

# Phison’s Resilient Business Model Generates Results through Challenging World Events

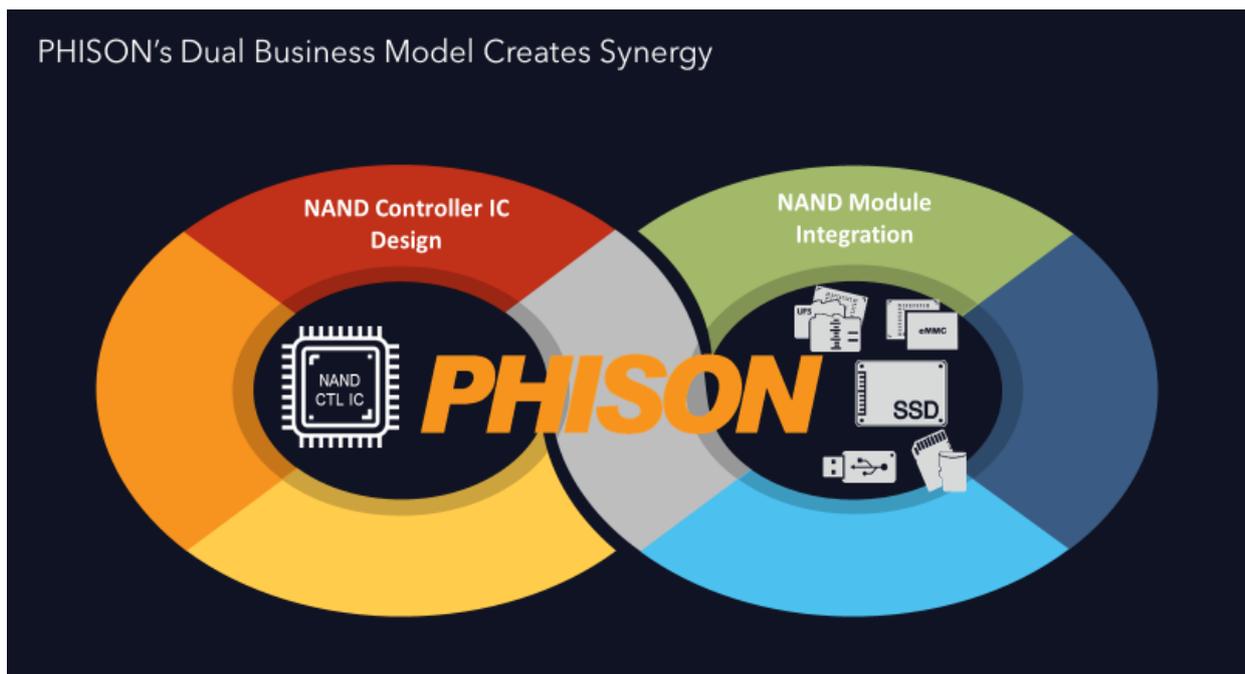
## EXECUTIVE SUMMARY

- Phison’s diversified revenue contribution flows from a range of NAND applications including consumer, embedded, and enterprise markets, making Phison less susceptible to global crisis incidents.
- During cyclical NAND price declines, Phison has demonstrated it can increase market share and unit shipments.
- During cyclical NAND price increases, Phison has demonstrated it can increase margin and revenue.

Over the past 20 years, Phison (TPEX: 8299) has endured the financial crisis of 2008, the cyclical nature of NAND industry pricing related to supply and demand, and the introduction of new NAND technologies and emerging applications. Throughout these events, Phison maintained profitability while overcoming the challenges and generating business growth. Though the COVID-19 virus is currently impacting businesses worldwide, Phison continues to leverage its unique and resilient business model to generate results as it has successfully done in the past.

## PHISON’S BUSINESS MODEL

Phison’s business model in Exhibit 1 is straightforward in simplicity but is underlined by massive engineering capability and flexible execution. Peer companies have attempted to study and replicate Phison’s model, but none have been successful to date.

