PHISON

2022
Solutions Catalogue

About
Phison

Phison Electronics Corp. (TPEX:8299) is a global leader in NAND Flash controller IC and storage solutions.

We provide a variety of services from controller design, system integration, IP licensing to total turnkey solutions, covering applications across SSD (PCIe/SATA/PATA), eMMC, UFS, SD and USB interfaces, reaching out to consumer, industrial and enterprise markets.

As an active member of industry associations, Phison is on the Board of Directors for SDA, ONFI, UFSA and a contributor for JEDEC, PCI-SIG, MIPI, NVMe and IEEE-SA.

Experience
20+ years
of experience with NAND flash storage

3 Priorities
- Consumer
- Embedded
- Enterprise

Employees
3000+
70% R&D

80%+
R&D Exp. / OPEX

Patents
2000+
Worldwide patents

Revenue
$2.23B
2021 Revenue, no debt

First in Class - Best in Performance

PCIe Gen 5 Client Controller, PS5026-E26

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.

- PCIe Gen 5x4
- TSMC 12nm Process
- LPDDR4 / DDR4
- 8CH with 32CEs
- 3D TLC / QLC Supported

- Dual CPU Architecture
- Phison 5th Gen LDPC & RAID ECC
- AES256 / TCG Opal 2.0 / SHA512 / RSA4096
- Form Factor: M.2 2280

Sequential Performance
Read 13,500 MB/s*
Write 12,000 MB/s*

Random Performance
Read 1,500K IOPS*
Write 2,000K IOPS*

*Numbers are subject to change

PHISON
PS5026-E26

PCIe Gen 4 Series

Controller	PS5016-E16	PS5018-E18	PS5025-E25	PS5019-E19T	PS5021-E21T
DRAM	DDR4	DDR4	LPDDR4 / DDR4	DRAM-less	DRAM-less
NAND	3D TLC / QLC	3D TLC / QLC	3D TLC / QLC	3D TLC / QLC	3D TLC / QLC
Capacity (up to)	8TB	8TB	4TB	2TB	4TB
Sequential R/W (up to)	5000/4400 MB/s	7400/7000 MB/s	7200/7000 MB/s	3600/3000 MB/s	4800/4200 MB/s
Random R/W (up to)	720K/750K IOPS	1000K/1000K IOPS	1200K/1200K IOPS	420K/550K IOPS	450K/530K IOPS
ECC	LDPC Gen 4 + RAID	LDPC Gen 4 + RAID	LDPC Gen 6 + RAID	LDPC Gen 4 + RAID	LDPC Gen 4 + RAID

SATA Series

Controller	PS3112-S12	PS3111-S11T	PS3117-S17T
DRAM	DDR4 / DDR3L	DRAM-less	DRAM-less
NAND	3D TLC / QLC	3D TLC / QLC	3D TLC / QLC
Capacity (up to)	16TB	1TB	4TB
Sequential R/W (up to)	550/530 MB/s	550/500 MB/s	550/510 MB/s
Random R/W (up to)	99K/90K IOPS	90K/85K IOPS	97K/86K IOPS
ECC	LDPC Gen 3 + RAID	LDPC Gen 2 + RAID	LDPC Gen 4 + RAID

PCIe Gen 3 Series

Controller	PS5012-E12	PS5013-E13T	PS5015-E15T
DRAM	DDR4 / DDR3L	DRAM-less	DRAM-less
NAND	3D TLC / QLC	3D TLC / QLC	3D TLC / QLC
Capacity (up to)	8TB	2TB	2TB
Sequential R/W (up to)	3400/3100 MB/s	2500/2100 MB/s	3300/3000 MB/s
Random R/W (up to)	680K/670K IOPS	280K/420K IOPS	420K/550K IOPS
ECC	LDPC Gen 3 + RAID	LDPC Gen 4 + RAID	LDPC Gen 4 + RAID

