

Quantum Semiconductor Market Forecasts to 2034 – Global Analysis By Material Type (Gallium Nitride (GaN), Silicon Carbide (SiC), Indium Phosphide (InP), Gallium Arsenide (GaAs), Quantum Dots, Topological Insulators and Two-Dimensional (2D) Materials), Wafer Size, Application, End User and By Geography

<https://marketpublishers.com/r/Q2FE4402B1B3EN.html>

Date: April 2026

Pages: 200

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

ID: Q2FE4402B1B3EN

Abstracts

According to Statistics MRC, the Global Quantum Semiconductor Market is accounted for \$0.5 billion in 2026 and is expected to reach \$17.4 billion by 2034 growing at a CAGR of 55.5% during the forecast period. Quantum semiconductors mark an emerging phase in electronic technology by utilizing principles of quantum physics such as superposition, tunneling, and entanglement to improve functionality. In contrast to traditional semiconductors, they function at extremely small scales where quantum behavior dominates electron movement. These materials support innovations like quantum computing, precision sensing, and rapid communication networks. Key components include quantum dots, topological insulators, and layered two-dimensional materials. With ongoing advancements, quantum semiconductors are anticipated to transform computational efficiency, reduce energy consumption, and accelerate data processing, ultimately influencing the development of advanced electronic and photonic systems in the coming years.

According to the SEALSQ & Government of Gujarat (India), SEALSQ signed a MoU with the Government of Gujarat to establish a 300-million-unit-per-year Post-Quantum Semiconductor Center in India.

Market Dynamics:

Driver:

Growing demand for quantum computing

Rising interest in quantum computing significantly propels the quantum semiconductor market forward. Organizations are pursuing computing systems that exceed traditional performance limits, and quantum semiconductors enable efficient qubit operations for complex problem-solving. These materials are essential for building scalable and advanced computational architectures. Strong investments from governments and private sectors are fostering rapid technological progress. Expanding use cases in areas such as encryption, pharmaceutical research, and financial analytics are increasing demand. As the field matures, the requirement for dependable and efficient quantum semiconductor solutions is set to grow, supporting continuous market development and innovation worldwide.

Restraint:

High development costs

Elevated development expenses act as a major constraint on the quantum semiconductor market. Creating and producing these advanced devices demands sophisticated facilities, unique materials, and expert professionals, leading to high costs. Building and operating specialized fabrication environments also require significant investment. Ongoing testing and refinement to ensure performance reliability add further financial burden. Such cost-intensive requirements make it difficult for smaller firms to enter the market and hinder broader adoption. Consequently, these economic challenges slow commercialization efforts and limit the scalability of quantum semiconductor technologies across different industrial sectors worldwide.

Opportunity:

Development of advanced quantum sensors

Advancements in quantum sensor technology create strong growth opportunities for the quantum semiconductor market. These semiconductors improve the precision and responsiveness of sensors used in healthcare, environmental analysis, and defense systems. They are capable of identifying very subtle variations in factors like temperature, pressure, and magnetic fields. As industries require more accurate and dependable measurement tools, quantum sensors are becoming increasingly popular.

Continuous research efforts are enhancing their efficiency while lowering production costs. This rising adoption across multiple fields is expected to boost the demand for quantum semiconductor components and support overall market expansion.

Threat:

Uncertain regulatory and policy frameworks

Unclear and evolving regulations pose a major risk to the quantum semiconductor market. Since quantum technologies are still emerging, governments have not fully established consistent rules and standards. This lack of clarity can create challenges related to data protection, intellectual property rights, and international collaboration. Frequent policy changes may slow down product launches and innovation efforts. Geopolitical factors can also impact trade and technology sharing. Such uncertainties increase business risks and may reduce investor confidence. Without well-defined and stable regulatory frameworks, companies may find it difficult to expand operations and achieve sustainable growth in this sector.

Covid-19 Impact:

The COVID-19 outbreak influenced the quantum semiconductor market in both negative and positive ways. Early in the pandemic, research work, production processes, and supply chains were significantly disrupted due to lockdowns and restricted access to facilities. Many projects experienced delays as funding priorities shifted toward healthcare needs. Despite these setbacks, the rapid move toward digitalization increased demand for high-performance computing, secure networks, and efficient data processing. This trend emphasized the value of quantum technologies, encouraging new investments and development efforts. As conditions improved, the market began to recover, showing increased focus on advanced and resilient semiconductor solutions.

The gallium nitride (GaN) segment is expected to be the largest during the forecast period

The gallium nitride (GaN) segment is expected to account for the largest market share during the forecast period because of its outstanding material characteristics. It features a wide bandgap, high electron mobility, and strong thermal resistance, making it ideal for high-power and high-frequency applications. GaN components are extensively utilized in communication technologies, power systems, and developing quantum applications. Its ability to enhance efficiency while minimizing energy loss contributes to

its widespread use. Ongoing improvements in manufacturing and integration processes continue to support its leading position, making GaN a crucial material for advancing modern quantum semiconductor technologies.

