

Micron 5400 Series SATA NAND Flash SSD Technical Product Specification

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

Features

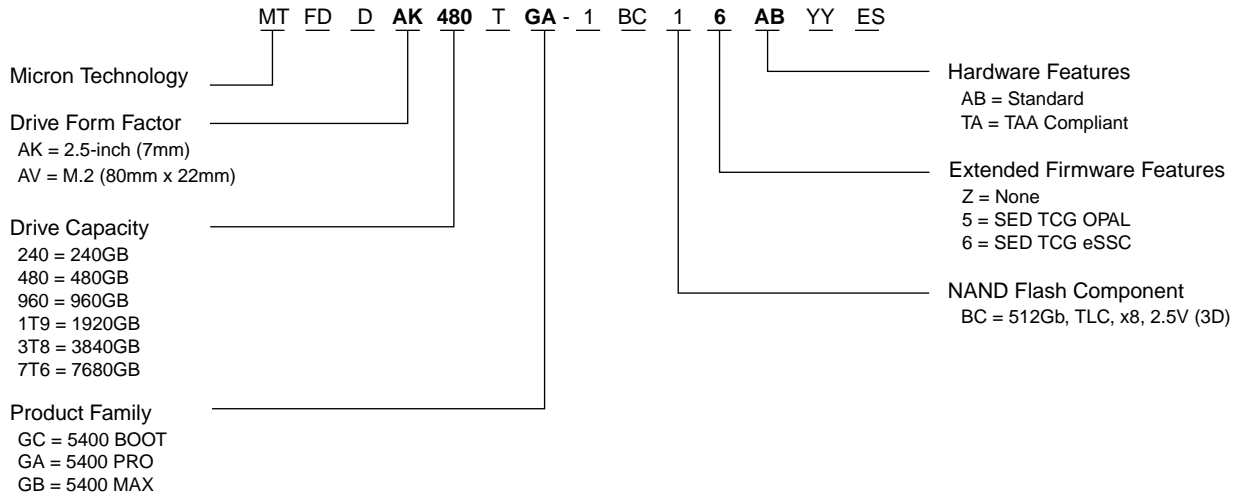
- Micron® 3D TLC NAND Flash
- Three performance/endurance levels
 - BOOT
 - PRO
 - MAX
- TCG Enterprise and TCG Opal 2.0 compliant self-encrypting drive (SED) options
- SATA 6 Gb/s interface
- ATA modes supported
 - PIO mode 3, 4
 - Multiword DMA mode 0, 1, 2
 - Ultra DMA mode 0, 1, 2, 3, 4, 5, 6
- 512-byte sector size support
- Hot-plug capable (2.5-inch only)
- ATA-8 ACS-4 command set compliant
- Security erase command set: fast and secure erase
- Performance (steady state)¹
 - Sequential 128KB read: Up to 540 MB/s
 - Sequential 128KB write: Up to 520 MB/s
 - Random 4KB read: Up to 95,000 IOPS
 - Random 4KB write: Up to 65,000 IOPS
- Endurance³: Total bytes written (TBW)
 - BOOT: Up to 438TB
 - PRO: Up to 10,512TB
 - MAX: Up to 23,827TB
- Reliability
 - MTTF: 3.0 million device hours²
 - Static and dynamic wear leveling
 - Uncorrectable bit error rate (UBER): <1 sector per 10¹⁷ bits read
 - End-to-end data protection
 - Enhanced power-loss data protection with data protection capacitor monitoring
- Self-monitoring, analysis, and reporting technology (SMART) command set
- Capacity³ (unformatted): 240GB, 480GB, 960GB, 1920GB, 3840GB, 7680GB
- Mechanical:
 - 2.5-inch x 7.0mm form factor
 - M.2 Type 2280 form factor
- RoHS-compliant package
- Secure field-upgradeable firmware with digitally signed firmware image
- Operating temperature
 - Commercial (0°C to 70°C)⁴

- Notes: 1. Performance varies by capacity and endurance.
2. The product achieves a MTTF based on population statistics not relevant to individual units.
3. 1GB = 1 billion bytes; formatted capacity is less.
4. As reported by SMART.

Part Numbering Information

Micron’s 5400 SSD is available in different configurations and densities. The chart below is a comprehensive list of options for the 5400 series devices; not all options listed can be combined to define an offered product. Visit micron.com for a list of valid part numbers.

Figure 1: Part Number Chart



Important Notes and Warnings

Micron Technology, Inc. ("Micron") reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions. This document supersedes and replaces all information supplied prior to the publication hereof. You may not rely on any information set forth in this document if you obtain the product described herein from any unauthorized distributor or other source not authorized by Micron.

