

Silicon Carbide Semiconductor Devices Market Forecasts to 2032 – Global Analysis By Product (Optoelectronic Devices, Power Semiconductors and Frequency Devices), Component, Wafer Size, Voltage Range, Application, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Silicon Carbide Semiconductor Devices Market is accounted for \$3.6 billion in 2025 and is expected to reach \$16.04 billion by 2032 growing at a CAGR of 23.8% during the forecast period. Silicon Carbide (SiC) semiconductor devices are advanced electronic components made from silicon carbide, a compound of silicon and carbon known for its exceptional thermal conductivity, high electric field strength, and wide bandgap. These devices, including diodes, MOSFETs, and power modules, are used in high-power and high-frequency applications due to their ability to operate at higher voltages, temperatures, and switching frequencies compared to traditional silicon-based devices. SiC semiconductors offer improved efficiency, reduced energy losses, and compact system designs, making them ideal for electric vehicles, renewable energy systems, industrial motor drives, and aerospace applications where performance and reliability are critical.

Market Dynamics:

Driver:

Surging Electric Vehicle (EV) Adoption

The growing popularity of electric vehicles (EVs) is accelerating the expansion of the Silicon Carbide (SiC) semiconductor device market. SiC devices offer improved efficiency, faster switching, and stronger thermal conductivity, making them excellent for

EV applications like inverters, onboard chargers, and powertrains. The demand for SiC components is increasing as automakers place a higher priority on enhanced performance, faster charging, and longer range. The market is expanding and SiC semiconductor technology innovation is being stimulated by this increasing integration in EV power electronics.

Restraint:

High Manufacturing & Material Costs

High manufacturing and material costs significantly hinder the growth of the Silicon Carbide (SiC) Semiconductor Devices Market. The complex fabrication process and the expensive nature of raw materials like high-purity silicon carbide wafers lead to increased production expenses. These high costs limit mass adoption, especially among small and mid-sized manufacturers, and constrain market competitiveness. Consequently, cost-sensitive applications tend to favor traditional silicon-based alternatives, impeding broader market penetration of SiC devices.

Opportunity:

Renewable Energy & Power Electronics

The growing adoption of renewable energy sources and advancements in power electronics are significantly propelling the Silicon Carbide (SiC) Semiconductor Devices Market. SiC devices offer high efficiency, faster switching, and better thermal performance, making them ideal for solar inverters, wind turbines, and smart grid applications. As the global push toward decarbonization intensifies, the demand for SiC-based solutions in renewable energy systems rises, driving innovation and expanding market opportunities across the clean energy and power electronics sectors.

Threat:

Limited Wafer Supply & Quality Issues

Limited wafer supply and persistent quality issues are significantly hindering the growth of the Silicon Carbide (SiC) semiconductor devices market. These constraints lead to production delays, increased manufacturing costs, and reduced yield rates, affecting supply chain efficiency and overall market scalability. Moreover, the inability to meet rising demand from high-growth sectors like electric vehicles and power electronics

hampers technological advancements and discourages potential investments in SiC device development.

Covid-19 Impact

The COVID-19 pandemic initially disrupted the Silicon Carbide (SiC) Semiconductor Devices Market due to supply chain interruptions, factory shutdowns, and reduced industrial activities. However, the market gradually rebounded with increased demand for energy-efficient solutions in electric vehicles and renewable energy. The pandemic accelerated digital transformation, boosting the adoption of SiC devices in high-performance electronics, leading to a resilient and adaptive recovery in the post-COVID landscape.

The power modules segment is expected to be the largest during the forecast period

The power modules segment is expected to account for the largest market share during the forecast period as it offers enhanced energy efficiency, high voltage capability, and superior thermal performance. These modules enable compact, lightweight designs, making them ideal for electric vehicles, renewable energy systems, and industrial applications. The rising demand for fast switching speeds and lower energy losses is accelerating the adoption of SiC power modules, thereby driving technological advancements and increasing their integration across high-performance power electronics systems.

The LED lighting segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the LED lighting segment is predicted to witness the highest growth rate, due to demand for power electronics with great efficiency. SiC devices are perfect for LED power supply and drivers because of their enhanced thermal conductivity, increased voltage tolerance, and increased energy efficiency. The need for dependable and small SiC-based solutions increases as energy-efficient lighting becomes more widely used, particularly in commercial and industrial settings.

Region with largest share:

During the forecast period, the Asia Pacific region is expected to hold the largest market share because of improvements in industrial automation, the growing use of electric cars, and the incorporation of renewable energy. Demand for SiC devices is increasing

as a result of significant investments made in high-efficiency power electronics by nations like China, Japan, and South Korea. Government programs encouraging green technology and energy efficiency also hasten market growth, establishing Asia Pacific as a major center for the development and production of SiC semiconductors.

Region with highest CAGR:

Over the forecast period, the North America region is anticipated to exhibit the highest CAGR, owing to expanding electric vehicle (EV) sector, renewable energy adoption, and advancements in industrial automation. SiC devices offer superior efficiency, thermal performance, and durability compared to traditional silicon, making them ideal for high-power applications. Supportive government policies, increasing investments in smart grid infrastructure, and rising demand for energy-efficient solutions are further accelerating market adoption, positioning North America as a key hub for SiC technology development.

Key players in the market

Some of the key players profiled in the Silicon Carbide Semiconductor Devices Market include Wolfspeed, Inc., STMicroelectronics, Infineon Technologies AG, ON Semiconductor, ROHM Semiconductor, Mitsubishi Electric Corporation, Toshiba Corporation, Littelfuse, Inc., Fuji Electric Co., Ltd., Renesas Electronics Corporation, Microchip Technology Inc., United Silicon Carbide, Inc., Power Integrations, Inc., Global Power Technologies Group, SemiQ Inc., Diodes Incorporated and Alpha and Omega Semiconductor.

Key Developments:

In February 2025, Mitsubishi Electric has reached an agreement with HD Renewable Energy, a Taipei-based solar power and battery energy storage systems (BESS) developer, to collaborate on projects aimed at achieving carbon neutrality.

In January 2025, Mitsubishi Electric Corporation, has announced plans to acquire a strategic stake in Bengaluru based Gervigreind Data Science Pvt. Ltd. This collaboration focuses on co developing and marketing no code data analysis and report generation tools that integrate seamlessly with Mitsubishi Electric's factory automation (FA) equipment and GENESIS64™ SCADA software—developed by ICONICS, its U.S.

Products Covered:

Optoelectronic Devices

Power Semiconductors

Frequency Devices

Components Covered:

Schottky Diodes

FET/MOSFET Transistors

Integrated Circuits

Rectifiers/Diodes

Power Modules

Other Components

Wafer Sizes Covered:

1 inch to 4 inches

6 inches

8 inches

10 inches & above

Voltage Ranges Covered:

Up to 600V

601V to 1200V

Above 1200V

Applications Covered:

Power Supplies and Inverters

RF Devices and Cellular Base Stations

LED Lighting

Electric Vehicles (EV)

Charging Infrastructure

Industrial Motor Drives

Other Applications

End Users Covered:

Automotive

Consumer Electronics

Aerospace & Defense

Medical Devices

Data & Communication Devices

Energy & Power

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

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