Three Reasons the Micron 7400 SSD Leads Data Center Infrastructure Transformation

A TRIPLE THREAT TO SLOW WORKLOADS

The Micron 7400 SSD delivers powerful PCIe Gen4 performance[1] with the widest design flexibility[2] for data center infrastructure innovation.

Data center operators and managers are being hit with rapidly evolving challenges — from “how do I get enough power?” and “how do I cool all these servers?" to “how do I store and secure ever-increasing amounts of storage in my limited space?”

The Micron 7400 SSD with NVM Express™ (NVMe™) can help.

It combines PCIe Gen4 performance with industry-leading form factor variety for the servers you have now and the servers you plan to add.

With the industry’s broadest[2] portfolio of form factors — the U.3, M.2 and industry’s latest E1.S — the Micron 7400 SSD offers the optimal combination of performance, flexibility and security for today’s most demanding workloads.

The Open Compute Project (OCP) developed and published specifications that have built a thriving, standardized ecosystem. This helps reduce deployment complexity and speeds time to market for the newest technologies from the cloud to the distributed edge.

Micron has supported industry standards like this for decades. The Micron 7400 SSD is Micron’s first SSD designed for select OCP deployments[3] and is available in enterprise and data center SSD form factors (EDSFF). Micron continues to support industry standards that are the foundation for rapid innovation around the globe.

TOP THREE BENEFITS

PCIe Gen4 Performance That Scales

The PCIe Gen4 performance in the 7400 SSD delivers over two times the throughput of our prior generation of Micron SSDs with NVMe[4] (and retains full PCIe Gen3 backwards compatibility) to meet the needs of the most demanding data centers.

World’s Broadest SSD Portfolio for Data Center Infrastructure Innovation[2]

The Micron 7400 SSD offers the industry’s broadest variety of form factors — U.3, E1.S and M.2 — to meet evolving power and thermal needs. Its wide capacity range (from 400GB up to 7.68TB) supports applications from boot to high-capacity storage.

At the Leading Edge of Security[5] With Hardware-Driven Performance

The SSD meets trusted industry standards including TCG Opal 2.01 and IEEE-1667 SED. The Micron 7400 is offered in SED, non-SED and Microsoft eDrive options to tailor security to deployment requirements, with Micron-designed dedicated security hardware that improves security posture.

1. In this document, we use the term performance to mean throughput, IOPS or both.
2. 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.
3. 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.
4. All prior-generation comparisons refer to the Micron 7300 SSD with NVMe.
5. 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.

PCIE GEN4 PERFORMANCE THAT SCALES

The Micron 7400 SSD is PCIe Gen4 native with PCIe Gen3 compatibility, so it works well with the PCIe Gen3 platforms you already have and the PCIe Gen4 platforms you plan to use.

Scale your infrastructure, today and tomorrow

Worldwide infrastructure growth requires storage solutions that are ready for deployment today and designed to meet the needs of tomorrow. The transition from PCIe Gen3 to Gen4 effectively doubles the interface bandwidth. Figure 1 shows the difference in interface bandwidth between PCIe Gen4 and Gen3 for a standard x4 interface. Note that PCIe Gen4 offers twice the interface bandwidth as Gen3. Because the Micron 7400 is Gen4 native, additional performance should be realized in Gen4 platforms.

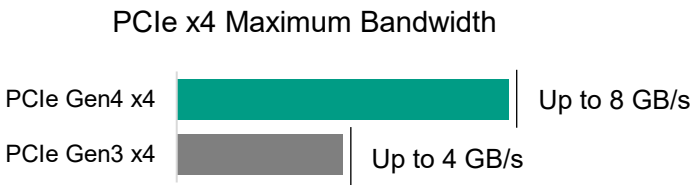

Figure 1: PCIe Data Rate (x4 Interface Example, Maximum Interface Bandwidth)

The PCIe Gen4 specification is designed to ensure forward and backward interoperability: PCIe Gen4 devices work in a system using a Gen3 interface, and PCIe Gen3 devices work in a system with a Gen4 interface.[6]

The Micron 7400 SSD uses this forward and backward compatibility to help ease the data center transition from Gen3 to Gen4. All Micron 7400 SSDs can operate in Gen4 and Gen3 platforms, making procurement and support a breeze.

