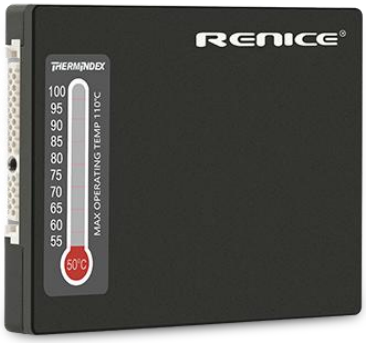
ShenZhen Renice Technology Co., Ltd

X10 2.5" RSATA R-SLC SSD

Datasheet



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Revision History

Revision	Description	Date
1.0	Preliminary datasheet released	1/3/2024

PRODUCT OVERVIEW

- Capacities
  - 512GB, 960GB, 1920GB
- Form Factor
  - 2.5 inch, 100 x69.85 x9.00mm
- Rugged SATA Host Interface
  - Smith R-SATA connector (default)
  - SATA 1.5Gb/s, 3Gb/s and 6Gb/s
  - Hot Pluggable
  - Boot support
- Sequential Performance
  - Read: up to 530MB/s
  - Write: up to 520MB/s
- Random Performance
  - Read (4KB): up to 70K IOPS
  - Write (4KB): up to 70K IOPS
- Latency
  - Sequential Read/Write: 75µs/35µs (typical)
  - Random Read/Write: 130µs/35µs (typical)
- Power Specifications
  - 5V power supply
  - Active mode: max. 4.8W (typical)
- Temperature Range
  - Operation: -40°C ~ +85°C
  - Storage: -50°C ~ +95°C
- NAND Configuration
  - 1 bit per cell (R-SLC mode)
- Data Retention
  - 10 years at 25°C, JESD47 compliant
- Lifetime Endurance
  - 30 Drive Writes Per Day (DWPD) for 5 years
- Advanced Flash Management
  - Built-in ECC
  - Static and Dynamic Wear Leveling
  - Bad Block Management
  - SMART and TRIM Commands
  - Enhanced power interrupt data protection
  - Unrecoverable Bit Error Rate (UBER)
  - Firmware Upgrade
- Data Security
  - AES 256-bit Encryption
  - End-to-End data path protection (local CRC)
  - Secure Erase (HW & SW)

CATALOGUE

1. Introduction

1.1 General Information

Designed with high-reliability RSATA connector and unique firmware architecture, Renice X10 series R-SLC SSD solution offers real SLC mode reliable long life, delivers ultra high endurance, sustainable high-speed performance and extreme high reliability in standard 2.5 inch form factor.

Configured with AES-256bit encryption, also assembles hardware physical destruction and logical data erase functions, and resistant extend operation temperature range from -40°C to +85°C, the X10 series RSATA SSD are well suitable for rugged environment and demanding applications in military and aerospace market.

2. Product Specifications

2.1 Physical Specifications

Table 1: Physical Specifications

Form Factor		2.5 inch SATAIII
Dimensions	Length	100±0.25mm
	Width	69.85±0.2mm
	Height	9.0±0.2mm
Connector		R-SATA Connector (Smith Connector)

2.2 Capacity

Table 2: Performance

Capacity	Maximum Performance			
	Sequential 128KB (QD=32, Workers=1)		4K Sustained Random	
	Read (MB/s)	Write (MB/s)	Read (IOPS)	Write (IOPS)
512GB	530MB/s	520MB/s	70,000	65,000
960GB	530MB/s	520MB/s	70,000	27,000
1920GB	530MB/s	520MB/s	70,000	46,000

NOTES:

1. Performance is measure with an unformatted SSD and FIO on Linux with QD32 with 1 worker.
2. Performance may differ according to flash configuration and platform.
3. The tables are for reference only. Any criteria for accepting goods shall be further discussed based on different flash configurations.

2.3 Capacity and Endurance

Table 3: capacity and endurance

Capacity	P/N	TeraBytes Written (TBW)	Drive Writes Per Day (DWPD)
512GB	RIS512G-RS2X10G	43,800	30
960GB	RIS960G-RS2X10G	52,260	30
1920GB	RIS1T92- RS2X10G	105,120	30

3. Interface Description

3.1 Pin Assignments and Description

Table 4: Pin Assignment and Description

Pin No.	Pin Name	Pin No.	Pin Name
S1	GND	P1	Vdes
S2	SATA Differential RX+ based on SSD	P2	Vdes/SE
S3	SATA Differential RX- based on SSD	P3	Vdes/PD
S4	GND	P4	GND
S5	SATA Differential TX- based on SSD	P5	GND
S6	SATA Differential TX+ based on SSD	P6	GND
S7	GND	P7	+5V/5Vdes
		P8	+5V/5Vdes
		P9	+5V/5Vdes
		P10	GND
		P11	DAS_OUT
		P12	GND
		P13	+12V/12Vdes/SE
		P14	+12V/12Vdes/SE
		P15	+12V/12Vdes/PD

4. Environmental and Electrical Specifications

4.1 Environmental Conditions

Table 5: Temperature and Humidity specification

Condition	Temperature
Operation	-40°C to +85°C
Storage	-50°C to +95°C
Humidity	5-95% RH

4.2 Power Consumption (typical)

Table 6: Power Consumption

Capacity	Active Write Typ	Active Read Typ	Idle
512GB	3.6W	3.2W	2W
960GB	3.6W	3.2W	2W
1920GB	4.8W	4W	2.8W

5. Reliability Specification

5.1 Power Failure Data Protection

The power-failure protection of X10 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.

