

Silicon Photonics Market Forecasts to 2030 – Global Analysis By Component (Lasers, Modulators, Detectors, Waveguides, Photonic Integrated Circuits (ICs), Amplifiers and Other Components), Technology, Application, End User and By Geography

<https://marketpublishers.com/r/SA45924A0CDEEN.html>

Date: February 2025

Pages: 150

Price: US\$ 4,150.00 (Single User License)

ID: SA45924A0CDEEN

Abstracts

According to Statistics MRC, the Global Silicon Photonics Market is accounted for \$2.28 billion in 2024 and is expected to reach \$8.27 billion by 2030 growing at a CAGR of 30.2% during the forecast period. Silicon photonics is a technology that uses silicon as a medium to manipulate light for data transmission and processing. It integrates photonic devices, such as lasers, modulators, and detectors, on a silicon chip, enabling high-speed optical communication and computing. Silicon photonics leverages the advantages of silicon's semiconductor properties, allowing for miniaturization and cost-effective mass production. It is widely applied in data centers, telecommunications, and high-performance computing.

According to a researcher's survey in 2023, there were a total of 6,603 data centers present among the listed 135 countries across the world. Among these, 310 data centers were present in Germany, 204 in France, 345 in the U.K., and 97 in Spain.

Market Dynamics:

Driver:

Increasing demand for high-speed data transmission

As data consumption rises across industries such as telecommunications, data centers, and cloud computing, the need for faster, more efficient communication technologies

intensifies. Silicon photonics, which leverages light-based transmission rather than traditional electrical signals, offers significant advantages in terms of speed, bandwidth, and energy efficiency. By enabling faster data transfer rates, reduced latency, and improved performance in high-volume applications, silicon photonics supports the development of next-generation communication systems, fueling market expansion.

Restraint:

Limited materials compatibility

Silicon photonics has limited materials compatibility because it primarily relies on silicon, which restricts the integration of other materials needed for certain optical functionalities, such as efficient light generation or detection. The lack of compatibility with materials like indium phosphide or gallium arsenide affects scalability, functionality, and integration with existing systems, slowing innovation and hindering the market growth of silicon photonics in applications like sensors, lasers, and advanced telecommunications.

Opportunity:

Miniaturization of devices

The miniaturization of devices enables more compact, powerful systems that can operate at higher speeds and lower power consumption. As demand for high-bandwidth, low-latency communication in sectors like data centers, telecommunications, and consumer electronics rises, miniaturized devices meet the need for improved performance and reduced size. These advancements help address challenges like power consumption and scalability, propelling market expansion and positioning silicon photonics as a key technology in modern computing and communication.

Threat:

High initial development costs

Silicon photonics requires high initial development costs due to the complex fabrication processes involved in integrating optical components with silicon chips. The need for specialized manufacturing equipment, advanced materials, and skilled labor adds to the expenses. Additionally, designing and optimizing silicon photonic devices for specific

applications demands significant research and development investment. These high upfront costs can slow down their adoption, thus hampering overall market growth.

Covid-19 Impact

The covid-19 pandemic temporarily disrupted the silicon photonics market, affecting manufacturing, research, and development activities due to supply chain interruptions and labor shortages. However, the pandemic also accelerated demand for advanced communication systems, data centers, and healthcare technologies, driving long-term growth in silicon photonics. The shift to remote work and increased reliance on cloud-based services further boosted demand for high-speed data transmission solutions. Post-pandemic recovery has led to resurgence in investment and technological advancements in this sector.

The active silicon photonics segment is expected to be the largest during the forecast period

The active silicon photonics segment is predicted to secure the largest market share throughout the forecast period. Active silicon photonics is a cutting-edge field that integrates active electronic devices with photonic systems to enable high-speed data transmission, processing, and sensing. By combining the benefits of silicon technology and photonics, this sector offers solutions for telecommunications, data centers, and quantum computing. This technology has the potential to revolutionize industries requiring fast, efficient data communication and advanced computing.

The data centers segment is expected to have the highest CAGR during the forecast period

The data centers segment is anticipated to witness the highest CAGR during the forecast period. Silicon photonics in data centers enables high-speed, energy-efficient data transmission using light instead of electrical signals. This technology allows faster interconnection between servers and storage systems, lowering energy consumption and enhancing overall data center performance. Silicon photonics also facilitates more compact designs, contributing to the reduction of space and power requirements in modern data centers.

