

# PHISON



## "Igniting Success for PCI Express"

### Innovation at Its Best!

#### Engineering Next-Generation Technologies Through Ecosystem Excellence

PCIe Gen5 continues to push the limits for system-level performance. By doubling the bandwidth of PCIe Gen4, Phison enables new experiences and possibilities for gaming, digital content creation, high performance computing (HPC), and data centers. Phison is blazing the way with our PCIe Gen5 SSD controllers and signal enhancing tools.

# Phison Enhancing PCIe<sup>®</sup> 5.0

CPU  
intel  
AMD

Storage Device  
Redriver  
**PHISON**



**Motherboard**

**ASUS**

**GIGABYTE™**

**ASRock**

# Building the PCIe® 5.0 Ecosystem

With E26 - The World's First Gen5 SSD

**PHISON**

Apacer

**crucial**  
by Micron

**ASUS**

**msi**

 影驰  
**GALAX**

**PNY**

**GIGABYTE™**

 SEAGATE

 CORSAIR


**SABRENT**

Projected  
**>60%**

**Faster SEQ. READ SPEED**

With PCIe® 5.0 storage

# Phison

1. **Flagship- PS5026-E26 with  Technology**
2. **Enterprise- X2 and XDC**
3. **Signal Enhancing Solutions- PS7101 & PS7201**



**Phison's E26 Gen5 SSD Solution**  
**First PCIe Gen5 SSD Solution**



**1** **Phison PS5026-E26**  
Providing the Best Next-Generation User Experience

# E26 Features

- Delivers the best user experience to date in a convenient M.2 2280 form factor
- The E26 features enterprise DNA to power next-generation sustained workloads that increase demands on storage systems
- PCIe Gen5x4 with up to 75% performance increase and performance-per-watt\*

\*Over previous generation flagship E18



# E26 Specifications



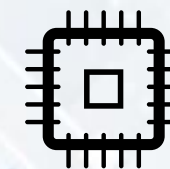
## Interface & Protocol

- ✓ Compatible with PCI Express Base Specification Revision 5.0
- ✓ **PCIe Gen5x4 (Bandwidth: 32GT/s x4)**
- ✓ Compatible with PCIe Gen4 / Gen3 / Gen2 / Gen1
- ✓ Compatible with NVMe 2.0



## Processor, Process & Package

- ✓ Dual-CPU architecture with built-in 32-bit microcontroller
- ✓ TSMC 12nm process technology
- ✓ 576-ball HSFCCSP, 16 mm x 16 mm



## Flash & DDR Interface

- ✓ Up to 8 CH with 32 CEs
- ✓ Flash interface compatible up to Toggle 5.0 & ONFI 5.0
- ✓ Support 3D TLC / QLC NAND flash
- ✓ Flash Transfer Rate up to 2400 MT/s
- ✓ Supply voltage of FLH I/O: 1.2V
- ✓ LPDDR4 and DDR4 both supported, transfer rate up to 3200Mbps
- ✓ **Sequential Read / Write (Controller Limits) up to 14,000 / 11,800 MB/s**
- ✓ **Random Read / Write (Controller Limits) up to 1.5M / 2M IOPS**

## Highlighted Features

- ✓ Phison 5<sup>th</sup> Gen LDPC & RAID ECC
- ✓ **Support I/O+ Technology for sustained read and write performance**
- ✓ Support APST<sup>1</sup> & ASPM<sup>1</sup>
- ✓ Support TCG OPAL 2.0 / AES256 / SHA512 / RSA4096
- ✓ Support enterprise features of Dual Port, SR-IOV and ZNS
- ✓ Support Namespace up to 64
- ✓ Operation: 0°C ~ 70°C
- ✓ Non-operation: -40°C ~ 85°C



