

AIRDISK PCIe Gen3 M.2 2280 SSD P1144 Datasheet

Version: A2

2026.03

Revision History

<i>Revision Number</i>	<i>Description</i>	<i>Revision Date</i>
A2	Update PN	2026.03
A1	Update PN	2025.11
A0	Initial release.	2025.11

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1. General Description

●Capacity

- 256GB/512GB/1TB is available

●Form Factor

- M.2 2280

●Features

- PCIe Gen3 8GT/s Interface, up to 4 Lanes
- Compliant with NVMe Express Revision 1.4
- Support Host Memory Buffer

●Performance

- 256GB
 - Read: Up to 2350MB/s
 - Write: Up to 1500MB/s
- 512GB
 - Read: Up to 3600MB/s
 - Write: Up to 2800MB/s
- 1TB
 - Read: Up to 3600MB/s
 - Write: Up to 2850MB/s

●Power Consumption

- Active write: 3100 mW (1TB)
- Active read: 3200 mW (1TB)

●Temperature

- Operating : 0°C to 70°C
- Non-Operating : -40°C to 85°C

●Shock

- Shock : 1500G, duration 0.5ms, Half Sine Wave
- Vibration :
10~2000Hz, 1.5mm, 20G, 1 Oct/min, 30min/axis(X,Y,Z)
- * Applicable only for cased product

