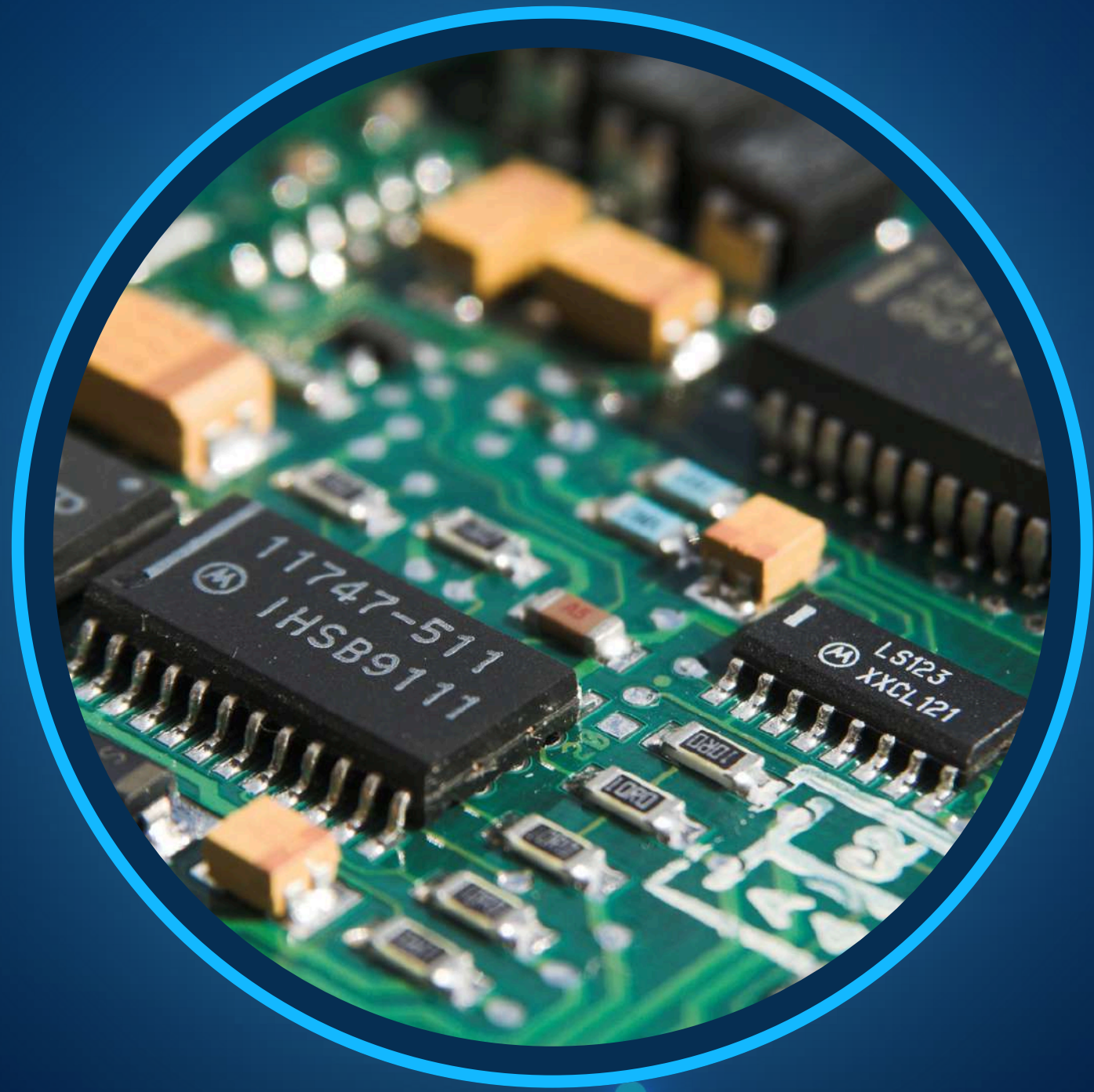


# **Comparative Study on Different Types of Motherboards**

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# What is a Motherboard?



A computer's motherboard is a circuit board that houses electrical parts and facilitates communication between them (BasuMallick, 2024).

It is also called the backbone of a computer.

It has several components on a single platform.

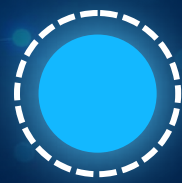


# Functions of a Motherboard



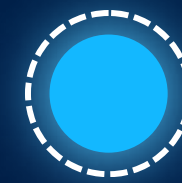
## Physical Connection:

- Provides slots and sockets for installing the CPU, RAM, and expansion cards (like graphics cards, sound cards, network cards, etc.).
- Offers connectors for peripheral devices such as keyboards, mice, monitors, and printers.



## Power Distribution:

- Regulates and distributes electrical power to all components through various power connectors.



## Data Transfer:

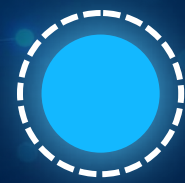
- Facilitates communication between the CPU, RAM, and other components using a system of buses and circuits.
- Enables data transfer between internal and external devices.

# Functions of a Motherboard



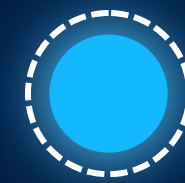
## System Integration:

- Coordinates the operation of all connected components, ensuring they work together seamlessly.
- Manages the timing and synchronization of various hardware components.



## Manages data flow

- The BIOS ensures that the operating system interacts well with input and output devices. Ensuring that the data sent to the computer moves as expected to perform its intended purpose (BasuMallik, 2024).



