# PASCARI

# X200E

White Paper

PHISON

# Phison PASCARI X200E Delivers Enhanced Endurance and Performance for the Data Center

Data centers are growing and being built at an unprecedented rate, thanks to the demands of AI and ML workloads. The need to store and quickly access a variety of LLMs means modern data centers need reliable, high-speed SSD storage in greater capacities than ever before, with proven reliability. The Pascari X200E provides exactly that, with enhanced endurance of three DWPR (drive writes per day) across all capacities and interfaces.

Whether it's the storage of AI models or high-demand transactional databases, Pascari X200-series drives offer top performance. The Pascari X200E builds on the same core design as the Pascari X200P, but with 28% NAND overprovisioning to greatly improve endurance. For workloads that have a higher proportion of writes, the Pascari X200E balances capacity against cost to remain competitive.

Phison has been a leader in the SSD storage and flash memory space for decades, and its latest X200E drives bring PCI Express 5.0 support along with an advanced controller and the latest in 3D NAND solutions. These provide scalability with Phison's proven reliability, tailor-made for the modern data center.

## PCI Express 5.0 boosts throughput for sequential and random workloads

Phison was one of the first companies to begin shipping PCIe 5.0 storage controllers, providing a crucial boost in performance and data throughput for AI and data center storage workloads. The fastest PCIe 4.0 x4 SSDs can only deliver up to 7.5 GB/s of sequential throughput. PCIe 5.0 doubles the potential bandwidth to 15.0 GB/s for sequential reads and writes, effectively maxing out the PCIe 5.0 x4 interface. Random read and write operations see similarly large gains.

The Pascari X200E delivers up to 3.0 million peak 4K random read IOPS, which equates to 12.3 GB/s of random IO. That's nearly double the throughput achievable with the fastest PCIe 4.0 SSDs. The Pascari X200E's ability to deliver such high performance, particularly at higher queue depths, ensures a consistent experience, even under the most demanding conditions.

## Pascari X200E Enterprise SSD family

The Pascari X200 series is Phison's current flagship line of enterprise SSDs. Engineered to meet the rigorous demands of modern data centers, the Pascari X200E family comes in capacities ranging from 1.6 TB up to 25.6 TB. Most capacities are available in either U.2 or E3.S form factors, with only slight variations in specifications.

All the Pascari X200E models come with the same core features, regardless of capacity. These features include Phison's in-house designed X2 controller, 3D TLC NAND, and a dual-port PCIe 5.0 x4/2x2 interface using the NVMe 2.0 protocol. X200E drives also support power loss protection, ISE, TCG Opal 2.0, AES-XTS 256-bit encryption, and SECDED — separate variants are available for ISE, SED, and non-SED drives.

> **For workloads that have a higher proportion of writes, the Pascari X200E balances capacity against cost to remain competitive.**

The X2 controller supports 16 NAND channels, and Phison's firmware team can customize it to support NAND solutions from all the major providers. Phison uses TSMC's 12nm FinFET process node for the X2, with a die size of 42 mm2. The Pascari X200E line uses SK hynix 176-layer 3D TLC NAND packages running at 1,600 MT/s. It has a quad-core processor, along with coprocessors to help boost data throughput.

Pascari X200E SSDs can be configured for single-port or dual-port operation. Dual-port operation improves reliability in servers with failover functionality, allowing two mirrored servers to directly connect with each drive. In the event of a server failure, operations can seamlessly migrate to the other server with no interruptions.

Sequential read and write speeds on the Pascari X200E can reach up to 14.8 GB/s and 8.7 GB/s, respectively. 4K random read and write operations extend to 3 million and 900K IOPS from a single drive. Multiple drives can be combined via RAID to achieve even higher levels of performance.

All Pascari X200E drives are rated for three DWPD (drive write per day) of endurance for five years, with 28% over provisioning. The smallest 1.6 TB model has an endurance rating of 8,760 TBW (terabytes written), doubling with each capacity increase up to a current maximum of 140,160 TBW on the 25.6 TB model.

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# Phison PASCARI X200E Enterprise SSD Specifications

