



SATAIII 2.5inch SATA

SM2259XT2+SKhynix(V7)

Data Sheet A2



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Revision History

Version	Description	Date	Remark
A0	Initial release	2023/07/05	
A1	Add 120GB/240GB Capacity SPEC	2023/07/15	
A2	Part Number Revised	2025/06/05	



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General Specification

Feature	Description
Capacity	120GB/128GB/240GB/256GB/512GB/1TB
Form Factor	2.5inch SATA
SATA Interface	SATA III 6.0Gb/s
Compliance	Serial ATA Revision 3.1 / INCITS ATA8-ACS-3
Performance	Sequential Read: 120GB up to 550MB/s, 240B up to 550MB/s 128GB up to 550MB/s, 256B up to 550MB/s 512GB up to 555MB/s, 1TB up to 555MB/s Sequential Write: 120GB up to 510MB/s, 240GB up to 514MB/s 128GB up to 510MB/s, 256GB up to 515MB/s 512GB up to 514MB/s, 1TB up to 514MB/s
IOPS (4K)	Random Read: 120GB up to 24.6K iops, 240GB up to 45K iops 128GB up to 25.5K iops, 256GB up to 44K iops 512GB up to 44.7K iops, 1TB up to 49K iops Random Write: 120GB up to 72.4K iops, 240GB up to 73K iops 128GB up to 72.2K iops, 256GB up to 73.1K iops 512GB up to 72.9K iops, 1TB up to 72.8K iops
Reliability	Mean Time Between Failure (MTBF): 1.5Million Hours Support global wear-leveling, bad block management algorithm Uncorrectable Bit Error Rate (UBER)<1 sector per 10 ¹⁶ bits read 120GB up to 85TBW, 240B up to 170TBW 128GB up to 85TBW, 256B up to 170TBW 512GB up to 340TBW, 1TB up to 680TBW
Power Management	5V SATA supply rail SATA Link Power Management(LPM) Device Sleep(DevSleep)
Power Consumption	Idle <480 mW (AVG) Active Write <1.2W (MAX) Active Read<1.1W (MAX)
Temperature	Operation : 0℃~70℃ Storage : -40℃~85℃
Humidity²	5% to 95%, non-condensing
Feature Support	Power loss data protection for data-at-rest S.M.A.R.T/NCQ/TRIM
Vibration	10HZ~2000HZ / 16 GRMS
Shock	1500G @ 0.5 ms, Half-sine.
Weight	< 45g



Dimension	100.0±0.25mm * 69.85±0.2mm * 7.00±0.15mm (L x W x H)
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1. Introduction

1.1. Description

QUANXING 2.5 SATA SSD is fully consist of semiconductor device and using NAND Flash Memory which has a high reliability and a high technology in a small form factor and supporting Serial ATA/INCITS ATA8-ACS3 (SATA) 3.0 interface standard. QUANXING 2.5 SATA SSD is provided more performance in terms of bandwidth and lower latency than SATAI/SATAII based counterparts.

Part Number	Form Factor	Capacity
QXS1A120GS1HC000	2.5"SATA	120GB
QXS1A128GS1HC000	2.5"SATA	128GB
QXS1A240GS1HC000	2.5"SATA	240GB
QXS1A256GS1HC000	2.5"SATA	256GB
QXS1A512GS1HC000	2.5"SATA	512GB
QXS1A001TS1HC000	2.5"SATA	1TB

