

ShenZhen Renice Technology Co., Ltd

X10B SATAIII Industrial M.2 SSD

Datasheet

V1.1

2023-2-13

Revision History

Revision	Description	Date
1.0	Formal Release	4/30/2021
1.1	Update capacity to 8TB	2/13/2023

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1. Introduction

1.1 Product Overview

Renice is strengthening our range of industrial-grade storage solutions with new product ranges featuring SATAIII transmission protocol. The newly released X10B series products support M.2 form factor, configured latest SATA controller and based on high-quality flash memory chips with industrial 3D-TLC NAND technology and high-performance DRAM, delivering capacities up to 8TB.

Both products are specified for industrial use at operating temperature from -40°C to +85°C. It ensures stable, high-performance, and consistent read and write operation, even in critical applications and demanding environment.

1.2 Feature

- **Industry Standard SATA Interface:**
 - SATAIII 6.0Gbps (Backward compatible with SATA3.0 and SATA1.5Gbps)
- **Form factor:**
 - M.2 2280: 80mmx 22mmx 3.5mm
- **Performance:**
 - Max Sequential Data Read:550MB/s
 - Max Sequential Data Write: 535MB/s
 - Random 4K Read: 98,000 IOPS
 - Random 4K Write: 20,000 IOPS
- **Capacities:**
 - M.2 2280: 480GB, 960GB, 1920GB, 3840GB, 7680GB
- **Lifetime Endurance:**
 - TBW: up to 4,800TB (with 7680GB)
- **Data Retention:**
 - JESD218A Compliant
- **Data Security:**
 - AES 256-bit encryption
 - Full disk encryption as self-encrypting drive with TCG Opal 2.0 (on request)
 - Secure Erase (on request)
- **Power Management:**
 - Input voltage: M.2: 3.3V (±5%)
 - Power consumption (TYP)
 - Active: <3.5W
 - Idle: <0.8W
- **Temperature ranges:**
 - Operation: -40°C~ +85°C
 - Storage: -50°C~ +95°C

- **Reliability:**
 - Global static and dynamic wear leveling
 - Enhanced power loss protection
 - UBER: 1 sector per 10^{17} bits read
 - MTBF: 2,000,000 Hours
 - Advanced LDPC error correction
- **Warranty:** 3 years

