

ShenZhen Renice Technology Co., Ltd

X10B 2.5" SATAIII TLC SSD

Datasheet

V1.0

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1. Introduction

1.1 Product Overview

The Renice X10B industrial 2.5" SATA 3.84TB SSD is a high-performance, high reliability solid state drive. It combines 3.84 TBytes of NAND Flash memory with DRAM and an advanced Serial ATA (SATA) controller in a standard 2.5-inch form factor casing.

X10B 2.5" SATA SSD's advance NAND management technology improves endurance, enhances data security and helps prevent data corruption during unexpected power failure events. It combines robust NAND controller hardware error correction capabilities with advanced wear-leveling algorithms and bad block management to improve data reliability and significantly extend the life of the product. Renice X10B SSD is an ideal storage option for network attached storage, industrial computer, navigation systems, test and measurement instrumentation, security and surveillance equipment, digital signage and networking systems.

1.2 Feature

- **Standard Serial ATA:** SATAIII, 6.0Gbps (Backward compatible with SATA1.5 and 3.0Gbps)
- **Form factor:** 2.5 inch 100mm x 69.85mm x 7mm (LxWxH)
- **Performance:**
 - Sequential Read: up to 550MB/s
 - Sequential Write: up to 520MB/s
- **Capacities:** 3.84TB
- **Temperature Range:**
 - Operating Temperature: -40°C to +85°C
 - Storage Temperature: -50°C to +95°C
- **Operating Voltage:** 5V±5%
- **Power Consumption:**
 - Active mode:
3.84TB: <4,000mW
 - Idle mode: <1,600mW
- **High Reliability:**
 - Mean Time Between Failure (MTBF) > 1,500,000 hours
- **NAND Configuration**
 - 3 bits per cell (3D TLC NAND)
 - Program/ Erase (P/E) Cycle: 3,000 times
- **Intelligent features:**
 - End-to-End data protection
 - Dynamics and Static Wear Leveling
 - AHCI, TRIM, and NCQ Support
 - Support S.M.A.R.T (Self-monitoring, Analysis and Reporting Technology)
 - Support TCG OPAL

- Secure Erase (on request)

2. Functional Block Diagram

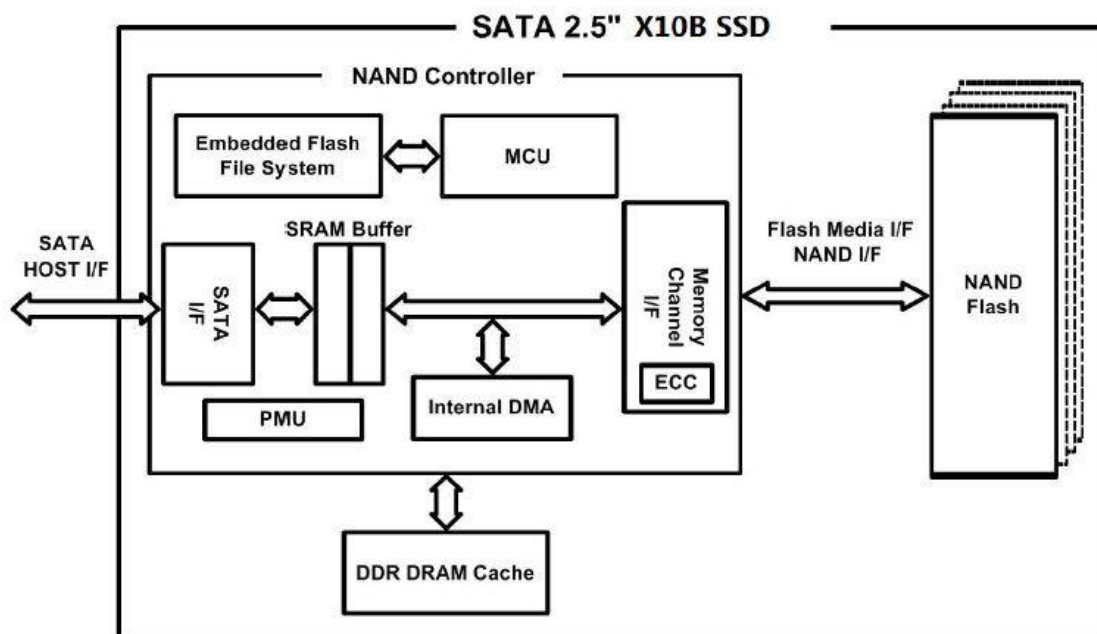


Figure 1: X10B 2.5" SATA SSD Functional Block Diagram

3. Product Specifications

3.1 Physical Specifications

Table 1: Physical Specifications

Form Factor		2.5" SATAIII
Dimensions	Length	100±0.25mm
	Width	69.85±0.25mm
	Height	7.0±0.15mm
Weight		<100g
Connector		7+15Pin

