



AGI SSD M.2 2280 SATA AS281E Series

Product Specification

Version 1.3

Part Number Information

AGI128ZAS281E1-BK	Capacity: 128GB	M.2 SATA
AGI256ZAS281E1-BK	Capacity: 256GB	M.2 SATA
AGI512ZAS281E1-BK	Capacity: 512GB	M.2 SATA
AGI1T0ZAS281E1-BK	Capacity: 1TB	M.2 SATA



Revision History

Rev.	Date	Description
Preliminary	2025.09.10	First version draft published
V1.0	2026.04.09	Update capacity, performance, and reliability information
V1.1	2026.04.17	Update 512GB & 1TB performance
V1.2	2026.06.16	Update Part Number Information
V1.3	2026.09.22	Update Performance

1. Introduction

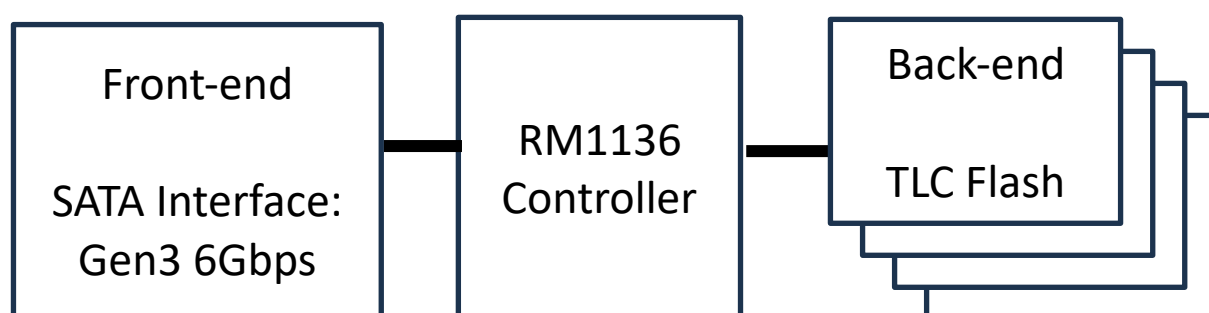
1.1 General Description

The AGI® Industrial M.2 SATA SSD is designed and built for industrial computers and embedded systems, providing stability, reliability and low power consumption. Here are three common applications for AGI® SSDs:

Hard drive replacement - Solid-state drives are the next generation of storage technology and run faster, quieter and cooler than traditional hard drives. With no moving parts, SSDs are also more durable and more reliable than hard drives.

For industrial PCs and embedded systems - AGI solid-state drives improve overall system responsiveness so it boots quicker, loads applications faster and operates more efficiently. They are suitable for a wide range of industrial and embedded platforms.

Revive older systems - Solid-state drives not only improve system performance but can also be used to extend the service life of older systems. Choosing an SSD is a practical and cost-effective way to upgrade an existing platform without a full system replacement.





1.2 Flash Management Technology

1.2.1 Background Garbage Collection

SSDs use dedicated controllers to manage NAND Flash storage and perform Garbage Collection (GC). GC is a background management process that helps organize valid and invalid data within the Flash memory.

When a file is deleted in an operating system such as Windows, the OS usually updates its file system table to mark that file as deleted. On a hard disk drive (HDD), the invalid data can remain in place until the system writes new data over it.

NAND Flash works differently. Data that already exists in a used block cannot be overwritten directly. Before new data can be written, the SSD must complete a Program/Erase cycle. In practice, the controller first moves any valid data from the used block to available pages in another block, then erases the original block, and finally writes the new data to the erased block. This operation is known as Garbage Collection. Modern operating systems also support the TRIM command, which allows the OS to inform the SSD which data is no longer needed, helping the SSD reclaim space earlier and reduce unnecessary data movement.

1.2.2 Wear-Leveling

AGI Flash storage devices use controller technologies designed to balance the number of Program/Erase (P/E) cycles across the Flash memory. By spreading write and erase activity more evenly among memory blocks, wear-leveling helps extend drive life and maintain more consistent performance throughout the product's service life.