2. Functional Block Diagram

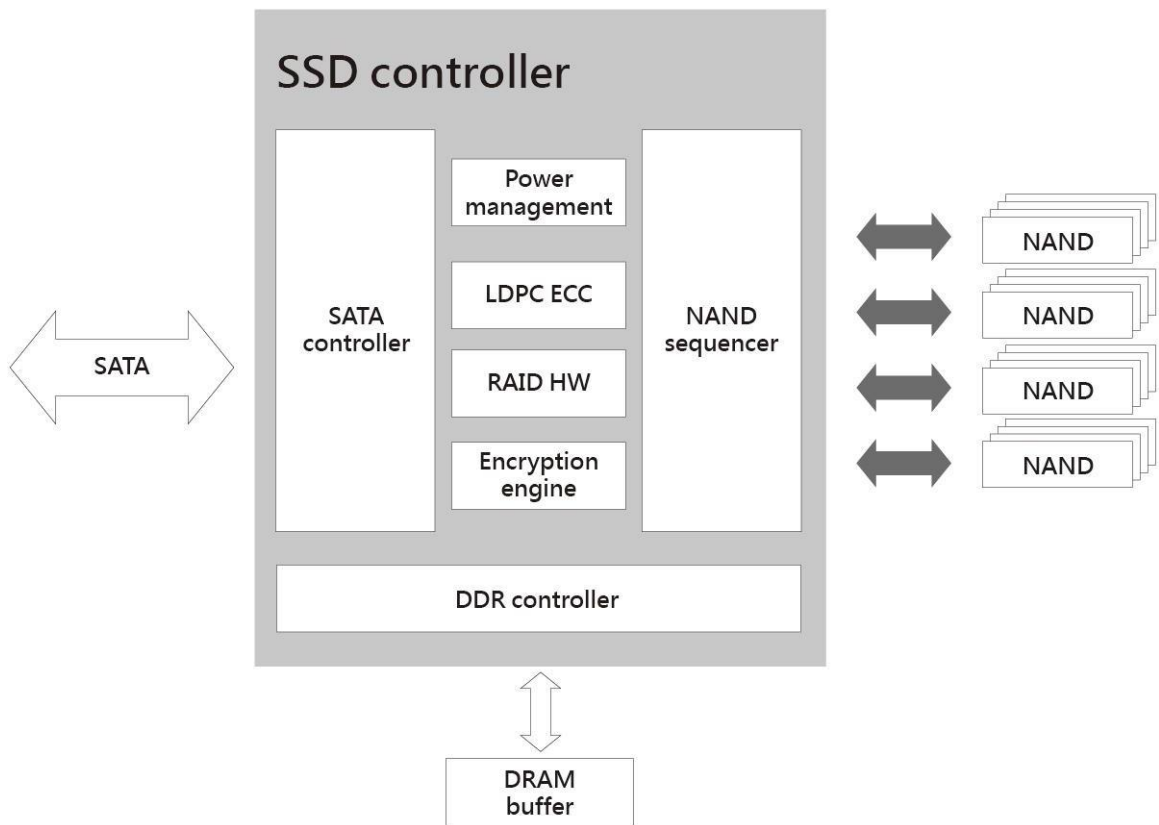


Figure 1: M.2 functional logic diagram

3. Product Specifications

3.1 Capacity

Table 1: User Addressable Sectors

X10B Series	Unformatted Capacity (Total User Addressable Sectors in LBA mode)
480GB	937,703,088
960GB	1,875,385,008
1920GB	3,750,748,848
3840GB	7,501,476,528
7680GB	15,002,931,888

Notes:

- (1) LBA count shown represents total user storage capacity and will remain the same throughout life of the drive.
- (2) The total usable capacity of the SSD may be less than total physical capacity because a small portion of the capacity is used for NAND flash management and maintenance purposes.

3.2 Performance

Table 2: Drive performance (Specification subject to change without notice)

Parameter	Capacity					Unit
	480GB	960GB	1920GB	3840GB	7680GB	
Sequential Read	550	550	550	550	550	MB/s
Sequential Write	535	535	535	535	535	MB/s
Random Read	98,000	98,000	98,000	98,000	75,000	IOPS
Random Write	10,000	20,000	20,000	20,000	10,000	IOPS

Notes:

- (1) Drive is connected as secondary
- (2) Actual performance may vary based on hardware, software, and overall system configuration
- (3) Sequential performance is measured with 128KB transfer size, QD 32 and 4KB align with IO Meter
- (4) Random performance is sustained performance measured with 4K/8K transfer size, QD32 and 4KB align with IO Meter.
- (5) Test Platform: CPU-Intel Core i7 4470K, Mother Board-ASUS Z87-Deluxe, Chipset-Intel Z87 Express, OS-Windows 8.1 Pro X64

3.3 Environment Specification

Table 3: Environmental Specification Table

Parameter	Value
Operating Temperature	-40°C ~+85°C
Storage Temperature	-50°C ~+95°C
Humidity (Non-Condensing)	5%~95% (Operating)
Vibration	10G (Peak, 10~2,000Hz)
Shock (Operating)	50G (11ms duration, half sine wave)
Shock (Non-Operating)	1,500G (0.5ms duration, half sine wave)

3.4 Power Consumption

Table 4: Power Consumption Table

Parameter	Unit	480GB	960GB	1920GB	3840GB	7680GB
Random Read (1MB Transfer)	W	<2.0	<2.5	<2.5	<2.5	<2.5
Random Write (1MB Transfer)	W	<3.0	<3.5	<3.5	<3.5	<3.5
Sequential Read (1MB Transfer)	W	<2.0	<2.5	<2.5	<2.5	<2.5
Sequential Write (1MB Transfer)	W	<3.0	<3.5	<3.5	<3.5	<3.5
Idle Average	W	<0.8	<0.8	<0.8	<0.8	<0.8

3.5 Reliability

X10B series products meet to exceed SSD endurance and data requirements as specified in the JESD218 standard. Reliability specifications are listed in the following table.

