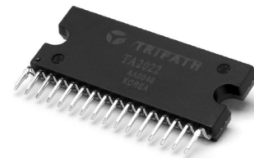# *Integrated circuits*

In electronics, an integrated circuit (also known as IC, microcircuit, microchip, silicon chip, or chip) is a miniaturized electronic circuit (consisting mainly of semiconductor devices, as well as passive components) that has been manufactured in the surface of a thin substrate of semiconductor material.

A hybrid integrated circuit is a miniaturized electronic circuit constructed of individual semiconductor devices, as well as passive components, bonded to a substrate or circuit board.

Integrated circuits are used in almost all electronic equipment in use today and have revolutionized the world of electronics. They are used in every part our daily lives: electronic alarm clock wakes us up, we get daily news from TV sets and radios, we use mobile phones to talk to people from all over the world and so on. This would not be possible without integrated circuits.


Integrated Circuit – is a complex electronic device where multiple electronic components are combined into a small housing. Transistors, diodes, resistors and capacitors can be squeezed into an integrated circuit in large quantities. Microprocessors contain tens of millions of integrated elements.

Integrated circuit is designed for a specific function. Analogue integrated circuits can be amplifiers, voltage regulators, filters, convertors, etc. Digital integrated circuits can be logical gates, counters, flip-flops, microprocessors, etc.

Advantages: cheap
small
easily programmable
low power consumption
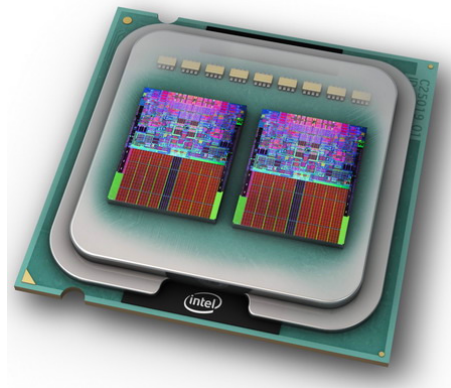
Integrated circuit types

Type	Number of elements
SSI = small scale integration	15
MSI = medium scale integration	10 – 100
LSI = large scale integration	1000 – 10 000
VLSI = very large scale integration	10 000 – 100 000
ULSI = ultra large scale integration	1 000 000 and more

Classification

Integrated circuits can be classified into **analog**, **digital** and **mixed** signal (both analog and digital on the same chip).

Digital integrated circuits can contain anything from one to millions of logic gates, flip-flops, multiplexers, and other circuits in a few square millimeters. The small size of these circuits allows high speed, low power dissipation, and reduced manufacturing cost compared with board-level integration. These digital ICs, typically microprocessors, DSPs, and micro controllers work using binary mathematics to process "one" and "zero" signals.

Analog ICs, such as sensors, power management circuits, and operational amplifiers, work by processing continuous signals. They perform functions like amplification, active filtering, demodulation, mixing, etc. Analog ICs ease the burden on circuit designers by having expertly designed analog circuits available instead of designing a difficult analog circuit from scratch.

ICs can also combine analog and digital circuits on a single chip to create functions such as A/D converters and D/A converters. Such circuits offer smaller size and lower cost, but must carefully account for signal interference.

Type of signal processed:

Analogue - analogue IC
- work with a composite signal
- an example is operational amplifier

Digital - digital IC
- work with digital signal
- an example is logical circuit

Processor

A well-known integrated circuit.
Most challenging to build.
The most important part of a personal computer.

Only a half century after their development was initiated, integrated circuits have become ubiquitous. Computers, cellular phones, and other digital appliances are now inextricable parts of the structure of modern societies. That is, modern computing, communications, manufacturing and transport systems, including the Internet, all depend on the existence of integrated circuits.

Example of an electric circuit with an IC – operation amplifier tester.
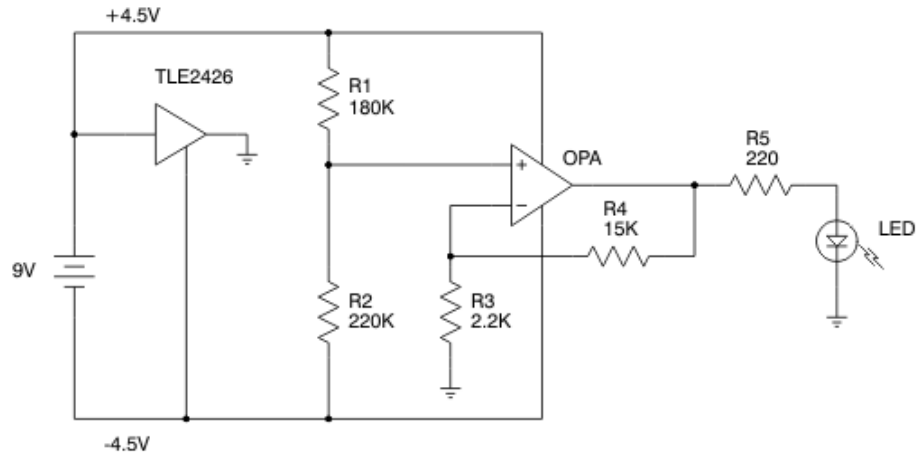
VOCABULARY

consisting – pozostávajúci

ubiquitous – všadeprítomný

cellular phones – mobilné telefóny

appliances – spotrebiče

revolutionized – prevrat

of modern societies – modernej spoločnosti

inextricable – neriešiteľný

depend – závisieť