Silicon Photonics - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019 - 2029

Market Report | 2024-02-17 | 110 pages | Mordor Intelligence

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Report description:

The Silicon Photonics Market size is estimated at USD 2.5 billion in 2024, and is expected to reach USD 8.96 billion by 2029, growing at a CAGR of 29.10% during the forecast period (2024-2029).

Key Highlights
-Silicon photonics is a developing branch of photonics offering a clear advantage over electric conductors used in semiconductors used in high-speed transmission systems. This technology is expected to push the transmission speeds up to 100 Gbps, with companies such as IBM, Intel, and Kothura achieving breakthroughs using the technology. Besides, this technology revolutionizes the semiconductor industry, enabling high-speed data transfer and processing.
-Optical communications have grown critical for terrestrial systems for the past several decades. Vast-haul fiber communications have seen significant gains in data speeds over long distances. New and more complicated technologies have been created to keep up with the need for worldwide big data transfer, as these systems continue to push the channel capacity boundaries. Silicon photonics is one of these technologies. Photonic components implemented utilizing established silicon fabrication techniques have shown considerable possibilities in providing low-cost, high-yield, tiny form-factor, and low-power photonic integrated circuits (PICs).
-Due to the widespread use of cloud services, the demand for data centers has surged in recent years. According to the Cloud Infrastructure Report 2021, 57% of respondents said more than half of their infrastructure is in the cloud, and 64% expect to be entirely in the public cloud in the next five years. These trends may drive the market studied over the period.
-In January 2022, Qpisemi unveiled AI processors based on silicon photonics to power AI 2.0 and various other applications, such as bioinformatics, drug discovery, AI modeling, optimization, metaverse, and manufacturing. Optical processors, rather than electrons, are used in AI 2.0 processors to perform neural-network calculations. For data centers, AI 2.0 processors, codenamed AI20PXX, may be 100 times quicker than GPUs.

-In silicon photonics applications, heat and various noise sources can disturb optical communications, pushing light into frequencies that are usually filtered out. Data may be lost or incomplete until those filters are modified, and reconstruction may be complex in the case of streaming data. However, forecasting when and how physical processes alter light is not always easy, making the modifications more challenging.
-On the production supply front, the global semiconductor shortage coincided with the COVID-19 pandemic and affected the majority of industries, including photonics. As per AIM Photonics, the global semiconductor shortage has hampered innovation in integrated photonics to a great extent.

Silicon Photonics Market Trends

Data Centers are Expected to Hold the Maximum Market Share

- The demand for silicon photonics, particularly used in high-bandwidth optical transceivers, continues to gain impetus to support proliferating high-performance computing (HPC) applications and ever-larger data centers.
- The rise in the number of data centers through 2021 due to the increased traffic from the enterprises and the consumers may provide a huge scope for the silicon photonics market during the forecast period.
- Within the enterprise, computing and collaboration are the main contributors to data center workload and computation demand. According to the Data Center World Global Conference, the average number of data centers will be approximately 10.3 per organization in three years (by 2021), which is up from the current 8.1 per organization. This surge calls for improved performance, on the whole, removing the interconnect bottlenecks and providing scope for the use of silicon photonics.
- In addition to the massive growth in data traffic, the infrastructure supporting the Internet of Everything (IoE) emphasizes the need for real-time responsiveness between people and objects. Increasingly, data processing and data traffic management require the ability to support cloud computing, cognitive computing, and big data analysis, pressurizing the market vendors to offer the necessary speed and capacity to deliver a timely response.
- Silicon nanophotonics technology is being increasingly applied to optical communication systems. The silicon optical transceiver market is expected to grow manifold in the next few years, driven by demand from large data centers and 5G technology. High-speed silicon photonics-based technologies are enabling smaller form factors with higher bandwidth and improved power efficiency.
- On the consumer side, video/media streaming is the most significant contributor. In the light of the potential data center traffic, key businesses like Google, Facebook, and Microsoft, are planning to ramp up their data center volumes across geographies. Therefore, the need for long-distance data transfer compared to traditional electronics may increase the demand for SiP during the forecast period.

Asia-Pacific to Witness the Fastest Growth

- China's silicon photonics market is expected to exhibit a significant growth rate among Asia-Pacific countries, owing to its growing economy and high global electronics market share. China is one of the prominent electronics producers and consumers. The manufacturing industry is rapidly growing in the region and is witnessing the continuous deployment of various manufacturing and telecommunications technologies, which is expected to drive the market's growth.
- The Chinese government's programs, such as the Made in China 2025 plan, are promoting R&D activities in factory automation and technologies and investments in them. As most automation equipment are imported from other countries, the 'Made in China' initiative aims to expand its domestic production of automation equipment.
- Japan holds a significant share in the silicon photonics market and is becoming more open to collaborations. Big corporations

want to stay on top and look for investments to fuel growth. The market size, emerging openness, and dynamic industry can surely benefit innovative companies in Japan, thereby driving the market's growth in Japan.
- South Korea is one of the major contributors to the market. Growing population, increasing investments in the development of silicon photonic products, the rising focus of international and domestic players on the development of modern silicon photonic products, and increasing R&D activities to increase the region's data transmission rate are also fueling the market's growth.
- The countries considered under the rest of Asia-Pacific include India, Singapore, and Taiwan. With the rapid development of AI, 5G, the internet of things, virtual reality, and the commercial application of these new technologies, the demand for data processing and information interaction is growing, which would speed up the construction of data centers in the region and lead to the explosive growth of the industry. According to Cloud Scene, some of the top markets in data centers include China, Japan, Australia, India, and Singapore.

Silicon Photonics Industry Overview

The degree of competition depends on various factors affecting the market, such as powerful competitive strategies and firm concentration ratio. The market comprises long-standing established players who have made significant investments in the product. The new players are entering the market and require high investments. The companies can sustain through powerful competitive strategies. Therefore, the competitive rivalry is moderately growing in the market studied.

- February 2022 - Intel Corporation acquired Tower Semiconductors to enable a globally diversified product portfolio to meet the growing demand for semiconductors. This acquisition also enables the company to provide foundry services to a global customer base.
- September 2021 - NeoPhotonics Corporation, a developer of silicon photonics and advanced hybrid photonic integrated circuit-based lasers, modules, and subsystems for bandwidth-intensive, high-speed communications networks, announced a new, tunable high-power FMCW (frequency-modulated continuous wave) laser module and high-power semiconductor optical amplifier (SOA) chips for bandwidth-intensive, high-speed communication networks.

Additional Benefits:

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

Table of Contents:

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