Automotive Applications. Products are not designed or intended for use in automotive applications unless specifically designated by Micron as automotive-grade by their respective data sheets. Distributor and customer/distributor shall assume the sole risk and liability for and shall indemnify and hold Micron harmless against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, death, or property damage resulting directly or indirectly from any use of non-automotive-grade products in automotive applications. Customer/distributor shall ensure that the terms and conditions of sale between customer/distributor and any customer of distributor/customer (1) state that Micron products are not designed or intended for use in automotive applications unless specifically designated by Micron as automotive-grade by their respective data sheets and (2) require such customer of distributor/customer to indemnify and hold Micron harmless against all claims, costs, damages, and expenses and reasonable attorneys' fees arising out of, directly or indirectly, any claim of product liability, personal injury, death, or property damage resulting from any use of non-automotive-grade products in automotive applications.

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/HBA 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. Performance is measured using a single drive direct attached (no RAID) to an integrated SATA controller.

Table 1: Drive Performance – BOOT M.2

Parameter	Capacity	
	240GB	Unit
Sequential read (128KB transfer)	540	MB/s
Sequential write (128KB transfer)	290	MB/s
Random read (4KB transfer)	62,000	IOPS
Random write (4KB transfer)	12,000	IOPS
Random 70/30 R/W (4KB transfer)	24,000	IOPS
READ latency (99.9%)	170	µs
WRITE latency (99.9%)	390	µs

- Notes: 1. Performance measured using FIO with a queue depth of 32 in the steady state region.
 2. 4KB transfers with a queue depth of 1 are used to measure READ/WRITE latency values.
 3. System variations and HBA used will affect measured results.

Table 2: Drive Performance – PRO M.2/2.5"

Parameter	Capacity						Unit
	240GB	480GB	960GB	1920GB	3840GB	7680GB	
Sequential read (128KB transfer)	540	540	540	540	540	540	MB/s
Sequential write (128KB transfer)	350	520	520	520	520	520	MB/s
Random read (4KB transfer)	75,000	95,000	95,000	95,000	95,000	93,000	IOPS
Random write (4KB transfer)	37,000	37,000	33,000	33,000	30,000	10,500	IOPS
Random 70/30 R/W (4KB transfer)	49,000	59,000	58,000	58,000	51,000	30,000	IOPS
READ latency (99.9%)	170	170	170	170	170	170	µs
WRITE latency (99.9%)	150	42	80	120	210	400	µs

- Notes: 1. Performance measured using FIO with a queue depth of 32 in the steady state region.
 2. 4KB transfers with a queue depth of 1 are used to measure READ/WRITE latency values.
 3. System variations and HBA used will affect measured results.

Table 3: Drive Performance – MAX 2.5"

Parameter	Capacity				Unit
	480GB	960GB	1920GB	3840GB	
Sequential read (128KB transfer)	540	540	540	540	MB/s
Sequential write (128KB transfer)	520	520	520	520	MB/s
Random read (4KB transfer)	95,000	95,000	94,000	95,000	IOPS
Random write (4KB transfer)	58,000	65,000	63,000	34,000	IOPS
Random 70/30 R/W (4KB transfer)	69,000	77,000	79,000	63,000	IOPS
READ latency (99.9%)	170	170	170	170	µs
WRITE latency (99.9%)	36	35	120	90	µs

- Notes: 1. Performance measured using FIO with a queue depth of 32 in the steady state region.
 2. 4KB transfers with a queue depth of 1 are used to measure READ/WRITE latency values.
 3. System variations and HBA used 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. Total bytes written measured with 55°C case temperature within the total bytes written values listed in this document. The table below shows the drive lifetime for each SSD capacity based on predefined usage conditions.

Table 4: Drive Lifetime

Capacity	Drive Lifetime (Total Bytes Written)			Unit
	BOOT	PRO	MAX	
240GB	438	657	2190	TB
480GB	–	1324	4380	
960GB	–	2628	8760	
1920GB	–	5256	17,520	
3840GB	–	8410	24,528	
7680GB	–	9110	–	

- Notes: 1. Total bytes written were calculated assuming drive is 100% full (user capacity) and a workload of 100% random, aligned 4KB writes.
 2. 1TB = 1,000,000,000,000 bytes



Electrical Characteristics

Table 5: SATA Power Consumption – 2.5-inch

Capacity	Idle Average	Sequential Write (128KB transfer)	Sequential Read (128KB transfer)
240GB	1.5W	3W	2.5W
480GB	1.5W	3.1W	2.5W
960GB	1.5W	3.1W	2.8W
1920GB	1.5W	3.6W	3.0W
3840GB	1.5W	3.8W	2.8W
7680GB	1.5W	3.9W	2.8W

Notes: 1. Data taken at 25°C using a 6 Gb/s SATA interface.
2. Sequential power measured during Iometer with 128KB transfer, RMS average over a 500ms window.