## Enhances performance

- Boosts the capabilities of a computer. Motherboards often transform the capabilities of a computer. (BasuMallik, 2024).



# What are the different types of Motherboard?

**01**

**AT Motherboard**

**02**

**ATX Motherboard**

**03**

**BTX Motherboard**

**04**

**Extended-ATX Motherboard**

**05**

**LPX Motherboard**

**06**

**Micro-ATX Motherboard**

**07**

**Mini ITX Motherboard**

**08**

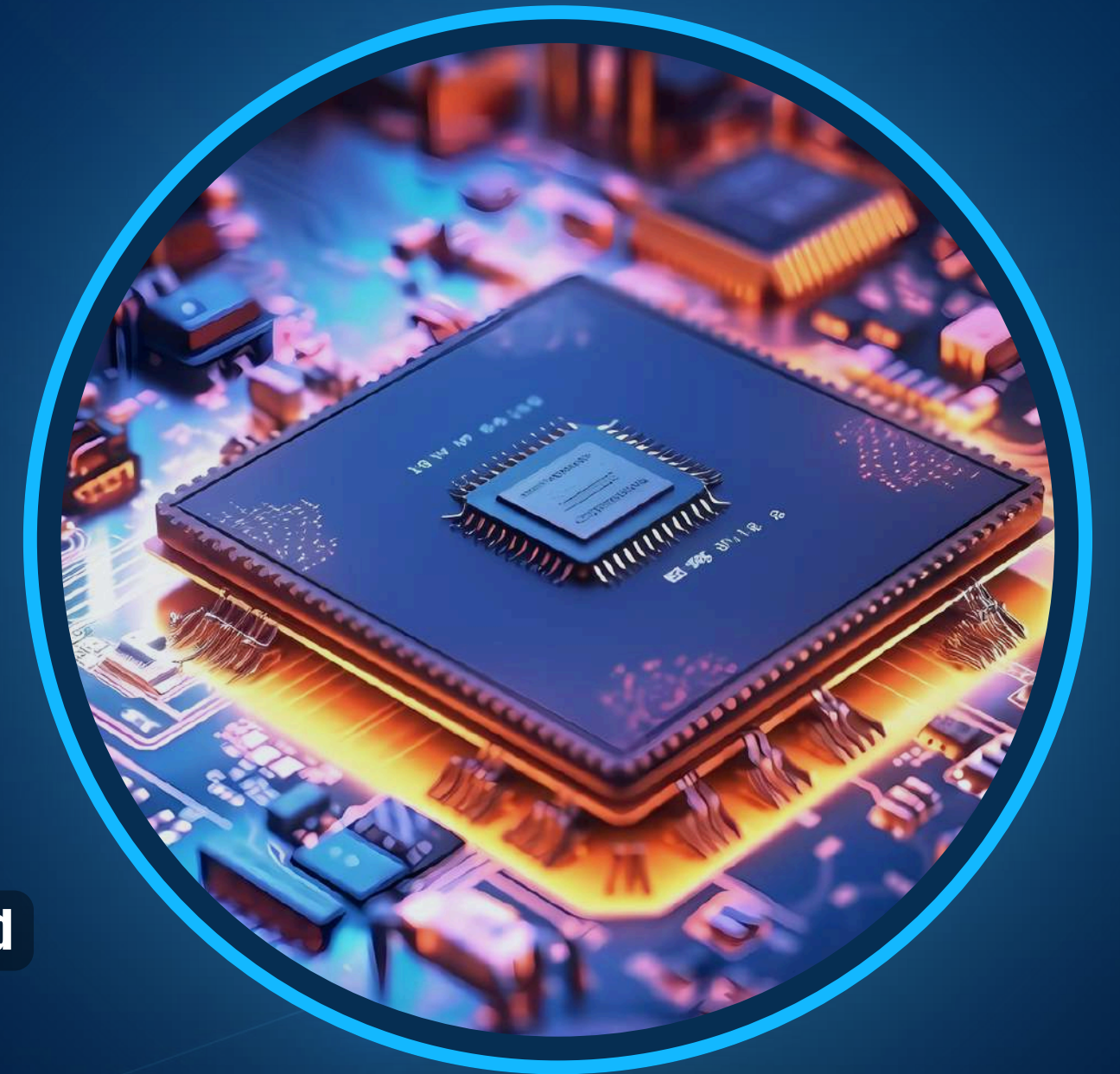
**Mini-ATX Motherboard**

**09**

**Pico BTX Motherboard**

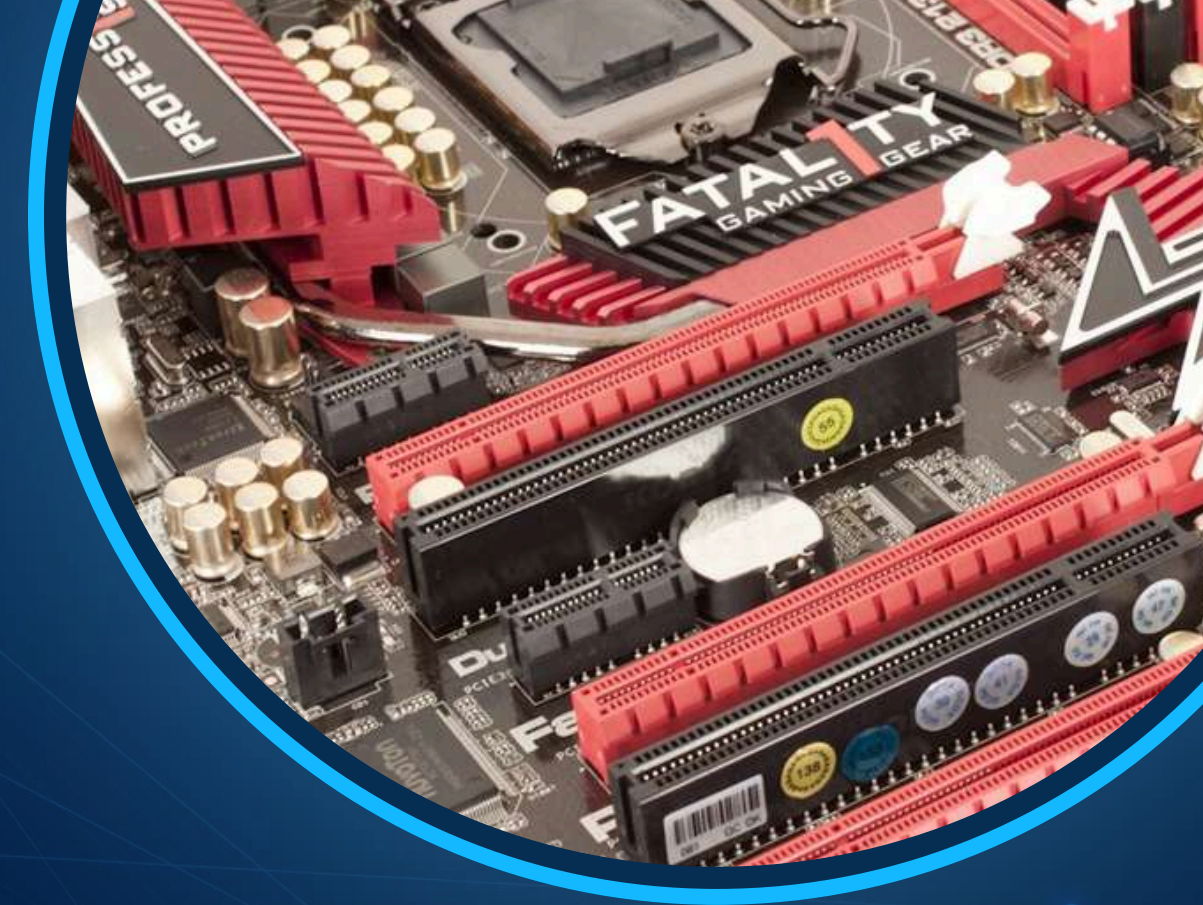
**10**

**Standard-ATX Motherboard**





# AT Motherboard



## Build

AT motherboards, popular in the 1980s, were a specific size and shape, using ISA expansion slots and a large power connector, and were primarily used in desktop computers of that era.

## Chipset

Early AT motherboards had limited chipsets that handled the system bus, memory, and I/O operations.

## CPU Slots

Socket 7 was used for Intel 486 and early Pentium processors, while Socket 8 was designed for later Pentium processors and could support dual CPUs and up to 8 RAM slots.

## BIOS

AT motherboards commonly used BIOS chips to store firmware and boot instructions, essential for system initialization and configuration.

## SATA

AT motherboards primarily used IDE interfaces for storage devices like hard drives and CD-ROM drives, as SATA was not widely adopted at the time.

## Memory Slots

AT systems used SIMM memory modules, typically 72-pin or 30-pin, supporting up to 64KB of RAM in two slots.

## PCI Slots

AT motherboards had limited expansion capabilities, using expansion slots for devices like sound cards, network cards, and graphics cards.

## Built-in Features

AT motherboards had ports for keyboard, mouse, printers, modems, external drives, and floppy disk drives. They were compatible with early PC hardware and had a simple design for easier troubleshooting.



# ATX Motherboard

## Build

ATX motherboards, introduced in 1995, improved upon AT motherboards with better power management, more expansion slots, and built-in USB support, making them more efficient and user-friendly for modern computers.

## CPU Slots

ATX motherboards support modern processors from Intel's 12th, 13th, and 14th generation Core series and AMD's Ryzen 7000 series.

## PCI Slots

Modern ATX motherboards offer multiple PCI-E slots for high-speed expansion cards like graphics cards, network cards, and sound cards.

## Memory Slots

Modern ATX motherboards typically have four RAM slots for high-speed DDR5 memory.

## Chipset

ATX motherboards use chipsets like Intel's 700 series for 13th-gen Core processors and AMD's X670E series for Ryzen 7000 series processors, integrating northbridge and southbridge functionalities.

