Confidential

Independent Market Research on China Power Amplifier Audio Chips Industry

For FourSemi 傅里叶

March, 2026

Signature _____

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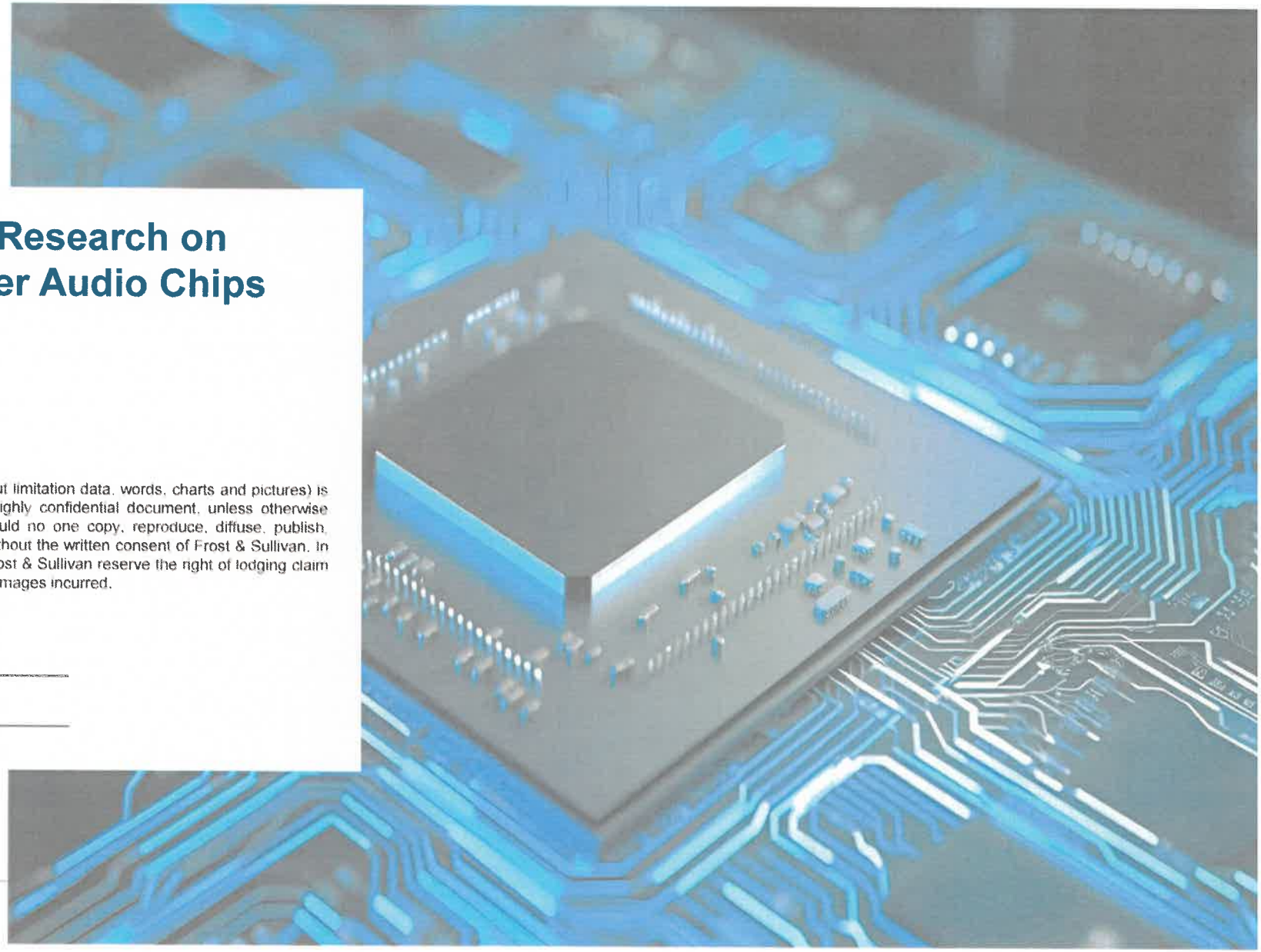


Glossary (1/4)