Table 1: Part Number

1.2 Functional Block Diagram

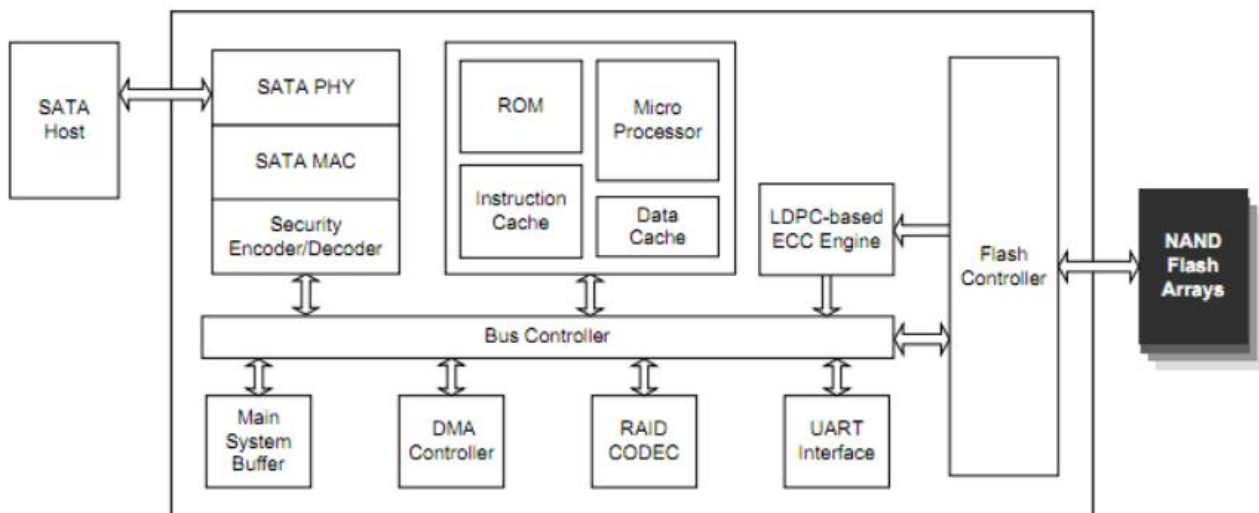


Figure 1: Functional Block Diagram



2. Product Specification

2.1 Form Factor

SATA Type 2.5inch Form Factor

2.2 Capacity

2.5" SATA : 120GB/128GB/240GB/256GB/512GB / 1TB

Capacity	Available Density
120GB	111.79GB
128GB	119.24GB
240GB	223.57GB
256GB	238.47GB
512GB	476.94GB
1TB	953.87GB

Table 2: User Area

Notes:

- Nominal Capacity: 1 Gigabyte (GB) =1,000,000,000 bytes
- Unformatted Capacity: 1 Gigabyte (GB) =1,073,741,824 bytes
- IDEMA standard.
- Actual usable capacity may be less (due to formatting, partitioning, operating system, applications or otherwise)

3. Performance

Capacity	Sequential Read	Sequential Write	Random Read (4KB)	Random Write (4KB)
120GB	550MB/s	510MB/s	24.6K iops	72.4K iops
128GB	550MB/s	510MB/s	25.5K iops	72.2K iops
240GB	550MB/s	514MB/s	45K iops	73K iops
256GB	550MB/s	515MB/s	44K iops	73.1K iops
512GB	555MB/s	514MB/s	44.7K iops	72.9K iops
1TB	555MB/s	514MB/s	49K iops	72.8K iops

Table 3: Read and Write Performance

Notes: ● Actual performance may vary depending on use conditions and environment.



- Performance measured using CDM v8.0.4/Random performance measured using AS SSD v 2.0.7.316 on Windows 10 64 bit.
- Sequential performance measured using 1MB data size. (QD=8 by Thrd 1).
- Random performance measured using 4 KB data size. (QD=1 by Thrd 64)

3.1 Ready Time

Type	Ready Time
Power on to Ready	Dependent on System HW and SW

Table 4: Specifications

Notes:

- Write cache enabled
- Device measured using Drive Master
- Test results may be different on different platform.
- Power on to ready time assumes proper shutdown (Power removal preceded by host Shutdown Notification)

3.2 Power Consumption

Parameter	Specification
Supply Voltage	Allowable Voltage 5V+/-5%
	Allowable noise/ripple 1~1MHZ, 120mVp-p

Table 5: Operating Voltage

Capacity	Product Status (w)		
	IDLE	Read	Write
120GB	480mW	0.92W	1.1W
128GB	480mW	0.92W	1.1W
240GB	480mW	0.95W	1.1W
256GB	480mW	0.95W	1.1W
512GB	480mW	1.0W	1.1W
1TB	480mW	1.1W	1.2W

Table 6: Power Consumption

Notes:

- Data taken at 2
- Active maximum power is measured using Iometer with 128 KB sequential write.



