

Corporate Overview- Enterprise Roadmap

Q4 2024

AGENDA

- Company Profile and Updates
- Phison Enterprise SSD Strategy
- Enterprise SSD Solution Roadmap & Specification
- Enterprise SSD Solution Highlights
- AI Series Solution Introduction



Quick Facts About Phison



Experience

24+

Years



\$1.5B

2023 Revenue

80%+

R&D Exp. / OPEX



**3900
+HC**

75% R&D

20%+

Global SSD Controller
Market Share

Business Focus

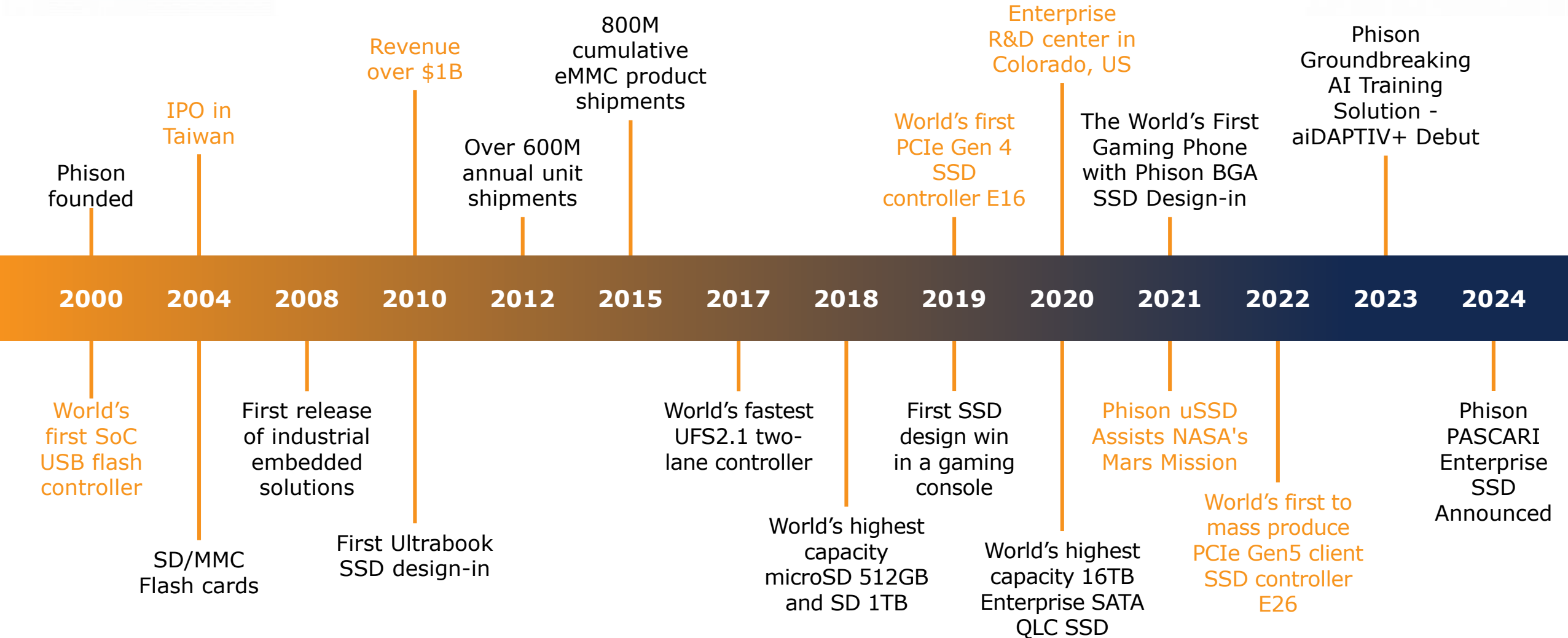
Client | Embedded | Enterprise
Automotive | Gaming | Design Service
Power IC | Signal IC

Global Support Map



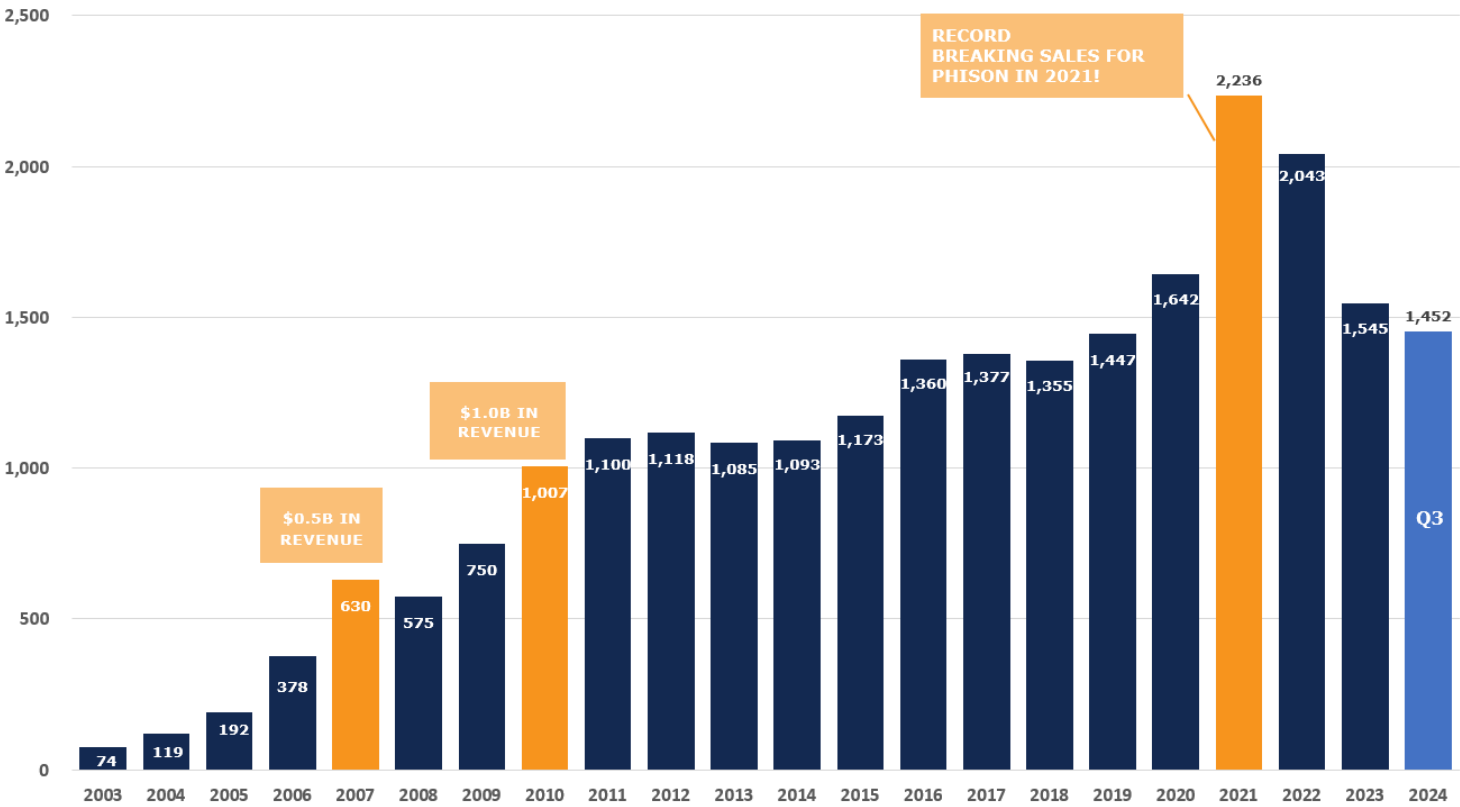
Company Milestones

More than 20 years of NAND controller leadership



Phison is a Technology Leader in NAND Storage

Millions in USD



Six World Firsts

Fastest Gen5

2023

Fastest Gen4

2021

Highest 2.5 eSSD

2020

First Gen4 QLC

2020

Highest Capacity M.2

2020

First Gen4

2019

Vast Sphere of Industry Influence

BOARD OF DIRECTORS



LEADERS / DEVELOPERS



Phison Serves the World's Largest Storage OEMs

NAND flash makers are Phison customers and suppliers

KIOXIA

micron®

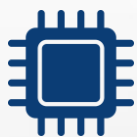
Western
Digital®

SAMSUNG

SOLIDIGM

SK hynix

OEM Customers



NAND Storage
Private Label



IP
Licensing



PC
OEM



Gaming
Consoles



Automotive



Datacenter



Industrial
Embedded

Patent Portfolio



2200+

Worldwide patents

Main Areas of Coverage

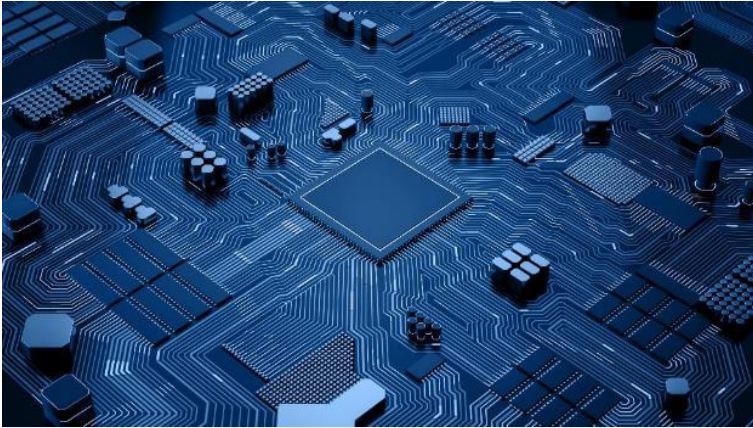
- NAND Application Performance & Lifetime
- NAND Error Handling Techniques
- High Speed Interfaces
- Mobile Security

1. Including granted and pending applications

Patents Worldwide	COUNTRY	GRANTED	PENDING
	China	646	76
	USA	639	59
	Others	776	33
	Total	2061	168

One-of-a-kind Business Model

The Foundation that Accelerates Innovation



Controller ASICs

- Best Partner for NAND Semicon
- Design to Support Multiple NANDs
- Sophisticated ASIC Knowledge
- Cutting-Edge ECC Design



Finished SSDs

- Controller/NAND/DRAM All-In-One
- Vertical Integration
- System-Level Validation
- One-stop Shopping



Design Service

- Comprehensive IP License
- TSMC/UMC Process
- Highly Customized
- Software Development Kit

Phison SSD Technology Trusted by Highly Respected Companies

To Infinity and Beyond !

