

# 2650 SSD Series Technical Product Specification

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

## Features

- Micron® 3D TLC NAND Flash
- PCIe® Gen4 x4
- NVMe 2.0
  - Number of namespaces supported: 1
  - Round robin arbitration: not weighted
  - Autonomous power state transitions
- TCG/Pyrite 2.01 compliant non-self-encrypting drive (non-SED)
- TCG/Opal 2.02 compliant self-encrypting drive (SED)
- Capacity (unformatted)<sup>1</sup>: 256GB, 512GB, 1024GB
- Endurance: Total bytes written (TBW): Up to 600TB HMB(Host Memory Buffer) DRAM-Less
- Industry-standard 512 byte sector size support
- Security
  - Digitally signed firmware
- Self-monitoring, analysis, and reporting technology (SMART)
- Device self-test
- Power loss protection for data-at-rest
- Power loss signal support
- Performance<sup>2</sup>
  - Sequential 1MB READ: Up to 6200 MB/s
  - Sequential 1MB WRITE: Up to 5700 MB/s
  - Random 4KB READ: Up to 950 KIOPS
  - Random 4KB WRITE: Up to 1000 KIOPS
- Latency<sup>3</sup>
  - Read (TYP): 50µs
  - Write (TYP): 12µs
- Reliability
  - MTTF: Up to 2 million device hours<sup>4</sup>
  - Static and dynamic wear leveling
  - Uncorrectable bit error rate (UBER): <1 sector per 10<sup>15</sup> bits read

- Operating temperature<sup>5</sup>
  - Commercial (0°C to +70°C)
  - Host-controlled thermal management
  - System management bus temperature monitoring (SMBus)
- Field upgradeable firmware
  - Firmware activation without reset
- Form factor
  - M.2 Type 2280, 2242, 2230
  - Single sided S3
- Electrical specification
  - Power supply: 3.3V ±5%

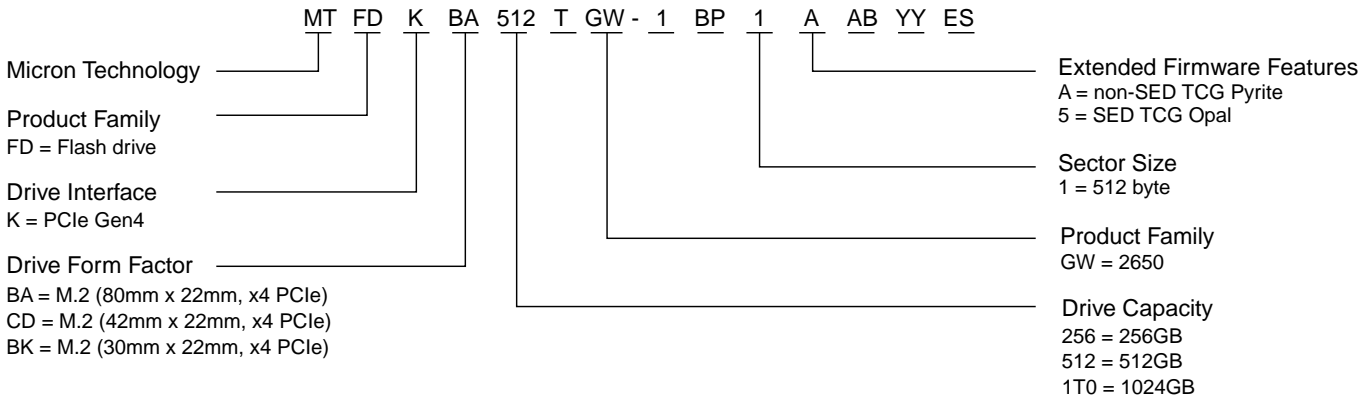
- Notes:
1. User capacity: 1GB = 1 billion bytes.
  2. Typical I/O performance numbers as measured fresh-out-of-box (FOB).
  3. 4KB, queue depth 1 transfers used for READ/ WRITE latency values.
  4. The product achieves a mean time to failure (MTTF) based on population statistics not relevant to individual units.
  5. Temperature measured by T<sub>CASE</sub>.

**Warranty:** Contact your Micron sales representative for further information regarding the product, including product warranties.

Part Numbering Information

Micron’s 2650 SSD is available in different configurations and capacities. The chart below is a comprehensive list of options for the 2650 series devices; not all options listed can be combined to define an offered product. Visit <https://www.micron.com> for a list of valid part numbers.

Figure 1: Part Number Chart



## Important Notes and Warnings

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**Critical Applications.** Products are not authorized for use in applications in which failure of the Micron component could result, directly or indirectly in death, personal injury, or severe property or environmental damage ("Critical Applications"). Customer must protect against death, personal injury, and severe property and environmental damage by incorporating safety design measures into customer's applications to ensure that failure of the Micron component will not result in such harms. Should customer or distributor purchase, use, or sell any Micron component for any critical application, customer and distributor shall indemnify and hold harmless Micron and its subsidiaries, subcontractors, and affiliates and the directors, officers, and employees of each against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, or death arising in any way out of such critical application, whether or not Micron or its subsidiaries, subcontractors, or affiliates were negligent in the design, manufacture, or warning of the Micron product.