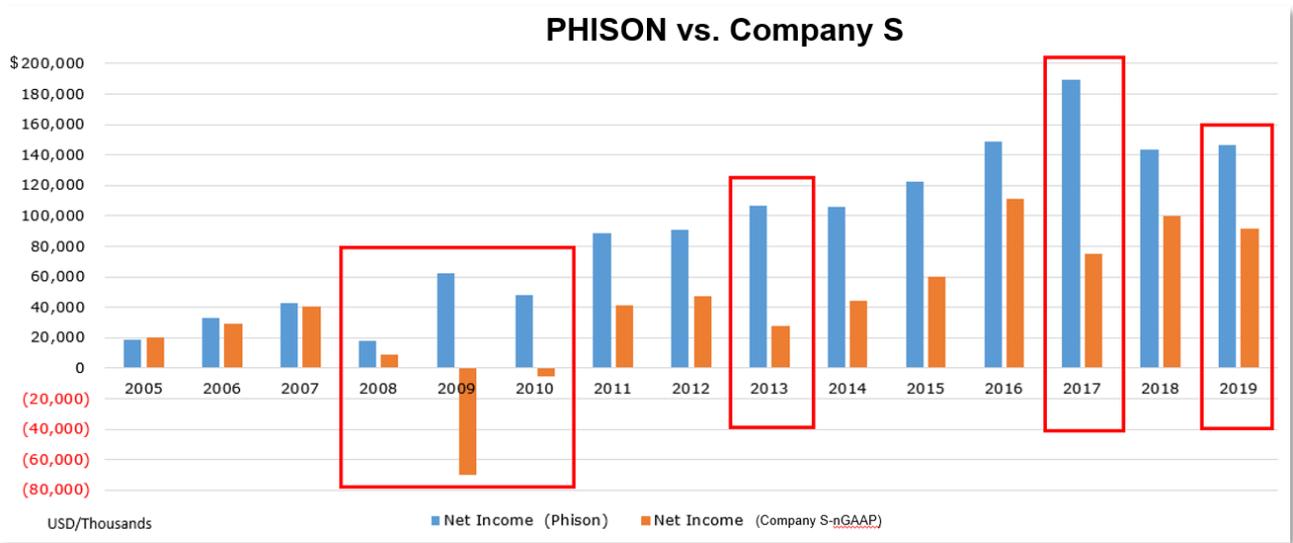


**Exhibit 1:** Phison’s unique business model of differentiated revenue and flexible execution.

This model consists of 2 key elements: 1) NAND controller IC design, and 2) NAND storage module integration. Storage module integration is defined as manufacturing an entire functioning storage device including the controller, NAND and firmware under private labels for our valued customers. There are competing companies that have some level of NAND controller IC design capability, but these companies do not have a NAND storage module integration business. There are also storage module integrator competitors, but these companies do not have NAND controller IC design capabilities. When analyzing each company’s complete model, Phison is the only fabless company that integrates NAND controller IC design to NAND storage module integration. This enables Phison to deliver greater flexibility and value to Phison’s global partners and customers and minimizes the impact from global crisis such as the COVID-19 of 2020 or the financial crisis of 2008.

**PHISON OUTPERFORMS PEERS**

An analysis of the 2008 financial crisis demonstrates that many companies were suffering from the economic downturn until 2010. Exhibit 2 below shows a comparison in net income between a competing NAND controller IC manufacturer “Company S” financial performance vs. Phison from 2005 – 2019, containing that time period. (Note: “Company S” is a publicly traded company under another name that is given the alias “Company S” for this analysis). Company S was not able to adapt its business model and required 2 years to recover from the crisis in 2008. Phison demonstrated superiority in its business model by maintaining positive net income throughout the crisis and even returning to growth in less than 1 year.

