

Silicon Carbide (SiC) Semiconductor Devices Market Forecasts to 2034 – Global Analysis By Device Type (SiC Discrete Devices and SiC Power Modules), Wafer Size, Voltage Range, Application, End User and By Geography

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Abstracts

According to Statistics MRC, the Global Silicon Carbide (SiC) Semiconductor Devices Market is accounted for \$5.8 billion in 2026 and is expected to reach \$22.7 billion by 2034, growing at a CAGR of 18.6% during the forecast period. Silicon carbide semiconductor devices refer to power electronic components fabricated using silicon carbide material, offering superior performance characteristics including higher breakdown voltage, higher thermal conductivity, higher switching frequency, and lower power losses compared to conventional silicon-based power devices. These devices encompass SiC discrete devices including SiC MOSFETs, SiC Schottky barrier diodes, SiC JFETs, SiC BJTs, SiC thyristors, and SiC power modules including standard power modules, intelligent power modules, and customized power modules.

Market Dynamics:

Driver:

Rapid electrification of automotive and transportation sectors

The accelerating electrification of the automotive and transportation sectors serves as a primary catalyst for the silicon carbide semiconductor devices market. Electric vehicles require highly efficient power electronics for traction inverters, onboard chargers, and DC-DC converters, where SiC devices offer superior efficiency, range extension, and faster charging capabilities. The growing adoption of SiC in EV powertrains is driven by

the technology's ability to reduce system losses and enable smaller, lighter designs. Additionally, rail transportation and electrified heavy-duty vehicles are increasingly adopting SiC technology for improved efficiency and reliability. As automotive electrification accelerates globally, the demand for SiC semiconductor devices continues to expand rapidly.

Restraint:

High manufacturing costs and limited wafer availability

The silicon carbide semiconductor devices market faces significant challenges from high manufacturing costs and limited wafer availability that can constrain production capacity and market growth. SiC wafer fabrication is more complex and costly than silicon processing, requiring high-temperature growth and specialized equipment. The limited availability of high-quality SiC substrates, particularly larger diameter wafers, restricts production scale. Additionally, the yield rates for SiC device manufacturing are typically lower than for silicon, contributing to higher costs. These cost factors can limit SiC adoption in price-sensitive applications and create supply constraints that affect market growth.

Opportunity:

Expansion of renewable energy and charging infrastructure

The rapid growth of renewable energy generation and electric vehicle charging infrastructure presents significant opportunities for silicon carbide semiconductor devices. Solar inverters and wind power converters benefit from SiC's higher efficiency and power density, enabling improved energy conversion and reduced system costs. EV charging infrastructure requires efficient power conversion for fast charging stations, where SiC devices enable compact, high-power designs with improved efficiency. The expanding deployment of renewable energy systems and charging networks driven by sustainability goals creates substantial demand for SiC power solutions. As these markets grow, the adoption of SiC devices continues to accelerate.

Threat:

Competition from gallium nitride and silicon alternatives

The silicon carbide semiconductor devices market faces threats from competition from

gallium nitride power devices and advanced silicon technologies that could limit adoption in certain applications. GaN devices offer advantages in specific voltage ranges and switching frequency applications, competing with SiC in some power electronics segments. Additionally, continuous advances in silicon device technology, including superjunction MOSFETs and IGBTs, continue to improve performance, narrowing the gap with wide-bandgap solutions. These competitive pressures can limit SiC adoption in applications where alternative technologies provide sufficient performance at lower cost.

Covid-19 Impact:

The COVID-19 pandemic significantly impacted the silicon carbide semiconductor devices market by accelerating automotive electrification and renewable energy adoption while disrupting semiconductor supply chains and manufacturing operations. The pandemic highlighted the importance of sustainable energy and clean transportation, increasing focus on SiC technology for efficient power conversion. Supply chain disruptions affected SiC wafer and device availability, creating shortages and delivery delays. The semiconductor industry's response to increased demand for power electronics in automotive and industrial applications supported SiC market growth. As electrification trends accelerated, the focus on SiC technology for efficient power conversion intensified.

