

High-end Semiconductor Packaging - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019 - 2029

Market Report | 2024-02-17 | 100 pages | Mordor Intelligence

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Report description:

The High-end Semiconductor Packaging Market size is estimated at USD 36.95 billion in 2024, and is expected to reach USD 85.91 billion by 2029, growing at a CAGR of 15.10% during the forecast period (2024-2029).

The continuous advancements in integration, energy efficiency, and product characteristics because of the growing demand across various end-user verticals of the industry and the use of packaging for improving the performance, reliability, and cost-effectiveness of electronic systems accelerate the market's growth. For instance, in March 2022, Intel Corp. invested EUR 80 billion across the entire semiconductor value chain in the European Union, including cutting-edge packaging technologies.

Key Highlights

- Packaging protects an electronic system from radio frequency noise emission, electrostatic discharge, mechanical damage, and cooling. The rise in the semiconductor industry worldwide is one of the major factors driving the growth of the semiconductor packaging market. In addition, in February 2023, the Semiconductor Industry Association (SIA) announced global semiconductor industry sales totaled USD 574.1 billion in 2022, the highest-ever annual total and an increase of 3.3% compared to the previous year's total of USD 555.9 billion.
- Furthermore, the rise of IoT and AI and the proliferation of complex electronics drive the high-end application segment in the consumer electronics and automotive industries. Due to these factors, more advanced semiconductor packaging technologies are being adopted to sustain demand.
- Further, in June 2022, SEMI Europe, the organization representing the entire European electronics manufacturing and design supply chain, immediately called for the quick passage of the European Chips Act and invited the European Commission, Member States, and Parliament to participate in discussions about the proposed legislation. The Act intends to support the region's transition to a digital and green economy while enhancing Europe's competitiveness and resilience in semiconductor technologies

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and applications.

-The growing research activities in the sector further bolstered the market's demand. For instance, Dresden is developing into a renowned hub for semiconductor research. In June 2022, Fraunhofer IPMS and IZM-ASSID announced a collaboration to form the Center for Advanced CMOS & Heterointegration Saxony. The center will provide the entire 300 mm microelectronics value chain, requiring high-tech research for upcoming innovations.

-Fraunhofer IPMS is positioned in Germany in applied research on the contemporary 300mm wafer industry standard in the front end of CMOS manufacturing, having recently invested over EUR 140 million in clean room equipment. Innovative packaging and system integration technologies from Fraunhofer IZM-ASSID supplement this knowledge.

-Furthermore, the semiconductor packaging market is expected to expand due to multiple long-term growth drivers, like 5G, IoT, automotive, and HPC. For instance, the government of India recently approved a USD 10 billion incentive package to build a complete semiconductor ecosystem, including fabs, home-grown chip design, and compound semiconductor plants.

-Moreover, the ongoing conflict between Russia and Ukraine is expected to impact the electronics industry significantly. The conflict has already exacerbated the semiconductor supply chain issues and the chip shortage that have affected the industry for some time. The disruption may come in the form of volatile pricing for critical raw materials such as nickel, palladium, copper, titanium, aluminum, and iron ore, resulting in material shortages. This would obstruct manufacturing in the studied market.

High-end Semiconductor Packaging Market Trends

Consumer Electronics Sector is Expected to Boost the Market

- The consumer electronics sector is significantly investing in the semiconductor packaging market. Growth of the smartphone, rising wearable and smart device adoption, and increasing consumer IoT device penetration in applications like smart homes are a few of the influential factors influencing the segment's growth. According to Ericsson, smartphone mobile network subscriptions worldwide reached nearly 6.6 billion in 2022 and are predicted to exceed 7.8 billion by 2028.

- Additionally, markets for smartwatches and smart speakers have become extremely popular in recent years due to the growing number of features and functionalities they can offer due to sophisticated semiconductor components. As a result, demand for Wi-Fi and Bluetooth chips increased dramatically. Consumer electronics manufacturers also use semiconductor components to equip their products with IoT and AI models, enhancing user experience and making products brighter.