Term	Definition
CAGR （复合增长率）	Compound annual growth rate
Voice coil	A critical component in dynamic loudspeakers and microphones, consisting of a wire coil suspended in a magnetic field that converts electrical audio signals into mechanical motion (in speakers) or vice versa (in microphones.
Ultra-low-power circuits	Electronic circuits specifically engineered to minimize energy consumption while maintaining required functionality.
Mid/high-power Audio Amplifier Chips（中大功率音频功放芯片）	Mid/high-power audio amplifier chips boost electrical audio signals to drive speakers in applications requiring high-volume output and dynamic range.
ASIC	application-specific integrated circuit, a custom-designed microchip optimized for a particular function, such as audio processing in smart devices, offering superior performance, power efficiency, and miniaturization compared to general-purpose processors.
Industrial “Four Basics “(工业“四基”）	The "Four Basics" of industry are the abbreviation for key basic materials, core basic components (elements), advanced basic processes, and industrial technology foundations.

Source: National Bureau of Statistics of China, Frost & Sullivan

Glossary (2/4)

Term	Definition
Class D	A high-efficiency audio amplifier that uses Pulse Width Modulation to convert analog signals into digital-like pulses, minimizing power loss and heat generation.
Analog circuit（模拟电路）	A circuit used to process continuously variable signals through components such as resistors, capacitors, and transistors.
Acoustic Vehicle Alerting System (AVAS)	A safety feature in electric and hybrid vehicles that generates artificial sounds at low speeds to alert pedestrians and cyclists of the vehicle's presence, ensuring compliance with regulatory standards.
ADC	Analog-to-digital converter, a device used to convert continuous analog signals into discrete digital signals.
Wafer Foundry (晶圆厂）	A facility that manufactures semiconductor wafers for fabless IC design companies.
IDM((Integrated Device Manufacturer)	A business model in which a single enterprise independently completes the entire industrial chain of IC design, wafer manufacturing, packaging and testing, and sells its own brand of chips.
Chip packaging(芯片封装）	The process of enclosing a semiconductor chip in a protective housing that facilitates electrical connections and heat dissipation.

Source: National Bureau of Statistics of China, Frost & Sullivan

Glossary (3/4)

Term	Definition
High-Efficiency PWM Modulation (高效率PWM调制技术)	High-efficiency PWM modulation is a technique for medium/high-power applications that adjusts pulse duty cycles to optimize energy conversion, reduce losses and EMI, and ensure output signal quality, requiring more robust design considerations at higher power levels.
“μV “	A unit of electrical potential equal to one-millionth of a volt (10−6 V), critical for quantifying low-noise performance in high-fidelity audio systems, sensor interfaces, and precision analog circuits
Anti-Distortion Software(抑制变形软件)	By leveraging proprietary algorithms integrated into the same platform, portability and seamless cross-application deployment across mobile device projects have been achieved.
Embodied Artificial Intelligence (EAI)	The interaction of a physical body with the environment to complete the integration from perception to decision-making and then to execution
Haptic Driver（触觉反馈芯片）	Refers to the technical means by which electronic devices convey operational driver through physical sensations such as vibration, click effects, etc. Its core objective is to enhance the authenticity and efficiency of human-computer interaction.
Telematics Boxes（T-BOX）	Vehicle-mounted embedded systems that integrate telecommunications (4G/5G, GNSS) and informatics (data processing), serving as the hub for connected car services, including audio streaming, emergency calls, and over-the-air (OTA) updates for infotainment systems.

