

LECTURE-5

ON BASIS OF CHIP SIZE

- ❖ *SSI (small-scale integration)*
- ❖ *MSI (medium-scale integration)*
- ❖ *LSI (large-scale integration)*
- ❖ *VLSI (very large-scale integration)*
- ❖ *ULSI (ultra large-scale integration)*

Evolution of Integrated Circuit

- Small scale integration(SSI)
- Medium scale integration(MSI)
- Large scale integration(LSI)
- Very large scale integration(VLSI)
- Ultra large scale integration(ULSI)

SSI (Small Scale Integration)

-circuits consisted of few tens of components on the chip

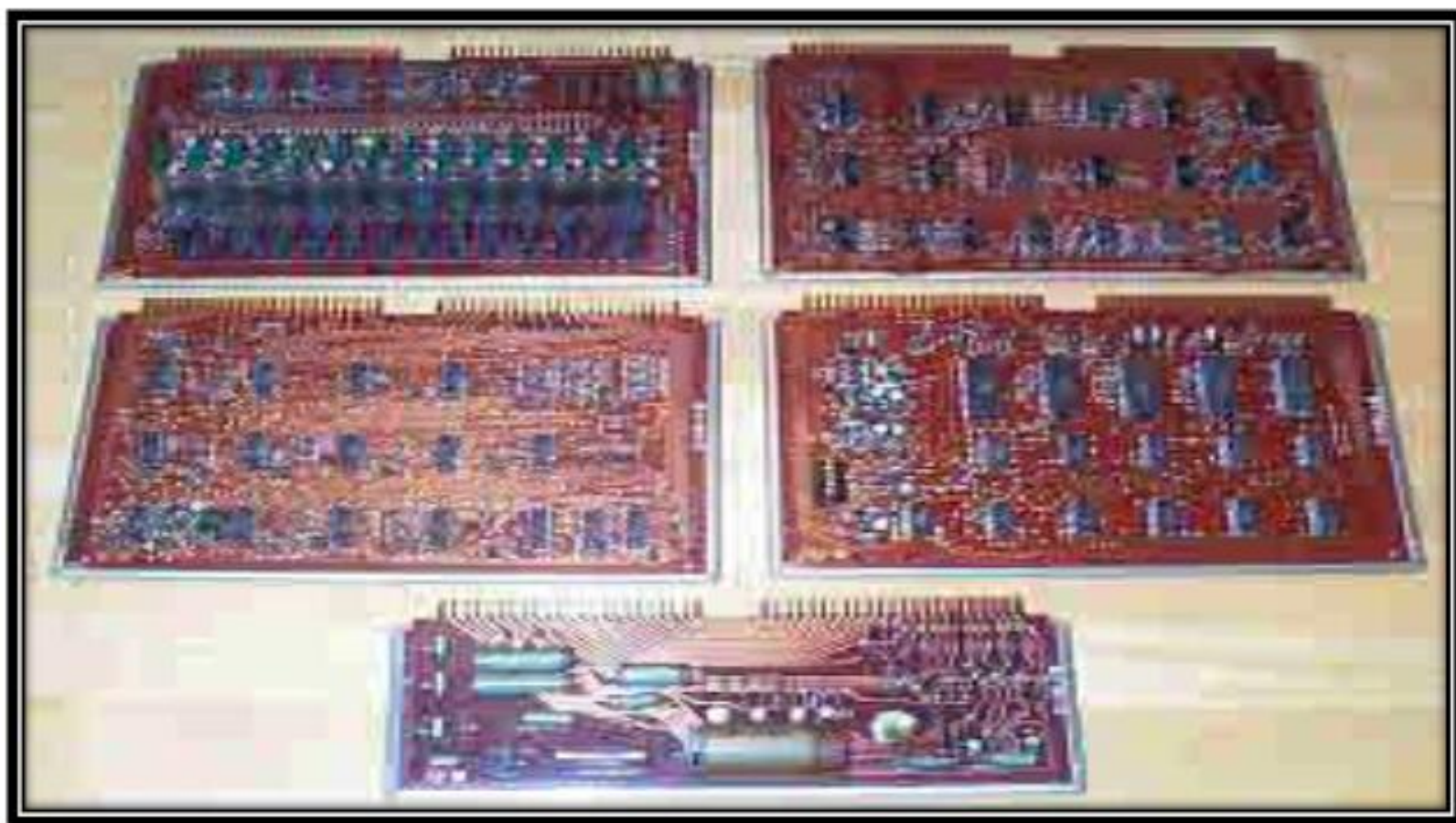
Example:

Philips TAA320



MSI (Medium Small Integration)

-devices came into existence which had 100's of transistors on the chip. MSI devices were less expensive and allowed more complex systems in very less space



