

## About Phison

**Business Model**

**Global Operations**

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**Cooperation Based on Mutual Trust**

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## About Phison



**Company Name:** Phison Electronics Corp. (Stock code : TW8299)

**Head Office Address:** No.1, 1-1 and 1-2, Qun Yi Rd., Jhunan, Miaoli, Taiwan 350, R.O.C.

**Date Established:** November 8, 2000

**Industry Category:** Electronics parts manufacturing industry

**Core Technologies:** NAND Flash Controller IC Design & NAND Storage Solution Integration

**Key Products:** NAND Controller IC & NAND Storage Solutions including SSD, UFS, eMMC, SD, and USB

**Operating Revenue:** NT\$ 40,788,105,000

**Number of Employees:** 1,531 (As of December 31, 2018)

Founded in 2000, Phison has specialized in the development and design of NAND Flash Memory controller ICs ever since. Starting from the world's first Single-of-Chip (SoC) USB flash drive controller and world's first USB PenDrive, Phison has continued to develop its core technologies and expand NAND storage solutions, becoming the most complete and advanced NAND storage solution provider globally. Additionally, growing from consumer market, Phison's business has covered AIoT, Automotive, Edge Computing, Servers, and all high-end NAND application markets, delivering full range of NAND storage solutions with high flexible and customized services to global partners and customers.

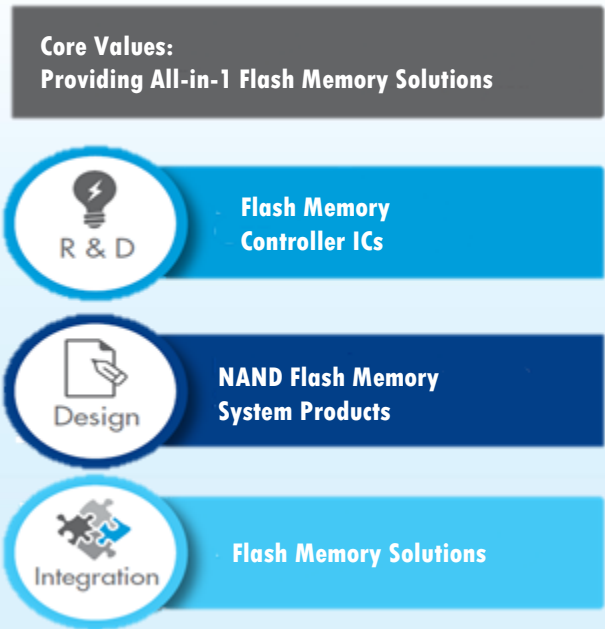
In comparing with 2017, Phison has grown in annual controller shipment by 20% in 2018, and SSD controller shipment has grown more than 50%. Moreover, the SSD, Embedded, and all niche solutions continue growing by 25% in 2018, stably keeping the overall margin of more than 20%, which proves to the public investors that Phison is strong and healthy financially. Furthermore, Phison's long-term and reliable relationship with global partners and customers have been the strongest foundation of Phison growth.

Phison is now the leader in controller ICs for USB flash drives, SD (Secure Digital) memory cards, eMMC (Embedded MultiMedia Card), PATA (Parallel Advanced Technology Attachment) / SATA (Serial Advanced Technology Attachment) / PCIe (Peripheral Component Interconnect Express) SSD (Solid State Disk), and UFS (Universal Flash Storage).



At the same time, Phison is willing to share with all stakeholders the value created in accordance with its business philosophy of "Sharing, Integrity, Efficiency, Innovation". The building of a partnership based on mutual trust enables both parties to collaborate in the most efficient manner and to deliver the most innovative total solution. Through professional and innovative R&D team which based on Phison's core values, we can provide total solutions that support all capacities and specifications while also exceeding the requirements and expectations of all business partners.