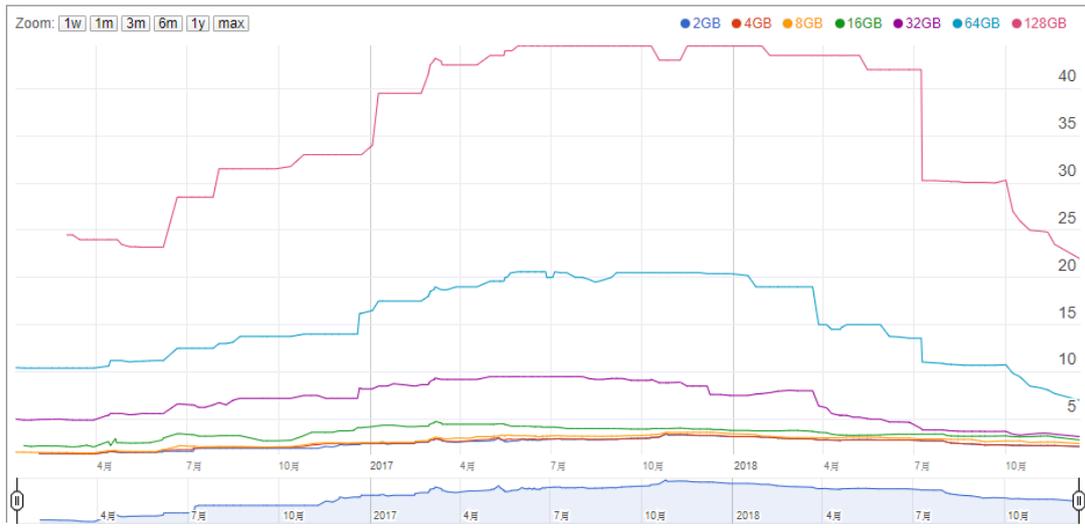


**Exhibit 2: Phison Outperforms (Net Income) Through Challenging World Events**

In 2013, the industry market pricing of SSDs was rapidly declining making replacement considerations of HDDs in consumer markets increasingly attractive. However, the price decline of SSDs put financial pressure on all companies throughout the SSD industry supply chain. Phison’s answer was to develop new SSD controller ICs and SSD solutions to meet the growing SSD demand while maintaining company’s revenue and growth within its extensive NAND storage solution portfolio which included USB flash drives, SD memory cards, and eMMC storage drives. Meanwhile, Company S posted net income losses due to their R&D expenditures on new SSD controllers, and their remaining product portfolio was not able to fund their operating expenses, proving the weakness of a pure NAND controller IC business model (Exhibit

2).

In 2017, the industry transition of 2D NAND to 3D NAND caused a serious shortage of NAND supply, and the price of NAND flash increased dramatically as shown in Exhibit 3. The increased NAND flash pricing directly impacted and increased the cost basis of SSDs. This slowed the adoption rate of SSDs over HDDs and limited the NAND storage adoption for other NAND applications such as embedded markets for automotive, Internet-of-Things, wireless, and more. Company S suffered financially from the industry NAND price increases, which resulted in big drop in net income shown in Exhibit 2. Over this same time period, Phison increased its margin and net income, once again proving the strength of having both NAND controller IC design and NAND storage integration business model.

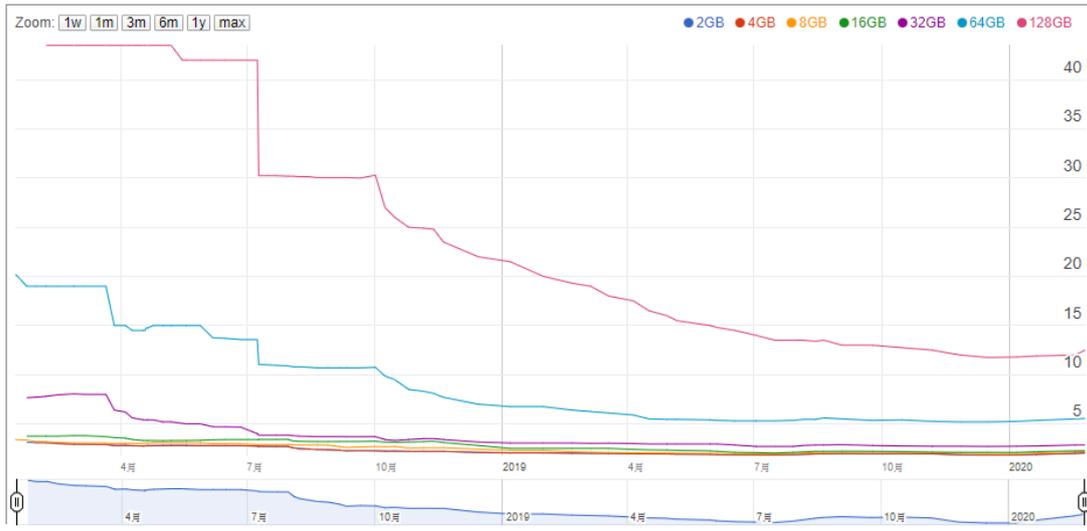


**Exhibit 3: NAND price trend from calendar 2016 to 2018**

\*The graph is compiled using Multi Level Cell (MLC) Grade A NAND flash prices from the global spot market, taking the daily low from the trading session.

