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OVERVIEW OF GLOBAL SEMICONDUCTOR INDUSTRY

Global Semiconductor Industry Development Trends

A new technological revolution is accelerating, accompanied by rising levels of electrification, the rapid development of industries such as new energy vehicles, and the accelerated deployment of AI-driven intelligent data centers. Energy and computing paradigms have evolved from ‘‘fossil energy and centralized computing’’ to ‘‘new energy and Central Processing Unit (CPU),’’ and now to ‘‘next-generation power systems with Graphics Processing Unit (GPU),’’ with computing power continuously moving closer to end-use scenarios and expanding its range of applications.

In this context, the global semiconductor industry is undergoing significant structural transformation, with automotive and AI applications emerging as the core drivers of the growth. In the automotive sector, the electrification trend is shifting vehicles from mechanical systems to electronic systems, making power device critical components for key functions such as motor drives and onboard charging. The advancement of artificial intelligence has likewise imposed higher demands on power devices, as large-scale model training and inference increasingly require enhanced computing power, power management and energy efficiency control. At the same time, the proliferation of smart terminals and the rise of AI-driven interactions are placing greater emphasis on high performance and low power consumption in audio ICs, accelerating their penetration and innovation in consumer electronics, in-vehicle voice systems, and related applications.

Semiconductor Product Categories

Semiconductor products can be broadly divided into four major categories based on structural and functional differences: integrated circuits, discrete devices, optoelectronic devices, and sensors.

Integrated circuits are miniature circuit systems that integrate a large number of transistors, resistors, capacitors, and other components onto a single chip and represent the most widely used type of semiconductor product today. Analog integrated circuits, which include signal chain chips, are used to process continuous signals. Discrete devices, such as power devices, are basic semiconductor components with single functions that have not been extensively integrated; they are commonly used in power control and circuit protection. Optoelectronic devices enable the conversion between electrical and optical signals and form the technological foundation for optical communications and display technologies. Sensors are used to detect and capture physical signals such as temperature, pressure, sound, light, and motion, converting them into electrical signals that can be processed by electronic systems. Common examples include MEMS microphones.

With the rapid advancement of intelligence and electrification, power semiconductors and other essential components have emerged as key enablers linking the physical world with digital systems. The ongoing upgrade of energy and computational power is sparking a transformative wave, fostering the integration of multi-modal sensing and control technologies, spanning acoustics, optics, and electronics, to support increasingly complex intelligent applications. At the same time, low-carbonization and electrification trends are reshaping global energy systems, accelerating the deployment of high-efficiency energy conversion and control devices. In addition, as human-machine interaction continues to evolve, end devices are placing stricter performance requirements on sensing and control chips, driving robust growth in demand for components such as audio ICs.

OVERVIEW OF THE GLOBAL AND CHINESE POWER DEVICE INDUSTRY

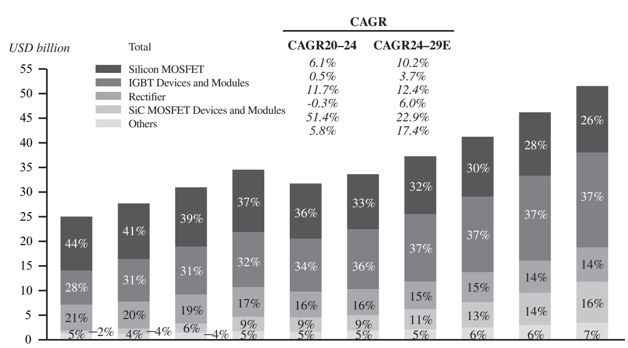
Definition and Classification of Power Devices

Power devices are the core components in electronic systems for electrical energy conversion and circuit control. By switching electrical currents on and off and modifying their waveforms, these devices enable power conversion, amplification, voltage regulation, current control, and circuit protection.

Based on material type, power devices can be divided into those fabricated with silicon-based materials and those manufactured using third-generation semiconductor materials such as silicon carbide (SiC) and gallium nitride (GaN). While early development relied primarily on silicon, the growing demand for high-voltage, high-power, and high-frequency applications has positioned third-generation semiconductors with their superior breakdown electric field strength and thermal conductivity as a key driver for future growth.

From a technological perspective, power devices can be classified into various types such as MOSFETs and IGBTs. MOSFETs and IGBTs are currently the mainstream power devices. As silicon-based power devices approach their theoretical performance limits, power devices fabricated with wide bandgap materials exhibit superior characteristics compared to their silicon-based counterparts and are expected to gradually replace them as the dominant choice for high-voltage and high-frequency applications.

Proportion of Global Power Device Categories, 2020–2029E



Source: Yole Group, The CIC Report.

Analysis of Power Device Size and Structure Evolution Trends

From the perspective of size evolution, power devices as a whole are exhibiting a trend toward larger wafer sizes and more advanced structural iterations. For silicon-based power devices, manufacturing processes have progressed from 4-inch and 6-inch wafers to 8-inch and now toward 12-inch wafers. Device structures have likewise advanced from diodes to (evolving from planar MOSFET to trench MOSFET, SGT MOSFET and super-junction MOSFET) and then to IGBTs, reflecting continuous optimization in conduction loss and switching performance.

