More Than AI: the Multi-Pillar Growth Story of Semiconductors

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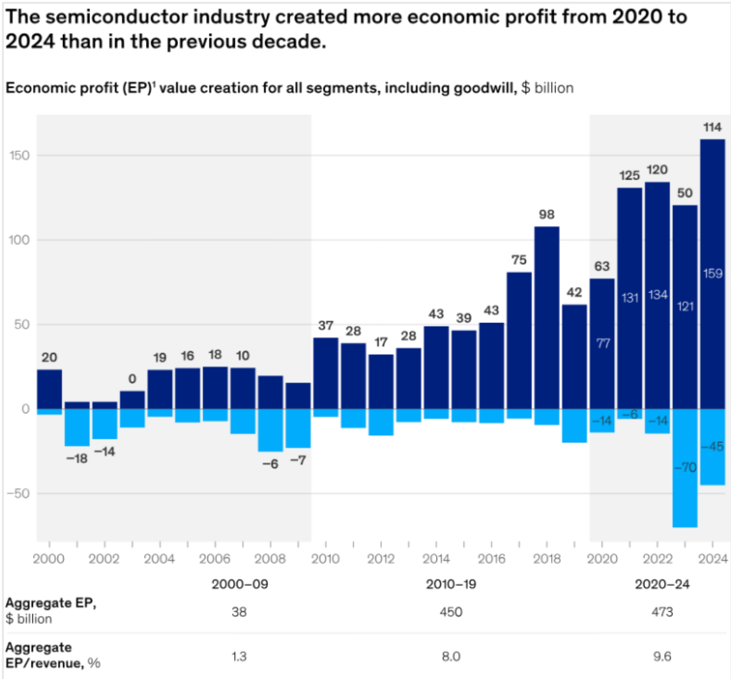
Semiconductors: beyond AI. The forces driving a $1 trillion industry

The semiconductor industry is making a powerful comeback. What was once projected to hit $1 trillion by 2030 is now expected to reach that milestone by 2028, according to IDC, nearly two years ahead of consensus.[1,2]

In just four years (2020–2024), the industry created $473 billion in economic profit, more than what was earned over the previous decade. This sharp increase in economic profit stems primarily from AI-driven growth and new semiconductor applications in automotive and industrial markets, with pandemic-induced product shortages contributing to exceptional gains.[3]



Source: McKinsey & Company

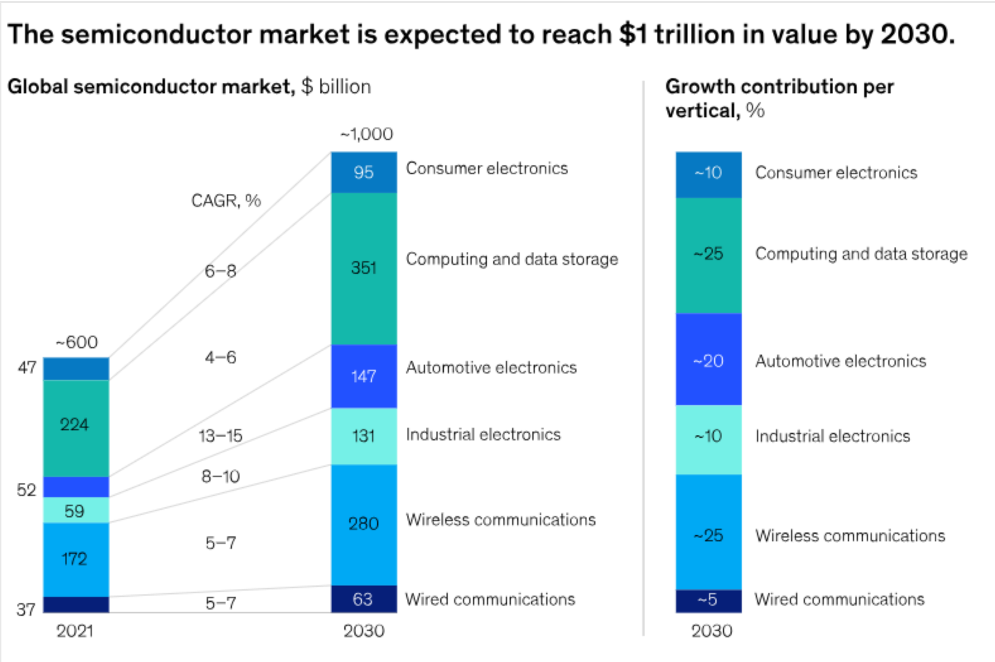
In the last couple of years, much of the market attention has focused on AI as the primary driver of semiconductor innovation and investments.

AI systems require massive computational resources, fuelling demand for high-performance GPUs, accelerators, and advanced memory solutions. This surge has played a significant role in the sector's recent growth and media visibility.

Yet, AI is only one piece of a much larger story. While AI-driven computing and data storage will be a key growth engine, accounting for roughly 25% of total market expansion, other sectors are also set to play significant roles. Wireless communications will contribute another 25%, fuelled by 5G and future connectivity technologies. Automotive electronics will add about 20%, driven

[1] https://www.mckinsey.com/industries/semiconductors/our-insights/exploring-new-regions-the-greenfield-opportunity-in-semiconductors
[2] https://my.idc.com/getdoc.jsp?containerId=prUS53791725
[3] https://www.mckinsey.com/industries/semiconductors/our-insights/silicon-squeeze-ais-impact-on-the-semiconductor-industry

by electric vehicles and autonomous systems. Industrial electronics and consumer electronics will each provide around 10%, reflecting the growing integration of semiconductors into manufacturing and everyday devices. Even wired communications, though smaller, will still add ~5%.[4]



Source: McKinsey & Company

This broad-based expansion underscores a fundamental truth: semiconductors are the backbone of modern technology. From smartphones and cars to data centres and medical equipment, these tiny components enable the computing power, connectivity, and energy efficiency that power our daily lives and global economies.

At the heart of this capability lies the unique nature of semiconductors themselves. Made primarily from silicon, these materials exhibit electrical properties between those of conductors and insulators, allowing precise control of current flow. This characteristic makes them ideal for creating transistors, the building blocks of microchips. Through advanced manufacturing, billions of transistors are integrated into a single chip, forming processors, memory, sensors, and power electronics that power nearly every modern innovation.

This article will focus on the broader forces that, alongside AI, are reshaping the semiconductor industry, highlighting technologies like automotive chips, robotics, power electronics, and connectivity solutions that are driving its next wave of growth.