## Pascari X200E U.2 Specifications

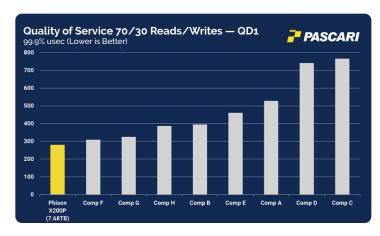| | | | | | |
|---|---|---|---|---|---|
| Capacity | 1.6TB | 3.2TB | 6.4TB | 12.8TB | 25.6TB |
| Interface | PCIe 5.0 1x4, 2x2 | PCIe 5.0 1x4, 2x2 | PCIe 5.0 1x4, 2x2 | PCIe 5.0 1x4, 2x2 | PCIe 5.0 1x4, 2x2 |
| NVMe Protocol | 2.0 | 2.0 | 2.0 | 2.0 | 2.0 |
| NAND Flash | 3D TLC | 3D TLC | 3D TLC | 3D TLC | 3D TLC |
| Sequential Read (MB/s) | 14,800 | 14,800 | 14,800 | 14,800 | 14,000 |
| Sequential Write (MB/s) | 4,300 | 8,600 | 8,700 | 8,350 | 7,400 |
| 4K Random Read (IOPS) | 2,400K | 3,000K | 3,000K | 3,000K | 2,300K |
| 4K Random Write (IOPS) | 400K | 800K | 900K | 900K | 615K |
| Read Latency (µs) | 60 | 60 | 60 | 60 | 60 |
| Write Latency (µs) | 10 | 10 | 10 | 10 | 10 |
| Max Power (W) | 25 | 25 | 25 | 25 | 25 |
| Idle Power (W) | 5 | 5 | 5 | 5 | 5 |
| DWPD | 3 | 3 | 3 | 3 | 3 |
| Endurance (TBW) | 8,760 | 17,520 | 35,040 | 70,080 | 140,160 |
| Warranty | 5 | 5 | 5 | 5 | 5 |

## Pascari X200E E3.S Specifications

| | | | | |
|---|---|---|---|---|
| Capacity | 1.6TB | 3.2TB | 6.4TB | 12.8TB |
| Interface | PCIe 5.0 1x4, 2x2 | PCIe 5.0 1x4, 2x2 | PCIe 5.0 1x4, 2x2 | PCIe 5.0 1x4, 2x2 |
| NVMe Protocol | 2.0 | 2.0 | 2.0 | 2.0 |
| NAND Flash | 3D TLC | 3D TLC | 3D TLC | 3D TLC |
| Sequential Read (MB/s) | 14,800 | 14,800 | 14,800 | 14,800 |
| Sequential Write (MB/s) | 4,300 | 8,600 | 8,700 | 8,350 |
| 4K Random Read (IOPS) | 2,400K | 3,000K | 3,000K | 3,000K |
| 4K Random Write (IOPS) | 400K | 800K | 900K | 900K |
| Read Latency (µs) | 60 | 60 | 60 | 60 |
| Write Latency (µs) | 10 | 10 | 10 | 10 |
| Max Power (W) | 25 | 25 | 25 | 25 |
| Idle Power (W) | 5 | 5 | 5 | 5 |
| DWPD | 3 | 3 | 3 | 3 |
| Endurance (TBW) | 8,760 | 17,520 | 35,040 | 70,080 |
| Warranty | 5 | 5 | 5 | 5 |

# Pascari X200E performance excels in real-world mixed workloads

The Phison PASCARI X200E provides excellent performance across a wide range of scenarios. Modern data centers all rely on SSDs for storage, but not all SSDs are equally fast. The Pascari X200E tackles the most demanding workloads, including both sequential and 4K random 70/30 read/write mixes. The 70/30 mix represents the sort of workload seen in heavy transactional databases. SSDs that do well in these tests also do well in less demanding scenarios. Pure read and pure write testing don't properly indicate true performance.

The Pascari X200E also delivers the best quality of service out of the tested drives. In our 99.9% percentile results, which indicate the worst-case responsiveness, the Pascari X200E has 9% lower latency than the next closest drive, and about one-third as much latency as the slowest drives that were tested. This shows that the drive offers consistent performance even under demanding workloads, which gives end users a more consistent experience when interacting with servers running heavy workloads.

**Random Mixed 70/30 Read/Write — 4KB**
IOPS (Higher is Better)



The Pascari X200E delivers the best-in-class performance among competing drives in demanding mixed 70/30 random read/write testing. Its IOPS are 10% higher than the next closest SSD, and over 65% faster than two of the tested drives. This translates into more responsiveness and higher throughput for applications including databases, AI, and real-time analytics.

## Maximum performance, scalability, and flexibility for modern data centers

The Pascari X200E data center SSD offers performance and scalability for modern data centers. Whether it's databases, real-time analytics, AI, or other HPC workloads, the Pascari X200E provides unmatched performance, reliability, and scalability. It's available in two form factors, with a wide range of capacities to fit every use case. The Pascari X200E also offers enhanced reliability and flexibility with its single port/dual port functionality that caters to different infrastructures.

Pascari X200E is a cutting-edge drive designed for the next generation of data-intensive applications that will shape the future of computing. With a high-speed controller that supports the latest PCI Express 5.0 interface, a 16-channel design, DRAM caching, and advanced features to ensure consistent performance, the X200E is set to provide storage for the next generation of servers powering the AI and ML revolution.

**Quality of Service 70/30 Reads/Writes — QD1**
99.9% usec (Lower is Better)