

Renice Technology Co., Limited

# X9 2.5" R-SATAIII SSD

DATASHEET



V1.0

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# 1. Introduction

## 1.1 Product Overview

The Renice X9 SSD has a R-SATA III (6Gbps) interface allowing for read/write speeds of 550/500MB per second. The X9 is ideal for a variety of applications, including enterprise solutions where data throughput needs to be high, as well as industrial installations where the potential for high shock and vibration conditions exist.

X9 series SSD carry up to 1GB DDR3 which gains high performance. Design using SLC/MLC NAND flash technology, and utilizing a unique firmware architecture, the X9 maximizes the bandwidth limitations of R-SATA III giving up to 90,000 input/output operations per second( IOPS).

## 1.2 Feature

- **HOST Interface:** R-SATA III, 6.0Gbps (Backward compatible with R-SATA 1.5 and 3.0Gbps)
- **Form factor:** 2.5 inch (100.0mmX70.0mmX9.5mm) L×W×H
- **Connector:** 7-pin signal segment and a 15-pin power segment
- **Performance:**
  - Max Sequential Data Read/Write: 550/500MB/s
  - Read/Write IOPS: 90,000 / 80,000
  - Access Time: <0.1ms
- **Capacities:** 512GB, 1TB, 2TB (MLC)  
256GB,512GB,1TB (SLC)
- **Power Management:**
  - Input voltage: 5V (±5%)
- **Temperature ranges:**
  - Operation: -40 to 85°C (Industrial)
  - Storage: -50 to 95°C
- **Intelligent features:**
  - Flash management algorithm: static and dynamic wear-leveling, bad block management algorithm
  - Supports dynamic power management and SMART (Self-Monitoring, Analysis and Reporting Technology)
  - Supports BCH ECC 8~80bits in 1KBytes
  - Support Power Failure Protection
  - TRIM support
  - Support AES-128/256 bits
  - Support NCQ
  - Support Interface Power Management
  - Support Spread-Spectrum Clocking
- **MTBF:** NO MTBF @25C