\*Source: <https://www.flashbay.com/support/faq/NAND-flash>

In 1H 2019, industry NAND pricing once again began to decline as shown in Exhibit 4, and had a significant impact on sales revenue for all NAND manufacturers as shown in Exhibits 5 and 6. Phison, which buys NAND wafers from many of these same NAND manufacturers, not only had minimal impact on its sales revenue from the NAND price drop incident, but also posted a growth of 0.5% (YoY of Q1 2019) and 5% (Q/Q of Q2 2019) during 1H 2019 (shown as Exhibit 7), demonstrating that Phison’s business model is able to minimize the impact from industry NAND price declines.



**Exhibit 4: NAND Price Trend from January 2018 to February 2020**

\*The graph is compiled using Multi Level Cell (MLC) Grade A NAND flash prices from the global spot market, taking the daily low from the trading session.

\*Source: <https://www.flashbay.com/support/faq/NAND-flash>

Company	Revenue (US\$M)		Market Share (%)	
	1Q19	QoQ (%)	1Q19	4Q18
<b>Samsung</b>	3,229.2	-25.0%	29.9%	30.4%
<b>Toshiba</b>	2,180.0	-20.2%	20.2%	19.3%
<b>Micron</b>	1,776.0	-18.5%	16.5%	15.4%
<b>WDC</b>	1,610.0	-25.9%	14.9%	15.3%
<b>SK Hynix</b>	1,023.7	-35.5%	9.5%	11.2%
<b>Intel</b>	915.0	-17.3%	8.5%	7.8%
<b>Others</b>	58.0	-25.0%	0.5%	0.5%
<b>Total</b>	10,791.9	-23.8%	100.0%	100.0%

Note 1. 4Q18 USD/JPY=1:112.8; USD/KRW=1:1,126.8

Note 2. 1Q19 USD/JPY=1:110.2; USD/KRW=1:1,124.8

**Exhibit 5: 1Q19 Sales Revenue (US\$M) of NAND Wafer Manufacturers**

Source: TrendForce <https://press.trendforce.com/press/20190530-3251.html>

Company	Revenue		Market Share	
	2Q19	QoQ (%)	2Q19	1Q19
<b>Samsung</b>	3,765.7	16.6%	34.9%	29.9%
<b>Toshiba</b>	1,948.1	-10.6%	18.1%	20.2%
<b>WDC</b>	1,506.0	-6.5%	14.0%	14.9%
<b>Micron</b>	1,461.0	-17.7%	13.5%	16.5%
<b>SK Hynix</b>	1,106.6	8.1%	10.3%	9.5%
<b>Intel</b>	940.0	2.7%	8.7%	8.5%
<b>Others</b>	59.4	2.3%	0.6%	0.5%
<b>Total</b>	10,786.9	0.0%	100.0%	100.0%

Note 1. 1Q19 USD/JPY= 1:110.2; USD/KRW=1:1,124.8

Note 2. 2Q19 USD/JPY= 1:110.0; USD/KRW=1:1,166.1

**Exhibit 6: 2Q19 Sales Revenue (US\$M) of NAND Wafer Manufacturers Makers**

Source: TrendForce <https://press.trendforce.com/press/20190815-3285.html>

2019	Revenue (\$B NTD)	Q/Q	Y/Y
1Q	9.343	-7.7%	0.5%
2Q	9.783	5%	-5.3%
3Q	12.39	27%	12.3%
4Q	13.173	6.3%	30.13%

**Exhibit 7: 2019 Phison Sales Revenue**

In 2H 2019, industry NAND pricing became more stable as shown in Exhibit 4. NAND wafer manufacturers also started to recover from the NAND price decline cycle as shown in Exhibits 8 and 9. Phison not only recovered from the industry downturn quickly, but also set record highs for calendar Q3, Q4, and the whole year of 2019 in sales revenue. Company S's financials suffered from the industry NAND price declines where their net income (Non-GAAP) decreased by 8.4% as compared to 2018 (Exhibit 2). This illustrates company S's limitation in flexibility to adopt to changes in the NAND industry.