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



# Standard and Future Pro Model Opportunities



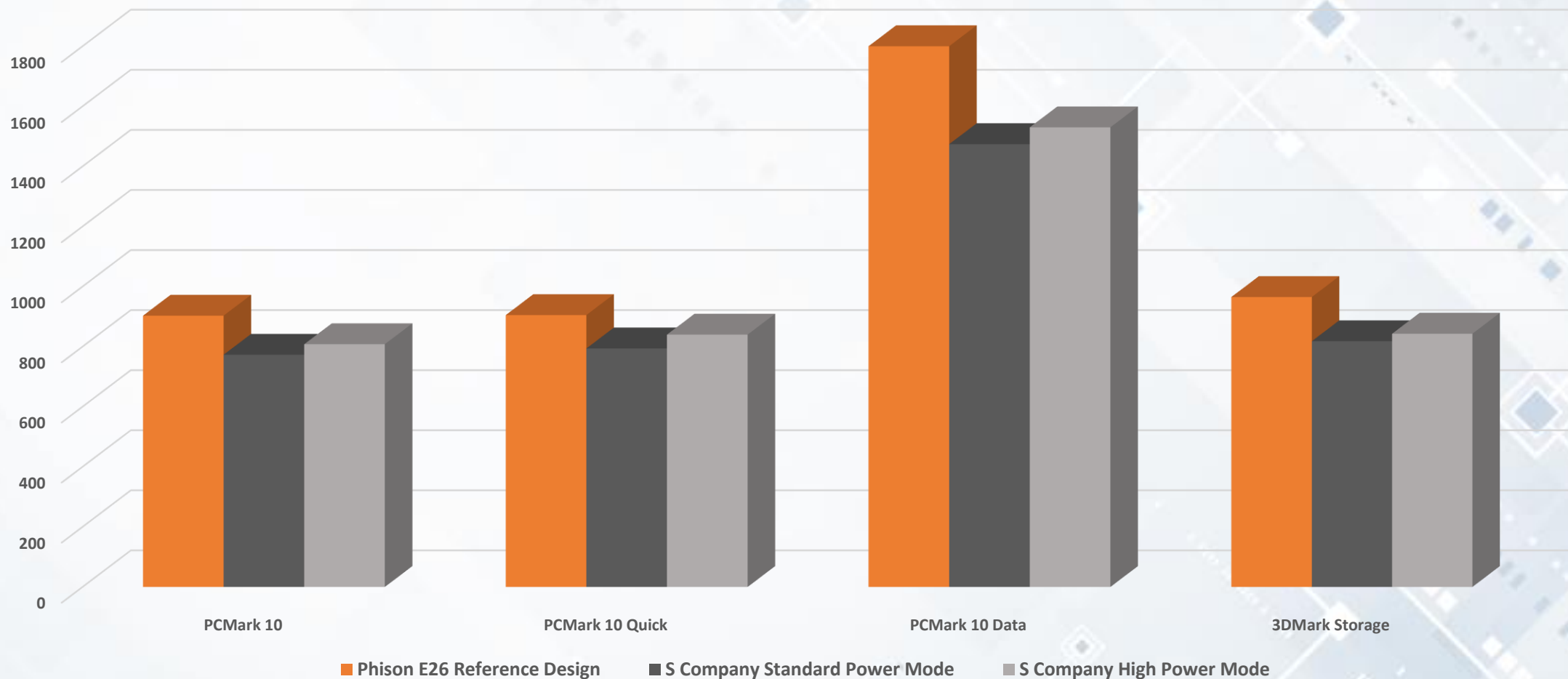
- E26 supports 1600MT/s, 2000MT/s and 2400MT/s flash.
- 1600MT/s flash products shipping in early February (CDM Result Right)
- First generation E26 surpasses performance of all existing Gen4 products in the market today in synthetic and real-world testing
- I/O+ Technology ensures superior next-generation gaming (DirectStorage) performance advantage

	Read (MB/s)	Write (MB/s)
<b>All</b>		
SEQ1M Q8T1	<b>10072.60</b>	<b>10161.60</b>
SEQ128K Q32T1	<b>9997.91</b>	<b>10213.51</b>
RND4K Q32T16	<b>6128.67</b>	<b>6832.15</b>
RND4K Q1T1	<b>102.14</b>	<b>445.59</b>
<b>NVMe Setting - Default Workload</b>		