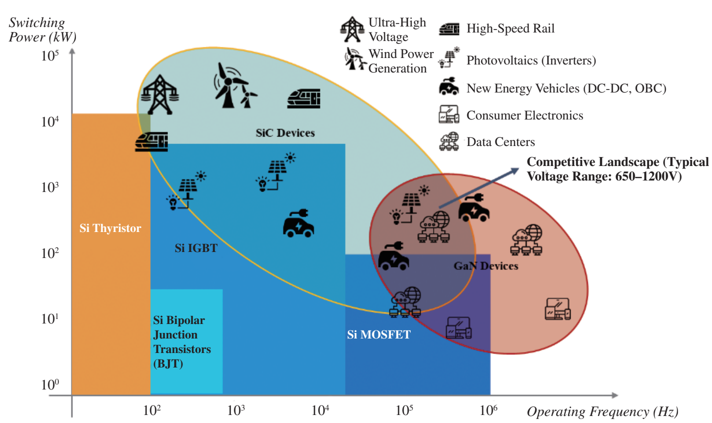
In comparison, SiC power devices began with 4-inch and 6-inch wafers and are currently in a critical phase of expansion toward 8-inch wafers. Their device structures have evolved from diodes to MOSFETs. For SiC MOSFETs, most companies remain focused on planar MOSFET designs, while some are beginning to establish technological advantages in trench MOSFET and super-junction MOSFET. Overall, the technological evolution of both silicon-based and SiC devices points toward higher performance and scalability. In the future, the combination of larger wafer sizes and advanced structures will further enhance device efficiency and cost competitiveness.

Analysis of Power Device Material Evolution Trends

As traditional silicon-based power devices approach their physical performance limits, the upgrade of materials has become an inevitable trend. Third-generation semiconductors, represented by SiC and GaN, are emerging as the key direction for material evolution in power devices due to their significant advantages in critical parameters such as bandgap width, breakdown electric field strength, and thermal conductivity. The rapid rise of third-generation semiconductors is essentially a technology-driven iteration fueled by "energy efficiency concerns," accelerating breakthroughs in efficiency, size reduction and thermal management for power devices.

From a material characteristics perspective, SiC and GaN demonstrate far greater stability than silicon when operating under complex conditions involving high voltage, high temperature, and high frequency. They are particularly well suited for applications with stringent requirements for energy efficiency and reliability. In terms of specific use cases, SiC is better suited for high-voltage, high-power fields such as new energy vehicles and industrial power supplies, whereas GaN, owing to its high-frequency characteristics, has achieved rapid penetration in medium- and low-voltage applications, including consumer and data center power supplies.

Comparison of Power Device Application Scenarios



Source: Yole Group, The CIC Report.

Analysis of Power Device Technology Evolution Trends

- **Transition from Planar to Three-Dimensional Structures:** Early planar devices faced performance bottlenecks, which were subsequently addressed through super-junction technology that enabled charge balancing and effectively improved the trade-off between breakdown voltage and conduction performance. In high-voltage, high-power scenarios, IGBTs have become the mainstream choice by combining the low drive power of MOSFETs with the high current density of bipolar transistors. In recent years, devices have further evolved toward three-dimensional structures, employing vertical channels and deep trench designs to significantly enhance current-carrying capacity and heat dissipation efficiency, thereby meeting the trend of increasing power density.

- **Industry-Wide Technological Breakthroughs:** With upgrades in CMP (chemical mechanical polishing) equipment, wafers can now undergo higher-precision thinning processes, reducing on-state resistance and improving conduction efficiency. Meanwhile, etching technology precision has advanced to the nanometer scale, enabling more accurate control of trench depth and line width, which significantly improves current transport paths and electric field distribution.

- **Advancements in Packaging Materials Toward Higher Thermal Conductivity and Lower Thermal Resistance:** Traditional materials and structures in packaging can no longer meet the heat dissipation requirements of high-performance scenarios. Currently, packaging is evolving toward materials with higher thermal conductivity and lower thermal resistance, such as copper- and ceramic-based substrates. Combined with advanced thermal interface materials (TIM) and bottom-cooling designs, these innovations effectively reduce junction temperatures during operation, enhancing system stability and reliability.

- **The Integration Evolution of Power Devices from Discrete to System-on-Power (SoP):** Power devices are gradually evolving from traditional discrete components to SoP integration. SoP integrates multiple functional modules, such as rectification, voltage conversion, and control, into a single package. This not only improves overall system power density and conversion efficiency but also significantly reduces device size and simplifies downstream system design for end-product manufacturers.

Business Models in the Power Device Industry

The power device industry currently operates under the following business models: IDM (Integrated Device Manufacturer) and the non-IDM models (fabless and virtual IDM).

- **IDM Model:** IDMs possess end-to-end capabilities, from design and manufacturing to packaging and testing. Leveraging in-house production lines across the entire process, companies can achieve high levels of coordination in quality control, capacity assurance, and process stability. This model is typically suited for applications with relatively stable product categories and clear batch production characteristics. However, due to the need for continuous investment in wafer fabrication, packaging and testing facilities, this model is associated with higher operating costs and asset intensity, along with reduced flexibility. As such, it is more commonly adopted by large enterprises.

