Flash Memory Summit

Leading PCIe Gen5
SSD Solutions
FMS 2022, *August 2-4, Santa Clara, CA*

PHISON

X1 SSD Platform: Best-in-Class U.3 Enterprise PCIe Gen4x4 eTLC SSD

Customizable Platform

Exceptional Performance at Low Power PCIe Gen4x4 Dual Port. Our most advanced SSD ever built. The X1 SSD platform has unrivaled performance while also consuming the least amount of power of drives in its class.

This is accomplished utilizing Phison's unique and patented CPU architecture. The X1 SSD solution CPU complex is composed of two performance and power efficient ARM R5 CPUs and dozens of small CPU co-processors that complete computationally heavy, redundant tasks at high speed with a minimum of power consumption.

Joint Development with Seagate

The X1 SSD platform was created in partnership with Seagate, the industry's #1 most trusted brand in Enterprise Storage. Seagate and Phison's engineering teams collaborated in the architecture, features, and development of the X1 SSD solution. Seagate's drive validation lab performed extensive systems and environmental testing to ensure the SSD has world-class reliability.

CONTROLLER

Features	Specifications
Capacities	1DWPD: 1.92, 3.84, 7.68, 15.36TB 3DWPD: 1.60, 3.20, 6.40, 12.8TB
Interface	PCIe Gen4x4, NVMe 1.4
Form Factor	U.3, 15mm & 7 mm thickness
NAND Flash	128L 3D eTLC
Sustained Performance (Up to 99%) [1,2,3]	
Sequential Read	7,400 MB/s
Sequential Write	Up to 7,200 MB/s
4K Random Read	1,750,000 IOPs
4K Random Write	Up to 470,000 IOPs
Quality of Service (99%) [3]	
4K Random Read QD1 Latency	84 µs
4K Random Write QD1 Latency	10 µs
Reliability	
UBER	< 1 sector per 10^{18} bits read
Power	
Typical	Random Read: 13.5W Random Write: 17.9W
Idle	6.5W
Temperature	
Operating	0°C ~ 70°C
Non-Operating	-40°C ~ 85°C
Advanced Features	• Power Loss Protection capacitors (pFail) • PRP/SGL • End-to-End Data Path Protection • DIF/DIX • SMBus • NVMe-MI • Multistreams • SECDED • SR-IOV • PI • TCG Opal 2.0, Sanitize, Crypto Erase • Memory Scrubbing

[1] 1MB/s = 1,000,000 bytes / second
[2] Performance measured using IOmeter version 1.1 on the full LBA span of the test drive.
  • Sequential 128K queue depth 32.
  • Random queue depth 32 with 4 workers
  • 4K = 4096 bytes.

X1
SSD Platform
Enterprise PCIe 4.0 SSD
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Best-in-Class
U.3 Enterprise PCIe Gen4x4 eTLC SSD

First in Class
Best in Performance

E26 PCIe Gen 5 client controller

Phison's first PCIe Gen 5 solution uses our outstanding architecture as a customizable solution to balance power, unique features, and class-leading performance. The E26 charges into the new year to meet the high demands from emerging workloads designed to take advantage of Gen 5 hardware.

PHISON
PS5026-E26

"By helping to enable an ecosystem, Phison's customizable E26 SSD is at the forefront of PCIe Gen 5 introductions and will facilitate data center customers looking to benefit from the technology's increased performance."

Jeff Janukowicz, Research Vice President at IDC.

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Features	Specifications
Host Interface	- PCIe 5.0 x4 (Bandwidth: 32GT/s x4) - Compliance with PCI Express Base Specification Revision 5.0 - Compliance with NVMe 2.0
Processor	- 2x ARM Cortex-R5 and 3x Proprietary IP CoXProcessor™ - TSMC 12nm process technology
Flash Controller	- Up to 8 Channels with 32 Chips Enable (CE) - Flash transfer rate up to 2,400MT/s - Capacity up to 32TB - Support 3D TLC and QLC NAND flash memory - Compliance with Toggle 5.0 and ONFi 5.0 - Flash I/O operating voltage supply 1.2V
DRAM Controller	- DDR4 & LPDDR4 (32 bit, 3200Mbps)
Data Reliability	- Phison 5th generation LDPC ECC & RAID ECC - DDR ECC engine - End-To-End Data Path Protection
Security	- AES 256 - SHA 512 - RSA 4096 - TCG Opal 2.0
Performance	- Sequential Read up to 12GB/s - Sequential Write up to 11GB/s - 4K Random Read up to 1,500K IOPS - 4K Random Write up to 2,000K IOPS
Power Management	- L1.2
Temperature Range	- Operating range: 0~70 °C - Storage range: -40~85 °C - Operating junction temperature: -40~125 °C
Package	- 576-ball FCCSP, 16 mm x 16 mm
Peripheral	- Built-in internal thermal sensor - GPIO pins - Built-in UART function - I3C and SPI for external ROM