Company	Revenue		Market Share	
	3Q19	QoQ (%)	3Q19	2Q19
Samsung	3,987.2	5.9%	33.5%	34.9%
KIOXIA	2,226.7	14.3%	18.7%	18.1%
WDC	1,632.0	8.4%	13.7%	14.0%
Micron	1,530.0	4.7%	12.9%	13.5%
Intel	1,290.0	37.2%	10.9%	8.7%
SK Hynix	1,145.7	3.5%	9.6%	10.3%
Others	77.5	30.4%	0.7%	0.6%
<b>Total</b>	<b>11,889.1</b>	<b>10.2%</b>	<b>100.0%</b>	<b>100.0%</b>

Note 1. 2Q19 USD/JPY= 1:110.0; USD/KRW=1:1,166.1

Note 2. 3Q19 USD/JPY= 1:107.3; USD/KRW=1:1,193.9

**Exhibit 8: 3Q19 Sales Revenue (US\$M) of NAND Wafer Manufacturers**

Source: TrendForce <https://press.trendforce.com/press/20191125-3311.html>

Company	Revenue		Market Share	
	4Q19	QoQ (%)	4Q19	3Q19
Samsung	4,451.1	11.6%	35.5%	34.5%
KIOXIA	2,340.7	5.1%	18.7%	19.3%
WDC	1,838.0	12.6%	14.7%	14.1%
Micron	1,422.0	18.1%	11.3%	10.4%
Intel	1,217.0	-5.7%	9.7%	11.2%
SK Hynix	1,207.4	5.4%	9.6%	9.9%
Others	69.8	-9.9%	0.6%	0.7%
<b>Total</b>	<b>12,546.0</b>	<b>8.5%</b>	<b>100.0%</b>	<b>100.0%</b>

Note 1. 3Q19 USD/JPY= 1:107.3; USD/KRW=1:1,193.9

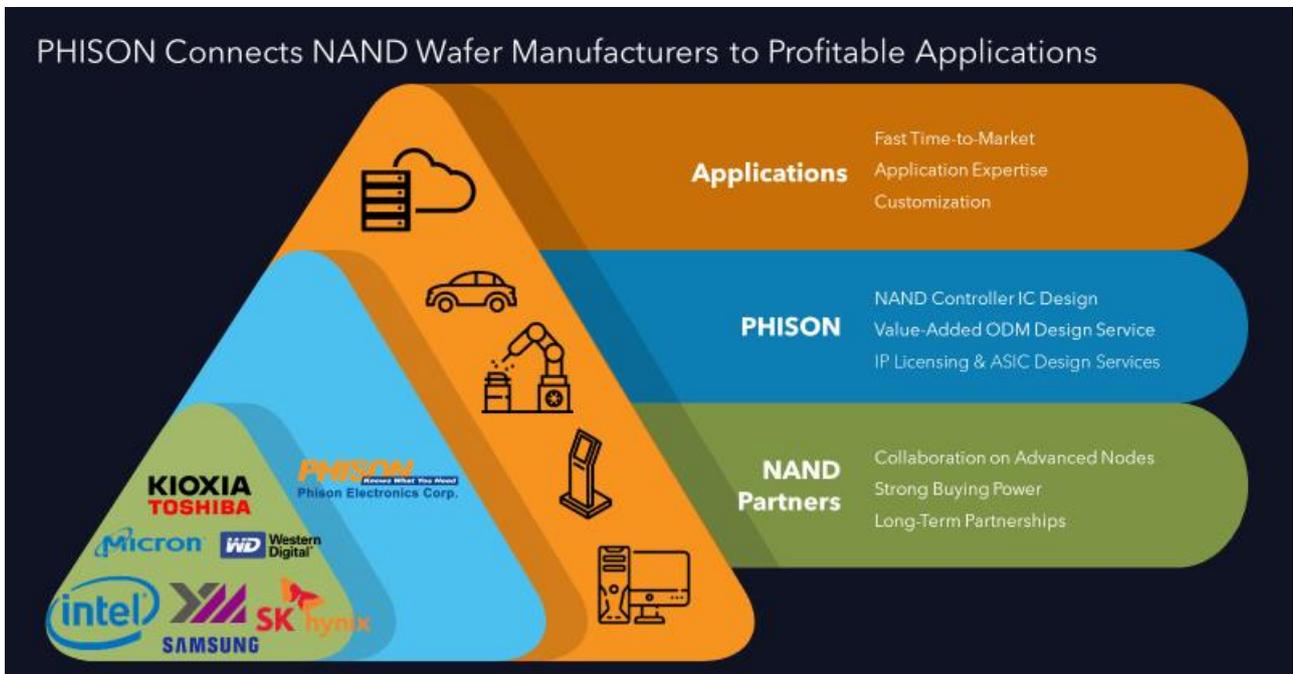
Note 2. 4Q19 USD/JPY= 1:108.7; USD/KRW=1:1,175.5

