QLC value. TLC performance. Micron innovation.

The world's first data center NVMe SSD with over 200 NAND layers is engineered to evolve data center economics.

Designed to keep pace with the accelerating growth of data, the Micron 6500 ION SSD provides a major advancement for data centers by lowering operating costs and improving storage efficiency. The Micron 6500 ION is a high-capacity SSD that offers a superior value over the competing QLC-based drive by providing best-in-class performance and enabling a more environmentally sustainable data center.[1]

The Micron 6500 ION reduces upfront purchase costs by coming in at a comparable price point to the competing QLC SSD[2] and lowers annual operating expenses by reducing power/cooling and server/software license costs through chassis consolidation.[3] It also reduce e-waste by delivering storage that lasts longer — all while outperforming and outlasting the competing QLC SSD and saturating 400 GbE networks with ease.[4]

For data centers that need to affordably scale storage density, the Micron 6500 ION is the answer.

Micron 6500 ION 30.72TB SSD
Available in U.3 (15mm) and E1.L (9.5mm)

MICRON 6500 ION: KEY BENEFITS

Faster reads, writes, fills, and rebuilds than the competing data center QLC SSD make it easier to store and maintain massive datasets.

- 34% better average read latency
- 58% faster sequential writes
- Up to 62% more 4KB random read IOPS
- Over 30X more 4KB random write IOPS at a queue depth (QD) of 128 and over 10X more at QD1
- Ideal for artificial intelligence data lakes, object stores, general purpose bulk cloud storage, NoSQL databases, and content delivery

Lower operating costs than the competing QLC SSD via improved power efficiency and endurance.

- Up to 20% reduction in power consumption
- Up to 56% better power efficiency (IOPS/watt)
- More than 10X better 4KB random write endurance (RDWPD)
- Nearly 1PB per U or 35PB per rack storage to reduce server sprawl[5]

Better price-performance with industry-leading security that surpasses the competing QLC SSD.[6]

- Leading die density enables sustainable affordability versus the competing QLC SSD
- Supply chain resiliency, including multiple SSD assembly and test sites, versus single assembly site for the competing QLC SSD
- The only 30.72TB TAA-compliant, value-focused NVMe SSD with FIPS 140-3 L2 certifiability
- Class-leading feature set, including OCP 2.0, NVMe 2.0 and NVMe-MI 1.2b, and SPDM 1.2 (attestation)

1. All comparisons to the competing QLC SSD are based on the Solidigm D5-P5316 30.72TB SSD from public information available at the time of this document's publication or on Micron testing. Value means the combination of performance, features, longevity, capacity, and purchase price. Performance refers to IOPS, GB/s or both. Average read latency for 4KB 100% random read at queue depth of 1. Sequential write 58% improvement measured at QD32 and QD64. Measurements made at QDs 1 to 256 yielded a range of improvements from -7% to 58% when compared to the competing QLD SSD. Random IOPS 62% improvement measured at QD32. Other measurements were made at QDs ranging from 1 to 256 and yielded a range of 18% to 62% improvements over competing drives. Power efficiency statements are based on IOPS per watt calculations. Solidigm documentation states that its endurance is rated using a 64KB 100% random write workload and is 0.41 DWPD. Rated Solidigm D5-P5316 endurance at 64KB transfer size is estimated to be 16X the rated endurance for a 4KB transfer size, yielding a 4KB value of 0.0256 (0.41/16). Micron 6500 ION rates endurance using 4KB random write workloads and is 0.3 DWPD.
2. Pricing statement based on public information available at the time of this document's publication.
3. When software is licensed by chassis, CPU, or CPU core.
4. Higher endurance ratings mean an SSD can tolerate more data written. Given the same workload, the SSD with higher endurance rating takes longer reach its rated endurance, lasting longer. Thirteen Micron 6500 ION SSDs saturate 400 GbE network bandwidth based on 4KB 100% random read performance of 1,000,000 IOPS for each of the 13 Micron 6500 ION SSDs (the sum of which is 52GB/s).
5. Unformatted capacity. 1GB = 1 billion bytes, formatted capacity is less. Based on 1U server like the Supermicro 1029P-NEL32R with 32x E1.L SSDs, each of which is 30.72TB and 42U rack (983TB per server, 36x 1U servers in 42U rack).
6. No hardware, software or system can provide absolute security under all conditions. Micron assumes no liability for lost, stolen or corrupted data.