- For instance, in March 2023, Huawei planned to launch its foldable smartphone with a significant battery upgrade in the coming years. The device will feature an upgrade to its battery, and it is rumored to be named the Mate X3. Further, Huawei will likely use the high-silicon anode material to enhance the smartphone's battery capacity, which is expected to be 5060mAh.

- Personal computers and laptops are now essential for young consumers heavily invested in technology. In addition, over the next ten years, innovation and advancement in the electronics sector are anticipated to drive semiconductor packaging sales. Sales of semiconductor packaging are expected to increase globally in both developing and developed markets due to the introduction of IoT and AI.

- Intel Corporation and the University College London (UCL) collaborated in June 2022 to introduce a new touchless computer that can be operated and controlled by gesturing the hands, head, face, and entire body. Higher power dissipation, faster speeds, higher pin counts, smaller footprints, and lower profiles are all constant demands in the electronics market. Semiconductor miniaturization and integration have resulted in lighter, smaller, and more portable appliances such as smartphones, tablets, and emerging IoT devices.

North America to Experience Significant Market Growth

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- The semiconductor sector in the United States and Canada has maintained a significant position in key future technologies, such as AI, quantum computing, and sophisticated wireless networks like 5G. For instance, as per GSMA, 5G will become the lead network technology in the US by 2025. The increasing implementation of 5G networks coincides with the growing demand for more immediate high-performance computing appliances, for which semiconductors form a critical element.
- The United States Government has significantly invested in boosting the penetration of advanced technologies, bolstering the demand for high-end semiconductor packaging. The United States is one of the world's fastest-expanding economies. According to WSTS, in October 2022, semiconductor sales in the Americas amounted to USD 12.29 billion, an increase from the USD 12.03 billion recorded for the previous month.
- The US Senate recently announced the Facilitating American-Built Semiconductors (FABS) Act, which may provide tax incentives to semiconductor manufacturers. The bill may establish a 25% investment tax credit for semiconductor manufacturing investments in equipment or fabs.
- Additionally, in September 2022, the Biden administration announced that it would invest USD 50 billion in building up the domestic semiconductor industry to counter dependency on China, as the US produces zero and consumes 25% of the world's leading-edge chips vital for its national security. President Joe Biden signed a USD 280 billion CHIPS bill in August 2022 to boost domestic high-tech manufacturing, part of his administration's push to increase US competitiveness over China. Such robust investments in the semiconductor sector in the region would offer lucrative opportunities for the growth of the studied Market.
- Furthermore, the United States is one of the largest markets for electric vehicles, and the country has also recorded rapid growth in EV sales in recent years. According to KBB, in the Q2 of 2022, just under 196,800 battery electric cars were sold in the United States. This was a year-over-year boost of around 66.4% compared to the sales recorded in Q2 of the previous year.
- Many regulations have been implemented in recent years to promote the use of electric vehicles in the country. For instance, New York state lawmakers recently passed a bill that essentially mandates that all new passenger cars sold in the state run on electric power by 2035. Moreover, the United States has set a target to ensure half of the vehicles sold in the country are electric by 2030.

High-end Semiconductor Packaging Industry Overview

The market for high-end semiconductor packaging is consolidated. Companies employ product innovation, expansions, and partnerships to stay ahead of the competition and widen their market reach. Several recent market developments include:

In October 2022, TSMC announced the Open Innovation Platform (OIP) 3D Fabric Alliance. The latest TSMC 3DFabric Alliance is TSMC's sixth OIP Alliance and the first of its variety in the semiconductor firm that joins forces with partners to accelerate 3D IC ecosystem readiness and innovation, with an entire expanse of best-in-class solutions and services for semiconductor design, memory modules, testing, manufacturing, substrate technology, and packaging.

In August 2022, Intel showcased the most recent architectural and packaging breakthroughs that enabled 2.5D and 3D tile-based chip designs, ushering in a new era in chipmaking technologies and their significance. Intel's system foundry model features improved packaging, and the company intends to increase the number of transistors on a package from 100 billion to 1 trillion by 2030.

Additional Benefits:

- The market estimate (ME) sheet in Excel format
- 3 months of analyst support

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