**Exhibit 9: 4Q19 Sales Revenue (US\$M) of NAND Wafer Manufacturers**

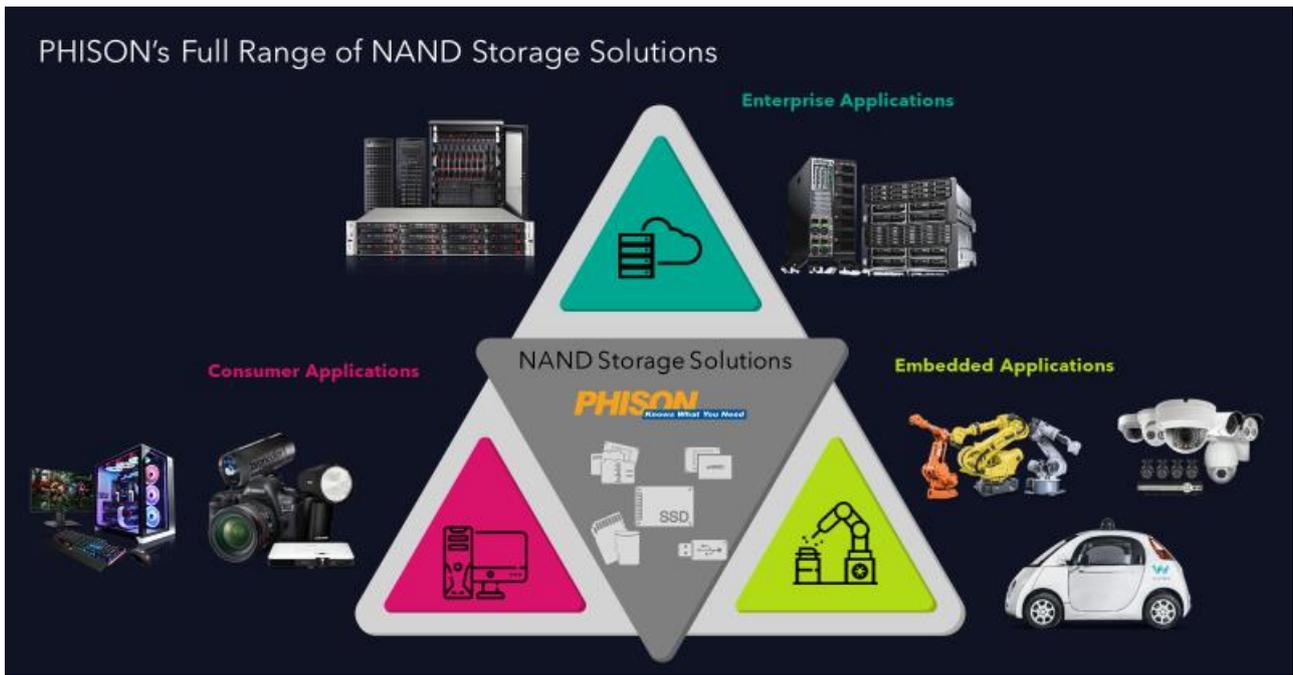
Source: TrendForce <https://press.trendforce.com/press/20191125-3311.html>

**PHISON DELIVERS MORE VALUE TO GLOBAL PARTNERS AND CUSTOMERS**

From inception, Phison is proud to have maintained a successful partnership with its biggest shareholder, KIOXIA (originally from Toshiba Memory Corporation; TMC). KIOXIA has not only been a shareholder but also a leading supplier of NAND for Phison’s highly competitive products. While Phison continues to source NAND from KIOXIA, Phison also sources several other NAND wafer manufacturers to its supply. Phison’s relationship with NAND wafer manufacturers extends beyond a simple supplier-customer relationship; Phison serves as a commercial bridge between NAND wafer manufacturers and end-market applications (Exhibit 10). Phison plays an important role providing NAND wafer manufacturers the ability to integrate their NAND Flash with Phison controllers, creating diverse solution portfolios (PCIe/SATA SSD, UFS, eMMC, SD, USB) that address a wider range of applications (Exhibit 11) that they could not otherwise accomplish with their own fixed resources and operational expense budgets.



