

CES 2021 Media

Leo Huang

Senior Director Product Marketing



Agenda

- Phison background
- What are we announcing?
- CES – product showcase

Facts About Phison

20+

Years of NAND Solution Expertise

3 Priorities

Consumer | Embedded | Enterprise



2300+ HC

70% R&D

600M

Average annual controller shipments



1900+

Worldwide patents



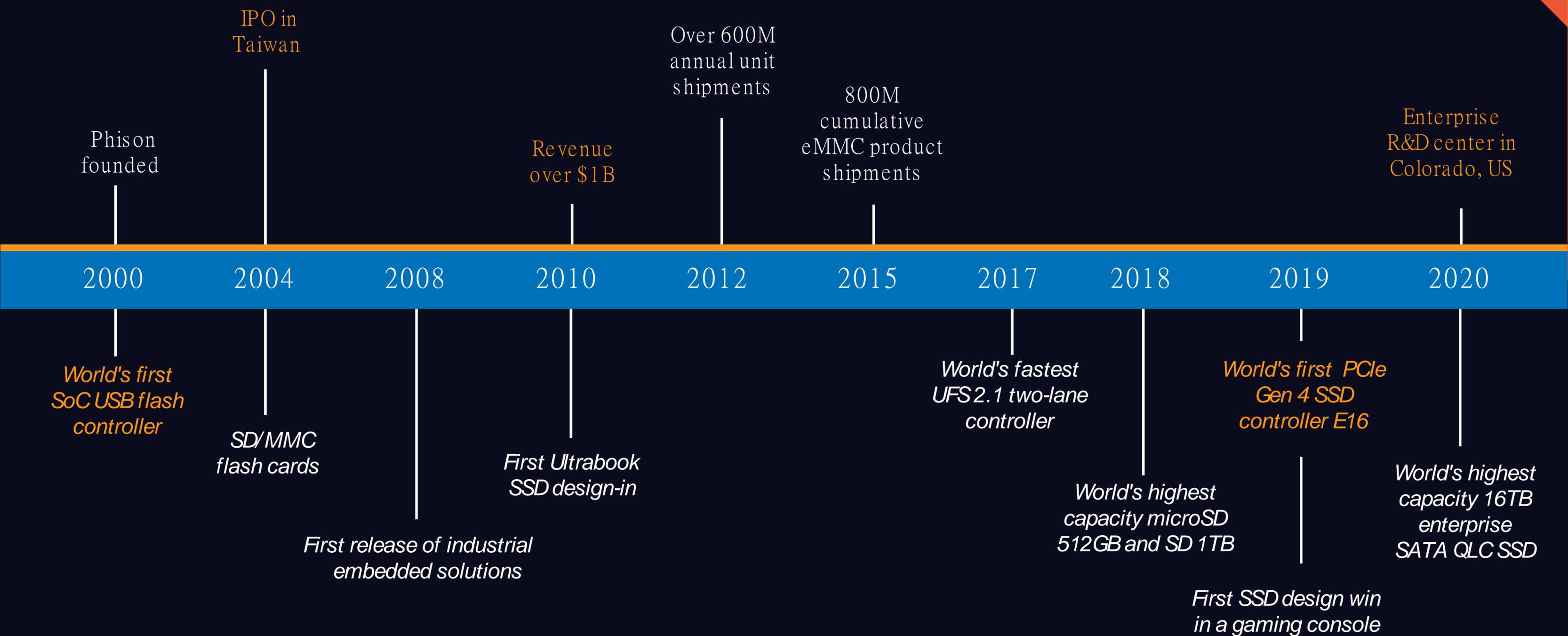
\$1.64B

2020 Revenue, no debt

Company Milestones



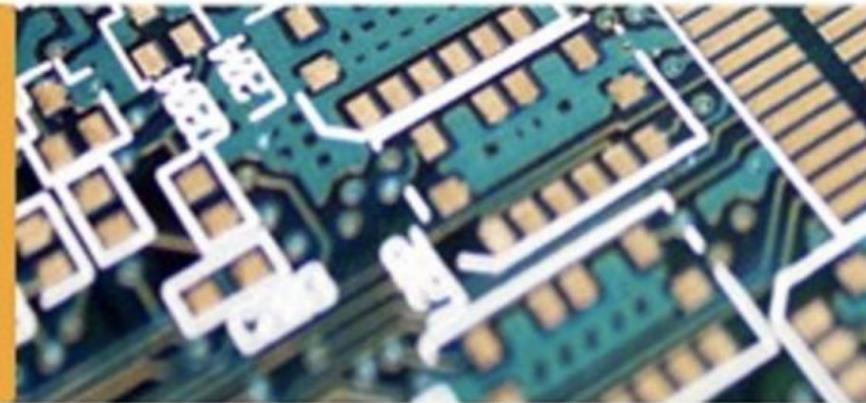
20 years of NAND controller leadership



Phison's Core Values

NAND Flash-based IC Design

Over 20 years of expertise developing NAND flash controllers
▶ 1900+ flash related patents¹, Internal Phy, ASIC,
and advanced NAND handling technologies



System Integration

Extensive expertise in mainstream applications
▶ Embedded, Enterprise, PC, and Mobile
▶ PATA, SATA, PCIe NVMe, USB, SD, eMMC, UFS