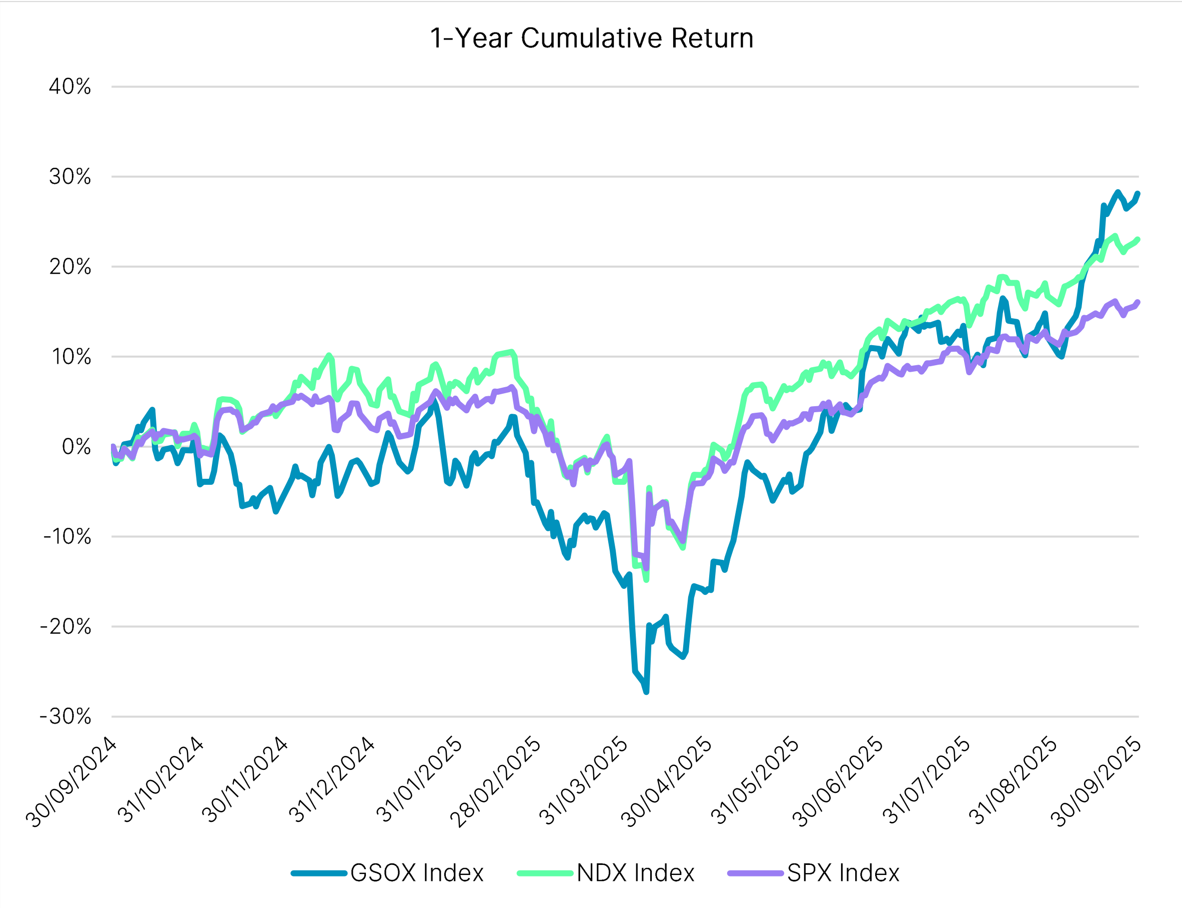
To illustrate these dynamics, we will reference the Nasdaq Global Semiconductor™ Index (GSOX™), which offers a comprehensive view of the semiconductor value chain. While AI-related semiconductor companies are well represented, the index also includes leading innovators in the segments driving long-term transformation, providing diversified exposure to the full spectrum of growth drivers.

[4] https://www.mckinsey.com/industries/semiconductors/our-insights/exploring-new-regions-the-greenfield-opportunity-in-semiconductors

The Nasdaq Global Semiconductor™ Index (GSOX™)

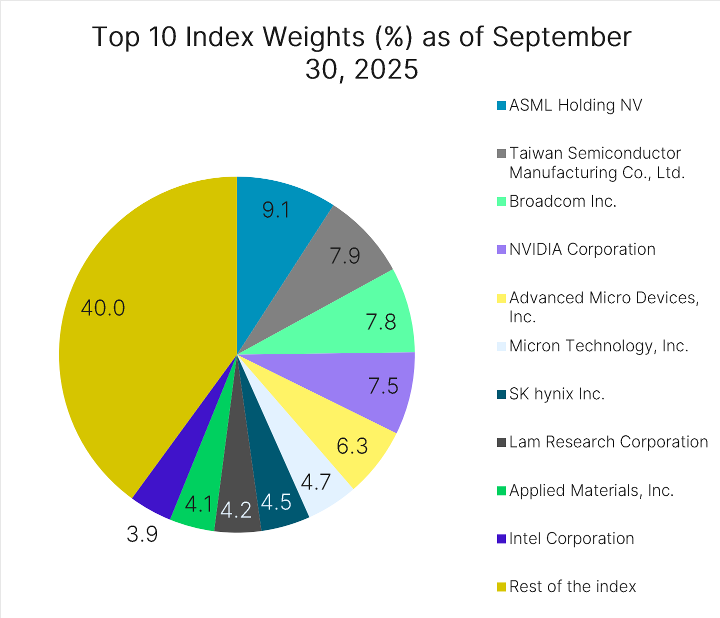
We begin with an overview of the Nasdaq Global Semiconductor™ Index (GSOX™), which tracks the performance of the 80 largest semiconductor companies worldwide, offering a broad representation of the sector.
Over the 12-month period ending September 30, 2025, the index delivered a total return of 28.14%, outperforming major U.S. equity benchmarks despite notable volatility.

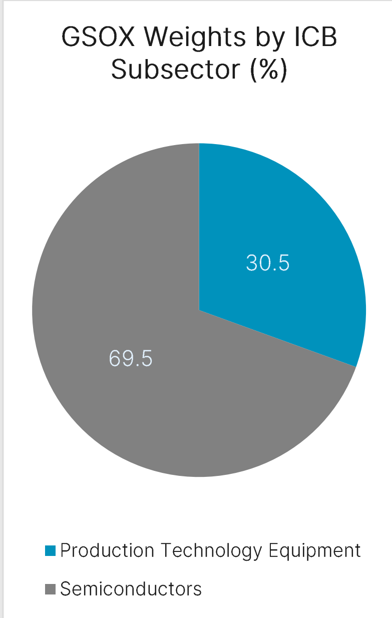
Following a sharp correction in March–April, GSOX rebounded strongly, rising 76.17% from its low on April 8, and ended the period well ahead of both the Nasdaq-100® (NDX®) and the S&P 500 (SPX).



GSOX is modified market capitalization-weighted, with the top five constituents by market capitalization capped at 8% and the rest capped at 4% during quarterly rebalancing.

As of the end of September 2025, the ten largest constituents accounted for 60% of the index weight. 69.46% of the index weight is in the Semiconductor Subsector, with the rest in the Production Technology Equipment Subsector, according to the Industry Classification Benchmark (ICB) classification system.





Having introduced the structure and performance of the index, we now turn to the broader forces driving growth across the semiconductor industry: automotive semiconductors, robotics, power electronics and advanced connectivity.

Part 1. Automotive: the convergence of power, compute & connectivity

Modern vehicles are no longer just mechanical machines. They are evolving into sophisticated electronic platforms, often described as "computers on wheels".