The SiC discrete devices segment is expected to be the largest during the forecast period

The SiC discrete devices segment is expected to account for the largest market share during the forecast period, driven by their widespread adoption as individual switching and rectification components in power electronics applications, offering designers flexibility and optimized performance for specific requirements. SiC discrete devices including MOSFETs and Schottky barrier diodes are widely used in automotive, industrial, and power supply applications. The growing deployment of SiC discretes in EV powertrains, onboard chargers, and power supplies supports market dominance. As system designers seek optimized solutions for specific applications, the demand for discrete SiC devices continues to grow, maintaining their leadership.

The SiC power modules segment is expected to have the highest CAGR during the forecast period

Over the forecast period, the SiC power modules segment is predicted to witness the

highest growth rate, driven by the increasing demand for integrated, high-power SiC solutions that combine multiple SiC devices in compact, thermally optimized packages for demanding automotive and industrial applications. SiC modules simplify design, improve reliability, and enable higher power density compared to discrete implementations. The growing adoption of SiC modules in EV traction inverters, industrial motor drives, and renewable energy converters supports segment growth. As power system designers seek integrated solutions with improved thermal management and simplified assembly, the demand for SiC modules continues to accelerate.

Region with largest share:

During the forecast period, the Asia Pacific region is expected to hold the largest market share, driven by the presence of leading semiconductor manufacturers, strong automotive production, expanding EV adoption, and significant investment in SiC technology across countries like Japan, China, South Korea, Taiwan, and Singapore. The region's strength in automotive manufacturing and semiconductor production supports SiC device development and deployment. Major automotive manufacturers and semiconductor companies in Asia Pacific are at the forefront of SiC technology adoption for EV applications. Additionally, the concentration of consumer electronics manufacturing and growing renewable energy investment contributes to the region's largest market share.

Region with highest CAGR:

Over the forecast period, the Asia Pacific region is also anticipated to exhibit the highest CAGR, reinforcing its market leadership through continued investment in semiconductor manufacturing and expanding SiC applications. The growth is fueled by increasing demand for SiC devices in electric vehicle powertrains, EV charging infrastructure, renewable energy systems, and industrial applications across Asia Pacific countries. China's aggressive EV adoption policies, Japan's power electronics expertise, and South Korea's semiconductor capabilities support regional growth. The rapid expansion of EV production and charging infrastructure across the region accelerates SiC adoption at the fastest pace.

Key players in the market

Some of the key players in Silicon Carbide (SiC) Semiconductor Devices Market include Infineon Technologies AG, STMicroelectronics N.V., Wolfspeed Inc., onsemi, ROHM Co. Ltd., Mitsubishi Electric Corporation, Fuji Electric Co. Ltd., Toshiba Corporation,

Microchip Technology Incorporated, Renesas Electronics Corporation, Coherent Corp., Navitas Semiconductor Corporation, NXP Semiconductors N.V., Qorvo Inc., and Semikron Danfoss.

Key Developments:

In March 2025, Infineon Technologies AG announced a new family of SiC power modules designed for electric vehicle traction inverters. The modules feature enhanced thermal performance and power density, enabling improved EV range and efficiency for next-generation automotive applications.

In February 2025, Wolfspeed Inc. unveiled its latest 200mm SiC wafer manufacturing facility expansion to meet growing demand from automotive and industrial customers. The expansion increases production capacity and supports the transition to larger wafer diameters for cost-effective SiC device manufacturing.

Device Types Covered:

SiC Discrete Devices

SiC Power Modules

Wafer Sizes Covered:

4-inch (100 mm)

6-inch (150 mm)

8-inch (200 mm)

Above 8-inch

Voltage Ranges Covered:

Below 650 V

650 V–1,200 V

1,200 V–3,300 V

Above 3,300 V

Applications Covered:

Power Supply & Conversion

Motor Drives

Inverters

On-Board Chargers (OBCs)

DC-DC Converters

Battery Charging Infrastructure

RF & Microwave Devices

Industrial Power Systems

End Users Covered:

Automotive

Industrial

Energy & Power

Consumer Electronics

Healthcare

Telecommunications

Rail Transportation

Aerospace & Defense

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

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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)

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Note: Tables for North America, Europe, APAC, South America, and Rest of the World (RoW) are also represented in the same manner as above.

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