

ITC PORTFOLIO NUMBER 5

COMPARATIVE STUDY ON DIFFERENT TYPES OF MOTHERBOARDS

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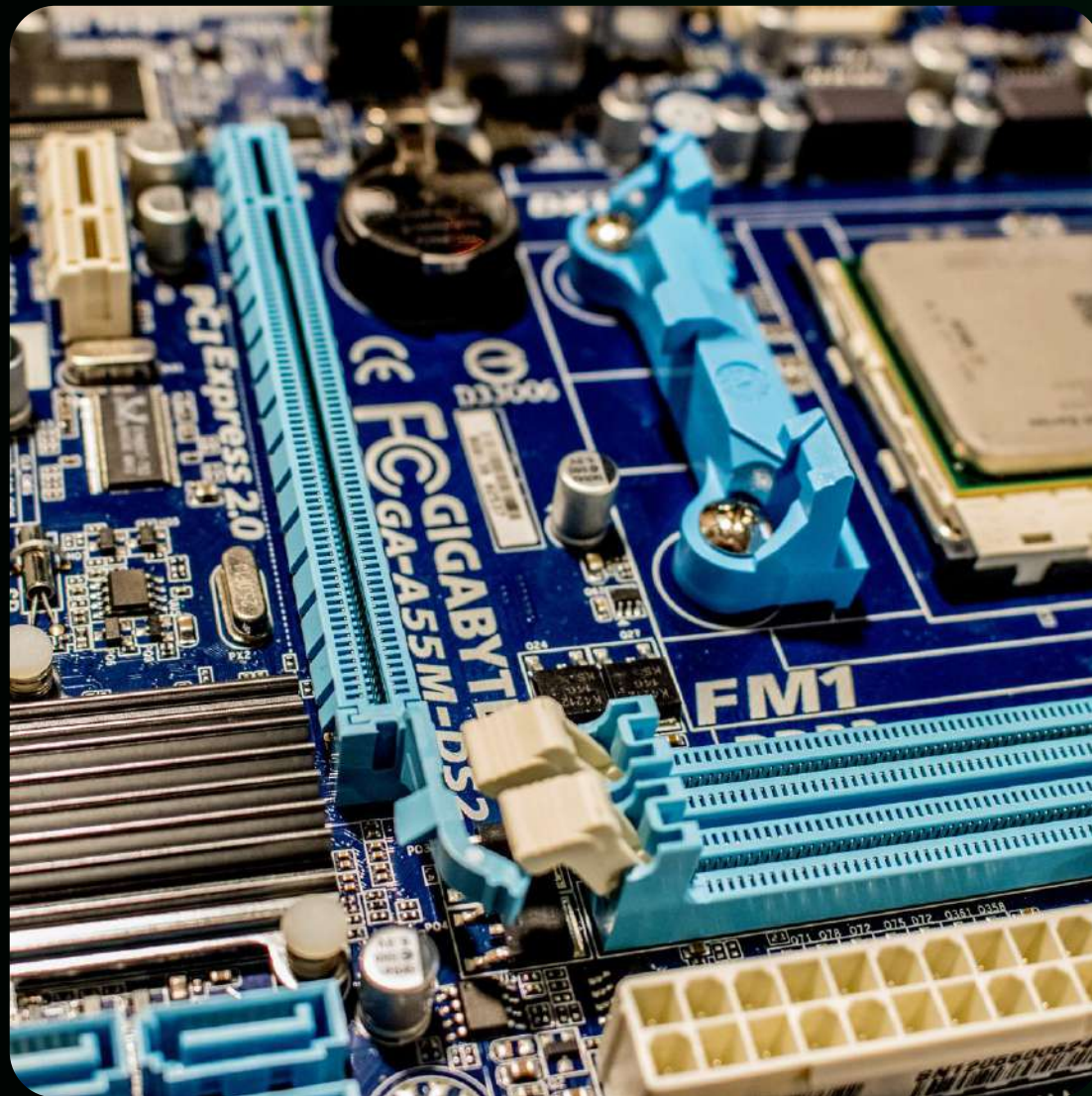
1

TABLE OF CONTENTS

- What is a motherboard?
 - › Functions of motherboard
 - › Key Components of motherboard
- Types of Motherboard
- Conclusion
- References



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WHAT IS MOTHERBOARD?

A [motherboard](#) is the main printed circuit board ([PCB](#)) in a computer. The motherboard is a computer's central communications backbone connectivity point, through which all components and external peripherals connect.

