
INDUSTRY OVERVIEW

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OVERVIEW OF THE GLOBAL AND CHINA DRAM MARKET

Definition and Classification of Memory Chip and DRAM

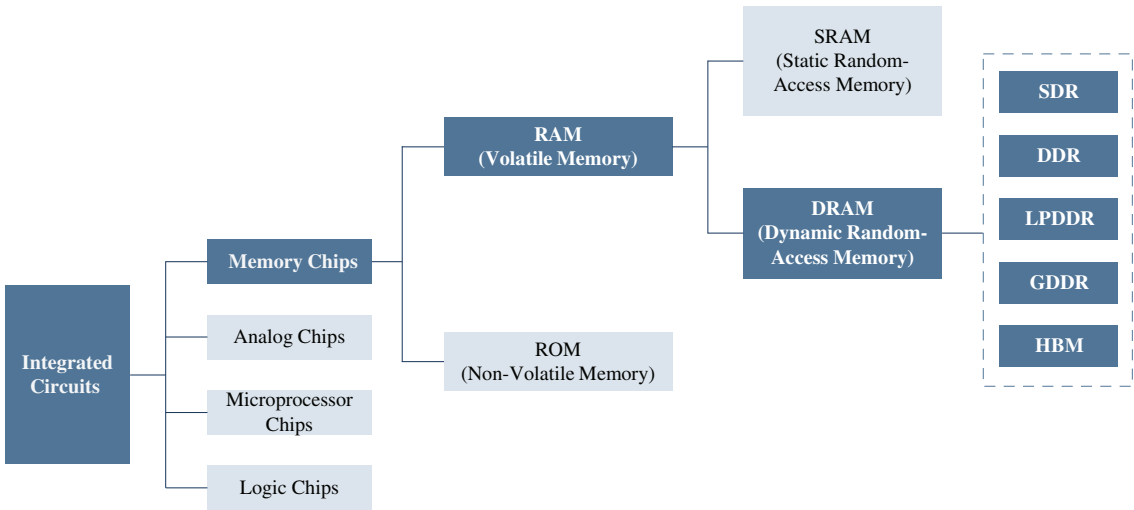
An integrated circuit is a miniature electronic device or component that integrates multiple electronic elements on a semiconductor material to perform specific circuit functions. It features a compact size, low power consumption, high reliability, and strong performance. Based on functionality, integrated circuits can be categorized into analog chips, microprocessor chips, logic chips, and memory chips. As a type of integrated circuit, memory chips are used for storing data and programs, serving as core components of information technology equipment and electronic information systems.

Memory chips can be classified into random access memory (“**RAM**”) and read only memory (“**ROM**”). RAM is a volatile memory that temporarily stores data, with the stored data being lost when power is removed. RAM is used to store data and programs that need to be processed and run in real time, and can be quickly accessed at any time by the device’s processor (such as the CPU). ROM is a non-volatile memory that permanently stores data, with the stored data retained even when power is removed.

SRAM and DRAM are two types of RAM. DRAM is a type of random access memory that stores data using capacitors and requires periodic refreshing to maintain data integrity. It has relatively lower cost and higher integration density, serving as the primary memory type in scenarios with high memory capacity requirements.

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Classification of Memory Chips

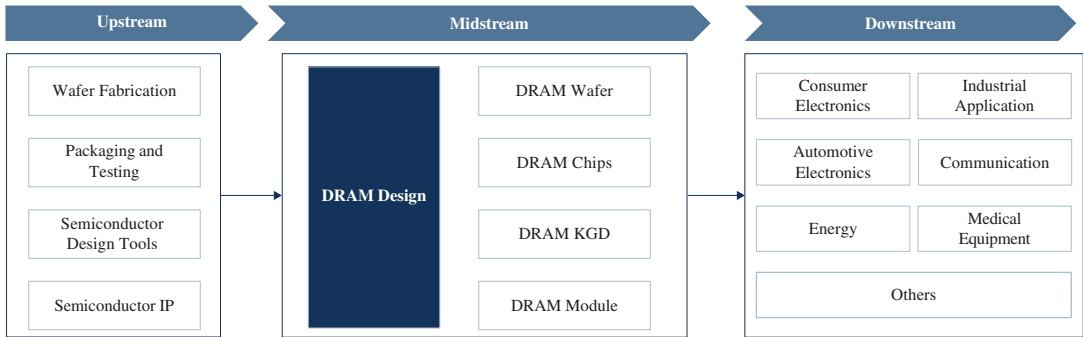


Source: Institute of Semiconductors, Chinese Academy of Sciences, Frost & Sullivan Report

In 2025, the global integrated circuit market reached RMB4,976.7 billion. In terms of market share by revenue, memory chips amounted to RMB1,633.1 billion in 2025, accounting for 32.8% of the integrated circuit market, making it the second-largest segment after logic chips. In terms of market share by revenue, DRAM dominates the global memory chip market, reaching a market size of RMB984.1 billion in 2025, making it the largest segment with a share of 60.3% within the memory chip market.

DRAM Industry Chain Analysis

The DRAM industry chain involves a large number of different participants. The following chart illustrates the main segments of the DRAM industry chain.