Best-of-breed 30.72TB performance versus the competing QLC SSD

The Micron 6500 ION offers better overall performance, read latency, and workload performance.[7]

Product Attribute	Micron 6500 ION SSD	Solidigm D5-P5316	The ION Difference
Sequential 128KB reads	6,800 MB/s	7,000 MB/s	Similar
Sequential 128KB writes	5,757 MB/s	3,643 MB/s	58% better
Random 4KB reads	440,901 IOPS	272,826 IOPS	62% better
Random 4KB read latency	70μs average	106μs	34% better
Random 4KB writes	254,244 IOPS	7,777 IOPS	Over 30X more
Mixed 4KB 70/30 random reads/writes	400,000 IOPS	Not noted on public documents	Significantly better per higher base specs
Mixed 4KB 70/30 random read latency	70μs average	167μs average	More than 2X better
Endurance (100% random writes)	0.3 RDWPD (9 TB/day)	0.026 RDWPD (<1 TB/day)	More than 10X better

Promotes a more sustainable data center

Sustainable data centers thrive with low-power, space-efficient, ultra-dense servers and storage. Increased density and improved performance help reduce power and cooling requirements through server consolidation and the resultant carbon footprint reduction.

Sustainability Benefit	Micron 6500 ION SSD Feature
Lower active power consumption	Up to 20% lower power consumption than the competition (uses up to 20W vs. up to 25W on the competing QLC SSD).
Reduced cooling requirements	Lower power consumption translates to lower overall cooling requirements.
Less e-waste	Higher endurance rating means the Micron 6500 ION SSD can tolerate the same write workload longer, making the SSD last longer
Longer infrastructure lifespan	10X more 4KB random write endurance extends SSD useful life, enabling longer rated service life.
Server consolidation	Industry-leading 30.72TB capacity enables nearly 1PB per U with E1.L form factor (>35PB per rack based on 1U server like the Supermicro 1029P-NEL32R with 32x E1.L SSDs, 30.72TB each, yielding 983TB per U for a standard 42U rack). Server consolidation means fewer physical servers to purchase and maintain reducing procurement (CapEx), ongoing maintenance costs (OpEx), and environmental impact since fewer servers and drives are needed to store the same amount of data.

Eclipses competing QLC SSD with superior value

Value is the difference between what you pay and what you get. This involves multiple considerations, such as features, security, supply chain fidelity, and industry specification compliance. The Micron 6500 ION eclipses the competing 30.72TB QLC SSD in several areas.

ION Feature	Data Center Advantage
Superior NAND[8]	Leading die density of 14.55 Gb/mm^2 vs. competing QLC die density of 13.80 Gb/mm^2 enables better value, thanks to Micron NAND layer leadership
Supply chain fidelity	Multiple SSD assembly and test sites versus single assembly site for the competing QLC SSD
Industry's most advanced security features	SPDM 1.2 (attestation) for identity authentication and firmware integrity verification
	TAA-compliant with FIPS 140-3 L2 certifiability at the ASIC level for maximum security
	Secure hash algorithm (SHA)-512, the strongest NIST-approved algorithm for signature generation
	TCG Opal 2.01-compliant SED SKUs available
Future-proofed specs	Compliant with latest industry standards, such as OCP 2.0, NVMe 2.0, and NVMe-MI 1.2b
SRIS	Reduced electromagnetic interference (EMI) through spread spectrum clocking (SSC)
Full enterprise feature set	Scatter/gather lists (SGLs), power-loss protection (PLP), data path protection (DPP), firmware activate without reset (FW AWOR), sanitize, 5-year warranty, and more[9]
Qualify with confidence	Proven third-generation, vertically integrated Micron NVMe SSD architecture

7.   Statements based on public information available at the time of this document's publication and on Micron laboratory workload testing. Specific workload results may vary from values shown in the Micron 6500 ION Key Specifications below due to system and stimulus configuration differences.