Real-word examples and future developments

An electric vehicle (EV) typically contains between 1,000 and 1,500 semiconductor components, supporting a wide range of functions beyond power electronics. While power inverters and battery management systems are among the most silicon-intensive subsystems, they represent only part of the picture. In fact, newer EV models may incorporate as many as 3,000 semiconductors, significantly more than the 300 to 1,000 typically found in internal combustion engine (ICE) vehicles.[5,6]

An EV integrates a wide range of additional semiconductor content, including:

- a suite of sensors, such as radars, cameras, ultrasonic sensors, IMUs.[7]
- MCU & SoCs, managing everything from climate control and lighting to energy optimization.[8]

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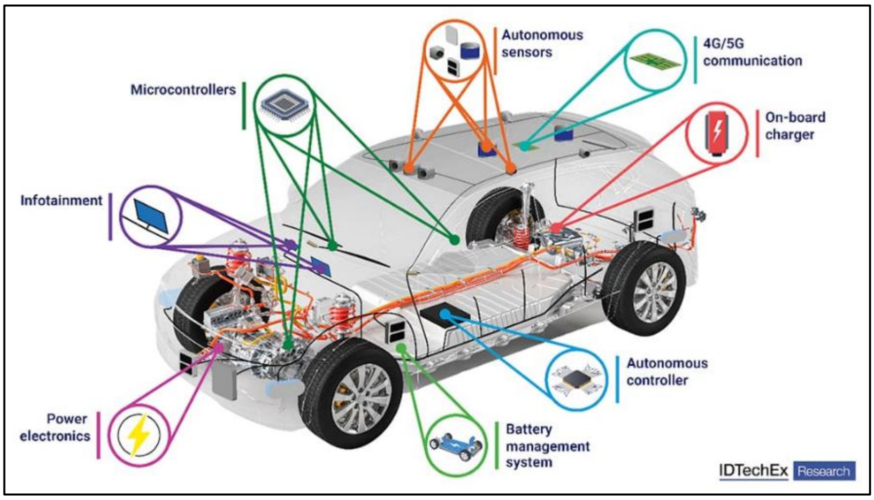
[5] https://semiconductorx.com/spotlight-tesla.html
https://www.yolegroup.com/product/report/automotive-semiconductor-trends-2025/
https://www.waferworld.com/post/growing-demand-for-electric-cars-and-its-impact-on-chip-manufacturers#:~:text=The%20Link%20Between%20EVs%20and,has%20the%20potential%20to%20grow.
[6] https://rhomotion.com/news/semiconductors-in-evs-what-you-need-to-know/
[7] Inertial Measurement Unit: a sensor system that measures a vehicle's acceleration, angular velocity and sometimes magnetic orientation. In automotive, these are part of the sensor suite for Advanced Driver Assistance Systems (ADAS) and autonomous driving.
[8] Microcontroller unit (MCU): a compact, integrated chip that functions as a dedicated controller for specific vehicle systems. MCUs handle real-time, specific operations such as managing battery systems, controlling lightening, regulating climate, or operating doors and window mechanism.
System on Chip (SoC): a more powerful, multifunctional chip. In vehicles it powers ADAS, autonomous driving platforms and connected services.

- Networking and RF modules (5G, Wi-Fi/Bluetooth transceivers) that keep the car connected and enable real-time data exchange with cloud services.
- Cybersecurity modules for data protection.



All these components are key enablers of the software-defined vehicle, where virtually every function, from safety, to power management to connectivity is controlled by software running on silicon.

On the top of this, ADAS and the move towards autonomous driving add a new layer of silicon demand. Autonomous vehicles generate massive amounts of data from sensors like cameras, radar, and lidar. To ensure safety and enable real-time decision-making, this data must be processed locally and instantaneously. Offloading it to the cloud introduces latency that is unacceptable in critical driving scenarios.

This shift has accelerated the adoption of Edge AI and High-Performance Computing (HPC) within the vehicle itself. These systems enable rapid, on-board analysis of sensor data, allowing vehicles to react instantly to dynamic road conditions, obstacles, and traffic. To support this, manufacturers are developing powerful, energy-efficient AI processors capable of operating reliably in extreme temperatures and harsh automotive environments.[9]

These AI-driven functions are growing fast and require cutting-edge process technologies, but they represent only a portion of total semiconductor content in a car. What makes the automotive segment strategically important is the diversity of demand. Unlike AI, which is concentrated in a few advanced chip types, automotive semiconductors span a wide range of components and manufacturing nodes, supporting connectivity, infotainment, safety, control systems, and EV propulsion.

This broad functionality drives increasing complexity and rising chip value per vehicle, positioning automotive as a key growth engine for the semiconductor industry.

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[9] https://markets.financialcontent.com/bpas/article/tokenring-2025-10-4-the-silicon-engine-how-evs-and-autonomous-driving-are-reshaping-the-automotive-semiconductor-landscape

Market growth

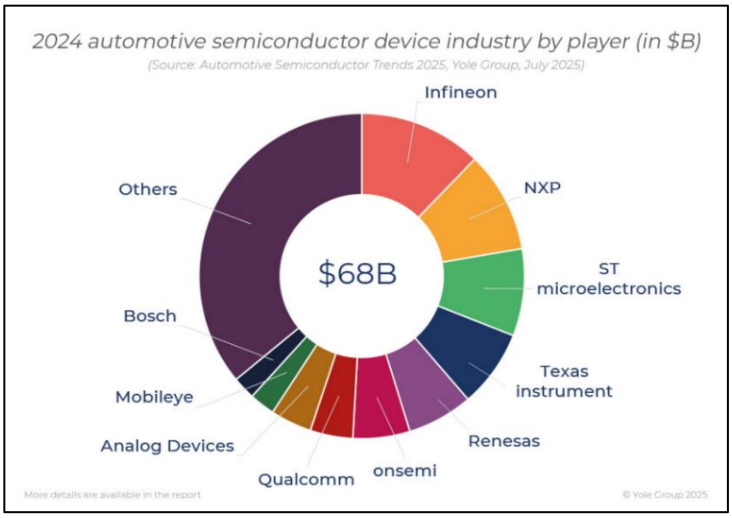
Estimates for the automotive semiconductor market vary across sources, but all point to strong, sustained growth:

- According to McKinsey, automotive electronics are projected to grow from about $52 billion in 2021 to roughly $147 billion by 2030, representing around 20% of total semiconductor market expansion.[10]
- Yole Group projects that the market will grow to $132 billion by 2030, from $68 billion in 2024, 5x faster than the overall automotive market.[11]
- Mondor Intelligence estimates the market will reach $143 billion by 2030, from $100 billion in 2025.[12]
- Other reports suggest the market will growth towards $110 billion by 2030, from $60-65 billion in 2023.[13]

Key players

As the automotive industry undergoes a profound transformation driven by electrification, autonomy, and digitalization, semiconductor companies are emerging as strategic enablers of this shift.