## 2. Functional Block Diagram

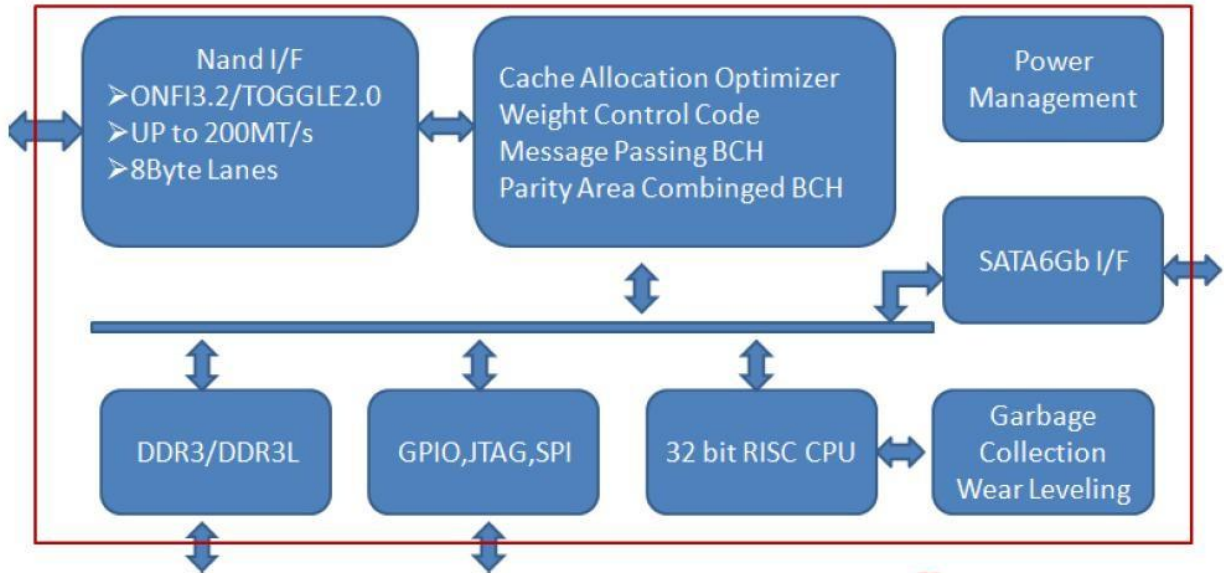


Figure 1 Renice X9 2.5" SATAIII SSD Block Diagram

## 3. Product Specifications

### 3.1 Physical Specifications

Table 2 Physical Specifications

<b>Form Factor</b>		2.5 INCH
<b>Dimensions</b>	Length	100±0.25mm
	Width	70.0±0.25mm
	Height	9.5±0.25mm
<b>Weight</b>		85g
<b>Connector</b>		R-SATA III 7+15 pin

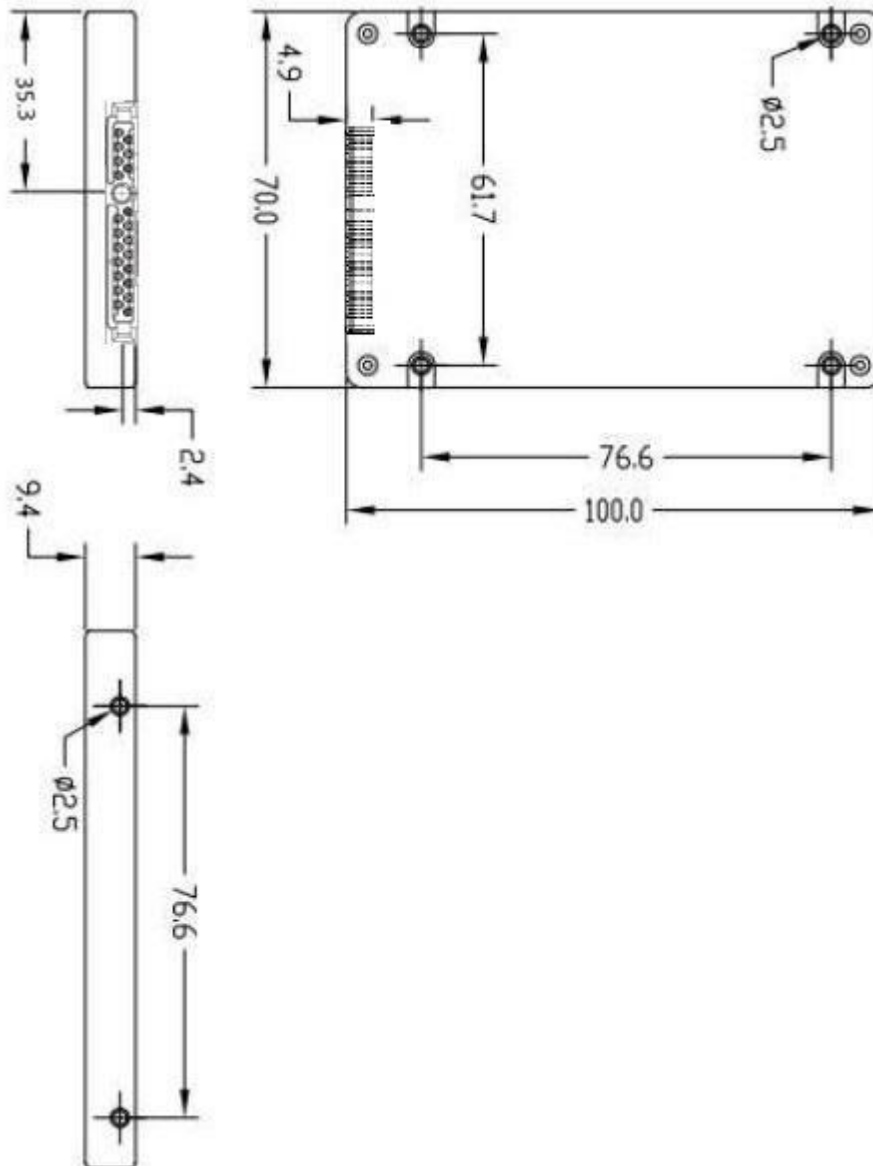


Figure 3 Renice X9 2.5" R-SATA III SSD mechanical dimensions

### 3.2 Host Interface

- 1.5/3.0/6.0Gbps SATA I/II/III interface
- Native Command Queuing (NCQ)
- Spread-Spectrum Clocking (SSC)
- Interface Power Management (IPM)