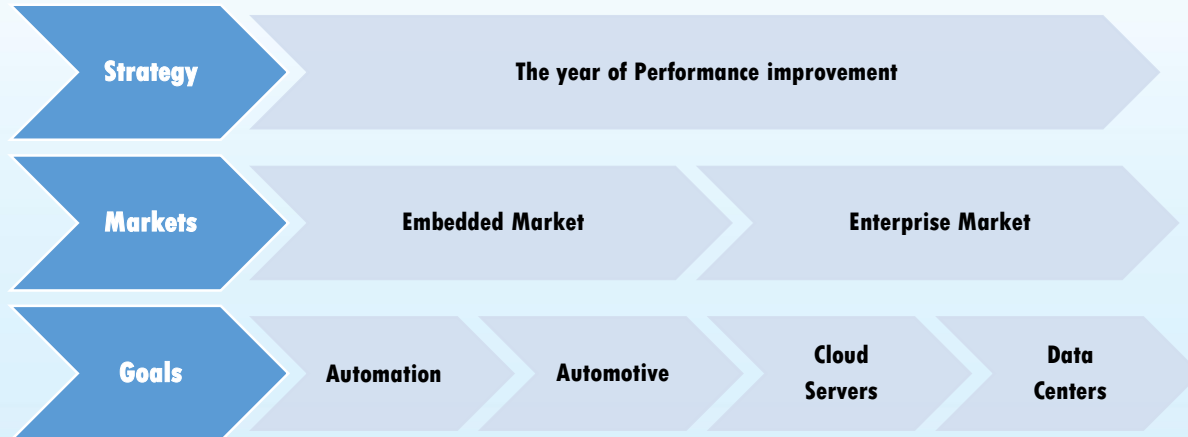
### Phison Core Value



### Phison Milestones

- A Solid Foundation**
  - 2000: Phison was founded at ITRI Incubator
  - 2002: Toshiba acquired a stake in Phison
  - 2004: Phison became OTC listed in Taiwan
- Enhanced Core Competencies**
  - 2006: Launched SD2.0 Card controller IC
  - 2007: Launched controller IC for 50-nm USB flash drives
  - 2007: Launched controller IC for 50-nm SD/MMC flash memories
- Strategic Alliances**
  - 2008: Started a strategic partnership with Kingston and SK Hynix for further stabilized supply of flash-memory materials
  - 2010: Entered the eMMC market in partnership with Kingston
- Expanded Markets**
  - 2012: Phison eMMC IC reached 1 million units cumulative
  - 2014: microSSD design-win in servers
  - 2015: PCIe PS5007: Best of Client SSD Award
  - 2017: Announces world's fastest UFS 2.1 Dual Lane Controller
  - 2017: Launched World First 512GB microSD Card
  - 2018: Announced Flagship PCIe Gen3x4 NVMe SSD Controller PS5012- E12, Targeting High-End NAND Storage Applications Such as Servers, Gaming, and Edge Computing
  - 2018: Introduced UFS 3.0 Controller PS8317, Focusing on 5G Mobile Devices
  - 2018: Released Latest 3D QLC NAND Storage Solutions, Announcing The TB Era is Coming
  - 2019: World First PCIe Gen4x4 NVMe SSD Controller PS5106-E16 Revealed, Keeping Leading the Industry
  - 2019: Successfully Upgrading Company Targets, Massively Focusing on AIoT, Automotive, Servers, and High-End NAND Storage Application Markets

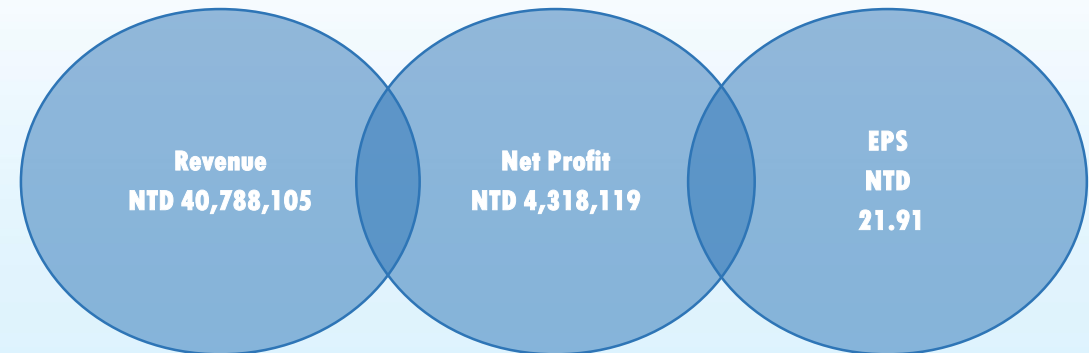
### 2019 Strategic Objective – The Year of Performance Improvement



K.S. Pua, the CEO and chairman of PHISON, said: PS5016-E16 is Phison's newest flagship SSD controller and the only PCIe Gen4x4 NVMe SSD controller on the market. Equipped the 4th generation of LDPC ECC engine and the latest 3D NAND Flash technology, PS5016-E16 could deliver more than 4000 MB/s in sequential read/write. Moreover, all the new NAND applications, including cloud computing, autonomous cars, smart medical, smart home, AIoT, etc., require NAND storage as one of the key components for computing processes. Phison, as the leading company in NAND controller IC design and storage solution provider, will continuously invest and expand to support global partners and customers by Phison's unique one-stop-shopping services.

—Chairman Pua Khein Seng

### Business Model



Item / Year	2014	2015	2016	2017	2018
Revenue	32,819,532	37,409,177	43,782,512	41,864,759	40,788,105
Operating costs	27,450,298	29,781,713	34,518,774	30,365,137	31,656,151
Gross profit	5,369,234	7,627,464	9,263,738	11,499,622	9,131,954
Income tax expense	541,355	576,571	675,083	956,580	687,062
Employee compensation and welfare	1,897,591	2,501,858	3,231,849	3,706,683	3,125,190
Total Assets	23,697,791	28,418,787	31,975,639	35,126,604	36,438,540

Unit: Thousands of NTD, Except Earnings Per Share(EPS).

Note 1. Consolidated financial performance for the table

Note 2. Please refer to Phison corporate website or consolidated financial performance on MOPS.

