

Dynamic Random Access Memory (DRAM) - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts (2024 - 2029)

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Abstracts

The Dynamic Random Access Memory Market size is estimated at USD 61.21 billion in 2024, and is expected to reach USD 170.08 billion by 2029, growing at a CAGR of 22.68% during the forecast period (2024-2029). In terms of shipment volume, the market is expected to grow from 17.49 billion units in 2024 to 31.03 billion units by 2029, at a CAGR of 12.16% during the forecast period (2024-2029).

Key Highlights

Semiconductor memory, called dynamic random access memory (DRAM), stores and processes data or program code necessary for a computer processor's functioning. This type of RAM is commonly found in personal computers, smartphones, ADAS systems, smartwatches, workstations, and servers.

The growing adoption of generative AI boosts the demand for fast processing and highly efficient DRAM solutions. For instance, Micron Technology partnered with Qualcomm Technologies Inc. to accelerate generative AI at the edge for smartphones. The company shipped production samples of the low-power double data rate 5X (LPDDR5X) memory to Qualcomm in October 2023. The LPDDR5X memory operates at a 9.6 Gbps speed grade, delivering the speed and performance the mobile ecosystem needs to unleash the power of AI at the edge.

Micron LPDDR5X provides advanced power-saving capabilities for mobile users using its innovative, 1? process node technology. Also, in September 2023, SK Hynix presented a prototype of AI accelerator card, AiMX1, based on the high-speed, low-power, and high-density memory solution GDDR6-AiM at the AI hardware & edge AI

Summit 2023 in California. AiMX1 is expected to significantly contribute to developing high-performance, data-intensive, and AI-based systems.

Datacenter demand for DRAM is projected to grow significantly, which will lift overall DRAM demand annually. Artificial intelligence and other cutting-edge technologies like streaming, gaming, and autonomous vehicles will continue to drive robust demand for data centers. This will drive innovation in data center architecture and technology as operators strive to provide the capacity that supports the increased power density required by high-performance computing. Integrating artificial intelligence, the Internet of Things, and 5G will be a massive tailwind to the demand for computing and DRAM.

Worldwide smartphone shipments declined significantly in FY 2023 compared to FY 2022 due to decreased consumer spending, economic downturn, and increased inflation. Smartphone vendors such as Samsung, Apple, Xiaomi, and Oppo (including One Plus) witnessed declining smartphone sales. Following smartphones, tablets, and PCs/laptops, demand fell in FY 2023 due to weakened consumer spending, interest rates, and increasing uncertainty due to ongoing geopolitical tensions. These factors will restrict the growth of the DRAM market.

The COVID-19 pandemic had a significant impact on the DRAM market, both on the demand side and the supply side. Lockdowns and factory shutdowns worldwide contributed to the supply shortage, but many of these impacts are expected to be temporary. Governments worldwide are taking steps to support the semiconductor industries, which could lead to a recovery.

Dynamic Random Access Memory (DRAM) Market Trends

The Data Center Application Segment is Expected to Hold Significant Market Share

The pandemic accelerated the use of digital platforms and cloud services, boosting data center development. As DRAM is an essential component for the proper functioning of modern enterprise and data center applications, the growth in data centers has significantly fueled the demand in the market. According to Cloudscene, as of September 2023, there were over 9,380 data centers worldwide.

DRAM suppliers have been working toward adjusting their product mixes to assign more wafer input to server DRAM products while minimizing the wafer input for mobile DRAM products. Two reasons have driven this trend. Firstly, the demand outlook is bright for the server DRAM segment. The latest server platforms from AMD and Intel

finally shipped to OEMs in 2022 but are expected to need ~six months for qualifying, facilitating a headwind to near-term server shipments and associated memory demand. Simultaneously, DRAM suppliers are building up significant inventory positions as production surges continue to outpace demand.

In the second position, the reason lies that the mobile DRAM segment faced a significant oversupply in 2022. In 2023, the projections on the development of smartphone shipments and the surge in the average DRAM content of smartphones remained pretty conservative. As a result, DRAM suppliers intend to keep expanding the share of server DRAM in their product mixes, thus providing significant growth in the data center segment.

Semiconductor manufacturers are likely to respond to changes in demand by producing more dynamic RAM (DRAM) for servers than for mobile devices this year, a milestone highlighting increasing enterprise use of emerging technology related to cloud computing, AI, and high-performance computing (HPC) applications. To handle the emerging-tech workloads, the average DRAM content of servers is expected to increase significantly.

Moreover, in the data center segment, the buyer inventory of DDR5 has been gaining popularity. For instance, Micron Technology unveiled its DDR5 chip, which it stated found the most demand from data center applications before popping up in client devices. Renesas has led the data center segment due to new chipsets for high-performance memory modules based on DDR5 multiplexer combined ranks (MCR) dual in-line memory modules. Meanwhile, Samsung's intensified production cutbacks have notably shrunk DDR4 wafer inputs, causing a supply crunch in server DDR4 stocks. This scenario leaves no leeway for further server DDR4 price reductions.

North America is Expected to Hold Significant Market Share

The market for DRAM is expected to register significant growth in the region owing to its increasing adoption in data centers, automotive, and consumer electronics.

In the United States, the growth of DRAM is projected to extend beyond personal devices and find increased utilization in cloud computing, servers, and automotive applications. Smartphones are increasingly incorporating DRAM, and mobile phones are anticipated to hold a significant portion of the DRAM market due to their expanding

market penetration and declining prices, resulting in greater consumer acceptance. As the range of use cases and mobile phone adoption continues to diversify and expand, the demand for the DRAM market is expected to rise.

The mobile phone industry in the United States is one of the largest industries, significantly impacting the market's growth positively. Rising investments and growing production rates across the region are significant market drivers.

Data center operators must optimize platform performance by leveraging advanced memory capabilities and processor advancements, fueling the demand for DDR5 DRAMs in the market. The United States is consistently experiencing substantial investments in data centers, which is anticipated to stimulate the requirement for DRAMs.

Another significant factor influencing the market is implementing 5G technology. Despite its recent introduction, 5G technology and wireless communication as a whole are projected to have a substantial effect on the market. As per Accenture's analysis, the adoption of 5G is anticipated to contribute more than USD 1.5 trillion to the gross domestic product (GDP) of the United States between 2021 and 2025.

Dynamic Random Access Memory (DRAM) Industry Overview

The dynamic random access memory (DRAM) market is semi-consolidated, with the major players in the market, like Samsung Electronics, SK Hynix, and Micron, holding a significant market share. Geographical expansion and product innovation play a vital role in the competitive strategy of market players. Vendors need enhanced fabrication and processing capabilities in line with the increasing data center, mobile, and consumer applications that require improved speed and performance. The prominent vendors in the DRAM market are investing heavily in the next generation of chips, like 24GB, DDR5, and HBM, and have moved into the next phase of making FRAMs for AI and 5G. This is helping them stay ahead of the competition, but it also means they need to be able to pay for their research and development.

September 2023: Samsung Electronics unveiled the pioneering low-power compression attached memory module (LPCAMM) form factor, marking a significant breakthrough in the DRAM market for personal computers, laptops, and data centers. This cutting-edge development has successfully passed rigorous system verification on Intel's platform,

achieving a remarkable speed of 7.5 Gbps.

June 2023: Micron Technology Inc. revealed its intention to construct a new assembly and test facility in Gujarat, India. The facility will cater to manufacturing DRAM and NAND products in domestic and international markets. The construction of the new facility was to commence in 2023 and will be carried out in phases. The first phase will include 500,000 square feet of cleanroom space and is expected to become operational in late 2024.

Additional Benefits:

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