Phison Continues Enabling Storage for Outer Space Technology



Get aiDAPIV+ with Phison

Phison Brings More To You with Proprietary AI Design Service and NAND Storage Solutions



Phison Awards

PCMag: Awarded The Best Internal SSDs for 2024, 3 out of 11 are enabled by Phison's controllers

PC The Best Internal SSDs for 2024

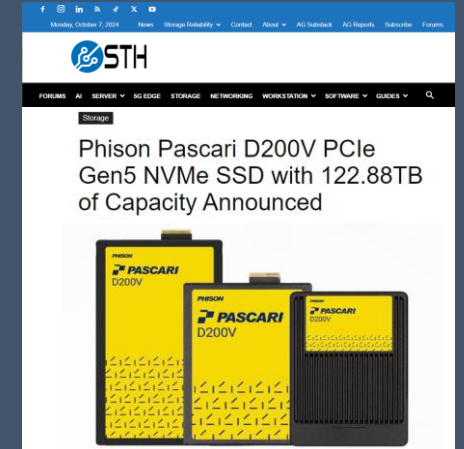
Still got a spinning hard drive in your desktop or laptop? Join Generation Flash: Here's everything you need to know to buy the right internal SSD, plus our top picks across M.2 and 2.5-inch drives.

- **Crucial T500** : E25
- **Crucial T705** : E26
- **Crucial P3** : E21T

Phison Wins Prestigious Best of Show Award at FMS 2024: The Future of Memory and Storage

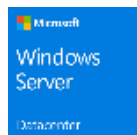


Phison In The News



- Sources:
1. <https://www.phison.com/en/company/newsroom>
 2. https://www.pcmag.com/picks/the-best-internal-ssds?test_uid=05GCyCmbxBRZxn0Zys1DBH&test_variant=a
 3. <https://www.phison.com/en/category/article/press-releases/phison-wins-prestigious-best-of-show-award-at-fms-the-future-of-memory-and-storage>
 4. <https://www.tomshardware.com/pc-components/ssds/phison-reveals-its-fastest-pcie-gen4-ssd-controller-yet-details-the-e29t-at-fms-2024>
 5. <https://www.servethehome.com/phison-pascari-d200v-pcie-gen5-nvme-ssd-with-122-88tb-of-capacity-announced/>
 6. <https://udn.com/news/story/6928/8189111>

Phison US Enterprise SSD R&D Lab



Located in Broomfield, CO

Mission: Local expertise to co-develop, test and support enterprise customers

- Firmware customization
- Systems integration, benchmarking and testing
- Customer systems joint qualification and certifications
- Fast customer issue resolution



20+ Experienced Enterprise System and Storage Engineers

Team Summary:

- Customer first mindset
- 2 senior managers with more than 30 years enterprise customer experience
- 4 firmware developers
- 12 test developers, execution and FA
- 2 customer support engineers
- 1 performance test expert
- 1 certification testing

Infrastructure:

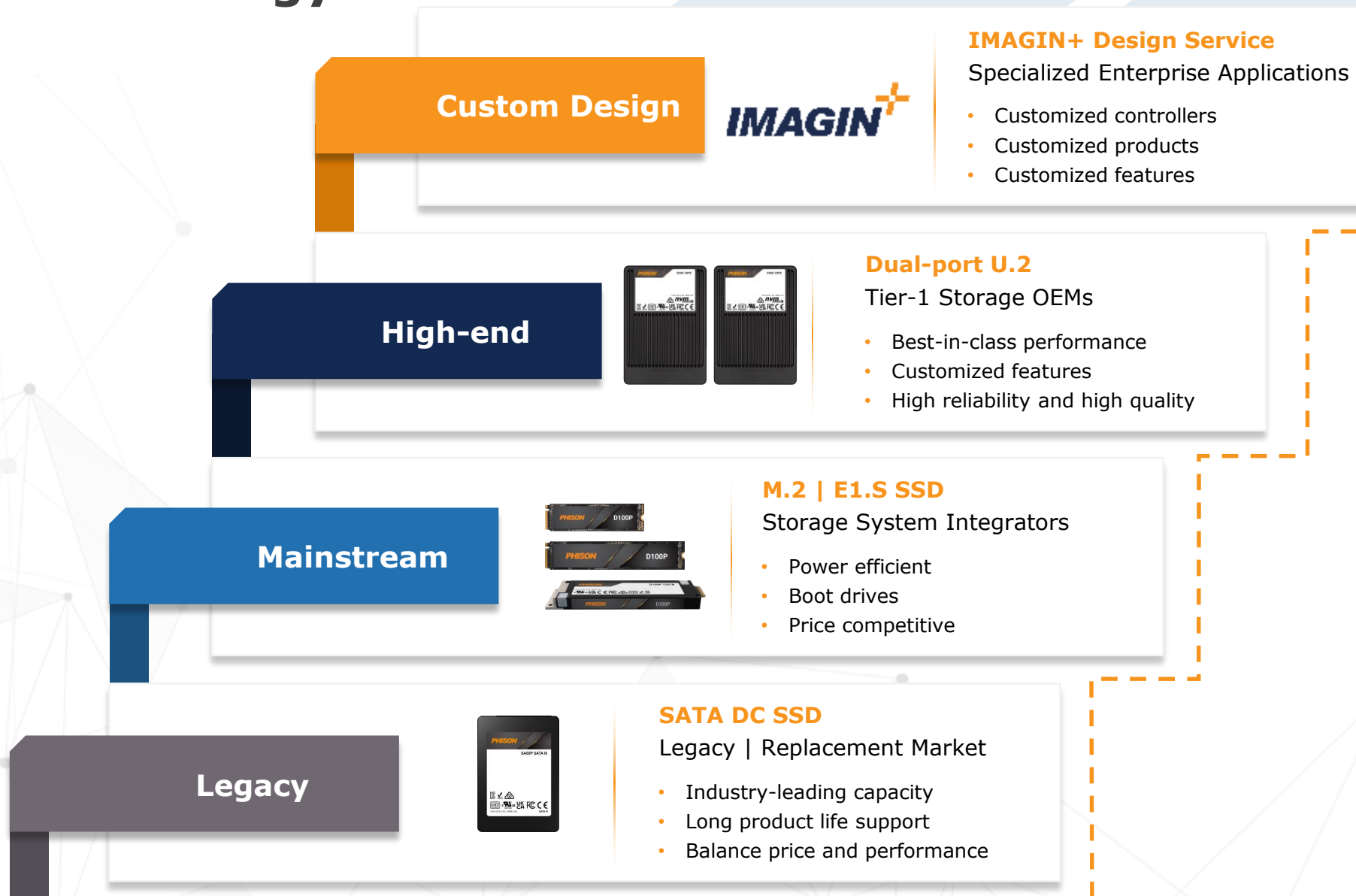
- 130 Rack Servers
- 80 Workstations
- Fully automated testing and reporting
- In house developed test tools and scripts as well as 3rd party and customer tests
- Testing 100s of drives and multiple customer firmware concurrently



Enterprise SSD

Phison Enterprise SSD Strategy

Enterprise SSD Strategy



Enterprise Storage in Everything

PHISON enables mainstream applications across industries

Data Science

- AI
- Deep Learning
- Supercomputing
- Quantum Computing

Biotechnology

- Medical Imaging
- DNA Sequencing

Finance

- High-Dimensional Derivative Pricing
- Blockchain

Military

- Satellite Imaging
- UAV System
- Geospatial Intelligence
- Space Technology

Phison Enterprise SSD Product Line-up



X-Series

- HPC
- Data Analysis
- Online Transaction
- Image Recognition



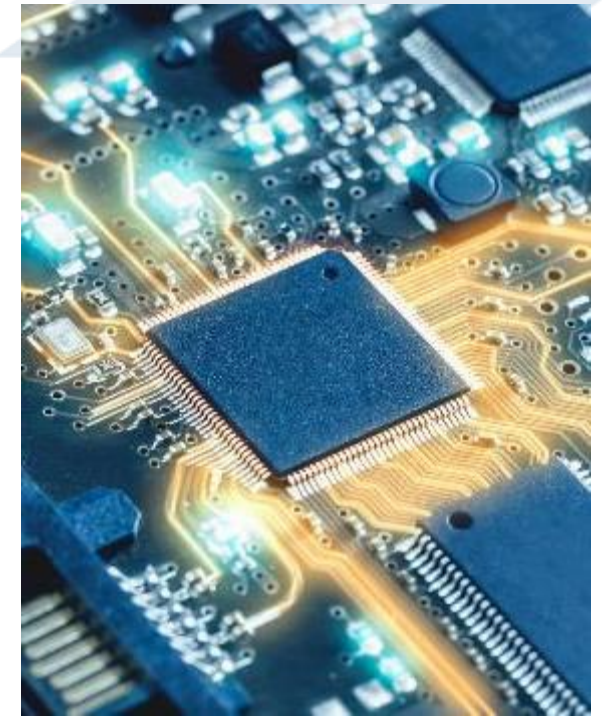
D-Series

- Workstation
- NAS
- Warm Data Storage



S-Series

- Database
- Social Media
- Media Streaming



B-Series

- Server Booting



Enterprise SSD

Solution Roadmap & Specifications

Enterprise SSD Roadmap



	2024		2025				2026		
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
X-Series High Performance NVMe									
	X100 PCIe 4.0 / U.3 / 1 or 3 DWPDP / 1.6TB to 30.72TB / Dual Port								
			X200 PCIe 5.0 / U.2, E3.S / 1 or 3 DWPDP / 1.6TB to 30.72TB / Dual Port						

Enterprise SSD Roadmap



	2024		2025				2026		
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3
S-Series SATA SSD									
	SA50 SATA III / 2.5" / 0.4 or 1 or 3 DWPD / 480GB to 15.36TB								
			SA52P SATA III / 2.5" / 1 DWPD / 480GB to 7.68TB						
			SA53P SATA III / 2.5" / 1 DWPD / 480GB to 3.84TB						
B-Series Boot Drive									
	B100 PCIe 4.0 / M.2 2280 / 1 DWPD / 480GB to 960GB								
	BA50 SATA III / M.2 2280, 2.5" / 1 DWPD / 240GB to 960GB								