Source: Frost & Sullivan Report

The upstream of the DRAM industry chain encompasses suppliers of wafer fabrication, packaging and testing, semiconductor design tools and semiconductor IP, providing the necessary support to DRAM design and production. Semiconductor design tools refers primarily to Electronic Design Automation (EDA) tools — software platforms used to design and verify semiconductor chips. These tools support various stages of chip development, including circuit design, simulation, logic synthesis, physical layout, timing analysis, and verification. Semiconductor IP refers to pre-designed and reusable functional blocks or modules that can be integrated into larger chip designs. These can include memory controllers, I/O interfaces, standard cell libraries, or even entire

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subsystems. The midstream of the industry chain consists of DRAM design companies, which are responsible for the design of DRAM wafers and DRAM chips. DRAM design specifically refers to the architectural and circuit-level design of DRAM memory chips, including the definition of memory array structure, timing mechanisms, power management, error correction, and performance optimization. Unlike general semiconductor design tools or reusable IP modules, DRAM design is a highly specialized process. A DRAM wafer is a silicon wafer that has undergone a series of semiconductor manufacturing processes. During these processes, thousands of DRAM dies are fabricated simultaneously. A DRAM chip is a packaged die that is cut from the wafer, ready for integration into electronic devices. DRAM KGD refers to a die that has passed rigorous testing to ensure its performance and quality and can be integrated into other integrated circuits system. In some application scenarios, multiple DRAM chips can be integrated with other chips on a PCB to form a DRAM module. In the downstream segment, DRAM can be applied across a broad range of applications such as consumer electronics, industrial application, automotive, communication, energy, medical equipment and others.

The cost of DRAM is primarily composed of wafer manufacturing, packaging and testing. Among these, wafer manufacturing accounts for approximately 70-80% of the total cost, while packaging and testing represent around 20%-30%.

Business Model in DRAM Industry

The DRAM industry primarily operates under three business models: IDM, fabless, and foundry. Under IDM model, companies design DRAM, and complete manufacturing, packaging and testing process in house. Under fabless model, companies are only responsible for DRAM design and outsource manufacturing, packaging and testing to third parties. Foundry companies are not involved in the design of DRAM products and solely focus on providing manufacturing technology support and production capacity for fabless companies. Given that the R&D and production of DRAM require in-depth coordination, fabless companies in the DRAM industry typically maintain long-term and in-depth partnerships with a limited number of foundries, to ensure a stable supply of production capacity and the continuous iteration of production technologies.

Periodic characteristics of the DRAM memory chip market

While the DRAM market maintains long-term growth, it exhibits strong short-term cyclicity. This is primarily driven by the concentration of downstream applications in smartphones, PCs, and servers, where demand is sensitive to technological iterations and macroeconomic conditions. Furthermore, the supply side is highly concentrated among three leading overseas companies accounting for approximately 95% of the market share, whose synchronized capacity and inventory management often result in market hysteresis. Additionally, high product standardization and substitutability lead to fierce price competition during periods of supply-demand imbalance.

Global and China DRAM Market Size Analysis and Forecast

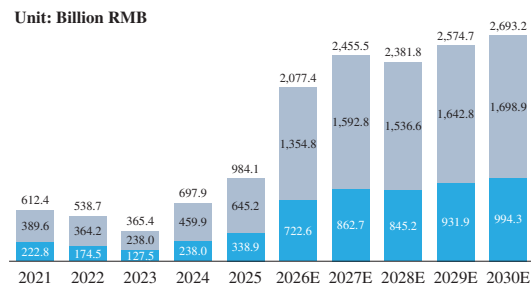
Due to inventory accumulation and weak demand in downstream consumer electronics fields, it fell from RMB612.4 billion in 2021 to RMB365.4 billion in 2023. With the booming demand of servers, recovery of consumer electronics and technological upgrades, the market size rebounded to RMB984.1 billion in 2025. Driven by the rapid development of AI applications, expansion of consumer electronics, and technological innovation will continue to drive market growth in long term. The global DRAM market size is expected to reach RMB2,693.2 billion in 2030, with a CAGR of 22.3% from 2025 to 2030.

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In line with the upward cycle of the global DRAM market, the DRAM market size in China rebounded to RMB338.9 billion in 2025 and is expected to increase to RMB994.3 billion in 2030, driven by the extensive downstream demand and the explosion of the AI industry. The types of DRAM used in IPTV terminals primarily include DDR3, DDR4, and LPDDR. In terms of market size, the global DRAM market related to IPTV grew from RMB2.8 billion in 2021 to RMB3.7 billion in 2025. It is projected to reach RMB4.7 billion by 2030. LPDDR4 as a mainstream low-power memory widely used in smart terminals and highly integrated devices, its market size grew from RMB3.7 billion in 2021 to RMB5.2 billion in 2025. It is expected to reach RMB10.8 billion by 2030. The global market size for 8Gb DDR4 products increased from RMB21.7 billion in 2021 to RMB27.9 billion in 2025. Due to its continued widespread application in general computing, servers, and industrial terminals, it is projected to reach RMB30.5 billion by 2030.

Global and China DRAM Market Size, by Sale Revenue

	CAGR	2021-2025	2025-2030E
Rest of the World		13.4%	21.4%
China		11.1%	24.0%
Global		12.6%	22.3%



Note: China market in above table includes the Chinese mainland, Hong Kong, Macau, and Taiwan

Source: Yole, Public Information, Expert Interview, Frost & Sullivan

Market Drivers and Trends of DRAM Industry

Continuous development, expansion and upgrade of downstream application fields and products

DRAM is fundamental to achieving efficient data processing and interaction, and is widely used across various electronic devices. The continuous development of traditional downstream application fields such as consumer electronics, automotive, industrial applications, and communications, provide stable support for the demand in the DRAM market. The growth of emerging fields continue to broaden the application scenarios of DRAM. The development of the AI industry, the popularization of consumer electronics such as smart wearable devices (e.g., smart watches, AR/VR), and the rise of markets such as humanoid robots and eVTOL* are accelerating the demand for DRAM.