1.3 Feature Description

- NCQ(Native Command Queuing)
- Compatible with SATA 1.5/3.0/6.0 Gb/s
- S.M.A.R.T Support
- Trim Command
- ATA/ATAPI Command Set(ACS) Compliant
- Dynamic & Static Wear-Leveling
- Background Garbage Collection
- SATA Revision 3.2
- Thermal Throttling
- Power Saving Mode:
 - Partial Mode
 - Slumber Mode
 - DEVSLP



2. General Production Specifications

2.1 Capacity

Addressable sectors follow the IDEMA organization standard, reference to Document LBA1-03 LBA Count for Disk Drives Standard.

Unformatted Capacity	Total User Addressable Sectors in LBA
128GB	250,069,680
256GB	500,118,192
512GB	1,000,215,216
1TB	2,000,409,264

2.2 Fundamental Specification

- Density: 128GB/256GB/512GB/1TB
- Form-Factor: NGFF 2280 M.2
- Interface: 6Gb/s SATA III
- Performance: Measured with CrystalDiskMark 8.0.4, 1GiB, QD32 T1, FOB state.
Performance may vary by platform, capacity and firmware. Performance values are measured at 25°C. Throughput may decrease at temperature extremes due to NAND timing adjustment and thermal throttling.

Capacity	128GB	256GB	512GB	1TB
Sequential Read (MB/s)	330	500	540	540
Sequential Write (MB/s)	120	265	500	500
4K Random Read QD32 (IOPS)	10000	14500	28000	55000
4K Random Write QD32 (IOPS)	30000	57000	71700	80000

2.3 Power Specification

Parameter	Specification
Input Voltage	3.3V +/- 5%

2.4 Reliability Specification

Parameter	Value
Mean Time between Failure (MTBF)	1,500,000 hours



2.5 Endurance and Warranty Policy

AGI warrants that its products will be free from defects in material and workmanship for the original end-user customer. Warranty coverage for this product remains valid until the earlier of the following:

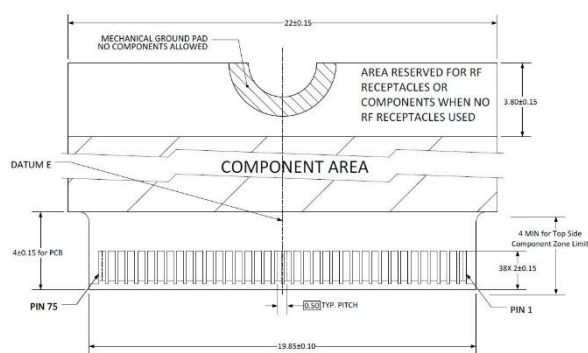
- (i) Three years from the original end-user customer's date of purchase.
- (ii) The date on which the SSD reaches its TBW threshold, as determined by AGI software.

Parameter	Capacity	Specification
Warranty Period	All	3 years or rated TBW, whichever comes first
TBW	128GB	100TB
	256GB	200TB
	512GB	400TB
	1TB	800TB

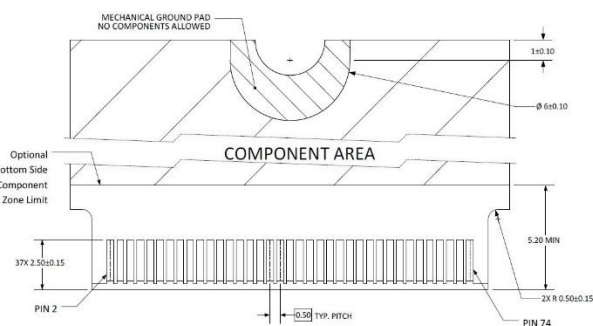
3. Physical Specification

The NGFF M.2 2280 form factor complies with the JEDEC specification for NGFF M.2 2280. Detailed mechanical dimensions are listed below, including tolerance information.