Motherboards can be found in virtually all computers, especially desktop and laptop PCs. The components that connect through them include chipsets, central processing units ([CPU](#)) and memory. The external peripherals include Wi-Fi, Ethernet and graphics cards with the graphics processing unit, or GPU.



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FUNCTIONS OF MOTHERBOARD

The functions of a computer motherboard are as follows:

- The motherboard acts as the central backbone of a computer on which other modular parts are installed such as the CPU, RAM and hard disks.
- The motherboard also acts as the platform on which various expansion slots are available to install other devices / interfaces.
- The motherboard is also responsible to distribute power to the various components of the computer.
- They are also used in the coordination of the various devices in the computer and maintain an interface among them.
- Some of the Sizes in which the motherboards are available are : BTX, ATX, mini-ATX, micro-ATX, LPX, NLX etc..

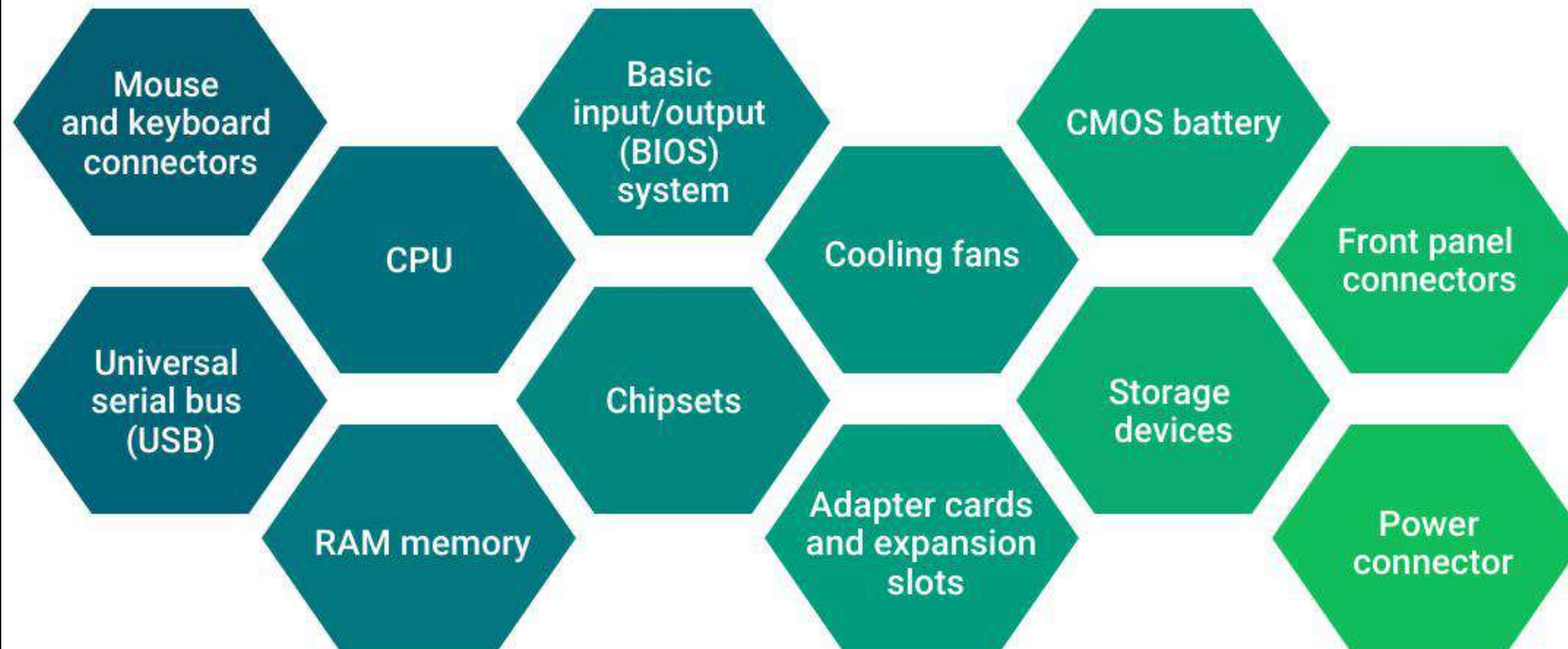


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Key Components of a Motherboard