●MTBF

- 1,500,000 Hours

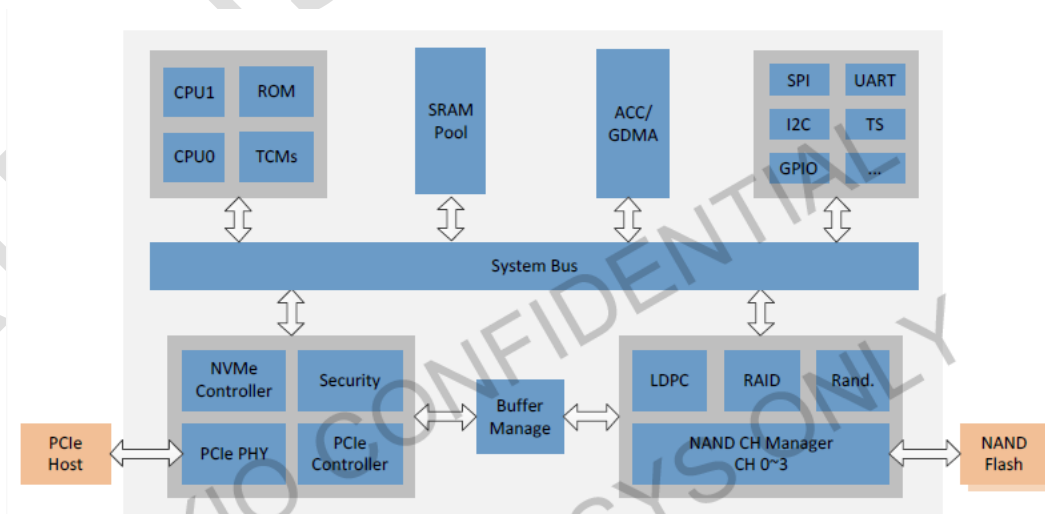
●Weight

- 256GB/512GB/1TB
- Max 8g

●TBW

- 256GB: 128TB
- 512GB: 256TB
- 1TB: 512TB

●SSD Functional Block Diagram

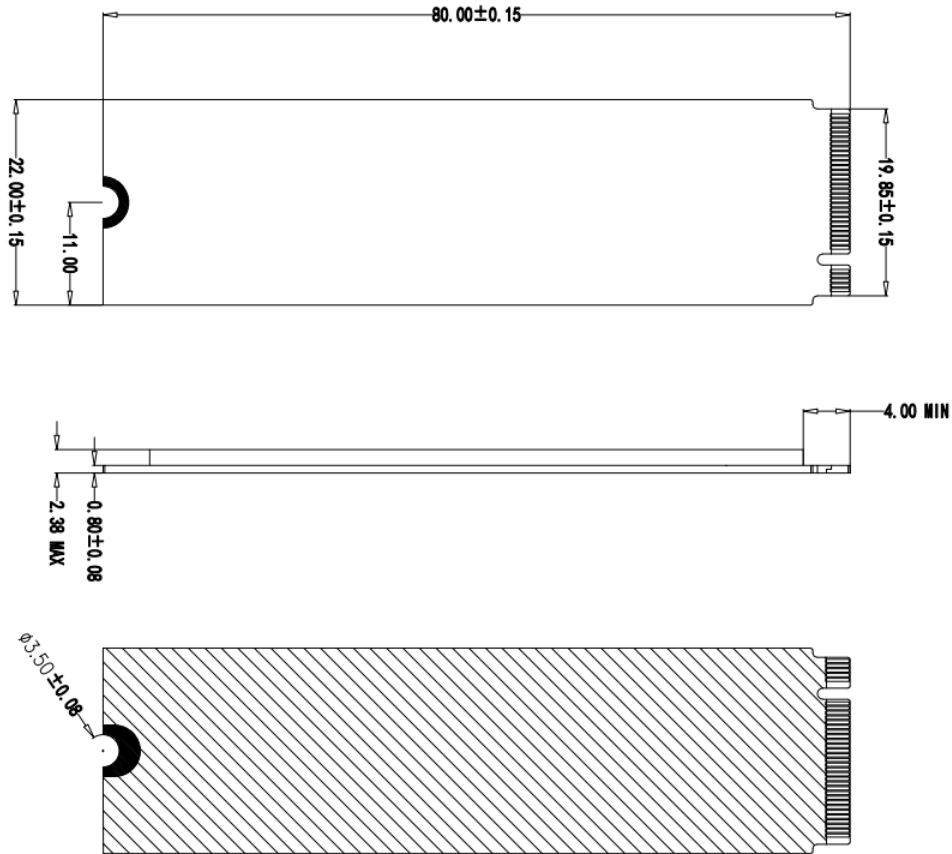


[Figure 1-1] SSD Functional Block Diagram

2. Mechanical Specification

2.1 M.2 2280 SSD physical dimensions and Weight

Capacity	Height (mm)	Width (mm)	Length (mm)	Weight (gram)
256GB/512GB/1TB	MAX 2.38	22.00 ± 0.15	80.00 ± 0.15	MAX 8g



[Figure 2-1] M.2 2280 Physical dimension

3. Product Specifications

3.1 Capacity

Nominal Capacity	256GB	512GB	1TB
Unformatted Capacity	238.47	476.94	953.87
User-Addressable Sectors	500118192	1000215216	2000409264
Bytes per Sector	512 Bytes		

[Table 3-1] User Addressable Sectors

NOTE:

1 Megabyte (MB) = 1 Million bytes; 1 Gigabyte (GB) = 1 Billion bytes

2 User Addressable Sectors in LBA mode is calculated by IDEMA rule.

3.2 Performance

Performance Parameter	Unit	256GB	512GB	1TB
Sequential Read (Max)	MB/S	2350	3600	3600
Sequential Write (Max)	MB/S	1500	2800	2850
Random Read 4K (Max)	IOPS	340K	450K	290K
Random Write 4K (Max)	IOPS	260K	310K	340K

[Table 3-2] Drive Performance

* Actual performance may vary depending on use conditions and environment

* Note

1. This performance represents the maximum speed, measured performance deviations within $\pm 10\%$ are acceptable

2. Performance measured using CrystalDiskMark 7.0.0

3. Write cache enabled

4. 1MB/sec = 1,048,576 bytes/sec was used in sequential performance

-System: AMD X570 Chipset, AMD Ryzen 9 5950X 16-Core processor, 16GB DDR4

-OS: Windows 10 x64 .

3.3 System Power Consumption

Input Voltage 3.3V $\pm$ 5%				
Parameter		256GB	512GB	1TB
Active ¹ (Typical, RMS)	Read	1900 mW	2900 mW	3200 mW
	Write	1900 mW	3000 mW	3100 mW
Idle ² (Typical)		700 mW	700 mW	700 mW

[Table 3-4] Power Consumption

CPU : Intel Core i7-7700K@4.2GHz

DRAM : 8GB DDR4

Chipset : Intel Z270

OS : Windows 10 x64

Test Tool : CrystalDiskMark 7.0.0

3.4 Supply Voltage

Item	Requirements
Allowable voltage	3.3V ± 5%
Allowable noise/ripple	100mV p-p or less

[Table 3-3] Voltage Requirements

3.5 System Reliability

Capacity	MTBF
256GB	1,500,000 Hours
512GB	
1TB	

[Table 3-5] MTBF Specifications

MTBF is Mean Time Between Failure. As same word, annual failure ratio is 0.4%.

