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Power Module Market - A Global and Regional Analysis: Focus on Application, Product, and Country Level Analysis - Analysis and Forecast, 2025-2035

https://marketpublishers.com/r/P7949CDA8AB7EN.html
Date: February 2025
Pages: 0
Price: US$ 4,900.00 (Single User License)
ID: P7949CDA8AB7EN

Abstracts

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This report will be delivered in 7-10 working days.The Global Power Module Market is experiencing significant growth due to the rising demand for energy-efficient power electronics across various industries, including electric vehicles (EVs), data centers, telecommunications, and industrial automation. Power modules are crucial in converting, controlling, and managing electrical power efficiently, making them essential components in modern electronic and electrical systems.

One of the major drivers of the market is the surging adoption of electric vehicles (EVs). EV manufacturers increasingly integrate silicon carbide (SiC) and gallium nitride (GaN)--based power modules to enhance energy efficiency and thermal performance. Additionally, expanding data centers and cloud infrastructure drives demand for power modules that support energy-efficient operations.

Advancements in wide-bandgap materials, such as SiC and GaN, revolutionize power module design, enabling higher power density, lower energy losses, and improved heat dissipation. The market is expected to grow at a CAGR of over 10% from 2024 to 2035, with increasing investments in renewable energy and industrial automation further contributing to its expansion. Government policies supporting energy efficiency, emissions reduction, and smart grid infrastructure will also boost demand for next-generation power modules.

Market Segmentation:

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Segmentation 1: by Application

- Automotive
- Electric Vehicle (EV) Traction Inverters
- On-Board Chargers (OBC)
- EV Charging Infrastructure
- Others
- Data Centers
- Server Power Supplies (AC-DC Converters)
- Power Distribution Units (PDUs)
- Others
- Network Infrastructure
- Telecom Base Stations
- Edge/Cloud Infrastructure Power Modules
- Others
- Others

Automotive Industry Application to Lead the Power Module Market (by Application)

The automotive segment is expected to dominate the market, particularly EV traction inverters. These components are essential for converting DC power from the battery into AC power for electric motors. The shift toward high-efficiency power electronics in EVs drives the adoption of SiC-based traction inverters, which offer higher efficiency, reduced energy losses, and improved range. With EV sales surging worldwide, the

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demand for power modules in traction inverters will continue to grow, making this sub-segment the market leader.

Segmentation 2: by Technology

- Silicon (Si) Modules
- Silicon Carbide (SiC) Modules
- Gallium Nitride (GaN) Modules
- Hybrid Modules

Silicon Carbide (SiC) Modules to Lead the Power Module Market (by Technology)

Among power module technologies, Silicon Carbide (SiC) modules are expected to lead due to their high efficiency, fast switching speeds, and superior thermal conductivity. SiC modules are increasingly replacing traditional Silicon (Si) power modules in EV powertrains, renewable energy systems, and industrial applications due to their ability to operate at higher temperatures and voltages, resulting in improved energy efficiency.

Segmentation 3: by Power Ratings

- Low Power (Below 100 W Modules)
- Medium Power (100 W – 2 kW Modules)
- High Power (Above 2 kW Modules)

Segmentation 4: by Product Type

- IGBT Modules
- MOSFET Modules
- Others

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Segmentation 5: by Region

- North America
- Europe
- Asia-Pacific
- Rest-of-the-World

Asia-Pacific Region to Lead the Power Module Market (by Region)

Asia-Pacific is projected to lead the Global Power Module Market, driven by the strong presence of semiconductor manufacturers, growing EV production, and expanding industrial automation. Countries like China, Japan, and South Korea are investing heavily in next-generation power semiconductor technologies, including SiC and GaN-based power modules for EVs and energy-efficient applications.

China, the world's largest EV market, is integrating advanced power modules into EV drivetrains and charging infrastructure, significantly contributing to market growth. Additionally, Japan and South Korea are at the forefront of semiconductor R&D and power module manufacturing, fostering innovation in energy-efficient power solutions.