Table 6: SATA Power Consumption – M.2 Type 2280

Capacity	Idle Average	Sequential Write (128KB transfer)	Sequential Read (128KB transfer)
240GB	1.5W	3W	2.5W
480GB	1.5W	3.1W	2.5W
960GB	1.5W	3.1W	2.8W

Notes: 1. Data taken at 25°C using a 6 Gb/s SATA interface.
2. Sequential power measured during Iometer with 128KB transfer, RMS average over a 500ms window.

Table 7: Operating Voltage

Parameter/Condition	Symbol	Min	Max	Unit
Voltage input (2.5-inch) ¹	V12	10.8	13.2	V
	V5	4.5	5.5	V
Voltage input (M.2)	3V3	3.14	3.46	V
Operating temperature ²	T _C	0	70	°C
Non-operating temperature	–	–40	85	°C
Rate of temperature change	–	–	20	°C/hour
Relative humidity (non-condensing)	–	5	95	%

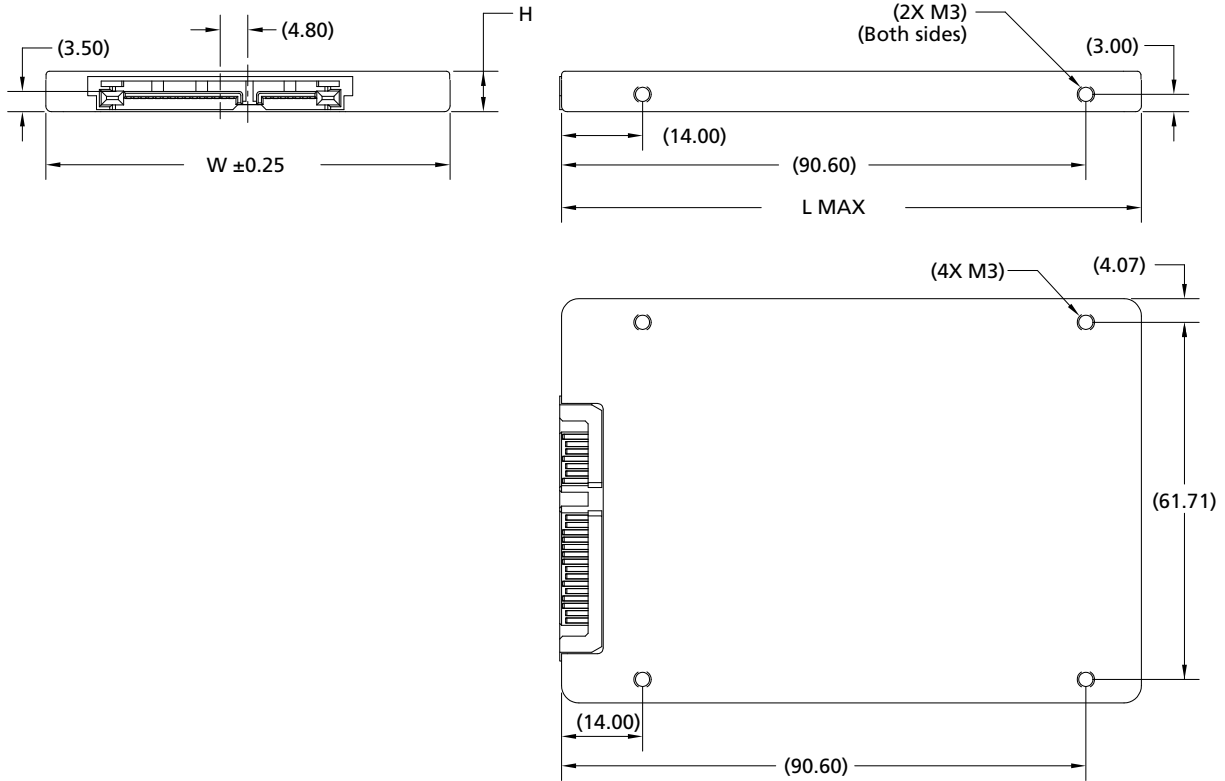
Notes: 1. 5V supply required; 12V supply optional
2. Based upon drive temperature reported by SMART

Physical Configuration

2.5-Inch 7mm

Screw: M3 x 0.5 with a maximum of 5mm encroachment into the SSD
Torque: Maximum of 4 in-lbs @ 200 rpm with an actuation style lever

