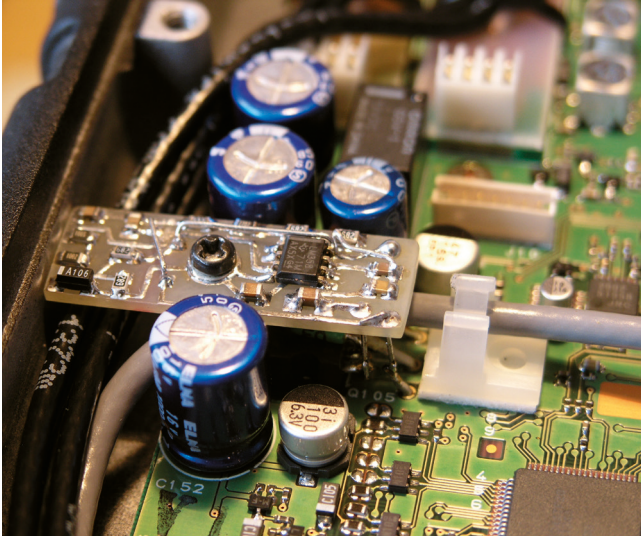


# WHAT IS AN INTEGRATED CIRCUIT?



The **integrated circuit** or **chip** is one of the most important inventions of the 20th century. The IC is the basic component of most digital devices including watches, calculators, and microprocessors, up to the very complex mainframe. Modern computing, communications, manufacturing and transportation systems, including the Internet, all depend on its existence.

An integrated circuit is a microelectronic semiconductor device consisting of many interconnected transistors and other components combined to form a complex system. An integrated circuit consists of a single-crystal chip of silicon, containing many millions of both active and passive elements and their interconnections and yet measuring only 5 mm square and 1 mm thick.

The IC is built on a small slice of a silicon wafer known as the **substrate**. This substrate is **doped** and **tracks** are **etched** by means of electron beams. The IC is enclosed in a plastic or ceramic case, and connected through metal pins to a printed circuit board.

Integrated circuits can be divided into three groups: analogue, digital and hybrid (both analogue and digital on the same chip). Digital integrated circuits can contain anything from one to millions of logic gates – inverters, AND, OR, NAND and NOR gates, **flip-flops**, **multiplexors**, etc. on a few square millimetres.

In recent years, the functional capability of ICs has increased enormously, while their cost, size and power consumption have steadily decreased bringing about revolutionary changes in electronic equipment.

Integrated circuits are classified by the number of electronic components they contain:

- **SSI (small-scale integration)**: up to 100 electronic components per chip;
- **MSI (medium-scale integration)**: from 100 to 3,000 electronic components per chip;
- **LSI (large-scale integration)**: from 3,000 to 100,000 electronic components per chip;
- **VLSI (very large-scale integration)**: from 100,000 to 1,000,000 electronic components per chip;
- **ULSI (ultra large-scale integration)**: more than 1 million electronic components per chip.

to etch: *incidere*  
 flip-flop (bistable multivibrator):  
*multivibratore bistabile*  
 multiplexor: *multiplatore*  
 track: *pista*

**1**  **Complete this chart which refers to the text above.**

Scale of integration	Number of components
	Tens
LSI	
ULSI	

## 2 Pair Work. In turns, decide if each sentence is true (T) or false (F) and give your partner some extra information.

- |   | T                        | F                        |
|---|--------------------------|--------------------------|
| a. The integrated circuit is one of the most important inventions of the 20th century.  | <input type="checkbox"/> | <input type="checkbox"/> |
| b. An IC is also called a chip because it is built on a single-crystal chip of silicon. | <input type="checkbox"/> | <input type="checkbox"/> |
| c. An IC contains only active components.   | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Silicon is doped and tracks are etched on the surface.                               | <input type="checkbox"/> | <input type="checkbox"/> |
| e. The IC is soldered to the printed circuit board.                                     | <input type="checkbox"/> | <input type="checkbox"/> |
| f. Integrated circuits are classified by the number of components they contain.         | <input type="checkbox"/> | <input type="checkbox"/> |

## 3 Match the words with the correct definitions.

- |                |                          |  |
|----------------|--------------------------|--|
| a. pin         | <input type="checkbox"/> | 1. A terminal on an IC used to connect it to the printed board.  |
| b. wafer       | <input type="checkbox"/> | 2. A thin semiconductor slice on which matrices of microcircuits can be fabricated.                                      |
| c. multiplexor | <input type="checkbox"/> | 3. The physical material on which a microcircuit is fabricated and forms the basic surface on which the circuit adheres. |
| d. substrate   | <input type="checkbox"/> | 4. Add impurities to a semiconductor to achieve a desired characteristic.  |
| e. dope        | <input type="checkbox"/> | 5. Remove the surface of a semiconductor material revealing parts of the underlying structure.                           |
| f. etch        | <input type="checkbox"/> | 6. A device for combining two or more signals.   |

## 4 Choose the correct answer among the three options given.

- An IC contains
  - tens of active and passive circuit elements.
  - both active and passive elements.
  - only active elements.
- The IC is connected to a printed circuit board
  - with the use of a plastic case.
  - via gold wires.
  - by means of external pins.
- Silicon is doped in order to
  - change its conducting properties.
  - make it thinner.
  - make it more resistant.
- The revolutionary changes in IC capability have brought about
  - a reduction in IC physical complexity.
  - a reduction in power consumption.
  - a rise in size.
- LSI integrated circuits contain
  - more than 100 thousand components.
  - thousands of components.
  - hundreds of components.

## 5 Refer back to the text and answer the following questions.

- What is an integrated circuit?
- How many components do ICs contain?
- What kind of treatments is Silicon submitted to?
- What are the applications of ICs?
- What has the development of IC technology made possible?