TYPES OF MOTHERBOARD

- AT Motherboard
- ATX Motherboard
- BTX Motherboard
- Extended-ATX Motherboard
- LPX Motherboard
- Micro-ATX Motherboard
- Mini ITX Motherboard
- Mini-ATX Motherboard
- Pico BTX Motherboard
- Standard-ATX Motherboard

Form Factor	Build	CPU Slots	Memory Slots	Chipsets	BIOS	PCI Slots	SATA	Built-in Features
AT Motherboard	<ul style="list-style-type: none">➤ AT motherboards were popular in personal computers in the 1980s. AT stands for Advanced Technical. These motherboards were a specific size and shape, fitting only in AT computer cases. They measured 305 mm by 280 mm. On an AT motherboard, you'd find a big power connector and several slots for extra parts along the bottom edge. The processor (the computer's brain) connected in the top right corner. Memory slots were next to the processor. AT motherboards used a system called ISA for adding new parts to the computer. Compared to today's motherboards, AT boards had fewer connectors and ports. They were simpler.	<ul style="list-style-type: none">➤ Socket 7: This socket was commonly used for Intel 486 and early Pentium processors.➤ Socket 8: A later socket designed for Pentium processors.	<ul style="list-style-type: none">➤ SIMM (Single In-line Memory Module) Slots: These were the primary memory modules used in AT systems, typically in 72-pin or 30-pin configurations.	<ul style="list-style-type: none">➤ ISA (Industry Standard Architecture) Chipset: This chipset handled the system bus, memory, and I/O operations. It was the backbone of AT motherboards.	<ul style="list-style-type: none">➤ Award BIOS or Phoenix BIOS: These were the most common BIOS implementations for AT motherboards, providing essential system initialization and configuration functions.	<ul style="list-style-type: none">➤ PCI (Peripheral Component Interconnect) Slots: These expansion slots were used for various devices like sound cards, network cards, and graphics cards.	<ul style="list-style-type: none">➤ IDE (Integrated Drive Electronics): AT motherboards primarily used IDE interfaces for hard drives and CD-ROM drives. SATA (Serial ATA) was not widely adopted until later.	<ul style="list-style-type: none">➤ PS/2 Ports: These ports were used for keyboard and mouse connections.➤ Serial and Parallel Ports: These ports were used for connecting various devices like printers, modems, and external drives.➤ Floppy Disk Drive Connector: This connector was used for floppy disk drives.

Form Factor	Build	CPU Slots	Memory Slots	Chipsets	BIOS	PCI Slots	SATA	Built-in Features
ATX Motherboard	<ul style="list-style-type: none"> ➤ ATX motherboards are modern computers' advanced version of older AT motherboards, measuring 305 mm by 244 mm. They feature a larger power connector, larger slots for extra parts, and better power management. They work with newer processors and faster memory, have more slots for adding parts, and come with built-in support for USB ports. ATX motherboards are designed to make computers work better and be easier to use. 	<ul style="list-style-type: none"> ➤ Socket LGA 1700: For Intel's 12th, 13th, and 14th generation Core processors. ➤ Socket AM5: For AMD's Ryzen 7000 series processors. 	<ul style="list-style-type: none"> ➤ DDR5 DIMM Slots: These are the most common memory slots for modern ATX motherboards, supporting high-speed DDR5 memory. 	<ul style="list-style-type: none"> ➤ Intel Z790, B760, H770: These chipsets are used with Intel's 13th generation Core processors. ➤ AMD X670E, B650E, X670, B650: These chipsets are used with AMD's Ryzen 7000 series processors. 	<ul style="list-style-type: none"> ➤ UEFI (Unified Extensible Firmware Interface): Modern ATX motherboards use UEFI, a more advanced and user-friendly BIOS interface. 	<p>PCIe (PCI Express) Slots: These slots are used for high-speed expansion cards, such as graphics cards, network cards, and sound cards.</p>	<ul style="list-style-type: none"> ➤ SATA Ports: These ports are used for connecting SATA hard drives and SSDs. ➤ M.2 Slots: These slots support high-speed NVMe SSDs. 	<ul style="list-style-type: none"> ➤ USB Ports: USB 3.2 Gen 2x2 and USB 4.0 ports for high-speed data transfer. ➤ Wi-Fi and Bluetooth: Integrated wireless connectivity. ➤ Audio Jacks: For headphones, microphones, and speakers. ➤ Ethernet Port: For wired network connections. ➤ RGB Headers: For connecting RGB lighting strips and fans.