The research institutions & universities segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the research institutions & universities segment is predicted to witness the highest growth rate because of their key contribution to innovation. They play a vital role in conducting foundational studies, developing experimental technologies, and exploring new quantum materials. Increased financial support from governments and international partnerships is enhancing their research capabilities. Academic organizations are building prototypes, performing experiments, and educating experts in quantum technologies. Their efforts help accelerate discoveries and facilitate early commercialization. With rising interest in quantum computing and advanced applications, this segment is expanding quickly, contributing significantly to the overall growth of the quantum semiconductor market.

Region with largest share:

During the forecast period, the North America region is expected to hold the largest market share because of its advanced technological environment and substantial investment in research. The region benefits from the presence of major technology firms, academic institutions, and supportive government programs focused on quantum innovation. Strong financial backing, sophisticated production capabilities, and a mature semiconductor industry enhance its leadership. A highly skilled workforce and early implementation of emerging technologies also contribute to growth. Rising demand for quantum computing, secure communication systems, and precision sensing solutions continues to reinforce North America's dominant role in the global quantum semiconductor industry.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is anticipated to exhibit the highest CAGR, driven by continuous technological progress and rising investments in research. Nations across the region are enhancing semiconductor production capabilities and focusing on next-generation technologies. Supportive government policies, increased funding, and partnerships with international companies are fostering innovation. The growth of the electronics sector and the need for advanced computing and

communication solutions are boosting demand. Furthermore, the availability of skilled professionals and improving research facilities are accelerating development, positioning Asia-Pacific as a major contributor to the expansion of the global quantum semiconductor market.

Key players in the market

Some of the key players in Quantum Semiconductor Market include Intel, IBM, Google Quantum AI, GlobalFoundries, TSMC, Samsung Foundry, PsiQuantum, Xanadu, Rigetti Computing, D-Wave Systems, IonQ, IQM Quantum Computers, Archer Materials, Quantum Motion, Diraq, Quantum Circuits, Inc. (QCI), Photonic Inc. and Infineon Technologies.

Key Developments:

In April 2026, Intel Corp plans to invest an additional \$15 million in AI chip startup SambaNova Systems, according to a Reuters review of corporate records, as the semiconductor company deepens its focus on artificial intelligence infrastructure. The proposed investment, which is subject to regulatory approval, would raise Intel's ownership stake in SambaNova to approximately 9%.

In December 2025, IBM and Confluent, Inc. announced they have entered into a definitive agreement under which IBM will acquire all of the issued and outstanding common shares of Confluent for \$31 per share, representing an enterprise value of \$11 billion. Confluent provides a leading open-source enterprise data streaming platform that connects processes and governs reusable and reliable data and events in real time, foundational for the deployment of AI.

In October 2025, Infineon Technologies AG has signed power purchase agreements (PPA) with PNE AG and Statkraft to procure wind and solar electricity for its German facilities. Under a 10-year deal with German renewables developer and wind power producer PNE AG, Infineon will buy electricity from the Schlenzer and Kittlitz III wind farms in Brandenburg, Germany, which have a combined capacity of 24 MW, for its sites in Dresden, Regensburg, Warstein and Neubiberg near Munich.

Material Types Covered:

Gallium Nitride (GaN)

Silicon Carbide (SiC)

Indium Phosphide (InP)

Gallium Arsenide (GaAs)

Quantum Dots

Topological Insulators

Two-Dimensional (2D) Materials

Wafer Sizes Covered:

150 mm

200 mm

300 mm

Other Wafer Sizes

Applications Covered:

Quantum Computing

Quantum Communication

Quantum Sensing & Imaging

Quantum Power Electronics

Quantum Optoelectronics

End Users Covered:

Aerospace & Defense

Automotive & Mobility-Tech

Consumer Electronics

Industrial Manufacturing

Healthcare & Medical Devices

Research Institutions & Universities

Regions Covered:

North America

United States

Canada

Mexico

Europe

United Kingdom

Germany

France

Italy

Spain

Netherlands

Belgium

Sweden

Switzerland

Poland

Rest of Europe

Asia Pacific

China

Japan

India

South Korea

Australia

Indonesia

Thailand

Malaysia

Singapore

Vietnam

Rest of Asia Pacific

South America

Brazil

Argentina

Colombia

Chile

Peru

Rest of South America

Rest of the World (RoW)

Middle East

Saudi Arabia

United Arab Emirates

Qatar

Israel

Rest of Middle East

Africa

South Africa

Egypt

Morocco

Rest of 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 2023, 2024, 2025, 2026, 2027, 2028, 2030,

2032 and 2034

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

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