- **Fabless Model:** Fabless companies concentrate on chip design and sales, outsourcing the entire manufacturing process — including wafer fabrication, packaging, and testing — to external partners. Due to the absence of proprietary process technologies, they inherently lack technical authority in the manufacturing process. Their collaborations with foundries and outsourced semiconductor assembly and test (OSAT) providers exhibit high dependency; they cannot customize manufacturing processes or swiftly respond to process iterations, thus passively adapting to existing process systems. This model features a light-asset structure and high turnover, enabling resources to focus on technological innovation and product differentiation, thereby accelerating product iteration. Its flexibility and scalability make it particularly suitable for small and medium-sized enterprises or emerging application sectors. However, heavy reliance on external capacity can pose challenges in terms of capacity assurance, delivery schedules, and deep process customization.

- **Virtual IDM Model:** The Virtual IDM model combines design-driven flexibility with moderate control over critical manufacturing processes. In this model, companies typically center on chip design while retaining control over specific proprietary process technologies, establishing deep partnerships with foundries and packaging or testing service providers. Unlike the Fabless model's passive dependence on external capacity, the Virtual IDM model possesses, to some extent, process control capabilities — such as instructing foundries to conduct targeted process optimizations based on its proprietary process requirements. By fostering collaboration between design and process development, companies can rapidly adjust to diverse downstream demands, enhancing product customization capabilities and overall delivery flexibility.

Power Device Industry Value Chain Analysis

With the advancement of electrification and digitalization, the demand for enhanced performance and energy efficiency across all segments of the power device value chain continues to grow. Efficient collaboration throughout the entire value chain has become essential to meeting the rising requirements for performance and energy efficiency. Upstream market participants include EDA (Electronic Design Automation) software providers, IP suppliers (offering independent, modular, and reusable circuit designs), as well as equipment and material suppliers. The midstream segment comprises the core stages of the industry: integrated circuit design companies may operate under the IDM model, the virtual IDM model, or the fabless model. Between the midstream and downstream, distributors play an important role by handling product distribution, channel expansion, and customer service. They enable manufacturers to more efficiently access broader markets and provide downstream customers with flexible procurement options and technical support services. Downstream application sectors include automotive, energy and industrial, and consumer markets.

Major Application Scenarios for Power Devices

Power devices are extensively deployed across multiple critical industry sectors, with varying requirements for performance, cost, and reliability depending on the end application.

In the automotive sector, power devices are used in both high-voltage and low-voltage systems. High-voltage applications include the main drive motor, high-voltage distribution, onboard chargers (OBC), and DC-DC converters, where SiC MOSFETs and IGBTs are predominantly used to meet requirements for high efficiency, high power density, and thermal robustness. Low-voltage applications cover systems such as low-voltage distribution, vehicle control, seat control, window control, chassis control, and electronic water pumps, fans, and other auxiliary devices, where silicon-based MOSFETs are primarily employed to ensure reliability, surge resistance, and compliance with automotive-grade certification standards.

In AI data centers, power devices are primarily utilized in server power supplies, GPU rack power systems, and other data center power delivery components. Their roles span key stages of the power architecture, including AC-DC rectifiers, DC-DC converters, DC-AC inverters in UPS systems. They must deliver high efficiency, high power density, and excellent thermal performance to meet the stringent energy efficiency and thermal management requirements of data-intensive workloads.

In the energy and industrial sectors, power devices are widely applied in industrial control, photovoltaic inverters, energy storage systems, and charging stations, with a focus on efficiency, reliability, and electromagnetic compatibility. In the consumer electronics segment, power devices are mainly used in fast chargers, power adapters, and laptop power supplies.

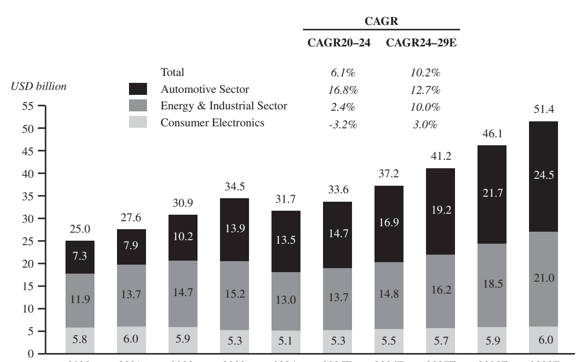
Global and Chinese Power Device Market Size

The global power device market has demonstrated steady growth. In revenue terms, the global market size increased from USD25.0 billion in 2020 to USD31.7 billion in 2024, representing a CAGR of 6.1% during this period. The modest decrease in 2023–2024 was primarily attributable to supply chain constraints and temporary weakness in end-market demand. It is projected to reach USD51.4 billion by 2029, with a CAGR of 10.2% from 2024 to 2029.

Among downstream applications, the automotive sector is one of the fastest-growing segments. The market size for automotive applications rose from USD7.3 billion in 2020 to USD13.5 billion in 2024, reflecting a CAGR of 16.8%. It is expected to reach USD24.5 billion by 2029, with a CAGR of 12.7% between 2024 and 2029. Automotive power device applications have exceptionally high entry barriers, imposing stringent requirements on electrical performance, reliability, and stability. Moreover, automotive manufacturers implement rigorous certification processes for power device suppliers, requiring multiple tests and verifications before integration into stable supply chains.