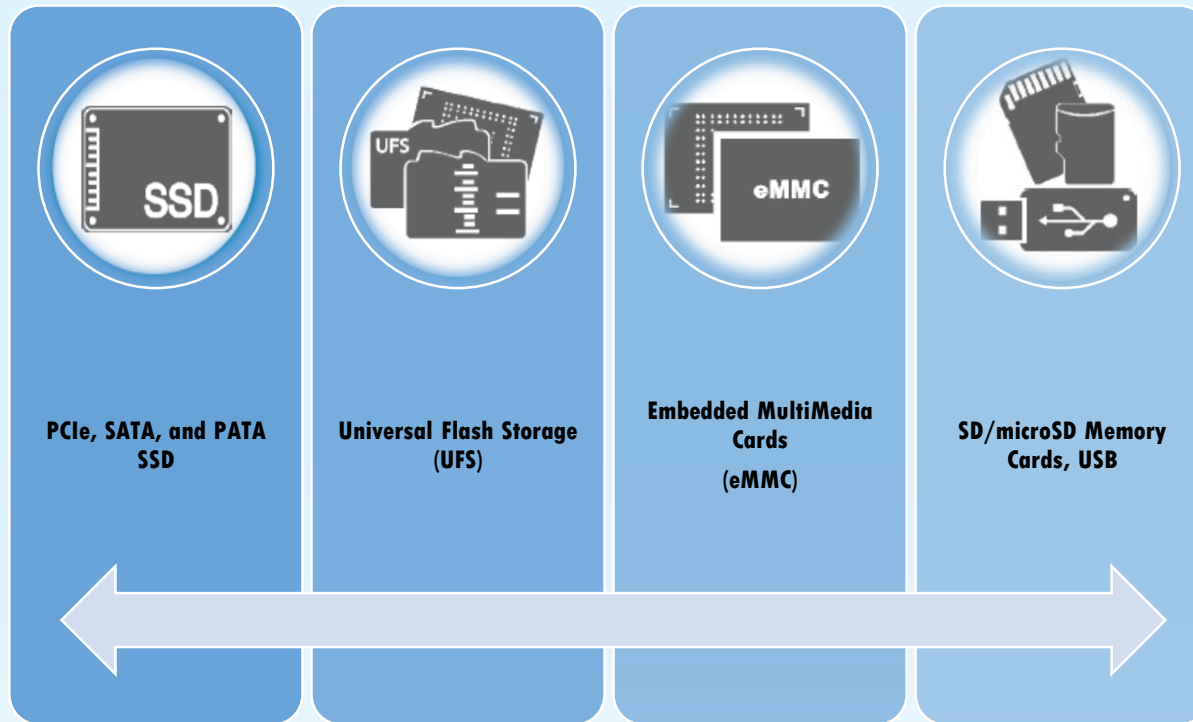
### Phison Value Chain

Upstream	Midstream	Downstream
The long-term and reliable partnership with NAND vendors & the most complete NAND controller IC solution provider	Full range of NAND storage solutions with highly flexible and customized services	Mobile Device, Tablet PC, Camera, Desktop PC, Laptop, Embedded System, Cloud Server & Data Center, Automotive System
R&D: Technology leader, patent advantage, innovative R&D team	Design: Industrial design, mechanical design, commercial design	Integration: Software-hardware integration technology
The most outstanding, innovative and complete flash memory solutions		