ODM

From Design to Manufacturing



Turnkey

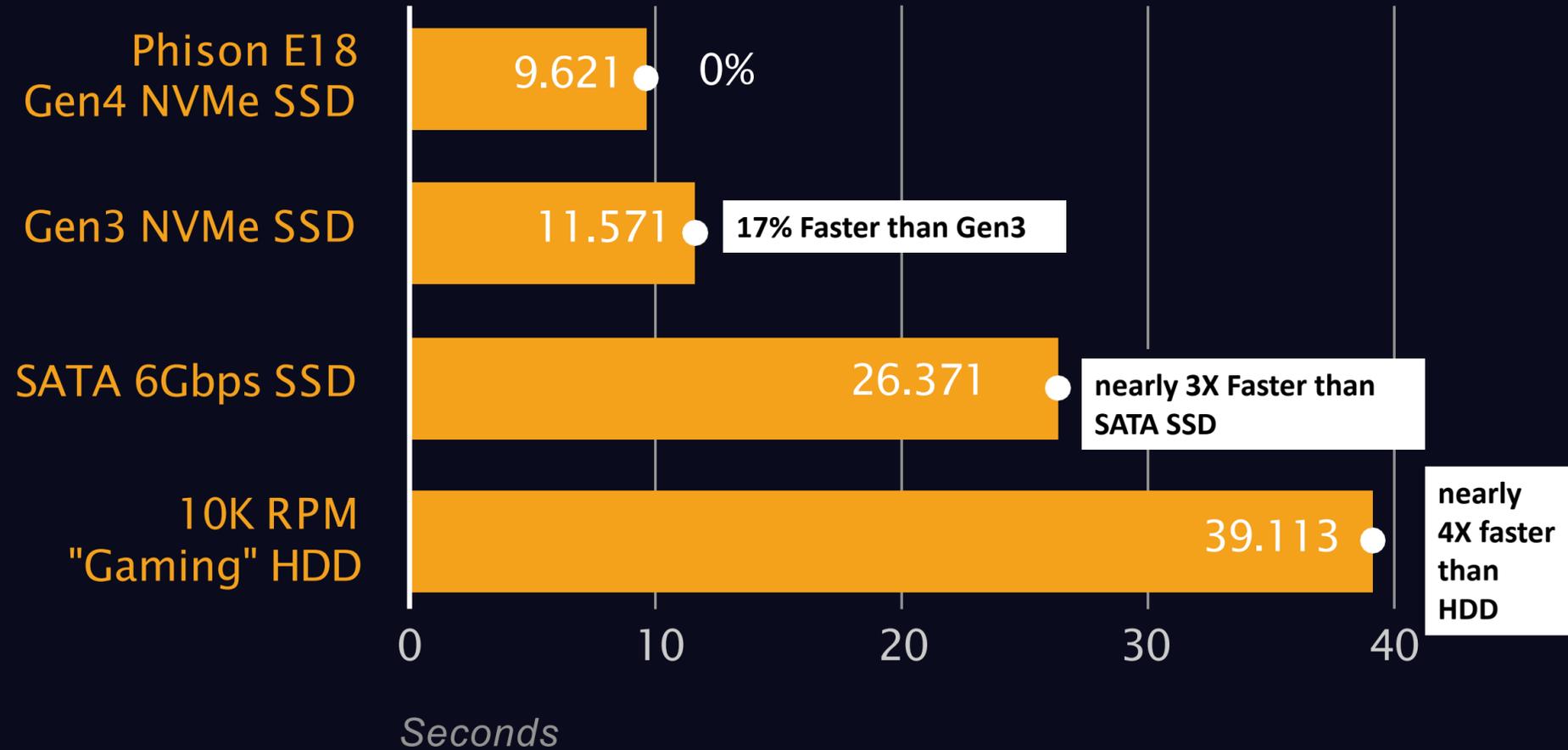
Flexible Business Model



Phison – Designed for Gaming and Content Creators

- We deliver what gamers want - PERFORMANCE! Through our ecosystem partners, we accelerate the path to winning and to create imagination.
- Purpose-built to transform a system into an integrated and immersive gaming station and for content creators developing new and innovative ways of imagining data.

Generations of Gaming Storage
Game Load Time Improvements



1

Phison PS2251-U17 / PS2251-U18
USB 3.2 Gen 2x2 Native
UFD controller



Phison U17 / U18 – Content Creators

Key Attributes:

- The Phison U17/U18 is the **world's fastest** USB 3.2 Gen 2x2 native UFD controller.
- The U17 goes up to 1 TB in capacity that reaches up to **1000 MB/s read and 800 MB/s write** performance.
- The U18 goes up to 4 TB in capacity that reaches up to **1900 MB/s read and 1700 MB/s write** performance.
- Perfect for creative or business professionals, the U17 and U18 allows users to be more productive and efficient when managing data.
- The U18 also supports **TCG Opal security** for business professionals that want added peace of mind.



Phison U18 USB 3.2 Gen 2x2 Performance

Capacity	Seq. Read (MB/s)	Seq. Write (MB/s)	Ran. Read (MB/s)	Ran. Write (MB/s)
512GB	1850	1000	250	320
1024GB	1850	1600	250	320
2048GB	1850	1600	260	330
4096GB	1900	1700	260	330

Estimates – subject to change

Confidential

2

Phison PS5013-E13T
PCIe Gen 3x4 NVMe BGA



Phison PS5013-E13T BGA – Efficient and Cool for Mobile Gaming

Key Attributes:

- Phison delivers the **lowest 1W of active power** to market for efficient mobile gaming so devices stay cool throughout the gaming experience.
- The E13T BGA SSD brings NVMe level performance to a small 11.5mm x 13mm form factor, making it the perfect solution for today's mobile devices.
- **Up to 2 TB** in capacity



Phison PS5013-E13T BGA - Keeping Cool Throughout the Game

Interface & Protocol

- ✓ Compatible with PCI Express Base Specification Rev 3.1
- ✓ PCIe Gen 3 x 4 (Bandwidth: 8GT/s x4)
- ✓ Compatible with PCIe Gen 3 / Gen 2 / Gen 1
- ✓ Compatible with NVMe 1.3

Flash & DDR Interface

- ✓ Up to 4 CH with 16 CEs; Up to 2TB
- ✓ compatible up to Toggle 3.0 & ONFI 4.0
- ✓ Support 3D TLC/QLC NAND Flash
- ✓ Flash transfer rate 800 MT/s
- ✓ Supply voltage of FLH I/O: 1.2V/1.8V

Processor, Process & Package

- ✓ Single-CPU architecture
- ✓ Built-in 32-bit microcontroller
- ✓ TSMC 28nm process technology

Highlighted Features

- ✓ Host Memory Buffer (HMB) support
- ✓ Phison 4th Gen LDPC & RAID ECC
- ✓ Support Low power L1.2 < 2mW
- ✓ 512B & 4KB sector sizes support
- ✓ Static & dynamic SLC cache support
- ✓ SmartZIP™ support
- ✓ Support AES256/TCG OPAL2.0/Pyrite
- ✓ Operation: 0°C~70°C
- ✓ Non-operation: -40°C~85°C
- ✓ Up to 1730 MB/s seq read, 1180 MB/s seq write
- ✓ Active 1W

3

Phison PS5018-E18
PCIe Gen4x4 NVMe
SSD Controller



Phison PS5018-E18 – Performance Driven for Gaming

Key Attributes:

- Phison's **second-generation** industry leading performance PCIe Gen4x4 NVMe SSD is its flagship gaming controller. The E18 is the only solution on the market to-date to break the **7GB/s barrier for both sequential read and write** with superior power efficiency.