## SATA

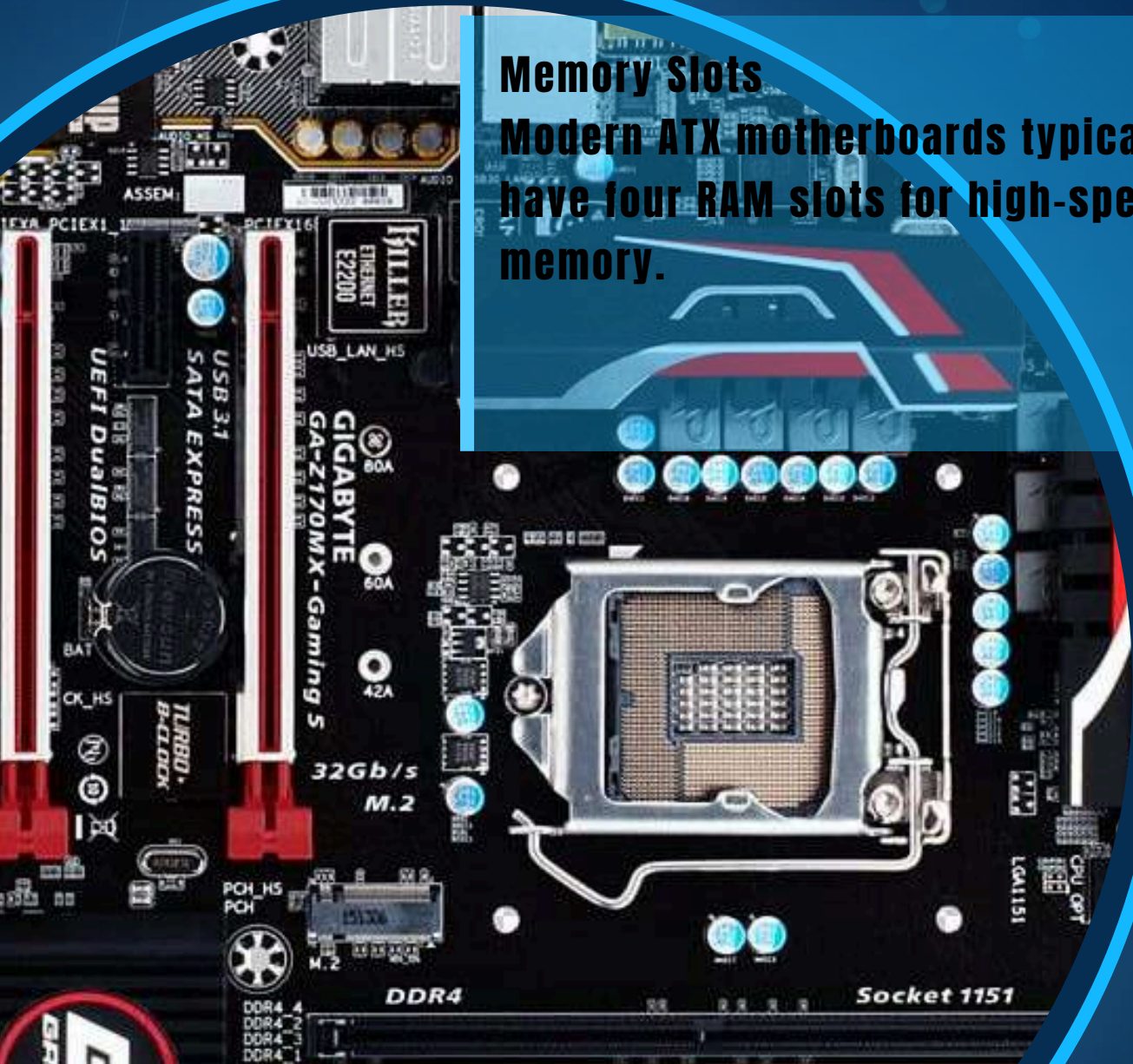
Modern ATX motherboards offer SATA ports for hard drives and SSDs, as well as M.2 slots for high-speed NVMe SSDs.

## BIOS

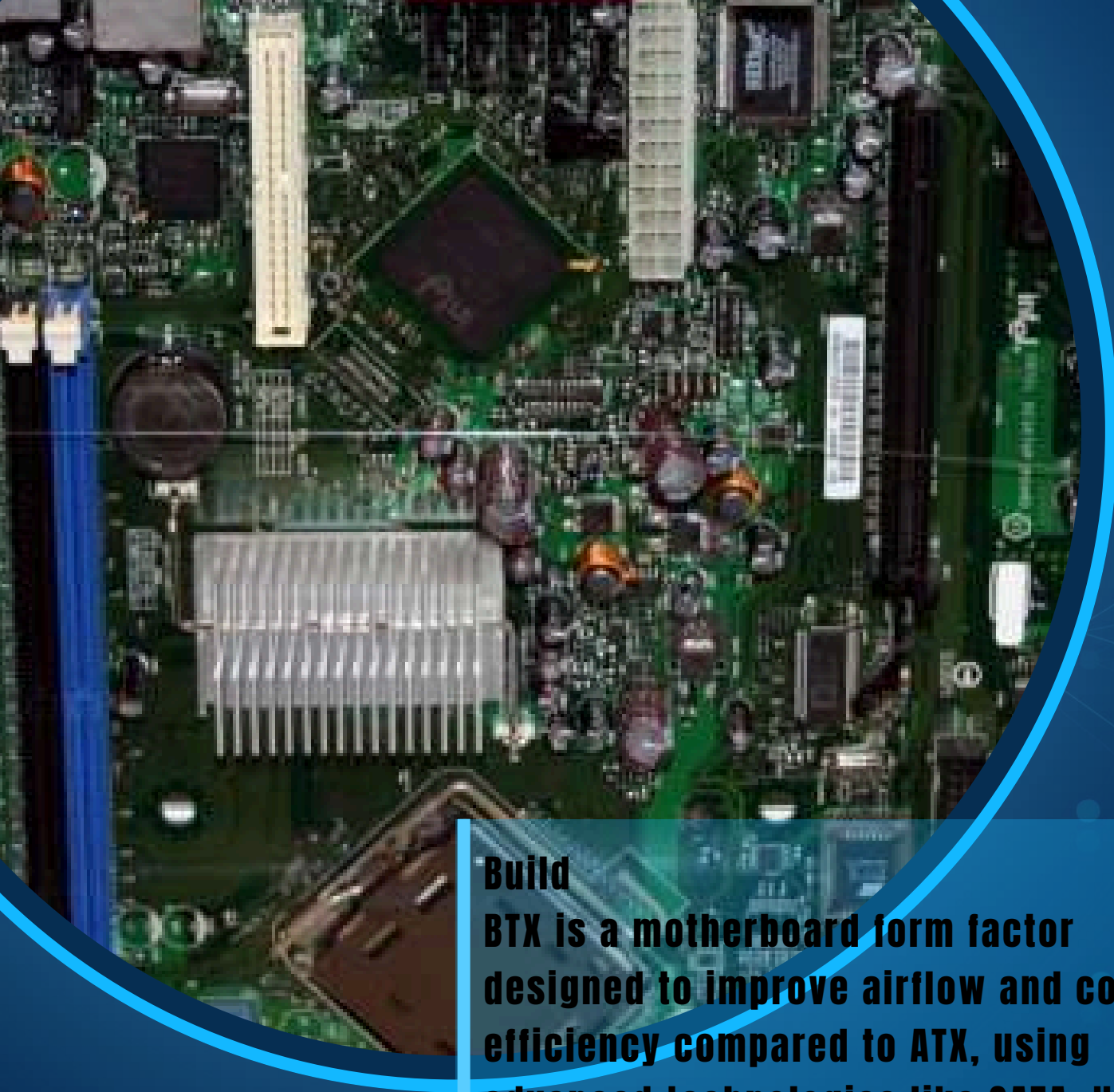
Modern ATX motherboards use UEFI, a more advanced BIOS interface, for system initialization and configuration.