PCIe / SATA Solutions - Form Factor Support List

PCIe	M.2 2280	M.2 2242	M.2 2230	BGA SSD	CF Express
PS5026-E26	V				
PS5016-E16	V				
PS5018-E18	V				
PS5025-E25	V				
PS5019-E19T	V				
PS5021-E21T	V		V		
PS5012-E12	V				
PS5013-E13T	V	V	V	V	V
PS5015-E15T	V				

SATA	2.5"	M.2 Series	mSATA mSATA mini	Half Slim	SVFM	uSSD	CFast
PS3112-S12	V	V					
PS3111-S11T	V	V	V	V	V	V	V
PS3117-S17T	V	V					

EPW Series

EPW5970
12.8 TB
Enterprise PCIe 4.0 SSD

- X1 Controller
- PCIe Gen 4x4
- 16CH, up to 12.8TB
- Seq. R/W up to 7400/6900 MB/s
- Ran. R/W up to 1756K/482K IOPS
- 3 / 1 DWPD
- Power Loss Protection

- Dual Port
- DIF / DIX
- ONFI bus-switch
- 256 Namespaces
- Physical Region Page
- E2EDPP
- SECDED

- Protection Information
- Memory Scrubbing

External SSD Solutions

Embrace your efficient life with Phison external SSD drive

Enterprise SSD Solutions

Phison's Enterprise SSDs performance and low power consumption enable mainstream applications in enterprise storage, compute, and data centers.

EPR Series

- E18DC Controller
- PCIe Gen 4x4
- 8CH, up to 1.92TB
- Seq. R/W up to 7000/1400 MB/s
- Ran. R/W up to 700K/50K IOPS

- 0.6 DWPD
- Multi Namespaces
- Physical Region Page
- E2EDPP
- SECDED

U32C Pro

- PS2251-18 Controller
- USB 3.2 Gen 2x2 + Type C
- Capacity up to 4TB
- Seq. R/W up to 1600/1500 MB/s
- SK hynix 3D TLC

PU31 Pro / PU31

- PS5013-E13T Controller
- USB 3.2 Gen 2x2 / Gen 2 + Type C
- Capacity up to 2TB
- Seq. R/W up to 2000/1900 MB/s
- Kioxia 3D TLC / Micron 3D TLC

U32C

- PS2251-17 Controller
- USB 3.2 Gen 2x2 + Type C
- Capacity up to 2TB
- Seq. R/W up to 1100/1000 MB/s
- Micron 3D QLC / SK hynix 3D TLC

SU30-C

- PS3111-S11T Controller
- USB 3.2 Gen 2 + Type C
- Capacity up to 1TB
- Seq. R/W up to 520/500 MB/s
- Kioxia 15nm TLC & 3D TLC / Micron 3D TLC/MLC / SK hynix 3D TLC

SD / microSD Solutions

VideoMate3
Stable Sustained Performance
· Capacity: 16GB~512GB
· Application: Dash Cam, Surveillance, IP Camera, GoPro
· SDA spec: CL10, U3, V30, A1/A2
· Special Feature: Low WAF, Sustained Write, Health Monitor
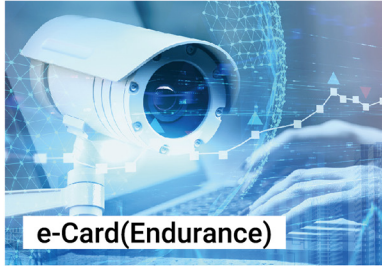
NV Card
Read Intensive Usage
· Capacity: 16GB~512GB
· Application: Navigation, System Boot up Card, Raspberry Pi
· SDA spec: CL10, U3, V30, A1
· Special Feature: Read Disturb Prevention, Data Retention(Auto Scan)

Auto Card
High Reliability & Data Integrity
· Capacity: 16GB~256GB
· Application: Automotive DVR, Police Recorder
· SDA spec: CL10, U1, V10, A1
· Special Feature: Data Integrity (Read verify function)

e-Card(Endurance)
High Life Endurance Time
· Capacity: 32GB~1TB
· Application: Embedded Card Slot
· SDA spec: CL10, U3, V30, A1/A2
· Special Feature: High Endurance, Health Monitor