Enterprise NVMe SSD Overview

	X100P	X100E	X200P	X200E
Capacity	1.92TB – 30.72TB	1.6TB – 25.6TB	1.92TB – 30.72TB	1.6TB – 25.6TB
Interface	PCIe 4.0 1x4, 2x2	PCIe 4.0 1x4, 2x2	PCIe 5.0 1x4, 2x2	PCIe 5.0 1x4, 2x2
Form Factor	U.2/U.3 15mm	U.2/U.3 15mm	U.2 15mm E3.S 1T	U.2 15mm E3.S 1T
Seq. Read (MB/s)	7,400	7,400	14,800	14,800
Seq. Write (MB/s)	6,900	6,900	8,700	8,700
Ran. Read (KIOPS)	1,750	1,750	3,000	3,000
Ran. Write (KIOPS)	190	470	500	900
DWPD	1	3	1	3
Security	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0
NVMe	• 64 Namespaces • NVMe-MI over SMBus • E2EDPP	• 64 Namespaces • NVMe-MI over SMBus • E2EDPP	• 128 Namespaces • NVMe-MI over SMBus • E2EDPP	• 128 Namespaces • NVMe-MI over SMBus • E2EDPP
Others	• Dual port • PLP	• Dual port • PLP	• Dual port • PLP	• Dual port • PLP
Status	MP	MP	CS	CS

Data Center NVMe SSD Overview

	D100P	D100P	D100P	D100P
Capacity	480GB – 1.92TB	480GB – 3.84TB	480GB – 3.84TB	480GB – 1.92TB
Interface	PCIe 4.0x4	PCIe 4.0x4	PCIe 4.0x4	PCIe 4.0x4
Form Factor	M.2 22x80mm	M.2 22x110mm	E1.S 9.5mm	U.2 15mm
Seq. Read (MB/s)	6,000	6,000	6,800	6,800
Seq. Write (MB/s)	1,800	1,800	2,000	2,000
Ran. Read (KIOPS)	800	800	900	900
Ran. Write (KIOPS)	60	60	70	60
DWPD	1	1	1	1
Security	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0
NVMe	• 64 Namespaces • NVMe-MI over SMBus • E2EDPP	• 64 Namespaces • NVMe-MI over SMBus • E2EDPP	• 64 Namespaces • NVMe-MI over SMBus • E2EDPP	• 64 Namespaces • NVMe-MI over SMBus • E2EDPP
Others	• PLP	• PLP	• PLP	• PLP
Status	MP	MP	MP	MP

Data Center NVMe SSD Overview

	D200P	D200E	D200V	D205V
Capacity	1.92TB - 7.68TB	1.6TB - 6.4TB	30.72TB - 61.44TB	122.88TB
Interface	PCIe 5.0x4	PCIe 5.0x4	PCIe 5.0 1x4, 2x2	PCIe 5.0 1x4, 2x2
Form Factor	E1.S 9.5mm (1.92 & 3.84 TB) E1.S 15mm (7.68TB)	E1.S 9.5mm (1.6 & 3.2 TB) E1.S 15mm (6.4TB)	U.2 15mm (30.72TB & 61.44TB) E3.S 1T (30.72TB) E3.L 1T (61.44TB)	U.2 15mm E3.S 1T E3.L 1T
Seq. Read (MB/s)	14,000	14,000	14,000 (Est.)	14,000 (Est.)
Seq. Write (MB/s)	Up to 8,600 (Est.)	Up to 8,600 (Est.)	Up to 3,000 (Est.)	Up to 3,300 (Est.)
Ran. Read (KIOPS)	Up to 3,000 (Est.)	Up to 3,000 (Est.)	3,000 (Est.)	3,000 (Est.)
Ran. Write (KIOPS)	Up to 400 (Est.)	Up to 800 (Est.)	Up to 27* (Est.)	Up to 31* (Est.)
DWPD	1	3	0.3	0.3
Security	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0
NVMe	• 128 Namespaces • NVMe-MI over SMBus • E2EDPP	• 128 Namespaces • NVMe-MI over SMBus • E2EDPP	• 128 Namespaces • NVMe-MI over SMBus • E2EDPP	• 128 Namespaces • NVMe-MI over SMBus • E2EDPP
Others	• PLP	• PLP	• Dual port • PLP	• Dual port • PLP
Status	CS in Q4'24 7.68TB CS in Q1'25	CS in Q4'24 6.4TB CS in Q1'25	CS in Dec'24 (Est.)	CS in Q1'25 (Est.) E3.S CS in H2'25

*Based on 16K random write

Data Center SATA SSD Overview

	SA50V	SA50P	SA50E
Capacity	1.92TB – 15.36TB	480GB – 7.68TB	480GB – 3.84TB
Interface	SATA III	SATA III	SATA III
Form Factor	2.5" 7mm	2.5" 7mm	2.5" 7mm
Seq. Read (MB/s)	530	530	530
Seq. Write (MB/s)	500	500	500
Ran. Read (KIOPS)	97	98	98
Ran. Write (KIOPS)	20	40	77
DWPD	0.4	1	3
Security	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0
Features	• E2EDPP • PLP	• E2EDPP • PLP	• E2EDPP • PLP
Status	MP	MP	MP

Booting SSD Overview

	BA50P	BA50P	B100P
Capacity	240GB – 960GB	240GB – 960GB	480GB – 960GB
Interface	SATA III	SATA III	PCIe 4.0x4
Form Factor	M.2 22x80mm	2.5"	M.2 22x80mm
Seq. Read (MB/s)	530	530	5,000
Seq. Write (MB/s)	500	500	700
Ran. Read (KIOPS)	98	98	450
Ran. Write (KIOPS)	30	30	30
DWPD	1	1	1
Security	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0	• AES-256 • TCG OPAL 2.0
Features	• E2EDPP • PLP	• E2EDPP • PLP	• 64 Namespaces • E2EDPP • PLP
Status	MP	MP	MP

Phison Enterprise SSD Menu



Series	Model Name	DWPD	Interface	Form Factor	Capacity	Sequential (MB/s)		Random (KIOPS)		Namespace	Status
						Read	Write	Read	Write		
X Series	X100P	1	PCIe 4.0 x4 or 2x2	U.2 / U.3 15mm	1.92TB to 30.72TB	7,400	6,900	1,750	190	64	MP
	X100E	3	PCIe 4.0 x4 or 2x2	U.2 / U.3 15mm	1.60TB to 25.60TB	7,400	6,900	1,750	470	64	MP
	X200P	1	PCIe 5.0 x4 or 2x2	U.2 15mm / E3.S 1T	1.92TB to 30.72TB	14,800	8,700	3,000	500	128	CS
	X200E	3	PCIe 5.0 x4 or 2x2	U.2 15mm / E3.S 1T	1.60TB to 25.60TB	14,800	8,700	3,000	900	128	CS
D Series	D100P	1	PCIe 4.0 x4	M.2 2280	480GB to 1.92TB	6,000	1,800	800	60	64	MP
		1	PCIe 4.0 x4	M.2 22110	480GB to 3.84TB	6,000	1,800	800	60	64	MP
		1	PCIe 4.0 x4	E1.S 9.5mm	480GB to 3.84TB	6,800	2,000	900	60	64	MP
		1	PCIe 4.0 x4	U.2 15mm	480GB to 1.92TB	6,800*	2,000*	900*	60*	64	MP
	D200P	1	PCIe 5.0 x4	E1.S 9.5mm	1.92TB to 3.84TB	14,000	8,300	3,000	220	128	CS: Q4'24
		1	PCIe 5.0 x4	E1.S 15mm	7.68TB	14,000*	8,600*	2,900*	400*	128	CS: Q1'25
	D200E	3	PCIe 5.0 x4	E1.S 9.5mm	1.6TB to 3.2TB	14,000	8,300	3,000	540	128	CS: Q4'24
		3	PCIe 5.0 x4	E1.S 15mm	6.4TB	14,000*	8,600*	2,900*	800*	128	CS: Q1'25

Phison Enterprise SSD Menu



Series	Model Name	DWPD	Interface	Form Factor	Capacity	Sequential (MB/s)		Random (KIOPS)		Namespace	Power Consumption (W)	Status
						Read	Write	Read	Write			
D Series (QLC)	D200V (Standard)	0.3	PCIe 5.0 x4 or 2x2	U.2 15mm	30.72TB to 61.44TB	14,000*	2,100*	3,000*	15.6**	128	25	CS: Dec'24
		0.3	PCIe 5.0 x4 or 2x2	E3.S 1T	30.72TB	14,000*	2,100*	3,000*	15.6**	128	25	CS: Dec'24
		0.3	PCIe 5.0 x4 or 2x2	E3.L 1T	61.44TB	14,000*	3,000*	3,000*	27**	128	30	CS: Dec'24
	D200V (High Performance)	0.3	PCIe 5.0 x4 or 2x2	U.2 15mm	30.72TB to 61.44TB	14,000*	3,000*	3,000*	27**	128	30	CS: Dec'24
		0.3	PCIe 5.0 x4 or 2x2	E3.S 1T	30.72TB	14,000*	3,000*	3,000*	27**	128	30	CS: Dec'24
		0.3	PCIe 5.0 x4 or 2x2	U.2 15mm	122.88TB	TBD	TBD	TBD	TBD	128	25	CS: Q1'25
	D205V (Standard)	0.3	PCIe 5.0 x4 or 2x2	E3.S 1T	122.88TB	TBD	TBD	TBD	TBD	128	25	CS: H2'25
		0.3	PCIe 5.0 x4 or 2x2	E3.L 1T	122.88TB	14,000*	3,300*	3,000*	31**	128	30	CS: Q1'25
		0.3	PCIe 5.0 x4 or 2x2	U.2 15mm	122.88TB	14,000*	3,300*	3,000*	31**	128	30	CS: Q1'25
	D205V (High Performance)	0.3	PCIe 5.0 x4 or 2x2	E3.S 1T	122.88TB	14,000*	3,300*	3,000*	31**	128	30	CS: H2'25

Phison Enterprise SSD Menu



Series	Model Name	DWPD	Interface	Form Factor	Capacity	Sequential (MB/s)		Random (KIOPS)		Namespace	Status
						Read	Write	Read	Write		
S Series	SA50V	0.4	SATA III	2.5" 7mm	1.92TB to 15.36TB	530	500	97	20	-	MP
	SA50P	1	SATA III	2.5" 7mm	480GB to 7.68TB	530	500	98	40	-	MP
	SA50E	3	SATA III	2.5" 7mm	480GB to 3.84TB	530	500	98	77	-	MP
B Series	BA50P	1	SATA III	M.2 2280	240GB to 960GB	530	500	98	30	-	MP
		1	SATA III	2.5"	240GB to 960GB	530	500	98	30	-	MP
	B100P	1	PCIe 4.0 x4	M.2 2280	480GB to 960GB	5,000	700	450	30	64	MP



Enterprise SSD

Solution Highlights

D200 Series Product Overview



D200V QLC SSD

Phison’s D200V series utilize QLC technology to meet the high storage density demand driven by AI. With an impressive 122TB per SSD, D200V will help drive the trend of efficient data storage with improved space utilization and reduced power consumption.