The competitive landscape is evolving rapidly, with U.S. firms commanding leadership in advanced computing, analog, and memory technologies, which are critical for high-performance vehicle platforms and autonomous systems. Meanwhile, Chinese suppliers are gaining ground in cockpit electronics, and power semiconductors, particularly in Silicon Carbide (SiC) devices that are essential for electric vehicle efficiency.[14]



Infineon Technologies, NXP, STMicroelectronics, Texas Instruments, Renesas Electronics, ON Semiconductor, Qualcomm, and Analog Devices, among the leading players in the automotive semiconductor space, are also listed constituents of the GSOX index, highlighting their global

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[10] https://www.mckinsey.com/industries/semiconductors/our-insights/exploring-new-regions-the-greenfield-opportunity-in-semiconductors
[11] https://www.yolegroup.com/product/report/automotive-semiconductor-trends-2025/
[12] https://www.mordorintelligence.com/industry-reports/automotive-semiconductor-market
[13] https://www.maximizemarketresearch.com/market-report/global-automotive-semiconductor-market/34474/
[14] https://www.yolegroup.com/press-release/semiconductors-at-the-heart-of-automotives-next-chapter-automotive-white-paper-vol-2/

market leadership. Another notable company included in the index, Rohm, further reflect the broad industry representation and influence.[15]

For more information on each individual company within GSOX, please refer to Table 1 in the Appendix.

Part 2. Robotics - semiconductors at the heart of the robotics revolution

Robotics represents another major frontier for chip proliferation, with each robot often requiring dozens to hundreds of specialised chips. Modern robots rely on advanced semiconductors for compute, sensing, memory, connectivity, and power management, enabling precision, adaptability, and AI integration. This makes robotics a powerful driver of semiconductor demand, alongside EVs and autonomous systems. As robots become more intelligent and pervasive, semiconductors remain the foundational technology powering this transformation.

The semiconductor market for robotics is projected to grow from $11.23 billion in 2025 to $41.24 billion by 2030, driven by applications in manufacturing, healthcare, logistics, and consumer electronics.[16]

The robot market can be divided into four main categories: personal robots, industrial robots, service robots, and humanoid robots. Each category has distinct technical requirements, which directly influence the type and quantity of semiconductors they use. In humanoid robots, for example, each unit can contain 1,000-2,000 individual semiconductor devices, including logic & compute, memory, power semiconductors, sensors, controllers, and networking chips.[17]

- Personal robots: are designed for individual use, primarily in home environments. Devices such as robotic vacuum cleaners and educational robots are gaining traction in the home appliance market. This growing adoption is driving demand for advanced components, particularly application-specific integrated circuits (ASICs) for optimized performance and connectivity ICs to enable seamless integration with smart home ecosystems.[18,19]
- Industrial robots: specialised machines utilized primarily in manufacturing and assembly processes. Industrial robotics is evolving rapidly thanks to advances in semiconductor technology and the demand for smarter, safer, and more efficient systems. At the core of this shift are embedded processors built on system-on-chip (SoC) architectures, integrating CPUs, peripherals, and accelerators into one platform. These processors enable robots to operate with greater precision, speed, and reliability, driving the next generation of automation.[20]
- Service robots: assist humans in non-industrial settings such as healthcare, hospitality, and logistics. Examples include delivery robots, hospital robots for medication transport, and concierge robots in hotels. Their ability to navigate dynamic environments and interact with people makes them increasingly valuable in-service industries. In healthcare, semiconductors enable precise surgical assistance, rehabilitation devices

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[15] https://www.grandviewresearch.com/industry-analysis/automotive-semiconductors-market
[16] https://www.marketsandmarkets.com/Market-Reports/semiconductor-market-for-robots-115553523.html
[17] https://semiconductorx.com/spotlight-humanoid.html
[18] https://www.pwc.com/gx/en/industries/technology/pwc-semiconductor-and-beyond-2026-full-report.pdf
[19] ASICs or application-specific integrated circuits: offer better performance and energy efficiency compared to general-purpose chips. Connectivity ICs: enable seamless communication with smartphones, cloud services, and other IoT devices.
[20] https://www.ti.com/lit/ta/ssztd34/ssztd34.pdf?ts=1763458187031

with adaptive feedback, and automated pharmacy systems, all powered by specialized microcontrollers and AI accelerators.[21]
- Humanoid robots: mimic human appearance and behaviour, enabling natural interaction and research applications. Notable examples include Honda ASIMO and Boston Dynamics Atlas, which showcase advanced locomotion, speech recognition, and facial expression simulation.[22]

NXP, NVIDIA, Intel, Analog Devices, Texas Instruments, AMD, and Qualcomm are among the leading semiconductor component suppliers represented in the GSOX index. Other notable players include Sony, Samsung, and Bosch.

For more information on each individual company within GSOX, please refer to Table 1 in the Appendix

Part 3. Power Electronics – enabling the future of energy and mobility

Power electronics is a critical technology that enables the conversion, control, and management of electrical power using electronic components. It allows for high efficiency, precise control, and reduced energy waste, which are essential requirements for modern electronic systems. By ensuring seamless electricity in multiple applications (from solar panels into the grid, from EV batteries to motors, from wind farms into transmission networks), power electronics can offer smarter, cleaner, and more sustainable energy.[23]

At the heart of power electronics are semiconductors, the materials used to build the devices that switch and regulate electricity. These include silicon (Si), silicon carbide (SiC), and gallium nitride (GaN), which are used to manufacture transistors, diodes, and integrated circuits.[24] These components allow power systems to operate at high voltages, switch rapidly, and minimize energy loss.

In simple terms: while most of semiconductors, like those in CPUs and GPUs, are designed for data processing and operate at relatively low power levels, power semiconductors can handle high voltages and can convert electricity from one form to another efficiently and safely. As a result, their demand is expected to scale with electrification.

There is a significant shift underway in the industry, driven by the adoption of advanced semiconductors such as SiC and GaN.[25,26]

According to Texas Instruments, while GaN (Gallium Nitride) technology currently carries a higher chip-level cost compared to traditional silicon, its advantages at the system level, such as improved energy efficiency, reduced size, and increased power density, can more than justify the initial investment. For instance, a modest 0.8% gain in efficiency in a 100-megawatt data

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[21] https://ep.jhu.edu/news/robots-making-a-difference-in-healthcare/
[22] https://eureka.patsnap.com/article/what-is-a-humanoid-robot-from-asimo-to-boston-dynamics-atlas
[23] https://www.electropages.com/blog/2024/02/what-is-power-electronics
[24] Transistors turn the flow of electrical power on and off very quickly, which allows the converter to regulate voltage, current, and frequency efficiently. Diodes control current direction and manage rectification (the process of converting alternative current, AC, into direct current, DC). Integrated circuits combine multiple functions for control (deciding when switches turn on/off) and protection (preventing overcurrent or overheating).
[25] https://www.microchipusa.com/industry-news/gan-and-sic-the-power-electronics-revolution-leaving-silicon-behind
[26] These next-generation materials are transforming power electronics by enabling smaller, faster, and more efficient systems, unlocking capabilities that are increasingly critical for high-performance applications like data centres, EVs, and renewable energy.

