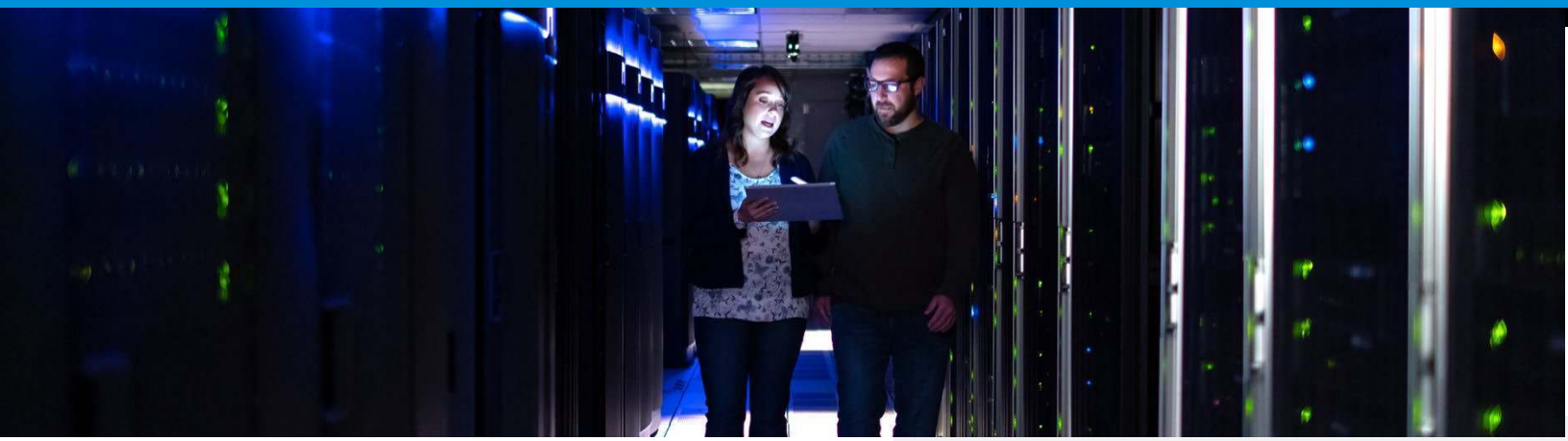
Micron® 7450 SSD With NVMe®

U.3 | E1.S | M.2



The World's Most Advanced 176-Layer NAND Data Center SSD: Sub-2ms QoS Latencies, Extensive Capacity and Deployment Options[1]

The Micron® 7450 SSD with NVMe® enables a wide variety of workloads for flexible deployment in hyperscale, cloud, data center, OEM and system integrator designs. It is the SSD for the infrastructure you are building right now -- and for the infrastructure you will build tomorrow.

Our 7450 SSD offers the industry's broadest range of PCIe® Gen4 SSD form factors[2] and enables several storage use cases, including boot, cache and main data storage. It also features Micron's unique Secure Execution Environment[3] to help keep your data secure.

Designed as a mainstream solution, the 7450 SSD balances performance and density. Our offering includes a PCIe Gen4, M.2, 22 x 80mm with power-loss protection[4] and a 7.68TB E1.S that delivers industry-leading capacity.[5]



U.3: 7mm and 15mm



E1.S: 5.9mm, 15mm and 25mm



M.2: 22x80mm and 22x110mm

Images are for illustration purposes only and may not be to scale.

MICRON 7450 SSD: KEY BENEFITS

176-layer NAND improves storage performance for data center workloads

Industry-leading 176-layer NAND, coupled with Micron CMOS-under-array (CuA) technology and PCIe Gen4, enables the 7450 SSD to yield faster read and write speeds, up to 1 million IOPS, enabling faster booting and application responsiveness.[6]

2ms and below QoS latency enables impressive responsiveness in data center workloads

The 7450 SSD delivers 2ms and below 99.9999% read latency.[7] This low and consistent latency can improve performance in latency-sensitive data center applications, including databases like Microsoft SQL Server, Oracle, MySQL, RocksDB, Cassandra and Aerospike, among others.