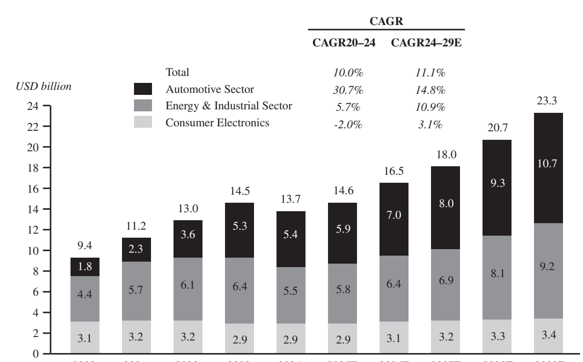
The energy and industrial sector expanded from USD11.9 billion in 2020 to USD13.0 billion in 2024 and is forecast to reach USD21.0 billion by 2029, with a CAGR of 10.0% between 2024 and 2029. The renewable energy segment represents a significant growth opportunity, with the market reaching USD2.4 billion in 2024 and expected to expand at a CAGR of 13.8% from 2024 to 2029. Additionally, AI data centers represent an increasingly important application segment for power devices, with a growing share of the overall market. The market size for power devices in AI data center applications was approximately USD700.0 million in 2024, achieving a CAGR of 23.9% from 2024 to 2029.

Global Power Device Market Size, by Revenue, 2020–2029E



Source: Yole Group, Omdia, The CIC Report.

China Power Device Market Size, by Revenue, 2020–2029E



Source: Statista, Omdia, The CIC Report.

The China power device market has demonstrated steady growth. In revenue terms, the China market size increasing from USD9.4 billion in 2020 to USD13.7 billion in 2024, representing a CAGR of 10.0% during this period. It is projected to reach USD23.3 billion by 2029, with a CAGR of 11.1% from 2024 to 2029.

Among downstream applications, the automotive sector is one of the fastest-growing segments. The market size for automotive applications rose from USD1.8 billion in 2020 to USD5.4 billion in 2024, with a CAGR of 30.7% during this period. The market is expected to reach USD10.7 billion by 2029, with a CAGR of 14.8% from 2024 to 2029.

There are significant disparities in the localization rates of power devices currently across different downstream applications. The consumer-grade segment has over 80% localization rate, while in the automotive-grade segment with the highest technical barriers and the largest market size, the localization rate remains below 10%. With the development of the new energy vehicle industry, domestic substitution is becoming a long-term trend.

Key Drivers and Trends for the Power Device Industry

- **Deep Transformation in New Energy Vehicles:** As the global penetration rate of NEVs continues to rise, electric drive systems are evolving toward integration and higher performance. To meet demands for higher efficiency and power density, power devices are advancing in material innovation, transitioning from silicon to silicon carbide and gallium nitride, as well as in packaging technology through solutions such as double-sided cooling and low-inductance design. These two advancements support deeper integration of power modules with drive control circuits.

- **AI-Driven Performance Enhancements:** With the rapid adoption of AI technologies, particularly in AI data centers, edge computing, and smart devices, there is growing demand for high-performance power devices with improved efficiency and capability.

- **Essential Needs of Energy Transition:** Large-scale construction of global energy storage and renewable power generation facilities is fueling demand for high-voltage, high-frequency, and high-reliability power devices. Beyond the performance of individual components, end users are increasingly emphasizing system-level efficiency, including thermal management.

- **Performance Enhancement Driven by Material Innovation:** The rapid adoption of third-generation semiconductor materials has significantly improved the high-power, high-frequency, and high-temperature performance of power devices. Compared with traditional silicon-based devices, SiC and GaN offer lower conduction losses, higher breakdown voltage, and stronger thermal stability.

- **Technological Innovation Supported by Manufacturing Advancements:** With the large-scale operation of large-diameter wafer production lines and improved capacity utilization, innovation in packaging technology has a stronger foundation. New packaging techniques (such as high-reliability interconnects) are breaking through traditional performance limitations, significantly enhancing the service life and energy efficiency of power devices.

Overview of the Global and Chinese Audio IC Industry

Definition and Classification of Audio ICs

Audio ICs refer to integrated circuits used for the acquisition, processing, conversion, and output of sound signals, serving as a critical bridge between real-world analog signals and digital computing systems. They cover the full product chain ranging from front-end audio sensor ICs, such as MEMS microphone ICs, to back-end signal chain ICs, and are widely applied in various voice-interaction scenarios, including smartphones, intelligent voice terminals, and in-vehicle systems. Audio ICs primarily include MEMS microphone ICs and signal chain ICs.

Composition of the Audio Signal Chain System

Various categories of audio ICs work in concert to form a complete audio signal chain system, which serves as the functional embodiment of audio ICs and covers the entire process from sound acquisition to signal output. The audio signal chain system begins with the **acquisition** stage, typically employing MEMS microphones as front-end sensors to capture sound waves from the environment and convert them into analog electrical signals. These signals are then subject to initial gain adjustment through a pre-amplifier (Pre-Amp) to ensure sufficient signal strength for subsequent processing. Analog filters and programmable gain amplifiers (PGA) further refine the raw signals, enabling noise suppression, bandwidth control, and other key functions to complete the **signal conditioning process**. The conditioned analog signals are subsequently converted into digital form by analog-to-digital converters (ADC) and passed to the **signal processing** stage. Here, audio algorithms are executed on the digital signal processor (DSP), implementing functions such as echo cancellation, noise suppression, and beamforming across both uplink and downlink pathways. The processed digital signals are then converted back into analog form by digital-to-analog converters (DAC) for playback by end devices. At the final **output amplification and driving** stage, output filters, power amplifiers (PA), and headphone/ speaker drivers jointly perform signal amplification and driving, ensuring sufficient output power for speakers or headphones. This completes the closed-loop operation of the audio signal chain.