## Built-in Features

Modern ATX motherboards offer high-speed USB ports, integrated wireless connectivity, audio jacks, Ethernet ports, RGB headers, and front panel connectors for power and audio.







# BTX Motherboard

## Memory Slots

BTX motherboards typically had 4 DIMM slots for DDR or DDR2 RAM, supporting dual-channel memory configuration for optimized performance.

## PCI Slots

BTX motherboards typically had multiple PCI Express slots, including x16 slots for graphics cards and x1 slots for other expansion cards. Some models also included legacy PCI slots for older cards.

## Build

BTX is a motherboard form factor designed to improve airflow and cooling efficiency compared to ATX, using advanced technologies like SATA, USB 2.0, and PCI Express.

## Chipset

BTX motherboards used integrated northbridge and southbridge chips to manage CPU communication and peripheral devices.

## SATA

BTX motherboards typically had several SATA ports for storage devices, and some models supported SATA RAID configurations for enhanced performance and data redundancy.

## CPU Slots

BTX motherboards primarily supported Intel's LGA775 socket for Pentium 4 processors, although later models might have supported other sockets. It is designed for modern processors compatible with the board.

## BIOS

BTX motherboards had firmware stored on the board for boot instructions and allowed users to configure system settings.

## Built-in Features

BTX motherboards often had integrated I/O ports like USB, audio, and network, as well as onboard sound and Gigabit Ethernet. They also included front panel connectors for audio and power.



# Extended ATX Motherboard

## Build

Extended ATX motherboards are the largest ATX variant, designed for powerful PC systems with ample space and features, enabling better cooling, overclocking, and expansion capabilities.

## Chipset

The motherboard uses a chipset with integrated northbridge and southbridge. The northbridge handles CPU communication, while the southbridge manages peripheral devices.

## SATA

Usually 4 to 12 SATA slots

## CPU Slots

The motherboard has 4 DIMM slots for RAM and uses a chipset with integrated northbridge and southbridge. The northbridge manages CPU communication, while the southbridge controls peripheral devices.

## BIOS

The motherboard has firmware stored on it for boot instructions and allows users to configure system settings.

## Built-in Features

The motherboard has front panel connectors for audio and power, as well as USB ports for peripherals.

## Memory Slots

Varies by Chipset

## PCI Slots

Typically 4 to 8 PCIe slots





# LPX Motherboard

## Build

LPX is a smaller motherboard form factor used in the late 1980s and 1990s, featuring a different layout and requiring a riser card for expansion.

## Chipset

The motherboard uses a chipset with integrated northbridge and southbridge. The northbridge handles CPU communication, while the southbridge manages peripheral devices.

## CPU Slots

LPX motherboards typically support modern processors and have fewer RAM slots than larger form factors.

## BIOS

LPX motherboards have multiple PCI Express and PCI slots, as well as firmware for boot instructions and system configuration.

## SATA

LPX motherboards often have integrated I/O, onboard sound, and onboard networking, but typically have fewer SATA ports compared to ATX motherboards.

## Memory Slots Varries by Chipset

## PCI Slots

LPX motherboards have multiple expansion slots, firmware for boot instructions, and allow users to configure system settings.

## Built-in Features

LPX motherboards vary in their connector options based on the socket type. They typically have front panel connectors for audio and power, as well as USB ports for peripherals.





# Micro-ATX Motherboard

## Build

AT motherboards, popular in the 1980s, were a specific size and shape, using ISA expansion slots and a large power connector, and were primarily used in desktop computers of that era.

## CPU Slots

Varies by socket

## PCI Slots

The motherboard has multiple PCI Express slots, typically two x16 slots and fewer x4 and x1 slots compared to ATX motherboards.