# PS5026-E26 Delivers an Exceptional User Experience



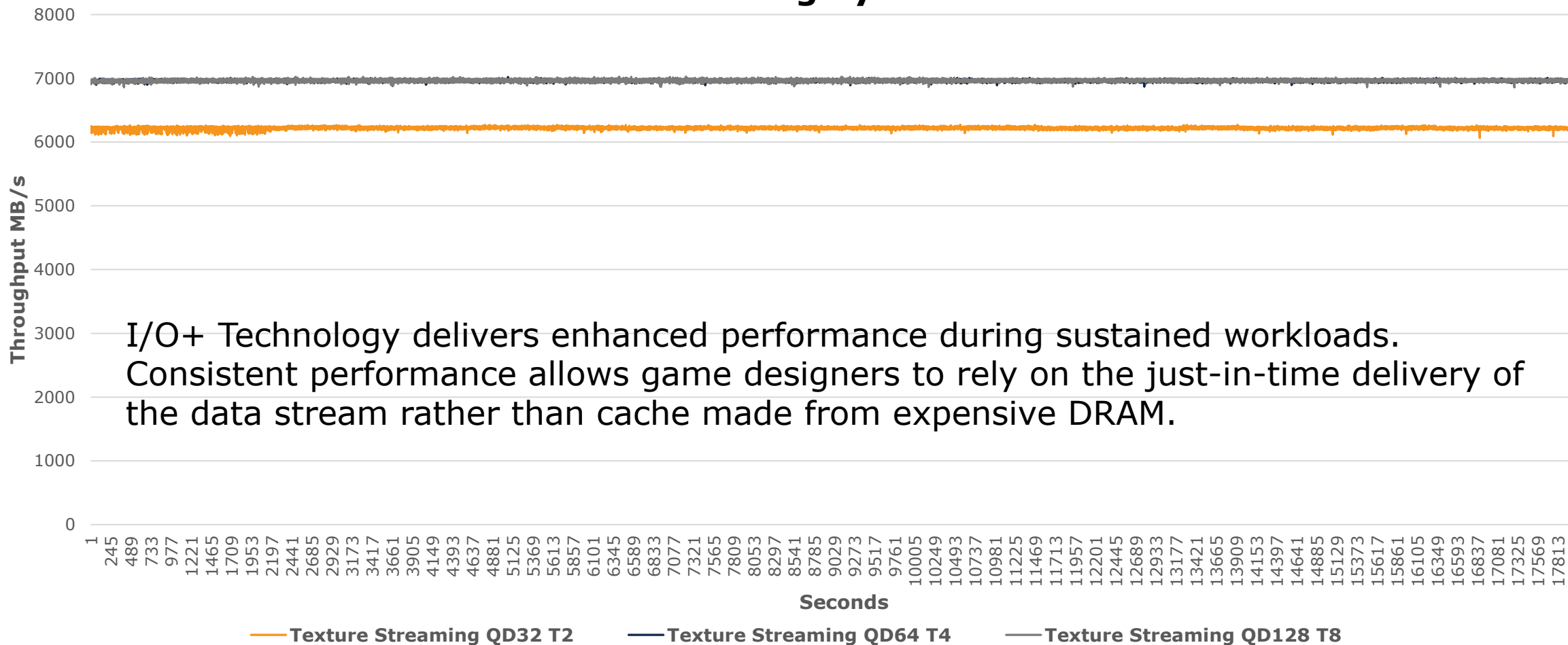
### PS5026-E26 Real-World Performance Results



# PS5026-E26 Featuring IO+ Technology



## Texture Streaming Synthetic Tests



## **Enterprise**

### **X2 PCIe Gen5 NVMe Controller**

**Two times the performance of its predecessor X1 PCIe Gen4**

### **XDC PCIe Gen5 NVMe Controller**

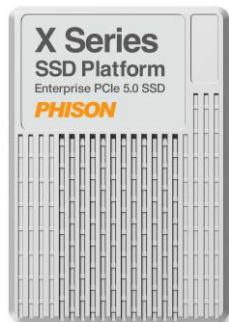
**Designed with the best combination of enabling performance and feature sets while still positioned as value priced storage**