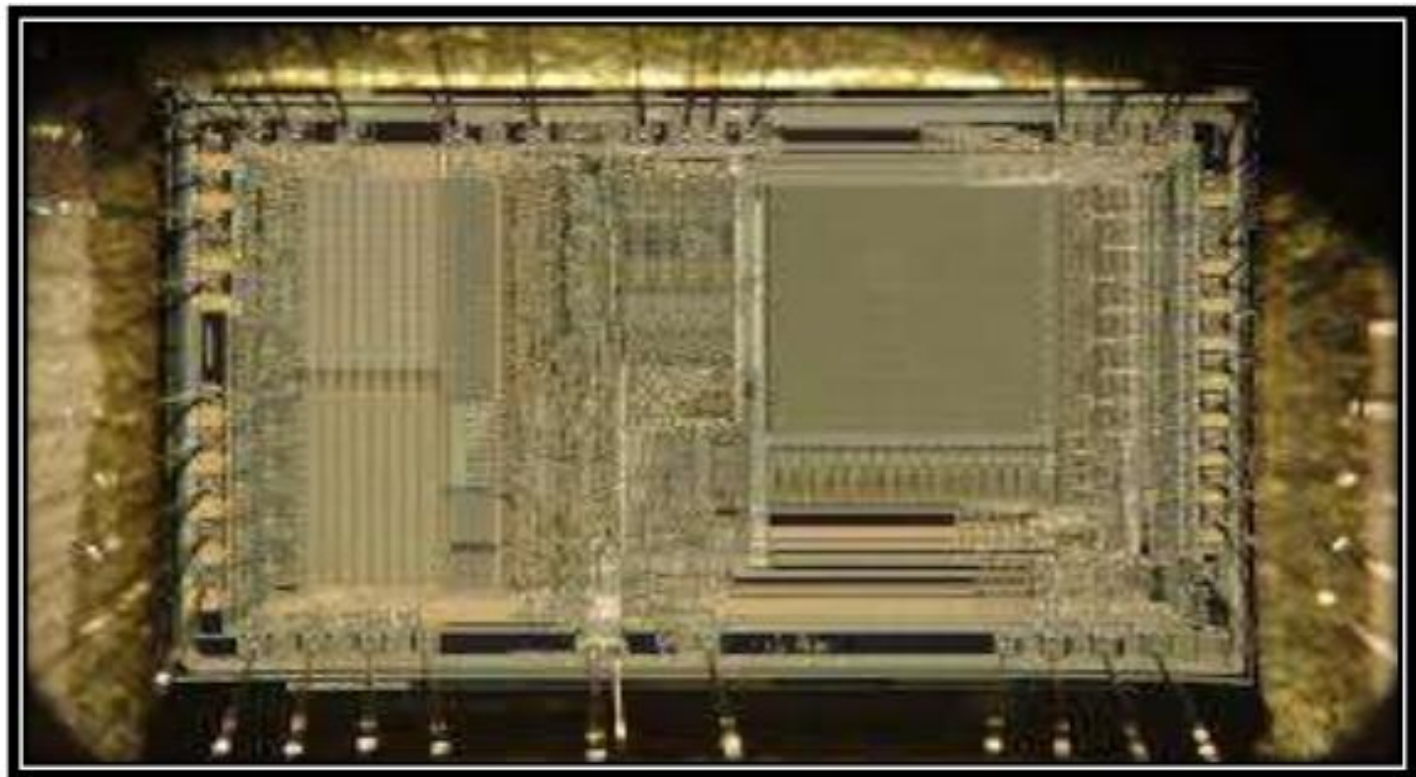
VLSI (Very Large Scale Integration)

is the process of creating an integrated circuit (IC) by combining thousands of transistors into a single chip. VLSI began in the 1970s when complex semiconductor and communication technologies were being developed. The microprocessor is a VLSI device. Before the introduction of VLSI technology most ICs had a limited set of functions they could perform. An electronic circuit might consist of a CPU, ROM, RAM and other glue logic. VLSI lets IC designers add all of these into one chip



ULSI (Ultra Large Scale Integration)

-is an IC with more than one million components per chip.



Chip size and Complexity

- Invention of Transistor (Ge) - 1947
- Development of Silicon - 1955-1959
- Silicon Planar Technology - 1959
- First ICs, SSI (3- 30gates/chip) - 1960
- MSI (30-300 gates/chip) - 1965-1970
- LSI (300-3000 gates/chip) -1970-1975
- VLSI (More than 3k gates/chip) - 1975

- ULSI (more than one million active devices are integrated on single chip)

| SSI | MSI | LSI | VLSI | ULSI |
|--------------------------------------|----------------------------|----------------------------|-----------------------------|-------------------------------|
| < 100 active devices | 100-1000 active devices | 1000-100000 active devices | >100000 active devices | Over 1 million active devices |
| Integrated resistors, diodes & BJT's | BJT's and Enhanced MOSFETS | MOSFETS | 8bit, 16bit Microprocessors | Pentium Microprocessors |