

## **SiC Wafer - Market Share Analysis, Industry Trends & Statistics, Growth Forecasts 2019-2029**

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### **Report description:**

The SiC Wafer Market size is estimated at USD 0.81 billion in 2024, and is expected to reach USD 2.04 billion by 2029, growing at a CAGR of 20.46% during the forecast period (2024-2029).

SiC semiconductors can endure ten times higher voltage than the existing semiconductors and operate at 400°C temperature, unlike the existing silicon semiconductors with a ceiling of 175 degrees. They also have a high-intensity level and can reduce the volume to one-tenth of silicon chips.

#### Key Highlights

- In the automotive industry, new EVs have reduced charge time and increased range and performance to meet customer expectations. Hence, automotive companies require power electronic devices capable of effective and efficient operation at elevated temperatures to offer the above-mentioned advantages to customers. Thus, power modules are being developed using wide-bandgap SiC technologies, owing to the advantages of SiC-based technology, such as high thermal conductivity, reduced switching losses, higher power density, and increased bandwidth capability.
- Power electronics play an essential role in the global electrical infrastructure. The technology is used in transportation (cars and trains), renewable energy (solar and wind), industrial (motor drives), and computing (power supplies). SiC is also used to make LEDs. Power electronics convert or transform alternating and direct current in systems.
- The growing demand for energy and the increasingly widespread use of renewable energy resources have allowed microgrids to play a fundamental role in the reduction of greenhouse gas emissions and in the reduction of energy derived from fossil fuels. However, silicon-based solid-state inverters and switches are too bulky and inefficient to be used in the microgrid system. WBG semiconductors such as SiC, thanks to their higher breakdown voltage and switching frequency, are proposing themselves as a fundamental component in the construction of efficient and reliable microgrids.

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-A larger wafer size offers more dies per unit area. The extra space to fabricate more dies enables semiconductor fabrication plants and OSATs (outsourced semiconductor assembly and test) to manufacture, test, or assemble more dies in a specific time. This increases the rate at which new products can be fabricated or assembled. To some extent, increasing wafer size also impacts the supply chain positively.

-The semiconductor industry has been affected significantly by various geopolitical scenarios, including the Russia-Ukraine War and the China-US Tech War, as well as a decline in consumer spending within the consumer electronics industry. This has had a direct impact on the supply and demand of SiC wafers in the global market. The semiconductor industry has faced several challenges over the past two years, including the COVID-19 pandemic and a lack of capacity to meet growing demand.

## SiC Wafer Market Trends

### Radio Frequency (RF) Segment to Witness Major Growth

- The exceptional electronic and thermal characteristics of silicon carbide (SiC) render it exceptionally suitable for cutting-edge high-power and high-frequency semiconductor devices that surpass the capabilities of both silicon and gallium arsenide devices. SiC-based technology offers significant benefits such as minimized switching losses, enhanced power density, superior heat dissipation, and expanded bandwidth capability. This leads to significantly condensed solutions with greatly enhanced energy efficiency at a lower expense at the system level.

- Moreover, the market is expected to be driven forward by the increasing utilization of SiC technologies in various commercial applications, such as RF power amplifiers in 5G wireless base station antennas and other high-performance RF applications. Additionally, the growing usage of SiC devices in cellular base stations and radio-frequency operations and the supportive government regulations promoting the use of renewable energy resources for power generation are expected to contribute to market growth.

- Silicon carbide finds its application in the manufacturing of radio frequency devices, including amplifiers and mixers, owing to its exceptional electron mobility and impressive breakdown electric field strength. These characteristics render it highly suitable for high-frequency applications where conventional materials may not suffice. RF semiconductors are extensively utilized in the fields of telecommunication, aerospace, automotive, and defense. The utilization of RF semiconductor electronics extends beyond phase shifters, attenuators, couplers, filters, amplifiers, switches, oscillators, and antenna tuners, encompassing a wide range of circuits.

- Moreover, the demand for SiC wafers is increasing worldwide owing to the global 5G wireless connection deployment. According to 5G Americas, by 2027, 5G connections will reach 5.9 million, which is likely accelerating, boosting the need for RF power amplifiers that may function efficiently in new high-frequency bands on a technology platform that can expand to meet demand.

### Asia-Pacific Holds the Largest Market Share

- Asia-Pacific is a major market for silicon carbide wafers. Government policies have also helped the region because of its dominating position in the global semiconductor market. Moreover, the region's semiconductor industry has been driven by Taiwan, India, China, Japan, and South Korea. These countries make up a considerable share of the global market for semiconductors, while other countries such as Thailand, Vietnam, Singapore, and Malaysia have also contributed significantly to the dominance of the region.

- Moreover, global chip sales of Chinese companies are rising, largely due to rising US-China tensions and nationwide efforts to develop China's chip sector, including government subsidies, purchasing preferences, and other preferential measures.

- The Asia-Pacific region is also a huge market for renewable power energy, especially solar and wind. The national governments

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are also playing a vital role in the adoption of solar infrastructure in the region, thereby boosting the market growth in the region. For instance, India ranks fourth in the overall renewable energy sector as per the Ministry of New and Renewable Energy. At COP26, the country set an expanded target of 500 GW of non-fossil fuel energy by 2030. This was an important obligation under Panchamrit. It is the world's largest expansion plan for renewable energies.

- Moreover, the installed solar energy capacity has increased 30 times in the last nine years and stood at 72.31 GW as of November 2023. SiC, which forms a critical element in power electronics devices like inverters, finds many applications in the renewable energy sector, such as delivering energy from photovoltaic (PV) arrays to the electric grid. As such, the booming renewable energy industry in the region presents huge growth potential for the market.

## SiC Wafer Industry Overview

The SiC wafer market is highly competitive and fragmented, consisting of some influential players such as Resonac Holdings Corporation, STMicroelectronics (Norstel AB), Xiamen Powerway Advanced Material Co, Coherent Corp. (II-VI Incorporated), and Wolfspeed Inc. These players, with noticeable shares in the market, are concentrating on expanding their customer base across foreign countries. They leverage strategic collaborative actions to improve their market percentage and enhance their profitability.

- December 2023: Coherent announced that Denso Corporation and Mitsubishi Electric Corporation had completed a USD 1 billion equity investment in its silicon carbide business. Under the deal, in exchange for an ownership interest of 12.5% with no control by Coherent, DENSO and Mitsubishi Electric each invested USD 500 million. Coherent had owned the other 75%.

- July 2023: Renesas Electronics Corporation and Wolfspeed Inc. announced the conclusion of a supply agreement for silicon carbide bare and epitaxial wafers and a deposit of USD 2 billion from Renesas to secure a ten-year supply commitment from Wolfspeed. Renesas will be in a position to begin silicon carbide power semiconductor production by 2025 when it receives high-quality silicon carbide wafers from Wolfspeed.

## Additional Benefits:

- The market estimate (ME) sheet in Excel format
- 3 months of analyst support

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