



MSATA SATAIII

SM2259XT2+SKhynix(V7)

Data Sheet A1



Important Notice: Information in this product specification is subject to change at anytime without notice, all product specifications are provided for reference only. To any intellectual, property rights in quanxing(quantxing) tech co., ltd. all information in this document is provided.



QuanXing applies the Right Technology to the Right Product at the Right Time. The aim is to create a better future for human life.

QuanXing recommends the user of mSATA products read and comply with the Terms and Conditions of Use written herein and firmly warns the user not to use mSATA products in life support, critical care, medical, safety equipment, or similar applications in order to avoid situations in which a malfunction or failure of a mSATA product could result in injury, loss of human life or damage to property.

QuanXing has been pursuing the goal of producing defect-free products in materials that they can function properly during their warranty period, but QuanXing does not warrant its products to operate without failure because malfunction or failure is possible to happen to semiconductor products due to electrical sensitivity and vulnerability. For any failure caused by inherent defects in mSATA products, QuanXing will repair, replace or refund the purchase price of the product; nonetheless, QuanXing is not responsible for any damage or loss of data users recorded.

This document is provided for information use only and is subject to change without prior notice. QuanXing assumes no responsibility for any error found in this document. No part of this document may be copied, reproduced, transmitted, and transcribed in any form by any means without obtaining any written permission from QuanXing.

All parts of the documentation are protected by copyright law and all rights are reserved.

© 2022 QuanXing. All rights reserved.

Revision History

Version	Description	Date	Remark
A0	Initial release	2023/08/31	
A1			



Contents

General Specification	4
1. Introduction	7
1.1. Description	7
1.2 Functional Block Diagram	7
2. Product Specification	8
2.1 Form Factor	8
2.2 Capacity	8
3. Performance	8
3.1 Ready Time	9
3.2 Power Consumption	9
3.3 Temperature	10
3.4 Reliability	10
3.5 Weight	11
3.6 Mechanical Drawing	11
4. Pin Locations and Signal Descriptions	12
4.1 Pin Assignment and Description	12
5. Supported Command	13
5.1 Command List	13
5.2 Identify Packet Device	14



General Specification

Feature	Description
Capacity	128GB/256GB
Form Factor	MSATA
SATA Interface	SATA III 6.0Gb/s
Compliance	Serial ATA Revision 3.1 / INCITS ATA8-ACS-3
Performance	Sequential Read:555GB up to 550MB/s, 256GB up to 555MB/s Sequential Write:128GB up to 510MB/s, 256GB up to 515MB/s
IOPS (4K)	Random Read:128GB up to 25.6K iops, 256GB up to 43.6K iops Random Write:128GB up to 72.5K iops, 256GB up to 73K 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 128GB up to 85TBW 256GB up to 170TBW
Power Management	3.3V SATA supply rail SATA Link Power Management(LPM) Device Sleep(DevSleep)
Power Consumption	Idle <230 mW (AVG) Active Write <1.0W (MAX) Active Read<1.1W (MAX)
Temperature	Operation : 0℃~70℃ Storage : -40℃~85℃
Humidity ²	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	< 10g
Dimension	50.80±0.15mm * 29.85±0.15mm * 3.70±0.15mm (L x W x H)



Figures

Figure 1. Functional Block Diagram

Figure 2. Mechanical Drawing

Figure 3. Pin Locations

Quanxing Tech Co., LTD.



Tables

Table 1: Part Number

Table 2: User Addressable Sectors

Table 3: Read and Write Performance

Table 4: Specifications

Table 5: Operating Voltage

Table 6: Power Consumption

Table 7: Temperature Relative Specifications

Table 8: Reliability Specifications

Table 9: Pin Assignment and Description

Table 10: ATA General Feature Command Set

Table 11: Power Management

Table 12: IDENTIFY PACKET DEVICE Information



1. Introduction

1.1. Description

QUANXING mSATA 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 mSATA SSD is provided more performance in terms of bandwidth and lower latency than SATAI/SATAII based counterparts.

