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Silicon Photonics Market by Product (Transceivers, Variable Optical Attenuators, Switches, Sensors, and Cables), By Components (Lasers, Modulators, Optical Waveguides, Optical Interconnects, Photodetectors) - Global Forecast to 2029

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Abstracts

The silicon photonics market was valued at USD 2.16 billion in 2024 and is projected to reach USD 7.52 billion by 2029, growing at a CAGR of 28.3% from 2024 to 2029.

The demand for high-speed broadband service is one of the major drivers in the market. The rising demand for new broadband connections and high-speed internet plans has prompted telecom service providers to invest in developing new network technologies, including silicon photonics. These technologies enable high-speed broadband connections and offer more broadband services over the existing network infrastructure.The increasing complexity of integrating on-chip lasers is one of the major restraints in the market. Lasers are required for high-performance optical data transmission because they create pure light in frequency and colors. Silicon photonics either uses an on-chip or off-chip light source. An on-chip light source refers to a light-emitting component integrated directly onto a semiconductor chip that is typically small and has lower power consumption than the off-chip light source. However, incorporating laser sources on a silicon chip is difficult as it increases the complexity. Also, different light sources have different spectral compositions; therefore, integrating on-chip laser is a complex process, hindering market growth.

Transceivers to account for the largest share of silicon photonics market during the forecast period

The Transceivers segment is expected to dominate the silicon photonics market during

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the forecast period. The transceivers sector is likely to dominate the silicon photonics market over the forecast period. Transceivers are utilized in a variety of applications, including high-performance computing, data centers, and telecommunications. A transceiver combines a transmitter and a receiver on a single platform. It is a bidirectional gadget that transmits and receives data. This gadget is generally utilized in cables or optical fiber networks. Multiple devices can connect to the same bus, making them ideal for parallel backplane applications like telephony and industrial infrastructure. An electronic switch connects the transmitter and receiver to the same antenna, preventing the transmitter's output from hurting the receiver.

The laser component in silicon photonics to account for largest market size during the forecast period.

Silicon lasers are fabricated using silicon and other materials, including indium phosphide and gallium arsenide. Silicon lasers are crucial to achieving integrated silicon photonics.

Ge-on-Si lasers and III-V-based Si lasers are two types of lasers. III-V-based Si laser is currently the most practical way of obtaining on-chip light sources in silicon photonics. III-V-based silicon lasers formed via bonding techniques demonstrate the best performance and display the best opportunity for use in silicon photonic manufacturing processes. However, in the long term, direct heteroepitaxial growth of III-V materials on Si seems more promising for low-cost, high-yield fabrication.

North America is expected to have the largest market during the forecast period.

North America is one of the leading markets for networking-based services and has many data centers. The region is expected to command the silicon photonics market in the coming years by accounting for the largest market share. It is the hub of many technology companies and R&D establishments, leading to prominent innovations and technological advancements. Also, there is a huge and steady flow of monetary investment available for research-related activities from governments and venture capitalists. End User such as military, defense, and aerospace; telecommunications; and data communication are highly demanded for silicon photonics technology-based products in the region.

In determining and verifying the market size for several segments and subsegments gathered through secondary research, extensive primary interviews have been conducted with key officials in the silicon photonics market. Following is the breakup of

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the profiles of the primary participants for the report.

By Company Type: Tier 1 – 40 %, Tier 2 – 40%, and Tier 3 – 20%

By Designation: Directors –40%, Managers- 40%, and Others – 20%

By Region: North America– 40%, Asia Pacific – 30%, Europe- 20%, and RoW – 10%

The report profiles key players in the silicon photonics market and analyzes their market shares. Players profiled in this report are Cisco Systems, Inc. (US), Intel Corporation (US), MACOM (US), GlobalFoundries Inc. (US), Lumentum Operations LLC (US), Marvell (US), Coherent Corporation (US), IBM (US), STMicroelectronics (Switzerland), Rockley Photonics Holdings Limited (US), Mellanox Technologies Ltd. (US), Sicoya GmbH (Germany), RANOVUS (Canada), Broadcom Inc. (US), Hamamatsu Photonics KK (Japan), Molex LLC (US), Fujitsu Limited (Japan), Chiral Photonics, Inc. (US), EFFECT Photonics (Netherlands), AIO Core Co., Ltd. (Japan), NKT Photonics (Denmark), IPG Photonics Corporation (US), DAS Photonics (Spain), TDK Corporation (Japan), SCINTIL Photonics (France), Teem Photonics (France), Lightwave Logic, Inc. (US), Source Photonics (US), Accelink Technologies Co., LTD, (China), and Infinera (US).

Research Coverage

The report defines, describes, and forecasts the silicon photonics market based on product, component, waveguide, end user, and region. It provides detailed information regarding drivers, restraints, opportunities, and challenges influencing its growth. It also analyzes competitive developments such as product launches, acquisitions, expansions, contracts, partnerships, and actions carried out by the key players to grow in the market.

Reasons to Buy This Report

The report will help the market leaders/new entrants with information on the closest approximations of the revenue numbers for the overall silicon photonics market and the subsegments. This report will help stakeholders understand the competitive landscape and gain more insights to position their businesses better and to plan suitable go-to-market strategies. The report also helps stakeholders understand the market pulse and

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provides information on key market drivers, restraints, challenges, and opportunities.

The report provides insights on the following pointers:

Analysis of key drivers (Rising demand for CMOS-integrated silicon photonics technology in data centers, growing focus on reducing power consumption using silicon photonic transceivers, increasing requirement for high bandwidth and high data transfer capabilities, and the surging demand for high-speed broadband services), restraints (Risk of thermal effect, complexity in integration of on-chip laser), opportunities (Increasing government and stakeholder funding, growing deployment of 5G networks, emerging applications of silicon photonics, surging utilization of silicon photonics technology in short-reach communication), and challenges (Embedding silicon photonic components into small circuits, inefficient electroluminescence of bulk crystalline silicon) influencing the growth of the silicon photonics market.

Product Development/Innovation: Detailed insights on upcoming technologies, research & development activities, and new product & service launches in the silicon photonics market

Market Development: Comprehensive information about lucrative markets – the report analyses the silicon photonics market across varied regions

Market Diversification: Exhaustive information about new products & services, untapped geographies, recent developments, and investments in the silicon photonics market

Competitive Assessment: In-depth assessment of market shares, growth strategies, and service offerings of leading players like Cisco Systems, Inc. (US), Intel Corporation (US), MACOM (US), GlobalFoundries Inc. (US), and Lumentum Operations LLC (US), among others in the silicon photonics market strategies. The report also helps stakeholders understand the pulse of the automotive airbags & seatbelts market and provides them with information on key market drivers, restraints, challenges, and opportunities.

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