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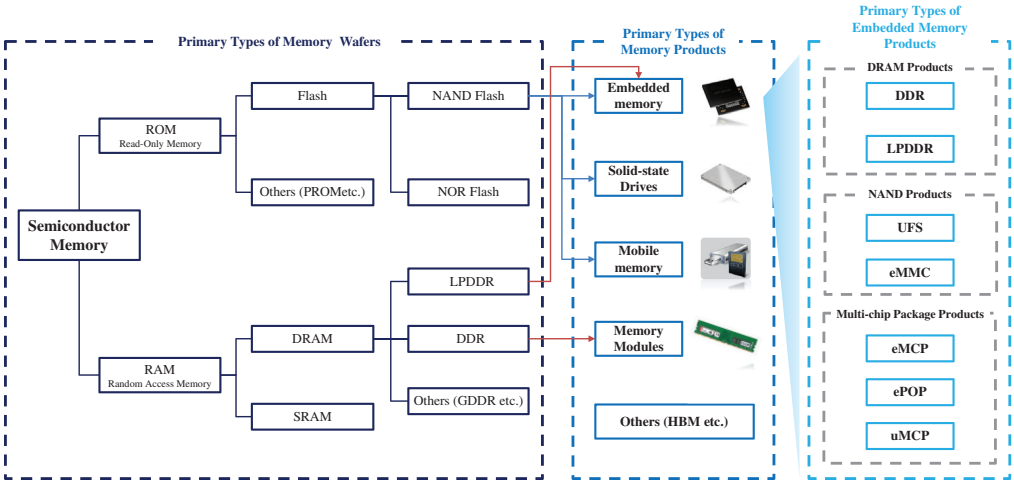
OVERVIEW OF GLOBAL SEMICONDUCTOR MEMORY MARKET

Introduction to Semiconductor Memory

With the deepening of global digital transformation, the rapid growth of the digital economy is driving explosive growth in global data volume. As the core of the digital economy era, semiconductor memory has become an indispensable key digital infrastructure. The global data volume has increased from 51 ZB in 2020 to 159.2 ZB in 2024 with a compound annual growth rate (CAGR) of 32.9%, and is expected to reach 527.5 ZB by 2029 with a CAGR of 27.0%. Consequently, the global semiconductor memory product market grows continuously. The market capacity for the two main memory products, NAND and DRAM, have increased from 410 billion gigabytes and 155 billion gigabits in 2020 to 833 billion gigabytes and 250 billion gigabits in 2024, with a CAGR of 19.4% and 12.7%, respectively. And they are expected to reach 1,716 billion gigabytes and 490 billion gigabits in 2029, with a CAGR of 15.6% and 14.4% from 2024 to 2029, respectively. Meanwhile, breakthroughs in AI technologies such as generative models have significantly accelerated the adoption and penetration of AI across various smart devices, such as smartphones, PCs, and IoT devices. AI models create further demand for localized, high-performance, and low-power data creation and memory, consolidating memory's role as a critical AI infrastructure. Semiconductor memory products refer to complete memory solutions formed by integrating one or more semiconductor memory wafers with other necessary components (such as controller chips, interface circuits, PCBs, casings, etc.), which can be directly used by end users or devices. Semiconductor memory products often have standardized interfaces, allowing direct embedding, plugging, or integration into higher-level systems, and are widely applied in the filed of consumer electronic, data center, automotive, and industrial industries.

Classification of Semiconductor Memory

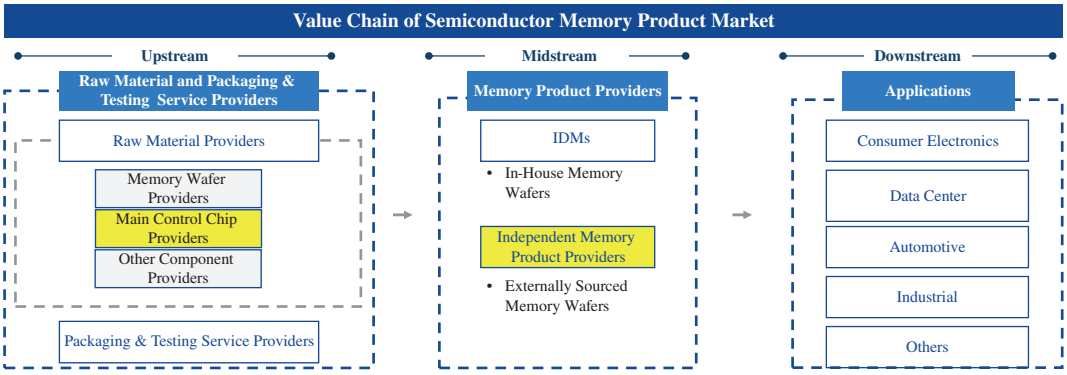
Memory wafers are core component of semiconductor memory products and can be categorized by volatility into ROM (Read-Only Memory) and RAM (Random Access Memory). ROM is a type of non-volatile memory that retains data after power is off, with common examples being Flash memory, including NAND Flash and NOR Flash. RAM is a type of volatile memory that loses data when power is off, including DRAM (Dynamic Random Access Memory) and SRAM (Static Random Access Memory). After cutting, packaging, and testing, these memory wafers form various memory products oriented to end users, such as embedded memory, solid-state drives, mobile memory, and memory modules, which are widely used in smartphones, tablets, PCs, servers, and other devices.



Major semiconductor memory products include: (a) Embedded Memory Products, which are memory products embedded within electronic devices. They are designed for the space and functional constraints of specific devices, mainly used to store the operating system, applications, user data, and firmware of the device. These products include embedded DRAM (DDR, LPDDR), embedded NAND (eMMC, UFS), and embedded multi-chip packaging products (eMCP, uMCP, ePOP). They are widely used in smartphones, tablets, smart TVs, IoT devices, and in-vehicle systems, with high requirements for stability, reliability, and low power consumption. Among them, embedded NAND products require controller chips to manage NAND flash read/write operations, including error detection and correction, wear-leveling, and other functions, while embedded multi-chip packaging refers to integrating multiple chips with different functions into a single package to save space and enhance integration; (b) Solid-State Drives (SSD), which are memory devices that use arrays of solid-state electronic memory chips to store data. SSDs contain no spinning disks and provide faster data access speed and greater durability. SSDs are categorized by interface into SATA SSDs and PCIe SSDs. They are widely used in PCs, game consoles, workstations, and data centers, significantly improving system responsiveness; (c) Mobile Memory Products, which are portable electronic products enabling cross-terminal data memory. They typically connect via standardized interfaces, emphasizing portability and ease of use. Products include USB flash drives, portable solid-state drives with high read/write performance, and memory cards used in digital cameras and smartphones; (d) Memory Modules, which are circuit boards equipped with memory chips that provide DRAM solutions for temporary data processing and program execution. Data in memory modules is lost when powered off. Serving as a buffer between the SoC platform and permanent memory, their capacity and speed directly affect multitasking capabilities and program execution efficiency in computers. They are widely used in computing and industrial applications. Dual In-line Memory Modules (DIMMs) is a major form of packaging for memory modules; and (e) others such as High Bandwidth Memory (HBM) and GDDR (Graphics DDR).

