

SOSAM 2.5 " SATA-III SSD DATASHEET V1.2

Part Number: KMSS3S2512AK1S4C

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1. Product Description

1.1 Product Overview

SOSAM 2.5" SATA-III SSD which adopts YS9082HP SSD controller and KIOXIA 0T28 3D TLC Nand Flash. It supports 2K LDPC ECC and RAID function to ensure full End-to-End data path protection that secures the data transmission between host system and NAND Flash.

The 2.5" SATA-III SSD's capacity up to 1TB. It fully compliant with SATA 3.0 protocol, delivers stable and outstanding performance up to 550MB/s read performance but low power consumption. With it effectively reduces the booting time of operation system and consumes less power than hard disk drive (HDD), the SSD is optimal for PC's boot drive and embedded system's storage.

1.2 Target Applications

- Embedded / Industrial Systems
- PC
- Notebook

1.3 Product Features

- Capacity: 512GB
- KIOXIA 0T28 3D TLC NAND type flash built in
- Form Factor: 2.5"
- Support Hot-plug
- Supports 1-port 1.5/3.0/6.0Gbps SATA I/II/III interface.
- SMART feature set and 48-bit Address feature set
- Compatibility: Full SATA hard disk compatible
- Ultra-rugged and reliable
- High-speed performance
- Silent, no moving parts
- Data retention: JESD47 compliant
- Proprietary wear leveling algorithms
- 100% tested hardware and software

Operating Voltage Requirement: $V_{cc} = 5.0V \pm 10\%$

Operating System: Supported by all operating systems

Interface: SATA 6.0Gbps (SATA - III) or SATA 3.0Gbps (SATA - II) or SATA 1.5Gbps (SATA - I)

Installation Requirements:

- System Hardware which supports SATA-I/SATA-II/SATA-III standards
- System Hardware includes SATA socket or transfer board

2. Physical Specifications

2.1 Mechanical SPECIFICATIONS

Length: Width 99.70 ± 0.50 mm

Width: 69.85 ± 0.25 mm

Thickness: $6.90 + 0.05 / -0.40$ mm

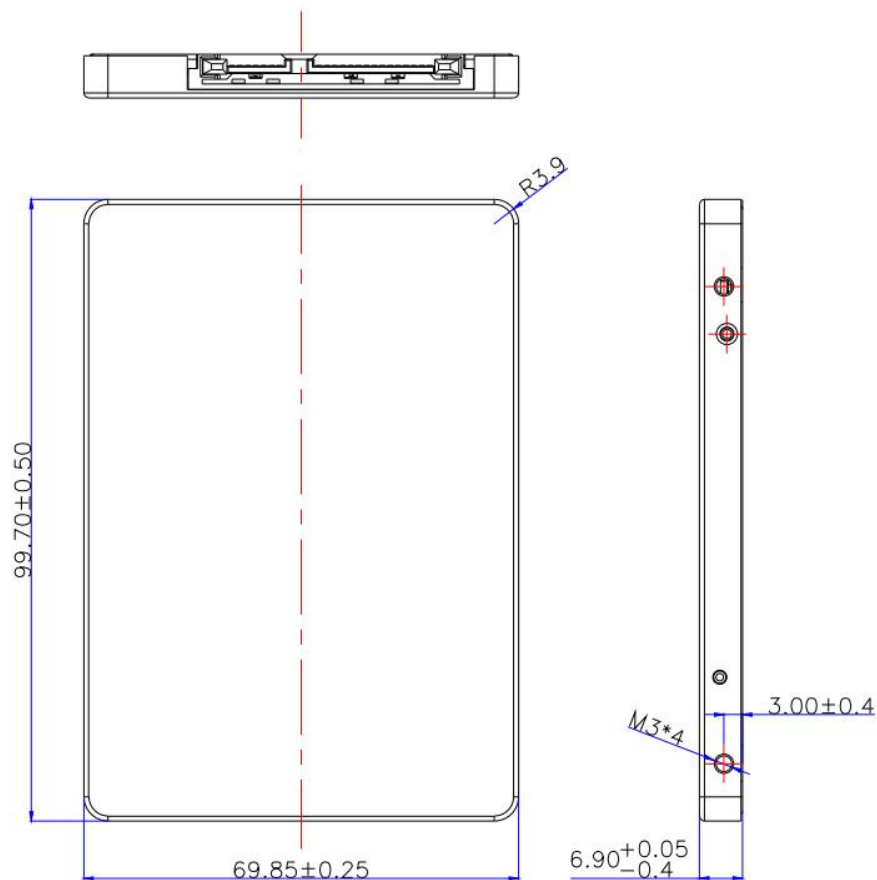


Figure 1: 2.5" SATA-III SSD Physical Dimension

3. Product Specifications

Operating Voltage: $V_{cc} = 5V \pm 10\%$

Modes: SATA 6.0Gbps (SATA - III) or SATA 3.0Gbps (SATA - II) or SATA 1.5Gbps (SATA - I) standards

3.1 Performance Specifications

Access Time: $< 100ms$

Power on to Ready: $< 500ms$

Data Transfer Time: Rated Data Transfer Speeds are maximums based on Crystal Disk Mark 8.0.6

* 2.5" SATAIII SSD Port and the installation of an enhanced driver required for maximum speed.