3.6 Endurance

TBW		
256GB	512GB	1TB
128TB	256TB	512TB

[Table 3-7] Endurance Specifications

Notes:

1-TBW (Terabytes Written) is a measurement of SSDs' expected lifespan, which represents the amount of data written to the device. To calculate the TBW of a SSD, the following equation is applied:

$$TBW = [(NAND\ Endurance) \times (SSD\ Capacity)] / WAF$$

NAND Endurance: NAND endurance refers to the P/E (Program/Erase) cycle of a NAND flash.

SSD Capacity: The SSD capacity is the specific capacity in total of a SSD.

WAF: Write Amplification Factor (WAF) is a numerical value representing the ratio between the amount of data that a SSD controller needs to write and the amount of data that the host's flash controller writes.

2-TBW may differ according to flash configuration and platform.

3-The endurance of SSD could be estimated based on user behavior, NAND endurance cycles, and write amplification factor. It is not guaranteed by flash vendor.

3.7 Environmental Specifications

Features	Operating	Non-Operating
Temperature	0°C to 70°C	-40°C to 85°C
Humidity	5% to 95%, non-condensing	
Vibration	10~2000Hz, 1.5mm, 20G, 1 Oct/min, 30min/axis(X,Y,Z)	
Shock	1500G, duration 0.5ms, Half Sine Wave	

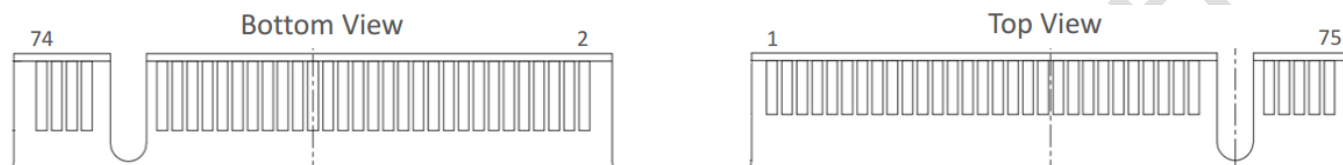
[Table 3-6] Power Consumption

Notes:

- 1-Temperature is measured by SMART Temperature .Proper airflow recommended.
- 2-Humidity is measured in non-condensing
- 3-Test condition for shock: 0.5ms duration with half sine wave
- 4-Test condition for vibration: 10Hz to 2,000Hz, 15mins/axis on 3axis

4. Electrical Interface Specification

4.1 Connector Dimension and Pin Location



[Figure 4-1] M.2 2280 Signal and Power pins

4.2 M.2 2280 Pin Assignments and Definition

Pin #	Assignment	Description	Pin #	Assignment	Description
1	GND	Ground	2	3.3V	3.3V source
3	GND	Ground	4	3.3V	3.3V source
5	PETn3	PCIe TX	6	N/C	N/C
7	PETp3	PCIe TX	8	N/C	N/C
9	GND	Ground	10	LED_1#	Device Active Signal
11	PERn3	PCIe RX	12	3.3V	3.3V source
13	PERp3	PCIe RX	14	3.3V	3.3V source
15	GND	Ground	16	3.3V	3.3V source
17	PETn2	PCIe TX	18	3.3V	3.3V source
19	PETp2	PCIe TX	20	N/C	N/C
21	GND	Ground	22	N/C	N/C
23	PERn2	PCIe RX	24	N/C	N/C
25	PERp2	PCIe RX	26	N/C	N/C
27	GND	Ground	28	N/C	N/C
29	PETn1	PCIe TX	30	N/C	N/C
31	PETp1	PCIe TX	32	N/C	N/C
33	GND	Ground	34	N/C	N/C
35	PERn1	PCIe RX	36	N/C	N/C
37	PERp1	PCIe RX	38	N/C	N/C
39	GND	Ground	40	N/C	N/C
41	PETn0	PCIe TX	42	N/C	N/C
43	PETp0	PCIe TX	44	N/C	N/C
45	GND	Ground	46	N/C	N/C
47	PERn0	PCIe RX	48	N/C	N/C
49	PERp0	PCIe RX	50	PERST#	PCIe Reset