Value Chain of Semiconductor Memory Product Market

The upstream of semiconductor memory product market primarily includes raw material and packaging/testing service providers. Raw material providers mainly include memory wafer providers, controller chip providers, and other component providers (such as interface circuits, PCBs, etc.). Controller chip is critical for embedded NAND products, as these require controller chips to manage NAND flash read/write operations. The midstream consists of memory product providers, which can be divided into Integrated Device Manufacturers (IDMs) and independent memory product providers. Providers with their own wafer fabs are referred to as IDMs, while those procuring wafers externally are independent memory product providers. Independent memory product providers integrate purchased memory wafers and other components with their own design and packaging capabilities to provide diversified memory solutions. They possess unique advantages in product innovation and market flexibility, enabling rapid responses to market changes and customer needs. The downstream consists of the major end-use application fields of memory products, covering consumer electronics, data center, automotive, industrial, and other sectors.



**Note: The areas highlighted in yellow indicate the segments of the value chain where the Company participates.*

Global and Chinese Mainland Semiconductor Memory Product Market Size

The global semiconductor memory product market size, by shipment, grew from 12.8 billion units in 2020 to 13.8 billion units in 2024, driven by the surge in demand for increasing memory capacity resulting from the rapid penetration of AI in smart devices. The market size experienced a temporary decline between 2022 and 2023 due to the supply-demand relationship. The CAGR from 2020 to 2024 was 1.8%. With new memory demands driven by breakthroughs in AI technology and the technical product upgrades of memory products, the global semiconductor memory product market size, by shipment, is expected to grow to 19.4 billion units by 2029, with a CAGR of 7.1% from 2024 to 2029. By revenue, the global semiconductor memory product followed the similar trend, increasing from USD149.9 billion in 2020 to USD192.8 billion in 2024 at a CAGR of 6.5% despite experiencing consecutive contractions during 2022 and 2023. It is expected to reach USD407.1 billion in 2029 with a CAGR of 16.1% from 2024 to 2029.

Between 2021 and 2023, the global shipments of semiconductor memory products experienced a notable decline, primarily due to cyclical demand adjustments following the pandemic-driven surge of consumer electronics in 2020 and 2021. During the early phase of the COVID-19 pandemic, global lockdowns and remote work trends led to a sharp, short-term increase in demand for consumer electronics such as PCs, smartphones, and data center equipment. This surge drove memory consumption, temporarily inflating shipment volumes of semiconductor memory products. However, with the diminishing effects of COVID-19 pandemic since 2022, the earlier demand acceleration gave way to a sharp correction. The saturation of consumer device markets, combined with weakening macroeconomic conditions and inflationary pressures, led to inventory buildup throughout the semiconductor supply chain. Consequently, semiconductor memory product providers faced reduced order volumes from key downstream sectors. In 2023, this downward trend persisted, driven by ongoing inventory reduction and subdued end-market demand, particularly in PCs and smartphones.

From 2020 to 2024, the global memory module shipments declined slightly driven by post-pandemic demand normalization. The sharp increase in 2020 and 2021, fueled by remote work and surging PC and server demand, led to a temporary market spike. As these short-term needs were fulfilled, shipments dropped in 2022 and 2023 amid inventory corrections, weaker consumer spending, and slowdown of investments on servers. Although 2024 showed a mild rebound supported by the stabilizing of inventories and emerging AI-related server demand, overall growth for the period remained negative, highlighting a cyclical adjustment following the pandemic-induced demand surge.

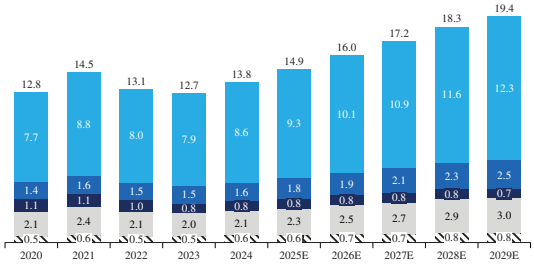
From 2024 to 2029, the shipments of embedded memory, mobile memory, and memory modules are expected to surpass the levels seen from 2020 to 2024, supported by multiple growth drivers, including (i) end product innovation across downstream electronics, such as AI-enabled smartphones, automotive electronics, and smart IoT devices, is expanding the total demand of memory products; (ii) the rapid adoption of AI is driving a new upgrade cycle across PCs, servers, and edge devices, all of which require higher-capacity and higher-bandwidth memory solutions; (iii) the proliferation of connected and intelligent devices in automotive, industrial, and consumer ecosystems is creating sustained embedded memory demand; and (iv) as global IT investment recovers and cloud infrastructure scales to support AI workloads, data center demand for high-performance DRAM and advanced modules will provide additional growth momentum. Therefore, these trends jointly point to a broad-based expansion in memory shipments through 2029, underpinned by technological innovation and rising memory intensity across end markets.

Global Semiconductor Memory Product Market, by shipment

Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**1.8%**	**7.1%**
Embedded Memory	2.9%	7.4%
Solid-state Drive	3.3%	9.0%
Mobile Memory	-6.0%	-2.7%
Memory Modules	-0.2%	7.4%
Others	3.0%	6.8%

Note: Others includes new memory products such as HBM.



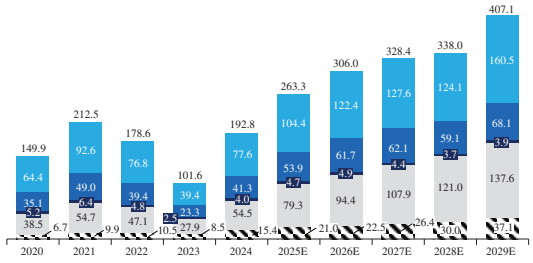
Source: Expert Interview; Frost & Sullivan

Global Semiconductor Memory Product Market, by Product, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**6.5%**	**16.1%**
Embedded Memory	4.8%	15.6%
Solid-state Drive	4.2%	10.5%
Mobile Memory	-6.3%	-0.5%
Memory Modules	9.1%	20.3%
Others	23.1%	19.2%

Note: Others includes new memory products such as HBM.



**Numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

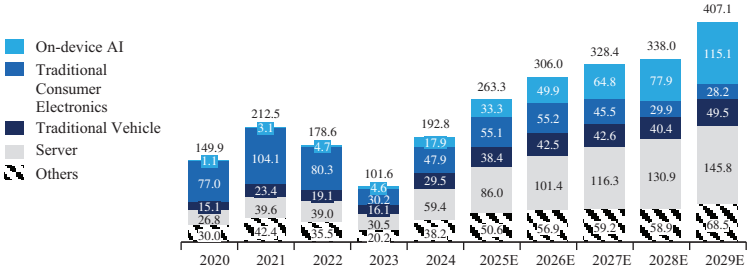
From the perspective of downstream applications, the on-device AI sector is growing significantly faster than other sectors, becoming the key driver of expansion in the global semiconductor memory product market. With the rapid emergence of new scenarios such as AI smartphones, AI PCs, AI glasses and intelligent driving, demand for semiconductor memory products in on-device AI applications is experiencing explosive growth. From 2020 to 2024, the on-device AI semiconductor memory market recorded a CAGR of 100.8%, with the market size reaching USD17.9 billion in 2024. For the period from 2024 to 2029, its CAGR is expected to remain high at 45.1%, continuing to lead all downstream sub-sectors. In the server field, driven by the surge in demand for AI servers resulting from the boom of large-scale models, the market size grew from USD26.8 billion in 2020 to USD59.4 billion in 2024, representing a CAGR of 22.0%. It is projected to reach USD145.8 billion by 2029 with a CAGR of 19.7% from 2024 to 2029.

Global Semiconductor Memory Product Market, by Downstream Application, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**6.5%**	**16.1%**
On-device AI	100.8%	45.1%
Traditional Consumer Electronics	-11.2%	-10.1%
Traditional Vehicle	18.2%	10.9%
Server	22.0%	19.7%
Others	6.2%	12.4%

Note: Others includes industrial, healthcare, and etc.



**Numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

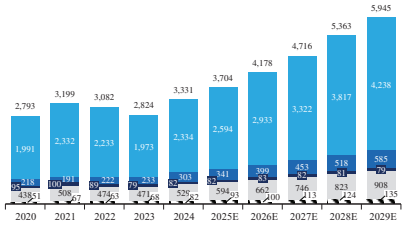
Chinese Mainland semiconductor memory product market size, in shipment, increased from 2,793 million in 2020 to 3,331 million in 2024 at a CAGR of 4.5%. It is expected to reach 5,945 million in 2029 with a CAGR of 12.3% from 2024 to 2029. In terms of revenue, the market increased from USD28.9 billion in 2020 to USD42.0 billion in 2024 at a CAGR of 9.8%, and is expected to reach USD111.3 billion in 2029 with a CAGR of 21.5% from 2024 to 2029.

Chinese Mainland Semiconductor Memory Product Market, by Product, in Shipment

Million, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**4.5%**	**12.3%**
Embedded Memory	4.1%	12.7%
Solid-state Drive	8.6%	14.1%
Mobile Memory	-3.6%	-0.7%
Memory Modules	4.8%	11.4%
Others	12.6%	10.5%

Note: Others includes new memory products such as HBM.

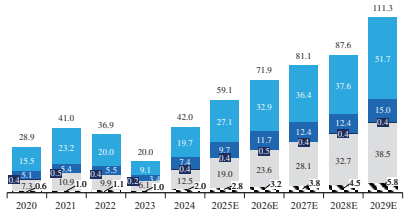


Chinese Mainland Semiconductor Memory Product Market, by Product, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**9.8%**	**21.5%**
Embedded Memory	6.2%	21.3%
Solid-state Drive	9.8%	15.2%
Mobile Memory	-4.1%	1.2%
Memory Modules	14.4%	25.2%
Others	35.1%	23.7%

Note: Others includes new memory products such as HBM.



**Numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

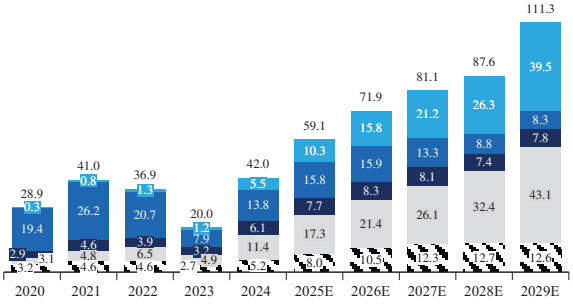
Segmented by downstream applications, the on-device AI sector is expected to experience the highest growth, with a CAGR of 106.9% from 2020 to 2024 and 48.3% from 2024 to 2029. Followed by is the server sector, with a CAGR of 38.5% and 30.5% during the same periods correspondingly.

Chinese Mainland Semiconductor Memory Product Market, by Downstream Application, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**9.8%**	**21.5%**
On-device AI	106.9%	48.3%
Traditional Consumer Electronics	-8.2%	-9.7%
Traditional Vehicle	20.4%	5.0%
Server	38.5%	30.5%
Others	12.9%	19.4%

Note: Others includes new memory products such as HBM.



**Numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

Drivers of Global Semiconductor Memory Product Market

AI models transitioning from single-modality to multi-modality, are revolutionizing the demand for data memory. As large models evolve from a single text modality to multi-modalities such as text, images, audio, and video, the size of their training datasets is growing exponentially. AI model training not only requires a high-speed memory layer to quickly feed massive datasets to the computing units, but the sheer size of the model parameters also places extremely high demands on memory, requiring memory with low latency and high throughput to support real-time responses. These factors together accelerate the demand for memory products in terms of both capacity and performance.

The upgrade in the form and applications of electronic products accelerate the demand for high-performance, low-power memory. These devices not only need sufficient memory capacity to accommodate operating systems, applications, and massive user data (such as high-definition images, audio files, and various sensor-collected information) but also need to meet the requirements of specific application scenarios in terms of read/write speeds and power consumption control. On the other hand, the "AI+" wave is injecting new vitality. In 2024, the penetration rates of global AI smartphones and AI PCs reached approximately 19.0% and 24.4%, respectively, and are expected to reach 75.2% and 96.4% by 2029, respectively, showing huge potential for development. Correspondingly, AI smartphones require larger capacity and lower power memory to run complex AI models and store the enhanced content generated. AI PCs emphasize local AI computing power and require larger capacity LPDDR, UFS, and SSD to support AI accelerators and AI applications.