5.2 Advanced Data Security

X10 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

Renice X10 2.5” SATA SSD supports the following command sets compliant with ATA8-ACS4 specification.

Table 7-1: ATA Support Command Sets

Command	Code	Command	Code
NOP	00h	SMART Disable Operations	B0h/D9h
Data Set Management	06h	SMART Return Status	B0h/DAh
Read Sector(s)	20h	Sanitize	B4h
Read Sector(S) EXT	24h	Sanitize Status EXT	B4h/00h
Read DMA EXT	25h	Crypto Scramble EXT	B4h/11h
Read Multiple EXT	29h	Block Erase EXT	B4h/12h
Read Log EXT	2Fh	Overwrite EXT	B4h/14h
Write Sector(s)	30h	Sanitize Freeze Lock EXT	B4h/20h
Write Sector(s) EXT	34h	Sanitize Antifreeze Lock EXT	B4h/40h
Write DMA EXT	35h	Read Multiple	C4h
Write Multiple EXT	39h	Write Multiple	C5h
Write DMA FUA EXT	3Dh	Set Multiple Mode	C6h
Write Log EXT	3Fh	Read DMA	C8h
Read verify Sector(s)	40h	Write DMA	CAh
Read Verify Sector(s) EXT	42h	Write Multiple FUA EXT	CEh
Write Uncorrectable EXT	45h	Standby Immediate	E0h
Read Log DMA EXT	47h	Idle Immediate	E1h
Write Log DMA EXT	57h	Standby	E2h
Read FPDMA Queud	60h	Idle	E3h
Write FPDMA Queued	61h	Read Buffer	E4h
Set Date and Time EXT	77h	Check Power Mode	E5h
Accessible MAX Address	78h	Set Sleep Mode	E6h
Execute Device Diagnostic	90h	Flush Cache	E7h
Download Microcode	92h	Write Buffer	E8h
Download Microcde DMA	93h	Read Buffer DMA	E9h
SMART	B0h	Flush Cache EXT	EAh
SMART Read Data	B0h/D0h	Write Buffer DMA	EBh
SMART Read/Attribute Thresholds	B0h/D1h	Identify Device	Ech
SMART Enable/Disable Attribute Autosave	B0h/D2h	Set Features	EFh
SMART Execute Off-line Immediate	B0h/D4h	Enable Volatile Write Cache	EFh/02h
SMART Read Log	B0h/D5h	Set Transfer Mode	EFh/03h
SMART Write Log	B0h/D6h	Enable the APM Feature	EFh/05h

SMART Enable Operations	B0h/D8h		

Command	Code	Command	Code
Enable Use of SATA Feature	EFh/10h	Security Set Password	F1h
Enable DMA Setup FIS Auto-Active Optimization Feature	EFh/10h/02h	Security Unlock	F2h
Enable DIPM Transitions	EFh/10h/03h	Security Erase Prepare	F3h
Enable SSP	EFh/10h/06h	Security Erase Unit	F4h
Enable Device Automatic Partial to Slumber Transitions Feature	EFh/10h/07h	Security Freeze Lock	F5h
Enable Device Sleep	EFh/10h/09h	Security Disable Password	F6h
Disable Reverting to Power-on Defaults	EFh/66h	Read Native Max Address	F8h
Disable Volatile Write Cache	EFh/82h	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/03h	Set Max Unlock	F9h/03h
Disable SSP	EFh/90h/06h	Set Max Freeze Lock	F9h/04h
Disable Device Automatic Partial to Slumber Transitions Feature	EFh/90h/07h	Set Max Set Password DMA	F9h/05h
Disable Device Sleep	EFh/90h/09h	Set Max Unlock DMA	F9h/06h
Enable Reverting to Power-on Defaults	EFh/CCh		

Table 7-2: SMART Attributes

Attribute ID	Description
09h	Power-on Hours (POH) Count
0Ch	Drive Power Cycle Count (involve unexpected power down)
A8h	SATA PHY Error Count (Only record from power-on; when power-off this value will clear to zero. These values include PHY Error Count, e.g., data FIS CRC, code error, disparity error, command FIS CRC, etc.
AAh	Available Reserved Space
AEh	Number of Unexpected Power Losses
BBh	NAND Flash read uncorrectable error count
BEh	SSD On-board Temperature
C0h	Number of Unexpected Power Losses
C2h	Controller Junction Temperature
C7h	Number of Accumulated CRC Errors (read/write data FIS CRC error)
F1h	Host Writes Data Count The raw value of this attribute reports the total number of sectors written by the host

	system. The raw value is increased by 1 for every 62,536 sectors (32MB) written by the host
F2h	Host Read Data Count The raw value of this attribute reports the total number of sectors read by the host system. The raw value is increased by 1 for every 65,536 sectors (32MB) read by the host.

7. Ordering Information

Table 9: Valid Combinations

Part Number	Description
RIS512G-RS2X10G	512GB X10 2.5” SATAIII R-SLC SSD, Industrial Temp. -40°C to +85°C
RIS960G-RS2X10G	960GB X10 2.5” SATAIII R-SLC SSD, Industrial Temp. -40°C to +85°C
RIS1T92-RS2X10G	1.92TB X10 2.5” SATAIII R-SLC SSD, Industrial Temp. -40°C to +85°C

7.1 Part Number Naming Rule