Speedy Card
High Performance
· Capacity: 32GB~1TB
· Application: High-End DSC, 4K/8K Video Recording
· SDA spec: CL10, U3, V60/V90, UHS-II
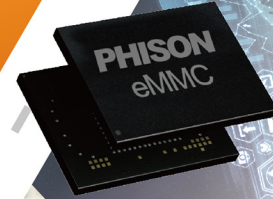· Special Feature: High Sequential Performance

SD Express Card
First PCIe Interface
· Capacity: 256GB~512GB
· Application: Laptop, 10K Video, AR/VR, High-End DSC
· SDA spec: CL10, U3, V30, Gen3 x1
· Special Feature: PCIe Level Performance

eMMC Solutions

PS8226
· eMMC 5.1 , 1 CH, HS-400
· 8GB~128GB
· Support 3D MLC / TLC
· SECC

PS8228
· eMMC 5.1 , 1 CH, HS-400
· 8GB~16GB
· Support 2D MLC / 3D TLC
· SECC

PS8229
· eMMC 5.1 , 1 CH, HS-400
· 32GB~128GB
· Support 3D TLC
· LDPC

PS8232
· eMMC 5.1 , 1 CH, HS-400
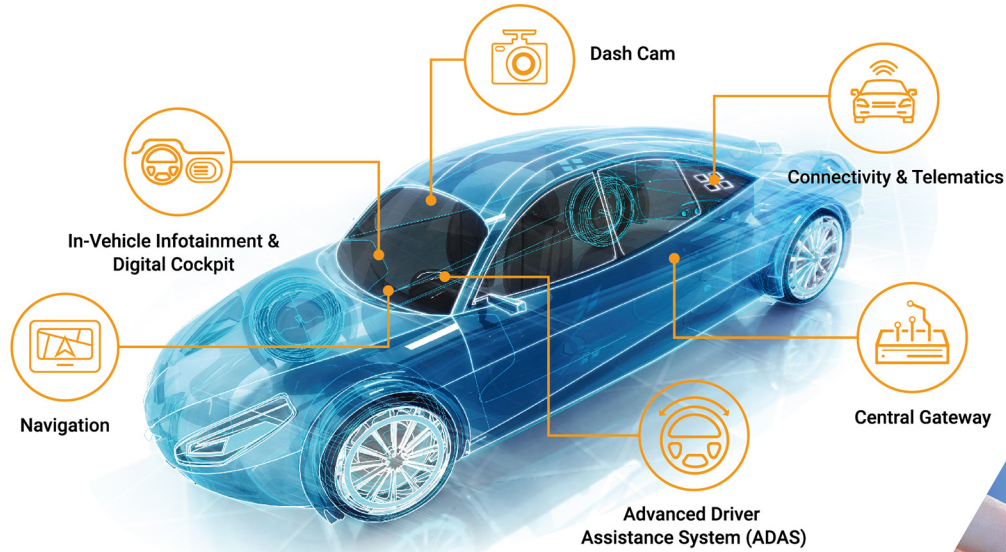· 32GB~64GB
· Low Power
· Support 3D TLC
· SECC

UFS Solutions

	PS8317	PS8318
Interface	HS-G3x2 UFS 2.2	HS-G3x2 UFS 3.1
NAND Flash	Micron 176L, 3D TLC, 512Gbit	Micron 176L, 3D TLC, 512Gbit
Capacity	64/128/256GB	128/256/512GB
NAND Channel, Max Speed	2ch, 800MT/s	2ch, 1600MT/s
Seq. R/W (up to)	1040/910 MB/s	2000/1500 MB/s
4KB Ran. R/W (up to)	120K/175K IOPS	210K/250K IOPS
Writebooster	Supported	Supported
HPB 2.0	Supported	Supported
Package Type	BGA-153	BGA-153
Dimensions (mm)	11.5 x 13.0	11.5 x 13.0
Operational Temperature	-25°C to 85°C	-25°C to 85°C

