Micron 6500 ION SSD Series Technical Product Specification

For additional technical and warranty information, contact your Micron sales representative.

Features

- Micron®3D TLC NAND Flash
- PCI Express Gen4
  - U.3 single port (x4) backward compatible with U.2
  - EDSFF E1.L single port (x4)
- NVM Express
  - Number of namespaces supported: 128
  - Weighted round robin with urgent arbitration supported
- Capacity (unformatted)
  - U.3: 30,720GB
  - E1.L: 30,720GB
- Endurance: Total bytes written (TBW)
  - Up to 56,000TB at 1.0 sequential DWPD
  - Up to 16,800TB at 0.3 random DWPD
- Enterprise sector size support = 512 and 4096-byte sector size (configurable)
- Security
  - Digitally signed firmware
  - FIPS 140-3 L2 certifiable
  - TAA compliant SKUs
  - Self-encrypting drive (SED) SKUs
  - SPDM 1.2 specification
  - Isolated security environment
  - Micron enterprise security suite
  - Hardware root of trust and chain of trust
  - TCG device identifier composition engine (DICE)
  - Secure hash SHA-512 (also supports SHA-384 and SHA-256)
  - RSA key size and signature scheme 3K/4K
- Surprise insertion/surprise removal (SISR) and hot-plug capable
- Self-monitoring, analysis, and reporting technology (SMART)
- Field-upgradeable firmware with support for activate without reset
- Performance[1]
  - Sequential 128KB READ: Up to 6800 MB/s
  - Sequential 128KB WRITE: Up to 5000 MB/s
  - Random 4KB READ: Up to 1,000,000 IOPS
  - Random 4KB WRITE: Up to 200,000 IOPS
- Latency[2, 3]
  - READ (TYP): 70µs
  - WRITE (TYP): 15µs
- Reliability
  - MTTF: 2.0M hours @ 0–55°C and 2.5M hours @ 0–50°C[4]
  - Static and dynamic wear leveling
  - Uncorrectable bit error rate (UBER): <1 sector per 10^{17} bits read
  - OCP 2.0-compliant end-to-end data protection
  - Enterprise power-loss protection
- Operating temperature[5]
  - Commercial (0°C to +70°C)
- Form factor
  - U.3: 100.45 x 70.10 x 15.00mm
  - EDSFF E1.L thin: 38.40 x 318.75 x 9.50mm
- Electrical specification
  - U.3/E1.L power supply: 12V ±10%
  - U.3/E1.L AUX supply: 3.3V ±10%

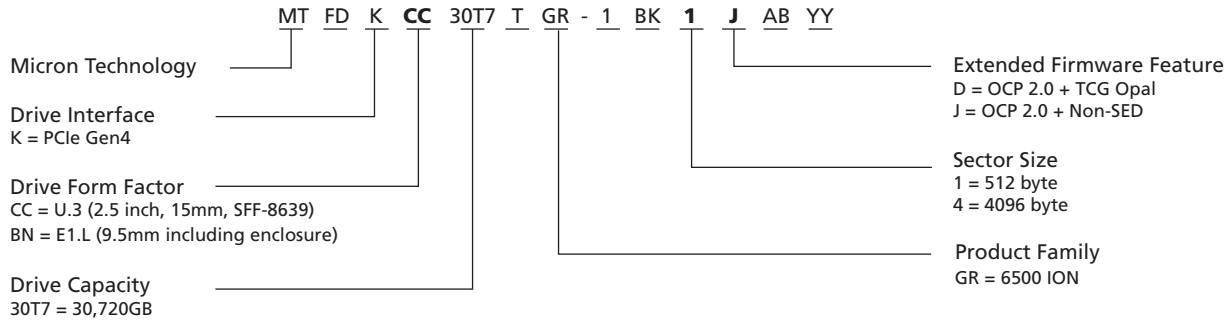
Notes: 1. Steady state as defined by SNIA Solid State Storage Performance Test Specification Enterprise v1.1.
2. 4KB, queue depth 1 transfers used for READ/WRITE latency values.
3. TYP: Median, 50th percentile
4. Product achieves MTTF based on population statistics not relevant to individual units.
5. Temperature measured by SMART.