# 2 PCIe Gen5 Enterprise- X2 & XDC

The New Wave of PCIe Gen5 Enterprise is Right Around the Corner



# Enterprise PCIe Gen5- X2 & XDC



Product Requirement Spec.		PS5026 (XDC) <i>new</i> Gen5 x 4 8CH w/ DRAM	PS5302 (X2) <i>new</i> Gen5 x 4 16CH w/ DRAM
<b>Categories</b>			
<b>Max Capacity</b>	Unformatted	up to 32TB	up to 256TB
<b>Interface</b>	PCIe	Yes	Yes
	SMBus	Yes	Yes
	UART	Yes	Yes
	GPIO	Yes	Yes
	I2C	Yes	Yes
	I3C	-	Yes
	JTAG	Yes	Yes
<b>Performance</b>	Max. Seq read	14 GB/s	14 GB/s
	Max. Seq write	7 GB/s	14 GB/s
	Max. 4K Rand. Read	2300K IOPS	3500K IOPS
	Max. 4K Rand. Write	240K IOPS	550K IOPS
	Power	15W/25W	25W/40W/70W
<b>Compliance</b>	NVMe	2.0	2.0
	PCIe	5	5
	NVMe MI	1.2a -via SMBus: x1 -via PCIe: x4	1.2 -via SMBus: x1 -via PCIe: x4
	MCTP	over SMBus / PCIe	over SMBus / PCIe
	TCG OPAL	Yes	Yes
	Open Channel	OC 2.0	OC 2.0
	SPDM	-	-
<b>Package</b>	Type	Flip Chip	Flip Chip
	Package Size	16 mm * 16 mm	21 mm * 21 mm
<b>Fab Info</b>	Process	T12-FFC	T12-FFC
	Operation Junction Temperature (Tj)	-40 ~ 125 °C	-40 ~ 125 °C



# **Phison PS7201 & PS7101**

**Signal enhancing solutions at the forefront of the  
PCIe Gen5 evolution**

**3**

## Signal Enhancing Solution- PS7101 & PS7201

Solving signal loss challenges





# Phison PCIe Gen5 Redriver and Retimer IC solutions

## Mass Production



- First PCIe Gen5 Redriver with PCI-SIG Certification
- 2-lanes (4CHs) with Mux/Demux function
- Major motherboard manufacturer design-ins, millions of units shipped in 2022

ASUS X670E Motherboard  
with PS7101



## Upcoming 2023 Products



- 4-lanes (8CHs)
- Pure Redriver



- 16-lanes (32CHs)
- Pure Redriver



- 2-lanes (4CHs)
- Low Power



- Retimer
- 16-lanes (32CHs)