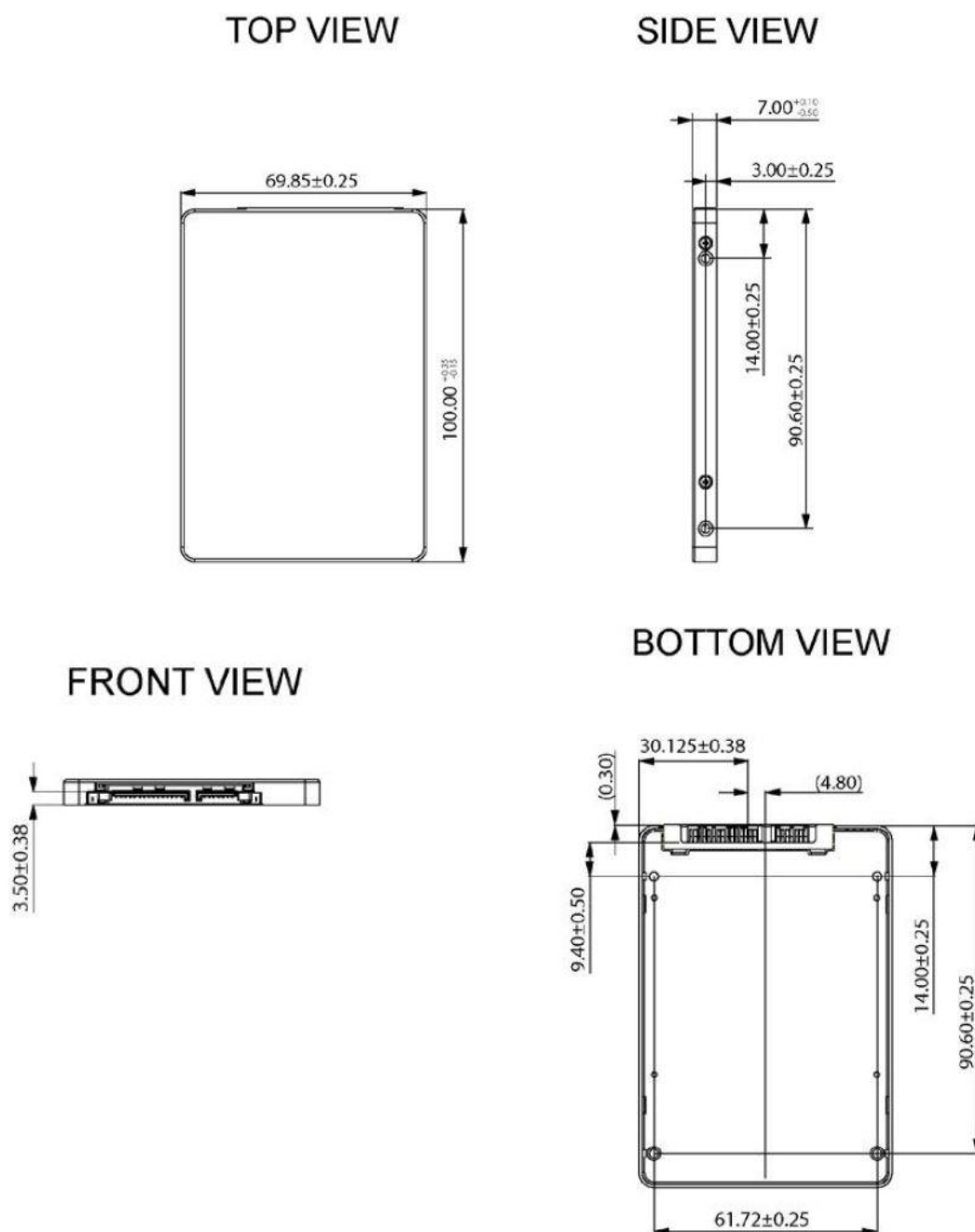


Figure 2: X10B 2.5" SATA SSD mechanical dimensions

3.2 Capacity

Table 2: Performance

Capacity	Product	ReadPerformance	Write Performance
3840GB	RIT3840-SX10B2	Up to 550MB/s	Up to 520MB/s

