

PORTFOLIO #5

Comparative Study on Different Types of Motherboards

Introduction:

The motherboard is the computer's heart, but it is also the most overlooked piece of hardware. The motherboard's primary function is to connect all components of a computer, such as memory, CPU, disks, and other devices, in a more efficient and speedier manner. Unlike other hardware components, the development of the motherboard is distinctive and has a significant impact on the market. While other components were designed independently, whether these devices operate together is determined by the motherboard's development (Tomljanovic & Kurelovic, 2013). Think of a motherboard as the central nervous system of your computer. It's a large circuit board that houses the CPU, RAM, storage drives, and expansion cards. It also provides connections for peripherals like keyboards, mice, and monitors. (Jake T. 2024).

This critical component of the modern PC plays an important role in keeping your computer running. The motherboard is the backbone that ties the computer's components together at one spot and allows them to talk to each other. Without it, none of the computer pieces, such as the CPU, GPU, or hard drive, could interact. Total motherboard functionality is necessary for a computer to work well. If your motherboard is on the fritz, expect some big problems (Knerl, 2019).

Discussion:

1. AT Motherboard

- The AT (Advanced Technology) motherboard was one of the first widely used motherboard standards in personal computing. Introduced in the 1980s, it is now obsolete but laid the groundwork for modern designs.
 - Simplicity in design for basic computing.
 - It has a Bulky size, limited slots for memory and peripherals, no support for modern interfaces like PCIe or SATA.
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2. ATX Motherboard

- The ATX (Advanced Technology Extended) motherboard is the most popular form factor for modern PCs. It offers a balance of size, compatibility, and expandability, making it suitable for general-purpose and gaming systems.
 - Multiple PCIe slots, ample memory slots, compatibility with a wide range of hardware, and robust power delivery.
 - Larger size can limit use in compact cases.
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3. BTX Motherboard

- BTX (Balanced Technology Extended) motherboards were introduced by Intel as an alternative to ATX to address thermal management issues. However, they saw limited adoption.
 - Optimized airflow and cooling layout.
 - Lack of widespread support, making them uncommon in modern systems.
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4. Extended-ATX (E-ATX) Motherboard

- E-ATX motherboards are larger than standard ATX and are typically used in high-end gaming PCs or workstations requiring additional slots and power.
 - Extra expansion slots, high memory capacity, and better power delivery for demanding tasks like rendering or gaming.
 - Expensive and requires large cases.
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5. LPX Motherboard

- LPX (Low Profile Extended) motherboards were designed for compact and slimline desktop systems.
 - Compact design suitable for space-saving PCs.
 - Limited expandability and reliance on riser cards for additional slots.
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6. Micro-ATX Motherboard

- Micro-ATX motherboards are a smaller variant of ATX, offering a balance between size and functionality.
- Compact and affordable while retaining compatibility with most hardware.
- Fewer PCIe and memory slots compared to standard ATX.

7. Mini-ITX Motherboard

- Mini-ITX motherboards are ultra-compact and designed for small form factor (SFF) PCs, such as home theater PCs (HTPCs) or portable systems.
- Space-saving, low power consumption, and minimalistic design.
- Limited expansion slots and reduced memory capacity.

8. Pico-BTX Motherboard

- Pico-BTX is the smallest variant of the BTX family, designed for ultra-compact systems.
- Ideal for space-constrained setups.
- Minimal expandability, now largely replaced by Mini-ITX.

9. Mini-ATX Motherboard

- Mini-ATX motherboards sit between Micro-ATX and Mini-ITX in terms of size and functionality.
- Smaller footprint while retaining moderate expandability.
- Less common, making compatibility with cases and components a potential challenge.

10. Standard-ATX Motherboard

- Standard-ATX motherboards offer versatility and are a default choice for most desktop builds.
- Widely supported, affordable, and feature-rich for general-purpose and enthusiast systems.
- May not be ideal for compact or extremely high-performance setups.

Key Factors to Consider When Choosing a Motherboard (Jeremy, L. 2024)

1. Cost
2. CPU
3. CPU socket
4. Form factor and case
5. Expansion ports
6. Built-in ports
7. RAM (memory)

TABLE

Form Factor	Build	CPU Slots	Memory Slots	Chipsets	BIOS/UEFI	PCI Slots	SATA	Builtin Features
AT Motherboard	12 x 13.8in or 304 x 350mm	1-2	2-4	AMD Chipsets	BIOS	3	2-4	Basic features, Limited I/O ports, legacy interfaces (serial, parallel ports). BIOS chip
ATX Motherboard	12 x 9.6in or 305 x 244mm	1	4	Intel (Z-series, H-series, B-series), AMD Chipset	UEFI	4-7	6-12	Standard features, Integrated I/O ports (USB, audio, and Ethernet) 20/24-pin power connector; supports modern PSUs. UEFI chip
BTX Motherboard	12.8in or 325mm	1	4	Intel 900 and 3000 Chipset	UEFI	2-3	4	Similar to ATX but rearranged for thermal optimization, Uses a 24-pin ATX connector, UEFI chip
Extended-ATX Motherboard	12 x 13in ot 304 × 330.2 mm	1-4	8-16	High-end Chipsets	UEFI	5-8	6-16	Additional USB, SATA, and power connectors, 24-pin ATX, and UEFI Chip
LPX Motherboard	Slimmer desktop design	1	2	Legacy Chipset	BIOS	1-2	2	Ribbon cables for I/O; riser cards for expansion slots, Limited due to space constraints, and BIOS chip
Micro-ATX Motherboard	9.6 x 9.6in or 244 x 244mm	1	4	Intel (H-series, B-series) and AMD (A/B-series)	UEFI	2-4	4-8	Reduced number of I/O ports compared to ATX, Fewer PCIe slots; ideal for budget and compact builds, Compact cooling designs due to limited space, UEFI Chip

Mini ITX Motherboard	6.7 x 6.7in or 170 x 170mm	1	2	Intel Atom or AMD Ryzen	UEFI	1	2-6	Fewer I/O ports, typically limited to essentials, One PCIe slot; designed for minimalistic builds, UEFI Chip
Mini-ATX Motherboard	11.2 x 8.2in or 284.5 x 208mm	1	2	Low-power Chipsets	UEFI	2	2	Moderate number of USB, audio, and video ports, Fewer PCIe slots than ATX but more than Mini-ITX, UEFI Chip
Pico BTX Motherboard	10.4in wide	1	1-2	Intel Chipset	UEFI	1	2	Simplified I/O for compact systems, Minimal; designed for embedded or niche systems, Optimized for low-power, small systems, UEFI Chip
Standard-ATX Motherboard	Typical ATX size: 12 x 9.6in or 305 x 244mm	1	4-8	Intel Z-series or AMD X-series	UEFI	3-6	6-8	Balanced I/O layout with standard USB, Ethernet, and audio ports, Modern 24-pin power connector, Multiple PCIe slots for a variety of components, UEFI Chip

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