Part Number	Form Factor	Capacity
QXS1B128GS1HC000	MSATA	128GB
QXS1B256GS1HC000	MSATA	256GB

Table 1: Part Number

1.2 Functional Block Diagram

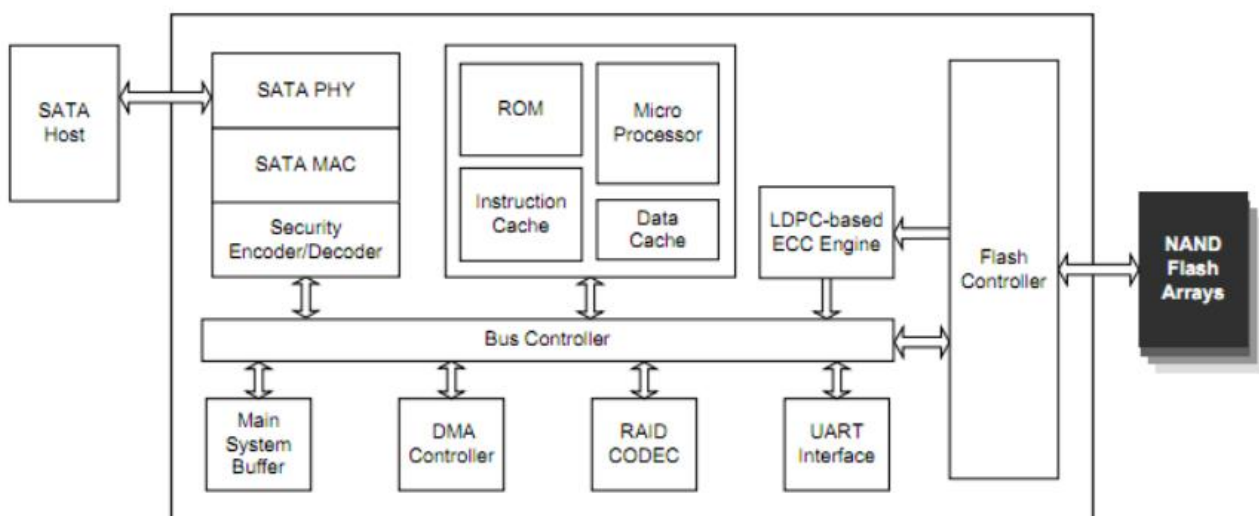


Figure 1: Functional Block Diagram



2. Product Specification

2.1 Form Factor

SATA Type mSATA Form Factor

2.2 Capacity

mSATA : 128GB/256GB

Capacity	Available Density
128GB	119.24GB
256GB	238.47GB

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)
128GB	555MB/s	510MB/s	25.6K iops	72.5K iops
256GB	555MB/s	515MB/s	43.6K iops	73K 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 3.3V+/-5%
	Allowable noise/ripple 1~1MHZ, 120mVp-p

Table 5: Operating Voltage

Capacity	Product Status (w)		
	IDLE	Read	Write
128GB	230mW	0.95W	1.0W
256GB	230mW	1.0W	1.1W

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	°C
	Non-Operating	-40	85	°C
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	128GB : 85TBW
	256GB : 170TBW
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 : 10g (max)

3.6 Mechanical Drawing

Size: 50.80±0.15mm * 29.85±0.15mm * 3.70±0.15mm (L x W x H)