Table 3: Endurance

Capacity	Product	Terabytes Written (TBW)
3840GB	RIT3840-SX10B2	6,114TB

4. Interface Description

4.1 Pin Assignments and Description

Table 4: Pin Assignment and Description

Pin No.	Pin Name	Description
Signal Segment		
S1	GND	Ground
S2	A+	SATA Differential Signal Pair A
S3	A-	SATA Differential Signal Pair A
S4	GND	Ground
S5	B-	SATA Differential Signal Pair B
S6	B+	SATA Differential Signal Pair B
S7	GND	Ground
Power Segment		
P1		Retired
P2		Retired
P3	DEVSLP	Not Supported
P4	GND	Ground
P5	GND	Ground
P6	GND	Ground
P7	V _{DD}	5V pre-charge
P8	V _{DD}	5V
P9	V _{DD}	5V
P10	GND	Ground
P11		Reserved
P12	GND	Ground
P13	PWR	Not Used (12V pre-charge)
P14	PWR	Not Used (12V)
P15	PWR	Not Used (12V)

4. Power Specifications

4.1 Operating Voltage

Operating voltage: 5V ($\pm 5\%$)

4.2 Power Consumption (typical)

Table 5: Power Consumption

Capacity	Part Number	Active (Typ)	Idle
3.84TB	RIT3840-SX10B2	4W	1.6W

5. Reliability Specification

5.1 Environment

Table 6: Environmental Specifications

Item	Features	
Temperature	Operation	-40°C ~+85°C
	Storage	-50°C ~+95°C
Humidity	5-90%	
Vibration	20G (196 m/s ²) Peak, 20Hz~2000Hz, (30 min per axis) x3 axis	
Shock	1,500G (14.7km/s ²), 0.5ms, half-sine wave	

5.2 Power Failure Data Protection

The power-failure protection of X10B 2.5" SATA TLC SSD is a mechanism to help preventing data corruption during abnormal power-loss situation. The Controller proactively optimizes the amount and stay time of the "active" data residing in the cache. To ensure the data integrity during power cycling, the controller sends a command to the host only when the incoming data is fully committed to the NAND Flash.

5.3 Advanced Data Security

X10B 2.5" SATA SSD supports AES-256bit encryption to protect the sensitive data information. Meanwhile, it compliant SATA standard protocol to implement secure erase via two methods: (1) Crypto Erase to delete OPAL based encrypt key and data quickly; (2) Erase block via sanitize command.

6. Supported Commands

X10B 2.5" SATA SSD supports the following command set compliant with ATA8-ACS4 specification.

Table 7: ATA Support Command Set

Command	Code	Command	Code
NOP	00h	Device Configuration	B1h
Data Set Management	06h	Restore	B1h/C0h
Read Sector(s)	20h	Freeze Lock	B1h/C1h
Read Sector(S) EXT	24h	Identify	B1h/C2h
Read DMA EXT	25h	Set	B1h/C3h
Read Native Max Address EXT	27h	Identify DMA	B1h/C4h
Read Multiple EXT	29h	Set DMA	B1h/C5h
Read Log EXT	2Fh	Sanitize	B4h
Write Sector(s)	30h	Sanitize Status EXT	B4h/00h
Write Sector(s) EXT	34h	Crypto Scramble EXT	B4h/11h
Write DMA EXT	35h	Block Erase EXT	B4h/12h
Set Max Address EXT	37h	Overwrite EXT	B4h/14h
Write Multiple EXT	39h	Sanitize Freeze Lock EXT	B4h/20h
Write DMA FUA EXT	3Dh	Sanitize Antifreeze Lock EXT	B4h/40h
Write Log EXT	3Fh	Read Multiple	C4h
Read verify Sector(s)	40h	Write Multiple	C5h
Read Verify Sector(s) EXT	42h	Set Multiple Mode	C6h
Write Uncorrectable EXT	45h	Read DMA	C8h
Read Log DMA EXT	47h	Write DMA	CAh
Write Log DMA EXT	57h	Write Multiple FUA EXT	Ceh
Read FPDMA Queud	60h	Standby Immediate	E0h
Write FPDMA Queued	61h	Idle Immediate	E1h