While North America and Europe are also witnessing rapid growth due to EV adoption and data center expansion, Asia-Pacific's dominance is reinforced by government support for power electronics R&D, local manufacturing hubs, and high semiconductor production capacity. The presence of key market players and investments in 5G networks, smart grids, and industrial automation will further solidify the region's leadership.

Key Players of Power Module Market

- Infineon Technologies
- Mitsubishi Electric
- ON Semiconductor

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STMicroelectronics

ROHM Semiconductor

Microchip Technology

Texas Instruments

ABB

Toshiba

Vishay Intertechnology

Delta Electronics

TDK Corporation

Eaton

Fuji Electric

Bel Power Solutions

Trends for Power Module Market

Advancements in Wide-Bandgap (WBG) Materials

One of the most significant trends in the Global Power Module Market is adopting wide-bandgap (WBG) materials, particularly SiC and GaN. These materials are revolutionizing power module design by enabling higher switching frequencies, lower energy losses, and superior thermal performance compared to traditional silicon-based modules.

SiC-based power modules are increasingly used in EV powertrains, industrial automation, and renewable energy systems due to their higher voltage tolerance and reduced energy dissipation. Meanwhile, GaN modules are finding applications in high-frequency power converters, data centers, and fast-charging

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systems.

As R&D investments and manufacturing scalability improve, WBG materials will become the industry standard, driving innovation in high-power, high-efficiency power electronics. This trend aligns with sustainability goals, as SiC and GaN modules help reduce carbon emissions by improving energy efficiency in critical applications.

Driver for Power Module Market

Surging Electric Vehicle (EV) Adoption

The rapid expansion of the EV market is a key driver of the Global Power Module Market. With governments worldwide promoting zero-emission vehicles, major automotive manufacturers invest in high-performance power electronics to enhance EV efficiency, power density, and battery life.

Power modules are crucial in EV traction inverters, onboard chargers, and fast-charging infrastructure, making them indispensable for EV development. SiC power modules replace traditional silicon-based power devices in EV drivetrains, offering higher energy efficiency, reduced cooling requirements, and increased vehicle range.

As global EV sales continue to rise, the demand for advanced power modules will accelerate, driving investments in semiconductor manufacturing, next-gen power device integration, and high-efficiency power conversion technologies. The EV sector’s rapid electrification will remain one of the most significant catalysts for market growth.

Restraint for Power Module Market

Complex Thermal Management Requirements

One of the biggest challenges in the Global Power Module Market is the complex thermal management associated with high-power applications. As power modules handle increasing power densities, managing heat dissipation and ensuring long-term reliability becomes critical.

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SiC and GaN power modules operate at higher frequencies and temperatures than traditional silicon-based devices, requiring advanced cooling solutions such as liquid cooling and advanced heat sinks. However, developing and integrating effective thermal management systems adds complexity and cost to power module design.

Manufacturers are investing in innovative packaging technologies and enhanced cooling techniques, but the cost implications and design challenges remain barriers to widespread adoption. Solving thermal management issues is critical to ensuring efficiency and reliability for industries reliant on high-power electronics (e.g., EVs, industrial automation, and renewable energy).

Opportunity for Power Module Market

Growing Adoption of Renewable Energy Systems

The global push toward clean energy presents a significant opportunity for the Global Power Module Market. As solar, wind, and battery storage installations grow, the demand for high-efficiency power modules rises.

Power modules are essential in solar inverters, wind turbine power electronics, and grid battery storage systems, where they optimize power conversion and reduce energy losses. The adoption of SiC-based power modules in renewable energy applications is increasing due to their high efficiency and ability to withstand extreme environmental conditions.

With governments setting ambitious renewable energy targets and companies investing in sustainable energy infrastructure, the market for power modules in solar and wind energy systems is expected to expand significantly. This shift toward clean energy solutions creates new revenue streams for power module manufacturers, fostering innovation in next-generation power electronics for renewable applications.

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