➤ CDM Test Result

Capacity	Data Transfer Speed (R/W)—MB/s Up to			
	1M sequential read@Q8T1	1M sequential write@Q8T1	4K random read@Q32T16	4K random write@Q32T16
512GB	550	500	230	290

Table 1: Data Transfer Speed Specifications (up to) under CDM 8.0.6 Benchmark

3.2 Power Conditions

Symbol	Rating	Value	Unit
V_{IN}	Input Voltage	$5V \pm 10\%$	V

Table 2: Absolute Maximum Ratings

Capacity	Power Consumption (W)		
	Idle	Read	Write
512GB	< 0.5	< 1.0	< 1.0

Table 3 : Average power consumption data from CDM 8.0.6

3.3 Total Bytes Written

Capacity	TBW
512GB	300TB

Table 4: TBW results

TBW: Total Bytes Written

Definition and conditions of TBW are based on JEDEC standard

4. Environmental Specifications

Operating Temperature:

Commercial Grade: 0°C to +70°C

Storage Temperature: -40°C to +85°C

Humidity: 5% to ~95% RH (Non-condensing)

Operating Shock: 1500G at 0.5ms

Operating Vibration: 15G(10 to 2000Hz)

5. Quality And Reliability Specifications

Data Retention: JESD47 compliant

Wear Leveling: Static and dynamic wear-leveling algorithm.

Bad Block Management: Failed Blocks of Flash will be replaced with new ones by the SSD.

ECC/EDC (Error Correction Code/Error Detection Code):

- Hardware LDPC ECC engine

MTBF: >1,000,000 hours

6. Pin Descriptions

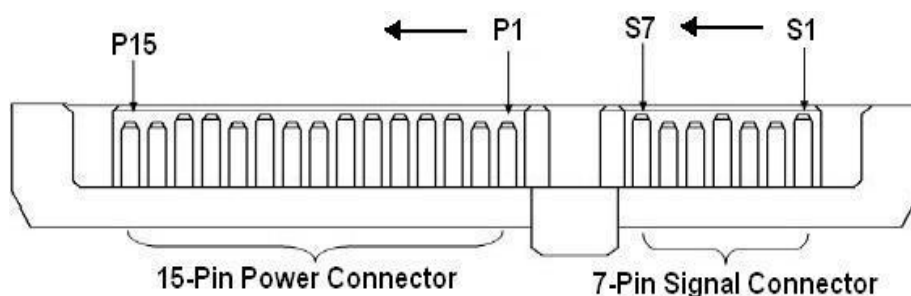


Figure 2: 7+15 Serial ATA port Interface Description

6.1 DATA PIN ASSIGNMENTS

Pin	Signal Name	Description
S1	GND	2nd mate
S2	A+	Differential Signal Pair for Transmit
S3	A-	Differential Signal Pair for Transmit
S4	GND	2nd mate
S5	B-	Differential Signal Pair for Receiver
S6	B+	Differential Signal Pair for Receiver
S7	GND	2nd mate

Table 5: Data Pin Signal Assignment

6.2 CONFIGURATION DESCRIPTIONS

Pin	Symbol	Description
P1	Not Used (3.3V)	N/A
P2	Not Used (3.3V)	N/A
P3	Not Used (3.3V P recharge)	
P4	GND	1st mate
P5	GND	2nd mate
P6	GND	
P7	5V P recharge	5V Power
P8	5V P recharge	5V Power
P9	5V P recharge	
P10	GND	
P11	Reserved	
P12	GND	
P13	Not Used (12V P recharge)	N/A
P14	Not Used(12V)	
P15	Not Used(12V)	

Table 6: Configuration Description

7. Supported ATA Command Set

7.1 ATA Command Register

2.5" SATAIII SSD supports the command show in the following tables.

Command Name	Code	PARAMETERS USED					
		SC	SN	CY	DR	HD	FT
CHECK POWER MODE	E5h	X	X	X	O	X	X
EXECUTE DIAGNOSTICS	90h	X	X	X	O	X	X
FLUSH CACHE	E7h	X	X	X	O	O	X
IDENTIFY DEVICE	ECh	X	X	X	O	X	X
IDLE	E3h	O	X	X	O	X	X
IDLE IMMEDIATE	E1h	X	X	X	O	X	X
INITIALIZE DEVICE PARAMETERS	91h	O	X	X	O	O	X
READ DMA	C8h	O	O	O	O	O	X
READ DMA EXT	25h	O	O	O	O	O	X
READ FPDMA QUEUED	60h	O	O	O	O	O	X
READ LOG DMA EXT	47h	O	O	O	O	O	X
READ LOG EXT	2Fh	O	O	O	O	O	X
READ MULTIPLE	C4h	O	O	O	O	O	X
READ SECTOR(S)	20h or 21h	O	O	O	O	O	X
READ VERIFY SECTOR(S)	40h or 41h	O	O	O	O	O	X
RECALIBRATE	10h	X	X	X	O	X	X
SECURITY DISABLE PASSWORD	F6h	X	X	X	O	X	X
SECURITY ERASE PREPARE	F3h	X	X	X	O	X	X
SECURITY ERASE UNIT	F4h	X	X	X	O	X	X
SECURITY FREEZE LOCK	F5h	X	X	X	O	X	X
SECURITY SET PASSWORD	F1h	X	X	X	O	X	X
SECURITY UNLOCK	F2h	X	X	X	O	X	X
SEEK	7xh	X	X	O	O	O	X
SET FEATURES	EFh	O	X	X	O	X	O
SET MULTIPLE MODE	C6h	O	X	X	O	X	X
SLEEP	E6h	X	X	X	O	X	X
SMART	B0h	X	X	O	O	X	O
STANDBY	E2h	X	X	X	O	X	X
STANDBY IMMEDIATE	E0h	X	X	X	O	X	X
WRITE DMA	CAh	O	O	O	O	O	X
WRITE DMA EXT	35h	O	O	O	O	O	X
WRITE FPDMA QUEUED	61h	O	O	O	O	O	X

