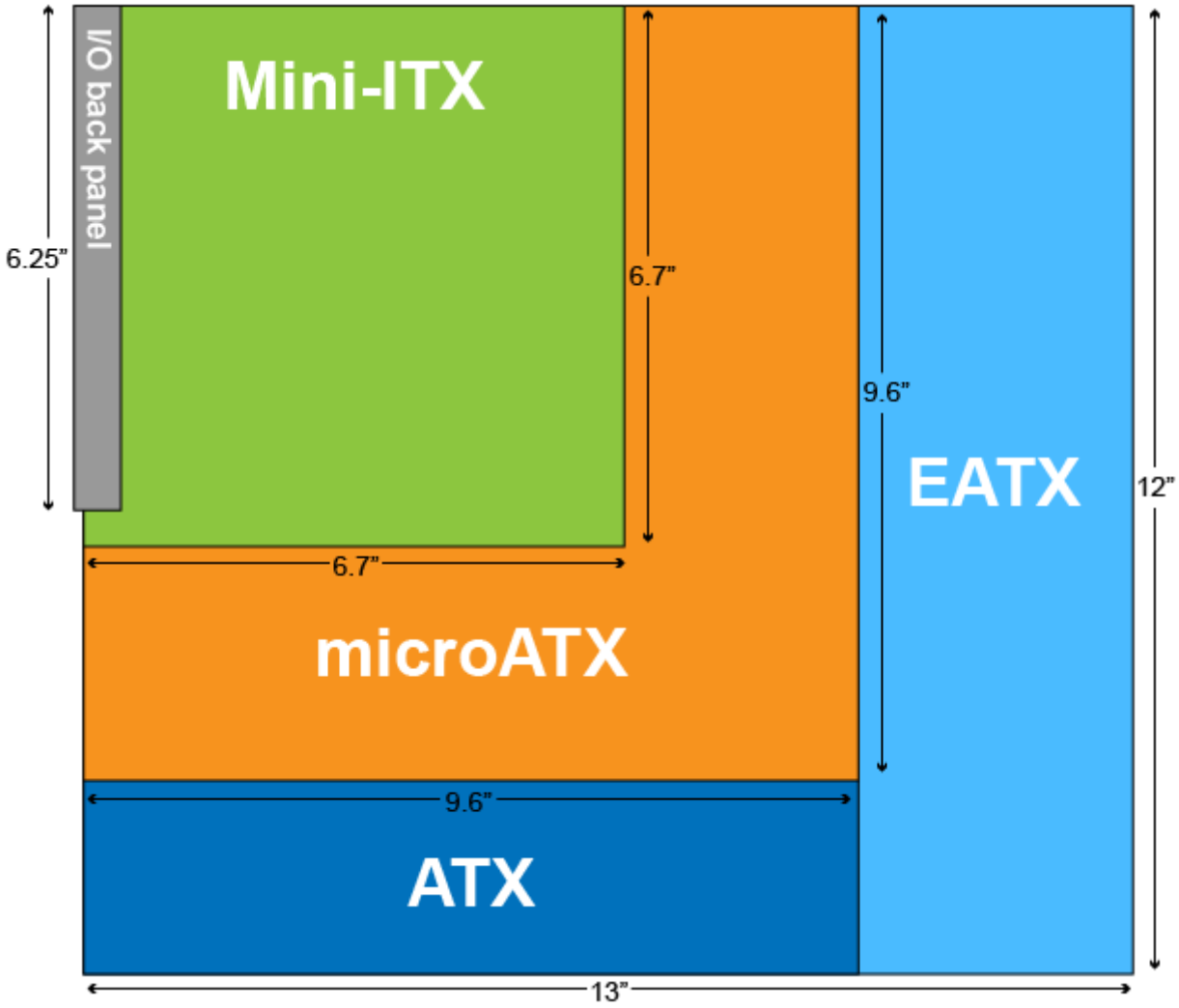
3.1.2 System Case Facts

Motherboards adhere to design specifications called form factors. The form factor determines the physical characteristics of a motherboard, including its dimensions, number of expansion slots, and mounting hole locations, as well as the back panel dimensions, arrangement, and orientation. The following graphic and table describe the characteristics of the most common motherboard form factors:



Form Factor	Characteristics

ATX	The ATX (advanced technology extended) form factor is the most commonly used form factor. Because of its popularity, several variants of the ATX form factor exist. Each variant has different specifications for dimensions and number of expansion slots. However, all ATX variants share the following characteristics:
	▪ Back plate measurements (6.25" × 1.75")
	▪ Power supply specifications:
	  ▪ 24-pin ATX power connector
	  ▪ On/off switch runs from the case to the motherboard
	  ▪ Soft-power control (OS can turn the computer off)
	▪ Expansion slot locations and spacing (0.8" between slots)
	▪ Mounting hole locations

- CPU location (top of board near power supply)

Below are the most common ATX variants and their unique characteristics:

Standard ATX	The standard ATX form factor is the form factor that all other variants are modeled after. ATX motherboards: ▪ Measure 12" × 9.6" ▪ Have up to seven expansion slots ▪ Have between six and nine mounting holes
Extended ATX (EATX)	The EATX form factor is the largest ATX variant. EATX: ▪ Measures 12" × 13" ▪ Typically uses extra space for additional memory slots
microATX	The microATX form factor is a smaller version of the ATX form factor. The microATX form factor: ▪ Measures 9.6" × 9.6" ▪ Has four expansion slots

ITX

The ITX form factor was designed for low-power, small form factor (SFF) computers. The most common ITX form factor is the Mini-ITX form factor. The Mini-ITX form factor:

- Specifies a maximum motherboard size of 6.7" × 6.7"
- Has only one expansion slot
- Allows for small (100 watt) power supplies
- Is typically used with a home theater PC (HTPC)

Other ITX form factors include the following:

- Nano-ITX (4.7" × 4.7")
- Pico-ITX (3.9" × 2.85")
- Mobile-ITX (2.9" × 1.7")

The Mini-ITX form factor uses the same mounting locations and back panel specifications as the ATX form factor, allowing Mini-ITX motherboards to fit in ATX cases.

NLX

NLX (new low profile extended) is an old form factor that was designed for use in slimline desktop computers. NLX:

- Uses a detachable riser card to provide expansion slots (the motherboard itself has no expansion slots).
- Allows the motherboard to slide in or out of the system case easily.
- Was replaced by microATX and Mini-ITX.

BTX

The BTX (balanced technology extended) form factor was designed as a replacement for the ATX form factor. However, it did not gain widespread adoption. With BTX:

- The CPU is positioned in such a way that air flow is increased.

- There is no heatsink fan. Instead, a thermal module or shroud fits over the CPU to move heat directly out of the system.
- The back panel orientation and mounting location is reversed.

BTX was implemented mainly by computer manufacturers such as Dell.

Computer cases are designed to fit motherboard form factors. The following table describes the most common types of computer cases:

Type	Description
ATX Full-tower	ATX full-tower cases are the largest computer cases. Full-tower cases have a lot of space for external and internal components. ATX full-tower cases are compatible with the following form factors: ▪ Standard ATX ▪ EATX ▪ microATX
ATX Mid-tower	ATX mid-tower cases are slightly smaller than full-tower cases. Mid-tower cases have fewer external and internal bays. ATX mid-tower cases are compatible with the following form factors: ▪ Standard ATX ▪ microATX ▪ Mini-ITX ▪ EATX (some)
microATX Tower	microATX towers are smaller cases designed to be placed on desktops. microATX towers typically have only one drive bay and are compatible with the following form factors: ▪ microATX ▪ Mini-ITX Some microATX towers have a slim design. These cases are typically half the width of a microATX tower and are designed to lie flat or upright.
Mini-ITX Tower	Mini-ITX towers are designed to house mini-ITX motherboards. They are typically smaller than microATX towers.
HTPC	Home theatre PC (HTPC) cases are designed to connect to TVs and be used as a home media computer. HTPC cases are compatible with microATX and Mini-ITX form factors.
Notebook	Notebook cases are generally proprietary and often vary among models.

Some small form factor cases (e.g., microATX and Mini-ITX towers) use riser cards for installing expansion boards. Riser cards are installed in an expansion slot and allow the expansion board to be installed parallel to the motherboard, instead of perpendicular.

When you purchase a computer case, it will usually come with the following components::

- Computer case
- Power supply (although the power supply might also be separate)
- Case fans
- Plastic or rubber feet that attach to the bottom of the case
- Metal screws and standoffs for attaching the motherboard
- Additional external connectors (such as audio, USB, and FireWire) that connect to motherboard headers