Specification

- Interface: PCIe 5.0 x 4
- Protocol: NVMe 2.0
- Form Factor: U.2 / E3.S / E3.L
- DWPD: 0.3 DWPD
- MTBF: 2.5 million hours
- Warranty: 5 years

Features

- 3D QLC NAND
- Dual-port design
- Power loss Protection
- Namespaces: 128

Capacity

- D200V:**
- 30.72TB
 - 61.44TB
- D205V:**
- 122.88TB

X200 Series Product Overview



X200 Series SSD

The best PCIe Gen5 performance, features, endurance, and economics for enterprise applications. The X200 shows Phison's dedication to developing advanced SSD technology to lead the industry in density, performance, and power efficiency for all mass-capacity storage providers.

Specification

- Interface: PCIe 5.0 x 4
- Protocol: NVMe 2.0
- Capacity: Up to 30.72TB
- Form Factor: U.2 / E3.S
- DWPD: 1 and 3 DWPD
- MTBF: 2.5 million hours
- Warranty: 5 years

Features

- Dual-port design
- Ultra-low latency
- Power loss Protection
- MF-QoS
- Namespaces: 128

Performance

Seq. Read		14,800 MB/s
Seq. Write		8,700 MB/s
Ran. Read		3,000K IOPS
Ran. Write		900K IOPS

Industry's Most Advanced PCIe 5.0 Enterprise SSD (7.68TB, 1 DWPD)



PHISON

X200P



SAMSUNG

PM1743



KIOXIA

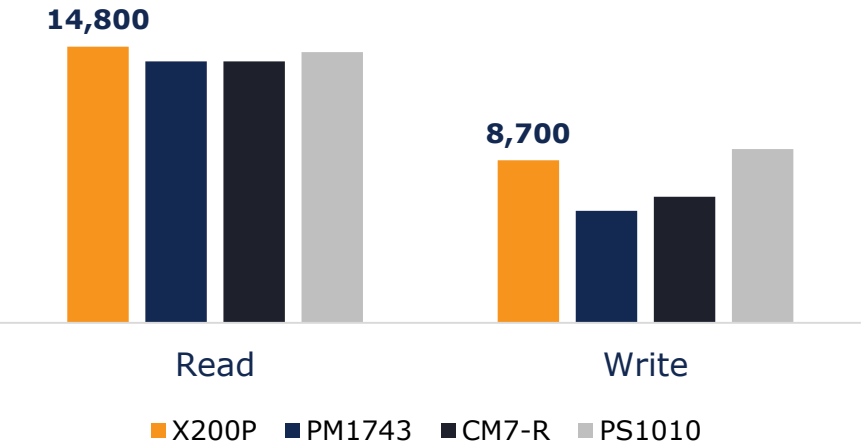
CM7-R



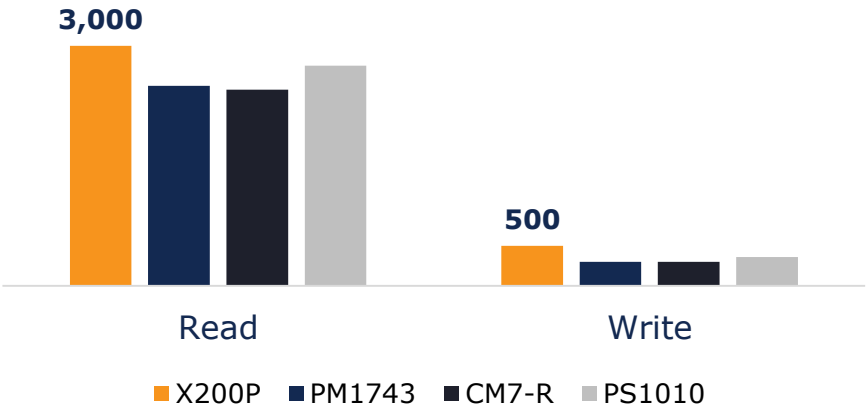
SK hynix

PS1010*

Sequential (MB/s)



4K Random (KIOPS)



X100 Series Product Overview



X100 Series SSD

Phison’s X100 series SSD is highly customizable and marks the spot for enterprises demanding faster and smarter global infrastructures. Featuring best-in-class performance, the X100 enables enterprises to reduce the total cost of ownership through higher storage density, lower power consumption and higher performance.

Specification

- Interface: PCIe 4.0 x4
- Protocol: NVMe 1.4
- Capacity: 2TB to 32TB
- Form Factor: U.3/U.2, 2.5” x 15mm
- DWPD: Up to 3 DWPD
- MTBF: 2.5 million hours
- Warranty: 5 years

Features

- Dual-port design
- Ultra-low latency
- Power loss protection (PLP)
- End-to-end data path protection (E2EDPP)
- Phison 5th Gen LDPC ECC engine
- Self-encrypting drive (SED) & FIPS 140-3¹
- Optimized for 24/7 enterprise workload

Performance

Seq. Read		7,400 MB/s
Seq. Write		6,900 MB/s
Ran. Read		1,750K IOPS
Ran. Write		470K IOPS

Advanced Technology Inside X100



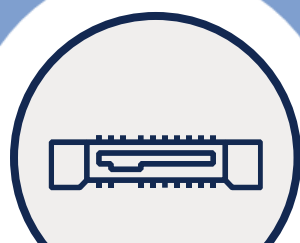
Dual-Port Design

- Allowing SSD to connect to 2 hosts simultaneously
- Failover connectivity



Data Integrity

- Extremely high data integrity with end-to-end data path protection
- Hardware pFail to prevent data loss from power outages or interrupts



U.3 Form Factor

- Tri-mode supported
- Backward compatible with U.2
- Simple and flexible



Reliability

- Zero defect under 70°C environment with 1,200 drives
- UBER < 1 in 10^{18} bits read (JEDEC standard: 10^{17})
- Advanced LDPC ECC engine



Quality of Service(QoS)

- Performance consistency over 95%
- 1,384 μ s for 99.999% 4K ran. read latency
- Running at highest speed without

Phison Enterprise SSD X100E (6.4TB, 3 DWPD)



PHISON

X100E



SAMSUNG

PM1735
(Gen4 x 8)



KIOXIA

CM6-V



micron

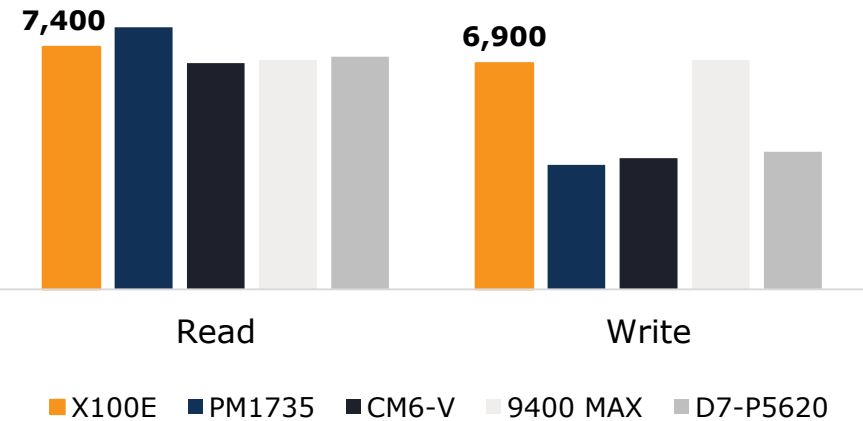
9400 MAX



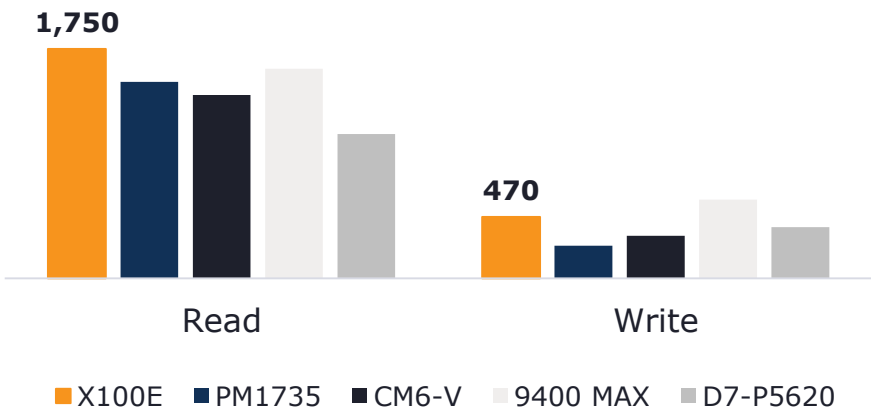
SOLIDIGM

D7-P5620

Sequential (MB/s)



4K Random (KIOPS)



Phison Enterprise SSD X100P (7.68TB, 1 DWPD)