Analysis of Audio Signal Chain Technology Evolution Trends

With the continuous upgrade of smart devices, wearable devices and voice interaction technologies, audio signal chain systems are evolving from discrete functional components towards higher levels of integration, lower power consumption and improved performance. At the front-end acquisition stage, **MEMS microphones** are undergoing a transition from traditional analog output to digital output. At the signal conversion stage, **ADC and DAC converters** continue to advance towards higher precision and lower power consumption. In addition, the **integration trend among functional modules** is becoming more apparent. From a **packaging** perspective, chip packaging is developing towards miniaturisation and higher density. At the same time, **integration** is shifting from single-function chips to SoC and SiP solutions, enabling more functions to be deployed within a single chip or package.

Value Chain Analysis of the Audio IC Industry

At the **upstream** level, wafer materials and manufacturing equipment provide the fundamental support for industry development. The **midstream** segment covers audio IC companies engaged in design and wafer fabrication. By integrating key functional modules such as ADC, DAC, PGA and DSP, audio IC companies deliver highly integrated, low-power and high signal-to-noise ratio signal chain solutions to meet the requirements of advanced applications such as voice recognition and spatial audio. At the **downstream** level, audio ICs are widely applied in a variety of terminal scenarios, including smartphones, smart speakers, smart wearables and in-vehicle voice systems. The audio IC industry value chain is demonstrating a trend of collaborative evolution, characterised by application-driven innovation and enhanced value through integration.

Analysis of Major Application Scenarios of Audio ICs

Consumer electronics: With the continuous advancement of AI technologies, functions such as AI voice assistants and multimodal interaction are being rapidly embedded into various smart devices, significantly enhancing user experience. Smartphones, smart speakers and AI earphones have already widely integrated voice recognition, natural language processing and semantic understanding capabilities, enabling services such as voice control, real-time translation, personalised recommendation and contextual interaction.

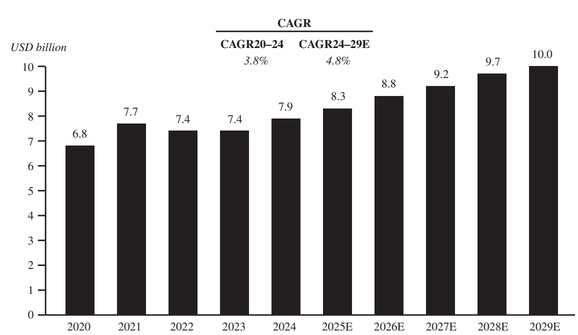
Automotive electronics: AI has become a core component of smart cockpits and advanced driver-assistance systems (ADAS). Voice interaction, as a key human-machine interface, has been widely adopted in vehicle systems, supporting functions such as intelligent voice control, voice wake-up and natural semantic understanding.

Other emerging AI application areas: In downstream segments such as education, healthcare, security and retail, AI-powered human-machine voice interaction technologies are also demonstrating strong potential. Service robots, equipped with AI voice functions, can conduct natural conversations with users, addressing diverse needs such as reception, guidance, companionship, inspection and warning, thereby accelerating the deployment of AI interaction capabilities across multiple industries.

Global and China's Audio IC Market Size

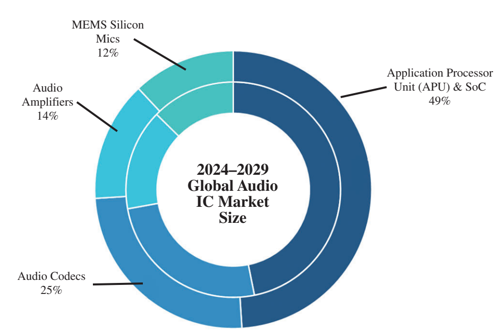
Driven by the upgrading of consumer electronics, the increasing adoption of smart voice applications and the acceleration of automotive intelligence, the audio IC market continues to expand. In revenue terms, the global audio IC market grew from USD6.8 billion in 2020 to USD7.9 billion in 2024, representing a CAGR of 3.8%. It is expected to reach USD10.0 billion by 2029, with a CAGR of 4.8% for the period from 2024 to 2029.

Global Audio IC Market Size, by Revenue, 2020–2029E



Source: Yole Group, The CIC Report.