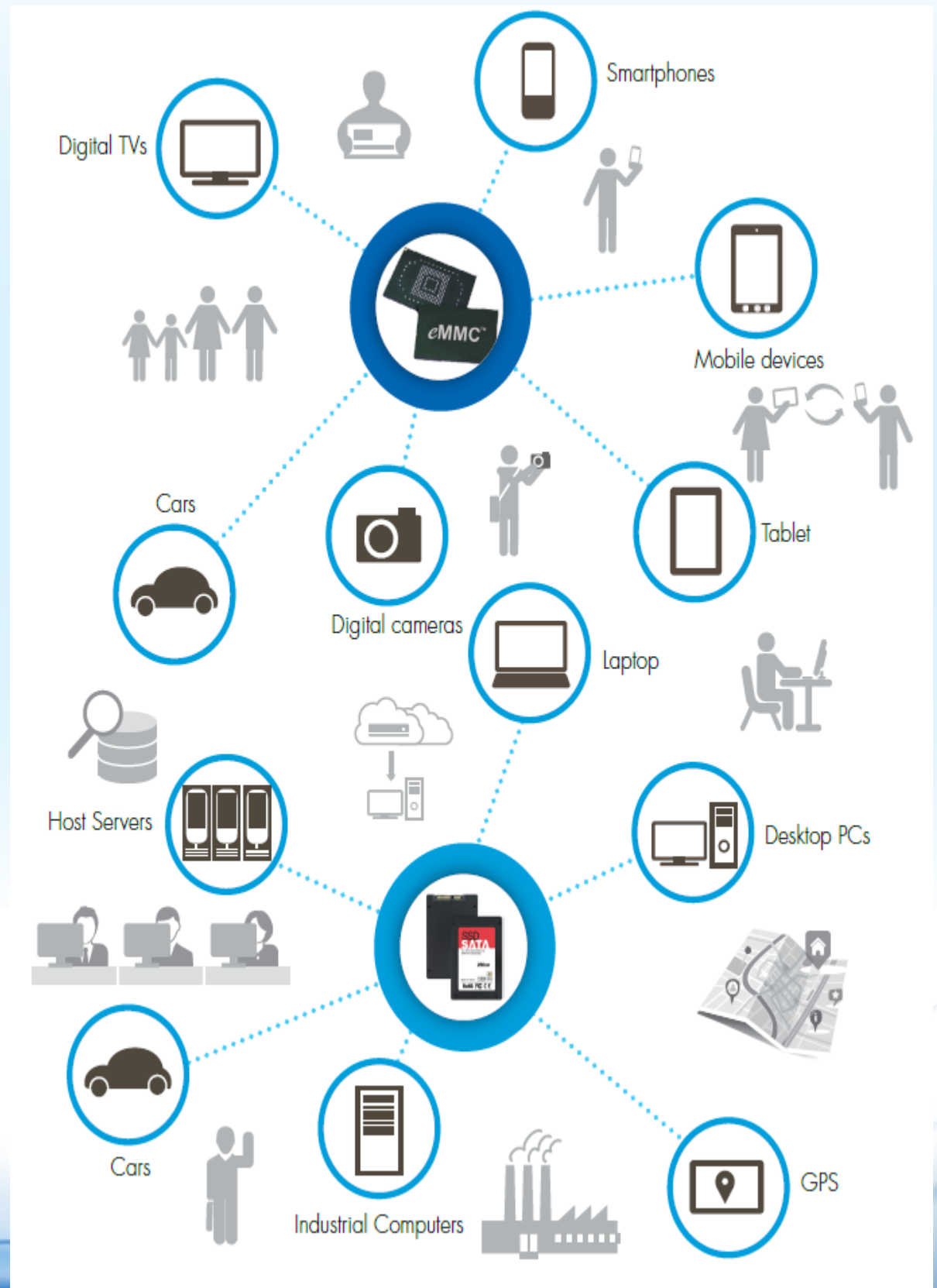
### Business Overview

By continuing R&D, Design, and Integration, Phison delivers the most unique and flexible business model and services globally, providing value-added solutions to global partners and customers. Phison's main products include NAND controller ICs of USB flash drive, SD/microSD card, eMMC, PCIe/SATA/PATA SSD, and UFS.

### Phison Products



### Phison Products in Daily Life



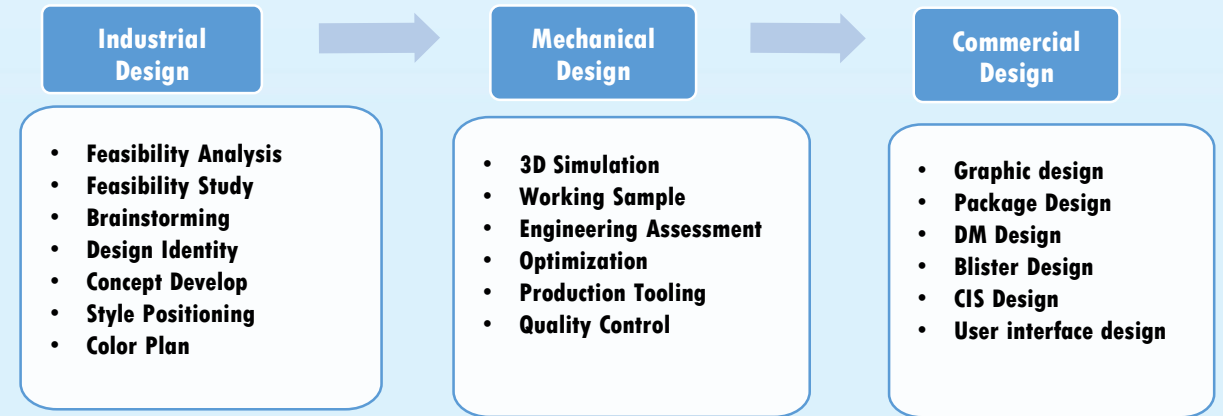
Leading by the latest 5G technology, AI, AIoT, Self-Driving Cars, AR/VR, eSPORTS, 8K, etc., have been the hottest technology spot recent years.

### Privacy Protection Software Applications



### Total Solutions of Industrial Design

In today's competitive marketplace, the success of a product's design depends not only on design quality but also on its ability to respond different trends. This phenomenon is particularly obvious when it comes to USB flash drives. The greatest advantage of Phison products is the integration of talented professionals from different fields such as industrial design, mechanical design and commercial design to provide our customers with the most comprehensive design services. Each designer adheres professional skills and knowledge to ensure every design project can enjoy optimal planning and management.



The primary mission of Phison is to help customers introduce creative processes and to achieve the best design solutions. At the same time, we also continue to innovate and enhance our professional skills to help customers realize their ultimate design concepts. For international markets where design quality is at a premium, the Phison design team offers world-class design capabilities. Through computer-assisted industrial design and our experience in manufacturing and mass production, we can help designers turn original concepts into a fully realized product.



Commercial design serves as the bridge between the product designer and consumer. Visual design can present the product in a more complete manner to consumer and also plays an important role in pushing product to mass market. It not only enables the end product to be presented with the best visual quality but also guarantees the best design and quality in each phase of mass production.



### The Foundation of Phison - Choose and Stay True to the Correct Business Model

Phison began building system products, or complete products, from the very beginning. We not only made controller ICs for sale to system builders but also made system products that competed against these same companies. This meant that Phison was competing against its own customers. This led to customer dissatisfaction and accusations of being “both the players and the referee”. In the beginning, nobody else was making these ICs so they had no choice but to buy from us. But when other IC companies appeared, they switched suppliers immediately.

Phison had to make a decision on whether to continue making system products. I thought about having Phison focus on IC design and abandoning the system market, but Aw Yong Chee Kong insisted that we stay with a business model of operating in both and not abandoning systems.

If we only made ICs, it might be profitable in the short term and would keep customers from defecting. But that would have not lasted long and would have made it hard to make money in the long term. Our theory was proved right in the end. Many IC customers that pay one dollar per unit today will only offer 80 cents tomorrow. They will then drop to 70 cents, and then 60 cents. How are you supposed to keep up with that? The price of controller ICs dropped very quickly and the average unit price are too low to be profitable.

