The Micron 7300 and 7400 SSDs With NVMe™: Selecting the Right Solution for Your Needs




Whether your applications pull terabytes of data from disparate databases or you are building data center infrastructure to accommodate immense scale, planning and implementing a successful flash-first strategy is imperative.

This guide explores the feature differences between the Micron 7300 and 7400 SSDs. It will help you decide which of these SSDs is the best fit for your workloads.

Features to Focus On

NVM Express™ (NVMe) SSDs are the de facto standard for the data center, providing mainstream storage for the most demanding applications and workloads. The introduction of Micron's 7400 SSD builds on the success of the Micron 7300 SSD, broadening the benefits of Micron's NAND and SSD design and validation expertise through new form factors, next-generation PCIe interface and advanced security features.

When choosing an SSD with NVMe, there are a few primary areas on which to focus — both for your needs today and into the future:

Physical characteristics: Important features include form factor, height and power draw.

PCI Express (PCIe) generation: PCIe Gen4 supports double the throughput of PCIe Gen3. The actual workload differences depend on system configuration and IO patterns.

Capabilities: In addition to capacity, capabilities to consider include NVMe namespaces, endurance, performance (IOPS and MB/s) and enhanced security.

Micron's Mainstream SSDs With NVMe

Micron's broad NVMe SSD portfolio helps enable more applications and workloads to take advantage of NVMe flash storage, accelerating the enterprise and the cloud.

Micron 7400 SSD

From U.3 to M.2 to E1.S form factors, the Micron 7400 SSD offers the optimal combination of performance, flexibility and security for today's most demanding workloads.

The Micron 7400 SSD delivers PCIe Gen4 performance[1] and industry-leading design flexibility for your servers with the industry's broadest portfolio of form factors.[2]

Micron 7300 SSD

The Micron 7300 SSD is built for workloads that demand high throughput and low latency while staying within budget. It is Micron's first data center SSD designed to enable in-platform, end-to-end NVMe (from system boot to main storage to caching).

1. In this document, we use the terms performance, IOPS and MB/s interchangeably.
2. Design flexibility refers to the combination of capacities, endurance classes and form factors. Broadest statement is based on widely available PCIe data center SSD products, capacity points, endurance values and form factors at the time of this document's publication.

Micron 7400 and 7300 SSD Features

Basic design elements — number of ports, dedicated boot form factor and number of NVMe namespaces supported — can all play a role in determining the best SSD for your needs. The importance of specific features may depend on your current infrastructure and your plans (for example, expansion, compaction, power/cooling, growth, retirement and location [local vs. cloud]).

Form Factors[3]

The Micron 7400 SSD delivers PCIe Gen4 performance and industry-leading design flexibility for your server with the broadest portfolio of form factors currently available, from U.3 to M.2 to E1.S. The Micron 7300 SSD supports U.2 and M.2 form factors.

U.3 U.2

U.3 and U.2 SSDs are designed for standard 1U or 2U front-access (hot swap) server platforms.

U.3 adds support for tri-mode (NVMe, SAS or SATA) host controllers, making host platform design and field support simpler. (One backplane supports NVMe, SAS and SATA SSD types.) U.3 SSDs are compatible with U.2 backplanes.

Micron 7400 SSD

U.3: 7mm and 15mm z-height

Micron 7300 SSD

U.2: 7mm z-height

M.2

The M.2 standard form factor specification can support NVMe or SATA. (The Micron 7400 and 7300 SSDs are NVMe.)

M.2 benefits include:

- Existing industry adoption
- Active PCI-SIG Mini standard development
- M.2 SSDs: small and modular with low power draw
- Both 22 x 80mm and 22 x 110mm form factors (broad flexibility)

M.2: 22 x 80mm and 22 x 110mm

M.2: 22 x 80mm and 22 x 110mm

E1.S

E1.S supports a standard enterprise and data center SSD form factor (EDSFF) connector and multiple enclosure options (to meet different heat-dissipation requirements). Only the Micron 7400 SSD supports the E1.S form factor.

E1.S: 5.9mm, 15mm and 25mm z-height

How to use: 15mm z-height enables greater power and heat dissipation while 7mm z-height means more SSDs can fit into the same chassis. The Micron 7400 SSD is uniquely offered in an optional 15mm form factor and E1.S. The standard E1.S form factor is commonly used in ultradense storage server and storage platforms.

7mm z-height

15mm z-height

3. Product images are representative and may not be to scale.

PCIe Version, SSD Design and Namespaces

SSD design helps ensure the SSD can satisfy intended application and workload requirements. Mainstream SSDs are well-suited for data center workloads and platforms that balance performance with price.