Region with largest share:

Asia Pacific is expected to register the largest market share during the forecast period

driven by the expansion of data centers, growing adoption of 5G networks, and the rise of artificial intelligence (AI) and machine learning applications. Countries like China, Japan, and South Korea are leading in semiconductor manufacturing and research, fostering innovation in silicon photonics. Additionally, government initiatives and investments in R&D further support market development, positioning the region as a global hub for silicon photonics advancements.

Region with highest CAGR:

North America is expected to witness the highest CAGR over the forecast period due to the region's strong focus on technological innovation and advancements in data communications, high-performance computing, and telecommunication sectors. The U.S. and Canada are key players, with significant investments in research and development, particularly from tech giants, universities, and semiconductor manufacturers. Additionally, the growing adoption of cloud computing, 5G networks, and data centers further drives market expansion.

Key players in the market

Some of the key players profiled in the Silicon Photonics Market include Intel Corporation, Cisco Systems Inc., IBM Corporation, Juniper Networks Inc., Nokia Corporation, Broadcom Inc., Lumentum Operations LLC, SAMSUNG Electronics Corporation, Apple Inc., STMicroelectronics, Raytheon Technologies Corporation, Infinera Corporation, Finisar Corporation, Analog Devices Inc., Lightwave Logic Inc., DustPhotonics, Tower Semiconductor Limited, GlobalFoundries Inc., Huawei Technologies Corporation and Rockley Photonics.

Key Developments:

In November 2024, Tower Semiconductor has introduced its 300mm Silicon Photonics process as a standard foundry offering, enhancing its 200mm platform. The larger wafer size increases compatibility with industry-standard platforms, simplifying integration with electronic components. This development provides a seamless transition for existing customers, positioning Tower to support growing demands in high-speed data communications.

In September 2024, DustPhotonics has unveiled an industry-first merchant 1.6Tb/s silicon photonics engine, targeting AI and hyperscale data center applications. This innovation promises to address the growing demand for high-speed, high-capacity

interconnects in data centers and AI workloads, offering unprecedented bandwidth and low latency.

Components Covered:

Lasers

Modulators

Detectors

Waveguides

Photonic Integrated Circuits (ICs)

Amplifiers

Other Components

Technologies Covered:

Active Silicon Photonics

Passive Silicon Photonics

Applications Covered:

Optical Coherence Tomography (OCT)

Test & Measurement

Integrated Photonic Circuits

Sensing

Quantum Computing

Optical Signal Processing

Automation

Other Applications

End Users Covered:

Telecommunications Providers

Data Centers

Medical & Healthcare Providers

Electronics Manufacturers

Automotive Companies

Aerospace & Defense Organizations

Other End Users

Regions Covered:

North America

US

Canada

Mexico

Europe

Germany

UK

Italy

France

Spain

Rest of Europe

Asia Pacific

Japan

China

India

Australia

New Zealand

South Korea

Rest of Asia Pacific

South America

Argentina

Brazil

Chile

Rest of South America

Middle East & Africa

Saudi Arabia

UAE

Qatar

South Africa

Rest of Middle East & Africa

What our report offers:

- Market share assessments for the regional and country-level segments
- Strategic recommendations for the new entrants
- Covers Market data for the years 2022, 2023, 2024, 2026, and 2030
- Market Trends (Drivers, Constraints, Opportunities, Threats, Challenges, Investment Opportunities, and recommendations)
- Strategic recommendations in key business segments based on the market estimations
- Competitive landscaping mapping the key common trends
- Company profiling with detailed strategies, financials, and recent developments
- Supply chain trends mapping the latest technological advancements

Free Customization Offerings:

All the customers of this report will be entitled to receive one of the following free customization options:

Company Profiling

Comprehensive profiling of additional market players (up to 3)

SWOT Analysis of key players (up to 3)

Regional Segmentation

Market estimations, Forecasts and CAGR of any prominent country as per the client's interest (Note: Depends on feasibility check)

Competitive Benchmarking

Benchmarking of key players based on product portfolio, geographical presence, and strategic alliances