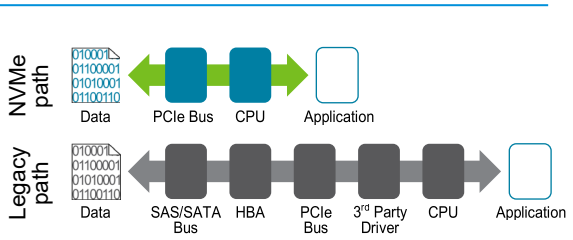

Figure 2: Shorter Data Path for NVMe vs. Legacy (SAS or SATA)

About PCIe Gen4 and NVMe

PCIe Gen4 and NVMe performance go hand in hand. The NVMe protocol, runs natively over PCIe, a physical layer that is directly connected to the CPU, resulting in a much shorter data path than with legacy protocols like SAS and SATA.

Devices using SAS or SATA interfaces require additional PCIe adapters (like a host bus adapter or RAID controller) to transfer data. As seen in Figure 2, this indirect attachment requires several protocol and bus conversions, creating a longer data access path for SAS and SATA.

WORLD'S BROADEST SSD PORTFOLIO FOR DATA CENTER INFRASTRUCTURE INNOVATION[7]

When SSDs were first introduced into data centers, they used legacy HDD form factors to facilitate integration into existing designs. Although these form factors were familiar, they were not optimal for SSDs nor for emerging, dynamic data centers. Things have changed.

SSD storage is now ubiquitous in the data center and used in many core workloads. Broad adoption and the expanded performance of NVMe SSDs have driven a need for new, optimized form factors (see Table 1).

6. See https://pcisig.com/specifications for specification details

7. 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.

E1.S: Designed for line of business data center and burgeoning hyperscale uses[8]

E1.S is designed to provide the flexibility to balance performance, capacity, scale and power. Its variety of standard thicknesses are ideal for 1U platforms with different needs (5.9mm to help maximize platform density, 25mm to help maximize performance and 15mm for balanced designs).

Micron 7400 E1.S: Available in 5.9mm, 15mm, and 25mm z-height and in capacities from 800GB to 3.84TB.

- 4-lane PCIe with a standard EDSFF connector
- Three thickness options (with the flexibility to meet heat dissipation, density, capacity, and performance demands)
- PCIe Gen4 support

U.3: Built on broad industry adoption (of the U.2 form factor)

The U.3 form factor is the latest evolution of the existing U.2 form factor standard, which has seen broad adoption in data center use.

Micron 7400 U.3: Available in a 7mm or 15mm z-height U.3 enclosure, with capacities from 800GB to 7.68TB.

- The Micron 7400 supports tri-mode (NVMe, SAS and SATA) host detection for broad platform design options. The Micron 7400 SSD itself is NVMe.
- Active SNIA and PCI-SIG SFF industry standards groups support ongoing development.
- Easy hot plug/hot add support makes service a breeze. It is a great fit for the platforms you already own.
- U.3 SSDs are fully backward compatible with U.2 hosts.[9]

M.2: Designed for internally mounted (non-hot swap), compact storage

M.2 form factors have been adopted in the data center as both a system boot solution and a compact data storage device (often in groups to improve density).

Micron 7400 M.2: The Micron 7400 SSD M.2 uses a PCIe Gen4 x4 interface in standard M.2 form factors with capacities from 400GB to 3.84TB.