Global Audio IC Market Breakdown by Product Type, 2020–2029E

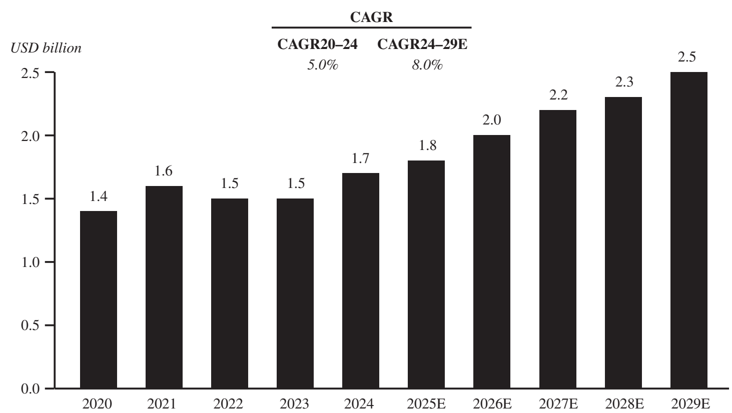


Source: Yole Group, The CIC Report.

The integration of Artificial Intelligence Generated Content (AIGC) capabilities and large language models (LLMs) into smart devices will significantly raise the specification requirements of microphones, particularly in terms of achieving higher signal-to-noise ratios, in order to enhance the user experience in voice interaction. The wider adoption of AI is expected to further expand the addressable market for audio ICs.

The size of China's audio IC market has grown from USD1.4 billion in 2020 to USD1.7 billion in 2024, representing a CAGR of 5.0% over the period. It is projected to reach USD2.5 billion by 2029, with a CAGR of 8.0% between 2024 and 2029.

China's Audio IC Market Size, by Revenue, 2020–2029E



Source: Yole Group, The CIC Report.

Key Drivers and Trends of the Audio IC Industry

With the growing demand for real-time responsiveness and higher intelligence levels in human-machine interaction, smart home devices and robotics, audio has become a critical entry point for human-machine interaction in the AI era. This trend is driving the accelerated adoption of audio ICs integrated with DSPs or dedicated AI processing units, providing critical support for edge devices to achieve low-latency, high-accuracy human-machine interaction.

As downstream applications diversify, audio ICs are expanding beyond traditional consumer electronics to automotive systems, smart home devices, conferencing tools, and wearables, driving demand for high-performance, multi-category products. The growing adoption of voice interaction as a core human-machine interface, coupled with trends toward integration, miniaturization, and low power consumption, is prompting manufacturers to optimize designs and packaging. Meanwhile, accelerated domestic substitution and the pursuit of supply chain autonomy are fueling rapid growth among local audio IC suppliers.

Structure and Process of MEMS Microphone

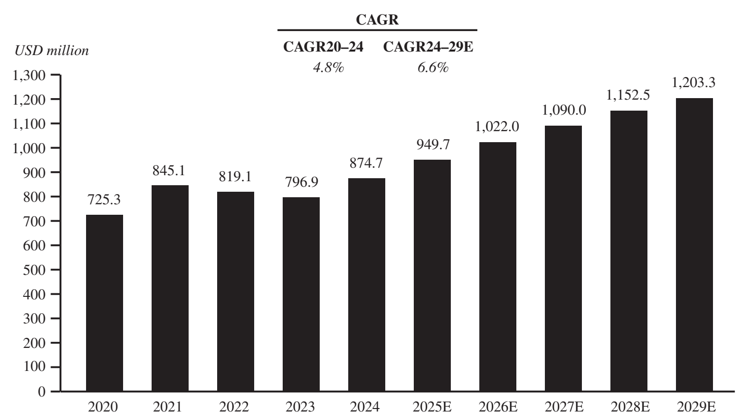
MEMS microphones are the front-end core components of the audio acquisition chain, and their performance directly determines the overall quality of terminal audio systems. A MEMS microphone module typically consists of a MEMS sensor chip, an ASIC chip, and the acoustic cavity and packaging structure. The MEMS sensor chip, through the capacitor structure formed by the diaphragm and backplate, converts sound pressure signals into electrical signals; the ASIC chip undertakes signal amplification, bias adjustment and analog-to-digital conversion; while the acoustic cavity and packaging design further enhance the signal-to-noise ratio and reliability. With this system-level integrated design, MEMS microphone modules can be widely applied in smartphones, AI earphones, smart speakers and in-vehicle voice systems, serving as critical enablers for voice interaction.

With the rapid growth of AI applications and the increasing adoption of multi-microphone arrays, MEMS microphone modules are evolving towards higher signal-to-noise ratio, lower noise, miniaturisation and greater integration, in order to meet the growing demand for enhanced voice acquisition performance in downstream applications.

Global MEMS Microphone Module Market Size

The global MEMS microphone module market increased from USD725.3 million in 2020 to USD874.7 million in 2024, representing a compound annual growth rate (CAGR) of 4.8% during the period. It is projected to reach USD1,203.3 million by 2029, with a CAGR of 6.6% for the period from 2024 to 2029.

Global MEMS Microphone Module Market Size, by Revenue, 2020–2029E



Source: Yole Group, The CIC Report.

Trends in Audio Signal Chain ICs

Audio signal chain ICs are experiencing strong demand in applications such as smartphones, smart speakers, wearable devices and robotics, with the market size continuing to expand. However, the domestic substitution rate remains relatively low at present, and core components are still largely dependent on overseas suppliers, which provides substantial market opportunities and localisation potential for domestic manufacturers. Audio signal chain ICs are evolving towards higher integration and greater intelligence.