Set Date and Time EXT	77h	Standby	E2h
Accessible MAX Address Configuration	78h	Idle	E3h
Execute Device Diagnostic	90h	Read Buffer	E4h
Download Microcode	92h	Check Power Mode	E5h
Download Microcode DMA	93h	Set Sleep Mode	E6h
SMART	B0h	Flush Cache	E7h
SMART Read Data	B0h/D0h	Write Buffer	E8h
SMART Read Attribute Thresholds	B0h/D1h	Read Buffer DMA	E9h
SMART Enable/Disable Attribute Autosave	B0h/D2h	Flush Cache EXT	EAh
SMART Save Attribute Values	B0h/D3h	Write Buffer DMA	EBh
SMART Execute Off-line Immediate	E0h/D4h	Identify Drive	ECh
SMART Read Log	B0h/D5h	Set Features	EFh
SMART Write Log	B0h/D6h	Enable Volatile Write Cache	EFh/02h
SMART Enable Operations	B0h/D8h	Set Transfer Mode	EFh/03h
SMART Disable Operations	B0h/D9h	Enable the APM Feature	EFh/05h
SMART Return Status	B0h/Dah		
SMART Enable/Disable Automatic Off-line	B0h/DBh		
Enable Use of SATA Feature	EFh/10h	Enable Read Look-ahead	EFh/Aah
Enable DMA Setup FIS Auto-Activate Optimization Feature	EFh/10h/02h	Enable Reverting to Power-on Defaults	EFh/CCh
Enable DIPM Transitions	EFh/10h/03h	Security Set Password	F1h
Enable SSP	EFh/10h/06h	Security Unlock	F2h
Enable Device Automatic Partial to Slumber Transitions Features	EFh/10h/07h	Security Erase Prepare	F3h
Enable Device Sleep	EFh/10h/09h	Security Erase Unit	F4h
Disable Read Look-ahead	EFh/55h	Security Freeze Lock	F5h
Disable Reverting to Power-on Defaults	EFh/66h	Security Disable Password	F6h
Disable Volatile Write Cache	EFh/82h	Read Native Max Address	F8h
Disable the APM Feature	EFh/85h	Set Max Address	F9h/00h
Disable Use of SATA Feature	EFh/90h	Set Max Set Password	F9h/01h
Disable DMA Setup FIS Auto-Activate Optimization Feature	EFh/90h/02h	Set Max Lock	F9h/02h
Disable DIPM Transitions	EFh/90h/06h	Set Max Freeze Lock	F9h/04h

Disable Device Automatic Partial to Slumber Transitions Feature	EFh/90g/07h	Set Max Set Password DMA	F9h/05h
Disable Device Sleep	EFh/90h/09h	Set Max Unlock DMA	F9h/06h
Obsolete CMD by the ATA/ATAPI specification			
Recalibrate	10h	Seek	70h
Read Sectors Without Retry	21h	Initialize Device Parameters	91h
Write Sectors Without Retry	31h	Read DMA Without Retry	C9h
Read Verify Sectors Without Retry	41h	Write DMA Without Retry	CBh

6.1 Identify-Device - ECh

The Identify-Device command enables the host to receive parameter information from X10B 2.5" SATA SSD. This command has the same protocol as the Read-Sector(s) command. All reserved bits or words are zero. The following table gives the definition for each field in the Identify-Device information.

Table 8: Identify-Device Information

Word Address	Total Bytes	Default Value	Data Field Type Information
0	2	0040h	General configuration bit
1	2	xxxxh ¹⁾	Obsolete
2	2	C837h	Specific configuration
3	2	xxxxh ¹⁾	Obsolete
4-5	4	0000h-0000h	Retired
6	2	003Fh	Number of sector per track
7-8	4	xxxxh ¹⁾	Reserved for the CompactFlash Association
9	2	0000h	Retired
10-19	20	eeeeh	Renice preset unique ID in ASCII
20-21	4	00003h-8000h	Retired
22	2	0000h	Obsolete
23-26	8	aaaah ⁵⁾	Firmware revision in ASCII
27-46	40	cccch ⁶⁾	User definable model number
47	2	8010h	Maximum number of sectors on Read/Write-Multiple command
48	2	4000h	Trusted Computing feature set options
49	2	2F00h	Capabilities
50	2	4000h	Capabilities
51-52	4	xxxxh ¹⁾	Obsolete
53	2	0007h	Field Validity
54-58	10	xxxxh ¹⁾	Obsolete
59	2	DD10h	Multiple sector setting is valid, one sector shall be transferred per interrupt on R/W Multiple command