The intelligent development of the automotive and industrial sectors. In the automotive sector, global sales of new energy vehicles grew from 3.1 million in 2020 to 18.2 million in 2024, with a CAGR of 55.4%. The corresponding penetration rate in global vehicles sales increased from 4.0% in 2020 to 15.6% in 2024. For vehicles, functions in the smart cockpit place higher demands on the capacity and read/write speeds of embedded memory like eMMC and UFS. In the future, vehicle-to-everything (V2X) and intelligent transportation systems will generate more multi-modal data, further increasing the demand for large-capacity, high-reliability memory. Additionally, in industrial sector, factories and manufacturing processes are becoming more automated and intelligent, which requires a large number of sensors, robots, and control systems to collect, process, and analyze data in real time. These devices have significantly increased demand for memory to support data memory, edge computing, and the operation of AI and machine learning algorithms.

Development Trends of Global Semiconductor Memory Product Market

The evolution of memory product technology brings performance optimization. In terms of memory density, NAND Flash technology increases the number of 3D stacking layers, providing high-capacity, TB-level memory for mainstream embedded and mobile devices and reducing the cost per bit. LPDDR technology is accelerating its evolution from LPDDR4 to LPDDR5 and even higher generations, significantly improving data transfer rates and optimizing energy consumption to meet the stringent demands in AI devices. Meanwhile, the

packaging and testing technology is also advancing. It achieves small-sized, highly integrated memory solutions by co-packaging high-density NAND Flash and high-performance LPDDR chips. This trend promotes the development of new combination methods, opening up new growth space for small-sized AI edge markets like smart wearables and AIoT devices.

The rapid iteration and development of emerging smart devices brings more opportunities for memory products. AI significantly promoting the rise of the emerging smart devices. Specifically, global shipments of AI glasses are undergoing explosive growth, increasing from 170 thousand sets in 2020 to 520 thousand sets in 2024, with a CAGR of 32.2%. At the same time, the global embodied AI robot market size increased from RMB37.84 billion in 2020 to RMB82.0 billion in 2024, with a CAGR of 21.3%. These AI-driven devices place higher demands on embedded memory, as they need to efficiently store and run increasingly complex AI models for edge inference within limited volume and power budgets, while processing high-bandwidth multimedia data. To meet these stringent demands, small-sized, highly integrated, high-performance, and low-power memory modules are gradually becoming the core configuration for these devices.

Competitive Landscape of Global and Chinese Mainland Semiconductor Memory Product Market

In 2024, IDM companies contributed approximately 80% of revenue and approximately 62% of shipments of the global semiconductor memory product market, while the independent companies contributed approximately 20% of revenue and approximately 38% of shipments of the same market. Among all market players, including IDM and independent companies, the top five players in global semiconductor memory product market held a combined market share of over 70% and over 50% in terms of revenue and shipment in 2024, respectively. The Company ranked outside the top ten market players in terms of revenue or shipment in 2024 and had a market share of 0.3% in terms of revenue, and a market share of 1.2% in terms of shipment in 2024.

Among independent companies, the top five players in global semiconductor memory product market held a combined market share of over 40% in terms of revenue in 2024. The Company ranked outside the top ten market players, in terms of revenue in 2024 and had a market share of 1.4% in terms of revenue in 2024. The Company ranked the second in terms of shipment in 2024 in the market.

Ranking of Global Semiconductor Memory Product Market Among Independent Memory Product Providers, 2024, by Shipment

Ranking	Provider	Shipment	Market Share
		(Million units)	*(%)*
1	Company A	493	9.4%
2	The Company	158	3.0%
3	Company I	139	2.7%
4	Company C	134	2.6%
5	Company B	125	2.4%

- Company A, founded in 1999, is headquartered in Chinese Mainland. It is listed in SZSE. Its main business is memory chips and memory solutions.
- Company I is a public company listed on Shenzhen Stock Exchange. It is founded in 2008 and headquartered in Chinese Mainland. Its product line covers four major series: SSD, embedded storage, memory modules, and mobile storage.
- Company C, founded in 2000, is headquartered in Taiwan, China. It is listed on the Taiwan Stock Exchange. The company is a leading designer, manufacturer, and seller of flash memory controllers and related products.
- Company B, founded in 2018, is headquartered in Chinese Mainland. It is not listed. Its main business is providing flash memory chips and solid-state drive solutions.

Among all market players, including IDM and independent companies, the top five players in Chinese Mainland semiconductor memory product market held a combined market share of over 60% and approximately 49% in terms of revenue and shipment in 2024, respectively. The Company ranked out of top ten market players and had a market share of 0.5% in terms of revenue, and a market share of 2.0% in terms of shipment in 2024.

Among independent companies in Chinese Mainland semiconductor memory product market the Company ranked the tenth in the market in terms of revenue and ranked the fourth in terms of shipment in 2024.

Ranking of Chinese Mainland Semiconductor Memory Product Market Among Independent Memory Product Providers, 2024, by Revenue

Ranking	Provider	Revenue	Market Share
		(USD Billion)	*(%)*
1	Company H	2.2	22.0%
2	Company B	1.1	11.3%
3	Company C	0.7	7.4%
4	Company A	0.7	7.0%
5	Company J	0.6	6.0%
…			
10	The Company	0.2	2.0%

- Company J is a private company founded in 1997 and headquartered in Chinese Mainland. It offers memory module products including server memory, memory modules, solid-state drives, and embedded storage.

Ranking of Chinese Mainland Semiconductor Memory Product Market Among Independent Memory Product Providers, 2024, by Shipment

Ranking	Provider	Shipment	Market Share
		(Million units)	*(%)*
1	Company A	142	11.7%
2	Company B	100	8.2%
3	Company D	80	6.6%
4	The Company	66	5.4%
5	Company C	52	4.3%

- Company D, founded in 2010, is headquartered in Chinese Mainland. It is listed on the Shanghai Stock Exchange. The company focuses on the design, development, and manufacturing of advanced semiconductor memory products and solutions.

