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.

1 Complete this chart.

Scale of integration	Number of components
	Tens
LSI	
ULSI	

to etch: incidere

flip-flop (bistable multivibrator):

multivibratore bistabile multiplexor: multiplatore

track: pista

2	PAIR WORK In turns, decide if each sentence is true or false and give your partner some extra information.							
		An IC is also calle	ed a cl	-	ortant inventions of the 20th century. n a single-crystal chip of silicon.			
	d. e. f.	The IC is soldered	d to tl	acks are etched on the ne printed circuit board classified by the numb				
3	(V)	*76\		with the correct defi				
	a.	Pin	1.	A terminal on an IC us	ed to connect it to the printed board.			
	b.	Wafer			slice on which matrices of microcircuits can be	fabricated		
	c.	c. Multiplexor . The physical material on which a microcircuit is fabricated and forms the basi surface on which the circuit adheres.						
	d.	Substrate	4.	Add impurities to a se	miconductor to achieve a desired characteristi	c.		
	e.	Dope	5.	Remove the surface of underlying structure.	f a semiconductor material revealing parts of t	ne		
	f.	Etch	6.	A device for combinin	g two or more signals.			
4		Choose the correct option.						
	a.	a. An IC contains						
		1. tens of active and passive circuit elements.						
		2. both active and passive elements.						
	3. only active elements.							
	b.	b. The IC is connected to a printed circuit board						
		1. with the use of a plastic case.						
	2. via gold wires.							
	3. by means of external pins.							
	c.	. Silicon is doped in order to						
		1. change its conducting properties.2. make it thinner.						
		3. make it mo		istant				
	d.	d. The revolutionary changes in IC capability have brought about						
		1. a reduction in IC physical complexity.						
	2. a reduction in power consumption.							
	3. a rise in size.							
	e. LSI integrated circuits contain							
		1. more than 100 thousand components.						
		2. thousands of components.						
		3. hundreds of	of con	nponents.				
5		Answer the fol	lowir	ng questions.				
	a.	What is an integr	rated	circuit?	d. What are the applications of ICs?			
	b. How many components do ICs contain?				e. What has the development of IC to	chnology		

c. What kind of treatments is Silicon submitted to?

made possible?