COMPETITIVE LANDSCAPE OF THE GLOBAL AND CHINESE POWER DEVICE AND AUDIO IC INDUSTRY

Ranking of Chinese Power Device Suppliers

Among Chinese power device suppliers, in terms of 2024 revenue, the company ranked 21st. Within the segment of non-IDM power device manufacturers, it ranked 6th by revenue in 2024. Despite being the most recently established among the top competitors, it has rapidly emerged as a new and competitive force in Chinese power device industry.

The market share of Chinese IDM power device companies is ~50%, with the number of such companies estimated to be ~50–100.

Ranking of Chinese Power Device Suppliers by Revenue 2024

Ranking	Year Founded	Company	2024 Power Device Revenue *(RMB billion)*	Market Share *(%)*	Business Model
1	1993	Company A[(1)]	~14.7	~14.9%	IDM
2	1997	Company B[(2)]	~5.4	~5.5%	IDM
3	2006	Company C[(3)]	~5.2	~5.3%	IDM
4	2003	Company D[(4)]	~5.2	~5.2%	IDM
5	1959	Company E[(5)]	~4.1	~4.2%	IDM
6	2005	Company F[(6)]	~3.4	~3.4%	NON-IDM
7	2000	Company G[(7)]	~2.9	~2.9%	IDM
8	1970	Company H[(8)]	~2.3	~2.3%	IDM
9	2018	Company I[(9)]	~2.2	~2.2%	IDM
10	1965	Company J[(10)]	~2.0	~2.0%	IDM
......		......	......	......	......
21	***2019***	***Our Company***	***~0.3***	***~0.3%***	***NON-IDM***

Source: Annual Reports, The CIC Report.

Notes:

(1) Originally founded overseas in 1993, Company A is a semiconductor and product integration company that was later acquired by Chinese Company. It is headquartered in China and listed on the Shanghai Stock Exchange (SSE).

(2) Founded in 1997, and headquartered in China, Company B is a prominent IDM for semiconductors in China. Company B is listed on SSE.

(3) Founded in 2006, and headquartered in China, Company C is a specialized manufacturer of semiconductor ICs and power devices. Company C is listed on Shenzhen Stock Exchange (SZSE).

(4) Founded in 2003, and headquartered in China, Company D is a comprehensive semiconductor company focusing on power devices and smart sensors. Company D is listed on SSE.

(5) Founded in 1959, and headquartered in China, Company E is a major provider of rail transit equipment and power devices. Company E is listed on SSE and Hong Kong Exchanges and Clearing Limited (HKEX).

(6) Founded in 2005, and headquartered in China, Company F is a leading designer and supplier of power semiconductor modules, particularly IGBTs. Company F is listed on SSE.

(7) Founded in 2000, and headquartered in China, Company G is a global frontrunner in the manufacturing of LED chips and compound semiconductors. Company G is listed on SSE.

(8) Company H is a private company. Founded in 1970, and headquartered in China, Company H is a long-established Chinese company specializing in discrete semiconductor components.

(9) Company I is a private company. Founded in 2018, and headquartered in China, Company I is a major global provider of integrated circuit packaging and testing services.

(10) Founded in 1965, and headquartered in China, Company J is a manufacturer focused on power devices and integrated circuits. Company J is listed on SSE.

Ranking of Chinese Non-IDM Power Device Suppliers

Ranking of Chinese Non-IDM Power Device Suppliers by Revenue 2024

Ranking	Year Founded	Company	2024 Power Device Revenue *(RMB billion)*	Market Share *(%)*	Business Model
1	2005	Company F	~3.4	~3.4%	NON-IDM
2	2013	Company K[(1)]	~1.7	~1.7%	NON-IDM
3	2006	Company L[(2)]	~1.3	~1.3%	NON-IDM
4	2008	Company M[(3)]	~0.9	~0.9%	NON-IDM
5	2014	Company N[(4)]	~0.6	~0.6%	NON-IDM
6	***2019***	***Our Company***	***~0.3***	***~0.3%***	***NON-IDM***

Source: Annual Reports, The CIC Report.

Notes:

(1) Founded in 2013, and headquartered in China, Company K is a prominent fabless company specializing in the design and sales of advanced power MOSFETs and IGBT products. Company K is listed on SSE.

(2) Founded in 2006, and headquartered in China, Company L is a specialized manufacturer of power devices, including IGBTs, FREDs, and power modules. Company L is listed on SSE.

(3) Founded in 2008, and headquartered in China, Company M is a innovative technology company focused on the R&D and design of high-performance power devices, particularly high-voltage super-junction MOSFETs. Company M is listed on SSE.

(4) Company N is a private company. Founded in 2014, and headquartered in China, Company N is a fabless semiconductor company dedicated to the design and development of power devices and analog chips.

(5) In the non-IDM ranking, fab-lite companies, which retain partial manufacturing capabilities, are often regarded as variants of the IDM model under broad industry classifications and are therefore excluded from this list, which covers only virtual IDM and fabless companies.

Ranking of Global MEMS Microphone IC Suppliers

Among global MEMS microphone IC design companies, the company ranked third in terms of shipment volume in 2024.