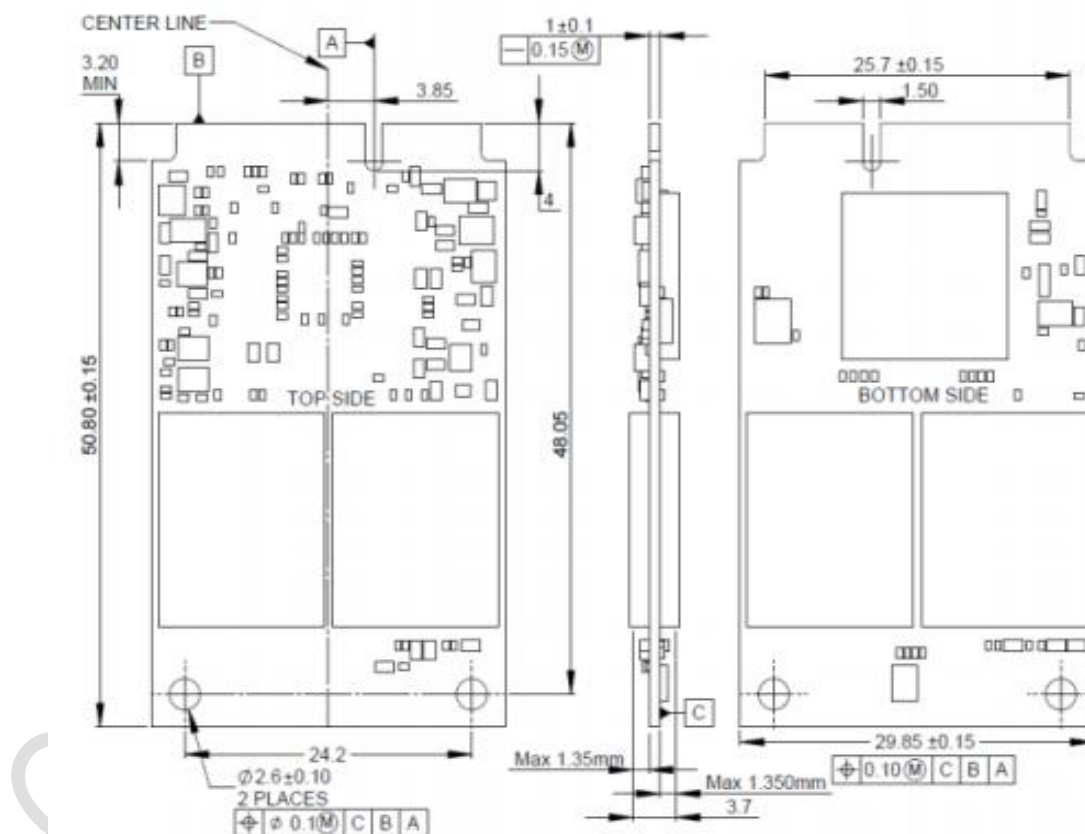


Figure 2: Mechanical Drawing



4. Pin Locations and Signal Descriptions

4.1 Pin Assignment and Description

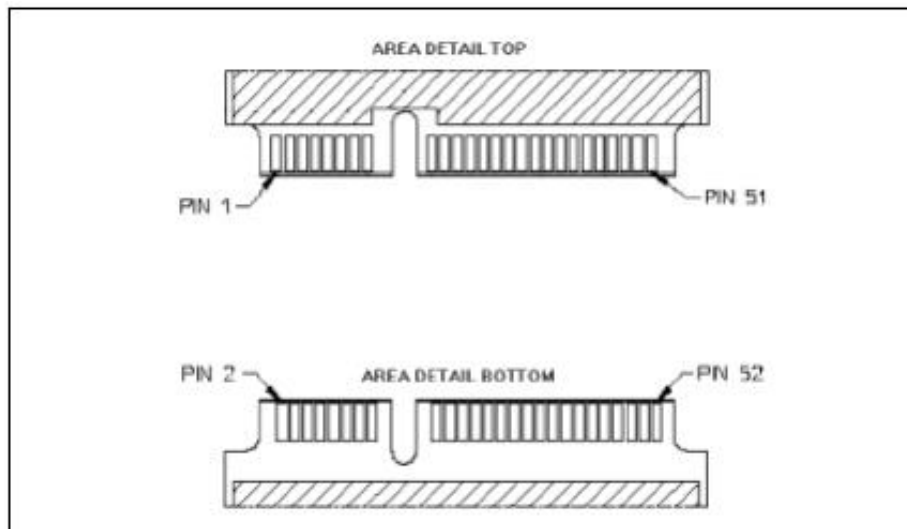


Figure 3: Pin Locations

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

1	Reserved	NC	2	+3.3V	3.3V Power (Source)
3	Reserved	NC	4	GND	GND
5	Reserved	NC	6	+1.5V	1.5V source
7	Reserved	NC	8	Reserved	NC
9	GND	GND	10	Reserved	NC
11	Reserved	NC	12	Reserved	NC
13	Reserved	NC	14	Reserved	NC
15	GND	GND	16	Reserved	NC
17	Reserved	NC	18	GND	GND
19	Reserved	NC	20	Reserved	NC
21	GND	GND	22	Reserved	NC
23	+B	Host Receiver Diff (output)	24	+3.3V	3.3V source
25	-B	Host Receiver Diff(output)	26	GND	GND
27	GND	GND	28	+1.5V	1.5V source
29	GND	GND	30	Two wire interface	Two wire interface Clock
31	-A	Host Transmitter(input)	32	Two wire interface	Two wire interface Data
33	+A	Host Transmitter(input)	34	GND	GND
35	GND	GND	36	Reserved	NC
37	GND	GND	38	Reserved	NC
39	+3.3V	3.3V source	40	GND	GND



41	+3.3V	3.3V source	42	Reserved	NC
43	Device type	NC	44	Reserved	NC
45	Vendor	Vendor specific	46	Reserved	NC
47	Vendor	Vendor specific	48	+1.5V	1.5V source
49	DA/DSS	Device Activity signal/disable staggered spin-up	50	GND	GND
51	Presence detection	Shall be pulled to GND by device	52	+3.3V	3.3V source

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
			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



		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



SATAIII 6Gbp/s SSD Series

		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	