8.   Superior means NAND density measured in gigabits per square millimeter.

9.   For warranty information, visit https://www.micron.com/support/sales-support/returns-and-warranties/enterprise-ssd-warranty or contact your Micron sales representative.
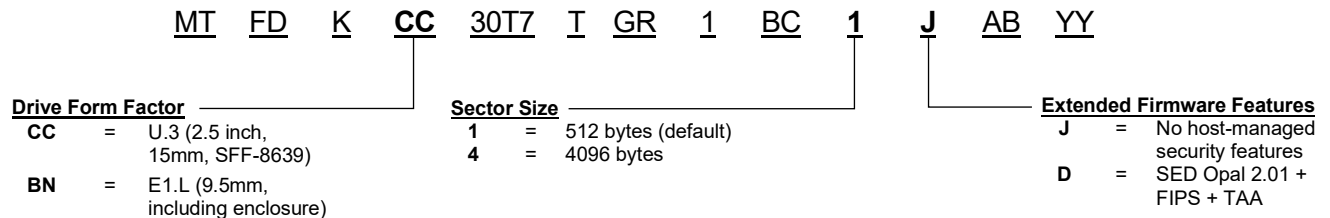
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Micron 6500 ION Key Specifications

		U.3 15mm	E1.L 9.5mm
Capacity		30.72TB	
Performance[10] 128KB sequential transfers, 4KB random transfers	Sequential Read (MB/s, QD128)	6,800	
	Sequential Write (MB/s, QD128)	5,000	
	Random Read (IOPS, QD128)	1,000,000	
	Random Write (IOPS, QD128)	200,000	
	70/30 Random Read/Write (IOPS, QD128)	400,000	
	Read Latency (µs, QD1, typical)[11]	70	
	Write Latency (µs, QD1, typical)[11]	15	
Power Consumption & Use Active average, RMS[12] 20W write maximum	Read	15W	
	Write	20W	
	Idle	5W	
	Operating Temperature	0°C to 70°C	
Endurance by Workload [13]	100% 128KB Sequential Writes	1.0 DWPD (30TB per day)	
	90% 128KB Sequential Write / 10% 4KB Random Write	0.9 DWPD (27TB per day)	
	70% 128KB Sequential Write / 30% 4KB Random Write	0.75 DWPD (23TB per day)	
	50% 128KB Sequential Write / 50% 4KB Random Write	0.55 DWPD (16TB per day)	
	100% 4KB Random Writes	0.3 DWPD (9TB per day)	
Basic Attributes	Interface	PCIe Gen4 1x4 NVMe (v2.0)	
	NAND	Micron 232-layer 3D TLC NAND	
Reliability	MTTF (0-50°C)	2.5 million device hours	
	UBER	<1 sector per 10^{17} bits read	
	Warranty	5 years	

Note: All values provided are for reference only and are not warranted values. Values represent the theoretical maximum endurance for the given transfer size and type since endurance varies by workload. Performance values measured at 20W.

Micron 6500 ION Part Numbers

Micron 6500 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. Visit micron.com/6500ION for a list of valid part numbers.

MT   FD   K   **CC**   **30T7**   T   GR   1   BC   **1**   **J**   AB   YY

Drive Form Factor
CC   =   U.3 (2.5 inch, 15mm, SFF-8639)
BN   =   E1.L (9.5mm, including enclosure)

Sector Size
1   =   512 bytes (default)
4   =   4096 bytes

Extended Firmware Features
J   =   No host-managed security features
D   =   SED Opal 2.01 + FIPS + TAA

10. 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 128K IO size and a queue depth of 32; Random read workloads measured using FIO with a 4K IO size and queue depth of 128; Random write workloads measured using FIO with a 4K IO size and a queue depth of 128.
11. Latency values measured with random workloads using FIO, 4KB transfers, queue depth = 1; Typical latency = median, 50th percentile.
12. RMS = Root Mean Square.
13. Actual endurance my vary by workload.

micron.com/6500ION

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