**Exhibit 10:** Phison not only designs controllers but also bridges NAND wafer manufacturers to applications



**Exhibit 11:** Phison not only designs controllers but bridges NAND to applications.

Global partners and customers choose to work with Phison not only for the products provided, but for the value that Phison delivers (Exhibit 12). This list of values that Phison delivers are integral in ensuring both Phison and its customers' success. Phison maintains in-house design technologies for both NAND controller IC and NAND storage module integration, offering customization services for limitless possibilities. With a full range of NAND storage solutions developed by experienced engineers, a flexible business model, and a one-stop-shopping experience, services maintain cohesiveness and synergy throughout development. These are all very important value considerations to Phison's global ODM/OEM customers.

Another key factor in Phison's attractive business model is Phison's policy to not compete with customers by offering branded products. Global branded partners and OEM customers are able to develop their own personal label and brand with Phison as a turnkey solution provider, removing the extra complication of competition with their direct customers.

The infographic is titled "PHISON Delivers More Value To Global Partners and Customers" and is set against a dark blue background. It features eight light blue rounded rectangular boxes arranged in a 4x2 grid. Each box contains a specific value proposition. The PHISON logo and tagline "Knows What You Need" are located in the bottom right corner of the infographic.

Value Proposition 1	Value Proposition 2
Private Label Model Enables OEM Brand Name Customers	Strong NAND Vendor Relationships Support Customers with NAND Price and Supply
Full NAND Storage Solutions Enable Customers' Time to Market	Engineering Staff with avg. of 10+ Years Experience Creates Best-in-Class Solutions
In-House Development of Critical IP with Patent Protection for Customers	Engineering Customization Creates Optimal Products for Customer Applications
Flexible Business Model Serves Customer Requirements	One-Stop-Shopping for OEM Customer Roadmap Requirements

**Exhibit 12:** Phison delivers exceptional value to its OEM customers

**CONCLUSION**

Phison is proud to have grown from a startup company over 20 years ago to achieve \$1.45B USD sales revenue in 2019 (a record high while even enduring the NAND industry price declines in 1H 2019). This result is a combination of over 2000 employees' expertise, dedication, and a flexible business model that recognizes revenue from various NAND applications and markets.

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## PHISON FACTS

- Over 20 years of experience in NAND controller IC design and module integration
  - Over 2,000 employees globally, with more than 75% in engineering
  - Over 1900 memory-related patents globally
  - 3 major priorities: enterprise, embedded, and consumer markets
  - 600M average annual controller shipments
  - \$1.45B USD sales revenue in 2019 (no debt)
  - Confidence that our unique business model can produce consistently strong cashflows and profits over the long-term amidst NAND memory market cycles
  - Maintain long-term partnerships with our global NAND flash suppliers and with our valued module customers
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## 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.

Our Website: <https://www.phison.com/en/company/about-us>

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## FORWARD-LOOKING STATEMENTS

Information included in this document that are not historical in nature are "forward-looking statements". Phison cautions readers that forward-looking statements are based on Phison's reasonable knowledge and current expectations, and are subject to various risks and uncertainties. Actual results may differ materially from those contained in such forward-looking statements for a variety of reasons including without limitation, risks associated with demand and supply change, manufacturing and supply capacity, design-win, time to market, market competition, industrial cyclicality, customer's financial condition, exchange rate fluctuation, legal actions, amendments of the laws and regulations, global economy change, natural disasters, and other unexpected events which may disrupt Phison's business and operations. Accordingly, readers should not place reliance on any forward-looking statements. Except as required by law, Phison undertakes no obligation to update any forward-looking statement, whether as a result of new information, future events, or otherwise.