Capacity, form factor and security options fit a wide variety of data center workloads

The 7450 SSD delivers an impressive array of capacities, from 400GB to 15.36TB[9] and has the industry's broadest variety of form factors, including U.3, M.2 and E1.S. It is the only PCIe Gen4 U.3 SSD in the industry available in both 15mm and 7mm,[8] plus there is an industry-leading 7.68TB E1.S option. These capacity and form factors choices help meet rapidly evolving power and thermal needs in your data center.

Security features like the Micron-unique Secure Execution Environment, self-encrypting drives (SEDs) and Microsoft eDrive options tailor security to deployment requirements and help improve your data security.

1. Based on similar use SSDs with NVMe available on the open market as of the date of this document's publication. The Micron 7450 SSD offers a broader range of form factors combined with industry-leading Micron 176-layer NAND.
2. Refers to the combination of form factors, capacities, and endurance classes available.
3. An isolated security processor within the SSD controller. 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.
4. Based on comparison of similar, commonly available, open-market SSDs
5. Unformatted. 1GB = 1 billion bytes. Formatted capacity is less.
6. Additional information available here: www.micron.com/176. Faster read and write based on comparison to Micron 7400 SSD with NVMe.
7. Up to queue depth = 32 for 4KB, 100% random, 70% read workload
8. Based on similar use SSDs with NVMe available on the open market as of the date of this document's publication

QoS latency and performance that data centers demand

The Micron 7450 SSD delivers 2ms and below QoS read latency of 99.9999% for small IO (4KB), mixed, random workloads -- an imperative for data centers to help improve latency-sensitive, workloads like transaction processing, multi-tenant hosting, real-time analytics, social media, resource planning, virtualization, broad database deployments, video on demand and other random, small IO focused workloads.

Micron 176-layer NAND Features[9]	Benefit
Simplified Read Algorithm	Improved 99.9999% QoS read latency for small (4KB), mixed, random workloads.
Metal Control Gate	Enables faster NAND programming for improved SSD write speed.

Form factors, capacities, and features to fit a diverse range of deployments

The Micron 7450 SSD is optimized for mainstream workloads, including cloud and object storage, SQL and NoSQL databases, block and object stores, VDI and server virtualization.

Micron 7450 SSD Feature	Benefit
E1.S (5.9mm, 15mm and 25mm)	Enterprise Datacenter SSD Form Factor (EDSFF) optimized for 1U platforms. Multiple z-height options to balance density and airflow.
U.3 (7mm and 15mm)	Only PCIe Gen4 U.3 form factor with both 15mm and 7mm offering flexibility for designs requiring 2.5-inch SSDs. Micron 7450 is U.2 backwards compatible.[10] Dual z-height options and U.2 compatibility broadens chassis options.
M.2 (22x80mm, 22x110mm)	Ultracompact M.2 form factors -- well-suited for boot devices. A PCIe Gen4 M.2 22x80mm SSD with Power Loss Protection – specifically designed for server boot use.
Power Loss Protection	SSD power holdup mechanism helps ensure data in flight is properly written when SSD power is lost.
Data Path Protection	Helps protect against bit errors as data travels from the PHY to the NAND and back.
Up to 128 Namespaces	Enables up to 128 isolated storage areas on the SSD, enhancing multitenancy and shared access via non-interfering I/O.
Wide Capacity Range	From 400GB to 15.36TB, supports boot to high-capacity storage (including a 7.68TB E1.S option).
Multiple-Sector-Size Support	Support for 512- and 4096-byte sectors. Easily satisfies multiple platform needs, operating systems, and workloads.
TAA Compliance	Compliance with the Trade Agreements Act (TAA), helps ease procurement in US Federal Government regulated programs.

Multi-faceted protection for a wide variety of threats

The Micron 7450 SSD offers a robust complement of proven security features built over generations of Micron data center SSDs. It offers critical security features that help address emerging threats as data and data-driven applications are virtualized, moved to the cloud or containerized.