PHISON
PS5026-E26

First in Class
PCIe Gen 5 Solution

Next Generation Gaming Workload

Storage will drive the user experience in next-gen gaming

Game developers will rely on NVMe storage to deliver a consistent data stream to the GPU in 2023. This model will come to market through DirectX 12 Ultimate® to reduce game load times and expand virtual worlds. Phison is leading in the development of this upcoming technology to meet the challenging requirements of both high performance and performance consistency. In the detailed demonstration at FMS 2022, we **showcase E18 with I/O+ technology.**

CONTROLLER

Features	Specifications
Host Interface	- PCIe 4.0 x4 (Bandwidth: 16GT/s x4) - Compliance with PCI Express Base Specification Revision 4.0 - Compliance with NVMe 1.4
Processor	- 3x ARM Cortex-R5 and 2x Proprietary IP CoXProcessor™ - TSMC 12nm process technology
Flash Controller	- Up to 8 Channels with 32 Chips Enable (CE) - Flash transfer rate up to 1,600MT/s - Capacity up to 8TB - Support 3D TLC and QLC NAND flash memory - Compliance with Toggle 4.0 and ONFi 4.2 - Flash I/O operating voltage supply 1.2V/1.8V
DRAM Controller	- DDR4 (32 bit, 2666Mbps)
Data Reliability	- Phison 4th generation LDPC ECC & RAID ECC - DDR ECC engine - End-To-End Data Path Protection
Security	- Pyrite - AES 256 - SHA 512 - RSA 4096 - TCG Opal
Performance	- Sequential Read up to 7,500MB/s - Sequential Write up to 7,100MB/s - 4K Random Read up to 1,000K IOPS - 4K Random Write up to 1,000K IOPS
Power Management	- L1.2 < 5mW
Temperature Range	- Operating range: 0~70 °C - Storage range: -40~85 °C - Operating junction temperature: -40~125 °C
Package	- 529-ball FCCSP, 12 mm x 12 mm
Peripheral	- Built-in internal thermal sensor - GPIO pins - Built-in UART function - I2C and SPI for external ROM

Introducing Phison's Most Advanced High-Speed PCIe Gen 5 Redriver IC

Phison's redriver comes with a patented Auto Tuning Software package. It can automatically set different gain parameters in the redriver for the customer's motherboard design and trace lengths, collect the results of the signal, and use AI technology to optimize and find the best parameters for the strongest transmission signals.

- Phison's PHiTUNE tool for optimal redriver calibration with improved equalization

- Two Lanes Mux & DeMux interleaved design for better routing and to reduce trace far-end cross talk

- Four-level I/O for EQ and GAIN setting to reduce pin count

- Flip Chip Package with less return loss and better heat dissipation

Features	Specifications
Host Interface	- PCIe 5.0 - Compliance to PCIe 4.0 & Gen 3.0
Process	- GlobalFoundries SiGe BiCMOS 8XP process technology
Configuration	- Interleaved - Embedded MUX/DEMUX function - 2 lanes 4 channel
Performance	- Equalization range: 3~20dB - Output maximum swing: 1,200 mVpp - Output linear range (Max): 1,100 mVpp
Latency	70ps
Power	- Low power mode < 50mW
Temperature Range	- Operating range: -40 to +85 °C
Supply Voltage	3.3V
Package	- FCCSP, 77 pin, 5 mm x 8 mm
EQ Auto-Tuning Tool	- Phison unique redriver tuning tool: PHiTUNE Tool
Features	- Signal adjustment flexibility - Transparent to link training - Rate and coding agnostic - Automatic receiver detect - I2C support - 4-Level I/O for EQ and GAIN - Mux/DeMux function can be disabled - Two EQ setting sweep frequency dimensions - Different setting for A/B port @ pin mode

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Contact us

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