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PROCESSORS: TYPES, PROPERTIES AND PRODUCTION METHODS

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Micro and nano processors are the foundation of almost all electronics. The processor is one of the key components of a computer, responsible for executing logical, arithmetic operations, and control operations that are written in machine code. Processors are typically made from silicon, which has an atomic crystal lattice that meets the necessary requirements for producing microchips and processors of almost any configuration. The practical capabilities of processors have evolved rapidly, with a significant increase in the number of cores and the emergence of hybrid processors based on chips that integrate both traditional processor cores and graphics processor cores.

A microprocessor is a programmable device designed to process digital or analog information, perform input data processing, execute arithmetic, logical, and other various operations, and provide results according to the commands it receives from memory. The CPU of a microprocessor resolves several key tasks in a wide range of applications. It is used to transfer data between RAM and other components of a personal computer. The CPU also coordinates information between internal and external storage devices, ensuring seamless multithreaded and multiprogramming system operation by decoding machine code.

A nano processor is a small and energy-efficient processor made possible by nanoscale structure technology. It is used in devices with limited resources such as tablets, mobile phones, smart watches, and other mobile devices. One of the main benefits of nano processors is their small size, providing excellent mobility and low power consumption. They also have advantages in terms of manufacturing cost and low heat dissipation, making them particularly suitable for use in resource-constrained devices. Nano processors are capable of processing large amounts of information and performing heavy computations on par with more power-

ful and larger processors. They are equipped with all the essential functions, such as multimedia capabilities, graphics processing, power management, and interfaces for communication with other devices. Over time, the development of nanoscale technology has reached a level where a vast number of devices are starting to use these processors due to their reliability, cost-effectiveness, and performance. In general, nano processors represent a technical solution for manufacturing modern mobile devices, providing high performance with minimal power consumption. With their help, devices become more durable, functional, and user-friendly.

The basis of all processors are crystals. The essence of creating crystals lies in the production of physical inconsistencies, which are the individual elements of the electrical circuit - transistors, diodes, resistors, capacitors, and other components.

The production of processors consists of more than three hundred operations, resulting in the formation of over 20 layers into a complex three-dimensional structure. The initial material for microchip crystals are 200-millimeter polished silicon wafers. Several hundred microchips are grown on a single wafer. As a result, the polished wafer is covered with a fascinating microscopic pattern. To achieve this result, about 20 layers with numerous physical properties are applied to the wafer. After all the actions leading up to the photolithography method, 20 different masks are sequentially created, which must have a deviation from each other of no more than 0.1 micrometer. As a result of many operations in growing the crystals, four to five layers of metallization are applied to the wafer to connect the individual elements of the microchip. Then testing is conducted. After that, the wafer is cut into separate crystals, each of which is placed in its own housing with reliable external contacts.

Ultimately, the processors undergo comprehensive testing under conditions of temperature, mechanical, and humidity loads. And now we can implement the resulting product into devices.

References

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