Pin #	Assignment	Description	Pin #	Assignment	Description
51	GND	Ground	52	CLKREQ#	PCIe Device Clock Request
53	REFCLKN	PCIe Reference Clock	54	N/C	N/C
55	REFCLKP	PCIe Reference Clock	56	N/C	N/C
57	GND	Ground	58	N/C	N/C
59	N/C	Mechanical Notch	60	N/C	Mechanical Notch
61	N/C	Mechanical Notch	62	N/C	Mechanical Notch
63	N/C	Mechanical Notch	64	N/C	Mechanical Notch
65	N/C	Mechanical Notch	66	N/C	Mechanical Notch
67	N/C	N/C	68	N/C	N/C
69	N/C	N/C	70	3.3V	3.3V source
71	GND	Ground	72	3.3V	3.3V source
73	GND	Ground	74	3.3V	3.3V source
75	GND	Ground			

[Table 4-1] M.2 2280 Connector Pin Assignment

5. Supported Command Set and Feature

The Admin command sets and NVM I/O command sets of MAXIO 1202 are defined in compliant with NVM Express specification revision 1.4.

5.1 Admin Command Set

Opcode(Hex)	Command Name
00h	Delete I/O Submission Queue
01h	Create I/O Submission Queue
02h	Get Log Page
04h	Delete I/O Completion Queue
05h	Create I/O Completion Queue
06h	Identify
08h	Abort
09h	Set Features
0Ah	Get Features
0Ch	Asynchronous Event Request
10h	Firmware Commit
11h	Firmware Image Download
14h	Device Self-test
80h	Format NVM
81h	Security Send
82h	Security Receive
84h	Sanitize

[Table 5-1] Admin command

5.2 NVM Express I/O Command Set

Opcode(Hex)	Command Name
00h	Flush
01h	Write
02h	Read
08h	Write Zeroes
09h	Dataset Management

[Table 5-2] NVMe I/O command**5.3 Log Page Identifiers Support**

Log Identifier (Hex)	Description
01h	Error Information
02h	SMART / Health Information
03h	Firmware Slot Information
05h	Commands Supported and Effects
06h	Device Self-test

[Table 5-3] Log Identifier**5.4 Feature Identifiers Support**

Feature Identifier (Hex)	Description
00h	Enable write cache
01h	Arbitration
02h	Power Management
03h	LBA Range Type
04h	Temperature Threshold
06h	Volatile Write Cache
07h	Number of Queues
08h	Interrupt Coalescing
09h	Interrupt Vector Configuration
0Ah	Write Atomicity Normal
0Bh	Asynchronous Event Configuration
0Ch	Autonomous Power State Transition
0Dh	Host Memory Buffer
0Eh	Timestamp
10h	Host Controlled Thermal Management
11h	Non-Operational Power State Config
12h-77h	Reserved
78h-7Fh	Refer to the NVMe Management interface Specification definition
80h-BFh	Command Set Specific
C0-FFh	Vendor Specific

[Table 5-4] Feature Identifier

5.5 SMART/Health Information

Bytes	Description
0	Critical Warning
2:1	Composite Temperature
3	Available Spare
4	Available Spare Threshold
5	Percentage Used
6	Endurance Group Critical Warning Summary
31:7	Reserved
47:32	Data Units Read
63:48	Data Units Written
79:64	Host Read Commands
95:80	Host Write Commands
111:96	Controller Busy Time
127:112	Power Cycles
143:128	Power On Hours
159:144	Unsafe Shutdowns
175:160	Media and Data Integrity Errors
191:176	Number of Error Information Log Entries
195:192	Warning Composite Temperature Time
199:196	Critical Composite Temperature Time
201:200	Temperature Sensor 1
203:202	Temperature Sensor 2
205:204	Temperature Sensor 3
207:206	Temperature Sensor 4
209:208	Temperature Sensor 5
211:210	Temperature Sensor 6
213:212	Temperature Sensor 7
215:214	Temperature Sensor 8
219:216	Thermal Management Temperature 1 Transition Count
223:220	Thermal Management Temperature 2 Transition Count
227:224	Total Time For Thermal Management Temperature 1
231:228	Total Time For Thermal Management Temperature 2
511:232	Reserved

[Table 5-5] SMART Information**5.6 Identify Command**

The Identify Command returns the data described below.