PHISON

X100P



SAMSUNG

PM1733



KIOXIA

CM6-R



micron

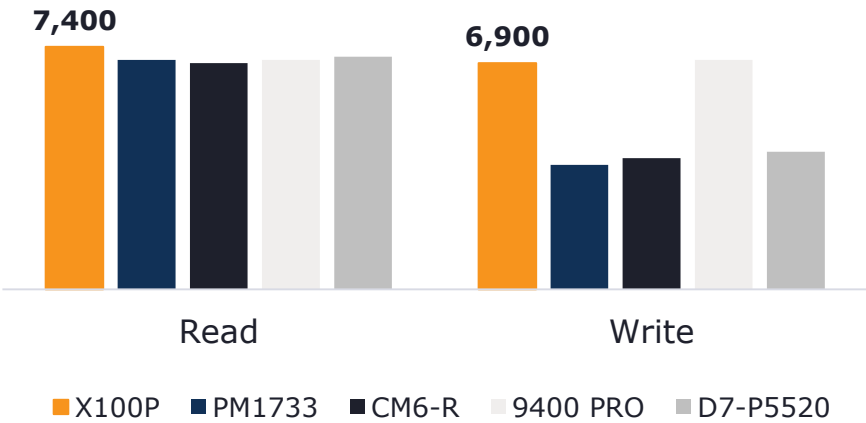
9400 PRO



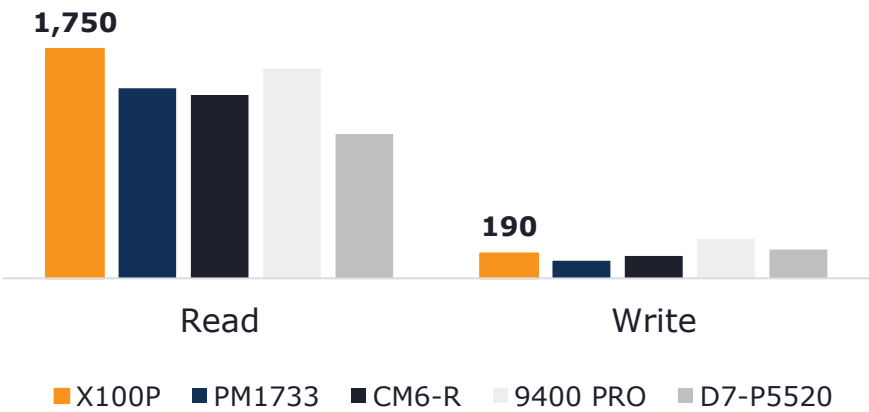
SOLIDIGM

D7-P5520

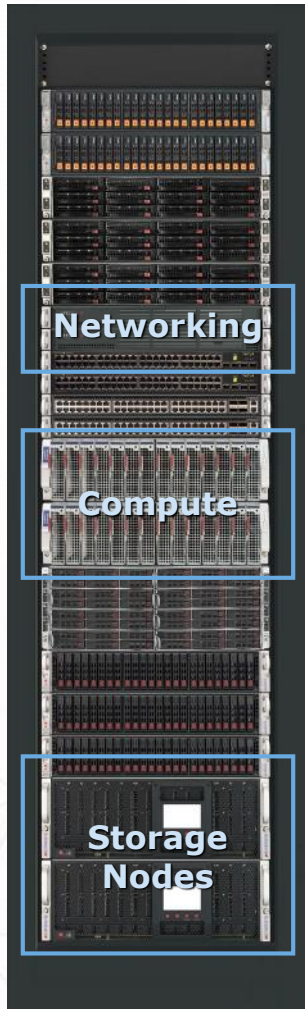
Sequential (MB/s)



4K Random (KIOPS)



Where Does Enterprise Use Boot Drives?



Networking

Securely manage the use of files and applications for office environments like hosting an intranet, file access via VPN, virtual server, etc.

Compute

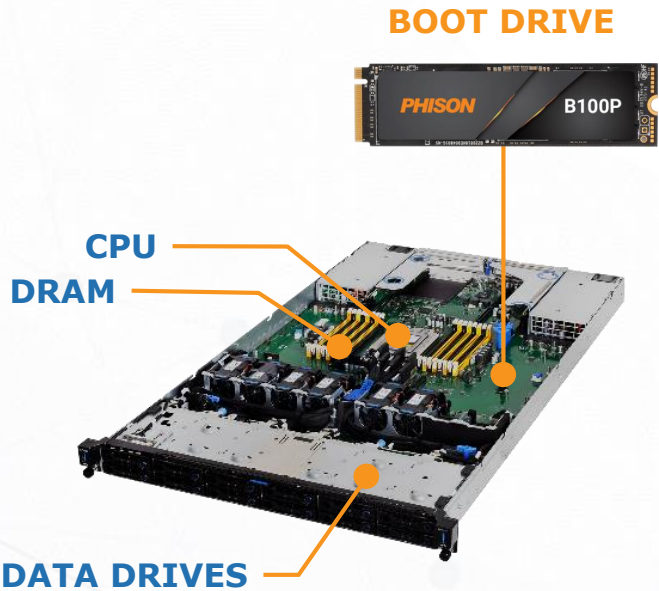
Process large amounts of data and perform complex mathematical computations such as AI, ML and other mission critical workloads

Storage Nodes

Built to meet data-intensive workloads and offer large capacity for rapidly growing data volume like big data, backup server and more

All the server units require Boot Drives as primary storage devices to load OS and initiate the system's startup process

Boot Drives for Enterprise Servers



Boot Drives

Use Case

- Booting File: Host OS
- Log: System logs & application logs
- Swap Space: Provides system more memory resources when RAM is full
- Scratchpad: Temporary results during computation

Interface

- PCIe interface is more popular
- PCIe M.2 is a cost-effective option with lower latency and faster boot up time

Form Factor

M.2 2280

Capacity

< 2TB

Power

< 5W

Configuration

Typically, 2 SSDs for RAID 1

Boot Drive shipments would be twice of server shipments

PCIe Enterprise SSD Product Configurations (B100 Series)



B100 Series SSD

B100 series SSD offers ultra fast startup time and enhances reliability for high-end server boot drives.

PCIe Gen4 x 4

√ Supported							
Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
M.2 2280	<u>B100P</u>	√ (Tantalum)	480GB	1	MP	4000/300	250K/15K
	TLC		960GB			5000/700	450K/30K

SATA Enterprise SSD Product Configurations (BA50 Series)



BA50 Series SSD

Offers an excellent combination of performance, reliability, and energy efficiency. It's a cost-effective option for primary boot drives in servers and data centers.

SATA III

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
2.5"	BA50P TLC	✓ (Aluminum cap)	240GB	1	MP	530/290	60K/10K
			480GB			530/480	90K/15K
			960GB			530/500	98K/30K
M.2 2280	BA50P TLC	✓ (Tantalum)	240GB	1	MP	530/290	60K/10K
			480GB			530/480	90K/15K
			960GB			530/500	98K/30K

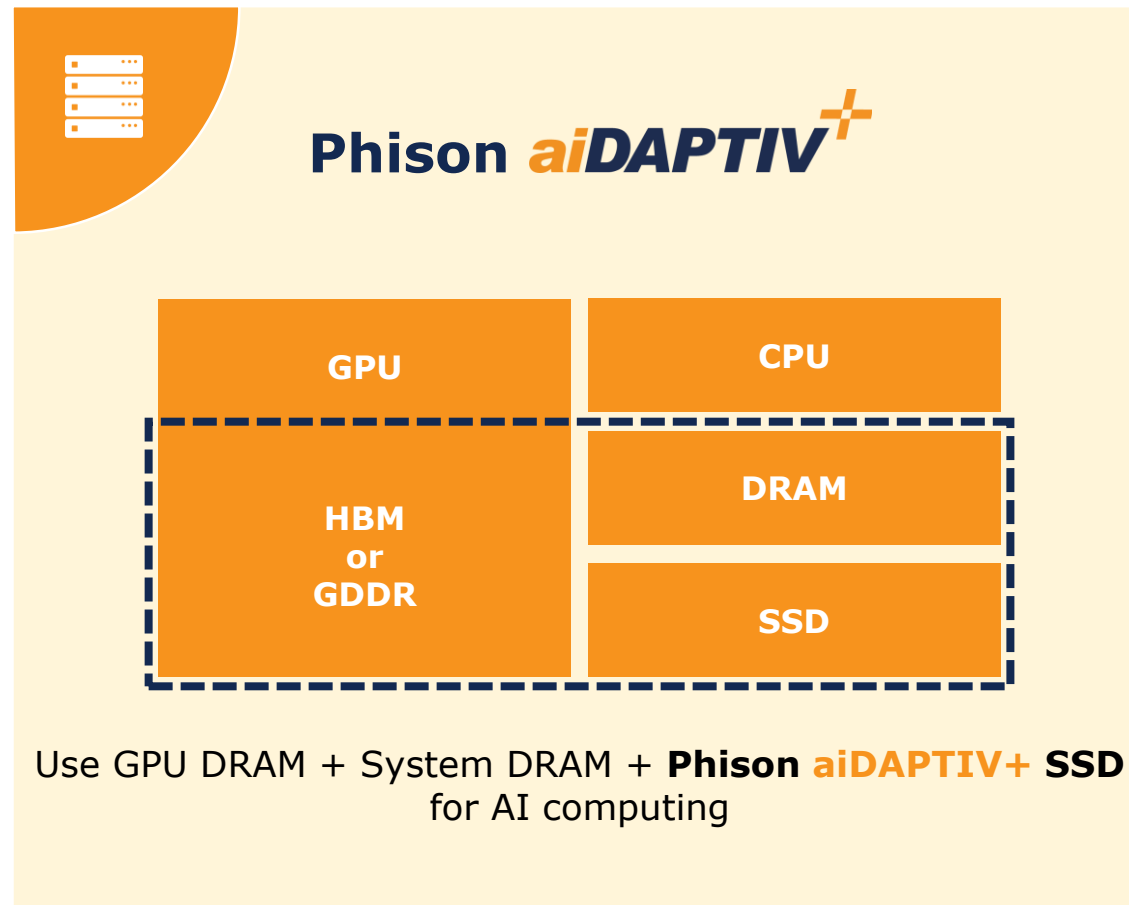
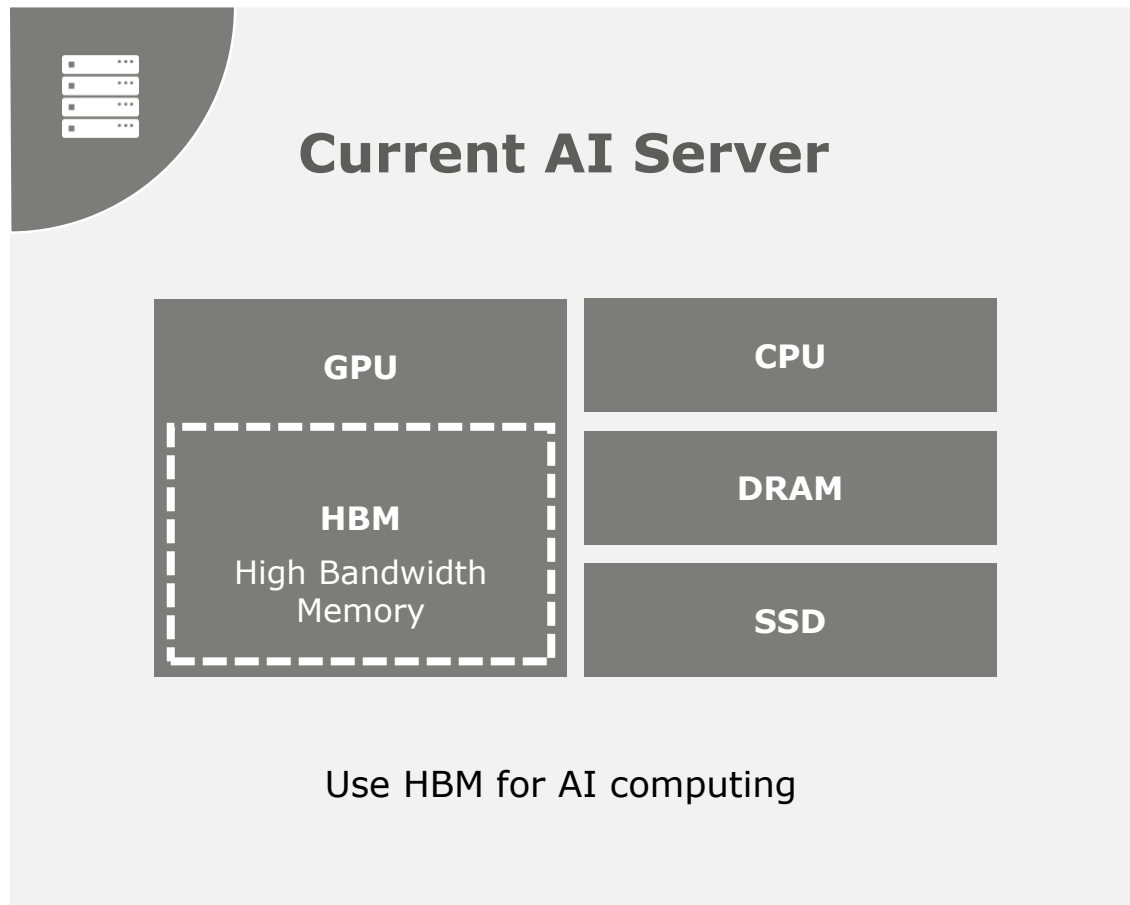