# Phison PS7101 PCIe Gen5 Redriver Design-Ins

ASRock X670E



Biostar X670E



ASUS X670E



Gigabyte X670E



▲主要搭载的是PS7101这种芯片

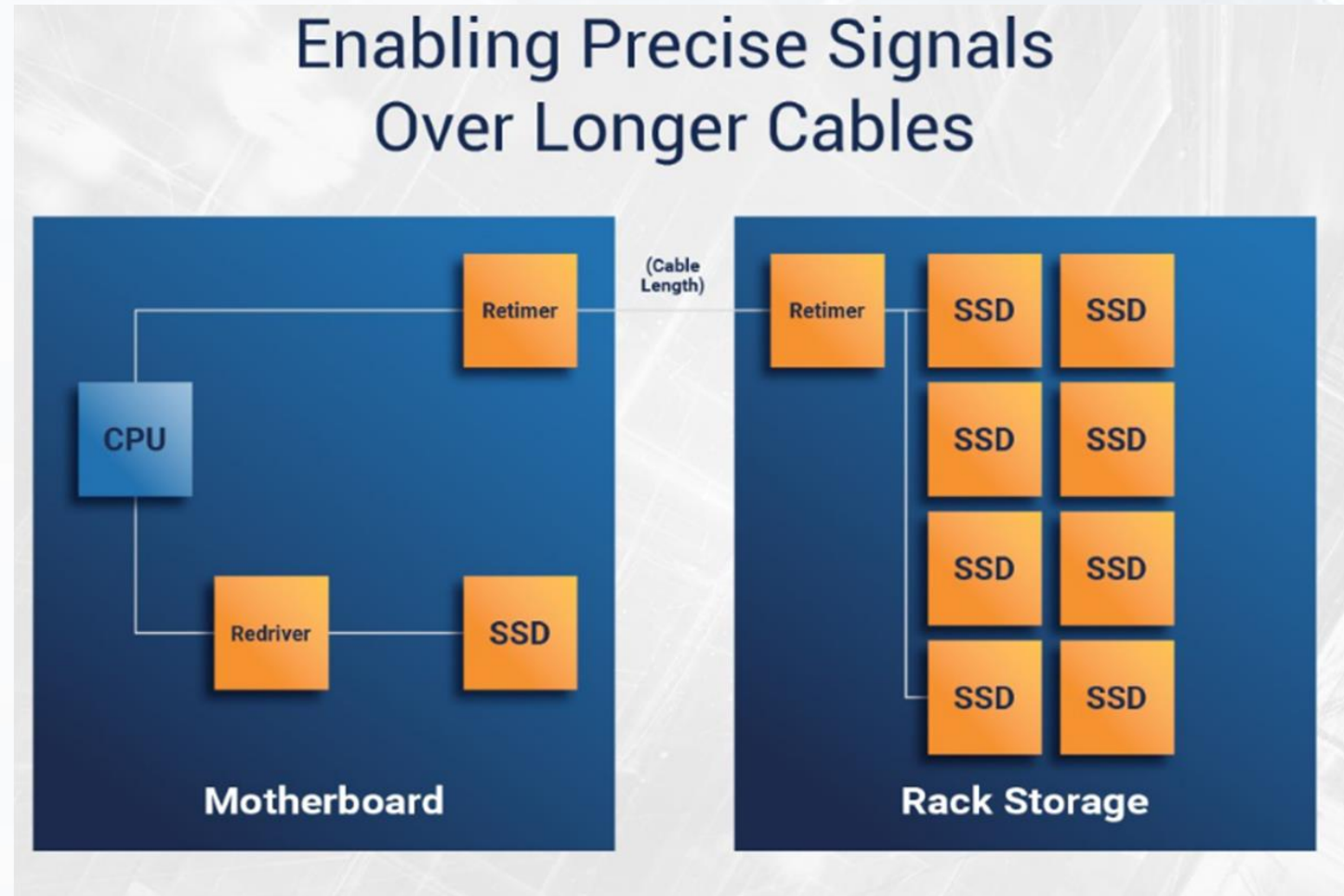
All of these motherboards are available today

## Links:

1. [https://www.hkepc.com/21169/AM5\\_%E5%A4%AA%E6%A5%B5%E5%B7%A8%E8%BC%AA%E7%99%BB%E5%A0%B4\\_ASROCK\\_X670E\\_Taichi\\_%E4%B8%B%E6%A9%9F%E6%9D%BF](https://www.hkepc.com/21169/AM5_%E5%A4%AA%E6%A5%B5%E5%B7%A8%E8%BC%AA%E7%99%BB%E5%A0%B4_ASROCK_X670E_Taichi_%E4%B8%B%E6%A9%9F%E6%9D%BF)
2. <https://benchlife.info/biostar-x670e- Valkyrie-am5-motherboard-unboxing/>
3. <https://benchlife.info/asus-rog-crosshair-x670e-hero-motherboard-unboxing/>
4. [https://t.cj.sina.com.cn/articles/view/1823348853/6cae1875020014nxs?finpagefr=p\\_103&](https://t.cj.sina.com.cn/articles/view/1823348853/6cae1875020014nxs?finpagefr=p_103&)