60-61	4	nnnnh ³⁾	Total number of user addressable logical sector for 28-bit commands
62	2	xxxxh ¹⁾	Obsolete
63	2	0407h	DMA data transfer is supported in Device
64	2	0003h	Advanced PIO Transfer mode supported
65	2	0078h	Minimum Multiword DMA transfer cycle time per Word
66	2	0078h	Manufacturer's recommended Multiword DMA transfer cycle time
67	2	0078h	Minimum PIO transfer cycle time without flow control
68	2	0078h	Minumum PIO transfer cycle time with IDRDY flow control
69	2	5D20h	Additional Supported
70	2	0000h	Reserved
71-74	8	xxxxh ¹⁾	Reserved for the IDENTIFY PACKET DEVICE command
75	2	001Fh	Queue length
76	2	E50Eh	Serial ATA Capabilities
77	2	0006h	Serial ATA Additional Capabilities
78	2	004Ch	Serial ATA features supported
79	2	0040h	Serial ATA features enable
80	2	07F8h	Major Version Number. Bit1~3 Obsolete
81	2	0000h	Minor version number
82	2	746Bh	Commands and feature sets supported
83	2	7D09h	Commands and feature sets supported
84	2	4163h	Commands and feature sets supported
85	2	7469h	Commands and feature sets supported or enabled
86	2	BC09h	Commands and feature sets supported or enabled
87	2	4163h	Commands and feature sets supported or enabled
88	2	007Fh	UDMA modes
89	2	0001h	Time required for Normal Erase mode command
90	2	0001h	Time required for Enhanced Erase mode command
91	2	00FEh	Current APM level value
92	2	FFFEh	Master Password Identifier
93	2	0000h	Hardware reset result
94	2	0000h	Current AAM value
95	2	0000h	Stream minimum request size
96	2	0000h	Streaming Transfer Time-DMA
97	2	0000h	Streaming Access Latency-DMA and PIO
98-99	4	0000h-0000h	Streaming Performance Granularity (DWord)
100-103	8	nnnnh ³⁾	Total # of user addressable logical sectors for the 48-bit Add feature set (QWord)
104	2	0000h	Streaming Transfer time-PIO
105	2	0008h	Maximum number of 512-Byte blocks of LBA Range Entries

106	2	4000h	Physical sector size/ logical sector size
107	2	0000h	Inter-seek delay for ISO 7779 standard acoustic testing
108	2	0000h	NAA/ IEEE OUI
109	2	0000h	IEEE/ OUI
110	2	0000h	Unique ID
111	2	0000h	Unique ID
112-115	8	xxxxh ¹⁾	Reserved for word wide name extension to 128 bits
116	2	0000h	Reserved for TLC
117-118	4	bbbbh ²⁾	Logical sector size (DWord)
119	2	401Dh	Commands and feature sets supported
120	2	401Dh	Commands and feature sets supported or enabled
121-126	10	xxxxh ¹⁾	Reserved for expanded supported and enabled settings
127	2	0000h	Obsolete
128	2	0021h	Security status
129-159	62	xxxxh ¹⁾	Vendor specific
160	2	0000h	CFA power mode
161-167	16	xxxxh ¹⁾	Reserved for the CompactFlash Association
168	2	0005h	Nominal Form Factor
169	2	0001h	01=the Trim bit in the DATA SET MANGEMENT is supported 00=the Trim bit in the DATA SET MANGEMENT is not supported
176-205	60	xxxxh ¹⁾	Current media serial number
206	2	0000h	SCT command transport
207-208	4	xxxxh ¹⁾	Reserved for CE-ATA
209	2	4000h	Alignment of logical blocks within a physical block
210-211	4	0000h-0000h	Write-Read-Verify sector count mode 3 (DWord)
212-213	4	0000h-0000h	Write-Read-Verify sector count mode 2 (DWord)
214	2	0000h	NV cache capabilities
215-216	4	0000h-0000h	NV cache size in logical blocks (DWord)
217	2	0001h	Nominal medial rotation rate
218	2	0000h	Reserved
219	2	0000h	NV cache options
220	2	0000h	Write-Read-Verify feature set current mode
221	2	0000h	Reserved
222	2	107Fh	Transport major version number
223	2	0000h	Transport major version number
224-233	20	xxxxh ¹⁾	Reserved for CE-ATA
234	2	0001h	Min # of 512-Byte data block per DOWNLOAD MICROCODE CMD for mode 03h

235	2	FFFEh	Max # of 512-Byte data block per DOWNLOAD MICROCODE CMD for mode 03h
236-254	38	xxxxh ¹⁾	Reserved
255	2	ddddh ⁴⁾	Integrity Word

- 1) xxxx – Don't care. This field is subject to change by the host or the device.
- 2) bbbb – default value set by the controller. The selections could be user programmable.
- 3) n – calculated data based on product configuration
- 4) dddd – unique number of each device
- 5) aaaa – any unique Renice firmware revision
- 6) cccc – the default value is "xxxGB X10B 2.5" SSD" or "xxxTB X10B 2.5" SSD" where xxx is the flash drive capacity. The user has an option to change the model number during manufacturing.

7. Ordering Information

Table 9: Valid Combinations

Part Number	Description
RIT3840- SX10B2	3840GB X10B 2.5" SATAIII TLC SSD, Industrial Temp. -40°C to +85°C

7.1 Part Number Naming Rule