Contents

1 EXECUTIVE SUMMARY

2 PREFACE

- 2.1 Abstract
- 2.2 Stake Holders
- 2.3 Research Scope
- 2.4 Research Methodology
 - 2.4.1 Data Mining
 - 2.4.2 Data Analysis
 - 2.4.3 Data Validation
 - 2.4.4 Research Approach
- 2.5 Research Sources
 - 2.5.1 Primary Research Sources
 - 2.5.2 Secondary Research Sources
 - 2.5.3 Assumptions

3 MARKET TREND ANALYSIS

- 3.1 Introduction
- 3.2 Drivers
- 3.3 Restraints
- 3.4 Opportunities
- 3.5 Threats
- 3.6 Technology Analysis
- 3.7 Application Analysis
- 3.8 End User Analysis
- 3.9 Emerging Markets
- 3.10 Impact of Covid-19

4 PORTERS FIVE FORCE ANALYSIS

- 4.1 Bargaining power of suppliers
- 4.2 Bargaining power of buyers
- 4.3 Threat of substitutes
- 4.4 Threat of new entrants
- 4.5 Competitive rivalry

5 GLOBAL SILICON PHOTONICS MARKET, BY COMPONENT

- 5.1 Introduction
- 5.2 Lasers
- 5.3 Modulators
- 5.4 Detectors
- 5.5 Waveguides
- 5.6 Photonic Integrated Circuits (ICs)
- 5.7 Amplifiers
- 5.8 Other Components

6 GLOBAL SILICON PHOTONICS MARKET, BY TECHNOLOGY

- 6.1 Introduction
- 6.2 Active Silicon Photonics
- 6.3 Passive Silicon Photonics

7 GLOBAL SILICON PHOTONICS MARKET, BY APPLICATION

- 7.1 Introduction
- 7.2 Optical Coherence Tomography (OCT)
- 7.3 Test & Measurement
- 7.4 Integrated Photonic Circuits
- 7.5 Sensing
- 7.6 Quantum Computing
- 7.7 Optical Signal Processing
- 7.8 Automation
- 7.9 Other Applications

8 GLOBAL SILICON PHOTONICS MARKET, BY END USER

- 8.1 Introduction
- 8.2 Telecommunications Providers
- 8.3 Data Centers
- 8.4 Medical & Healthcare Providers
- 8.5 Electronics Manufacturers
- 8.6 Automotive Companies
- 8.7 Aerospace & Defense Organizations

8.8 Other End Users

9 GLOBAL SILICON PHOTONICS MARKET, BY GEOGRAPHY

9.1 Introduction

9.2 North America

9.2.1 US

9.2.2 Canada

9.2.3 Mexico

9.3 Europe

9.3.1 Germany

9.3.2 UK

9.3.3 Italy

9.3.4 France

9.3.5 Spain

9.3.6 Rest of Europe

9.4 Asia Pacific

9.4.1 Japan

9.4.2 China

9.4.3 India

9.4.4 Australia

9.4.5 New Zealand

9.4.6 South Korea

9.4.7 Rest of Asia Pacific

9.5 South America

9.5.1 Argentina

9.5.2 Brazil

9.5.3 Chile

9.5.4 Rest of South America

9.6 Middle East & Africa

9.6.1 Saudi Arabia

9.6.2 UAE

9.6.3 Qatar

9.6.4 South Africa

9.6.5 Rest of Middle East & Africa

10 KEY DEVELOPMENTS

10.1 Agreements, Partnerships, Collaborations and Joint Ventures

- 10.2 Acquisitions & Mergers
- 10.3 New Product Launch
- 10.4 Expansions
- 10.5 Other Key Strategies

11 COMPANY PROFILING

- 11.1 Intel Corporation
- 11.2 Cisco Systems Inc.
- 11.3 IBM Corporation
- 11.4 Juniper Networks Inc.
- 11.5 Nokia Corporation
- 11.6 Broadcom Inc.
- 11.7 Lumentum Operations LLC
- 11.8 SAMSUNG Electronics Corporation
- 11.9 Apple Inc.
- 11.10 STMicroelectronics
- 11.11 Raytheon Technologies Corporation
- 11.12 Infinera Corporation
- 11.13 Finisar Corporation
- 11.14 Analog Devices Inc.
- 11.15 Lightwave Logic Inc.
- 11.16 DustPhotonics
- 11.17 Tower Semiconductor Limited
- 11.18 GlobalFoundries Inc.
- 11.19 Huawei Technologies Corporation
- 11.20 Rockley Photonics