WRITE LOG DMA EXT	57h	O	O	O	O	O	X
WRITE LOG EXT	3Fh	O	O	O	O	O	X
WRITE MULTIPLE	C5h	O	O	O	O	O	X
WRITE SECTOR(S)	30h or 31h	O	O	O	O	O	X

Table 7: Command Set

Note:

O = Valid, X = Don't care

SC = Sector Count Register

SN = Sector Number Register

CY = Cylinder Low/High Register

DR = DEVICE SELECT Bit (DEVICE/HEAD Register Bit 4)

HD = HEAD SELECT Bit (DEVICE/HEAD Register Bit 3-0)

FT = Features Register

7.2 SMART Attribute

Attribute ID(Hex)	Attribute Description
05	Reallocated Sector Count
09	Power-On Hours
0C	Power Cycle Count
A7	SSD Protect Mode
A8	PHY Error Count
A9	Bad Block Count
AD	Erase Count
AF	Bad Cluster Table Count
B4	Spare Block Count Left
C0	Unexpected Power Loss Count
C2	Temperature
E7	SSD Life Left
E9	Write Counts Sectors to Nand
EA	Read Counts Sectors from Nand
F1	Write Sector Count
F2	Read Sector Count

Table 8: SMART Data Vendor-specific Attributes

8. Product Ordering Part Numbers

Product Family	Capacity	Part Number
2.5" SATA-III SSD	512GB	KMSS3S2512AK1S4C

Table 9: Part Number

9. Installation

BEFORE GETTING STARTED

1. Back Up Your Data

VISUAL INSPECTION

1. Before unpacking and handling the SSD, discharge the static electricity by touching the metal chassis of your computer or by using an anti-static wrist strap
2. Inspect the box and device for the following
 - a. Box is damaged or water-stained
 - b. Any damage to the SSD

HANDLING THE SSD

1. Be cautious when unpacking, installing, and handling the SSD drive. Misuse of the SSD voids all warranty. Follow the succeeding instructions when managing the SSD
2. Follow all ESD precautions
3. Always operate the SSD within environmental conditions

INSTALLATION

System Requirements

To install the SSD in your computer, ensure that you have the following items:

1. Mounting Screws (If needed)

Install the SSD

Follow these steps to install the SSD

1. Power down the PC
2. Remove the computer system outside cover

3. Insert the SSD to the connector on motherboard
4. Replace the PC cover
5. Power on the PC
6. A BIOS sign-on message appears and displays a key sequence to enter the BIOS setup. Set up the BIOS to recognize the SSD.
7. Installation is Complete

USING THE SSD IN A MS-DOS OS

The SSD is already partitioned and formatted by NTFS, so if you want to install MS-DOS O/S on the SSD, it should be re-partitioned and re-formatted. After installing the SSD, it must be installed as a disk drive under DOS. Run the DOS commands as listed below and follow the instructions displayed for each command.

1. Run the DOS FDISK program to partition the SSD
2. Verify that the partition is active and ready for formatting
3. Run the DOS FORMAT command to high-level format the SSD

USING THE SSD IN A WINDOWS OS

No modifications need to be made to use the SSD in a Windows OS platform.

USING THE SSD IN A LINUX O/S

Port driver is needed to be made to use the SSD in Linux OS platforms.

USING THE SSD IN OTHER O/S

Port driver is needed to be made to use the SSD in other OS platforms.

10. For More Information

For Technical Support:

If additional support is needed, please visit the SOSAM Web site at www.kumi2020.com for the following topics:

- Warranty Services:** Includes the warranty service policy and the RMA request forms.
- Technical Information:** Includes product data sheets and various USB white papers.
- Tools Section:** Includes frequently asked questions (FAQs).

For More Information or Further Technical Support Please Contact:

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Revision History

Version	Release Date	Changes
1.0	Dec. 2024	Initial Release
1.1	Apr. 2025	Add Capacity Information
1.2	Apr. 2025	Performance data updates

Table 10: Revision History