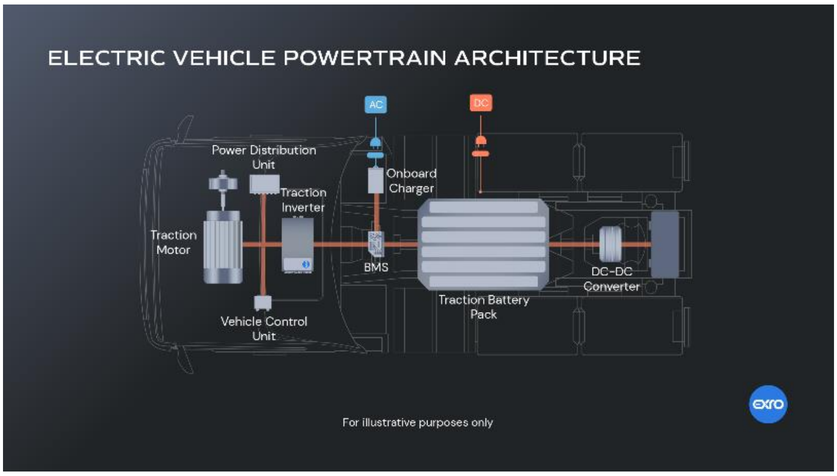
center using GaN-based power management can result in $7 million in energy savings over a 10-year period. This amount of saved energy is equivalent to the annual consumption of approximately 80,000 households, comparable to the energy needs of a small city.[27]

STMicroelectronics projects that within the next 30 years, more than half of all power semiconductor devices will be based on SiC technology. Although SiC devices cost more to produce, their efficiency delivers major system-level savings. In EVs, for instance, an additional upfront cost of around $300 in SiC components can lead to savings of up to $2,000 per vehicle, thanks to reductions in battery size, cooling requirements, and overall system complexity.[28]

Real-world applications

Power electronics are embedded in many technologies we rely on every day.

- Electric Vehicles. In EVs, they allow energy conversion for motor operation, voltage regulation, power flow coordination between battery, motor and auxiliary systems, and effective energy management.[29] According to PwC, as the automotive industry transitions from internal combustion engine (ICE) vehicles to hybrids and fully electric vehicles, power semiconductors are projected to account for more than half of the total semiconductor cost in automotive systems, highlighting their growing strategic importance.[30]



Source: Exro[31]

- Smart Grid. Power electronics is not just an EV story. As renewable energy scales and industries electrify, power grids are shifting from centralized systems to smart, decentralized networks. Power electronics enable this transition by integrating renewables, storage, and EVs into flexible grids, providing real-time energy conversion and control for efficient distribution.[32]

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[27] https://www.ti.com/about-ti/newsroom/company-blog/3-reason-gan-is-changing-power-management.html
[28] https://www.researchgate.net/publication/395188669_Power_Electronics_Development_Trends
[29] https://ijrpr.com/uploads/V5ISSUE11/IJRPR35266.pdf
[30] https://www.pwc.com/gx/en/industries/technology/pwc-semiconductor-and-beyond-2026-full-report.pdf
[31] Power electronics component in the illustration: 1) traction inverter (converts DC from battery to AC for the motor), 2) onboard charger (convert AC from the grid to DC for charging), 3) DC-DC converter (steps down high-voltage DC to low-voltage DC), 4) power distribution unit (routes electrical power within the EV's complex architecture), 5) Battery Management System, BMS, which relies on power electronics to protect against overvoltage, overcurrent or overheating.
[32] https://science-society.inesctec.pt/index.php/inesctecesociedade/article/view/105/204

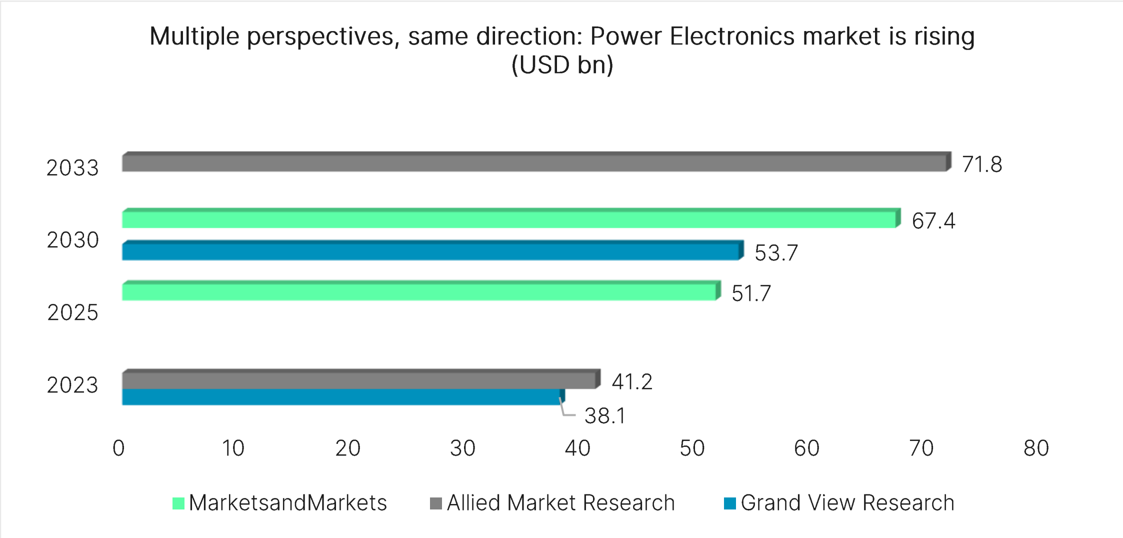
- **Data Centres.** In data centres, they regulate and optimize power distribution across thousands of servers, ensuring stable operation while minimizing energy loss and cooling requirements.[33]

- **Medical Equipment.** Power electronics have also significantly advanced medical equipment. Modern electrosurgical devices now support various surgical effects, including tissue cutting and coagulation. Using advanced semiconductors, these devices can operate at higher speed with less energy loss, which make them smaller, more reliable and more precise.[34]

Market growth, drivers & challenges

The global power electronics market is consistently projected to growth over the next years, with multiple research reports highlighting an upward trend.