Technological innovation of High-bandwidth Stacked DRAM

In recent years, the miniaturization process of DRAM has stalled, with density growth slowing down, which has constrained the improvement of DRAM performance. With the rise of AI industry, the requirements for memory performance in servers and high-performance computers have increased significantly. High-bandwidth stacked DRAM, a technology that stacks multiple layers of DRAM chips or stacks DRAM wafers with logic wafers, has revolutionized the traditional DRAM

*Note: eVTOL refers to electric vertical take-off and landing aircraft.

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architecture. It significantly enhances bandwidth, reduces latency and power consumption, and can better meet the demands of AI computing. As AI technology continues to develop along with the expansion of its application scenarios, the market demand for high-bandwidth stacked DRAM is rising sharply.

Increase of domestic self-sufficiency rate

The global DRAM market is highly concentrated with top three overseas companies occupying approximately 95% of the market share, while Chinese companies only take a very small share. In recent years, Chinese companies have increased investment in R&D and market expansion in DRAM market. Coupled with policy support and growing demand for domestic supply chains from downstream market, these companies have achieved notable progress in product development and market penetration in certain segments. In particular, domestic substitution policies have become a strong driver of growth. Under the “14th Five-Year” National Informatization Plan, China has placed strategic emphasis on strengthening independent capabilities in computing and memory chips, recognizing DRAM as a core component of national information infrastructure and cybersecurity. This has translated into coordinated efforts to advance R&D, integrate supply chains, and provide financial and policy support for local enterprises. More recently, supportive tax incentive schemes — such as the 2025 list of integrated circuit and software enterprises issued by the National Development and Reform Commission — explicitly include memory manufacturers, lowering R&D and production costs while encouraging reinvestment into innovation and equipment upgrades. Together, these initiatives not only help domestic DRAM companies enhance technology and scale production but also accelerate localization, improve competitiveness, and reinforce China’s long-term self-sufficiency in niche DRAM.

OVERVIEW OF THE GLOBAL AND CHINA NICHE DRAM MARKET

Definition of Niche DRAM and Mainstream DRAM

Based on product and market features, DRAM can be categorized into mainstream DRAM and niche DRAM. Mainstream DRAM features large capacity and high transmission speeds, primarily used in large-scale standardized electronic devices such as smartphones, PCs, and servers. In contrast, niche DRAM relies on mature technologies to meet diverse market needs across automotive, communications, industrial applications, and medical equipment. These sectors prioritize customization, better performance-price ratio, long lifecycle support, and reliability. Additionally, the highly fragmented downstream applications of niche DRAM lead to relatively stable demand, resulting in smaller market fluctuations compared to the mainstream DRAM market.

The niche DRAM market is neither disappearing nor a sunset industry. As mainstream DRAM products undergo technological upgrades, older-generation products are typically absorbed and sustained by the niche DRAM market after exiting mainstream segments. These products continue to serve applications in consumer electronics, industrial, and automotive that require high stability, low power consumption, and cost efficiency. Leveraging its cost advantages and reliable performance, niche DRAM continues to demonstrate resilient demand across multiple sub-segments characterized by such requirements. The lifecycle of DRAM products follows a progressive transition from mainstream markets to niche segments before gradually fading out. When a new DRAM generation achieves superior bandwidth and power efficiency, it replaces the previous generation in mainstream applications such as PCs, servers and smartphone. The preceding generation, characterized by maturity, stability, cost efficiency, and long-term supply capability, transitions into long-lifecycle applications including consumer electronics, industrial equipment, and automotive systems, thereby becoming niche products. Older generations, in turn, exhibit a gradual phase-out pattern as replacement completes, demand contracts, and production capacity shifts, resulting in an extended overall lifecycle.

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As an illustrative case study, from a generational perspective, DDR1, DDR2, and DDR3 entered the mainstream DRAM market in 2000, 2003, and 2007, respectively, and were widely adopted in PCs, servers, and smartphones. With continuous technological advancements and the growing downstream demand for higher performance and lower power consumption, new-generation products such as DDR4 and DDR5 were subsequently introduced, gradually replacing earlier generations as the dominant products in the mainstream DRAM market. Meanwhile, older generations progressively exited the mainstream DRAM market, with DDR1, DDR2, and DDR3 transitioning into niche DRAM markets around 2006, 2010, and 2016, respectively. At present, DDR3 remains the primary product in the niche market, while DDR1 and DDR2 continue to serve specific applications such as consumer electronics, industrial, and automotive, where long-term supply stability and high reliability are prioritized. Although their market scale has diminished, they illustrate the long lifecycle and slow iteration typical of niche DRAM products.

The evolution of the niche DRAM market is shaped by both technological progress and application demand. The mainstream DRAM market’s continuous pursuit of higher performance and lower power consumption drives the introduction of new generations, while older generations have gradually transitioned into the niche market and continued to deliver value in specific applications. Furthermore, the industrial and automotive sectors prioritize long-term supply stability, product reliability, and cost efficiency, which allows niche DRAM products to sustain extended lifecycles in these specialized markets. Backed by substantial market demand and its outstanding cost-performance advantages, niche DRAM continues to demonstrate strong vitality. Its core applications lie in segments where memory performance requirements are modest but cost efficiency and stability are critical, including digital televisions, set-top boxes, digital cameras, media players, gaming consoles, smart speakers, communication base stations, routers, Wi-Fi devices, industrial sensors, surveillance systems, smart meters, smart locks, in-vehicle gateways, automotive dashboards, vehicle sensors, and in-car infotainment systems. These fields generally demand limited storage capacity and performance, yet require low-power and cost-effective memory solutions — precisely where niche DRAM fits. As a result, niche DRAM and mainstream DRAM maintain a clearly differentiated competitive landscape and are expected to coexist in the long term, with niche DRAM unlikely to be replaced by mainstream products in the near future. Niche DRAM faces structural headwinds as AI shifts some demand toward higher-end, higher-capacity memory, potentially narrowing its addressable market. Nevertheless, given that niche applications are highly fragmented and seldom depend on capacity or leading-edge nodes, the overall impact is expected to remain limited.