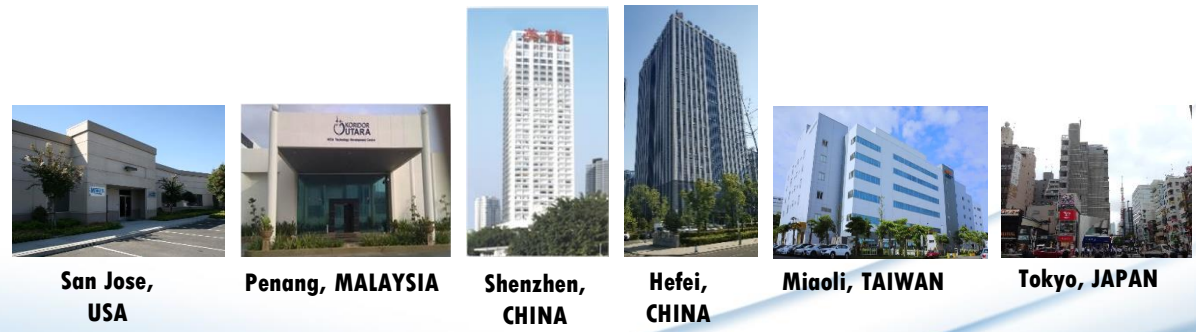
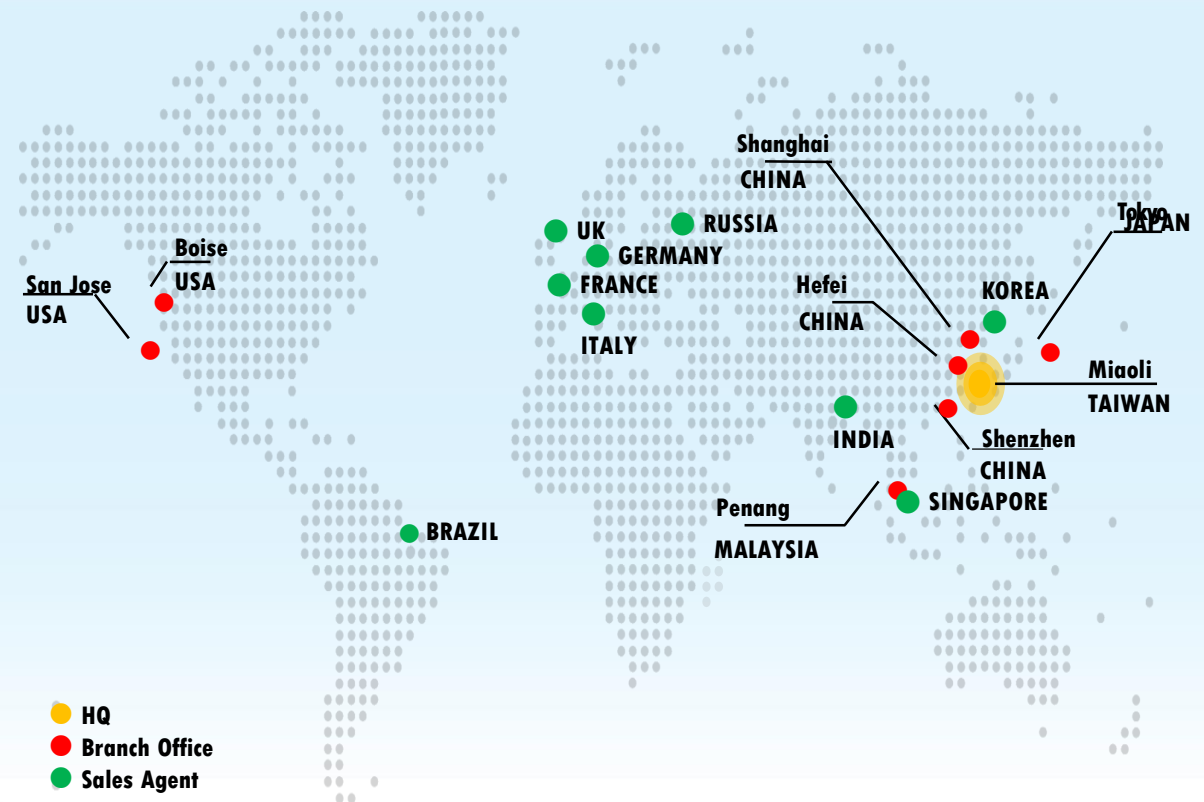
Phison could not concentrate exclusively on systems nor controller ICs. If Phison didn't make controller ICs, why would Toshiba bother backing us? We would have no value. Toshiba backed us because if we can turn a profit then we can continue to develop controller ICs. That means we can then turn around and help them push their Flash products. That's why Phison's controller IC business is essential.

Source: “Living up to its own expectations; how Phison achieved profits of NTD31.8 billion in ten years”

### Global Operations

Phison is headquartered in Miaoli, Taiwan, with subsidiaries in Japan, China, and Malaysia. This facilitates transnational strategic partnerships and the building of a closer working relationship with business partners in each country. Sales locations include Taiwan, North America, Brazil, Italy, France, Germany, U.K., China, India, Japan, South Korea, Malaysia and Russia, where local customers can enjoy timely technical support. When customers have a question or issue with product, they can receive immediate response and solution, which can strengthening partnerships with international customers.