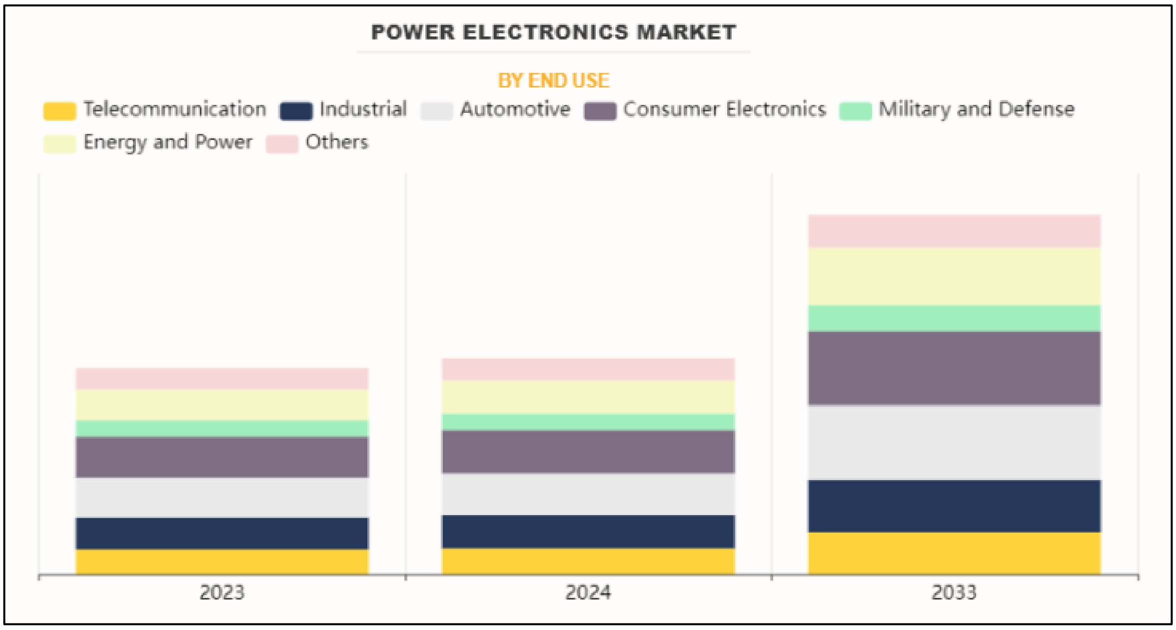
- According to Grand View Research, the market is expected to increase from $38.1 billion in 2023 to $53.7 billion by 2030 (CAGR of 5.2%)
- MarketsandMarkets forecasts growth from $51.7 billion in 2025 to $67.4 billion by 2030 (CAGR of 5.4%).
- Allied Market Research projects an increase from $41.2 billion in 2023 to $71.8 billion by 2033 (CAGR of 5.8%).[35]



The chart below illustrates the power electronics market segmented by end use from 2023 to 2033. It highlights how consumer electronics remains the dominant segment throughout the forecast period, driven by the growing demand for smartphones, laptops, and smart devices.[36]

Notably, Automotive and Energy & Power emerge as the fastest-growing segments, driven by electric vehicle adoption, renewable energy integration, and grid modernization. Industrial applications also expand steadily, supported by automation and smart manufacturing.

[33] https://www.microchip.com/en-us/about/media-center/blog/2025/next-gen-ai-data-centers-optimize-power-efficiency-with-sic
[34] https://www.ieee-pels.org/magazine/increasing-role-of-power-electronics-in-biomedical-applications/
[35] https://www.alliedmarketresearch.com/power-electronics-market
https://www.marketsandmarkets.com/Market-Reports/power-electronics-market-204729766.html
https://www.grandviewresearch.com/industry-analysis/power-electronics-market
[36] Power electronics in consumer electronics are responsible for converting electricity from one form to another, regulating voltage and current to protect batteries, making moder devices reliable and safe for everyday use.

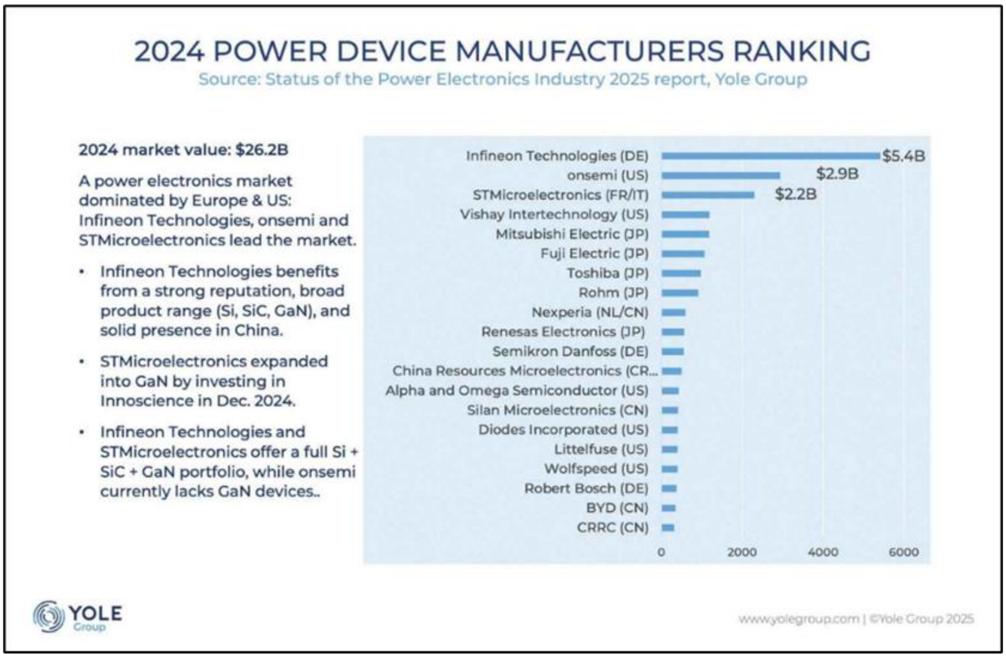


Source: Allied Market Research

Market leaders

The power electronic devices supply chain is still largely dominated by companies from Europe, the US, and Japan.

According to Yole Group, in 2024, four Chinese semiconductor companies (CRMicro, Silan, BYD, and CRRC) entered the global Top 20 rankings, marking a significant milestone in China's ascent within the industry. Their rapid growth has been driven by robust domestic demand, strategic government-led investment initiatives, and cost-effective local wafer sourcing. While these firms still lag behind the industry's top-tier suppliers in terms of scale, their momentum is notable.[37]



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37 https://www.yolegroup.com/strategy-insights/power-electronics-industry-growth-challenges-and-strategic-shifts/

Among the leading power device manufacturers shown above, Infineon Technologies, ON Semiconductor, STMicroelectronics, Rohm, and Renesas Electronics are also constituents of the GSOX index underscoring their global influence and market leadership. Additional prominent players included in the index are Texas Instruments and Qorvo, further underscoring the breadth of industry representation.[38]

For more information on each individual company within GSOX, please refer to Table 1 in the Appendix.

Part 4 - Semiconductors driving the future of connectivity: 5G

Beyond power electronics and automotive semiconductors, which drive energy efficiency and the shift to EVs and autonomy, connectivity chips are emerging as a major long-term growth engine.

Semiconductors enable high-speed data processing and efficient communication across 5G networks, IoT devices, and emerging satellite-based connectivity systems. As digital ecosystems expand, their role in supporting seamless connectivity is becoming increasingly important.

Smaller, faster, smarter: the semiconductor-shift behind 5G

According to Dimension Market Research, the global 5G semiconductor market is projected to grow from USD 37.8 billion in 2025 to USD 101.8 billion by 2034, at a CAGR of 11.6%.[39] This growth is driven by the deployment of 5G infrastructure and rising demand across sectors like automotive, healthcare, industrial automation, and consumer electronics:

- In smartphones and consumer devices, 5G semiconductors enable ultra-fast data speeds, low latency, and seamless switching between network bands, supporting advanced features like cloud gaming, HD streaming, and real-time video calls.

