

Power Electronics Market - Growth, Trends, Covid-19 Impact, and Forecasts (2023 - 2028)

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Report description:

The Global Power Electronics Market is anticipated to witness a CAGR of 4.38% during the forecast period. The growing need for power-efficient products is one of the major factors driving the demand for power electronics products across all end-user industries. Therefore, the increasing need for energy-efficient products in markets, such as data centers, automotive, telecom infrastructure, and 5G devices, is witnessing significant investment in the studied market. The growing adoption of power management integrated circuits (ICs) is also fuelling the demand for power electronics.

Key Highlights

Over the last few years, power electronic products have been integrated into all types of energy conversion applications. They are needed in all phases of the conversion process, from generation through transmission and, ultimately, consumption.

Advancements in energy infrastructure, production of renewable energy, and energy-efficient portable electronics components drive the market growth at a higher rate. Silicon carbide (SiC) and gallium nitride (GaN) are particularly well-suited for power electronics use.

Further, the insulated gate bipolar transistor (IGBT) and metal-oxide-semiconductor field-effect transistor (MOSFET) markets will continue to increase, but part of the market will go to SiC, especially when talking about modules for electric vehicles/hybrid electric vehicles (EV/ HEV). Moreover, the demand for power MOSFET is supported by their increasing use in replacing IGBTs and thyristors. Besides, the significant advantage of using power MOSFET in reinforcing the power efficiency of devices at low voltages is the reason for increasing demand in the global power MOSFET market.

Also, trends in the automotive industry, like electric vehicle and autonomous vehicle, and increasing production of electric vehicles is emerging as significant driver for the power electronic market growth. SiC semiconductors are ideal for applications such as onboard chargers and inverters used within plug-in hybrid (PHEV) and fully electric vehicles. This is because their energy efficiency is significantly higher compared to traditional silicon.

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To ensure EVs can operate over long distances and charge within a small timeframe, the vehicle's power electronics must be designed to handle high temperatures. SiC semiconductors have energy efficiency of over 95%, i.e., only 5% of the energy is lost as heat during power conversion instances, such as recharging the vehicle at a high-power rapid-charger. Further, factors such as increasing demand for consumer electronics and wireless communications and growing demand for energy-efficient battery-powered portable devices are driving the market growth; factors such as shortage of silicon wafers across the world coupled with the return on investment (ROI) metrics are anticipated to challenge the market growth. However, in the medium-term, vehicle sales rebound is expected due to the complete roll-out of the COVID-19 vaccine and improved treatment plans. In addition, advanced driver-assistance system (ADAS) and electric and hybrid cars are becoming more prevalent post-COVID-19 and are expected to drive the power semiconductor market.

Power Electronics Market Trends

Aerospace and Defence to Hold Major Market Share

The aerospace and defense sector is witnessing the ongoing struggle to reduce size, weight, power, and cost while at the same time increasing command, communications, intelligence, and surveillance capabilities. This is forcing Aerospace and Defense (A&D) organizations to invest in solutions with ever-increasing power densities and capabilities.

The growing military expenditure across the globe is expected to drive the market. For instance, according to Stockholm International Peace Research Institute (SIPRI), the United States, China, India, the United Kingdom, and Russia are the top 5 countries that have to spend close to USD 100 billion and more for their military in 2021.

In the sector, power electronics products are adopted for various applications, like power drive controls, landing gear, defensive aids systems (DAS), engine systems and controls, flight control, navigation, cabin lighting, avionics, and communications, among others. For instance, signal processing for modern military radars, avionics, weapon systems, unmanned aerial vehicle (UAV) payloads, and missile controls use processing power that emits tremendous amounts of heat. Efficient power electronics help to reduce heat and improve performance.

Many market vendors are offering products specific to the A&D industry. For example, the US-based Solid State Devices Inc. offers SFC35N120 1200-volt silicon carbide (SiC) power MOSFETs for high-reliability aerospace and defense power electronics applications, such as power factor correction (PFC) boost converters and high-voltage directcurrent-direct current (DC-DC) converters.