OVERVIEW OF GLOBAL EMBEDDED MEMORY PRODUCT MARKET

Introduction and Classification to Embedded Memory Product

An embedded memory product is a memory product that consists a semiconductor memory chip, a controller, and other necessary components into a single, fully functional, highly optimized module, which is then integrated into the main system of an electronic device. As a core memory medium integrated on the motherboard of an electronic device, it adopts embedded NAND Flash solutions, DRAM solutions, or NAND and DRAM composite solutions designed to meet the stringent requirements of smartphones, IoT devices, and automotive electronics for space, power consumption, and performance.

Major embedded memory products include eMMC (embedded Multi Media Card), UFS (Universal Flash Storage), eMCP (embedded Multiple Chip Package), LPDDR (Low Power Double Data Rate), DDR (Double Data Rate Synchronous Dynamic Random Access Memory), uMCP (Ultra Multi-Chip Package) and ePOP (Embedded Package-on-Package). eMMC is a flash memory solution for embedded terminal devices, with advantages in size and cost. It is widely used in smartphones, tablets, automotive electronics, smart wearables, set-top boxes, etc. UFS is an iterative product of eMMC, with higher memory capacity and transmission rates. It has become the mainstream choice for mid-to-high-end smartphones. Other application fields include automotive electronics, the Internet of Things, smart wearables, and set-top boxes. eMCP consists of eMMC and LPDDR packaged together to minimize space and enhance connectivity between chips, while providing both large-capacity solid-state memory and dynamic random memory. It is suitable for space-constrained mobile devices. LPDDR is a special type of random access memory (RAM) designed to improve energy efficiency and performance. It provides a solution for systems that require fast data access without consuming too much power, and is known for its low power consumption and small size. It is widely used in mobile devices such as smartphones, tablets, ultra-thin laptops, and smart wearables. LPDDR4/4X shows significant performance improvement over LPDDR3/3X, providing higher data transfer rates and lower power consumption, and is currently advancing towards LPDDR5/5X and higher versions to meet the demand for higher bandwidth and lower power consumption. DDR is a widely used memory technology with a high data transfer rate, suitable for devices such as computers and servers. uMCP is a packaging technology that integrates high-capacity flash memory and high-speed RAM into a single chip, offering higher performance density, larger storage, and lower power consumption. It is primarily used in smart phones, tablets, and other mobile devices. ePOP is a packaging technology that combines high-performance eMMC and LPDDR into a single product. It uses a Package-on- Package (PoP) method to s stack the memory vertically on top of the CPU, resulting in a more compact design that saves space. This makes ePOP ideal for ultra-thin devices with strict size limitations, such as smart watches, smart bands, VR glasses, and other wearable devices. It is also used in some flagship smart phones.

Global and Chinese Mainland Embedded Memory Product Market Size

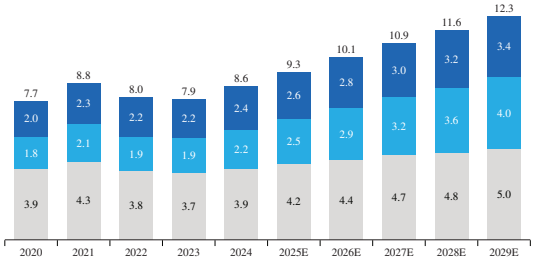
The global embedded memory product market size, by shipment, grew from 7.7 billion units in 2020 to 8.6 billion units in 2024, with a CAGR of 2.9%. The growth in this period was mainly driven by factors such as the development of AI, smart devices, industrial automation, and the Internet of Things. From 2024 to 2029, the market is expected to grow to 12.3 billion units, with a CAGR of 7.4%. The global embedded memory product market size, by revenue, increased from USD64.4 billion in 2020 to USD77.6 billion in 2024 with a CAGR of 4.8%. It is expected to reach USD160.5 billion in 2029 with a CAGR of 15.6% from 2024 to 2029.

Global Embedded Memory Product Market, by shipment

Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**2.9%**	**7.4%**
eMMC	5.5%	6.7%
LPDDR	5.8%	12.1%
Others	0.1%	4.9%

Note: Others includes embedded products such as UFS, DDR, eMCP, and ePOP.

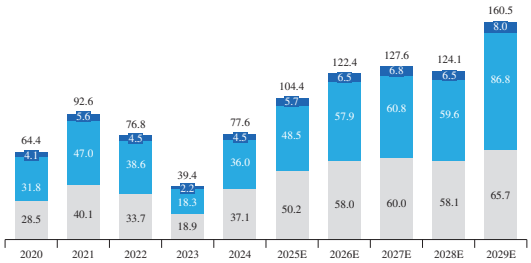


Global Embedded Memory Product Market, by Product, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**4.8%**	**15.6%**
eMMC	2.4%	12.2%
LPDDR	3.1%	19.2%
Others	6.8%	12.1%

Note: Others includes embedded products such as UFS, DDR, eMCP, and ePOP.



**Numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

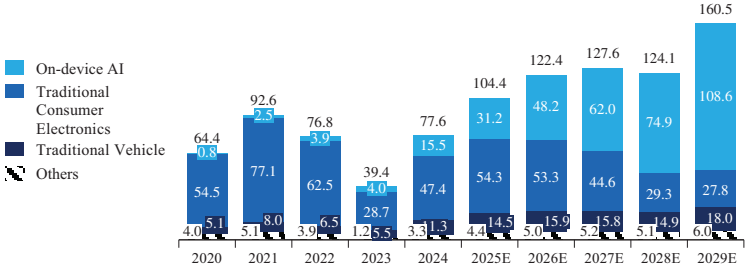
Segmented by the downstream application, different from the global semiconductor memory product market, the global embedded memory product market focused on on-device AI, traditional consumer electronics, traditional vehicles and others only. Among it, in the early stages, traditional consumer electronics held the largest market share. However, as traditional consumer electronics and vehicles gradually integrate AI technology, On-device AI has become the dominant application, and is expected to continuously drive the growth of the market, reaching USD108.6 billion in 2029 with a CAGR of 47.6% from 2024 to 2029.

Global Embedded Memory Product Market, by Downstream Application, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**4.8%**	**15.6%**
On-device AI	109.8%	47.6%
Traditional Consumer Electronics	-3.4%	-10.1%
Traditional Vehicle	22.0%	9.8%
Others	-4.7%	12.7%

Note: Others includes industrial, healthcare, and etc.



**numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

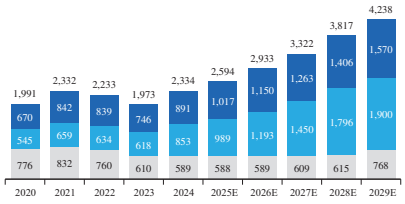
Chinese Mainland embedded memory product market size, by shipment, increased from 2,334 million in 2024 and is expected to reach 4,238 million in 2029 with a CAGR of 12.7%. By revenue, it increased from USD19.7 billion in 2024 and is expected to reach USD51.7 billion in 2029 with a CAGR of 21.3% from 2024 to 2029.