- In autonomous vehicles, these chips facilitate real-time communication between cars, infrastructure, and cloud systems, enhancing navigation, safety, and enabling over-the-air updates.

- Private 5G networks are unlocking the full potential of smart factories by enabling seamless, real-time connectivity between machines, sensors, and workers. Companies like Toyota Material Handling and CJ Logistics have already seen significant gains in productivity and cost savings by deploying private 5G.[40,41]

- In healthcare, 5G enables real-time tracking of equipment, patient vitals, and staff movement. It powers connected ambulances that stream live data and video to

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[38] https://www.marketsandmarkets.com/Market-Reports/power-electronics-market-204729766.html
[39] https://dimensionmarketresearch.com/report/5g-semiconductor-market/
[40] https://www.ericsson.com/en/blog/2024/9/unlocking-the-promise-of-smart-factories#:~:text=One%20of%20standout%20features%20of,learning%20and%20industrial%20generative%20AI.
[41] As an example, with private 5G networks, companies can centralize and streamline inventory management, tracking goods as they move through warehouses and production lines in real time. This helps prevent stockouts and delays in manufacturing. A great example is CJ Logistics in South Korea, which implemented Ericsson's private 5G network across its operations. Compared to traditional Wi-Fi, they achieved a 20% increase in productivity and a 15% reduction in capital expenditures

hospitals, allowing for better preparedness and remote assistance during emergencies.[42,43]

To meet the demands of ultra-fast data transmission and low latency, chipmakers are embracing innovations like System-on-Chip (SoC) designs, which combine processing units, memory, and radio frequency (RF) components into a single, space-efficient chip. Advanced packaging techniques, such as 3D stacking and chipset integration, allow components to be placed in closer proximity, minimizing signal delay and boosting data throughput.

At the materials level, compounds like gallium nitride (GaN) and silicon carbide (SiC) are gaining traction for their ability to handle high power and operate efficiently at high frequencies, making them ideal for next generation 5G applications. Together, these advances are enabling the seamless connectivity and speed that define the 5G era.[44,45]

Looking ahead, research into 6G promises even greater bandwidth and ultra-low latency which will drive continue innovation and growth in semiconductor technology for wireless networks.

Satellite Connectivity

While 5G networks are transforming urban and rural connectivity on the ground, satellite communication enables global coverage, connecting remote regions, ships, aircraft and even IoT devices in hard-to reach locations. Semiconductors are at the heart of this evolution. Their ability to regulate electrical current makes them vital for controlling electronic circuits in harsh environments like high altitudes and extreme temperatures.[46]

- Power management & efficiency. Satellites require highly efficient power systems to operate reliably in orbit. Semiconductors like radiation-tolerant MOSFETs[47] regulate voltage and current, ensuring stable operation despite fluctuations in solar energy or battery levels.[48]

- Low noise amplifiers (LNAs): amplify very weak incoming signals from distant satellites or earth stations while keeping added noise minimal. Built using semiconductors for high-frequency performance and compact design. Essential for GPS, mobile networks, radio telescopes, and deep-space probes.[49]

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[42] 5G enables features that are difficult or impossible to achieve with older networks like 4G or Wi-Fi: ultra-low latency, high bandwidth, which supports high-resolution video feeds, and seamless connectivity (5G routers in ambulances can switch networks and maintain stable connections even in rural or low-signal areas)
[43] https://www.pwc.in/assets/pdfs/emerging-tech/the-5g-healthcare-revolution-remote-surgery-and-robotics.pdf
[44] https://www.semiconductor-digest.com/how-5g-technology-is-supercharging-semiconductors-and-transforming-chip-design/
[45] https://www.microchipusa.com/industry-news/5g-and-semiconductors?srsltid=AfmBOookzfmKMsSYWBTT4Y5TCzMxI4whVJHTHB58Jsmm3zZBp_I27OEQ
[46] https://www.semiconductorrevieweurope.com/news/the-role-of-semiconductors-in-space-exploration-and-satellite-technology-nwid-1037.html
[47] Radiation-tolerant MOSFETs are specialized transistors designed to operate reliably in space environments, where exposure to ionizing radiation (from cosmic rays, solar flares, etc.) can degrade or destroy standard electronic components.
[48] https://www.infineon.com/assets/row/public/documents/24/59/infineon-from-advanced-semiconductors-for-secure-and-efficient-satellite-communication-whitepaper-en.pdf
[49] https://semiconductorinsight.com/blog/why-gaas-low-noise-amplifiers-are-revolutionizing-high-frequency-applications-and-what-it-means-for-the-future-of-the-phototube-market/

- Extreme temperature tolerance. Satellites face temperature swings from -200°C to +100°C and operate in vacuum. Semiconductors made from wide bandgap materials like Gallium Nitride (GaN) are ideal for these conditions.[50]

Key Players

Leading players in the 5G and satellite connectivity space represented in GSOX include Qualcomm, MediaTek, Broadcom, Intel, Infineon, Qorvo, and Analog Devices. Other notable companies in this domain are Samsung Electronics and Huawei.

For more information on each individual company within GSOX, please refer to Table 1 in the Appendix.

Conclusions

The semiconductor industry stands at the intersection of multiple transformative trends, far beyond the current focus on artificial intelligence. While AI has undoubtedly accelerated demand for advanced chips, the sector's long-term growth is anchored in a broader set of structural forces: the electrification of transportation, the global energy transition, the evolution of automotive platforms, the expansion of connectivity through 5G and 6G, and the rise of robotics. These pillars are driving sustained, diversified demand across end markets, from electric vehicles and renewable energy systems to smart factories and next-generation medical devices.

Reflecting this multi-dimensional growth, the Nasdaq Global Semiconductor™ Index (GSOX™) goes beyond AI leaders to include companies driving innovation in power electronics, robotics, automotive semiconductors, and connectivity solutions.

Semiconductors are at the heart of all modern technology. Whether it's AI, electric vehicles, or clean energy systems, none of these can advance without improvements in semiconductor technology first. They are the foundation and the building blocks of innovation.

The HSBC Nasdaq Global Semiconductor UCITS ETF (Europe: HNSC) tracks the GSOX.

[50] https://www.esa.int/Enabling_Support/Space_Engineering_Technology/Going_GaN_novel_chips_powering_space_missions

Appendix - Table 1: Representative GSOX constituents recognized as leading semiconductor component suppliers in Power Electronics, Automotive, Robotics, and 5G Connectivity.