AI-Series

Solution Roadmap

Start from the Architecture

Enhancing Language Model Capabilities



aiDAPTIV⁺ Family

AI Application

PyTorch
AI Framework

aiDAPTIVLink
Middleware Library

GPU
Cost Efficient

aiDAPTIVCache
100 DWPD

aiDAPTIVLink

Middleware

Drop-in for all existing
AI applications



aiDAPTIVCache

Pascari AI-Series SSD Family

Seamless Integration
with HBM

Web UI

Dataset

Load
Model

Finetune

Monitor

Resource
MGM

Validation

Inference

M/W
service

Database

aiDAPTIV⁺

Pro Suite

End-to-End Experience
Fine-tune to Inference



Scaling Boundaries, Not Budgets



[LEARN MORE](#)



Ease of Use and Development

Spend your time training your idea, not yourself or your engineers to set up and familiarize with an aiDAPTIV+ system



Cost and Accessibility

aiDAPTIV+ leverages cost-effective NAND flash to increase access to large-language model (LLM) training with commodity workstation hardware



Security and Data Privacy

aiDAPTIV+ workstations will help you retain control of your data and keep it on premises



PHISON

Thank You!

CONFIDENTIAL

PHISON



Appendix

PCIe Enterprise SSD Product Configurations (X100 Series)

PCIe Gen4 x 4 Dual Port/Single Port

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
U.3 2.5" 	X100P TLC	√ (Aluminum cap)	1,920GB	1	MP	7400 / 4200	1750K / 126K
		√ (Aluminum cap)	3,840GB	1	MP	7400 / 6900	1750K / 188K
		√ (Aluminum cap)	7,680GB	1	MP	7400 / 6900	1750K / 190K
		√ (Tantalum)	15,360GB	1	MP	7000 / 7000	1600K / 180K
		√ (Tantalum)	30,720GB	1	MP	7000 / 6000	1600K / 180K
U.3 2.5" 	X100E TLC	√ (Aluminum cap)	1,600GB	3	MP	7400 / 4200	1750K / 300K
		√ (Aluminum cap)	3,200GB	3	MP	7400 / 6900	1750K / 460K
		√ (Aluminum cap)	6,400GB	3	MP	7400 / 6900	1750K / 470K
		√ (Tantalum)	12,800GB	3	MP	7000 / 7000	1600K / 480K
		√ (Tantalum)	25,600GB	3	MP	7000 / 6000	1600K / 450K

PCIe Enterprise SSD Product Configurations (X200 Series: U.2)

PCIe Gen5 x 4 Dual Port/Single Port

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
U.2 2.5" 	<u>X200P</u> TLC	√ (Aluminum cap)	1,920GB	1	CS	14800 / 4300	2400K / 170K
		√ (Aluminum cap)	3,840GB	1	CS	14800 / 8600	3000K / 380K
		√ (Aluminum cap)	7,680GB	1	CS	14800 / 8700	3000K / 500K
		√ (Tantalum)	15,360GB	1	CS	14800 / 8350	3000K / 500K
		√ (Tantalum)	30,720GB	1	CS	14800* / 8250*	3000K* / 450K*
U.2 2.5" 	<u>X200E</u> TLC	√ (Aluminum cap)	1,600GB	3	CS	14800 / 4300	2400K / 400K
		√ (Aluminum cap)	3,200GB	3	CS	14800 / 8600	3000K / 800K
		√ (Aluminum cap)	6,400GB	3	CS	14800 / 8700	3000K / 900K
		√ (Tantalum)	12,800GB	3	CS	14800 / 8350	3000K / 900K
		√ (Tantalum)	25,600GB	3	CS	14800* / 8250*	3000K* / 800K*

*Estimated Performance

PCIe Enterprise SSD Product Configurations (X200 Series: E3.S)

PCIe Gen5 x 4 Dual Port/Single Port

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
E3.S 	X200P TLC	√ (Tantalum)	1,920GB	1	CS	14800 / 4300	2400K / 170K
		√ (Tantalum)	3,840GB	1	CS	14800 / 8600	3000K / 380K
		√ (Tantalum)	7,680GB	1	CS	14800 / 8700	3000K / 500K
		√ (Tantalum)	15,360GB	1	CS	14800 / 8350	3000K / 500K
E3.S 	X200E TLC	√ (Tantalum)	1,600GB	3	CS	14800 / 4300	2400K / 400K
		√ (Tantalum)	3,200GB	3	CS	14800 / 8600	3000K / 800K
		√ (Tantalum)	6,400GB	3	CS	14800 / 8700	3000K / 900K
		√ (Tantalum)	12,800GB	3	CS	14800 / 8350	3000K / 900K

PCIe Enterprise SSD Product Configurations (D100 Series)

PCIe Gen4 x 4

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
 M.2 2280	D100P TLC	✓ (Tantalum)	480GB	1	MP	6000 / 700	450K / 25K
		✓ (Tantalum)	960GB	1	MP	6000 / 1400	750K / 50K
		✓ (Tantalum)	1920GB	1	MP	6000 / 1800	800K / 60K
 M.2 22110	D100P TLC	✓ (Tantalum)	480GB	1	MP	6000 / 700	450K / 25K
		✓ (Tantalum)	960GB	1	MP	6000 / 1400	750K / 50K
		✓ (Tantalum)	1920GB	1	MP	6000 / 1800	800K / 60K
		✓ (Tantalum)	3840GB	1	MP	3700 / 1700	400K / 40K
 E1.S	D100P TLC	✓ (Tantalum)	480GB	1	MP	6500 / 700	450K / 25K
		✓ (Tantalum)	960GB	1	MP	6800 / 1400	800K / 50K
		✓ (Tantalum)	1920GB	1	MP	6800 / 2000	900K / 60K
 U.2	D100P TLC	✓ (Aluminum cap)	480GB	1	MP	6500 / 700	450K / 25K
		✓ (Aluminum cap)	960GB	1	MP	6800 / 1400	800K / 50K
		✓ (Aluminum cap)	1920GB	1	MP	6800 / 2000	900K / 60K

PCIe Enterprise SSD Product Configurations (D200 Series)

PCIe Gen5 x 4 Single Port

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
 E1.S	<u>D200P</u> TLC	√ (Tantalum)	1,920GB	1	CS: Q4'24	14,000 / 4,200	2,100K / 160K
		√ (Tantalum)	3,840GB	1	CS: Q4'24	14,000 / 8,300	3,000K / 220K
		√ (Tantalum)	7,680GB	1	CS: Q1'25	14,000* / 8,600*	2,900K* / 400K*
 E1.S	<u>D200E</u> TLC	√ (Tantalum)	1,600GB	3	CS: Q4'24	14,000 / 4,200	2,100K / 400K
		√ (Tantalum)	3,200GB	3	CS: Q4'24	14,000 / 8,300	3,000K / 540K
		√ (Tantalum)	6,400GB	3	CS: Q1'25	14,000* / 8,600*	2,900K* / 800K*

*Estimated Performance

PCIe Enterprise SSD Product Configurations

(D200 Series Standard)

PCIe Gen5 x 4 Dual Port/Single Port

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)*	S. 4K Random Read/ 16K Random Write (IOPS)*	Power Consumption (W)
U.2 2.5" 	D200V QLC	✓ (Aluminum cap)	30,720GB	0.3	CS: Dec' 24	14000 / 2100	3000K / 15.6K	25
		✓ (Aluminum cap)	61,440GB	0.3	CS: Dec' 24	14000 / 2100	3000K / 15.6K	25
E3.S 	D200V QLC	✓ (Tantalum)	30,720GB	0.3	CS: Dec' 24	14000 / 2100	3000K / 15.6K	25
E3.L 	D200V QLC	✓ (Tantalum)	61,440GB	0.3	CS: Dec' 24	14000 / 3000	3000K / 27K	30

*Estimated Performance

PCIe Enterprise SSD Product Configurations

(D200 Series High Performance)

PCIe Gen5 x 4 Dual Port/Single Port

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)*	S. 4K Random Read/ 16K Random Write (IOPS)*	Power Consumption (W)
U.2 2.5" 	<u>D200V</u> QLC	✓ (Aluminum cap)	30,720GB	0.3	CS: Dec' 24	14000 / 3000	3000K / 27K	30
		✓ (Aluminum cap)	61,440GB	0.3	CS: Dec' 24	14000 / 3000	3000K / 27K	30
E3.S 	<u>D200V</u> QLC	✓ (Tantalum)	30,720GB	0.3	CS: Dec' 24	14000 / 3000	3000K / 27K	30

*Estimated Performance

PCIe Enterprise SSD Product Configurations

(D200 Series Standard)

