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Power Electronics Market ? Global Industry Size, Share, Trends, Opportunity, and Forecast, Segmented By Device Type (Power Discrete, Power Module and Power IC), By Material (Silicon, Silicon Carbide, Gallium Nitride and Others), By Voltage (Low Voltage, Medium Voltage, High Voltage), By Application (ICT, Consumer Electronics, Industrial, Automotive, Aerospace and Defence, and Others), By Region & Competition, 2021-2031F

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Abstracts

The Global Power Electronics Market is projected to expand from USD 52.85 Billion in 2025 to USD 76.16 Billion by 2031, registering a CAGR of 6.28%. Power electronics utilize solid-state technologies to effectively control and convert electric power across various energy systems. This market is primarily driven by the accelerating shift toward renewable energy, the growth of industrial automation, and the widespread electrification of the transportation sector. To support these expanding applications, the industry is significantly boosting its production infrastructure to satisfy the demand for critical components. As reported by SEMI, global semiconductor capacity was anticipated to reach 33.6 million wafers per month in 2025.

Nevertheless, the market faces a notable challenge regarding the high fabrication costs and supply chain complexities of wide-bandgap materials such as silicon carbide. While these materials offer superior energy efficiency, their intricate manufacturing requirements and lower yields relative to traditional silicon can hinder scalable production. This technical barrier complicates the achievement of cost-effective mass adoption, thereby delaying the broader commercialization of next-generation power

modules.

Market Driver

The rapid adoption of electric and hybrid vehicles acts as a major catalyst for the power electronics sector. As automotive manufacturers move away from internal combustion engines, the demand for essential components like traction inverters, on-board chargers, and battery management systems has surged. These subsystems depend heavily on advanced power modules to manage high voltages and ensure efficient energy transfer, pushing the industry toward materials with higher power density. According to the International Energy Agency's 'Global EV Outlook 2024' from April 2024, global sales of electric cars neared 14 million in 2023, indicating a robust shift toward electrified mobility that directly necessitates increased semiconductor volume.

Concurrently, the expansion of renewable energy generation and integration drives significant market momentum. Solar photovoltaic systems and wind turbines require sophisticated inverters and converters to transform variable direct current into stable alternating current for grid compatibility. This transition demands high-efficiency power devices capable of handling substantial power loads with minimal energy loss. According to the International Energy Agency's 'Renewables 2023' report from January 2024, global annual renewable capacity additions increased by almost 50% to nearly 510 gigawatts in 2023. To accommodate such rapid industry growth, major players are aggressively expanding manufacturing capabilities; for instance, Infineon Technologies AG committed an additional five billion euros in 2024 to expand its silicon carbide power fabrication facility in Malaysia.

Market Challenge

The substantial fabrication costs and intricate supply chain requirements associated with wide-bandgap materials, specifically silicon carbide, constitute a primary obstacle to the scalable growth of the global power electronics market. Although these materials provide enhanced energy efficiency, their complex manufacturing cycle leads to lower production yields relative to established silicon-based components. This discrepancy results in elevated unit prices, which discourages widespread adoption in price-sensitive industries such as automotive manufacturing and consumer appliances. Consequently, the inability to achieve cost parity with traditional technologies creates a bottleneck that delays the comprehensive commercialization of next-generation power modules.

This challenge significantly increases the capital intensity required for market entry and

expansion, forcing companies to allocate vast resources toward specialized infrastructure rather than immediate product proliferation. The magnitude of the financial commitment needed to address these manufacturing hurdles effectively limits the number of players capable of scaling production. According to SEMI, in October 2025, the power-related segment, including compound semiconductors, was projected to invest $27 billion in equipment spending over the subsequent three years. Such high capital requirements for fabrication facilities directly hamper the speed at which manufacturers can ramp up production, thereby moderating the overall pace of market expansion.

Market Trends

The transition toward 800V electrical architectures in electric vehicles represents a critical evolution aimed at reducing charging times and enhancing system efficiency. By doubling the operating voltage from the standard 400V, automotive engineers can significantly lower current levels, which reduces resistive heating and allows for the use of thinner, lighter cabling. This shift directly impacts the power electronics market by necessitating advanced traction inverters and onboard chargers capable of withstanding higher thermal and electrical stresses, driving the demand for specialized silicon carbide components. To support this high-voltage ecosystem, major component suppliers are heavily investing in localized manufacturing. For example, Onsemi announced in a June 2024 press release plans to invest up to 2 billion dollars to establish a vertically integrated silicon carbide manufacturing facility in the Czech Republic.

Simultaneously, the proliferation of artificial intelligence is compelling data centers to shift from legacy 12V to 48V power distribution architectures. Modern high-performance computing racks require power densities that render 12V systems inefficient due to excessive copper losses and bulky cabling requirements. A 48V intermediate bus architecture mitigates these issues by delivering power more efficiently to the server motherboard, where point-of-load converters then step it down for specific processors. This structural change is essential to manage the surging global energy load created by computational processing. According to the International Energy Agency's 'Electricity 2024' report from January 2024, electricity consumption from data centers, artificial intelligence, and the cryptocurrency sector could double to roughly 1,000 terawatt-hours by 2026.

Key Market Players

Mitsubishi Electric Corporation

Fuji Electric Co. Ltd.

Toshiba Corporation

Infineon Technologies AG

ON Semiconductor Corporation

STMicroelectronics International N.V.

Texas Instruments Incorporated

Renesas Electronics Corporation

Vishay Intertechnology Inc.

NXP Semiconductors N.V.

Report Scope

In this report, the Global Power Electronics Market has been segmented into the following categories, in addition to the industry trends which have also been detailed below:

Power Electronics Market, By Device Type

- Power Discrete
- Power Module
- Power IC

Power Electronics Market, By Material

- Silicon
- Silicon Carbide

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- Gallium Nitride
- Others

Power Electronics Market, By Voltage

- Low Voltage
- Medium Voltage
- High Voltage

Power Electronics Market, By Application

- ICT
- Consumer Electronics
- Industrial
- Automotive
- Aerospace and Defence
- Others

Power Electronics Market, By Region

- North America
  - United States
  - Canada
  - Mexico
- Europe

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France

United Kingdom

Italy

Germany

Spain

Asia Pacific

China

India

Japan

Australia

South Korea

South America

Brazil

Argentina

Colombia

Middle East & Africa

South Africa

Saudi Arabia

UAE

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Competitive Landscape

Company Profiles: Detailed analysis of the major companies present in the Global Power Electronics Market.

Available Customizations:

Global Power Electronics Market report with the given market data, TechSci Research offers customizations according to a company's specific needs. The following customization options are available for the report:

Company Information

Detailed analysis and profiling of additional market players (up to five).

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