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Part Numbering Information

Micron 6500 ION SSDs are available in different configurations. The chart below is a comprehensive list of options; not all options listed can be combined to define an offered product. Visit www.micron.com for a list of valid part numbers.

Figure 1: Part Number Chart



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Performance

Measured performance can vary for a number of reasons. The major factors affecting drive performance are the capacity of the drive and the interface of the host. Additionally, overall system performance can affect the measured drive performance. When comparing drives, it is recommended that all system variables are the same, and only the drive being tested varies.

Performance numbers will vary depending on the host system configuration.

Table 1: Drive Performance

Parameter Power State 0		U.3 30,720GB	E1.L 30,720GB	Unit
Sequential (128KB transfer)	Read	6800	6800	MB/s
	Write	5000	5000	
Random (4KB transfer)	Read	1000	1000	KIOPS
	Write	200	200	
	70/30 Read/Write	400	400	
Latency	Read (TYP)	70	70	µs
	Write (TYP)	15	15	
	Read (99%)	80	80	
	Write (99%)	65	65	

Notes: 1. Performance values measured under the following conditions:
- — Steady state as defined by SNIA Solid State Storage Performance Test Specification Enterprise v1.1
- — 4K sector size
- — Drive write cache enabled
- — NVMe power state 0
- — Sequential READ and WRITE workloads measured using FIO with a queue depth of 128
- — Random READ and WRITE workloads measured using FIO with a queue depth of 128

2. Performance values measured with the following system configuration:
- — Generic X570 motherboard
- — AMD Ryzen7 3700X 8-Core CPU @ 3.6 GHz
- — DDR4 16GB @ 3200 MHz

3. Latency values measured under the following configuration:
- — Random workloads using FIO with 4KB transfers and a queue depth of 1
- — TYP = median, 50th percentile

4. System variations will affect measured results.

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Endurance

While actual endurance varies depending on conditions, the drive lifetime can be estimated based on capacity, assumed fixed-use models, ECC, and formatted sector size.

Lifetime estimates for the device are shown in the following tables in total bytes written.

Table 2: Endurance

Estimated Endurance	Total Bytes Written (TBW) in TB	TBW Per Day for 5 years	Drive Writes Per Day (DWPD) for 5 Years
6500 ION Capacity	**30,720GB**	**30,720GB**	**30,720GB**
100% 128K Sequential Writes	56,000	30.72TB	1.00
90% 128K Sequential Writes/ 10% 4K Random Writes	50,400	27.64TB	0.90
80% 128K Sequential Writes/ 20% 4K Random Writes	47,600	26.11TB	0.85
70% 128K Sequential Writes/ 30% 4K Random Writes	42,000	23.04TB	0.75
50% 128K Sequential Writes/ 50% 4KB Random Writes	30,800	16.89TB	0.55
100% 4K Random Writes	16,800	9.20TB	0.30
100% 8K Random Writes	16,800	9.20TB	0.30
100% 16K Random Writes	16,800	9.20TB	0.30

Notes: 1. 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.

2. 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.
3. 1TB = 1,000,000,000,000 bytes; 1GB = 1,000,000,000 bytes.

Endurance calculation assumptions for workloads noted above:

- For pure 4K, 8K, and 16K random write workloads, 100% random aligned to transfer size noted.
- For mixed 4K sequential/random write workloads:
  – Sequential and random data is not interleaved
  – LBA ranges segregated for sequential/random portions
  – Sequential data contiguously written to LBA range followed by random data for rest of LBA

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Electrical Characteristics

Table 3: Power Consumption

Parameter Power State 0	U.3 30,720GB	E1.L 30,720GB	Unit
Active read (maximum RMS)	15	15	W
Active write (maximum RMS)	20	20	W
128K sequential read (average RMS)	15	15	W
128K sequential write (average RMS)	20	20	W
4K random read (average RMS)	14	14	W
4K random write (average RMS)	15	15	W
Idle (average RMS)	5	5	W

Notes: 1. Power limiting is configured through Set/Get Features Power Management.
2. Power consumption measurements are for reference only; actual workload power consumption will vary.