Bytes	Default Value	Description
01:00	1E48h	PCI Vendor ID(VID)
03:02	XXX	PCI Subsystem Vendor ID
23:04	XXX	Serial Number
63:24	XXX	Model Number
71:64	XXX	Firmware Revision

Bytes	Default Value	Description
72	00h	Recommended Arbitration Burst
75:73	XXX	IEEE OUI Identifier
76	00h	Controller Multi-Path I/O and Namespace Sharing Capabilities
77	09h	Maximum Data Transfer Size
79:78	00h	Controller ID
83:80	00010400h	Version
87:84	0007A120h	RTD3 Resume Latency
91:88	001E8480h	RTD3 Entry Latency
95:92	00000200h	Optional Asynchronous Events Supported
99:96	00h	Controller Attributes
101:100	00h	Read Recovery Levels Supported
110:102	-	Reserved
111	-	Controller Type
127:112	00h	FRU Globally Unique Identifier
129:128	-	Command Retry Delay Time 1
131:130	-	Command Retry Delay Time 2
133:132	-	Command Retry Delay Time 3
239:134	-	Reserved
255:240	00h	Refer to the NVMe Management Interface Specification for definition
257:256	0006h	Optional Admin Command Support
258	02h	Abort Command Limit
259	03h	Asynchronous Event Request Limit
260	XXX	Firmware Updates
261	03h	Log Page Attributes
262	3Fh	Error Log Page Entries
263	04h	Number of Power States Support
264	01h	Admin Vendor Specific Command Configuration
265	01h	Autonomous Power State Transition Attributes
267:266	XXX	Warning Composite Temperature Threshold
269:268	XXX	Critical Composite Temperature Threshold
271:270	XXX	Maximum Time for Firmware Activation
275:272	XXX	Host Memory Buffer Preferred Size
279:276	XXX	Host Memory Buffer Minimum Size
295:280	00h	Total NVM Capacity
311:296	XXX	Unallocated NVM Capacity
315:312	00h	Replay Protected Memory Block Support
317:316	00h	Extended Device Self-test Time
318	01h	Device Self-test Options
319	01h	Firmware Update Granularity
321:320	0000h	Keep Alive Support
323:322	0001h	Host Controlled Thermal Management Attributes
325:324	XXX	Minimum Thermal Management Temperature

Bytes	Default Value	Description
327:326	XXX	Maximum Thermal Management Temperature
331:328	02h	Sanitize Capabilities
335:332	-	Host Memory Buffer Minimum Descriptor Entry Size
337:336	-	Host Memory Maximum Descriptors Entries
339:338	-	NVM Set Identifier Maximum
341:340	-	Endurance Group Identifier Maximum
342	-	ANA Transition Time
343	-	Asymmetric Namespace Access Capabilities
347:344	-	ANA Group Identifier Maximum
351:348	-	Number of ANA Group Identifiers
355:352	-	Persistent Event Log Size
511:356	-	Reserved
512	66h	Submission Queue Entry Size
513	44h	Completion Queue Entry Size
515:514	0000h	Maximum Outstanding Commands
519:516	00000000h	Number of Namespaces
521:520	001Fh	Optional NVM Command Support
523:522	0000h	Fused Operation Support
524	01h	Format NVM Attributes
525	01h	Volatile Write Cache
527:526	0000h	Atomic Write Unit Normal
529:528	0000h	Atomic Write Unit Power Fail
530	00h	NVM Vendor Specific Command Configuration
531	00h	Namespace Write Protection Capabilities
533:532	00h	Atomic Compare & Write Unit
535:534	00h	Reserved
539:536	00h	SGL Support
543:540	00h	Maximum Number of Allowed Namespaces
767:544	00h	Reserved
1023: 768	00h	NVM Subsystem NVMe Qualified Name
2047:1792	00h	Reserved
2079:2048	XXX	Power State 0 Descriptor
...	XXX	(N/A)
3071:3040	XXX	Power State 31 Descriptor
4095:3072	00h	Vendor Specific

[Table 5-6] Identify Data Structure

6. Product Line up

Type	Capacity	Part Number
PCIe M.2 2280 SSD	256GB	APF10-256G-P11441021A
PCIe M.2 2280 SSD	512GB	APF10-512G-P11441022A
PCIe M.2 2280 SSD	1TB	APF10-001T-P11441024A

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