## Memory Slots

Varies by Chipset

## Chipset

The motherboard uses either UEFI or Legacy BIOS. It has integrated northbridge and southbridge chips. The northbridge handles CPU communication, while the southbridge controls peripheral devices.

## SATA

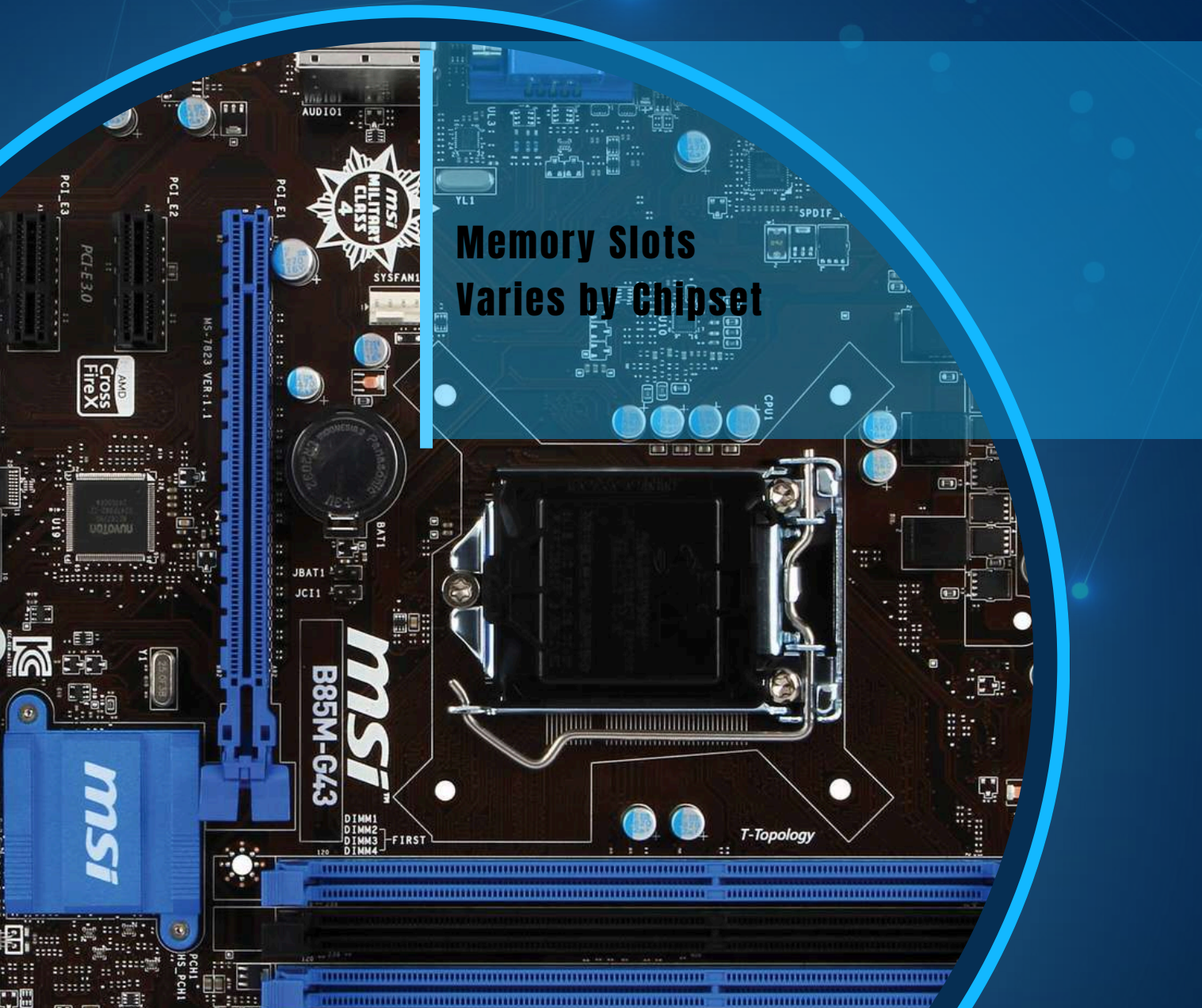
The motherboard has integrated I/O, onboard sound, and networking. It has fewer SATA ports compared to ATX motherboards.

## BIOS

The motherboard has multiple PCI Express and PCI slots. It uses firmware stored on the board for boot instructions and allows users to configure system settings.

## Built-in Features

The motherboard varies in connector options by socket type. It typically has front audio and power connectors, as well as USB ports for peripherals.







# Mini ITX Motherboard

**Memory Slots**  
Varies by Chipset

**PCI Slots**  
Usually has one PCI-E x16 slot

**Build**  
The Mini-ITX is a compact motherboard designed for small form factor PCs, prioritizing energy efficiency over maximum expandability.

**Chipset**  
Mini-ITX motherboards use either UEFI or Legacy BIOS. They have integrated northbridge and southbridge chips. The northbridge handles CPU communication, while the southbridge controls peripheral devices.

**SATA**  
Mini-ITX motherboards often have integrated I/O, onboard sound, and networking. They typically have fewer SATA ports compared to larger form factors.

**CPU Slots**  
Mini-ITX motherboards are smaller than ATX and typically support modern processors. They usually have two RAM slots.

**BIOS**  
Mini-ITX motherboards have fewer PCI Express and PCI slots. They use firmware stored on the board for boot instructions and allow users to configure system settings.