PCIe Gen5 x 4 Dual Port/Single Port

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)*	S. 4K Random Read/ 16K Random Write (IOPS)*	Power Consumption (W)
U.2 2.5"								
	D205V QLC	√ (Aluminum cap)	122,880GB	0.3	CS: Q1' 25	TBD	TBD	25
E3.S								
	D205V QLC	√ (Tantalum)	122,880GB	0.3	CS: H2' 25	TBD	TBD	25
E3.L								
	D205V QLC	√ (Tantalum)	122,880GB	0.3	CS: Q1' 25	14000 / 3300	3000K / 31K	30

*Estimated Performance

PCIe Enterprise SSD Product Configurations

(D200 Series High Performance)

PCIe Gen5 x 4 Dual Port/Single Port

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)*	S. 4K Random Read/ 16K Random Write (IOPS)*	Power Consumption (W)
U.2 2.5" 	<u>D205V</u> QLC	√ (Aluminum cap)	122,880GB	0.3	CS: Q1' 25	14000 / 3300	3000K / 31K	30
E3.S 	<u>D205V</u> QLC	√ (Tantalum)	122,880GB	0.3	CS: H2' 25	14000 / 3300	3000K / 31K	30

*Estimated Performance

SATA Enterprise SSD Product Configurations (SA50 Series)

✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
2.5" 	SA50V TLC	✓ (Aluminum cap)	1920GB	>0.4	MP	530 / 500	94K / 13K
			3840GB			530 / 500	97K / 20K
		✓ (Tantalum)	7680GB			530 / 500	97K / 14K
			15360GB			530 / 500	94K / 10K
	SA50E TLC	✓ (Aluminum cap)	480GB	3	MP	500 / 440	95K / 40K
			960GB			530 / 500	98K / 67K
			1920GB			530 / 500	98K / 77K
			3840GB			530 / 500	98K / 68K

SATA Enterprise SSD Product Configurations (SA50 Series)

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
2.5" 	SA50P TLC	√ (Aluminum cap)	480GB	1	MP	530 / 360	92K / 20K
			960GB			530 / 500	98K / 33K
			1920GB			530 / 500	98K / 40K
			3840GB			530 / 500	98K / 30K
			7680GB			530 / 500	97K / 23K

SATA Enterprise SSD Product Configurations (BA50 Series)

√ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
2.5" 	<u>BA50P</u> TLC	√ (Aluminum cap)	240GB	1	MP	530 / 290	60K / 10K
			480GB			530 / 480	90K / 15K
			960GB			530 / 500	98K / 30K
M.2 2280 	<u>BA50P</u> TLC	√ (Tantalum)	240GB	1	MP	530 / 290	60K / 10K
			480GB			530 / 480	90K / 15K
			960GB			530 / 500	98K / 30K

PCIe Enterprise SSD Product Configurations (B100 Series)

PCIe Gen4 x 4

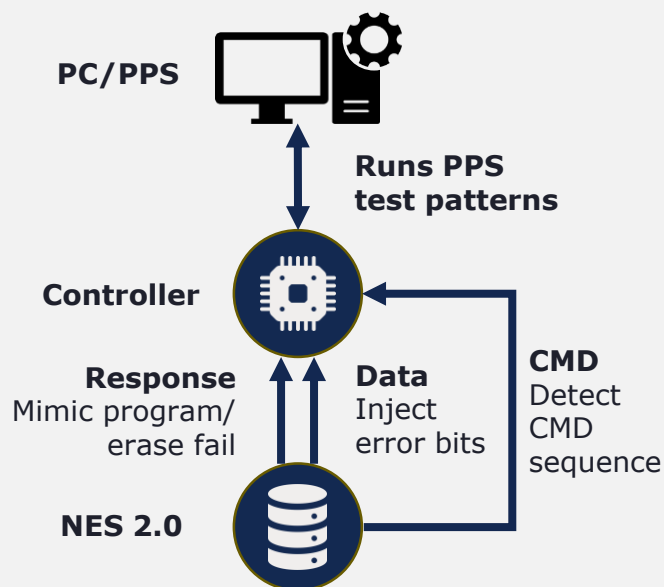
✓ Supported

Form Factor	Product Series	H/W Pfail	Capacity	Up to DWPD (5 Years)	Product Status	S. Seq. R/W (MB/s)	S. 4K Random R/W (IOPS)
M.2 2280 	<u>B100P</u>	✓ (Tantalum)	480GB	1	MP	4000 / 300	250K / 15K
	TLC	✓ (Tantalum)	960GB	1	MP	5000 / 700	450K / 30K

PHISON SSD Design Validation

NAND Emulator System

Ensures NAND operations and
Shortens Time to Market



Phison Pattern System (PPS)

Robust Validation System

-  Garbage Collection
-  Customer Request
-  JEDEC Spec
-  Flash Translation Layer
-  Feedback Bugs
-  Platform Behavior
-  Stress Test
-  Data Reliability
-  Power Cycling Test

Strong Facility Investment

Ensure compatibility/compliance
before shipping

- **4,000+** Testing Platforms
- Self-built Chamber for strict environmental tests
- High-speed Signal Lab for signal integrity check including PCIe/MPHY/USB/DDR/ONFi
- Increasing CAPEX of cutting-edge equipment to enable first to market technologies

Test for Enterprise Quality

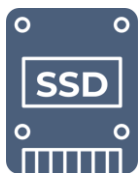
- <200 factory DPPM
- <0.5% AFR
- Better UBER than JEDEC requirements
- Consistent workload performance through EOL
- Enterprise factory quality with ORT