### Global Operations Map



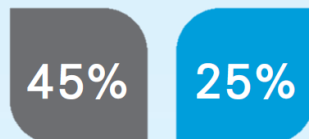
San Jose, USA      Penang, MALAYSIA      Shenzhen, CHINA      Hefei, CHINA      Miaoli, TAIWAN      Tokyo, JAPAN

Distribution of major sales regions	
Sales regions	2018
Asia	39.05%
North America	30.23%
Taiwan	20.63%
Europe	8.85%
Central and South America	0.77%
Oceania	0.47%

In 2018, the overall value of SSD-related controller ICs and end product shipments grew by 11% year over year. We hope to continue to increase our products' share of market sales.

### Share of the Global Memory Market

Phison's share of global market for USB flash drive controller ICs



Phison's share of global market for flash memory controller ICs

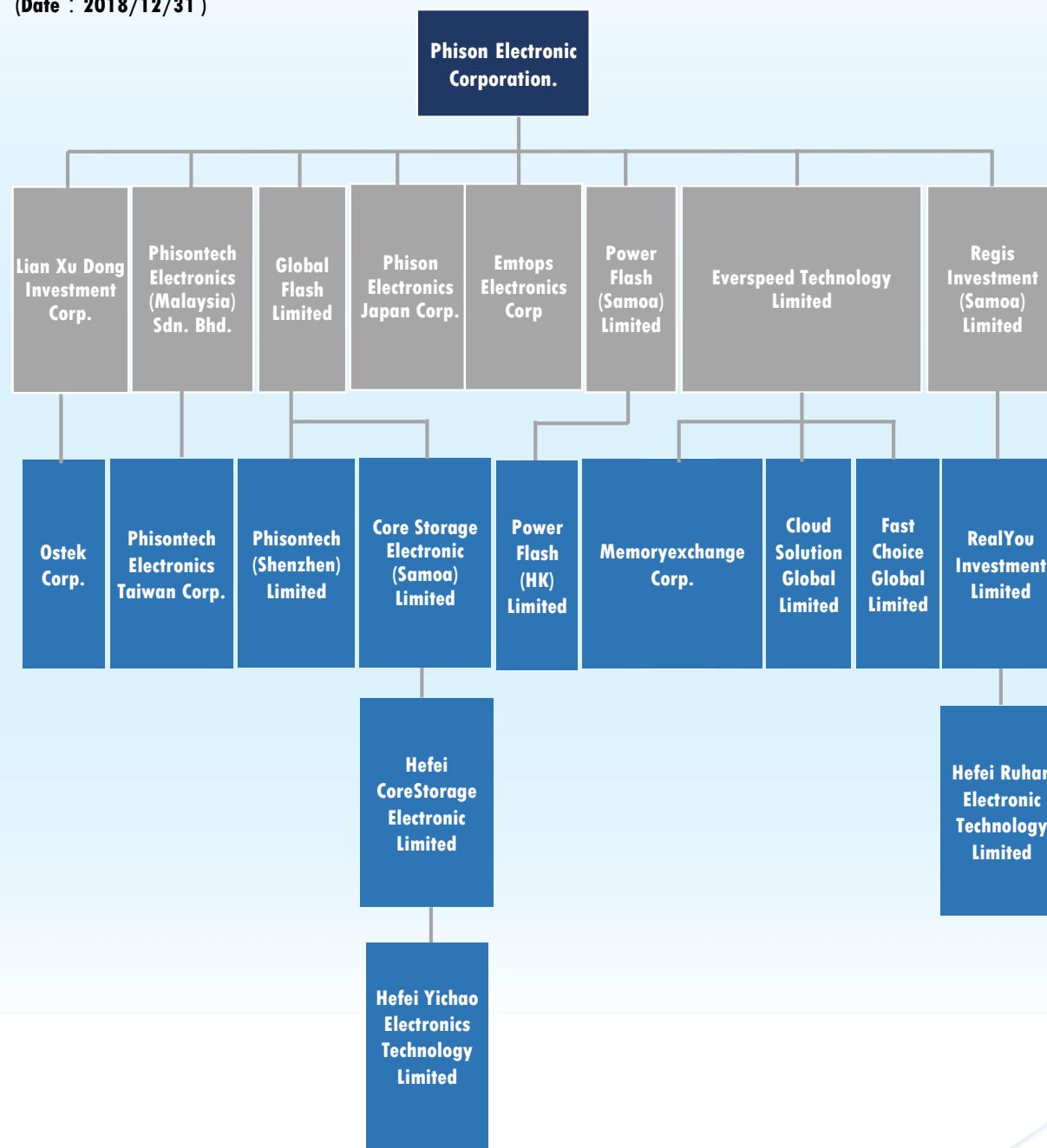
Research by the iSuppli market research firm showed that in 2012, global shipments of flash memory and USB flash drive controller ICs were 1.13 billion pieces and 360 million pieces respectively. Phison's flash memory card controller ICs accounted for 25% of the market while USB flash drive controller ICs accounted for 45%. In 2014, the overall market of SSD and eMMC are growing fast, Phison has become the leading supplier of Controller ICs-related except foreign manufacturers.