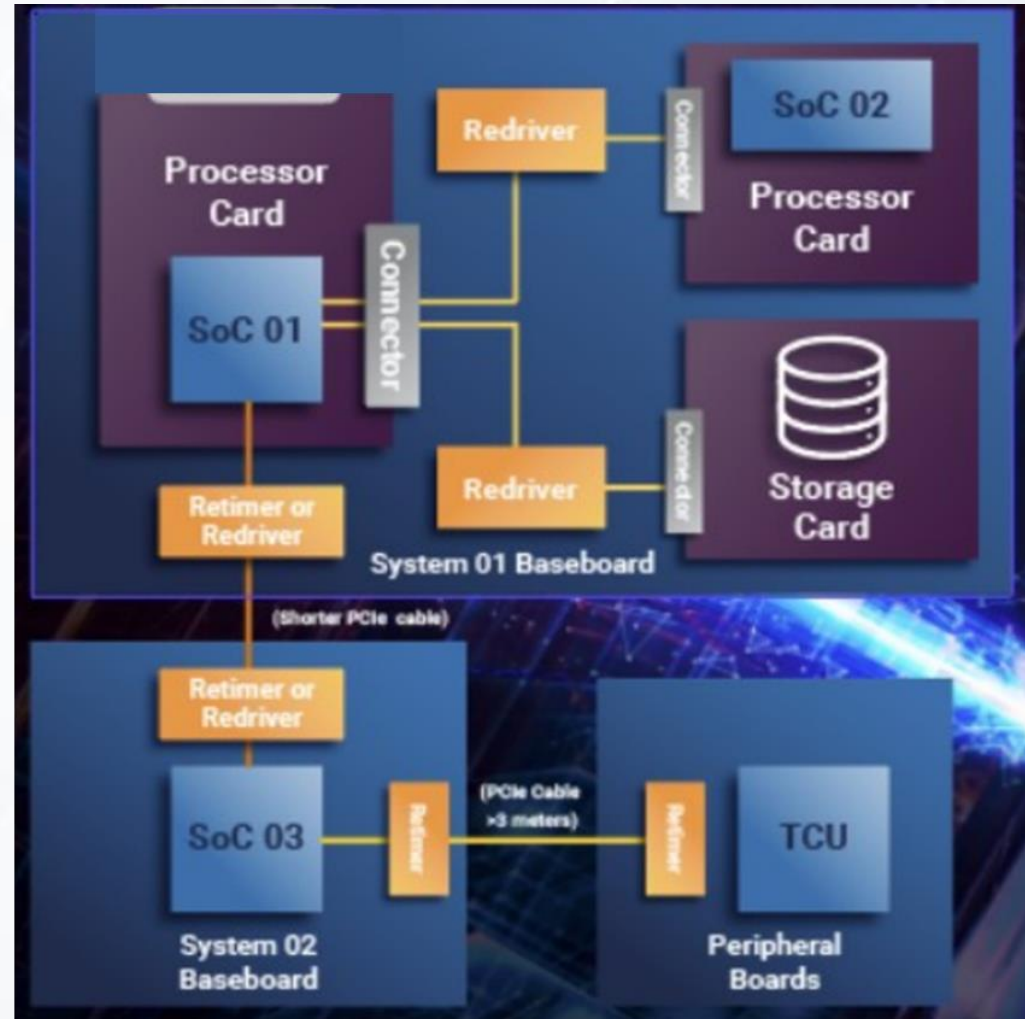
# Redriver and Retimer Examples in Compute Applications

- **Redrivers** boost the signal between CPUs and SSDs to maintain the fastest PCIe Gen5 speeds
- **Retimers** enable high speed connections over long cable lengths between servers and rack storage



# Redriver and Retimer Examples in Automotive Applications

- Cars are becoming rolling data centers with advances in autonomous driving, entertainment systems and telemetry
- **Redrivers** boost the signal between CPUs and peripherals maintaining fast Gen5 speeds
- **Retimers** connect components with high speed located at long cable lengths across the vehicle



***PHISON***

**Thank You!**