- Existing industry adoption
- Active standard development
- Small with low power draw
- 22 x 80mm and 22 x 110mm M.2 form factors (broad flexibility, ideal for boot applications)

E1.S	Cloud & 1U: Performance and density focused 5.9mm, 15mm, and 25mm z-height.	
U.3	Standard servers: Hot swap/hot add 7mm and 15mm z-height.	
M.2	Board-mounted system boot or grouped for ultracompact data storage. 22 x 80mm and 22 x 110mm	

Table 1: Micron 7400 SSD Form Factors and Common Use Cases

8. Statement is based “EDSFF – A Dynamic Family of Form Factors for Data Center SSDs”https://www.snia.org/sites/default/files/SSSI/OCP%20EDSFF%20JM%20Hands.pdf

9. https://www.storagereview.com/news/evolving-storage-with-sff-ta-1001-u-3-universal-drive-bays

AT THE LEADING EDGE OF SECURITY

The Micron 7400 SSD builds on Micron's security expertise to deliver an extensive set of security features and help ensure data privacy (summarized in Table 2 below). These standards-based features are designed to enhance your ability to secure your business data. According to CPO Magazine, data privacy can be directly tied to business value.

Hardware Security Island

Dedicated security processing hardware with physical isolation delivers security-related function isolation.

Signed Firmware Binaries

Firmware update images are signed by Micron and verified by the Micron 7400 SSD to ensure they contain a valid signature before a firmware update is allowed.

Cryptographic Erase

This feature ensures data on the SSD is unreadable by almost any currently known decryption technology. The Sanitize Block Erase operation can then be used to eliminate data.

Configurable Namespaces

In NVMe version 1.0, this defines a standard for locking a namespace and logical block address ranges within a namespace. Download the specification.

Data Security Features	How it Helps
Asymmetric Roots of Trust	Enables authenticated revocation of root keys (in immutable ROM)
Strong Asymmetric Key Support	Uses NIST-approved algorithms with 208-bit/3072-bit RSA encryption keys
RSA Delegation Key Support	Enables customers to maintain ownership of RSA keys
Key-Based Firmware Update	Validates firmware using public key-based authentication prior to firmware update
Key-Based Privileged Access	Helps protect against unauthorized privileged SSD function execution with public key-based authorization
Secure Boot	Helps ensure that the SSD firmware (including boot loader) and platform operating system have not been compromised. Secure boot is designed to prevent installation and operation of unsigned software (operating systems or drivers).
Hardware Encryption Engine	Uses advanced, hardware-based encryption (industry standard SHA-256). Hardware encryption can improve overall system performance compared to software-based encryption.
Nondisruptive Firmware Update	Applies and activates firmware updates without requiring system restart, which reduces server downtime
Security Event Logging	Writes a log of all security-related events to an internal database. This log can be downloaded, analyzed and audited.
TCG Opal	Includes a set of broadly adopted management standards designed to secure data while stored in the SSD (The 7400 implements TCG Opal version 2.01; download the TCG Opal specification)
IEEE 1667/Microsoft eDrive	Offers an operating system-independent protocol for authenticating storage devices that can be hot inserted (see docs.microsoft.com: Enhanced Storage; About Enhanced Storage; Using Enhanced Storage; and Enhanced Storage Reference)
NIST SP800-193: Platform Firmware Resiliency	*Protection:* Helps ensures that the platform firmware code and critical data remain in a state of integrity and protected from corruption *Detection:* Detects when firmware code and critical data have been corrupted (download the NIST specification)
FIPS-Certified	Includes FIPS 140-3 Level 2 certification
Power-Loss Protection	Offers both data center-class sudden power-loss protection for data at rest (written to NAND) and data in flight (data being written to NAND). The Micron 7400 incorporates internal power-loss detection and power holdup circuitry.

Table 2: Micron 7400 SSD Data Security Features

CONCLUSION

The Micron 7400 SSD delivers leading security innovations, the broadest portfolio of form factors currently available for your server (from E1.S to U.3 to M.2) and PCIe Gen4 for scalable performance. It brings the optimal balance of flexibility, power and security that modern data center applications demand.

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