	Micron 7400 SSD	Micron 7300 SSD
PCIe Generation PCIe Gen4 is the latest standard. Compared to PCIe Gen3, it offers two times the transfer rate per lane (16 GT/s). This means that an equivalent number of PCIe Gen4 lanes can support about two times the throughput of the same number of PCIe Gen3 lanes.	Gen4	Gen3
SSD Design The Micron 7300 and 7400 SSDs are both designed to support mainstream, business-critical workloads that demand affordable, performant results. The Micron 7300 SSD is also offered in dual-port configurations. (The Micron 7400 SSD is single-port.) The Micron 7400 SSD is Micron's first SSD designed for select Open Compute Project (OCP) deployments[4] and is available in EDSFF form factors. Micron continues to support industry standards that are the foundation for rapid innovation around the globe.	✓OCP	
NVMe Namespaces NVMe namespaces can be used to logically divide an NVMe SSD into smaller sections, each with independent I/O submission and completion queues. This subdivision can minimize multiuse interaction by helping NVMe SSDs keep the I/O for each namespace separated (noninterfering). They are useful when sharing NVMe SSDs over high-bandwidth fabrics. Single-namespace SSDs are less flexible when sharing.	Up to 128	1

How to use: The Micron 7400 SSD is a PCIe Gen4, single-port device. (PCIe Gen4 is designed to support twice the interface bandwidth of PCIe Gen3.) The Micron 7400 also supports up to 128 NVMe namespaces. As a PCIe Gen4 SSD, the Micron 7400 is fully compatible with PCIe Gen3 infrastructure (although at possibly reduced, PCIe Gen3 bus limited performance). The Micron 7300 SSD is a PCIe Gen3 SSD, available in single-port or dual-port configurations.

Both the Micron 7300 and 7400 SSDs are designed to satisfy the needs of performance-focused, budget-aware, mainstream data center workloads.

4. The Micron 7400 SSD complies with most, but not all, requirements of the Open Compute Project NVMe Cloud SSD Specification 1.0a. Please contact your account manager for additional details.

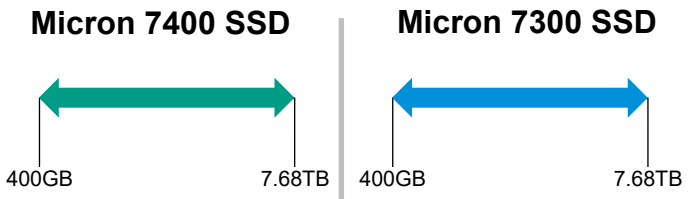
Capacity, Performance and Power Efficiency

SSD capacity requirements vary with intended use. Smaller capacity SSDs are typically used for system boot devices while larger capacity SSDs are often used for caching or main data storage.

Performance requirements will also vary with use. Some workloads require high read performance (such as business analytics or content delivery), others rely on extended write performance (caching or logging), and some benefit from more balanced (read and write) performance.

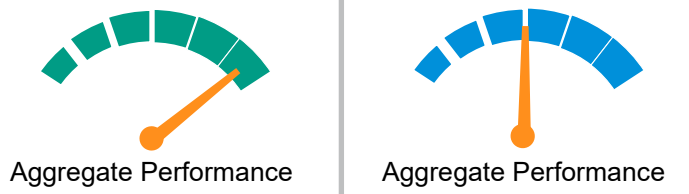
Capacity

The Micron 7400 and 7300 SSDs are available in a broad range of capacities for use as boot, cache or main data store devices. Available capacity will vary with form factor and product family (PRO or MAX).



Performance (4-Corners)

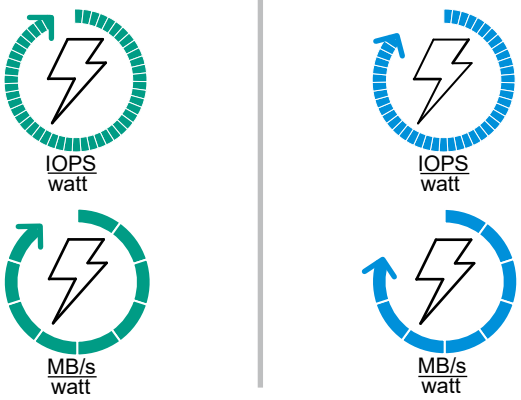
Four-corners performance[5] provides an overview of SSD performance. It measures random read and write IOPS (4K transfer size) and read and write throughput in MB/s (128K transfer size). Performance can vary with SSD interface, capacity and form factor.