There is an increasing demand for a wide range of semiconductor devices as the entry of private aerospace companies becomes more common. SpaceX, Blue Origin, and Virgin Galactic focus their businesses on various industry verticals that need various power electronic components. Such trends are expected to drive the growth of the market studied during the forecast period.

Asia Pacific is Expected to Record Significant Growth Over the Forecast Period

The Asia Pacific semiconductor industry is driven by Taiwan, China, Japan, and South Korea, which together constitute approximately 65% of the global discrete semiconductor market, while others, like Vietnam, Thailand, Singapore, and Malaysia, also contribute significantly to the region's dominance in the market.

The automotive industry has been proliferating across Asia and specifically in China. The Government of China views its automotive industry, including the auto parts sector, as one of the country's pillar industries. The government expects China's automobile output to reach 35 million units by 2025. This is expected to drive the market studied.

The region is also witnessing the increasing development of data centers. The regional governments are also playing a significant role in the studied market developments. For instance, according to the Ministry of Electronics and Information Technology

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(MEITY), the Indian government is also working on policies to develop a semiconductor and power electronic components manufacturing base in the country.

The technology boom is powering the region's economies. Explosive growth in new-era gadgets such as the Internet-linked wearable devices and connected appliances is stoking new demand for components such as power semiconductors. South Korea, India, Singapore, and Taiwan are among the economies expected to benefit the most.

The vendors of power electronics in Asia are highly involved in consumer electronics, EV automotive, and the power and energy industry. Moreover, Asia is the largest producer and consumer of electronic gadgets, which is expected to offer more opportunities.

Further, in China, the growth of the studied market can also be attributed to the booming electronics industry. Electronics is one of the largest industries in China and is a significant contributor to the country's overall economic growth. For instance, as per the State Council of the People's Republic of China, during the two months from January to February 2022, the added value of major electronics manufacturers rose 12.7% year-on-year, compared with the 7.5% growth seen in the overall industrial sector in the country. China is the world's leading producer of electronic devices such as TVs, smartphones, laptops and PCs, refrigerators, and air conditioners.

Power Electronics Market Competitor Analysis

The power electronics market is a fragmented one with the presence of various global as well as regional players such as Texas Instruments Incorporated, ABB Ltd., Veeco Instruments Inc., Gresham Power Electronics, Scientech Technologies Pvt., XP Power Limited, ST Microelectronics NV, Renesas Electronics Corporation, Toshiba International Corporation, Fuji Electric Co., Ltd., and many others. Most of these players are involved in several strategic developments, including mergers, acquisitions, new product launches, and market expansion, to gain a competitive edge in the global market.

In March 2022, ROHM Semiconductor announced that Lucid, a luxury electric vehicle company headquartered in California, is using its SiCMOSFET in the Lucid Air. The Wunderbox, the main on-board charging unit in the vehicle, integrates a DC-DC converter and the bi-directional on-board charger (OBC), where an advanced power factor correction circuit is capable of operating at high switching frequencies due to the superior performance of the SiC MOSFET. The improved performance at high frequency and high temperature of ROHM's SCT3040K and SCT3080K SiC MOSFETs have helped Lucid to reduce the size of the design while also reducing power losses, which results in high charging efficiency.

In January 2022, Magnachip Semiconductor Corporation announced the launch of a new generation of low-voltage (LV) MOSFETs featuring lower $R_{ds(on)}$ for battery protection circuit modules (PCMs) in smartphones. With the demand for high-end 5G and long term evolution (LTE) smartphones increasing, extended battery life and strengthened protection features for batteries are becoming important. 5G phones, in particular, need long-lasting batteries with high endurance to process a large amount of data for fast download and upload. As per the company, the new generation LV MOSFETs with advanced overvoltage and overcurrent protection features help extend battery life and reduce overheating issues.

Additional Benefits:

The market estimate (ME) sheet in Excel format
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