Chinese Mainland Embedded Memory Product Market, by Product, in Shipment

Million, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**4.1%**	**12.7%**
eMMC	7.4%	12.0%
LPDDR	11.9%	17.4%
Others	-6.7%	5.5%

Note: Others includes embedded products such as UFS, DDR, eMCP, and ePOP.

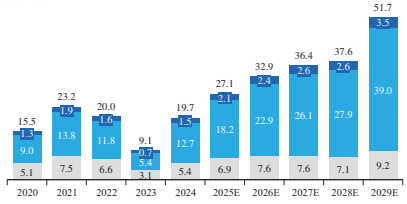


Chinese Mainland Embedded Memory Product Market, by Product, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**6.2%**	**21.3%**
eMMC	3.6%	18.5%
LPDDR	9.0%	25.2%
Others	1.4%	11.2%

Note: Others includes embedded products such as UFS, DDR, eMCP, and ePOP.



**numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

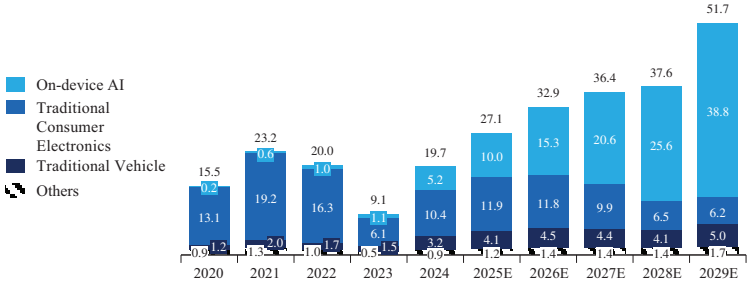
Segmented by downstream applications, Chinese Mainland embedded memory product market appears to have a similar trend with the global market. The on-device AI gradually takes the market with a CAGR of 49.5%, increasing from USD5.2 billion in 2024 to USD38.8 billion in 2029.

Chinese Mainland Embedded Memory Product Market, by Downstream Application, in Revenue

USD Billion, 2020-2029E

CAGR	2020-2024	2024-2029E
Total	**6.2%**	**21.3%**
On-device AI	125.8%	49.5%
Traditional Consumer Electronics	-5.6%	-9.8%
Traditional Vehicle	27.8%	9.3%
Others	0.0%	13.6%

Note: Others includes industrial, healthcare, and etc.



**numbers may not be added up to the totals due to rounding; Source: Expert Interview; Frost & Sullivan*

COMPETITIVE LANDSCAPE OF GLOBAL EMBEDDED MEMORY PRODUCT MARKET AMONG INDEPENDENT MEMORY PRODUCT PROVIDERS

Overview of Competitive Landscape

The participants in the global embedded memory product market can be divided into IDMs and independent memory product providers. IDMs hold the majority of the market share in the global embedded memory product market. However, independent memory product providers are gradually gaining more favor from customers by quickly responding to market changes and providing customized solutions. IDMs mainly maintain their advantages through

building long-term collaboration with large-scale downstream customers by using large-scale production and standardized products to meet high-volume demands. With a more flexible operating model, independent memory product providers can provide customers with more customized and differentiated product solutions. This includes providing a wider range of capacity options or special package forms, and offering faster responses to small-volume, multi-variety orders. The deep understanding and rapid response capabilities of independent memory product providers in niche markets fill the gaps left by IDMs, collectively promoting the healthy development and technological innovation of the entire memory ecosystem.

Ranking and Market Share

In 2024, IDM companies contributed approximately 85% of revenue and approximately 80% of shipments of the global semiconductor embedded memory product market, while the independent companies contributed approximately 15% of revenue and approximately 20% of shipments of the same market. Among all market players, including IDM and independent companies, the top five players in global embedded memory product market held a combined market share of over 70% in terms of revenue in 2024. The Company ranked outside the top ten market players and had a market share of 0.6% in terms of revenue. The top five players in global embedded memory product market held a combined market share of over 65% in terms of shipment in 2024. The Company ranked the tenth in the market with shipment of 140 million and a share of 1.6%.

Ranking of Global Embedded Memory Product Market, 2024, by Shipment

Ranking	Provider	Shipment	Market Share
		(Million units)	*(%)*
1	Company K	2,523	29.3%
2	Company L	1,978	23.0%
3	Company M	512	6.0%
4	Company N	369	4.3%
5	Company O	310	3.6%
...			
10	The Company	140	1.6%

- Company K is a public company listed on Korea Exchange. It is founded in 1969 and headquartered in Korea. It is a subsidiary of a global manufacturer of consumer electronics, chips, and electronic components.
- Company L is a public company listed on Korea Exchange. It is founded in 1983 and headquartered in Korea. It is a global memory chip manufacturer, specializing in the production of DRAM and NAND flash memory.
- Company M is a public company listed on NASDAQ. It is founded in 1978 and headquartered in United States. It is a global computer memory chip manufacturer.
- Company N is a public company listed on Tokyo Stock Exchange. It is founded in 2017 and headquartered in Japan. It is a memory manufacturer spun off from its parent company.
- Company O is a public company listed on NASDAQ. It is founded in 1988 and headquartered in United States. It is a global memory manufacturer spun off from another global memory manufacturer.

The Company ranked second in terms of shipment and ranked sixth in terms of revenue in 2024 among all independent memory product providers in the global embedded memory market.

Ranking of Global Embedded Memory Product Market Among Independent Memory Product Providers, 2024, by Shipment

Ranking	Provider	Shipment	Market Share
		(Million units)	*(%)*
1	Company A	150.0	8.7%
2	The Company	140.1	8.2%
3	Company B	120.0	7.0%
4	Company C	108.4	6.3%
5	Company D	89.2	5.2%

Ranking of Global Embedded Memory Product Market Among Independent Memory Product Providers, 2024, by Revenue

Ranking	Provider	Revenue	Market Share
		(USD Billion)	*(%)*
1	Company A	1.2	10.1%
2	Company B	1.1	9.1%
3	Company H	0.6	5.5%
4	Company D	0.6	5.2%
5	Company C	0.6	4.8%
6	The Company	0.5	4.2%

Source: Public disclosures of listed companies; Expert Interview; Frost & Sullivan

- Company H, founded in 1987, is headquartered in the United States. It is not listed. Its main business is designing, manufacturing, and selling various memory products.