**Customer Responsibility.** Customers are responsible for the design, manufacture, and operation of their systems, applications, and products using Micron products. ALL SEMICONDUCTOR PRODUCTS HAVE INHERENT FAILURE RATES AND LIMITED USEFUL LIVES. IT IS THE CUSTOMER'S SOLE RESPONSIBILITY TO DETERMINE WHETHER THE MICRON PRODUCT IS SUITABLE AND FIT FOR THE CUSTOMER'S SYSTEM, APPLICATION, OR PRODUCT. Customers must ensure that adequate design, manufacturing, and operating safeguards are included in customer's applications and products to eliminate the risk that personal injury, death, or severe property or environmental damages will result from failure of any semiconductor component.

**Limited Warranty.** In no event shall Micron be liable for any indirect, incidental, punitive, special or consequential damages (including without limitation lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort, warranty, breach of contract or other legal theory, unless explicitly stated in a written agreement executed by Micron's duly authorized representative.

## 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.

For SSDs designed for the client computing market, Micron specifies performance in fresh-out-of-box (FOB) state.

For a description of these performance states and of Micron's best practices for performance measurement, refer to Micron's technical marketing brief [Best Practices for SSD Performance Measurement](#).

**Table 1: Drive Performance**

Parameter PCIe Gen 4	Capacity			Unit
	256GB	512GB	1024GB	
Sequential READ (1MB transfer)	5000	7000	7000	MB/s
Sequential WRITE (1MB transfer)	2500	4800	6000	MB/s
Random READ (4KB transfer)	370	740	1000	KIOPS
Random WRITE (4KB transfer)	500	1000	1000	KIOPS

Notes: 1. Performance values measured under the following conditions:

- Windows 11 secondary data drive
- CrystalDiskMark 8.0.4
- Drive write cache enabled
- NVMe power state 0
- Sequential workloads measured using CDM with 1MB Q8T1
- Random workloads measured using CDM with 4KB Q32T16

2. Performance values measured with the following system configuration:

- Dell® Precision 3581 Mobile Workstation
- Intel® i7-13800H Processor (Raptor Lake)
- Crucial® 16GB (2 x 8GB) DDR5-4800 SDRAM
- Microsoft® Windows 11 Pro

3. System variations will affect measured results.

## Endurance

Endurance for the SSD can be predicted based on the usage conditions applied to the device, the internal NAND component cycles, the write amplification factor, and the wear-leveling efficiency of the drive. The tables below show the drive lifetime for each SSD capacity by client computing and sequential input and based on predefined usage conditions.

**Table 2: Total Bytes Written**

Capacity	Total Bytes Written
256GB	200TB
512GB	300TB
1024GB	600TB

Notes: 1. Total bytes written validated with JEDEC Standard JESD219-A Client endurance workload.

- Host workload parameters, including write cache settings, I/O alignment, transfer sizes, randomness, and percent full, that are substantially different than the described notes may result in varied endurance results.
- GB/day can be estimated by dividing the total bytes written value by (365 × number of years). For example: 100TB/3 years/365 days = 91GB/day for 3 years.

## Electrical Characteristics

**Table 3: NVMe Power Consumption**

Capacity	NVMe Power State							Unit
	PS4	PS3	PS2	PS1	PS0			
	Sleep	Slumber	Heavy Throttle	Light Throttle	Active Idle	Active Writes	Active Reads	
						PCIe Gen4	PCIe Gen4	
256GB	<2.5	<30	<1500	<3000	<150	<6100	<6100	mW
512GB	<2.5	<30	<1500	<3000	<150	<6100	<6100	mW
1024GB	<2.5	<30	<1500	<3000	<150	<6100	<6100	mW

Notes: 1. Active read power is a typical RMS active average power measurement performed using FIO with 128KB sequential read transfers.

- Active write power is a typical RMS active average power measurement performed using FIO with 128KB sequential write transfers.

3. PS3 power measured at 25°C.

**Table 4: Maximum Ratings**

Parameter/Condition	Symbol	Min	Max	Unit
Voltage input	3.3V	3.135	3.465	V
Operating temperature <sup>1</sup>	T <sub>C</sub>	0	70	°C
Non-operating temperature	–	–40	85	°C
Rate of temperature change	–	–	20	°C/hour
Relative humidity (non-condensing)	–	5	95	%

Note: 1. Temperature measured in T<sub>CASE</sub> and T<sub>JUNCTION</sub> by SMART.