Phison PS5018-E18 – Performance Driven for Gaming

Introduction

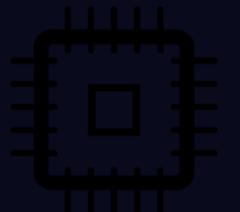
Interface & Protocol

- ✓ Compatible with PCI Express Base Specification Revision 4.0
- ✓ PCIe Gen 4x4 (Bandwidth: 16GT/s x4)
- ✓ Compatible with PCIe Gen 4 / Gen 3 / Gen 2 / Gen 1
- ✓ Compatible with NVMe 1.4



Processor, Process & Package

- ✓ Triple-CPU architecture with built-in ARM Cortex-R5, 1GHz
- ✓ TSMC 12nm process technology
- ✓ 529-ball TFBGA, 12 mm x 12 mm



Flash & DDR Interface

- ✓ Up to 8 CH with 32 CEs; Up to 8TB SSD
- ✓ Flash interface compatible up to Toggle 3.0 & ONFI 4.0
- ✓ Support 3D TLC/QLC NAND flash
- ✓ Flash Transfer rate up to 1600 MT/s
- ✓ Supply voltage of FLH I/O: 1.2V
- ✓ DDR4 @2666 with 16-bit mode

Highlighted Features

- ✓ Phison 4th Gen LDPC
- ✓ Support APST¹ & ASPM¹
- ✓ Support Low power L1.2 < 3mW
- ✓ Support Pyrite, AES256, SHA512, RSA4096



1. APST: Autonomous Power State Transition
ASPM: Active States Power Management



Phison PS5021-E21T
PCIe Gen 4x4 NVMe
SSD Controller



Phison PS5021-E21T PCIe Gen 4x4 NVMe

Key Attributes:

- Phison's **second generation** mainstream PCIe Gen 4 controller.
- Provides up to **25 percent** improvement in performance and power efficiency over previous generation E19T.
- The transition from **28nm to 12nm** process technology for this new controller allows for a new wave of design-in opportunities and will continue to be a great solution for console, PC/laptop, and mobile gaming.



Phison PS5021-E21T PCIe Gen 4x4 NVMe

Introduction

Interface & Protocol

- ✓ Compatible with PCI Express Base Specification Revision 4.0
- ✓ PCIe Gen 4x4 (Bandwidth: 16GT/s x4)
- ✓ Compatible with PCIe Gen 4/ Gen 3 / Gen 2 / Gen 1
- ✓ Compatible with NVMe 1.4

Flash & DDR Interface

- ✓ Up to 4 CH with 16 CEs; Up to 4TB
- ✓ compatible up to Toggle 3.0 & ONFI 4.2
- ✓ Support 3D TLC/QLC NAND Flash
- ✓ Flash Transfer rate up to 1600 MT/s
- ✓ Supply voltage of FLH I/O: 1.2V

Processor, Process & Package

- ✓ Single-CPU architecture
- ✓ Built-in 32-bit microcontroller
- ✓ TSMC 12nm process technology
- ✓ 198-ball HSTFBGA, 7 mm x 11 mm
- ✓ Ball pitch : 0.6mm

Highlighted Features

- ✓ Host Memory Buffer (HMB) support
- ✓ Phison 4th Gen LDPC & RAID ECC
- ✓ Support Low power L1.2 <2.7mW
- ✓ 512B & 4KB sector sizes support
- ✓ Static & dynamic SLC cache support
- ✓ Support AES256/SHA512/RSA4096/SM4/TCG OPAL 2.0/Pyrite
- ✓ Up to 5000 MB/s sequential read, 4500 MB/s sequential write performance



Phison PS5021-E21T PCIe Gen 4x4 NVMe

Phison PS5021-E21T

Capacity	Seq. Read (MB/s)	Seq. Write (MB/s)	4K Ran. Read (IOps)	4K Ran. Write (IOps)
512GB	4700	1650	250K	350K
1024GB	5000	3300	500K	700K
2048GB	5000	4500	780K	800K
4096GB	5000	4500	780K	800K

Estimated performance – subject to change

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Questions?