Form Factor	Build	CPU Slots	Memory Slots	Chipsets	BIOS	PCI Slots	SATA	Built-in Features
BTX Motherboard	<ul style="list-style-type: none"> ➤ BTX (Balanced Technology Extended) is a motherboard form factor designed to improve airflow and cooling efficiency compared to the traditional ATX form factor. 	<ul style="list-style-type: none"> ➤ Socket Type: BTX motherboards typically supported Intel's LGA775 socket for Pentium 4 processors. Later models might have supported other sockets, but LGA775 was prevalent during the BTX era. 	<ul style="list-style-type: none"> ➤ DIMM Slots: BTX motherboards usually had 4 DIMM slots for DDR or DDR2 RAM. ➤ Memory Configuration: Dual-channel memory configuration was common, optimizing performance and allowing for flexible memory upgrades. 	<ul style="list-style-type: none"> ➤ Intel Chipsets: Intel chipsets like the i915 and i925X were popular choices for BTX motherboards. These chipsets provided support for various features like PCI Express, SATA, and USB. 	<ul style="list-style-type: none"> ➤ UEFI or Legacy BIOS: BTX motherboards could have either a traditional BIOS or a more advanced UEFI BIOS. UEFI offered a graphical interface and more advanced features. ➤ BIOS Features: Essential BIOS features included overclocking options, boot priority settings, and hardware monitoring. 	<ul style="list-style-type: none"> ➤ PCI Express Slots: BTX motherboards typically had multiple PCI Express slots, including one or two x16 slots for high-performance graphics cards and several x1 slots for expansion cards. ➤ PCI Slots: Some BTX motherboards also included legacy PCI slots for older expansion cards. 	<ul style="list-style-type: none"> ➤ SATA Ports: BTX motherboards usually had several SATA ports for connecting hard drives and SSDs. ➤ SATA RAID: Some motherboards supported SATA RAID configurations for improved performance and data redundancy. 	<ul style="list-style-type: none"> ➤ Integrated I/O: BTX motherboards commonly integrated I/O ports like USB, audio, and network directly onto the motherboard. ➤ Onboard Sound: Many BTX motherboards had onboard sound capabilities, often powered by a dedicated audio codec. ➤ Onboard Networking: Integrated network controllers, typically Gigabit Ethernet, were common on BTX motherboards.
Extended-ATX Motherboard	LGA775 (primarily)	4 DIMM	Intel i915, i925X	Legacy BIOS	Multiple PCI Express, PCI	Multiple	Integrated I/O, Onboard sound, Onboard networking	LGA775 (primarily)
LPX Motherboard	Varies by socket	Varies by socket	Varies by chipset	UEFI or Legacy	Multiple PCI Express, PCI	Multiple	Integrated I/O, Onboard sound, Onboard networking	Varies by socket
Micro-ATX Motherboard	Varies by socket	Varies by socket	Varies by chipset	UEFI or Legacy	Multiple PCI Express, PCI	Multiple	Integrated I/O, Onboard sound, Onboard networking	Varies by socket

Form Factor	Build	CPU Slots	Memory Slots	Chipsets	BIOS	PCI Slots	SATA	Built-in Features
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Mini ITX Motherboard	Varies by socket	Fewer than ATX	Varies by chipset	UEFI or Legacy	Fewer PCI Express, PCI	Fewer	Integrated I/O, Onboard sound, Onboard networking	Varies by socket
Mini-ATX Motherboard	Varies by socket	Fewer than mATX	Varies by chipset	UEFI	Limited PCI Express, PCI	Fewer	Integrated I/O, Onboard sound, Onboard networking	Varies by socket
Pico BTX Motherboard	Varies by socket	Fewer than mITX	Varies by chipset	UEFI	Limited PCI Express, PCI	Fewer	Integrated I/O, Onboard sound, Onboard networking	Varies by socket
Standard-ATX Motherboard	Varies by socket	Varies by socket	Varies by chipset	UEFI or Legacy	Multiple PCI Express, PCI	Multiple	Integrated I/O, Onboard sound, Onboard networking	Varies by socket

Conclusion

Motherboards serve as the foundation of every computer system, giving all other parts a place to interact and work together. Motherboard technology has advanced dramatically over time, giving rise to a variety of form factors and functionalities. By understanding the characteristics of different form factors, users can select the most suitable motherboard for their specific needs, whether it's a high-performance gaming rig, a compact home theater PC, or a low-power server.

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