- Actual power consumption may varies with ambient temperature, host platform and software settings.

3.3 Temperature

Environment	Mode	Min	Max	Unit
Ambient Temperature	Operating	0	70	℃
	Non-Operating	-40	85	℃
Humidity	Operating	5	95	%
	Non-Operating	5	95	%

Table 7: Temperature Relative Specifications

Note: Measured without condensation.

3.4 Reliability

Parameter	Value
Mean Time Between Failure (MTBF)	1,500,000 hours
Support global wear-leveling, bad block management algorithm	
Uncorrectable Bit Error Rate (UBER)	< 1 sector per 10^{16} bits read
Power On/Off Cycles	1,000 Times
Endurance	120GB : 85TBW, 240GB : 170TBW
	128GB : 85TBW, 256GB : 170TBW
	512GB : 340TBW, 1TB : 680TBW
Shock (Non-operating)	1500G @ 0.5ms, Half-sine
Vibration (Non-operating)	16 Grms/10~2KHZ

Table 8: Reliability Specifications

Note:

- MTBF is calculated based on a Part Stress Analysis. It assumes nominal voltage with all other parameters within specified range.
- Power on/off cycles is defined as power being removed from the drive, and the restored. Most host systems remove power from the drive when entering suspend and hibernate as well as on a system shutdown.
- Shock specifications assume that the SSD is mounted securely with the input vibration applied to the drive mounting screws. Stimulus may be applied in the X, Y or Z axis.
- Vibration specifications assume that the SSD is mounted securely with the input vibration applied to the drive mounting screws. Stimulus may be applied in the X, Y or Z axis. The measured specification is in root mean squared form.



3.5 Weight

Weight : 45g (max)

3.6 Mechanical Drawing

Size: $100.0 \pm 0.25\text{mm} * 69.85 \pm 0.2\text{mm} * 7.00 \pm 0.15\text{mm}$ (L x W x H)

