



Get Extra with SATA

Phison PS3112-S12 (Phison S12) is a market-proven NAND flash controller IC solution that saturates the SATA SSD performance bandwidth. Adopted by numerous module vendors, the S12 enables performance up to 550 MB/s in sequential operations and 99 KIOPS in random operations, making it the most exciting option for those seeking SSD performance with a SATA interface upgrade from mechanical hard drives.

Application

Client Platforms

Entry-level Game Consoles



Product Features

Market-leading performance

Manufactured using TSMC's 28nm process technology, the S12 is optimized for a SATA III 6Gb/s interface, enabling SSDs with maximized bandwidths and link efficiency. Paired with state-of-the-art 3D NAND flash memory chips, the S12 handles application payloads immaculately with minimal latency.

Phison 3rd Generation LDPC ECC engine

Phison's proprietary third-generation ECC engine based on the LDPC coding scheme effectively maintains NAND flash data reliability. Relative to the prior generation, the 3rd Gen engine comes with even higher correction strength, exacting to more than double of that of a conventional BCH ECC engine.

Excellent Scalability

The S12 supports up to 8 NAND flash data transmitting channels with up to 32 Chip Enable (CE) counts running on mainstream NAND flash interfaces in ONFI and Toggle and allowing capacity scaling from 128 GB up to 16 TB.

End-to-End Data Path Protection

From the entry through PHY to the access of NAND flash memory, data packages go through a series of encryption/decryption using various coding schemes, including but not limited to AES, CRC, and SEDEC, to gain a multi-layered protection over the course of delivery.

CONTROLLER

PS3112-S12

Features	Specifications
Host Interface	<ul style="list-style-type: none">- SATA III (Bandwidth: 6Gb/s)- Compliance with SATA Revision 3.2- Backward compatible with existing SATA generation transfer rates
Processor	<ul style="list-style-type: none">- Dual-CPU architecture with built-in 32-bit microcontroller- TSMC 28nm process technology
Flash Controller	<ul style="list-style-type: none">- Up to 8 Channels with 32 Chip Enable (CE) counts- Flash transfer rate up to 667MT/s- Capacity up to 16TB- Support 3D TLC and QLC NAND flash memory- Compliance with Toggle 3.0 and ONFi 4.0- Flash I/O operating voltage supply 1.2V/1.8V
DRAM Controller	<ul style="list-style-type: none">- DDR3L (16 bit, 1600Mbps)- DDR4 (8/16 bit, 1600Mbps)
Data Reliability	<ul style="list-style-type: none">- Phison 3rd generation LDPC ECC engine- DDR ECC engine- End-to-end data path protection
Security	<ul style="list-style-type: none">- AES 256- TCG Opal
Performance	<ul style="list-style-type: none">- Sequential Read up to 550MB/s- Sequential Write up to 530MB/s- 4K Random Read up to 99K IOPS- 4K Random Write up to 90K IOPS
Power Management	<ul style="list-style-type: none">- DEVSLP < 5mW
Temperature Range	<ul style="list-style-type: none">- Operating range: 0~70 °C- Storage range: -40~85 °C
Package	<ul style="list-style-type: none">- 529-ball TFBGA, 16 mm x 16 mm
Peripheral	<ul style="list-style-type: none">- Built-in internal thermal sensor- GPIO pins- Built-in UART function- I2C and SPI for external ROM



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Solutions

PS3112-S12

Capacity ⁽¹⁾	256GB	512GB	1024GB	2048GB	3840GB	7680GB	16000GB
Interface	SATAIII 6Gb/s						
Form Factor	M.2 2280, 2.5"						
NAND Flash	3D TLC / 3D QLC						
Performance ⁽²⁾							
Sequential Read	550 MB/s	550 MB/s	550 MB/s	550 MB/s	550 MB/s	550 MB/s	550 MB/s
Sequential Write	530 MB/s	530 MB/s	530 MB/s	530 MB/s	530 MB/s	530 MB/s	530 MB/s
4K Random Read	94K IOPS	98K IOPS	98K IOPS	99K IOPS	98K IOPS	98K IOPS	99K IOPS
4K Random Write	88K IOPS	90K IOPS	90K IOPS	90K IOPS	89K IOPS	89K IOPS	89K IOPS
Power Consumption ⁽³⁾							
Supply Voltage	M.2 3.3V ± 5% 2.5" 5V ± 5%						
Active (Average)	1800mW	1800mW	1800mW	2000mW	3200mW	3700mW	4200mW
Idle	100mW	100mW	110mW	110mW	1400mW	1700mW	1800mW
DEVSLP ⁽⁴⁾	5mW	5mW	5mW	5mW	-	-	-
Environmental							
Operating Temperature	0°C - 70°C						
Non-Operating Temperature	-40°C - 85°C						
Reliability & Warranty							
TBW(Max) ⁽⁵⁾	150TB	350TB	750TB	1500TB	13800TB	28500TB	45000TB
MTBF	1.6 million hours					1.5 million hours	
UBER	<10 ⁻¹⁶	<10 ⁻¹⁶	<10 ⁻¹⁶	<10 ⁻¹⁶	<10 ⁻¹⁶	<10 ⁻¹⁶	<10 ⁻¹⁶
Advanced Features							
- End-to-End Data Protection - TCG Opal Support - Thermal Monitoring							

(1) 1 GB = 1,000,000,000 bytes

(2) Performance is based on CrystalDiskMark 6.0.0, 1GB range for sequential read/write and IOMeter, 1GB range for 4K random read/write

(3) Power consumption is measured during the sequential read and write operations performed by CrystalDiskMark 6.0.0(1GB range)

(4) The value of DEVSLP mode is measured while entering device sleep mode for 5 minutes. DEVSLP Mode is the optional function for device

(5) TBW is Terabytes written and the results are obtained in compliance with JEDEC SSD endurance workload JESD219A



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