Table 4: Operating Voltage – U.3 and EDSFF

Power Rail	Electrical Parameter	Value
12V	Operating voltage	12 Vdc (±10%)
	MIN/MAX rise time	1ms/100ms
	Fall time	<5s
	MIN power-off time	50ms
	Inrush current (typical peak)	2.0A
3.3 V_{AUX}	Operating voltage	U.3: 3.3 Vdc (±15%) E1.L: 3.3 Vdc (±10%)
	MIN/MAX rise time	1ms/50ms
	MIN/MAX fall time	1ms/5s
	MAX average current	5mA

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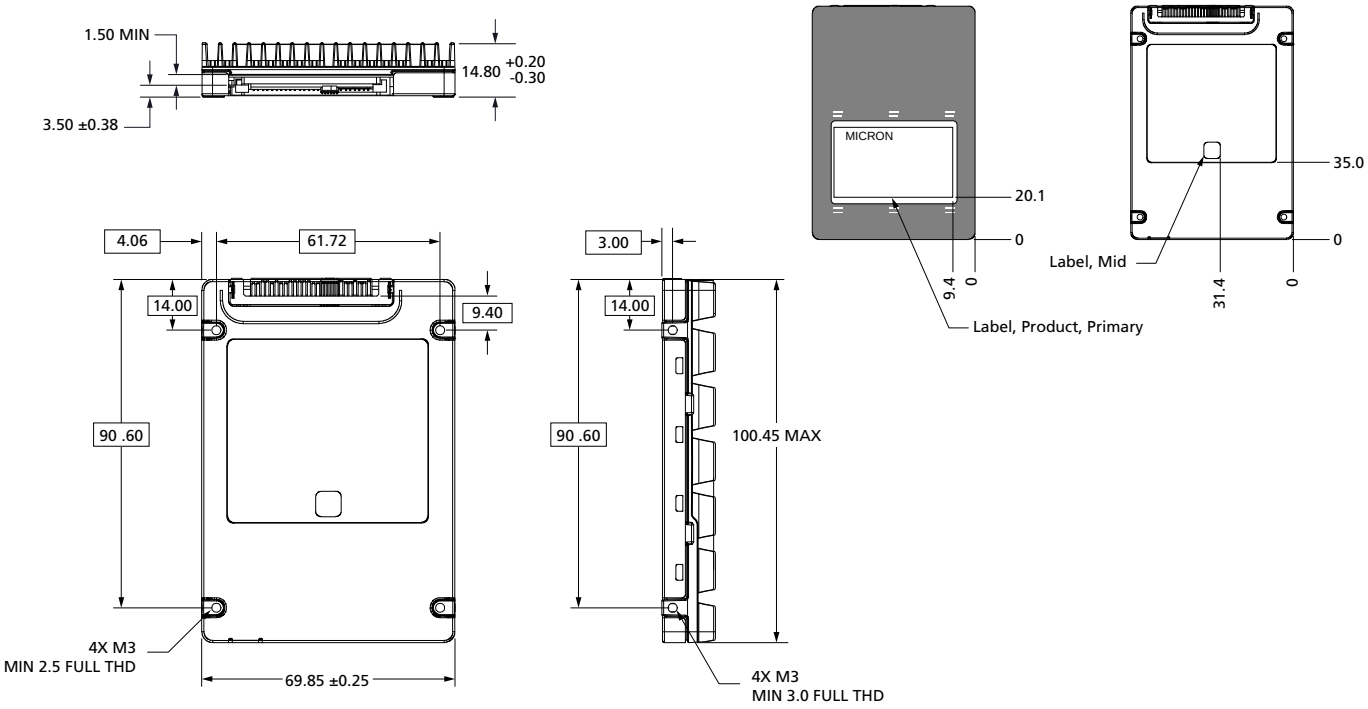
Physical Configuration