The niche DRAM market maintains a clearly differentiated competitive landscape from the mainstream DRAM segment. Mainstream DRAM is primarily used in large-scale standardized electronic devices such as smartphones, PCs, and servers, which have uniform requirements for memory performance and specifications. As a result, mainstream DRAM products are standardized, featuring high capacity and fast data transfer rates, and benefit from cost reduction through economies of scale. In contrast, niche DRAM serves specific segments including consumer electronics, industrial, and automotive applications, where demand is more diverse and emphasizes customization, cost-performance balance, long lifecycle support, and reliability. Although the rise of AI applications is driving certain devices toward higher-end memory, the fragmented application landscape and differentiated positioning of niche DRAM ensure its continued relevance and steady growth in the future.

The niche DRAM market will continue to develop with technological advancement. As mainstream DRAM advances, older-generation products are gradually transitioned into the niche market, forming a technology gradient and market relay effect that sustains long-term growth momentum for niche DRAM. Meanwhile, ongoing improvements in process technology and reliability design are enhancing the performance, capacity, and stability of new-generation niche DRAM products, enabling them to better meet the stringent requirements of consumer electronics, industrial and automotive applications.

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The current mainstream DRAM products in the market are DDR4 with a capacity of above 8Gb and later-generation DRAM. DDR4 with a capacity of 8Gb or less and earlier-generation DRAM are regarded as niche DRAM.

	Products	Applications	Price	Features
Mainstream DRAM	- HBM - GDDR - DDR5 - DDR4 (above 8Gb)	- Servers - PCs - Smart-phone - Others	High price with higher degree of fluctuations	- High performance - High product standardization - Highly concentrated downstream application - High cyclical fluctuation - Fast technological iteration
Niche DRAM	- DDR4 (8Gb or below) - DDR3 - DDR2 - DDR1 - SDR	- TV/Set-up boxes - Smart home appliances - Robotics - Network communication - Industrial control systems - Automotive electronics	Lower price with lower degree of fluctuations	- Cost efficiency - Demand for product customization - Highly fragmented downstream application - Moderate cyclical fluctuation - Relatively mature process nodes

Source: Frost & Sullivan Report

Global and Chinese Niche DRAM Market Size Analysis and Forecast

The niche DRAM market also exhibits cyclical changes. Over the past decade, the niche DRAM market has exhibited pronounced cyclical fluctuations. These cyclical patterns result from the interplay and recurring influence of demand, production, inventory, and pricing. The underlying mechanism of these cycles is as follows:

- Rising demand drives market expansion**

When global economic growth is robust, and demand in consumer electronics, automotive electronics, and industrial control remains strong, niche DRAM demand rises accordingly. During this phase, supply falls short of demand, prices increase, and manufacturers enjoy wider profit margins. To capture greater market share and higher profits, manufacturers expand capacity and scale up production, pushing the market into an expansionary stage. The niche DRAM market exhibits pronounced cyclicity, with price fluctuations closely tied to supply-demand dynamics, generational product transitions, and shifts in downstream applications. Historically, 2013, 2016, and 2020 each marked typical expansion phases in the market cycle. The 2013 price surge was primarily driven by supply contraction and unexpected disruptions. Some manufacturers reallocated capacity from PC DRAM to higher-margin Mobile DRAM, while a major fire incident at a leading Korean company’s plant reduced global effective supply, further widening the supply-demand gap. In the second half of 2016, the smartphone production boom tightened PC DRAM supply as capacity shifted toward mobile products, and the introduction of DDR4 led manufacturers to gradually scale back DDR3 wafer input, intensifying supply shortages and driving prices higher once again. In 2020, the pandemic fuelled surging demand for remote work and learning, leading to strong growth in niche applications such as routers and networking devices. Combined with the gradual reduction in DDR3 product supply by leading Korean manufacturers, this initiated a restocking cycle in the niche DRAM market, with the upward momentum extending into 2021. Due to the industry’s highly concentrated supply structure and high product standardization, niche DRAM market expansions are typically driven by rapid downstream demand growth or supply tightening, while contractions result from weakening demand and elevated inventory levels.

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The supply and demand fluctuations in the DRAM market are relatively more drastic fluctuations compared to its downstream industries, primarily due to the market structure and product characteristics. The DRAM market is highly concentrated. In 2024, the three leading international manufacturers accounted for approximately 70% of the global niche DRAM market and about 90% of the mainstream DRAM market. Their capacity planning and inventory strategies have a significant impact on the overall supply-demand balance. Moreover, given the intense competition and convergence in business strategies among these top players, any adjustment made by one manufacturer is quickly amplified across the entire market. In addition, although niche and mainstream DRAM products differ to some extent in specifications, the overall standardization level of DRAM is much higher than that of most other chip categories. This high degree of standardization amplifies the industry’s cyclicality, leading to relatively more evident price and capacity volatility.

- **Cyclical dynamics of supply, inventory and pricing in the niche DRAM market**

As manufacturers continuously expand capacity, supply eventually outpaces demand. At the same time, as demand growth slows or stabilizes, channel inventories begin to accumulate. Once inventory reaches a certain level, suppliers adopt price-cutting strategies to accelerate turnover, intensifying market competition and driving prices downward. Subsequently, declining prices dampen manufacturers’ production incentives, prompting them to cut output in response to market changes. With lower production, supply gradually decreases, while inventory levels are reduced through consumption over time. Once inventories fall to a certain threshold, supply and demand regain balance, or even shift into shortage, at which point prices stabilize and begin to recover.

