

Difference between NVMe, SATA and M.2 SSDs

SSD terms can be confusing to beginners. There are many different terms used, including NVMe, SATA and M.2, which are confusing.

The following article will detail the differences between NVMe, SATA, and M.2 SSDs so you can make an informed decision when purchasing a new SSD.

Explanation of two popular interfaces NVMe and SATA

When shopping for a new SSD, you will likely encounter these two terms: NVMe SSD and SATA SSD. But what are they and what makes these two terms different?

In short, NVMe (Non-Volatile Memory Express) and SATA (Serial ATA) are the interfaces between the SSD and the rest of the computer. SATA was born in 2003 and plays an important role in helping modern HDDs increase data transfer speeds. SATA is then used in SSDs to communicate between the drive and the rest of the system. Therefore, there are SATA HDD and SATA SSD.

On the other hand, NVMe is a newer interface created specifically for SSDs. NVMe SSDs use the Peripheral Component Interconnect Express bus (referred to as PCIe), a versatile interface standard found on the motherboard to connect high-speed components such as graphics cards and SSDs. PCIe is also used to connect other components such as network cards.



In the context of storage interfaces, there are two main protocols: AHCI (Advanced Host Controller Interface) and NVMe (Non-Volatile Memory Express). AHCI is an older protocol designed for use with SATA devices, including early HDDs and SSDs. On the other hand, NVMe is a new and more efficient protocol created specifically for SSDs using the PCIe interface, offering significantly better performance and lower latency.

NVMe delivers faster performance and is one of the main reasons why NVMe SSDs are more expensive than SATA SSDs of the same storage capacity. However, even though NVMe SSDs are faster, there are still reasons why you should stick with SATA SSDs instead of going straight to the NVMe standard.

Depending on the interface used, you will see SSDs labeled as SATA or PCIe. There are many different factors to consider when choosing between SATA and PCIe SSDs. As mentioned earlier, PCIe SSDs can use older AHCI drivers or newer NVMe drivers. But if speed is all you care about, then choose NVMe over a PCIe SSD with AHCI drivers. For example, Crucial's T700 PCIe 5.0 M.2 SSD offers read speeds of up to 12.4GB/s.

Also, keep in mind that the maximum transfer speed varies depending on the PCIe generation. The following is a summary of the differences between NVMe and SATA:

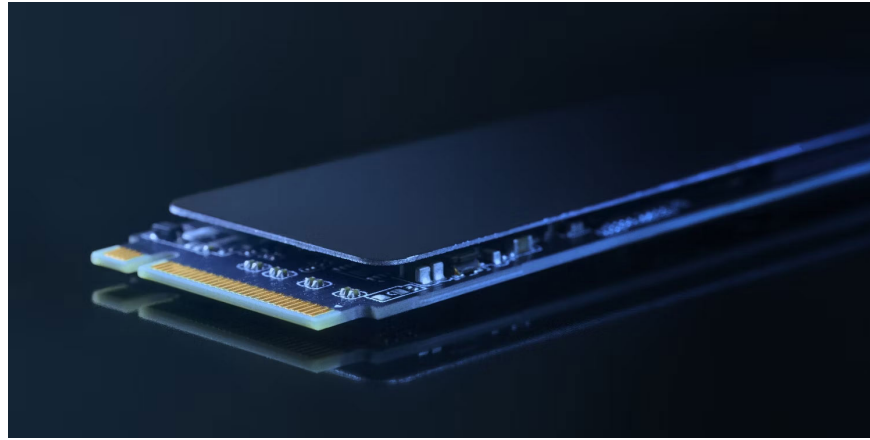
Features	NVMe	SATA
Interface Type	PCIe (Peripheral Component Interconnect Express)	Serial ATA (AHCI protocol)
Data transmission speed	At least 10GB/s (PCIe 5.0)	Up to 600MB/s (SATA III)
Latency	Lower latency due to direct PCIe connection	Higher latency due to AHCI overhead
Form factor	Add-in card M.2, U.2, PCIe	2.5", 3.5", M.2 (SATA)
Price	Usually more expensive	Generally more affordable
Application	Best for high performance tasks	Suitable for general use

M.2 is a form of SSD

In addition to NVMe and SATA, M.2 is also a popular term in the SSD space. But what is M.2 SSD?

Simply put, an M.2 SSD is an SSD in an M.2 form factor. M.2 is what was formerly known as Next Generation Form Factor (NGFF).

NVMe SSDs typically use M.2 form factors, but they can also be found in U.2 and as additional PCIe cards. SATA SSDs come in standard 2.5-inch forms and smaller and thinner M.2 forms. Additionally, they can also come in 3.5-inch forms, but these are much less common. Most modern SATA SSDs come in 2.5-inch form factors. You'll find M.2 SSDs in laptops, tablets, and ultra-slim mini PCs.



M.2 was developed by the International SATA Foundation and a group of industry companies. It is often referred to as a replacement for the mini Serial Advanced Technology Attachment (mSATA) SSD. Even though mSATA is old, you can still buy SSDs with existing interfaces, like the Leven JMS600 512GB mSATA SSD.

There are different types of M.2 SSDs, including SATA SSDs, PCIe NVMe SSDs, and PCIe AHCI SSDs. Remember that M.2 only tells about the style and doesn't tell you much about the interface used, which is just as important, if not more important.

You'll come across a lot of industry jargon when shopping for SSDs. However, don't let all that jargon confuse you. As detailed above, the main difference between NVMe SSD and SATA SSD is the interface used - NVMe SSD uses PCIe interface, while SATA SSD uses SATA interface.

On the other hand, M.2 is a form of SSD commonly used to integrate high-performance storage in high-end gaming rigs, ultraportable laptops, and tablets. You can get SATA and PCIe SSDs in M.2 form factors.

Often, these terms are combined. You'll see someone talking about their new M.2 NVMe SSD or M.2 SATA SSD. Just know that they are talking about the type of SSD and interface used.

You finished reading the article "**Difference between NVMe, SATA and M.2 SSDs**" edited by the [TipsMake](#) team. We hope this article has provided you with many useful tech tips and tricks. You can search for similar articles on tips and guides. Thank you for reading and for following us regularly.