2.5D & 3D Semiconductor Packaging - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019 - 2029

Market Report | 2024-02-17 | 126 pages | Mordor Intelligence

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Report description:

The 2.5D & 3D Semiconductor Packaging Market size is estimated at USD 9.91 billion in 2024, and is expected to reach USD 18.28 billion by 2029, growing at a CAGR of 13.03% during the forecast period (2024-2029).

Key Highlights
-2.5D and 3D are packaging methodologies for including multiple IC inside the same package. In a 2.5D structure, two or more active semiconductor chips are placed side-by-side on a silicon interposer to achieve extremely high die-to-die interconnect density. In a 3D structure, active chips are integrated by die stacking for the shortest interconnect and smallest package footprint. In recent years, 2.5D and 3D have gained momentum as ideal chipset integration platforms due to their merits in achieving extremely high packaging density and high energy efficiency.
-High-performance computing, data center networking, and autonomous vehicles are pushing the adoption rates for the studied market, along with its evolution from a technology point of view. Today, the trend is to have enormous computing resources at the cloud, edge computing, and device levels.
-Further, the studied market has been expanding due to trends like the downsizing of electronic items brought on by technological breakthroughs and growing demand for consumer electronics with higher bandwidth and power efficiency. By utilizing dynamic heat management, high-speed data management, low power consumption, high memory capability, and other features, 3DIC and 2.5D TSV interconnect for advanced packaging in semiconductor chips refine the user experience. This serves as one of the key driving forces behind the market expansion of its consumer electronic applications.
-High initial investment and increasing complexity of semiconductor IC designs act as restraining factors for the studied market. The designers must overcome serious technical and organizational challenges before capturing the benefits of 2.5D/3D packaging and achieving a competitive edge.
-The worldwide semiconductor shortage caused by the COVID-19 pandemic prompted players to focus on increasing production

capacity. For instance, the Semiconductor Manufacturing International Corp (SMIC) announced aggressive plans to double its production capacity by 2025, by constructing new chip fabrication plants in various cities, including a September 2021 announcement to establish a new factory in Shanghai's free trade zone. Such an increase in semiconductor production capacities is likely to benefit the studied market.

2.5D & 3D Semiconductor Packaging Market Trends

Growing Consumption of Semiconductor Devices Across Industries to Drive the Market

- Rising digitization, increasing trends of remote work and remote operations, and increasing consumer demand for electronics have sparked the need for advanced semiconductor devices that enable various new capabilities. As the demands for semiconductor devices intensify consistently, advanced packaging techniques provide the form factor and processing power required for today's digitized world.
- For instance, according to the Semiconductor Industry Association, during August 2022, global semiconductor industry sales were USD 47.4 billion, a slight increase of 0.1% over the August 2021 total of USD 47.3 billion.
- 2.5D and 3D packaging technology is quickly gaining popularity in the semiconductor industry owing to its numerous benefits. For instance, 3D integration of semiconductor chips provides a flexible way to carry out the heterogeneous system-on-chip (SoC) design by integrating disparate technologies, such as mixed signal and radio frequency (RF) components, memory and logic circuits, optoelectronic devices, etc., onto different dies of a 3D integrated circuit (IC).
- Consumer electronics is one of semiconductor vendors' most prominent end-user industries. Growth in the smartphone industry, increasing adoption of smart devices and wearables, and rising penetration of consumer IoT devices in applications like intelligent homes are driving the growth of semiconductor devices, thereby positively impacting the market.
- Further, owing to the soaring growth pushed by 5G commercialization around the world, 5G-relevant devices are expected to flood global markets, including network infrastructure, networking equipment, nodes, and mobile terminals. For instance, according to Ericsson, smartphone subscription is expected to reach 7,840 million in 2027, from 6,259 million in 2021.
- Moreover, rising data center build-outs and the increasing use of electric and autonomous vehicles have also increased the demand for advanced semiconductors, further supporting the studied market's growth. For instance, as per IEA, sales of electric vehicles (EVs) doubled in 2021 from the previous year to reach a new record of 6.6 million. Also, nearly 10% of global car sales were electric in 2021. With power semiconductor devices forming a key element in such vehicles, the demand for these devices has witnessed remarkable growth from this segment in recent years.
- Such trends depict the huge demand for semiconductor devices across different end-user industries. With the semiconductor packaging process playing a critical role in semiconductor manufacturing and design, the rising consumption of semiconductor devices will increase the demand for semiconductor packaging solutions simultaneously.

China Holds Significant Market Share

- Advancing technologies have been contributing to the development of various consumer electronics, medical devices, telecom and communication devices, and automotives, among others. With the launch of 5G services in the country, the demand for smartphones, among other things, has been increasing.
- According to the Ministry of Industry and Information Technology (MIIT), China aims to have 2 million installed 5G base stations in 2022 to expand the country's next-generation mobile network. The Chinese mainland currently has 1.425 million installed 5G base stations that support more than 500 million 5G users nationwide, making it the most extensive network in the world, as per MIIT. The growing implementation of 5G in the region is also expected to promote the demand for 5G-enabled devices, thereby

increasing the need for 2.5D and 3D semiconductor packaging in China.
- Similarly, as per the China Academy of Information and Communications (CAICT), China's shipments of smartphones compatible with 5G networks rose by 63.5% to 266 million in 2021. Further, 5G smartphone shipments accounted for 75.9% of domestic shipments, higher than a global average of 40.7%. By July 2022, 5G smartphones would have accounted for 74% of all mobile phone shipments in China. The total number of 5G smartphone shipments by July 2022 was 124 million units, and China introduced 121 new 5G mobile phone models. Such trends will accelerate the demand for 2.5D and 3D semiconductor packaging solutions in the country.
- With the increasing demand for 2.5D and 3D semiconductor packaging solutions, many companies have been carrying out various activities in the market. Major players' investments in the country are set to fuel the 2.5D & 3D semiconductor packaging market.
- In October 2022, TSMC launched its Open Innovation Platform (OIP) 3DFabric Alliance at the 2022 Open Innovation Platform Ecosystem Forum. The new TSMC 3DFabric Alliance would be TSMC's sixth OIP Alliance and the first of its kind in the semiconductor industry for collaborating with various partners to accelerate 3D IC ecosystem readiness and innovation, with a full spectrum of best-in-class services and solutions for semiconductor design, substrate technology, memory modules, testing, packaging, and manufacturing.

2.5D & 3D Semiconductor Packaging Industry Overview

The 2.5D & 3D semiconductor packaging market is moderately fragmented, with the presence of various significant players like ASE Group, Amkor Technology Inc., Intel Corporation, Samsung Electronics Co. Ltd, and Siliconware Precision Industries Co. Ltd., among others. The key players are continuously making efforts for partnerships, mergers, acquisitions, innovations, and investments in the market to retain their market positions.

In August 2022, Intel showcased the most recent architectural and packaging breakthroughs that enable 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. The company intends to increase the number of transistors on a package from 100 billion to 1 trillion by 2030.

In June 2022, ASE Group announced VIPack, an advanced packaging platform designed to enable vertically integrated packaging solutions. The VIPack represents ASE's next-generation 3D heterogeneous integration architecture that expands design rules and delivers ultra-high density and performance.

Additional Benefits:

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

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