- **Price recovery and structural product upgrades drive the next cycle**

Recovering prices once again improve profitability. Manufacturers, seeking to capitalize on these opportunities, increase capacity investments, initiating another round of production growth. As capacity expands faster than demand, inventories accumulate anew, putting downward pressure on prices and completing the full cycle. Parallel to these cyclical fluctuations, the market undergoes structural changes through product standard iteration. From 2020 to 2023, leading manufacturers gradually scaled back DDR3 production. Starting from late 2024, they shifted their strategic focus toward high-end DRAM products required by the AI market (such as DDR5 and HBM), progressively reduced DDR4 output, and accelerated their exit from the niche DRAM segment.

However, due to the fragmented downstream application markets, the existence of customized demands, and the increase in the number of market participants, its market fluctuation is more moderate compared to that of the overall DRAM market, especially the mainstream DRAM market. The global niche DRAM market size reached RMB68.6 billion in 2025, achieving growth amid fluctuations since 2020. Due to China’s strong presence in the global supply chain in industries such as consumer electronics, automotive, communications, industrial automation and control, China remains as the largest market in the global niche DRAM market. In 2025, China’s niche DRAM market size reached RMB41.6 billion, representing over 60% of the global market. In the global DRAM market in 2025, in terms of sales revenue, niche DRAM and mainstream DRAM accounted for 7.0% and 93.0% of the market share, respectively. In the Chinese DRAM market in 2025, in terms of sales revenue, niche DRAM and mainstream DRAM held market shares of 12.3% and 87.7%, respectively. From 2020 to 2023, the niche DRAM market underwent cyclical changes. Between 2020 and mid-2022, the DRAM industry was in an upward phase. During this period, Korean leading companies phased out portions of their DDR3 production and reallocated capacity to logic chips, prompting customers to stockpile inventory and driving up DDR3 prices — resulting in overall strength in the niche DRAM segment. From the second half of 2022 onward, weakened end-market demand led to elevated inventory levels. To expedite inventory digestion, Korean leading companies implemented successive price reductions, triggering a sustained correction in the DRAM industry. By 2023, market supply and demand had reached a relative equilibrium, with

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DDR3 prices largely stabilizing and exhibiting modest volatility. In 2024, the niche DRAM market entered a recovery phase. Following the full withdrawal of Korean leading companies from the DDR3 business during the year, both demand and pricing in the niche segment began to trend upward.

The application of mainstream DRAM is concentrated in large-scale, standardized electronic devices such as smartphones, personal computers, and servers, while niche DRAM primarily serves sectors like general consumer electronics, communications, the Internet of Things (IoT), industrial applications, and automotive. Driven by the differing demands of these application scenarios, mainstream DRAM is designed to meet the performance requirements for high data processing speed and large capacity in end devices, resulting in superior performance compared to niche DRAM, with corresponding higher capacity and higher prices. As a result, in terms of revenue, the global market share of mainstream DRAM is larger than that of niche DRAM, with respective shares of 93.0% and 7.0% in 2025. Mainstream DRAM accounted for approximately 90.8% of total sales volume measured by capacity, with niche DRAM represented the remaining 9.2%. The price per GB of mainstream DRAM is slightly higher than that of niche DRAM. The primary factor of the market size gap is that mainstream DRAM chips have a larger capacity (GB) per unit compared with niche DRAM chips. The downstream application scenarios for niche DRAM are highly dispersed, covering a wide range of end-device categories. Additionally, while the demand for storage in some sub-segments may be low per device, the total number of end devices is large, leading to strong overall sales performance.

Currently, international leading companies are gradually exiting the niche DRAM market, where they previously accounted for approximately 70% to 80% of the supply, a substantial market gap is expected to emerge. This gap will likely be filled by Chinese manufacturers. Moreover, given the high capital requirements and long construction cycles of DRAM production lines, foundries show limited willingness to expand capacity in the short term, providing long-term support for niche DRAM pricing. Additionally, a massive number of low-capacity electronic devices, such as IoT device, network communication terminals, 5G base stations, monitoring systems, smart meters, automotive electronics and more, continue to support the expansion of the niche DRAM market. It is projected that by 2030, the market size of niche DRAM will grow to RMB136.2 billion.

In 2026, as leading international manufacturers further withdraw from the niche DRAM market and reallocate production capacity toward higher-margin products such as DDR5 and HBM, the niche DRAM market is expected to face a market gap of RMB57.8 billion, it is projected to reach RMB91.1 billion by 2030.

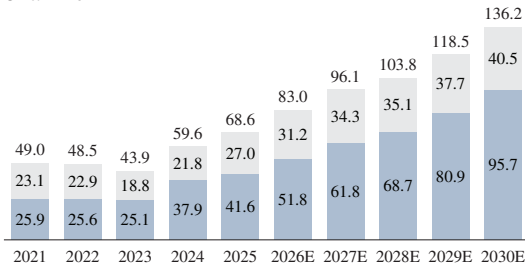
The global niche DRAM market is primarily concentrated in the Mainland China, Taiwan, South Korea and United States. In 2025, the leading international players jointly accounted for 65.8% of the global market, while the remaining share was mainly held by Taiwanese and Chinese mainland companies, representing 25.1% and 9.2% of the global niche DRAM market, respectively. Against the backdrop of escalating global trade tensions, Chinese mainland customers have increasingly shifted their procurement preferences toward domestic suppliers to ensure supply chain security and stability. Under this trend, the current supply gap in the niche DRAM market is expected to be largely filled by manufacturers from Taiwan and Chinese mainland. As the three major international players continue to scale down their investments in the niche DRAM segment, China's market share is anticipated to rise further, supported by the geographical proximity and supply chain advantages of Chinese companies in addressing this emerging market opportunity.