PHISON Enterprise SSD Aligned with Industry Best Practices

Total Investment on Reliability Test > \$ 50M per model, per generation



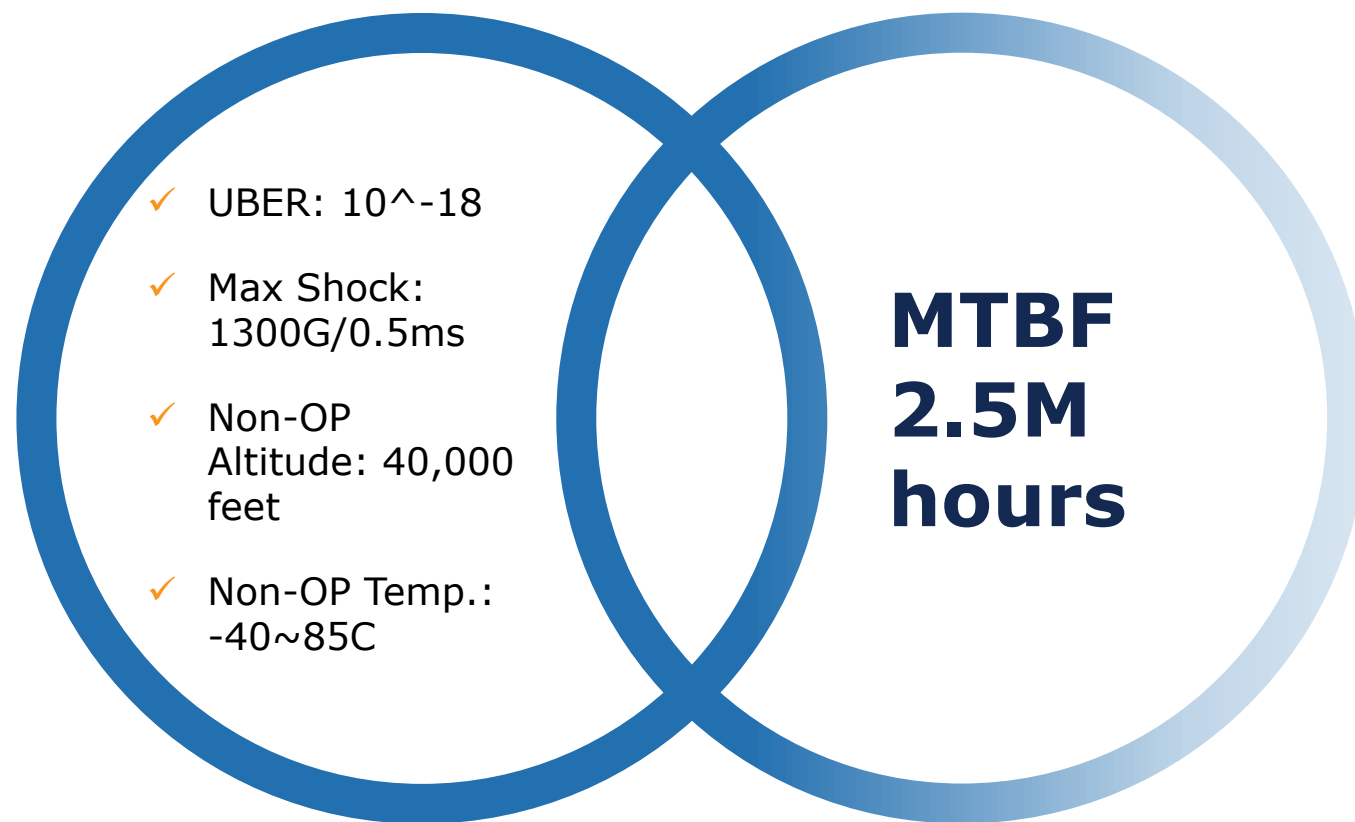
6000+
Testing Hours



2000+
Samples



20+
Chambers

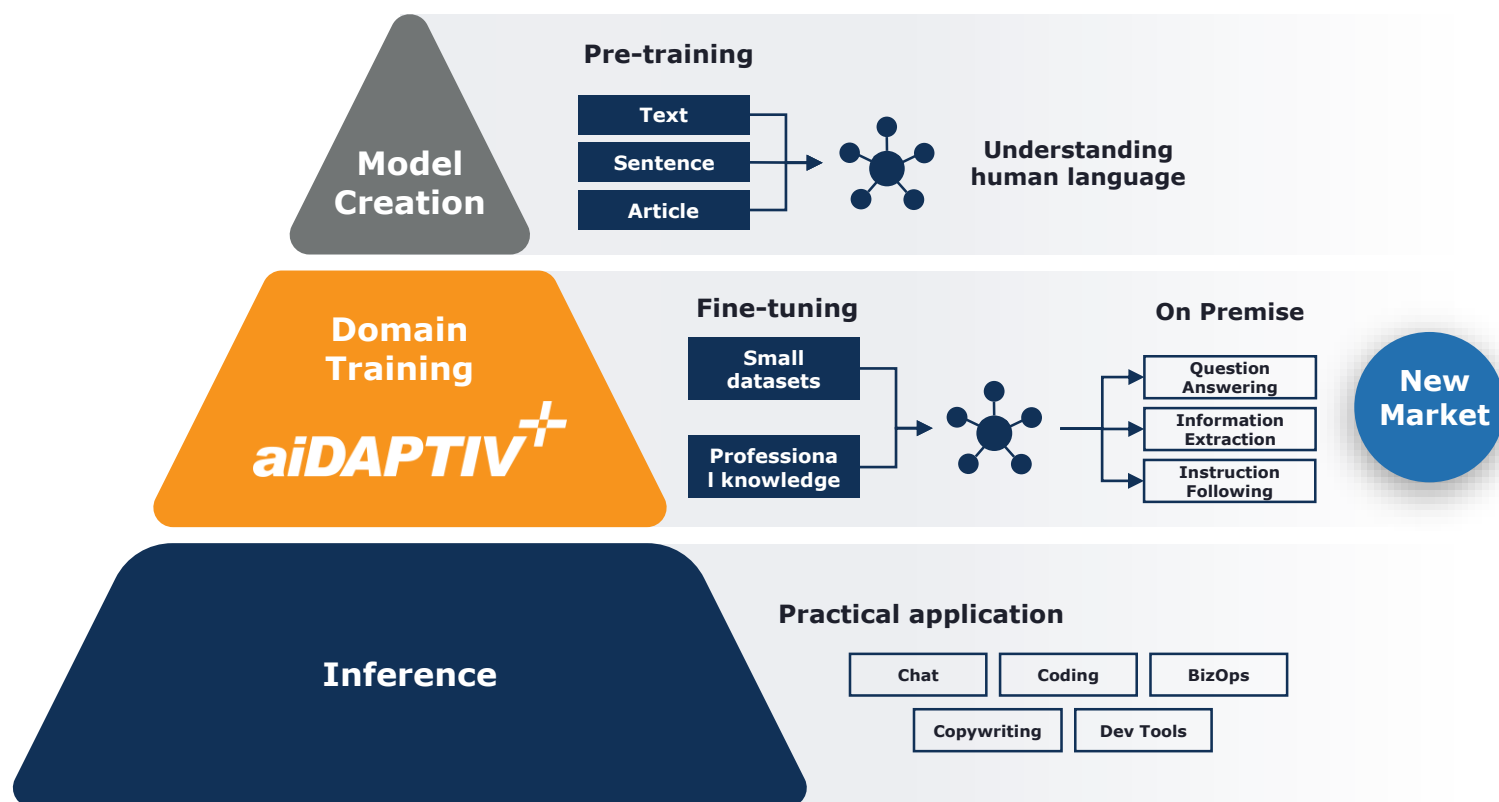


aiDAPTIV⁺ Family Roadmap

ES CS

	2024		2025				2026			
	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
AI100E PCIe 4.0 M.2 2280, U.2										
	PCIe 4.0 / M.2 2280 / 100 DWPDP / 320GB, 1TB & 2TB									
	PCIe 4.0 / U.2 / 100 DWPDP / 1TB to 2TB									
AI200E PCIe 5.0 M.2 2280										
AI250E PCIe 5.0 U.2										
AI270E PCIe 5.0 M.2 2280, E1.S, U.2										

Today's LLM Market Segment



GPU Cards Requirements

>1000

Massive GPUs
High Computing Power Required

10~100

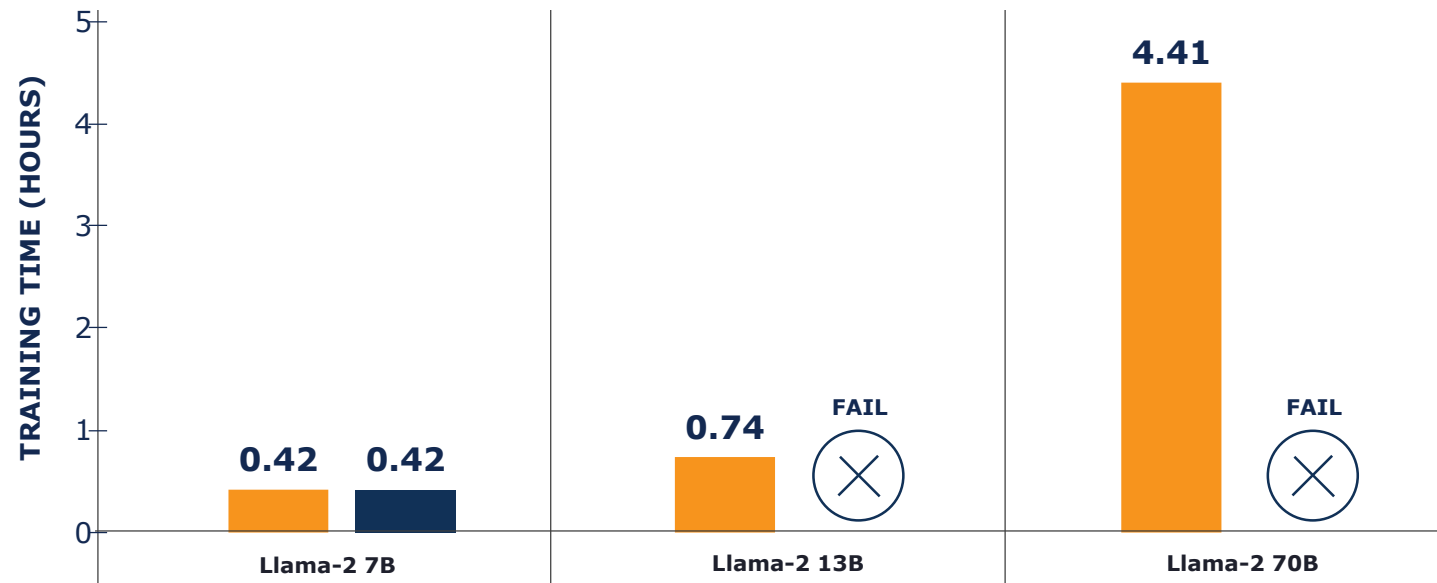
Depends on Memory Size
(GPU RAM $\geq$ 20x Model Size)

1

Minimal requirement

aiDAPTIV⁺ Trains Larger Models W/ Linear Scaling

Single node 4x GPU configuration comparing GPU and GPU + aiDAPTIV⁺



Model Size (Training)	140 GB	260 GB	1400 GB
HBM Pool (Usage%)	192 GB (73%)	192 GB (120%)	192 GB (729%)
Minimum GPU Count	4 / 4	4 / 6	4 / 30

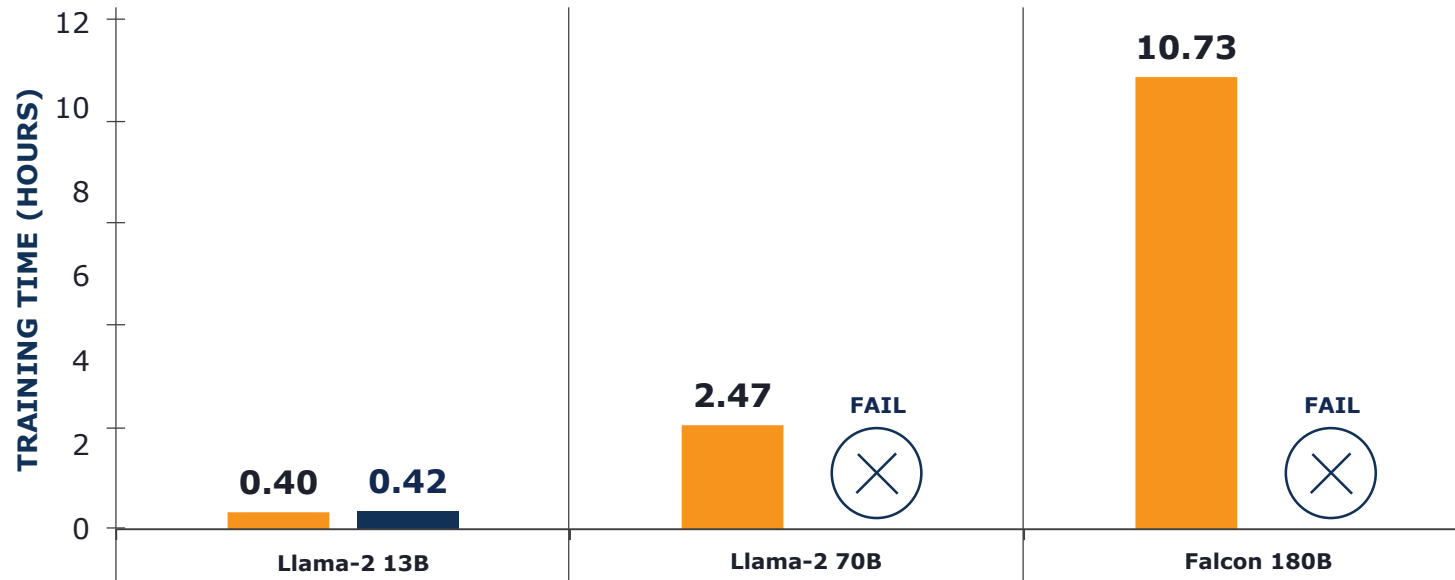
Note: Scaling is linear based on GPU count and model size

System Configuration

- RAM: 512 GB
- GPU: 4x RTX 6000 ada
- GDDR: 192 GB

aiDAPTIV⁺ Beyond Workstations – Server Scaling

Single node 8x GPU configuration comparing GPU and GPU + aiDAPTIV⁺



Model Size (Training)	260 GB	1400 GB	3600 GB
HBM Pool (Usage%)	384 GB (68%)	384 GB (365%)	384 GB (938%)
Minimum GPU Count	8 / 8	8 / 30	8 / 75

Note: Scaling is linear based on GPU count and model size

System Configuration

- RAM: 512 GB
- GPU: NVIDIA L40S
- GDDR: 384 GB

aiDAPTIV⁺ System Configuration Suggestion

Workstation / Server

LLM Model Size with aiDAPTIV ⁺	AI100E (NVMe Gen4x4)	System Collocation Suggestion	
		GPU (Suggestion)	System memory
Up to 34B Mixtral 8x7B	1TB * 2	RTX 4000 ada *2 RTX 5000 ada *2 RTX 6000 ada *2	256GB
Up to 70B	2TB * 2	RTX 4000 ada *4 RTX 5000 ada *4 RTX 6000 ada *4	512GB
Mixtral 8x22B	2TB * 2	RTX 6000 ada *4 L40S *4	1TB
Up to 180B	2TB * 4	L4 *8 L40 *8 L40S *8	2TB

Note:

1. Default: SSD *2 in RAID0
2. System Memory :DDR4 3200 or higher
3. GPU: Cuda 12.2.1, NV driver version: 535 or higher