

# Comparative Study on Different Types of Motherboards

## Introduction:

The motherboard is in some ways like the backbone or nervous system of every PC build. Nearly everything in your PC either plugs into your motherboard or plugs into something that plugs into your motherboard. The motherboard's form factor (typically E-ATX, ATX, Micro ATX, or Mini-ITX) also dictates the size of the PC case you'll need to use. And, at least just as importantly, the socket and chipset determine which processors you can install in your CPU socket.

## Discussion:

If the memory, graphics card, and CPU are the vibrant limbs of your PC, the motherboard acts as its skeleton, connective tissue, and circulatory system—keeping everything connected and functioning smoothly. In some ways, it's even the soul of your system, tying everything together for optimal performance.

Motherboards come in different sizes, known as form factors, to meet varying needs and fit in different PC cases. The most common include:

1. **ATX (Advanced Technology Extended):** Measuring 12 x 9.6 inches, ATX is the standard motherboard size and provides extensive features, including multiple PCIe slots for GPUs and M.2 storage. It's ideal for high-performance builds, such as gaming PCs, due to its size, which accommodates advanced cooling solutions like liquid cooling and supports future upgrades with additional RAM and storage. ATX is commonly used in full-sized desktop PCs, offering versatility and ample expansion options.
2. **Micro-ATX:** Slightly smaller at 9.6 x 9.6 inches, this form factor retains much of the ATX's functionality but with fewer PCIe slots and connectors. Micro-ATX is a good choice for compact systems where space is tight but performance is still a priority. While it has fewer RAM slots and a bit less airflow, these limitations can

be addressed with aftermarket cooling solutions. It's often used in budget builds, office PCs, or smaller gaming setups that need to balance size and power.

3. **Mini-ITX:** At just 6.7 x 6.7 inches, Mini-ITX is designed for ultra-compact builds, like home theater PCs (HTPCs) or portable systems. Despite its small size, it can still support modern processors and components, with some boards featuring VRM cooling for the CPU and a single PCIe slot for a GPU. However, its limited space can make it harder to include advanced cooling systems or multiple storage devices. Mini-ITX is ideal for minimalist builds that prioritize portability over expandability.

While these motherboard sizes are backward compatible with cases designed for larger boards, smaller motherboards tend to come with fewer features and reduced cooling capacity. As a result, they are better suited for use cases that emphasize space-saving or portability. Additionally, it's important to consider the power supply requirements, as smaller boards may need supplies with fewer connectors.

Table :

Form Factor	Build	CPU Slots	Memory Slots	Chipsets	BIOS	PCI Slots	SATA	Built-in Features
AT Motherboard	Obsolete, larger design used in older PCs	1	2-4	Basic, early chipsets	Legacy BIOS	Limited	Limited support	Basic, no advanced features
ATX Motherboard	Standard size for most desktop PCs (12 x 9.6 inches)	1	4-8	Wide range, supports modern CPUs	UEFI or Legacy BIOS	4-7	4-6 SATA ports	USB, Ethernet, M.2 slots, expansion options
BTX Motherboard	Designed for better thermal management;	1	2-4	Limited, fewer options	Legacy BIOS	2-4	2-4 SATA ports	Improved airflow

	now mostly obsolete							
Extended-ATX	Larger than ATX (12 x 13 inches), used for workstations or servers	1	8+	High-end chipsets	UEFI	7-8	6+ SATA ports	Advanced cooling, multiple GPUs
LPX Motherboard	Used in slimline desktop cases, obsolete	1	1-2	Basic	Legacy BIOS	2	Limited support	Integrated graphics, compact design
Micro-ATX Motherboard	Smaller than ATX (9.6 x 9.6 inches), compact	1	2-4	Moderate range, modern CPUs	UEFI or Legacy BIOS	2-4	2-4 SATA ports	Compact, affordable, expansion options
Mini ITX Motherboard	Very small (6.7 x 6.7 inches), for compact builds	1	2	Limited	UEFI	1-2	2 SATA ports	Wi-Fi, Bluetooth, compact cooling options
Mini-ATX Motherboard	Rare, compact, and smaller than Micro-ATX	1	2	Limited	Legacy BIOS	1	2 SATA ports	Compact design
Pico BTX Motherboard	Extremely compact version of BTX, very rare	1	1-2	Very limited	Legacy BIOS	1	1-2 SATA ports	Compact design for specific applications
Standard-ATX Motherboard	General term for ATX-size motherboards, common for desktops	1	4-8	Wide range of options	UEFI	4-7	4-6 SATA ports	Advanced cooling, USB ports

## References

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