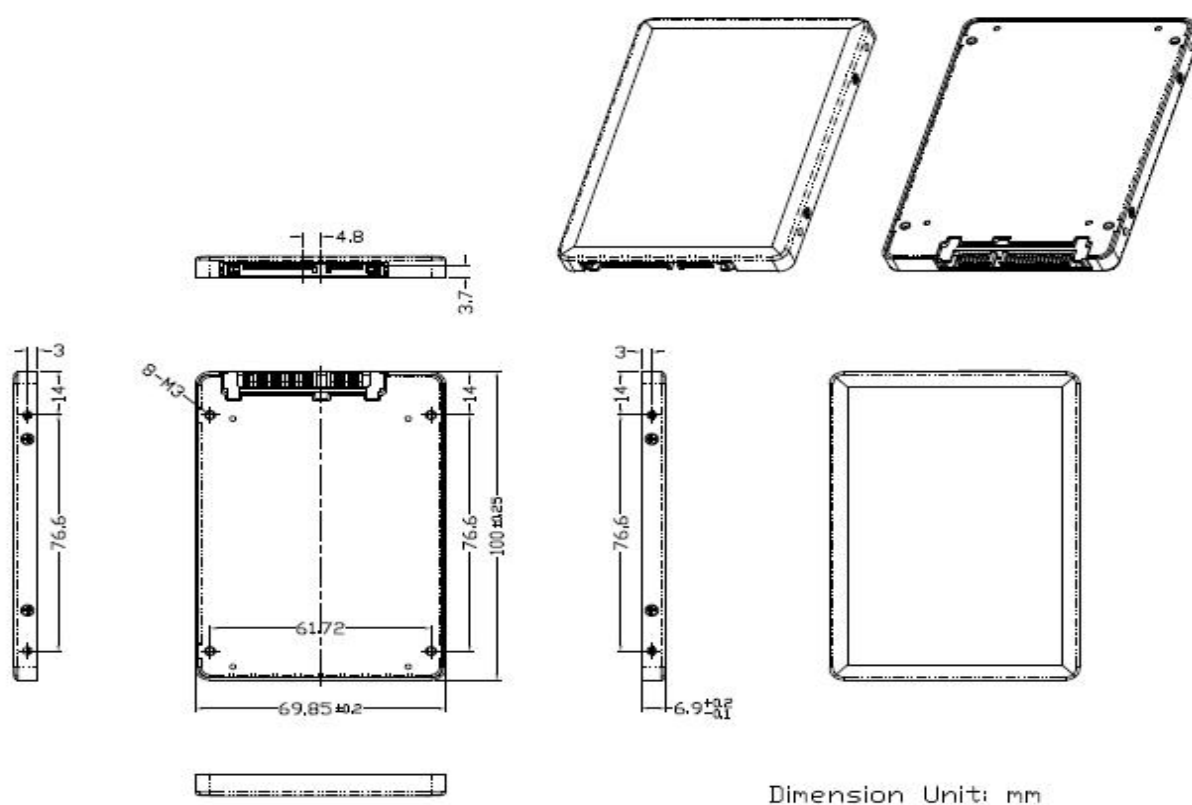


Figure 2: Mechanical Drawing



4. Pin Locations and Signal Descriptions

4.1 Pin Assignment and Description

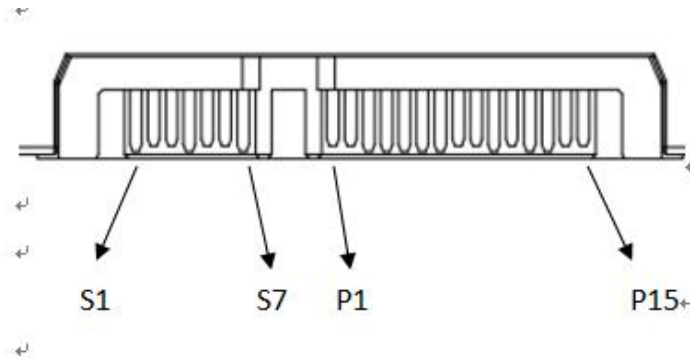


Figure 3: Pin Locations

Table 9 defines the signal assignment of Serial ATA Power Pin Definitions

Pin Name	Signal Name	Description
S1	Ground	Second Mate
S2	R+	+Differential Receive Signal
S3	R-	-Differential Receive Signal
S4	Ground	Second Mate
S5	T-	-Differential Transmit Signal
S6	T+	+Differential Transmit Signal
S7	Ground	Second Mate
Pin Name	Signal Name	Description
P1, P2,P3	V3.3	3.3V Power(Not used)
P4	Ground	First Mate
P5	Ground	Second Mate
P6	Ground	Second Mate
P7	V5	5V power, pre-charge, second Mate
P8	V5	5V power
P9	V5	5V power
P10	Ground	Second Mate
P11	Reserved	Reserved
P12	Ground	First Mate
P13	V12	12V Power(Not used)
P14	V12	12V Power(Not used)
P15	V12	12V Power(Not used)



5. Supported Command

5.1 Command List

Table 10: ATA General Feature Command Set

General Feature command set (non-PACKET) which consists of below
EXECUTE DEVICE DIAGNOSTIC
FLUSH CACHE
READ DMA
READ SECTOR(S)
READ VERIFY SECTOR(S)
SEEK
SET FEATURES
WRITE DMA
WRITE SECTOR(S)
READ MULTIPLE
SET MULTIPLE MODE
WRITE MULTIPLE

Table 11: Power Management

The Power Management feature set include the following commands:
CHECK POWER MODE
IDLE
IDEL IMMEDIATE
SLEEP
STANDBY
STANDBY IMMEDIATE



5.2 Identify Packet Device

The following table details the sector data returned by the IDENTIFY DEVICE command.