Micron 7450 SSD Feature	Benefit
Secure Execution Environment	Includes dedicated, isolated security processing hardware for security-related functions. Physical isolation helps protect against attacks.
Security Flexibility	SED and non-SED options available to help meet varied security deployment options.
Industry Standard Security	TCG Opal 2.01 and IEEE 1667 options available; FIPS 140-3 Level 2 certification eases adoption to existing security deployments.
Asymmetric Roots of Trust	Easily revoke previously authenticated root keys (in immutable ROM) to meet changing needs.
Strong Asymmetric Key Support	Uses standard, National Institute of Standards and technology (NIST)-approved algorithms with 208-bit/3072-bit RSA keys for standardized, strong key support.
RSA Delegation Key Support	Enables customers to maintain ownership of RSA keys, helping keep ownership within customer boundaries.
Secure Boot	Helps ensure firmware integrity on a running platform and defends against malware.
Key-Based Firmware Update	Validates firmware using public key-based authentication prior to firmware update (malware protection).
Key-Based Privileged Access	Helps protect against unauthorized privileged SSD function execution with public key-based authorization. Helps guard against unauthorized changes.

9. Additional information available here: www.micron.com/176
10. Additional information available here: https://www.storagereview.com/news/evolving-storage-with-sff-ta-1001-u-3-universal-drive-bays

Micron 7450 SSD Key Specifications

U.3		7450 PRO: U.3 Read-Intensive, 1 Drive Write per Day					7450 MAX: U.3 Mixed-Use, 3 Drive Writes per Day				
Capacity		**960GB**	**1.92TB**	**3.84TB**	**7.68TB**	**15.36TB**	**800GB**	**1.6TB**	**3.2TB**	**6.4TB**	**12.8TB**
Performance[11]	**Seq. Read (MB/s)**	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800
	Seq. Write (MB/s)	1,400	2,700	5,300	5,600	5,600	1,400	2,700	5,300	5,600	5,600
	Rand. Read (IOPS)[12]	530,000	800,000	1,000,000	1,000,000	1,000,000	530,000	800,000	1,000,000	1,000,000	1,000,000
	Rand. Write (IOPS)	85,000	120,000	180,000	215,000	250,000	145,000	250,000	390,000	400,000	410,000
	70/30 Rand. Read/Write (IOPS)	110,000	190,000	300,000	415,000	520,000	165,000	290,000	500,000	645,000	680,000
	Latency (TYP, µs)[13]	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)
Endurance (total bytes written in TB)[13]		1,700	3,650	7,300	14,000	28,000	4,300	8,700	17,500	35,000	70,000

E1.S		7450 PRO: E1.S Read-Intensive, 1 Drive Write per Day				7450 MAX: E1.S Mixed-Use, 3 Drive Writes per Day			
Capacity		**960GB**	**1.92TB**	**3.84TB**	**7.68TB**	**800GB**	**1.6TB**	**3.2TB**	**6.4TB**
Performance	**Seq. Read (MB/s)**	6,800	6,800	6,800	6,800	6,800	6,800	6,800	6,800
	Seq. Write (MB/s)	1,400	2,600	5,000	5,600	1,400	2,600	5,000	5,600
	Rand. Read (IOPS)	530,000	800,000	1,000,000	1,000,000	530,000	800,000	1,000,000	1,000,000
	Rand. Write (IOPS)	85,000	120,000	180,000	215,000	145,000	250,000	390,000	400,000
	70/30 Rand. Read/Write (IOPS)	110,000	190,000	300,000	415,000	165,000	290,000	500,000	645,000
	Latency (TYP, µs)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write))	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)
Endurance (total bytes written in TB)		1,700	3,650	7,300	14,000	4,300	8,700	17,500	35,000