**Built-in Features**  
Mini-ITX motherboards vary in connector options by socket type. They typically have front audio and power connectors, as well as USB ports for peripherals.



# Mini ATX Motherboard

## Build

Mini-ATX motherboards are a middle ground between ATX and micro-ATX, offering a balance of size and expandability, suitable for smaller cases.

## Chipset

Mini-ATX motherboards use UEFI and have integrated northbridge and southbridge chips. The northbridge handles CPU communication, while the southbridge controls peripheral devices.

## SATA

Mini-ATX motherboards often have integrated I/O, onboard sound, and networking. They usually have fewer SATA ports compared to larger form factors.

## CPU Slots

Usually has 2 RAM slots

## BIOS

Mini-ATX motherboards have limited PCI Express and PCI slots. They use firmware stored on the board for boot instructions and allow users to configure system settings.

## Built-in Features

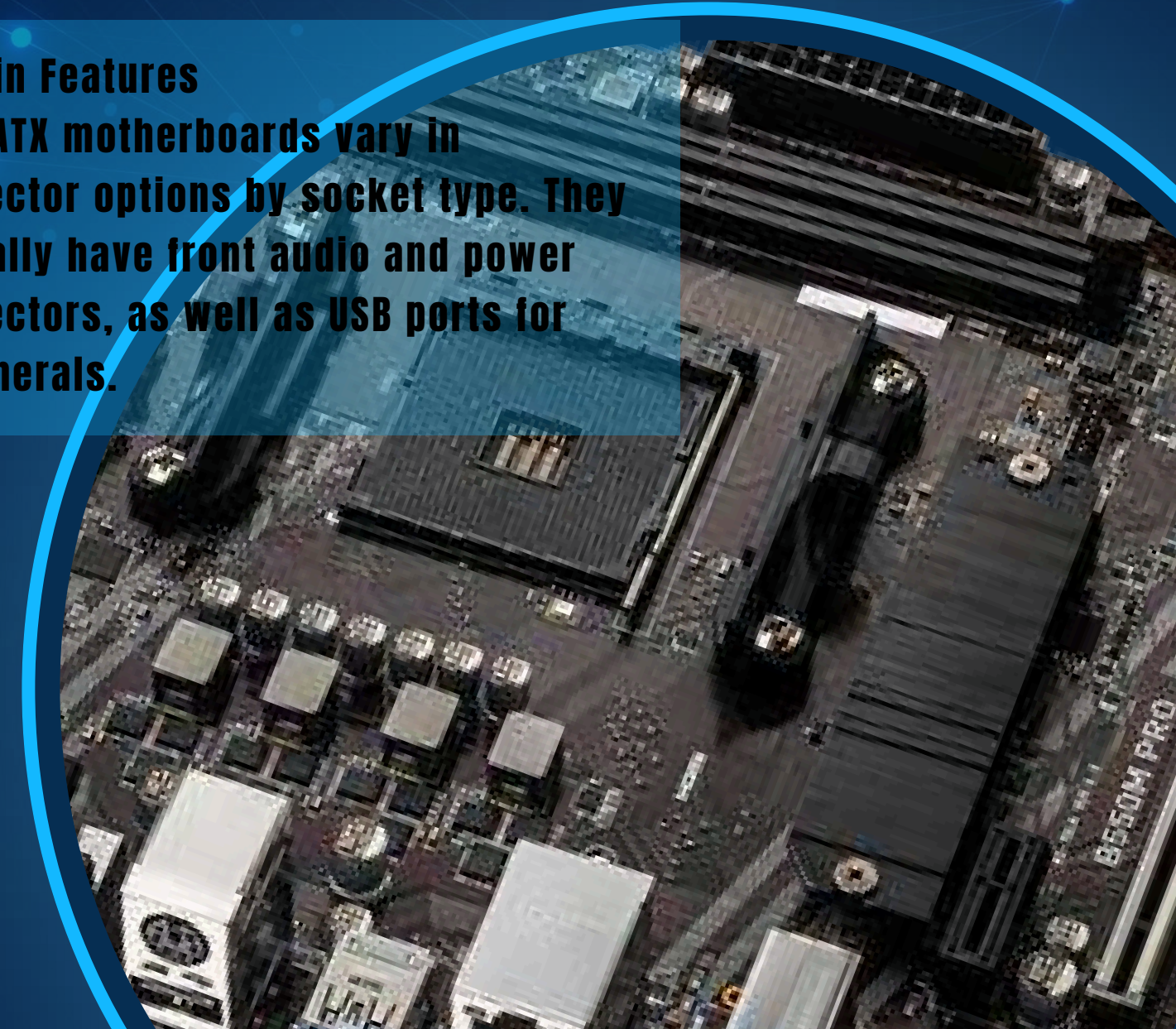
Mini-ATX motherboards vary in connector options by socket type. They typically have front audio and power connectors, as well as USB ports for peripherals.

## Memory Slots

Varies by Chipset

## PCI Slots

Mini-ATX motherboards typically have fewer PCIe slots compared to ATX boards.





# Pico BTX Motherboard



## Build

Pico BTX motherboards are small form factor motherboards with limited expansion slots, suitable for digital applications with modest hardware requirements.

## Chipset

Pico BTX motherboards use UEFI and have integrated northbridge and southbridge chips. The northbridge handles CPU communication, while the southbridge controls peripheral devices.

## CPU Slots

Pico BTX motherboards are smaller than mITX and typically support modern processors. They usually have limited RAM slots compared to larger form factors.