### Investments and Affiliates

#### Phison Affiliate Organizational Chart

(Date : 2018/12/31 )



The re-investment policy of Phison focuses on the development of NAND Flash system integration technology. We are continuing to diversify, expand and enhance the quality of products and services, strengthen the development of key technologies, track future market requirements and enhance core competitiveness.

## Operation Challenges

### Future Development Strengths



### Future Development Challenges and Response Strategies

**Blooming industry with numerous new competitors**

• **Coping strategy:** Phison uses excellent key-technological capabilities in NAND flash controller IC design and firmware programming to expedite the development of new generation products, endeavors to increase value added and multifunctional integration of products, and offers customers various total solutions so as to enlarge the technical gap ahead to the competitors in the same industry and to increase profits-earning ability effectively.

**Global flash memory market dominated by international giants**

• **Coping strategy:** Phison works closely with the international leading flash memory suppliers to further seek strategic alliance chance and also monitor specifications changes of flash memory devices, supply-demand situation in market and pricing trends so as to perform flexible stock adjustment to reduce inventory risks.

**Diversified product specifications**

• **Coping strategy:** Due to the flash memory specifications are constructed by the international giant companies and there are numerous types of small-sized memory cards in the market, it is imperative that Phison keeps track of progress of all flash memory specifications, latest small-sized memory card protocols and the end market, so as to expedite development of new technology and new product, to increase more types of main products, and to enhance versatile functions of products so that Phison will be able to achieve market segmentation, increase value added of products and extend product life cycle, and reduce the impact of specification changes or under performance of end-product development.

## Cooperation Based on Mutual Trust

Honesty in conduct is the business philosophy of Phison and is also the principle of Phison's behavior and business operation. In the past, Phison always had a helping hand at critical moments, the reason is that in addition to Phison owns our own core technology and development capability to strive for self-improvement, mostly important of all, Phison knows to conduct business in honesty just same as to behave truth in life.

### Partner - Toshiba

**TOSHIBA**

Shareholding of Phison stock : 10.06 %

With respect to controller ICs, it was the inevitable trend that most IC design houses dedicated in the NAND flash controller IC industry at the early stage worked closely with upstream NAND flash manufacturers. Given that Phison was capable of developing, designing and marketing both flash memory controller ICs and related system-level products, Toshiba not only began investing in Phison in 2002 but also continuously cooperated with Phison on various product developments with adoption of Toshiba's specialized Multi-Level Cell (MLC) and Triple-Level Cell (TLC) flash memory technologies to design and develop high-performance, high-compatibility controller ICs and, thus, related flash memory were also purchased from Toshiba's affiliates or distributors. In addition, the controller IC firmware developed by Phison worked well with Toshiba's flash memory. This, along with the vibrant growth of the flash memory product market and successful launch of Phison's innovative application product of flash memory, meant the business began to expand rapidly and the business relationship between two companies getting closer.

As Toshiba has its own NAND flash wafer factory, this meant it could support Phison on flash memory. Toshiba is also the originator of the Secure Digital and xD-Picture formats. Add to this, Phison has cross-licensing agreements for small memory card formats with companies promoting which to obtain controller IC patent protection so that Phison can dedicate to development of flash controller ICs without obstacle. The development of various flash controller IC products along with obtaining the stable flash memory supply is the key point of Phison's rapid growth.



### "Toshiba Chairman - Kiyoshi Kobayashi's Commend"

Ten years ago, Tanaka Motoji San and I visited the Incubation Center of Industrial Technology Research Institute (ITRI) to have in-site survey of USB single-chip controller of Phison Electronics Corp., where several Phison R&D staffers were working so hard and practically lived in the lab. One of them is the Chairman Pua who is young at that time. I remember the scene so distinctly just like it was yesterday.

The success of a startup depends not only on its technological prowess, but also on its management's personal qualities and leadership, as well as the excellence of employees, shareholders or business partners. I expect Phison to keep moving forward, adhere to its founding philosophy, and deepen its contribution to the industry as a whole.

Kiyoshi Kobayashi, Chairman, Toshiba Corporation  
Semiconductor & Storage Products Company



### The Foundation of Phison - Toshiba Saved Phison Twice

The best decision ever made by Phison was to bring Toshiba on board as an investor.

In the beginning, few people thought Phison would amount to anything. Toshiba was the only corporate shareholder willing to invest in us. When Phison became embroiled in a lawsuit and all of our cash was provisionally seized by the courts, Toshiba chose to believe in us and upped its investment, saving the company.

The court case in 2002 led to the provisional seizure of \$45 million NTD in cash. This was all of the cash that Phison had at the time and our customers' confidence in us was shaken as well. Toshiba was already a shareholder at the time and it chose to inject a further \$100 million NTD. This money saved Phison. It restored the company's cash flow and enabled us to endure the 4-year-long legal battle until both parties agreed to a settlement.

When a global shortage of flash memory occurred in 2003, it was Toshiba that somehow collected the sufficient goods and sold it to Phison for below market price. Chairman Pua Khein Seng was moved beyond words and secretly swore to himself: "We'll never say NO to TOSHIBA!" The table has turned. In 2007, over-supply in the memory market led to plummeting prices and it was Toshiba's turn to ask Phison to buy its inventory during difficult times. Even though it was a deal that would incur a loss of more than \$1 billion NTD, Pua signed it without hesitation to pay back in consideration of Toshiba's past support. Since then, the friendship between Phison and Toshiba has become something that money can't buy.