# 4. Interface Description

## 4.1 Pin Assignment

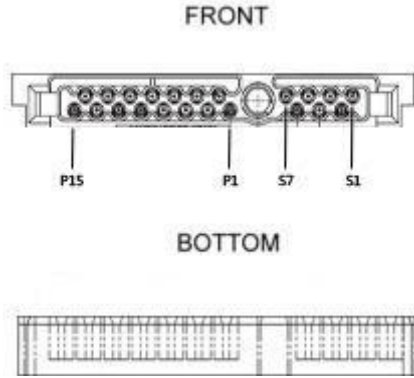


Figure 4: Pin Assignments

## 4.2 Pin Description

### 1. Normal pin definition:

Pin No.	Pin Name	Pin No.	Pin Name
S1	GND (2 <sup>nd</sup> mate)	P1	V33 (No Power)
S2	SATA Differential RX+ based on SSD	P2	V33 (No Power)
S3	SATA Differential RX- based on SSD	P3	V33 (No Power)
S4	GND(2 <sup>nd</sup> mate)	P4	GND
S5	SATA Differential TX- based on SSD	P5	GND
S6	SATA Differential TX+ based on SSD	P6	GND
S7	GND(2 <sup>nd</sup> mate)	P7	+5V
		P8	+5V
		P9	+5V
		P10	GND
		P11	Reserved
		P12	GND
		P13	V12 (No Power)
		P14	SE
		P15	SE_LED



## 2. Physical Burn pin definition:

Pin No.	Pin Name	Pin No.	Pin Name
S1	GND (2 <sup>nd</sup> mate)	P1	SE
S2	SATA Differential RX+ based on SSD	P2	SE_LED
S3	SATA Differential RX- based on SSD	P3	PD5S
S4	GND(2 <sup>nd</sup> mate)	P4	GND
S5	SATA Differential TX- based on SSD	P5	GND
S6	SATA Differential TX+ based on SSD	P6	GND
S7	GND(2 <sup>nd</sup> mate)	P7	+5V
		P8	+5V
		P9	+5V
		P10	GND
		P11	Reserved
		P12	GND
		P13	+12V
		P14	+12V
		P15	+12V

## 5. Power Specifications

### 5.1 Operating Voltage

Operating voltage: 5V ( $\pm 5\%$ ) 12V ( $\pm 5\%$ -Physical burned dedicated power supply)

### 5.2 Power Supply Voltage

1.2V for Core, 1.35V for DDR3, 1.8V for IO and SPI Flash, 3.3V for NAND

### 5.3 Power Consumption (typical)

Operation (Read/Write) –3W/10W@1TB

Idle–1.5W



## 6. Reliability Specification

### 6.1 Environment

**Table 6 Environmental Specifications**

Item	Features	
Temperature	Operation	Industrial: -40~+85°C
Humidity	5-95%	
Vibration	10Hz-2000Hz, 16.4 G (X, Y, Z axis, 1 hour /axis)	
Shock	Peak Acceleration: 1,500 G, 0.5ms(Half-sine wave, ±X,±Y,±Z axis, 1 time/axis) Peak Acceleration: 50 G, 11ms(Half-sine wave, ±X,±Y,±Z axis, 3 times/axis)	

### 6.2 Wear-leveling

Renice X9 SSD support both static and dynamic wear-leveling, these two algorithms guarantee all type of flash memory at same level of erase cycles to improve lifetime limitation of NAND based storage.

### 6.3 H/W ECC and EDC for NAND Flash

Programmable BCH strength (8-bit ~ 80-bit) and Codeword size (512/1024 Bytes) .

### 6.4 Power Failure Protection

Renice X9 2.5" R-SATA SSD adopts on board DDR and Super Capacitor. Data will be written to DDR firstly and then to NAND flash. In case of Power Loss, the Capacitor will support the transferring of Data from DDR to NAND flash.