Table 5: Reliability table

Parameter	Value
Mean Time Between Failures (MTBF)	2,000,000 hours
Uncorrectable Bit Error Rate (UBER)	<1 sector per 10^{-17}
Endurance Rating (TBW)	480GB: up to 300TB 960GB: up to 600TB 1920GB: up to 1200TB 3840GB: up to 2400TB 7680GB: up to 4800TB

4. M.2 Board Physical Dimension Diagram

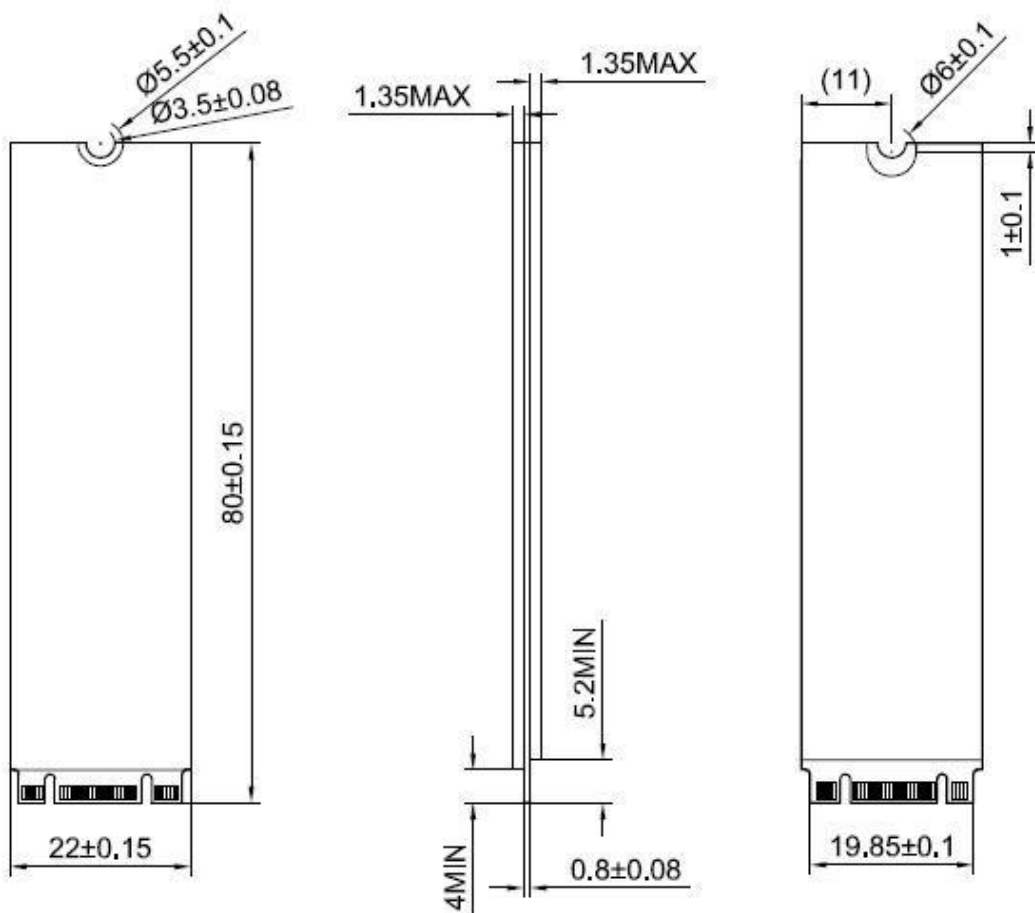


Figure 2: Physical Dimension Diagram for M.2 2280 board

Table 6: Physical Dimension for M.2 2280

Physical Dimensions	Value	Unit
Length	80	mm
Width	22	mm
Thickness	3.6	mm

5. Pin Assignment

5.1 M.2 2280 Board

Table 7: Pin assignment and description for signal and power of M.2 board

Pin	Signal Description	Pin	Signal Description
1	GND	2	3.3V DC Input
3	GND	4	3.3V DC Input
5	No Connection	6	Reserved
7	No Connection	8	No Connection
9	No Connection	10	DAS (Device Activity Signal)
11	No Connection	12	SATA Module Key
13	SATA Module Key	14	SATA Module Key
15	SATA Module Key	16	SATA Module Key
17	SATA Module Key	18	SATA Module Key
19	SATA Module Key	20	No Connection
21	GND	22	UART_RXD
23	No Connection	24	Reserved
25	No Connection	26	Reserved
27	GND	28	Reserved
29	No Connection	30	UART_TXD
31	No Connection	32	No Connection
33	GND	34	No Connection
35	No Connection	36	No Connection
37	No Connection	38	Reserved
39	GND	40	No Connection
41	TXP (SATA TX+)	42	No Connection
43	TXN (SATA TX-)	44	Reserved
45	GND	46	Reserved
47	RXN (SATA RX-)	48	Reserved
49	RXN (SATA RX+)	50	No Connection
51	GND	52	No Connection

53	No Connection	54	No Connection
55	No Connection	56	No Connection
57	GND	58	No Connection
59	SATA Module Key	60	SATA Module Key
61	SATA Module Key	62	SATA Module Key