Automotive Solutions

Phison offers storage solutions for every automotive applications

- Dash Cam
- Connectivity & Telematics
- In-Vehicle Infotainment & Digital Cockpit
- Navigation
- Central Gateway
- Advanced Driver Assistance System (ADAS)

	Interface	Product Series	Controller	Grade	Capacity
eMMC	eMMC 5.1	MEM5 MEMA	PS8225 PS8231	Grade2 / Grade3	4GB~128GB
UFS	UFS 2.2 / UFS 3.1	MUM76	PS8317	Grade2 / Grade3	64GB~256GB
NVMe BGA SSD	NVMe 1.4	MPT167A MPT567A	PS5013 PS5021	Grade3	128GB~1TB
SD / microSD	SD 6.0	MiM	PS8210 PS8131 PS8132	Grade3	128MB~512GB

The Perfect Automotive Storage Solutions Partner

Phison brings over twenty years of flash storage experience to the automotive industry and is a world-leading, trusted OEM business partner.

Strong Supply Chain
- ★ Capable of supporting long development cycle
- ★ Reliable relationship with NAND makers
- ★ Long-term partnership with IC manufacturers
- ★ Dedicated "Longevity Program"
- ★ Fix BOM

Customer Service
- ★ Customized design service
- ★ Failure analysis service in wafer / device level
- ★ On-site technical support
- ★ TAT control

Experience & Solutions
- ★ Successful experience with Tier1 OEM
- ★ Strong in-house technology
- ★ Wide-range solutions portfolio

Phison's Contributions to the Automotive Industry

AECC AUTOMOTIVE EDGE COMPUTING CONSORTIUM   RENESAS R-Car Consortium   MIH

Industry Certifications

Market longevity and leadership, Combined with the timely support and highly customized service, makes Phison the perfect flash memory solution partner for the automotive industry

AEC-Q100 Grade2 / Grade3	Functional Safety with ISO26262
Supplier Chain Certification by IATF16949	Automotive SPICE® Certification

* The coverage of certification will be adjusted according to customer requirements and different projects.

Embedded and Industrial NAND Solutions

Highly **Application-aware** and optimized for **Mission Critical System**

▎ What are Significant Features in Embedded Storage?

- **Extended and Optimized Integration for Industrial Domain**
  - Optimization of NAND flash endurance and firmware performance
  - Manufacturing specialty for industrial domain
- **Data Integrity and Board Compatibility**
  - Consistent Performance by significant workload
  - Expertise qualification in system-level architecture
- **Featured Robust Security**
  - On-the-fly hardware-based encryption. (OPAL2.0/ FIPS140-2)
  - Write Protect/ Cryptographic Erase
- **Rigorous Manufacturing and Testing for Product Survivability**
  - High/Low temp. ELF screening from IC to system-level
  - Enhancement of Underfill and Sidefill for Vibration / shock resistance
- **Durability and Longevity Committed**
  - Long-life cycles support with management of BOM and DCN / EOL notice
  - Health monitoring/ Firmware upgrade/ FA diagnosis for before and after-service

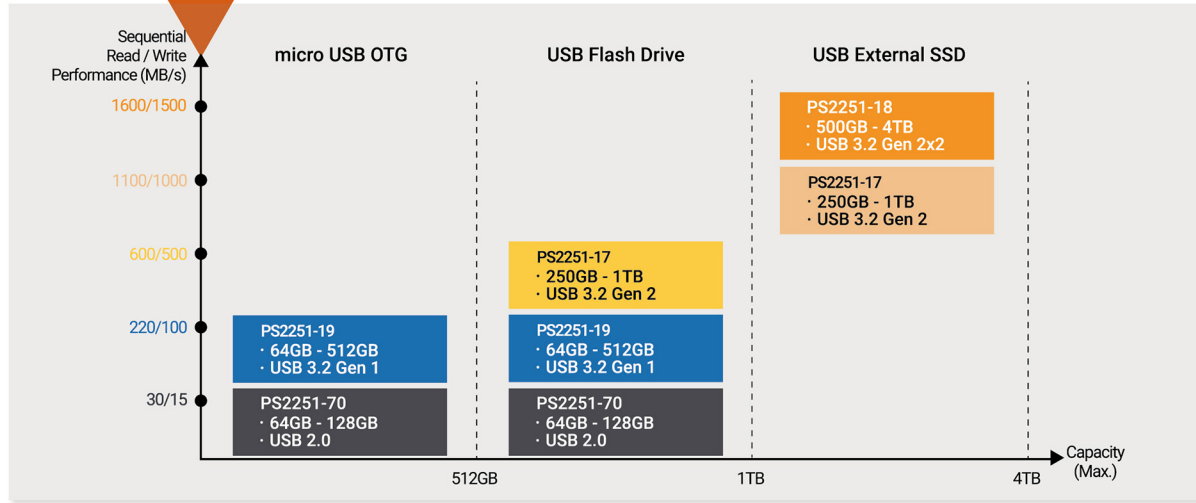## High-end Performance and True Industrial PCIe SSD