Source: "Living up to its own expectations; how Phison achieved profits of NTD31.8 billion in ten years"



Toshiba planted and adopted tree in Phison's farm / Tree category : Prunus campanulata

### Strategic Alliance - Kingston



Shareholding of Phison stock : 5.71 %

Flash memory is extensively used in 3C product applications, especially in consumer products such as USB flash drives, memory cards and MP3 players. Flash memory is also quickly becoming a standard feature on smartphone and other handheld devices. Embedded memory system products integrate flash memory and controller ICs to make it easier for manufacturers to make use of flash memory and to shorten product design time. This has in turn accelerated the introduction of flash memory in various products.

To break into the supply chain of leading smartphone makers and take a leading market share, Phison has formed a new joint venture to establish a new company with Kingston, the international leader in DRAM (Dynamic Random Access Memory) modules to target the market for embedded memory system application products. Kingston leads the new company while Phison focuses on controller IC design. By integrating the purchasing, sales, production, manufacturing and design expertise of both sides, this novel partnership model has carved out a niche in the emerging market of embedded memory applications.

Kingston is not only the largest independent DRAM module maker in the world with a market share of over 40% but is also one of the top players in NAND flash modules as well. This means it an industry leader in terms of brand recognition, channel strategy and purchasing power. Kingston also possesses extensive manufacturing capacity and comprehensive global distribution channels. This has helped to ensure a steady supply of flash memory and also helped to develop product sales channels and business promotion.

The strategic partnership between Phison, Toshiba and Kingston is different to that of other controller IC design houses. In the future, the partnership model will become more diversified as well. Phison will continue to build its position with care in order to establish long-term strategic partnerships, engage in vertical integration of upstream/downstream resources, create efficient and plentiful production capacity, develop new product lines, expand into new market areas and provide the market with more complete product services.

### Customer Relationship Management

Phison makes satisfying customer requirements its top priority. To achieve excellence in customer relationship management, customer service regulations and processes have been systematized to ensure the consistency of Phison's service quality. This serves as the basis for providing high-quality customer services, helps customers create value and also maximizes profits for Phison as well.



#### Customer Satisfaction

Phison began conducting annual customer satisfaction surveys among our top 25 customers in 2006. We hope that better understanding of customer requirements and expectations will help drive continuous improvement at Phison in the future. Customers are asked to score Phison in terms of price, delivery, service, technology and quality. The results are also used to review Phison's internal performance evaluations.

Up to the year of 2018, customer satisfaction among the top 25 customers has generally stayed at around 70% to 80%. According to survey results, customers wanted price adjustments. In response, Phison will provide customers with strategic project-specific prices and set/adjust prices based on customers' product and service requirements in order to satisfy customers' expectations on pricing. In the future, we will continue to make raising customer satisfaction our aim by constantly enhancing the quality of Phison products and services.

#### Customer Complaints

To improve efficiency of response process for the customer complaints and increase customer satisfaction, Phison has established a customer complaints management process. When a customer experiences a quality problem or has any questions or complaints, they can communicate with Phison through the customer complaints channel. The customer's problem will be dealt with right away so as to effectively increase bilateral interaction quality and frequency. In 2018, no case of divulging customer's information or violating customer's privacy.

### Customer Complaints Management Process



### Honors and Awards

#### 2018 Honors

Award
 Toshiba 2018 Award Best Partner
 Toshiba 2018 Award Greatest Sales Contribution
 Skill Evaluation Center of Workforce Development Agency- Talent Quality-management System(TTQS) bronze medal
<b>Social Welfare</b> <ul style="list-style-type: none"> <li>■ Certificate of Appreciation: Hsinchu TFCF</li> <li>■ Certificate of Appreciation: Hsin Miao Development Center</li> <li>■ Certificate of Appreciation: Child Welfare League Foundation</li> <li>■ Certificate of Appreciation: (Eden) Hsinchu City Care Service Center for Mental Retardation</li> <li>■ Certificate of Appreciation: Holy Family for Special Education</li> <li>■ Certificate of Appreciation: Yu An Children's Home</li> <li>■ Certificate of Appreciation: Huashan Foundation</li> <li>■ Certificate of Appreciation: Syin-Lu Foundation</li> <li>■ Certificate of Appreciation: National Tsing Hua University</li> <li>■ Certificate of Appreciation: National Chiao Tung University</li> <li>■ Certificate of Appreciation: Hsinchu City Government</li> <li>■ Certificate of Appreciation: National Taiwan University, College of Medicine</li> <li>■ Certificate of Appreciation: Hsinchu County Government</li> <li>■ Certificate of Appreciation: Miaoli County Police Bureau</li> </ul>

### Participation in Industry Associations

Year of Entry	Organization	Membership Type
2012-2018	Mobile Industry Process Interface Alliance	Member
2010-2018	Universal Flash Storage Association	Board member
2009-2017	SD Card Association	Board member
2008-2018	Solid State Drive Alliance	Board member
	The IEEE Standards Association	Corporate Membership
2007-2018	Joint Electron Device Engineering Council JC-42 Solid State Memories JC-64 Embedded/Removable Memory: Storage/Cards	Member
	Non-Volatile Memory Host Controller Interface	Working group member
2006-2018	Open NAND Flash Interface	Board member
2004-2018	The Peripheral Component Interconnect Special Interest Group	Member
	USB Implementers Forum	Member

