untuk dapat memahaminya Dan jadikanlah aku termasuk golongan orang-orang shaleh Ya Allah kabulkanlah do'aku ini.

Capaian Pembelajaran:

- 1. Mahasiswa mampu mengenali bentuk dan jenis komponen elektronika aktif
- 2. Mahasiswa mampu mengenali bentuk dan jenis komponen *surface-mounted technology*

Komponen Elektronika Aktif



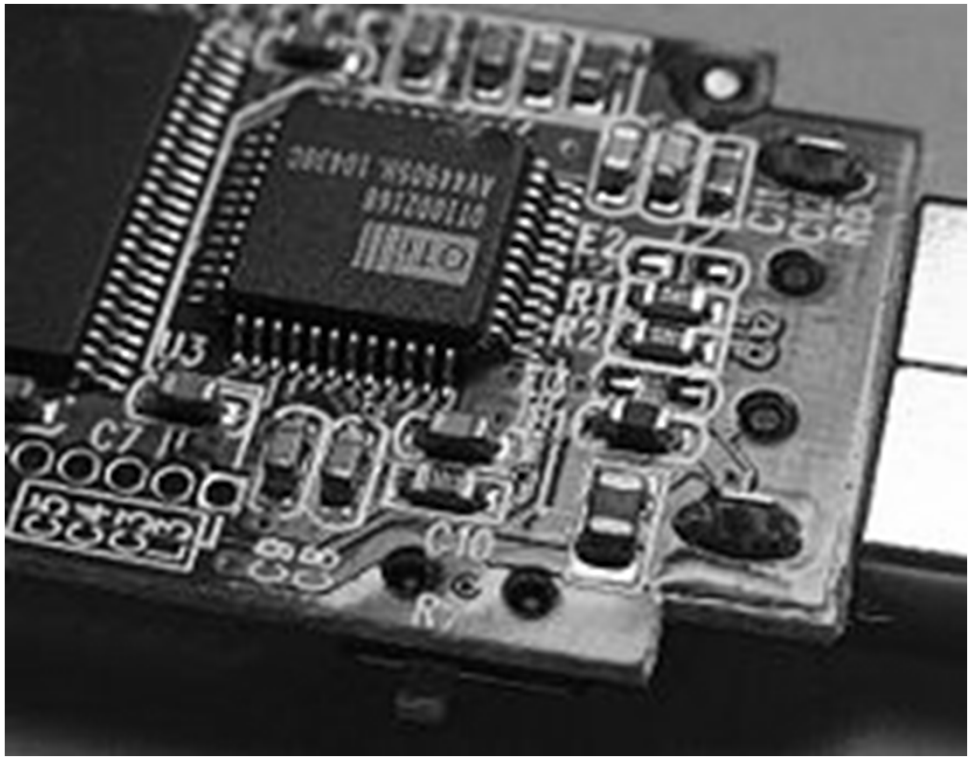
- Active electronic components are those that can control flow of electricity. Most PCB (***P**rinted **C**ircuit **B**oard*) have at least one active component.
- **Example**: Transistors, Integrated Circuits or ICs, Logic Gates, Vacuum Tubes, Silicon-Controlled Rectifiers (*SCRs*).

- **Active components** rely on a source of energy (usually from the DC circuit, which we have chosen to ignore) and usually can inject power into a circuit, though this is not part of the definition.[1] Active components include amplifying components such as transistors, triode vacuum tubes (valves), and tunnel diodes.
  - Semiconductors
    - Transistors
    - Diodes
    - Integrated circuits
    - Optoelectronic devices
  - Display technologies
  - Vacuum tubes (valves)
  - Discharge devices
  - Power sources

Surface-Mounted Technology (SMT)

- is a method in which the electrical components are mounted directly onto the surface of a printed circuit board (PCB).
- An electrical component mounted in this manner is referred to as a **surface-mount device** (**SMD**).
- SMT allows for increased manufacturing automation which reduces cost and improves quality
- It also allows for more components to fit on a given area of substrate.
- An SMT component is usually smaller than its through-hole counterpart because it has either smaller leads or no leads at all.
- It may have short pins or leads of various styles, flat contacts, a matrix of solder balls (BGAs), or terminations on the body of the component.