Company	Index Weight[51]	Market Cap (bn) (USD)[52]	YTD Total Return (USD)[53]	Description
Texas Instruments (US)	2.4%	147	-11.1%	Recognized leader in power electronics, with ~78% of its revenue coming from analog and embedded processing products. Strategically focused on industrial and automotive markets (69% of its end-market revenue), TI enables efficient power conversion, signal processing, and system control across a wide range of applications.[54]
Infineon Technologies (EU)	1.1%	52	22.9%	Recognized leader in automotive, power management, and microcontrollers. For FY2024, power semiconductors accounted for ~55% of total revenue, followed by embedded control and connectivity (~30%), RF & sensors (~10%), and memory ICs (~5%). [55]
STMicroelectronics (EU)	0.5%	22	-1.0%	The company expects the Power & Discrete segment to grow at a low double-digit to mid-teens CAGR, making it one of the fastest-growing segments in their portfolio by 2028. Leading supplier of SiC power devices. The company continues to invest heavily in SiC capacity (notably in Catania, Italy) with the aim of fully integrate the entire SiC value chain on a single site.[56]
Renesas Electronics (JP)	0.5%	23	-4.7%	Renesas made power one of its four core pillars to meet rising energy demands in AI infrastructure, automotive, and industrial systems. Analog and Power each account for approximately 20% of Renesas' total revenue mix, alongside Microcontrollers (~40%) and System-on-Chip (SoC) (~15%). The company plans to double power segment sales to $7B by 2030. Its acquisition of Transphorm strengthens its position in GaN technology, targeting a $13B market by 2030.[57]
ON Semiconductor (onsemi) (US)	0.4%	20	-20.6%	ON Semiconductor is driving growth across key end markets including automotive, industrial automation, AI data centers, with strategic investments in SiC technology. The company aims to capture 35–40% of the global SiC market. Broad portfolio of AC-DC and DC-DC conversion, gate drivers, battery management, and LED drivers. [58]
Qorvo (US)	0.2%	9	35.7%	A leading global provider of connectivity and power solutions. Their technology portfolio includes power management IC and high-power GaN switches. End markets served: defense, Edge IoT, AI data centers, automotive and industrial.[59]
ROHM (JP)	0.1%	6	74.9%	ROHM is aggressively expanding its production capacity, transitioning to 8-inch wafers, and launching new generations of SiC devices to meet growing demand.[60]

[51] As of October 31, 2025
[52] As of October 31, 2025
[53] As of October 31, 2025
[54] https://investor.ti.com/static-files/285c885f-42b8-4fb2-a7e3-8284f9413f2f
[55] https://www.infineon.com/assets/row/public/documents/corporate/investors/presentations/2025/2025-05-08-q2-fy25-investor-presentation-v01-00-en.pdf?fileId=8ac78c8b96295ebc0196abff795a00b1
[56] https://newsroom.st.com/media-center/press-item.html/c3262.html
https://www.st.com/content/dam/aboutus/who-we-are/pdf/st-company-presentation-en.pdf
[57] https://www.renesas.com/en/blogs/renesas-power-group-addresses-urgent-energy-needs-ai-infrastructure
https://www.renesas.com/en/document/ppt/power-2025-capital-market-day
https://www.renesas.com/en/document/ppt/25575807?r=1320481
[58] https://investor.onsemi.com/static-files/5f2c4e47-4095-401f-8fdc-dd4201ef6469
[59] https://ir.qorvo.com/static-files/ee74c2ad-711f-401d-abc4-0a7eca3bcaf5
[60] https://www.rohm.com/analogpower/powertech
https://www.yolegroup.com/player-interviews/power-sic-the-cornerstone-of-rohms-business-expansion-in-the-next-five-years-an-interview-with-rohm/

NXP (EU)	1.1%	53	2.0%	Specializes in automotive and industrial semiconductors, including microcontrollers and secure connectivity solutions. NXP's automotive semiconductor business is its largest and fastest-growing segment, projected to grow from $5.5B in 2024 to $9.5B by 2027 (27% CAGR). The company leads in key domains including radar, secure car access, in-vehicle networking, and automotive processors. Growth is driven by software-defined vehicles (SDVs), radar systems, electrification, and connectivity[61]
Qualcomm (US)	3.4%	195	19.8%	Major player in automotive semiconductor through its Snapdragon Digital Chassis, powering next-generation cockpit electronics, connectivity and central compute platforms. The company also leads in 5G/V2X connectivity. Automotive revenues of $ 984 million for Q3 FY25 (+21% YoY). [62] Qualcomm is recognized as a global leader in 5G and mobile processors, enabling connectivity and edge AI.[63]
Analog Devices (US)	2.5%	115	11.6%	Focused on signal processing, sensors, and power management for precision applications. Analog Devices has seen its automotive segment grow significantly, now contributing 30% of fiscal 2024 revenues, up from 20% in fiscal 2022. In Q2 FY25, Automotive revenue grew 22.4% YoY, driven by demand in auto connectivity, ADAS, infotainment, and power solutions. The company offers a wide range of analog, digital, power, and sensor ICs tailored for automotive applications, including battery management, video processing, and in-cabin experience enhancements[64]
MediaTek (TW)	1.5%	68	2.9%	MediaTek's Dimensity 9500 and 8300 chipsets deliver flagship 5G performance, AI integration, and power efficiency. These chips are used in smartphones and other devices. MediaTek is a pioneer in 5G SoCs, with industry-first support for generative AI and advanced gaming.[65]
Broadcom (US)	7.4%	1,746	60.6%	Leader in connectivity, RF, infrastructure semiconductors linked to 5G and wireless networks. In March 2025, the company announced the X85 5G Modem-RF system, supporting 3GPP advanced features[66]
Intel (US)	4.0%	191	99.5%	Intel® Xeon® 6 processors with E-cores, launched in 2024, are experiencing widespread adoption among 5G core solution vendors and telecom operators[67]
Nvidia (US)	7.0%	4,921	50.8%	Dominates in GPUs and AI accelerators, essential for robotics and autonomous systems. NVIDIA offers a three-computer solution that enables robots to see, learn, perceive their environment, and make real-time decisions[68].
AMD (US)	8.6%	417	112%	AMD provides high-performance and adaptive computing solutions for industrial robotics. Their portfolio includes embedded processors, FPGAs, and system-on-modules designed to accelerate AI, machine vision, and real-time control. By combining deterministic control with advanced AI capabilities, AMD helps enable collaborative robots, autonomous machines, and edge-based intelligence for safer and more efficient operations.[69]

[61] https://assets.main.pro2.maf.media-server.com/0e7dca3eac1d4c8d968409a099014223/NXP_Investor_Day_2024_-_Presentation.pdf
[62] https://www.qualcomm.com/automotive
https://s204.q4cdn.com/645488518/files/doc_events/2025/Jul/30/Q3FY25-Earnings-Call-Transcript_7-30-25_Final.pdf
[63] https://www.qualcomm.com/5g
[64] https://www.nasdaq.com/articles/adis-automotive-segment-booming-momentum-sustainable
[65] https://www.mediatek.com/press-room/mediatek-dimensity-9500-unleashes-best-in-class-performance-ai-experiences-and-power-efficiency-for-the-next-generation-of-mobile-devices
[66] https://docs.qualcomm.com/bundle/publicresource/87-87284-1_REV_B_Qualcomm_x85_5G_Modem_RF_Product_Brief.pdf
3GPP is the global body responsible for developing the technical specifications for mobile communication systems, including 3G, 4G (LTE), and 5G.
[67] https://www.intc.com/news-events/press-releases/detail/1729/mwc-2025-intel-showcases-foundational-network
[68] https://www.nvidia.com/en-us/industries/robotics/
[69] https://www.amd.com/en/solutions/industrial/robotics.html

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