Among all market players, including IDM and independent companies, the top five players in Chinese Mainland embedded memory product market held a combined market share of over 65% in terms of revenue in 2024. The Company ranked outside the top ten market players and had a market share of 0.9% in terms of revenue. The top five players in Chinese Mainland embedded memory product market held a combined market share of almost 60% in terms of shipment in 2024. The Company ranked the ninth in the market with shipment of 62 million and a market share of 2.7%.

Ranking of Chinese Mainland Embedded Memory Product Market, 2024, by Shipment

Ranking	Provider	Shipment	Market Share
		(Million units)	*(%)*
1	Company K	469	20.1%
2	Company L	420	18.0%
3	Company P	242	10.4%
4	Company Q	151	6.5%
5	Company M	117	5.0%
...			
9	The Company	62	2.7%

- Company P is a private company founded in 2016 and headquartered in Chinese Mainland. It is a company focused on the design and manufacturing of 3D NAND flash memory
- Company Q is a private company founded in 2016 and headquartered in Chinese Mainland. It is an integrated memory manufacturer focused on the design, development, production, and sales of DRAM chips

Among independent companies, the top five players in Chinese Mainland embedded memory product market held a combined market share of 50.6% in terms of revenue in 2024. The Company ranked the fifth in the market with revenue of USD0.2 billion and a share of 4.5%. The top five players in Chinese Mainland embedded memory product market held a combined market share of 46.0% in terms of shipment in 2024. The Company ranked the third in the market with shipment of 62 million and a share of 9.1%.

Ranking of Chinese Mainland Embedded Memory Product Market Among Independent Memory Product Providers, 2024, by Revenue

Ranking	Provider	Revenue	Market Share
		(USD Billion)	*(%)*
1	Company B	0.9	24.0%
2	Company A	0.3	8.6%
3	Company D	0.3	8.1%
4	Company C	0.2	5.4%
5	The Company	0.2	4.5%

Ranking of Chinese Mainland Embedded Memory Product Market Among Independent Memory Product Providers, 2024, by Shipment

Ranking	Provider	Shipment	Market Share
		(Million units)	*(%)*
1	Company B	96	14.0%
2	Company D	71	10.4%
3	The Company	62	9.1%
4	Company A	43	6.3%
5	Company C	42	6.2%

The Company ranked first in terms of shipment in 2024 among all independent memory product providers in the global LPDDR market. In terms of shipment in 2024, the Company ranked the second among all independent memory product providers in the global memory market with self-developed embedded controller memory products.

Ranking of Global LPDDR Market Among Independent Memory Product Providers, 2024, by Shipment

Ranking	Provider	Shipment	Market Share
		(Million units)	*(%)*
1	The Company	59.1	13.2%
2	Company A	37.5	8.4%
3	Company B	19.2	4.3%
4	Company D	13.4	3.0%
5	Company H	10.5	2.3%

Ranking of Global Memory Product with Self-Developed Embedded Controller Among Independent Memory Product Providers, 2024, by Shipment

Ranking	Provider	Shipment
		(Million units)
1	Company C	108.4
2	The Company	40.9
3	Company E	30.0
4	Company F	20.0
5	Company G	19.0

- Source: Public disclosures of listed companies; Expert Interview; Frost & Sullivan
- Company E, founded in 2017, is headquartered in Chinese Mainland. The company is not listed and focuses on the research and development, design, and manufacturing of semiconductor and integrated circuits.
- Company F, founded in 1995, is headquartered in Taiwan, China. It is listed on NASDAQ. The company specializes in the design, development, and marketing of NAND Flash controllers and SSD solutions.
- Company G, founded in 2018, is headquartered in Chinese Mainland. The company is not listed and focuses on the development, design, and sales of cutting-edge storage technologies and semiconductor devices for various applications.

Key Success Factors and Entry Barriers in Global Embedded Memory Product Market Among Independent Memory Product Providers

Full-process technical capabilities. The ability to cover through memory wafers selection, self-development of controller chips and firmware algorithms, and in-depth optimization of the overall memory design is key to ensuring optimal adaptation and synergy between the product and terminal devices. Given that embedded memory is integrated into terminal devices and profoundly affects their overall performance and user experience, any defect can bring huge risks. Therefore, embedded memory providers must ensure their products meet strict reliability standards. This requires providers to precisely balance the feasibility of upstream technology, the ability to interface with midstream SoC platforms, and the commercialization needs of downstream customers. At the same time, providers must be capable of achieving wafer testing and screening capabilities, which involves accurately identifying and selecting high-quality wafers that meet the strict standards of embedded applications from a massive volume of wafers.

Stable and high-quality upstream supply resources from memory wafer providers. Independent memory product providers are required to establish stable partnerships with memory wafer providers to ensure supply of high-quality wafers, even during market cyclical upturns. Companies with unstable supply of wafers will find it difficult to obtain the highest quality wafers from providers, which in turn affects the overall yield and performance of their products.

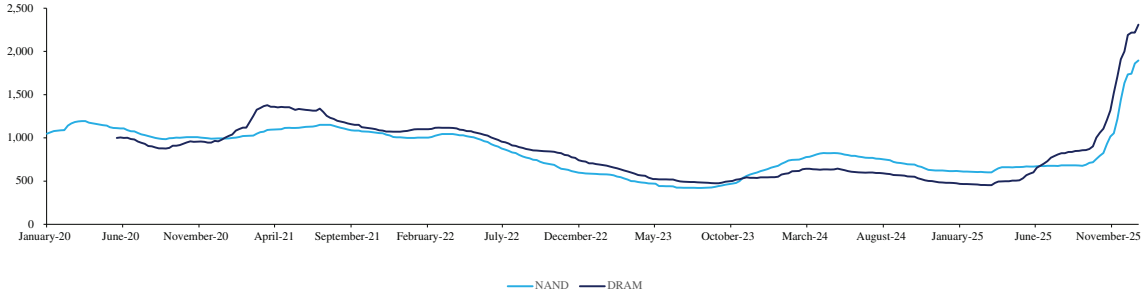
Supply chain integration and certification barriers from downstream customers. Downstream brand providers, typically have a strict validation cycle when selecting core embedded memory providers. Such certification directly affects the memory product's ability to work in synergy with the processor. The downstream customers are more willing to collaborate with the memory product providers that have been recognized by SoC platform providers. The supply chain integration and certification barriers make it difficult for new entrants to quickly expand their market share.