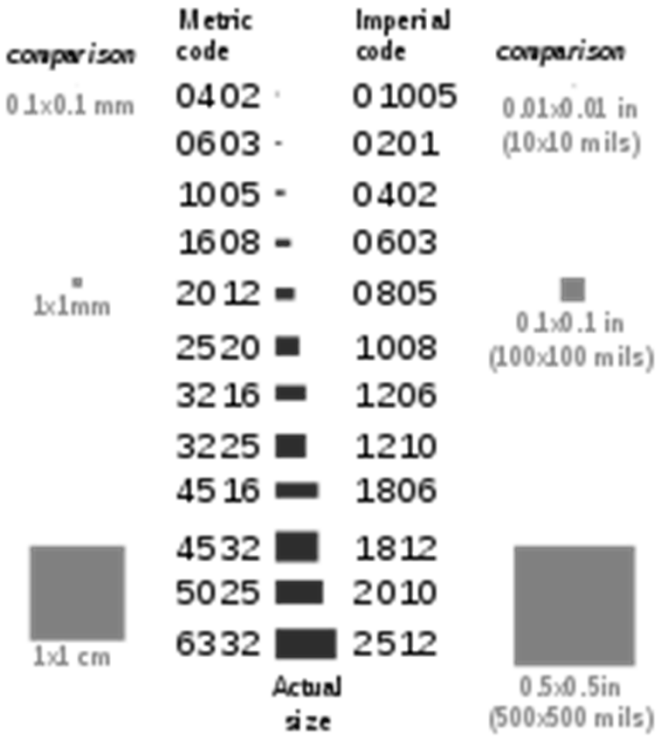
Example

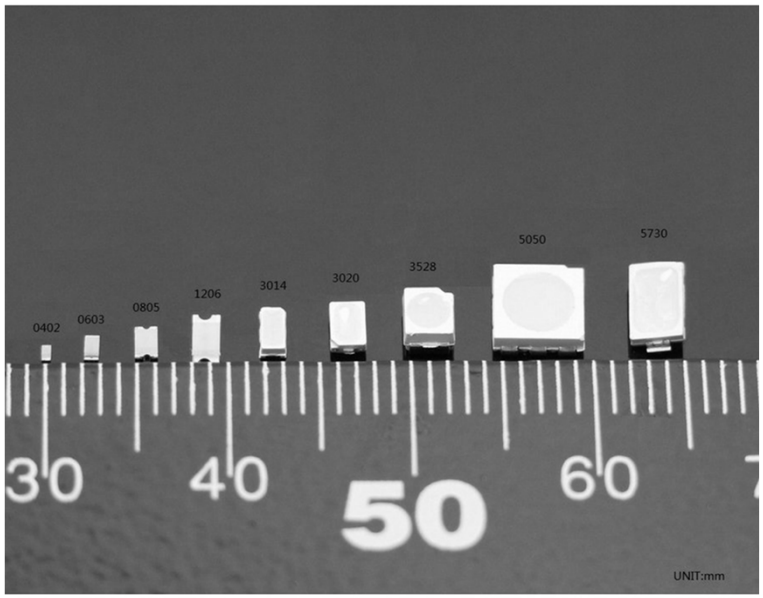


- Surface-mount capacitor

- A MOSFET transistor, placed upon a British postage stamp for size comparison.

component sizes, metric and imperial codes for two-terminal packages





Advantages

- Smaller components.
- Much higher component density (components per unit area) and many more connections per component.
- 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.

Advantages

- Simpler and faster automated assembly. Some placement machines are capable of placing more than 136,000 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.[11]

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Disadvantages

- SMT may be 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.[*citation needed*]
- 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.[12] Handling of small SMT components can be difficult, requiring tweezers, unlike nearly all through-hole components. 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 developed 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' solder connections may be damaged by potting compounds going through thermal cycling.
- 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.[13]

Disadvantages

- Solder joint dimensions in SMT quickly become much smaller as advances are made toward ultra-fine pitch technology. 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.[14][15]
- SMDs, usually being smaller than equivalent through-hole components, have less surface area for marking, requiring marked part ID codes or component values to be more cryptic and smaller, often requiring magnification to be read, whereas a larger through-hole component could be read and identified by the unaided eye. This is a disadvantage for prototyping, repair, rework, reverse engineering, and possibly for production set-up.

TERIMA KASIH

Ada Pertanyaan?