M.2		7450 PRO: M.2 Read-Intensive, 1 Drive Write per Day				7450 MAX: M.2 Mixed-Use, 3 Drive Writes per Day			
Capacity		**480GB**[12]	**960GB**	**1.92TB**	**3.84TB**	**400GB**	**800GB**	**1.6TB**	**3.2TB**
Performance	**Seq. Read (MB/s)**	5,000	5,000	5,000	5,000	5,000	5,000	5,000	5,000
	Seq. Write (MB/s)	700	1,400	2,400	2,500	700	1,400	2,400	2,500
	Rand. Read (IOPS)	280,000	520,000	735,000	735,000	280,000	520,000	735,000	735,000
	Rand. Write (IOPS)	40,000	82,000	120,000	160,000	65,000	156,000	250,000	300,000
	70/30 Rand. Read/Write (IOPS)	50,000	110,000	185,000	300,000	78,000	165,000	270,000	450,000
	Latency (TYP, µs)	80 (read) 30 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)	80 (read) 15 (write)
Endurance (total bytes written in TB)[14]		800	1,700	3,650	7,300	2,100	4,300	8,700	17,500

Micron 7450 SSD: Common Features		
Basic Attributes	**Interface**	PCIe Gen4 1x4 NVMe (v1.4)
	NAND	Micron 176-layer 3D TLC NAND
Reliability	**MTTF**	2 million device hours
	UBER	<1 sector per 10^{17} bits read
	Warranty	5 years
Environmental Characteristics	**Power**	Sequential read (maximum of average RMS values by form factor): U.3: 12.1W / E1.S: 12.0W / M.2: 8W Sequential write (maximum of average RMS values by form factor): U.3: 16.6W / E1.S: 14W / M.2: 7.9W
	Operating Temp.	0-70°C

Notes: All values provided are for reference only and are not warrantied values. For warranty information, visit https://www.micron.com/support/sales-support/returns-and-warranties/enterprise-ssd-warranty or contact your Micron sales representative.

Values represent the theoretical maximum endurance for the given transfer size and type. Actual lifetime will vary by workload.

Refer to percentage used in the SMART/Health information (Log Identifier 02h) to check the device life used.

U.3 7.68TB, 15.36TB performance measured at 25W; E1.S 3.84TB, 7.68TB performance measured at 20W

11. Performance measured under the following conditions:
Steady state as defined by SNIA Solid State Storage Performance Test Specification Enterprise v1.1; Drive write cache enabled; NVMe power state 0; Sequential workloads measured using FIO with a queue depth of 32; Random READ workloads measured using FIO with a queue depth of 256 (1,000,000 IOPS statement based on 4K sector size; Random WRITE workloads measured using FIO with a queue depth of 128; E1.S measured in 20W slot
12. 1 million IOPS value measured using 4K sector size.
13. Latency values measured with random workloads using FIO, 4KB transfers, queue depth = 1; TYP = median, 50th percentile.
14. Actual lifetime will vary by workload. Total bytes written calculated assuming drive is 100% full (user capacity) with workload of 100% random aligned 4KB.

Micron 7450 SSD Part Numbers

Micron 7450 SSD part number information is provided below for configuration-dependent values (shown in **bold**). Other part number values in the example part number are fixed. See the parts catalog at micron.com/7450 for more information.

MT FD K **BA** **400** T **FS-** 1 BC **4** **Z** AB

Drive Form Factor

CB	=	U.3	(2.5 inch, 7mm)
CC	=	U.3	(2.5 inch, 15mm)
BZ	=	E1.S	5.9mm (bare board)
CE	=	E1.S	15mm (incl. enclosure)
BU	=	E1.S	25mm (incl. enclosure)
BA	=	M.2	22x80mm
BG	=	M.2	22x110mm

Drive Capacity

PRO

480	=	480GB
960	=	960GB
1T9	=	1.92TB
3T8	=	3.84TB
7T6	=	7.68TB
15T3	=	15.36TB

MAX

400	=	400GB
800	=	800GB
1T6	=	1.6TB
3T2	=	3.2TB
6T4	=	6.4TB
12T8	=	12.8TB

Product Family

FR	=	PRO
FS	=	MAX

Sector Size

1	=	512 bytes
4	=	4096 bytes

Security Features

D	=	OCP 1.0a + Opal 2.01
E	=	OCP 1.0a + Opal 2.01 + IEEE-1667
Z	=	Non-SED
2	=	SED Opal 2.01 + IEEE-1667
5	=	SED Opal 2.01

micron.com/7450

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