Table 12: IDENTIFY PACKET DEVICE Information

Word	O/M	F/V	
0-48			Set as indicated in ATA8-ACS
49	M		Capabilities
		F	15-12 Set as indicated in ATA8-ACS
		F	11 Shall be set to one
		F	10 Shall be set to one
			9-0 Set as indicated in ATA8-ACS
50-51			Set as indicated in ATA8-ACS
53	M		Filed validity
		R	15-3 Reserved
		F	2 1=the fields reported in word 88 are valid 0=the fields reported in word 88 are not valid
		F	1 1=the fields reported in words(70:64) are valid 0=the fields reported in words(70:64) are not valid
		F	0 Obsolete
54-62			Set as indicated in ATA8-ACS
63	M		Multiword DMA transfer
		F	15-3 Set as indicated in ATA8-ACS
		F	2 1=Multiword DMA mode 2 and below are supported
		F	1 1=Multiword DMA mode 1 and below are supported
		F	0 1=Multiword DMA mode 0 is supported
64	M		PIO Transfer modes supported
		F	15-2 Set as indicated in ATA8-ACS
		F	1-0 PIO modes 3 and 4 supported
65	M		Minimum Multiword DMA transfer cycle time per word
		F	15-0 Cycle time in nanoseconds
66	M		Manufacture's recommended Multiword DMA transfer cycle time
		F	15-0 Cycle time in nanoseconds
67	M		Minimum PIO transfer cycle time without flow control
		F	15-0 Cycle time is nanoseconds
68	M		Minimum PIO transfer cycle time with IORDY flow control



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		F	15-0	Cycle time in nanoseconds
69-75				Set as indicated in ATA8-ACS
76	0			Serial ATA capabilities
		F	15	Reserved
		F	14	Supports Device Automatic Partial to Slumber transitions
		F	13	Supports Host Automatic Partial to Slumber transitions
		R	12-11	Reserved
		F	10	Supports Phy event counters
		F	9	Supports receipt of host-initiated interface power management requests
		F		
		R	8	Reserved
		F	7-4	Reserved for future Serial ATA signaling speed grades
		F	3	1=Supports Serial ATA Gen3 signaling speed (6.0Gbps)
		F	2	1=Supports Serial ATA Gen2 signaling speed (3.0Gbps)
		F	1	1=Supports Serial ATA Gen1 signaling speed (1.5Gbps)
		F	0	Shall be cleared to zero
77	0			Serial ATA Additional capabilities
		R	15-4	Reserved
		V	3-1	Coded value indicating current negotiated Serial ATA Signal Speed
		F	0	Shall be cleared to zero
78	0			Serial ATA features supported
		R	15-7	Reserved
		F	6	1=Supports software settings preservation
		F	5	1=Supports asynchronous notification
		R	4	Reserved
		F	3	1=Device supports initiating interface power management
		F	2-1	Reserved
		F	0	Shall be cleared to zero
79	0			Serial ATA features enabled
		R	15-7	Reserved
		V	6	1=Software settings preservation enabled
		V	5	1=Asynchronous notification enabled
		R	4	Reserved
		V	3	1=Device initiating interface power management enabled



		R	2-1	Reserved
		F	0	Shall be cleared to zero
80-87			Set as indicated in ATA8-ACS	
88			15-6	Set as indicated in ATA8-ACS
		F	5	1=Ultra DMA mode 5 and below are supported
		F	4	1=Ultra DMA mode 4 and below are supported
		F	3	1=Ultra DMA mode 3 and below are supported
		F	2	1=Ultra DMA mode 2 and below are supported
		F	1	1=Ultra DMA mode 1 and below are supported
		F	0	1=Ultra DMA mode 0 is supported
89-92			Set as indicated in ATA8-ACS	
93		V	COMRESET result. The contents of this word shall be cleared to zero	
94-221			Set as indicated in ATA8-ACS	
222			Transport Major Revision	
			0000h or FFFFh=device does not report version	
			Bits	Description
		F	15:12	Transport Type
				0h=Parallel
				1h=Serial
				2h-Fh=Reserved
			11:6	Reserved
		F	5	SATA Rev 3.0
		F	4	SATA Rev 2.6
		F	3	SATA Rev 2.5
		F	2	SATA II: Extensions
		F	1	SATA 1.0a
		F	0	ATA8-AST
223		F	Transport Minor Revision	
224-255			Set as indicated in ATA8-ACS	