PRICE ANALYSIS OF SEMICONDUCTOR MEMORY WAFER & DRAM/ NAND BASED PRODUCTS

Due to industry practices, the factors affecting the company's product prices and the price of raw material wafers are largely consistent. The overall price plateaued at a high level throughout the first half of 2022 before experiencing a pronounced decline in the second half of the year. This downward trend persisted until mid-2023, which marked the beginning of a sustained rebound that continued through mid-2024. Subsequently, prices resumed a downward trajectory, which extended into the first quarter of 2025. The second quarter of 2025 witnessed a substantial increase in DRAM prices; however, prices were still below the elevated levels seen in 2022. In the second half of 2025, both the DRAM and NAND markets experienced a pronounced surge, with prices rising sharply to reach their highest levels in nearly five years.

The downward trajectory was primarily driven by a sharp contraction in end-customer demand, and rising inventory pressures. After June 2023, with the effects of production reductions and a gradual recovery in end-demand, the memory market began to rebound. The DRAM price increased , at the end of the first half of 2025, due to manufacturers phased out older process technologies. The upward pricing trend persisted throughout the second half of 2025, primarily driven by a substantial increase in demand for memory products fueled by the rapid expansion of AI applications. Going forward, the prices of DRAM and NAND are expected to continue to rise through 2026 as the strong growth of AI-related demands and the industry supply growth lagged the demand growth. In 2027 and 2028, new capacity added in 2025 and 2026 begins to ramp, which in turn ease supply constraints and drive a shift from strong price inflation toward overall stabilization or mild declines. By 2029, the expected proliferation of AI-driven devices and infrastructure is expected to continue to accelerate the memory demand, creating conditions for an ASP upturn in 2029, particularly for high-performance DRAM and advanced NAND used in AI workloads. The chart set forth below illustrates the price indices of NAND Flash and DRAM globally from January 2020 to December 2025.

Price indices of NAND Flash and DRAM (January 2020-December 2025)



**Note:* The price index of DRAM is only available after May 2020; Source: CFM; Frost & Sullivan

The semiconductor memory product market encompasses a diverse array of product categories, and the unit price of any specific product is affected by multiple factors, including the underlying wafer technology, storage capacity, supply-demand dynamics, and the competitive landscape. Consequently, the unit prices can differ significantly across various specifications. The table set forth below illustrates the price ranges and trends of three types of embedded memory products with typical storage capacity to show historical price movements from 2022 to 2025.

RMB per unit	2022H1	2022H2	2023H1	2023H2	2024H1	2024H2	2025H1	2025H2
DRAM-based products (DDR, LPDDR) (8-16Gb)	15.2-42.7	11.9-33.2	8.3-23.2	7.2-20.1	8.7-24.4	7.7-20.6	7.4-20.6	17.5-48.9
NAND Flash-based products (eMMC, UFS) (8-128GB)	16.8-89.5	12.0-63.9	8.4-44.8	8.4-44.5	13.0-69.5	11.5-61.5	10.8-57.5	16.5-87.8

RMB per unit	2022H1	2022H2	2023H1	2023H2	2024H1	2024H2	2025H1	2025H2
MCP embedded memory products (eMCP, uMCP, ePOP) (4GB+64GB-8GB+128GB)	134.8-304.0	80.9-228.1	70.9-159.9	55.3-146.7	88.7-199.9	58.6-176.3	74.2-167.4	145.1-327.2

The price trends of these three types of embedded memory products exhibit broadly similar trends due to shared macroeconomic and industry-wide factors. Since the second half of 2022, the market entered a prolonged downturn characterized by declining prices through mid-2023. The downward trend was primarily attributed to global macroeconomic headwinds, accumulated inventory levels across the supply chain, and softer demand in consumer electronics. However, a recovery phase commenced in late 2023 and continued through mid-2024. This rebound was catalyzed by strategic production cuts implemented by major upstream suppliers to rebalance market supply, coupled with a gradual recovery in downstream demand. However, a brief dip occurred from late 2024 to early 2025, before stabilizing and modestly rebounding by mid-2025 and sharply rising in the second half of 2025, propelled by AI-driven downstream expansions that increased memory product consumption. Similar to the price trends of DRAM and NAND Flash, the unit prices of embedded memory products are expected to continue to rise through 2026. In 2027 and 2028, the unit prices are expected to stabilize or experience mild declines. The memory products are expected to witness an ASP upturn in 2029 due to AI-related driving forces.

For other semiconductor memory products such as SSD, mobile memory products, and memory modules, the historical and forecasting price trends of these memory products generally demonstrate a similar pattern as embedded memory products due to shared macroeconomic and industry-wide factors.

SOURCE OF INFORMATION

In connection with the [**REDACTED**], we have engaged Frost & Sullivan to conduct a detailed analysis and to prepare an industry report on the markets in which we operate. Services provided by Frost & Sullivan include market assessments, competitive benchmarking and strategic and market planning for a variety of industries. We have agreed to a total of RMB500,000 in fees and expenses for the preparation and use of the Frost & Sullivan Report. The payment of such an amount was not contingent upon our successful [**REDACTED**] or on the results of the Frost & Sullivan Report. Apart from the Frost & Sullivan Report, we have not commissioned any other industry report in connection with the [**REDACTED**]. We have extracted certain information from the Frost & Sullivan Report in this section, as well as in the sections headed "Summary," "Risk Factors," "Business," "Financial Information" and elsewhere in this document to provide our potential [**REDACTED**] with a more comprehensive presentation of the industries in which we operate. Unless otherwise noted, all of the data and forecasts contained in this section are derived from the Frost & Sullivan Report, various official government publications and other publications. Frost & Sullivan prepared its report

based on its in-house database, independent third-party reports and publicly available data from reputable industry organizations. Where necessary, Frost & Sullivan contacts companies operating in the industry to gather and synthesize information in relation to the market, prices and other relevant information. Frost & Sullivan believes that the basic assumptions used in preparing the Frost & Sullivan Report, including those used to make future projections, are factual, correct and not misleading. Frost & Sullivan has independently analyzed the information, but the accuracy of the conclusions of its review largely relies on the accuracy of the information collected. Frost & Sullivan's research may be affected by the accuracy of these assumptions and the choice of these primary and secondary sources. Our Directors confirm that after taking reasonable care, there has been no adverse change in the market information since the date of the report prepared by Frost & Sullivan which may qualify, contradict, or have an impact on the information set forth in this section in any material respect.