	MPT1 Series	MPD2 Series	MPT5 Series	MPD6 Series
Interface	PCIe Gen 3x4	PCIe Gen 3x4	PCIe Gen 4x4	PCIe Gen 4x4
Controller	PS5013-E13TI	PS5012-E12DI	PS5021-E21TI	PS5018-E18DI
Capacity	128GB – 2048GB	240GB – 7680GB	256GB – 2048GB	480GB – 3840GB
Form Factor	M.2 2242 / M.2 2280 /CFX™ / BGA SSD	M.2 2280 / M.2 22110 / U.2	M.2 2280 / M.2 2230 / BGA SSD	M.2 2280 / M.2 22110
Cache Memory	DRAM-less	DDR4	DRAM-less	DDR4
Seq. R/W	2500/2100MB/s	3200/3000 MB/s	3600/3000 MB/s	7400/7000 MB/s
Reliability (TBW)	> 2,400 (Base on 2048GB)	> 12,000 (Base on 7680GB)	> 1,600 (Base on 2048GB)	> 5,000 (Base on 3840GB)
HW PLP Circuit	NA	Support	NA	Support
Temperature	0~70°C to - 40~85°C			

Intelligent and Comprehensive SATA SSD

	MST1 Series	MST3 Series	MSD2 Series
Interface	SATA III	SATA III	SATA III
Controller	PS3111-S11T	PS3117-S17TI	PS3112-S12DI
Capacity	4GB – 1024GB	64GB – 2048GB	120GB – 7680GB
Form Factor	BGA SSD	2.5" / M.2 2280 / M.2 2242 / mSATA / CFast	M.2 2280 / M.2 2242 / 2.5"
Cache Memory	DRAM-less	DRAM-less	DDR3L/DDR4
Seq. R/W	550/500 MB/s	550/510 MB/s	550/530 MB/s
Reliability (TBW)	> 800 (Base on 1024GB)	> 2,900 (Based on 1024GB)	> 12,000 (Base on 7680GB)
HW PLP Circuit	NA	NA	Support
Temperature	0~70°C to - 40~85°C		

USB Solutions

Sequential Read / Write Performance (MB/s)

| | micro USB OTG | USB Flash Drive | USB External SSD |

1600/1500 — PS2251-18 · 500GB - 4TB · USB 3.2 Gen 2x2

1100/1000 — PS2251-17 · 250GB - 1TB · USB 3.2 Gen 2

600/500 — PS2251-17 · 250GB - 1TB · USB 3.2 Gen 2

220/100 — PS2251-19 · 64GB - 512GB · USB 3.2 Gen 1 | PS2251-19 · 64GB - 512GB · USB 3.2 Gen 1

30/15 — PS2251-70 · 64GB - 128GB · USB 2.0 | PS2251-70 · 64GB - 128GB · USB 2.0

Capacity (Max.) — 512GB — 1TB — 4TB

AAY 01 | Glory | Jorry | Sevin | Ares
Shield-P | | USB Flash Drive | OTG | SIP
Robust | Gain | Hoop | Lara | Rubber Series

Application Guide

PHISON