63	SATA Module Key	64	SATA Module Key
65	SATA Module Key	66	SATA Module Key
67	No Connection	68	No Connection
69	GND	70	3.3V DC Input
71	GND	72	3.3V DC Input
73	GND	74	3.3V DC Input
75	GND		

6. Supported ATA Commands

Renice X10B Series SSD supports ATA commands that are shown as following table. For details of the NVMe command, please refer to ATA/ATAPI ACS3 command set.

Table 8: Supported ATA Command Set

Command Name	Code (Hex)	Command Name	Code (Hex)
NOP	00h	Read Multiple	C4h
Data Set Management	06h	Write Multiple	C5h
Read Sectors	20h	Set Multiple Mode	C6h
Read Sectors EXT	24h	Read DMA	C8h
Read DMA EXT	25h	Write DMA	CAh
Read Native Max Address EXT	27h	Write Multiple FUA EXT	CEh
Read Multiple EXT	29h	Standby Immediate	E0h
Read Log EXT	2Fh	IDLE Immediate	E1h
Write Sectors	30h	Standby	E2h
Write Sectors EXT	34h	IDLE	E3h
Write DMA EXT	35h	Read Buffer	E4h
Set Max Address EXT	37h	Check Power Mode	E5h
Write Multiple EXT	39h	Sleep	E6h
Write DMA FUA EXT	3Dh	Flush Cache	E7h
Write Log EXT	3Fh	Write Buffer	E8h
Read Verify Sectors	40h	Read Buffer DMA	E9h
Read Verify Sector EXT	42h	Flush Cache EXT	EAh
Write Uncorrectable EXT	45h	Write Buffer DMA	EBh

Read Log DMA EXT	47h	Identify Device	ECh
Write Log DMA EXT	57h	Set Features	EFh
Read FPDMA Queued	60h	Security Set Password	0xF1
Write FPDMA Queued	61h	Security Unlock	0xF2
Set Date & Time EXT	77h	Security Erase Prepare	0xF3
Accessible Max Address	78h	Security Erase Unit	0xF4
Execute Device Diagnostic	90h	Security Freeze Lock	0xF5
Download MicronCode	92h	Security Disable Password	0xF6
Download MicroCode DMA	93h	Read Native Max Address	0XF8
SMART	B0h	Set Max Address	0xF9
Sanitize Device	B4h		