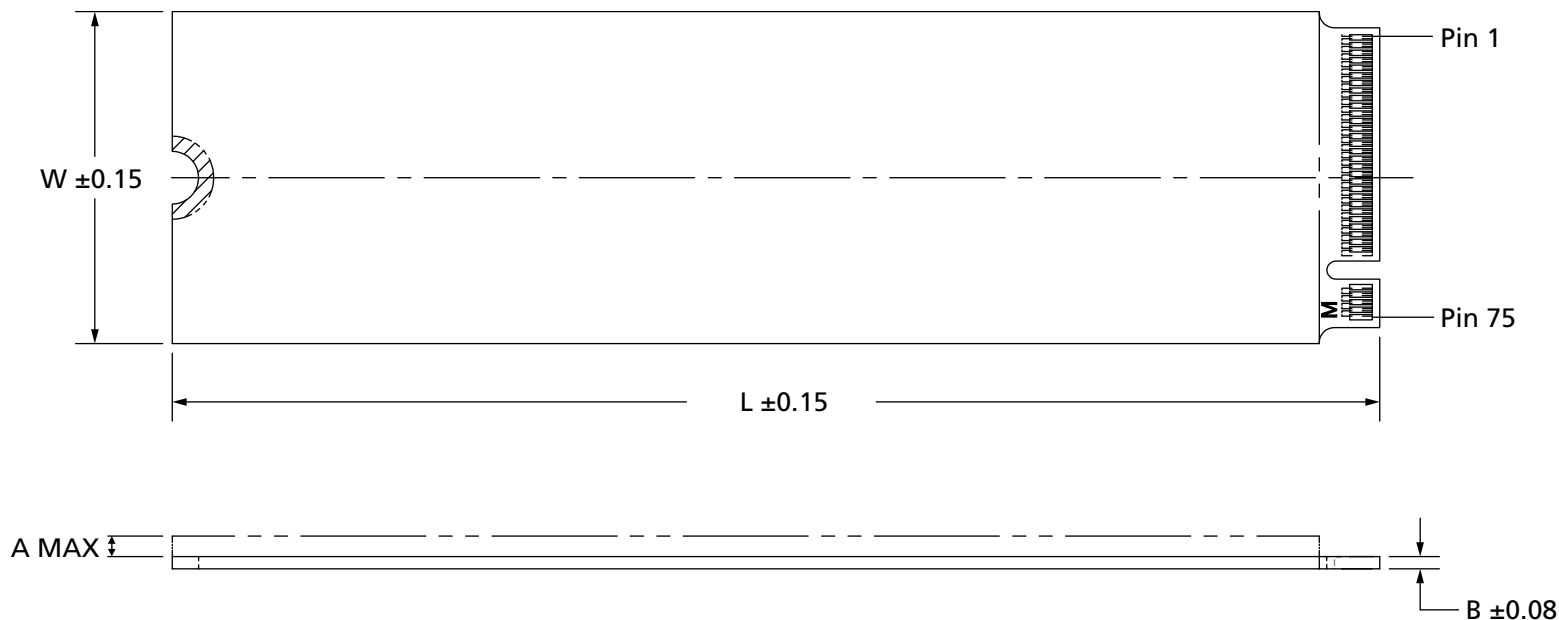
## Physical Configuration

### M.2 Type 2280, 2230, 2242

Product mass: 10 grams MAX

Physical dimensions conform to the applicable form factor specifications as listed in the figure below.

**Figure 2: M.2 Type 2280, 2230, 2242 Form Factor**



Note: 1. All dimensions are in millimeters.

**Table 5: M.2 Type 2280, 2230, 2242 Form Factor Dimensions**

Capacity (GB)	Type	W	L	A	B	Unit
256	2280-S3-M	22.00	80.00	1.50	0.80	mm
512						
1024						
256	2242-S3-M	22.00	42.00	1.50	0.80	mm
512						
1024						
256	2230-S3-M	22.00	30.00	1.50	0.80	mm
512						
1024						

Note: 1. Dimension values per PCI Express M.2 Electromechanical Specification, Revision 1.1.

## Compliance

The SSDs comply with the following:

- Micron Green Standard
- CE (Europe): EN55032, EN55035 Class B, RoHS
- UKCA (UK): EN 55032, EN 55035, Class B, RoHS
- Built with sulfur-resistant resistors
- FCC: CFR Title 47, Part 15, Class B
- UL/cUL: approval to UL/IEC 60950 and UL/IEC 62368-1
- BSMI (Taiwan): approval to CNS 13438 Class B, CNS15663
- RCM (Australia, New Zealand): AS/NZS CISPR32 Class B
- KC RRL (Korea): approval to KS C 9832 Class B, KS C 9835 Class B  
 B 급 기기                      이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거  
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- Morocco: EN55032, EN55035 Class B
- UkrSEPRO (Ukraine): EN55032 Class B, EN62368-1, RoHS (Resolution 2017 No. 139)



## FCC Rules

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.



## Revision History

### Rev. A – 07/2024

- Initial release.

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This data sheet contains minimum and maximum limits specified over the power supply and temperature range set forth herein. Although considered final, these specifications are subject to change, as further product development and data characterization sometimes occur.