Power Efficiency

Relative power efficiency[6] compares performance (in IOPS or GB/s) divided by the power consumed by the platform for that performance value for the Micron 7400 and 7300. More complete circles indicate greater power efficiency (better).

Application-level power efficiency may differ.



How to use: Your workloads' data size and placement patterns will influence your results. Four-corners performance data and power efficiency can help you determine which SSDs to consider when upgrading existing platforms and building new ones.

Although available in the same user capacity ranges, the Micron 7400 SSD offers improved performance with a slight edge in power efficiency.

5. Data shown: Micron 7400 3.84TB PRO (U.3) and Micron 7300 3.84TB PRO (U.2). The Micron 7400 shows an average increase of 1.7x across 4-corners performance. Other capacities, form factors and I/O profiles may show different results. See www.micron.com
6. Data shown: Micron 7400 3.84TB PRO (U.3) and Micron 7300 3.84TB PRO (U.2). Power efficiency is defined as each 4-corners performance value divided by SSD power consumed for that value. Other capacities, form factors and I/O profiles may show different results. See www.micron.com

Endurance and Security[7]

SSDs wear as they are written and have a warranted write endurance (typically expressed in drive writes per day or DWPD). This warranted value expresses how much data can be written to an SSD within its warranty period. New security threats emerge daily. Security features help address concerns as data and data-driven applications continue to move to the cloud (public and private).

Endurance (DWPD)

The Micron 7400 SSD and 7300 SSD are each offered in two endurance configurations (PRO = 1 DWPD, MAX = 3 DWPD). The MAX versions excel in workloads where random write performance and endurance are imperative.

Security Features

Different deployments, workloads and environments may require different security features and other elements to enable those features.

Feature	Benefit	Micron 7400 SSD	Micron 7300 SSD
Secure Execution Environment	Provides dedicated, isolated security processing hardware (in SSD controller)	✓	
Asymmetric Roots of Trust	Enables authenticated revocation of root keys (in immutable ROM)	✓	
Strong Asymmetric Key Support	Uses standard, National institute of Standards and Technology-approved algorithms with 2048-bit/3072-bit RSA keys	✓	
RSA Delegation Key Support	Enables customers to maintain ownership of RSA keys	✓	
Secure Boot	Helps ensure firmware integrity on running platform	✓	
Key-Based Firmware Update	Validates firmware image using public key-based authentication	✓	
Key-Based Privileged Access	Helps protect against unauthorized, privileged, SSD function execution with public key-based authorization	✓	
Digitally Signed Firmware	Helps prevent malicious firmware tampering	✓	✓
Data Center-Grade Power Loss Protection	Protects data at rest (written to NAND) and data in flight (data being written to NAND) from sudden power loss	✓	✓
TCG[8] Opal	TCG Opal v2.01	✓	✓

Micron 7400 SSD	Micron 7300 SSD
1 or 3	1 or 3

How to use: Both the Micron 7400 and 7300 SSDs can satisfy the needs of performance-focused, budget-aware, mainstream data center workloads needing either one or three drive fills per day (endurance). The Micron 7400 SSD supports additional and newer security features and standards.

7. No hardware, software or system can provide absolute security under all conditions. Micron assumes no liability for lost, stolen or corrupted data arising from the use of any Micron products, including those products that incorporate any of the mentioned security features.
8. Trusted Computing Group, https://trustedcomputinggroup.org/

Conclusion

IT infrastructure is evolving faster than ever, and Micron NVMe SSDs are the powerhouses that help drive data center application performance. In this near-constant evolution, storage demands, the rise in importance of data and the need for insight continue to increase radically. And they aren't letting up.

Micron first enabled broad NVMe adoption with the introduction of the Micron 7300 SSD (www.micron.com/7300), expanding the benefits of NVMe across the entire data center and delivering mainstream NVMe performance up to six times the performance of SATA SSDs, at a similar price.

The Micron 7400 SSD (www.micron.com/7400) extends that innovation by adding PCIe Gen4 performance, industry-leading design flexibility for your servers and new, dedicated hardware-based security features.

SSD selection depends on many elements. Your workload, infrastructure, platform needs and a host of other factors may influence which SSD is best for you.

When you need a mainstream SSD with NVMe that offers a broad range of form factors, features, capacity, power efficiency, economical performance, workload-matched endurance and tuned security, Micron makes the choice simple.

micron.com/7300
micron.com/7400