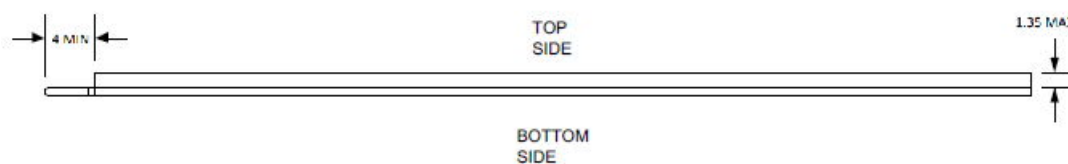
Length	Width	Thickness	Weight
80mm	22mm	3.5mm	5.7~5.9g



Top Side



Bottom Side



4. Environment Specifications

4.1 Storage Specification

Mode	Min	Max	unit
Operating	-25	85	°C
Storage	-40	85	°C

4.2 Durability Specification

All materials are required to pass the ICQ unit's visual inspection (VI) and quality tests. Routine durability testing covers both new PCBAs and running materials to ensure consistent product durability.

Item	Condition
Shock	1500G@0.5ms

5. M.2 2280 SATA Pin Assignment

Pin#	Type	Description	Pin#	Type	Description
P1	CONFIG_3	Connect to GND	P39	GND	Return Current Path
P2	+3.3V	3.3V Source	P40	Reserved	No Connect
P3	GND	Return Current Path	P41	SATA-B+	Host Receiver Differential Signal Pair
P4	+3.3V	3.3V Source	P42	Reserved	No Connect
P5	Reserved	No Connect	P43	SATA-B-	Host Receiver Differential Signal Pair
P6	Reserved	No Connect	P44	Reserved	No Connect
P7	Reserved	No Connect	P45	GND	Return Current Path
P8	Reserved	No Connect	P46	Reserved	No Connect
P9	Reserved	No Connect	P47	SATA-A-	Host Transmitter Differential Signal Pair
P10	DAS/DSS	Device Activity Signal	P48	Reserved	No Connect
P11	Reserved	No Connect	P49	SATA-A+	Host Transmitter Differential Signal Pair
P12	Module Key	No Connect	P50	Reserved	No Connect
P13	Module Key	No Connect	P51	GND	Return Current Path
P14	Module Key	No Connect	P52	Reserved	No Connect
P15	Module Key	No Connect	P53	Reserved	No Connect
P16	Module Key	No Connect	P54	Reserved	No Connect
P17	Module Key	No Connect	P55	Reserved	No Connect
P18	Module Key	No Connect	P56	MFG_DATA	No Connect
P19	Module Key	No Connect	P57	GND	Return Current Path
P20	Reserved	No Connect	P58	MFG_CLOCK	No Connect
P21	CONFIG_0	Connect to GND	P59	Module Key	No Connect
P22	Reserved	No Connect	P60	Module Key	No Connect
P23	Reserved	No Connect	P61	Module Key	No Connect
P24	Reserved	No Connect	P62	Module Key	No Connect
P25	Reserved	No Connect	P63	Module Key	No Connect
P26	Reserved	No Connect	P64	Module Key	No Connect
P27	GND	Return Current Path	P65	Module Key	No Connect
P28	Reserved	No Connect	P66	Module Key	No Connect
P29	Reserved	No Connect	P67	Reserved	No Connect
P30	Reserved	No Connect	P68	SUSCLK	No Connect
P31	Reserved	No Connect	P69	CONFIG_1	Connect to GND
P32	Reserved	No Connect	P70	+3.3V	3.3V Source
P33	GND	Return Current Path	P71	GND	Return Current Path
P34	Reserved	No Connect	P72	+3.3V	3.3V Source
P35	Reserved	No Connect	P73	GND	Return Current Path
P36	Reserved	No Connect	P74	+3.3V	3.3V Source
P37	Reserved	No Connect	P75	CONFIG_2	Connect to GND
P38	DEVSLP	Reserved for Devslp			