Ranking of Global MEMS Microphone IC Suppliers by Shipment Volume 2024

Ranking	Year Founded	Company	Country/ Region	2024 MEMS Microphone ICs Shipment *(billion tablets)*	Market Share *(%)*
1	1999	Company O[(1)]	Germany	~2.0–2.5	~31.7%
2	1946	Company P[(2)]	United States	~1.5–2.0	~24.5%
3	***2019***	***Our Company***	***China***	***~1.2***	***~16.8%***
4	1993	Company Q[(3)]	China	~0.7	~9.4%
5	2001	Company R[(4)]	China	~0.5	~7.2%

Source: The CIC Report.

Notes:

(1) Founded in 1999, and headquartered in Germany, Company O is a leading German semiconductor manufacturer. Company O is listed on Frankfurt Stock Exchange (FWB) and OTC Markets Group QX Market (OTCQX).

(2) Founded in 1946, and headquartered in United States, Company P is a global supplier of advanced micro-acoustic microphones, speakers, audio processing, and precision device solutions. Company P is listed on New York Stock Exchange (NYSE).

(3) Founded in 1993, and headquartered in China, Company Q is a leading intelligent device solutions provider specializing in acoustics, optics, haptics, sensors, and semiconductors, serving global top-tier customers. Company Q is listed on HKEX.

(4) Founded in 2001, and headquartered in China, Company R is a global technology company engaged in the research, manufacturing, and sales of precision components. Company R is listed on SZSE.

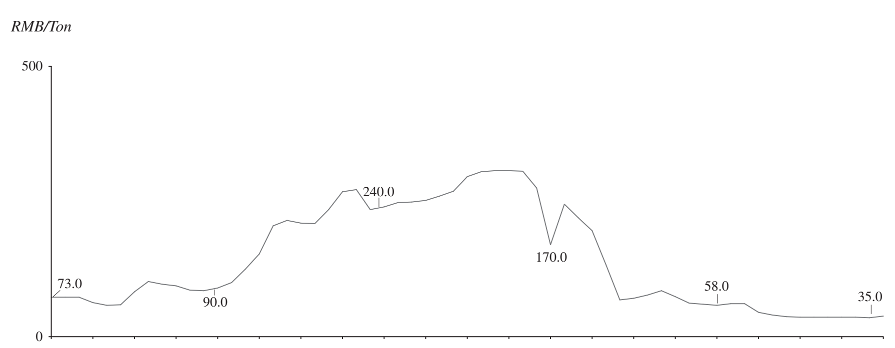
Entry Barriers of the Power Device and Audio IC Industry

The power device and the audio IC industry exhibit significant barriers to entry. Their core competitiveness is underpinned by advanced technical capabilities, accumulated manufacturing process know-how, high entry thresholds and stringent certification systems, robust product quality control, deep downstream application understanding, as well as a stable customer base and collaborative supply chain ecosystem.

Raw Material Price Analysis and Forecast

The manufacturing of power devices and analog chips involves multiple critical raw materials, with wafer materials being the core, including traditional Si as well as third-generation semiconductor materials such as SiC and GaN for high-performance applications. Driven by demand from the new energy industry, silicon prices experienced a short-term surge and remained high. However, with the gradual release of upstream production capacity and a more balanced market supply and demand, prices have steadily declined and currently entered a relatively stable range.

China's Silicon Material Prices, 2020–2024



Source: Wind, The CIC Report.

The market price of silicon carbide (97%) in Ningxia region is chosen as a representative indicator for Chinese silicon carbide prices, as Ningxia is one of the core production bases of the industry in China, featuring substantial production capacity and active spot trading. Its price level is therefore highly representative and serves as an important reference for the overall market. China's Ningxia SiC (97% spot price) experienced a sharp rise from 2020 to a peak of approximately RMB76,000 per ton in 2022, followed by a steady decline to around RMB38,000 per ton by 2024.

Market Price Analysis and Forecast for Power Devices

The average selling prices of discrete power semiconductors in China are projected to remain relatively stable around 1 RMB/Units between 2022 and 2029.

SOURCE OF INFORMATION

We engaged CIC, an independent market research and consulting company that provides industry consulting services, commercial due diligence, and strategic consulting, to conduct detailed research on and analysis of power device and audio IC industry. We have agreed to pay a fee of RMB530,000 to CIC in connection with the preparation of the CIC Report. We have incorporated certain information from the CIC Report into this section, as well as into "Summary," "Business," "Financial Information," and elsewhere in this document to provide potential with a comprehensive presentation of the industries where we operate.

During the preparation of the CIC Report, CIC conducted both primary and secondary research, and gathered knowledge, statistics, information, and insights on industry trends within the target research markets. The primary research involved interviews with key industry experts and leading industry participants. The secondary research consisted of analyzing data from various publicly available sources, such as the National Bureau of Statistics.

The CIC Report was compiled based on the following assumptions: (i) the overall social, economic, and political environment in China is expected to remain stable during the forecast period; (ii) related key industry drivers are likely to propel continued growth in power device and audio IC industry throughout the forecast period, including favorable policies and wider acceptance of different levels of autonomous driving features in vehicle; and (iii) there will be no extreme force majeure or unforeseen industry regulations in which the market may be affected in either a dramatic or fundamental way during the forecast period.

Our Directors, after making reasonable enquiries, confirm that there have been no adverse change in the market information since the date of the CIC Report which may qualify, contradict or have an impact on the information in this section.