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Global and China Niche DRAM Market Size, by Sale Revenue

CAGR	2021-2025	2025-2030E
Rest of the World	4.0%	8.4%
China	12.6%	18.2%
Global	8.8%	14.7%

Unit: Billion RMB



Note: China market in the above table includes the Chinese mainland, Hong Kong, Macau, and Taiwan

Source: Yole, Public Information, Expert Interview, Frost & Sullivan

Market Drivers and Trends of the Niche DRAM Market

Growing demand for customization

With the diversification of memory product requirements across various industries, customized niche DRAM products can better meet the personalized needs of specific customers. For example, IoT devices typically require low-power consumption and small-capacity DRAM, while automotive electronics have strict requirements for the reliability and stability of DRAM.

International companies shift market targets

Although leading overseas manufacturers still hold a significant market share in the niche DRAM market, their increased focus on high-end mainstream DRAM markets such as HBM and DDR5 has led to a gradual withdrawal from the niche DRAM market. This implies that the production supply of niche DRAM is expected to tighten in the future. Combined with extensive and stable downstream market demand, prices of niche DRAM are expected to recover in the long run. The supply-demand relationship in the niche DRAM market is poised to maintain healthy development over the long term.

Gradual increase in the share of domestic manufacturers

Domestic companies are gradually accumulating technical and market experiences in the niche DRAM market providing products with performance that is close or equivalent to overseas companies. Driven by favorable government policies and increasing downstream demand for localized supply chains, domestic DRAM companies are expected to further expand their market share. In October 2023, the Ministry of Industry and Information Technology and other authorities issued the *Action Plan for the High-Quality Development of Computing Power Infrastructure* (《算力基礎設施高質量發展行動計劃》), which emphasizes the need to “continuously enhance the capabilities of the storage industry and encourage manufacturers of storage products to strengthen independent R&D and manufacturing of key storage components.” This reflects policy support for domestic enterprises to intensify efforts in developing core DRAM technologies. The localization of DRAM chip is expected to help break foreign technology blockades and enhance China’s capacity for independent innovation in the DRAM industry. This will drive companies in DRAM industry to accelerate technological breakthroughs and production line upgrades, expediting the achievement of self-reliance in core technologies. In May 2024, the Ministry of Industry and

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Information Technology and other relevant authorities released the *Action Plan for Informatization Standards Development (2024-2027)* (《信息化標準發展行動計劃(2024-2027年)》), which outlines critical information technologies, emphasizing advancing standardization for core technologies such as high-performance computing chips and memory chips. This initiative plays a dual role in guiding domestic enterprises to align R&D with unified standards for enhanced product compatibility, while facilitating alignment with international benchmarks to accelerate localization and import substitution.

Average Selling Price Trend of DRAM

In the niche DRAM market, DDR3 stands out as the most widely used product. Driven by supply-demand dynamics, its price exhibited volatility between 2020 and 2024. In 2021, some leading companies shifted their production capacity to other product lines. This adjustment led to a reduced supply of DDR3, which in turn caused a significant price increase. In 2022, major manufacturers scaled up DDR3 production, but growth in end-market demand fell short of expectations. To speed up inventory clearance, companies resorted to price reductions, triggering a decline in DDR3 prices. From 2023 to 2024, changes in overall market supply and demand were relatively moderate. As a result, DDR3 prices remained relatively stable with only minor fluctuations.

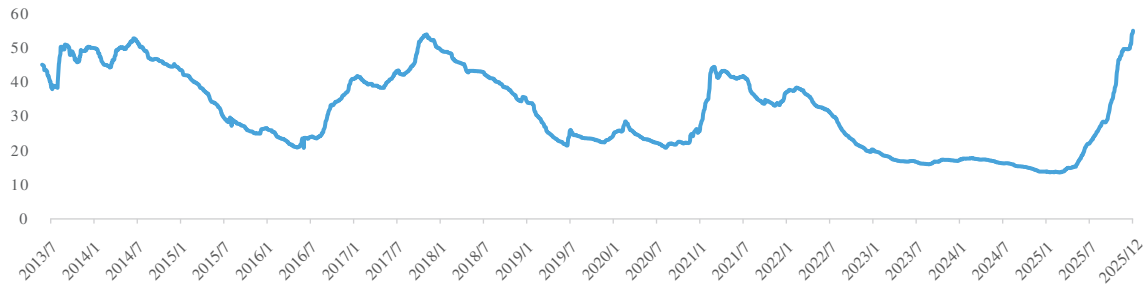
The background of the DRAM market downturn since 2022 and the decline in DDR3 prices lies in the slower-than-expected growth of end-market demand, which prompted companies to implement price cuts in order to accelerate inventory clearance. From 2020 to mid-2022, the entire DRAM industry was in an upward cycle. During this period, international players such as Korean leading companies discontinued production of certain DDR3 products and shifted their production lines to logic chip products, prompting customers to stockpile inventory and driving DDR3 prices upward. Starting in the second half of 2022, weakened end-market demand led to inventory buildup. To expedite inventory clearance, international leading companies successively implemented price reductions, causing DDR3 prices to drop. The DRAM industry entered a downward cycle. From 2023 to 2024, market supply and demand reached relative balance, and DDR3 prices remained generally stable with only minor fluctuations. In 2025, as international leading companies successively ceased DDR4 production and shifted their capacity toward higher-margin products such as DDR5 and HBM, market supply declined sharply, pushing the DRAM industry into another upward cycle. As customer demand recovered, DDR3 prices also rose, driven by the fact that only Chinese manufacturers retained large-scale supply capabilities.