Figure 2: 2.5-Inch Package – 7mm

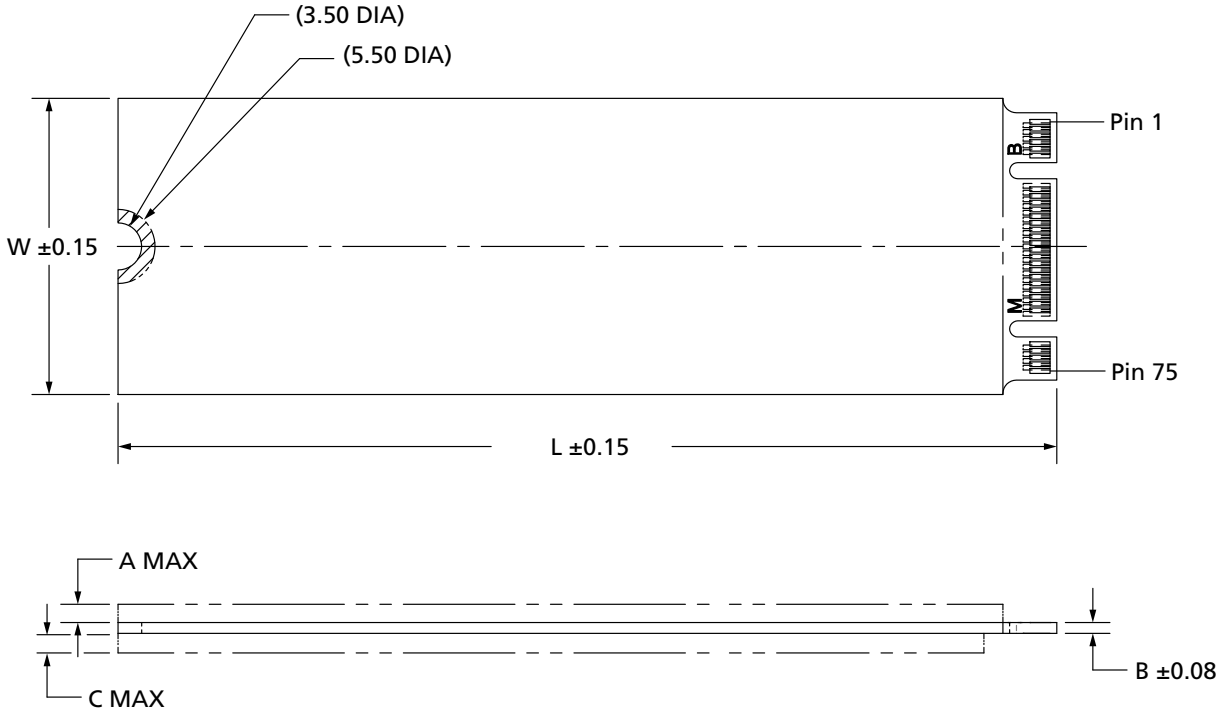


Note: 1. All dimensions are in millimeters.

M.2 2280

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

Figure 3: M.2 Type 2280 Package



Note: 1. All dimensions are in millimeters.

Compliance

Micron SSDs comply with the following:

- Micron Green Standard
- Built with sulfur resistant resistors
- CE (Europe): EN 55032 Class B, RoHS
- UKCA (UK): SI 2016/1091 Class B and SI 2012/3032 RoHS
- FCC: CFR Title 47, Part 15 Class B
- UL/cUL: approval to UL-60950-1, 2nd Edition, IEC 60950-1:2005 (2nd Edition); EN 60950-1 (2006) + A11:2009+ A1:2010 + A12:2011 + A2:2013
- BSMI (Taiwan): approval to CNS 13438 Class B and CNS 15663
- RCM (Australia, New Zealand): AS/NZS CISPR32 Class B
- KC RRA (Korea): approval to KN32 Class B, KN 35 Class B
B 급 기기 이 기기는 가정용으로 전자파적합등록을 한 기기로서 주거 (가정용 정보통신기기) 지역에서는 물론 모든 지역에서 사용할 수 있습니다.
- W.E.E.E.: compliance with EU WEEE directive 2012/19/EC. Additional obligations may apply to customers who place these products in the markets where WEEE is enforced.
- TUV (Germany): approval to IEC60950/EN60950
- VCCI (Japan): 2015-04 Class B
この装置は、クラス B 情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。
取扱説明書に従って正しい取り扱いをして下さい。
VCCI-B
- IC (Canada): ICES-003 Class B
 - This Class B digital apparatus complies with Canadian ICES-003.
 - Cet appareil numérique de la classe B est conforme à la norme NMB-003 du Canada.
- Morocco: approval to EN55032/EN55024 Class B
- UkrSEPRO (Ukraine): EN55032 Class B, IEC60950/EN60950, RoHS (Resolution 2017 No. 139)



Revision History

Rev. A – 09/2023

- Initial release

8000 S. Federal Way, P.O. Box 6, Boise, ID 83707-0006
208-368-4000, micron.com/support

Micron and the Micron logo are trademarks of Micron Technology, Inc.
All other trademarks are the property of their respective owners.

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.