## BIOS

Pico BTX motherboards have limited PCI Express and PCI slots. They use firmware stored on the board for boot instructions and allow users to configure system settings.

## SATA

Pico BTX motherboards often have integrated I/O, onboard sound, and networking. They typically have fewer SATA ports compared to larger form factors.

## Memory Slots Varies by Chipset

## PCI Slots

Pico BTX motherboards have limited expansion options due to their small size.

## Built-in Features

Pico BTX motherboards vary in connector options by socket type. They typically have front audio and power connectors, as well as USB ports for peripherals.



# Standard ATX Motherboard

## Build

ATX is a more compact and standardized version of the AT motherboard, introduced by Intel in the 1990s. It offers improved component interchangeability and advanced connection technologies.

## CPU Slots

ATX motherboards support modern processors and typically have 4 RAM slots. The specific socket type determines the compatible processors.

## PCI Slots

Typically has 4 to 7 PCIe slots

## Memory Slots Varies by Chipset

## Chipset

ATX motherboards use either UEFI or Legacy BIOS. They have integrated northbridge and southbridge chips. The northbridge handles CPU communication, while the southbridge controls peripheral devices.

## SATA

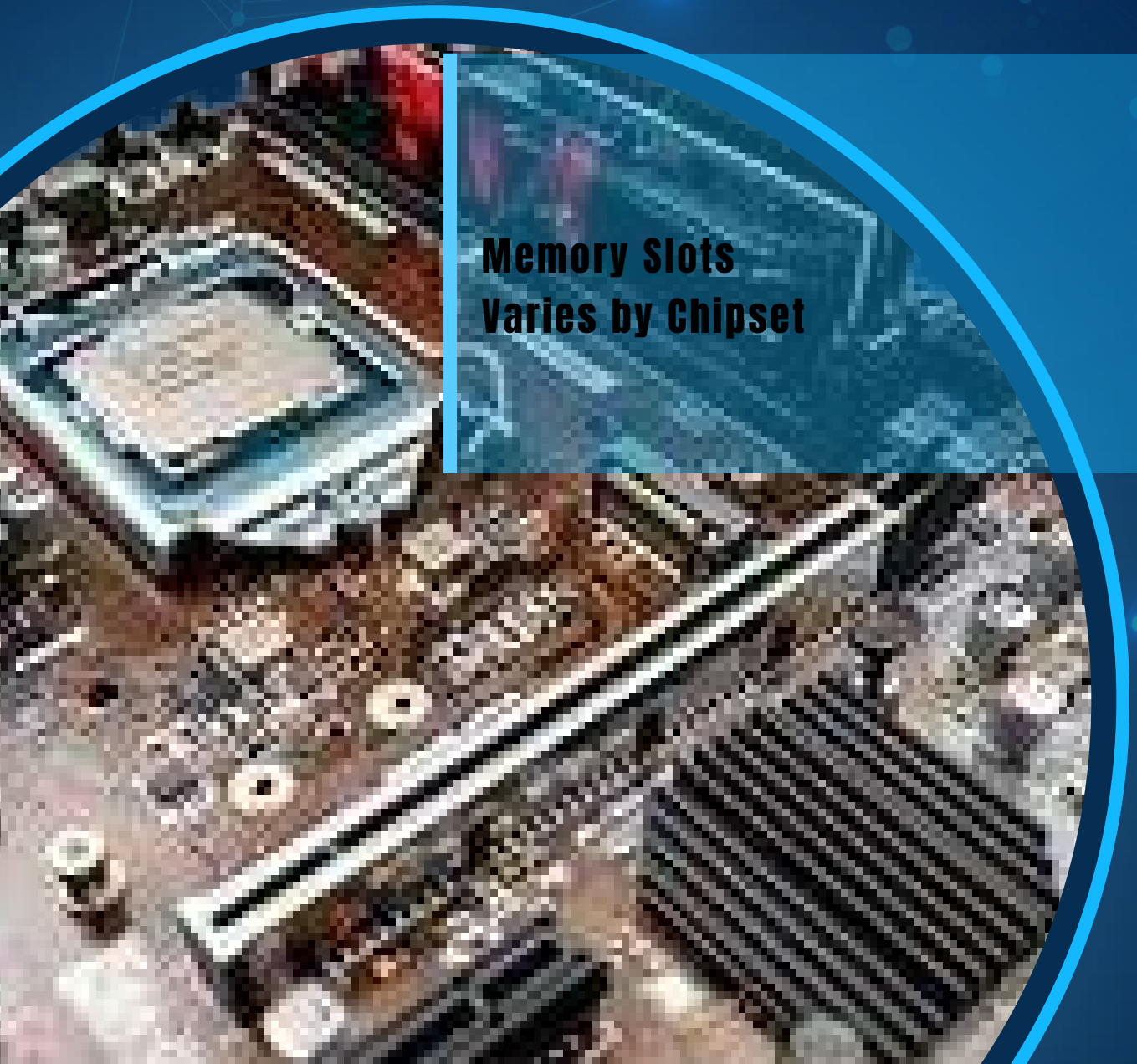
ATX motherboards often have integrated I/O, onboard sound, and networking. They typically have 4 to 12 SATA ports for storage devices.

## BIOS

ATX motherboards have multiple PCI Express and PCI slots. They use firmware stored on the board for boot instructions and allow users to configure system settings.

## Built-in Features

ATX motherboards vary in connector options by socket type. They typically have front audio and power connectors, as well as USB ports for peripherals.







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**Thank  
You!**