U.3 Enterprise PCIe (SFF - 8201 and SFF - 8223)

Product mass: less than 200 grams for U.3 15mm

Figure 2:

Figure 3: U.3 15mm Nominal Dimensions



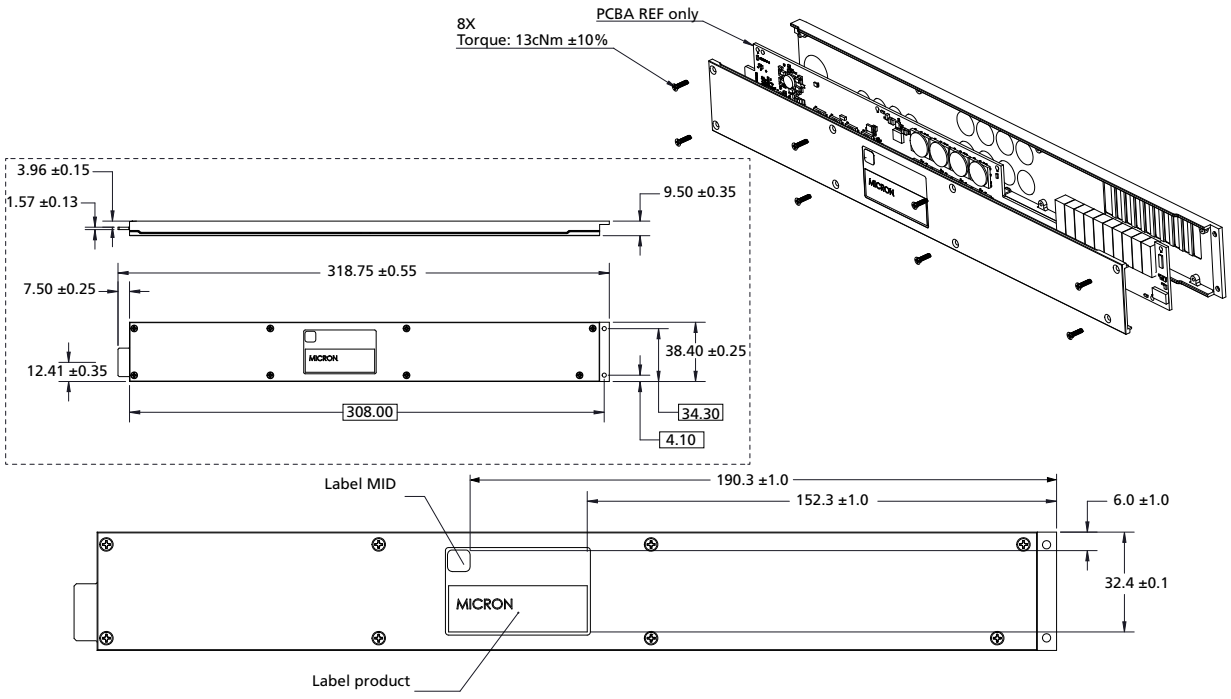
Notes: 1. All dimensions are in millimeters.
2. Dimension values per SFF - 8201, Revision 3.4 and SFF - 8223 Revision 2.7.

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E1.L Enterprise PCIe x4

Product mass: less than 300 grams for E1.L.

Figure 4: E1.L 9.5mm Nominal Dimensions



Notes: 1. All dimensions are in millimeters.
2. Dimension values per SFF-TA-1007 Revision 1.1.

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Compliance

Micron SSDs comply with the following:

- Micron Green Standard
- Built with sulfur-resistant resistors
- CE (Europe): EN55032, EN55035 Class A, RoHS
- FCC: CFR Title 47, Part 15, Class A
- UL/cUL: approval to UL 62368-1
- BSMI (Taiwan): approval to CNS 13438, Class A, CNS 15663
- RCM (Australia, New Zealand): AS/NZS CISPR32 Class A
- KC RRL (Korea): approval to KS C 9832 Class A, KS C 9835 Class A
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Revision History

Rev. A – 06/2023

- Initial release

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