Against this backdrop, niche DRAM has consistently displayed cyclical volatility. In the second half of 2013, niche DRAM prices peaked, followed by a prolonged downcycle until they bottomed out in the first half of 2016. From the second half of 2016, prices entered a recovery phase, reaching a new cycle peak at the end of 2017, before falling again and hitting another trough in late 2019, where they remained for several months. In mid-2020, niche DRAM prices began another rebound, peaking in mid-2021 before entering a new downward cycle. Leading manufacturers have shifted their business focus toward high-end DRAM products required for the AI market (such as DDR5 and HBM) and accelerated their exit from the niche DRAM segment. As the top three players strategic pivot directly triggered a sharp supply contraction, driving niche DRAM prices to surge rapidly since 2025. Moreover, the long-term supply contraction resulting from their exit is expected to significantly alter the traditional cyclical dynamics of the niche DRAM market. Ultimately, supply and demand will reach equilibrium, with prices expected to stabilize relatively over the long run. Against this backdrop, the impact on the Group’s sustainable development and liquidity is generally positive, as rising prices and supply contraction enhance profitability and order visibility, supporting improvements in operating cash flow and inventory turnover.

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DRAM DDR3 Memory Chips Price Trend, 2013-2025

Unit: RMB per GB



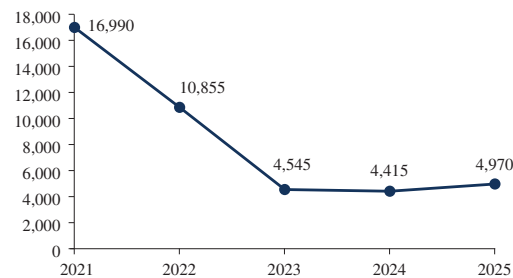
*Note: The DRAM DDR3 memory chip price trend covers the period from July 2013 to December 2025.

Source: DRAMexchange, Frost & Sullivan Report

The 12-inch wafer, serving as the key raw material for DRAM production, experienced price fluctuations over the period from 2021 to 2025. The core cost of DRAM chips stems from wafers, whose costs are affected by multiple factors such as specification parameters, process types, and procurement scales. Since 2022, as end-market demand weakened and inventory levels surged, wafer prices have declined. Supply and demand reached a relative balance from 2023 to 2024. The price trend of wafers is correlated with the DRAM industry cycle, shaped by both supply-demand dynamics and production capacity shifts.

12-Inch Wafer Price Trend, 2021-2025

Unit: RMB/unit



Source: TrendForce, Frost & Sullivan

OVERVIEW OF THE HIGH-BANDWIDTH STACKED DRAM INDUSTRY

Over the past two decades, processor performance has continued to improve rapidly, while memory performance has increased at a relatively smaller rate. This disparity has resulted in a “performance gap”, leading to a memory bottleneck that limits high-performance processors. This challenge is particularly significant in AI computing. Stacking technology allows multiple DRAM chips to be vertically stacked, significantly enhancing data transfer bandwidth and memory density. It has emerged as a key solution to overcome the DRAM performance bottleneck and meet future computational demands.

INDUSTRY OVERVIEW

Definition of High-bandwidth Stacked DRAM

High-bandwidth stacked DRAM relies on stacking technology. It is an advanced packaging and integration solution that realizes the interconnection of multiple layers of DRAM chips through packaging-level stacking technologies such as TSV and Hybrid Bonding. With its extremely wide bus and stacking structure, it delivers high-capacity and high-bandwidth memory performance, relieving the bandwidth bottleneck between the processor and the memory. It improves integration, performance, and energy efficiency for AI applications.

Currently, HBM and Wafer on Wafer are two major technical routes to realize high-bandwidth stacked DRAM. HBM achieves ultra-high bandwidth by stacking multiple DRAM die layers with TSV and microbump interconnections, enabling parallel data transfer across layers. Wafer on Wafer vertically stacks logic wafers and DRAM wafers through hybrid bonding technology to support near-memory computing, achieving higher bandwidth and lower power consumption.

Global High-Bandwidth Stacked DRAM Market Size Analysis and Forecast

Driven by the explosive growth of the AI industry, high-bandwidth stacked DRAM is set to significantly outpace the overall DRAM market. The global high-bandwidth stacked DRAM market size, in terms of revenue, increased from RMB12.3 billion in 2021 to RMB217.6 billion in 2025 with a CAGR of 105.1%. Driven by AI technological innovations and expansion of AI applications, the global high-bandwidth stacked DRAM market size is expected to rapidly grow to RMB696.9 billion with a CAGR of 26.2% from 2025-2030.

Market Drivers and Trends of High-Bandwidth Stacked DRAM Industry

The Surge in AI Computing Power Drives the Market Demand

Generative AI and large-model technologies are driving up global computing power demand. From 2024 to 2029, global computing power is expected to triple and AI server shipments to double. High-bandwidth and low-latency memory are crucial for AI training and inference. With the high bandwidth and low power consumption characteristics, high-bandwidth stacked DRAM has become a core component of AI servers, which enables AI servers to quickly access and process large volumes of data, accelerating the training and inference processes.

Development of localization

Currently, international companies dominate the supply of High-Bandwidth Stacked DRAM. As international trade conflicts exacerbate high-bandwidth stacked DRAM supply issues, China is advancing high-bandwidth stacked DRAM localization via increased R&D effort and policy encouragement. There are domestic DRAM companies have recently announced R&D achievements related to High-Bandwidth Stacked DRAM. Domestic high-bandwidth stacked DRAM R&D is anticipated to make a breakthrough in near future.

OVERVIEW OF COMPETITIVE LANDSCAPE OF GLOBAL AND CHINESE DRAM INDUSTRY

Overview of DRAM market competition

Mainstream DRAM Market:

The mainstream DRAM market is dominated by top three companies from South Korea and the U.S. Leveraging advanced technologies and large-scale production capabilities, they hold approximately 95% of the global market share. Notwithstanding this, a very small number of companies from China and Taiwan region have made breakthroughs and achieved commercialization.