### 6.5 Endurance

Write endurance: >25 years @ 100GB write/ day (512GB MLC)

Read endurance: JESD47 compliant



## 6.6 MTBF

MTBF (Mean Time between Failures) of Renice X9 SSD: NO MTBF @25C

# 7. Security Function (Optional)

Renice X9 R-SATA SSD can support Secure Erase function with a Hardware Key\* for emergency data erasure based on customers' request. Secure Erase can be triggered by pressing the Secure Erase Key. The process of erasure will not be stopped until finished, even if power failure happens, it will be continued when power is back on.

No matter Renice X9 R-SATA SSD is acting as master Drive or slave drive, once the Secure Erase function is triggered, SE will be carried out immediately whether the SSD is in idle mode(no read/write) , or work (read/write) mode. After SE is finished, the SSD gets to be uninitialized drive and can be used again after formatting.

Hardware key\*: The X9 R-SATA SSD is designed with SE K2 or P1 (P14) to the external switch, the client is requested to connect an external hardware touch switch/button to trigger the SE function.

## 7.1 Technical Concept

Se is deleted by IO expand chip GPIO, transmitted to the main control chip implementation. Signal drop-down 3 seconds safely delete function is triggered, whether through hardware or software. Then Controller will send Delete Command to NAND Flash to start SE.

### (1): Hardware Information

#### a. Trigger Time: 0~3 seconds

Controller will take it as mis-operation and no SE command will be sent.

#### b. Trigger Time: 3~10 seconds

All data on board will be deleted and data of FF pattern will be written in.

## 7.2 SE Type

The specific SE type of X9 R-SATA SSD is similar to NTISSP-9 which is one SE standard commonly seen from SSD solutions on market, however X9 only executes the SE command for one time.

**(Note: The SE function of Renice X9 solution could be customized based on clients' standard.)**

X9 SE is done by 2 steps, Erase and Write.

1. Erase: Every memory block on the board is erased;

2. Write: Every Memory Chips location is recorded with a pattern FF.

So if clients need other types of SE, please forward us specific standards. And our R&D will figure out the availability.

## 7.3 Time taken for SE

**Scenario 1:** only Mapping Table deleted. Data on disk could be recovered maliciously.

Around 5 seconds

**Scenario 2:** Both Mapping Table and memory storage blocks are deleted. And disk will be written in fully with data of meaningless pattern.

Theoretical formula for Scenario 2:

e.g. Micron MT29F64G08CBABA NAND flash.

8GB=4096 BLOCK;

Each Block Erase needs 3ms based on Flash Data Sheet

Controller Used 2 plan and Interleave mode to scan the data;

Time=4096\*3ms/2/1.5 = 4 Seconds

Plan: the same meaning with Channel for the Data transmission;

Interleave: used for enhance the Data transmission speed In One Channel; Interleave value depends on NAND deployed, which is usually between 1.0 and 2.0. In our example we use 1.5 as a convenient median.

## 8. Write Protection Function (Optional)

Renice X9 R-SATA SSD can support write protection function based on customers' request with a Hardware Button\*. Write protection can be enabled by operating the Write Protection button. Once write protect function triggered, the whole disk could be for read only, in that case, no more data could be written into the disk to avoid the virus infection.

Hardware Button\*: Renice X9 R-SATA SSD is designed with Write Protection jumper connector, the client is requested to connect an external hardware touch switch/button to operate the Write Protection function.



## 9. Physical Burn Function (Optional)

Physical Burn is burned to Flash IC wafer circuit, reached the purpose of physical destruction of data.

Renice X9 R - SATA SSD support hardware button physical burned protection function. Through R - SATA interface P3 external switch, touch more than 5 s time to start the physical function of burning program, for the whole process of burning 45 s.

## 10. Ordering Information

**Table 7 Valid Combinations**

Capacities/Flash type	Industrial Temp	Part Number
256GB/SLC	-40 to 85°C	RIS256-RS3X92
512GB/SLC	-40 to 85°C	RIS512-RS3X92
1TB/SLC	-40 to 85°C	RIS01T-RS3X92
512GB/MLC	-40 to 85°C	RIM512-RS3X92
1TB/MLC	-40 to 85°C	RIM01T-RS3X92
2TB/MLC	-40 to 85°C	RIM02T-RS3X92

# 11.Part Number Naming Rule