List Of Tables

LIST OF TABLES

- Table 1 Global Silicon Photonics Market Outlook, By Region (2022-2030) (\$MN)
- Table 2 Global Silicon Photonics Market Outlook, By Component (2022-2030) (\$MN)
- Table 3 Global Silicon Photonics Market Outlook, By Lasers (2022-2030) (\$MN)
- Table 4 Global Silicon Photonics Market Outlook, By Modulators (2022-2030) (\$MN)
- Table 5 Global Silicon Photonics Market Outlook, By Detectors (2022-2030) (\$MN)
- Table 6 Global Silicon Photonics Market Outlook, By Waveguides (2022-2030) (\$MN)
- Table 7 Global Silicon Photonics Market Outlook, By Photonic Integrated Circuits (ICs) (2022-2030) (\$MN)
- Table 8 Global Silicon Photonics Market Outlook, By Amplifiers (2022-2030) (\$MN)
- Table 9 Global Silicon Photonics Market Outlook, By Other Components (2022-2030) (\$MN)
- Table 10 Global Silicon Photonics Market Outlook, By Technology (2022-2030) (\$MN)
- Table 11 Global Silicon Photonics Market Outlook, By Active Silicon Photonics (2022-2030) (\$MN)
- Table 12 Global Silicon Photonics Market Outlook, By Passive Silicon Photonics (2022-2030) (\$MN)
- Table 13 Global Silicon Photonics Market Outlook, By Application (2022-2030) (\$MN)
- Table 14 Global Silicon Photonics Market Outlook, By Optical Coherence Tomography (OCT) (2022-2030) (\$MN)
- Table 15 Global Silicon Photonics Market Outlook, By Test & Measurement (2022-2030) (\$MN)
- Table 16 Global Silicon Photonics Market Outlook, By Integrated Photonic Circuits (2022-2030) (\$MN)
- Table 17 Global Silicon Photonics Market Outlook, By Sensing (2022-2030) (\$MN)
- Table 18 Global Silicon Photonics Market Outlook, By Quantum Computing (2022-2030) (\$MN)
- Table 19 Global Silicon Photonics Market Outlook, By Optical Signal Processing (2022-2030) (\$MN)
- Table 20 Global Silicon Photonics Market Outlook, By Automation (2022-2030) (\$MN)
- Table 21 Global Silicon Photonics Market Outlook, By Other Applications (2022-2030) (\$MN)
- Table 22 Global Silicon Photonics Market Outlook, By End User (2022-2030) (\$MN)
- Table 23 Global Silicon Photonics Market Outlook, By Telecommunications Providers (2022-2030) (\$MN)
- Table 24 Global Silicon Photonics Market Outlook, By Data Centers (2022-2030) (\$MN)

Table 25 Global Silicon Photonics Market Outlook, By Medical & Healthcare Providers (2022-2030) (\$MN)

Table 26 Global Silicon Photonics Market Outlook, By Electronics Manufacturers (2022-2030) (\$MN)

Table 27 Global Silicon Photonics Market Outlook, By Automotive Companies (2022-2030) (\$MN)

Table 28 Global Silicon Photonics Market Outlook, By Aerospace & Defense Organizations (2022-2030) (\$MN)

Table 29 Global Silicon Photonics Market Outlook, By Other End Users (2022-2030) (\$MN)

Note: Tables for North America, Europe, APAC, South America, and Middle East & Africa Regions are also represented in the same manner as above.

I would like to order

Product name: Silicon Photonics Market Forecasts to 2030 – Global Analysis By Component (Lasers, Modulators, Detectors, Waveguides, Photonic Integrated Circuits (ICs), Amplifiers and Other Components), Technology, Application, End User and By Geography

Product link: <https://marketpublishers.com/r/SA45924A0CDEEN.html>

Price: US\$ 4,150.00 (Single User License / Electronic Delivery)

If you want to order Corporate License or Hard Copy, please, contact our Customer Service:

info@marketpublishers.com

Payment

To pay by Credit Card (Visa, MasterCard, American Express, PayPal), please, click button on product page <https://marketpublishers.com/r/SA45924A0CDEEN.html>