7. S.M.A.R.T Support

7.1 S.M.A.R.T Command Sets

Table 9: S.M.A.R.T Attributes

ID (Dec)	ID (Hex)	Attribute Name	Description
1	01h	Raw Read Error Rate	Total event count for all correctable and un - correctable ecc, it would be cleared to 0 when exceeding FFFFFFFFFFh
5	05h	Retried Block Count	Retired block count after leaving factory
9	09h	Power-on hours	Power on time, cumulative over the life of the device, integer number in hour time units
12	0Ch	Device Power Cycle Count	Cumulative number of power cycle events over the life of the device
165	A5h	Maximum Erase Count	Maximum erase count of all the blocks in the device
166	A6h	Minimum Erase Count	Minimum erase count of all the blocks in the device
167	A7h	Average Erase Count	Average erase count of all the blocks in the device
169	A9h	Remain life	Indicate the worn-out status of the device
170	AAh	Available Reserved Space	Percentage of reserved blocks remaining in OP
171	ABh	Program Fail Count	Total count of program fails
172	ACh	Erase Fail Count	Total count of erase fails

174	A Eh	Unexpected Power Loss	Total count of unexpected power loss events
183	B7h	Total SATA Link Down Grade Link Count	Total count of the number of times SATA interface selected lower signaling rate due to error Byte0~1: count of failing SATA connection Byte2~3: count of SATA1 Byte4~5: count of SATA2
194	C2h	Temperature	Byte0~1: current temperature Byte2~3: minimum temperature Byte4~5: maximum temperature
198	C6h	ECC on-the-fly Error Count	Count of un - correctable ecc (UECCC). It is cleared at power - on reset.
199	C7h	Current SATA Interface CRC Count	Count of SATA interface CRC during this power on, it would be cleared to zero during power off
241	F1h	Lifetime Writes from Host System	Data written by host (GB=1024*1024*1024 Byte)
242	F2h	Lifetime Reads to Host System	Data read to host (GB=1024*1024*1024 Byte)
249	F9h	Total NAND Writes	Total data written to NAND (GB=1024*1024*1024 Byte)
250	FAh	Current SATA Link Down Grade Link Count	Count of the number of times SATA interface selected lower signaling rate due to error during this power on, it would be cleared to 0 during power off Byte0~1: count of failing SATA connection Byte2~3: count of SATA1 Byte4~5: count of SATA2
251	FBh	Total SATA Interface CRC Count	Life-time SATA interface CRC count

7.2 S.M.A.R.T Feature Set

The SMART feature set command has several separate sub-commands which are selective by host to write it to the devices' features registers before issuing the S.M.A.R.T. The sub-commands are listed below.

Table 10: S.M.A.R.T sub command

Command	Sub-Code
SMART READ DATA	D0
SMART READ ATTRIBUTE THRESHOLD	D1
SMART ENABLE/DISABLE ATTRIBUTE AUTOSAVE	D2
SMART EXECUTE OFF-LINE IMMEDIATE	D4
SMART READ LOG	D5
SMART WRITE LOG	D6
SMART ENABLE OPERATIONS	D8
SMART DISABLE OPERATIONS	D9
SMART RETURN STATUS	DA

8. Ordering Information

Table 14: Valid Combinations

Part Number	Capacity	Flash Type	Form Factor
RIT480-SX10B-N8	480GB	3D-TLC	M.2 2280
RIT960-SX10B-N8	960GB	3D-TLC	M.2 2280
RIT1920-SX10B-N8	1920GB	3D-TLC	M.2 2280
RIT3840-SX10B-N8	3840GB	3D-TLC	M.2 2280
RIT7680-SX10B-N8	7680GB	3D-TLC	M.2 2280

8.1 Part Number Naming Rule