INDUSTRY OVERVIEW

Niche DRAM Market:

The niche DRAM market is mainly characterized by differentiated demands. The top three companies from South Korea and the U.S. hold an aggregated market share of approximately 70%. Meanwhile, a number of companies from Taiwan have a strong presence in this market. While companies from China currently hold a very small market share, but is gaining on market share by focusing on segmented scenarios such as low-capacity consumer electronics, automotive, communication and industrial control. With the gradual withdrawal of global companies from the niche market, the increase in demand of supply chain localization and the support of government policies, companies from China are expected to continue expansion of market share.

High-Bandwidth Stacked DRAM Market:

The high-bandwidth stacked DRAM market has extremely high technological barriers. South Korean companies have established an absolute leading position with U.S. companies closely behind, while there are no companies from China having achieved large-scale commercialization.

Ranking of Chinese Companies in Global Niche DRAM market

In 2025, companies from China generated an aggregated revenue of RMB6.3 billion with a total market of 9.2% globally. With respect to the aggregated revenue generated by companies from China, our Company ranked fifth with a market share of 10.4%.

Ranking of China Companies in aggregated revenue generated by Chinese companies, By Sales Revenue in 2025⁽⁵⁾

Ranking	Company	Business Model	Market share based on aggregated revenue generated by Chinese companies
1	Company A ⁽¹⁾	Fabless	24.5%
2	Company B ⁽²⁾	Fabless	22.4%
3	Company C ⁽³⁾	IDM	22.3%
4	Company D ⁽⁴⁾	Fabless	14.1%
5	Our Company	Fabless	10.4%

Source: Expert interviews, Frost & Sullivan

Notes:

- (1) Company A is a listed company established in 2005 and has its headquarters in Beijing, China. The company's main products include niche DRAM, Flash, microcontrollers, and sensors, etc., which are widely applied in fields such as industry, automobiles, consumer electronics, and the Internet of Things.
- (2) Company B is a listed company founded in 2005 and is headquartered in Beijing, China. The company's main products include computing chips, memory chips (niche DRAM, SRAM and Flash), analog and interconnection chips, etc., which are widely used in fields such as automotive electronics, industry and medical care, communication equipment, and consumer electronics.
- (3) Company C is a private company established in 2016 and is headquartered in Fujian, China. It is an integrated circuit enterprise focusing on the research, development and manufacturing of DRAM. Its products are widely used in fields such as communications, consumer electronics, industrial control.
- (4) Company D is a private company founded in 2006 and its headquarter is located in Shanxi, China. The company's primary business is the design and sales of niche DRAM products. Its products are widely used in fields such as communications, consumer electronics, industrial control, automotive electronics.
- (5) Only the revenue from the niche DRAM of the IDM manufacturers' own brands is included in the calculation scope, and the revenue generated from their foundry business is not included.

INDUSTRY OVERVIEW

Ranking of Companies in Global Niche DRAM market

Our company specializes in the niche DRAM market. In 2025, the market size of the global niche DRAM market reached RMB68.6 billion. Our Company held a market share of 1.0% based on our revenue in 2025.

Ranking of China Companies in Global Niche DRAM market, By Sales Revenue in 2025

Ranking	Company	Business Model	Market share based on global niche DRAM market
1	Company E	IDM	29.9%
2	Company F	IDM	20.6%
3	Company G	IDM	15.3%
4	Company H	IDM	10.4%
5	Company I	IDM	8.6%
6	Company A	Fabless	2.2%
7	Company B	Fabless	2.1%
8	Company C	IDM	2.0%
9	Company J	Fabless	1.7%
10	Company D	Fabless	1.3%
11	Company K	Fabless	1.2%
12	Our Company	Fabless	1.0%

- (1) Company E is a listed company founded in 1969, and its headquarters is located in South Korea. Its main products include smartphones, televisions, semiconductor chips, household appliances, etc. Its products are widely used in fields such as consumer electronics, telecommunications equipment, and semiconductor manufacturing.
- (2) Company F is a listed company founded in 1983 and its headquarters is located in South Korea. The company focuses on the research, development, production, and sales of storage solutions. Its main products include DRAM, NAND Flash, CMOS image sensors, etc. The products are widely used in fields such as personal computers, smartphones, data centers, servers, and automotive electronics.
- (3) Company G is a listed company founded in 1978, with its headquarters in the United States. Its main products include DRAM, NAND flash memory, CMOS image sensors, etc. The products are widely applied in fields such as computers, consumer electronics, automotive electronics, and network equipment.
- (4) Company H is a listed company founded in 1995 and its headquarter is located in Taiwan, China, is a company focusing on the research, development, and manufacturing of DRAM. Its products are widely used in fields such as computers, consumer electronics, and communication equipment.
- (5) Company I is a listed company founded in 1987 and its headquarter is located in Taiwan, China. It is a company mainly engaged in memory integrated circuits. Its main products include code-type flash memory, niche memory, mobile memory, etc., which are widely used in fields such as consumer electronics, computers, automotive electronics, and industrial electronics.
- (6) Company J is a listed company founded in 1998 and is headquartered in Taiwan, China. It is a professional IC design company. The company focuses on niche memory and flash memory products, and at the same time has expanded into non-memory fields, such as audio amplifiers, power management, motor control, wireless communication transceivers, and System-on-Chip (SoC), etc. Its products are widely used in fields such as consumer electronics, industrial control, and automotive electronics.
- (7) Company K is a listed company founded in 1991 and is headquartered in Taiwan, China. It is a company specializing in memory and IC design. The company’s main products include DRAM, SRAM, NOR Flash, etc., which are widely used in fields such as consumer electronics, automotive electronics, and industrial control.