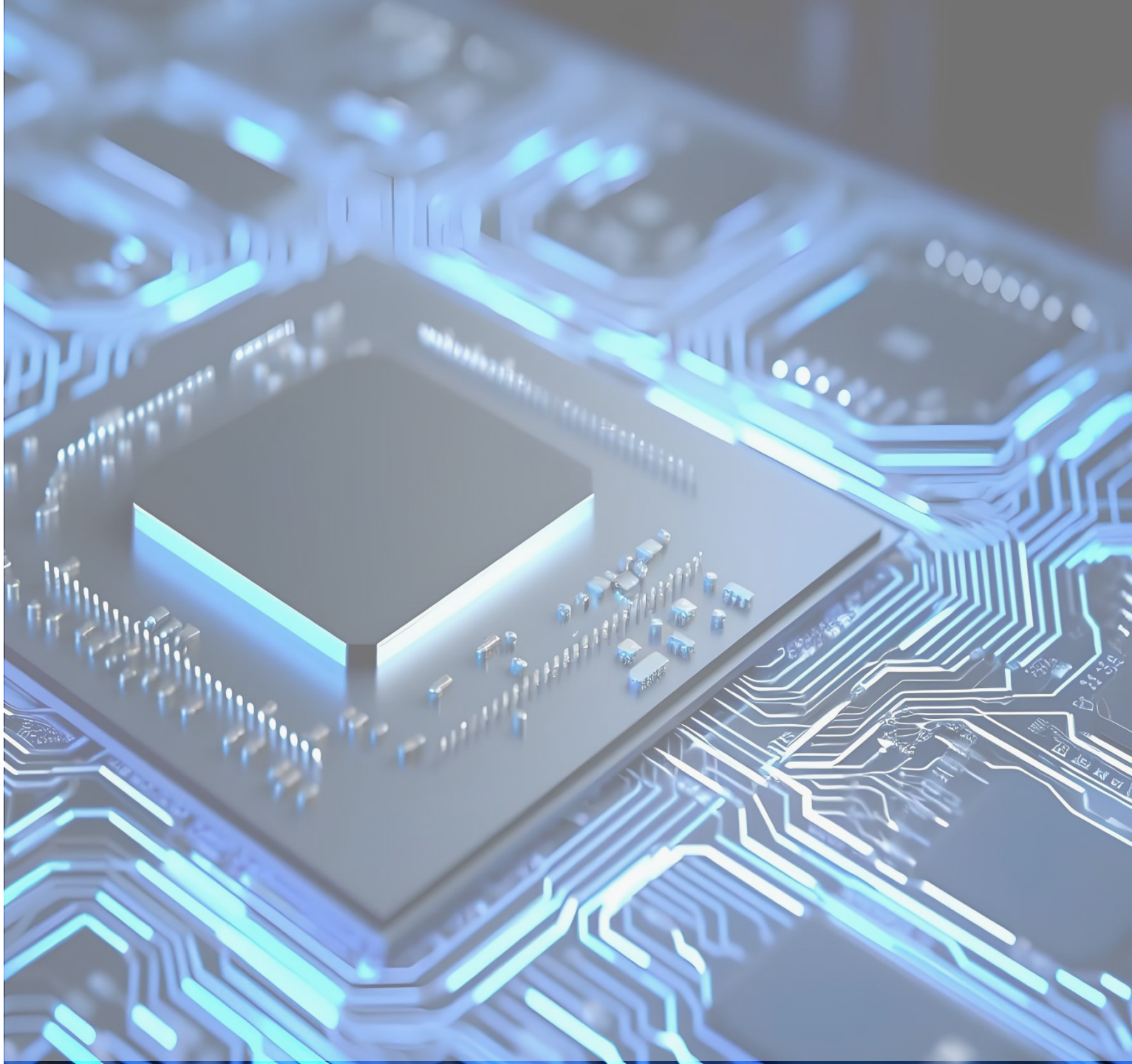
Source: National Bureau of Statistics of China, Frost & Sullivan

Glossary (4/4)

Term	Definition
Mixed Signal Chip （数模混动芯片）	An integrated circuit chip that combines analog circuits and digital circuits. Its interior can include basic modules of analog circuits such as voltage sources, current sources, operational amplifiers, comparators, etc., as well as basic modules of digital circuits such as inverters, registers, flip-flops, MCUs, and memory.
Spread-spectrum technology	A technique used in Class-D audio amplifiers to reduce EMI by dynamically modulating the switching frequency, preventing concentrated noise at any single frequency.
Digital Signal Processor (DSP)	Digital signal processing is a method of handling real signals by using digital techniques to perform conversions or extract information. These signals are represented by digital sequences.
Power Consumption reduction Algorithm (降低功耗算法）	It is a type of algorithm that reduces the energy consumption of electronic devices by optimizing computing, controlling hardware resources or adjusting system behavior
AEC-Q100（汽车电子可靠性测试认证规范）	A critical reliability testing standard for integrated circuits used in automotive applications, ensuring performance under extreme temperatures, vibrations, and other harsh conditions.
Integrated Circuit（集成电路)	An integrated circuit (IC) is a miniaturized electronic device that densely packs transistors, resistors, and capacitors on a semiconductor substrate (like silicon) to achieve complex functions.

Source: National Bureau of Statistics of China, Frost & Sullivan

Agenda

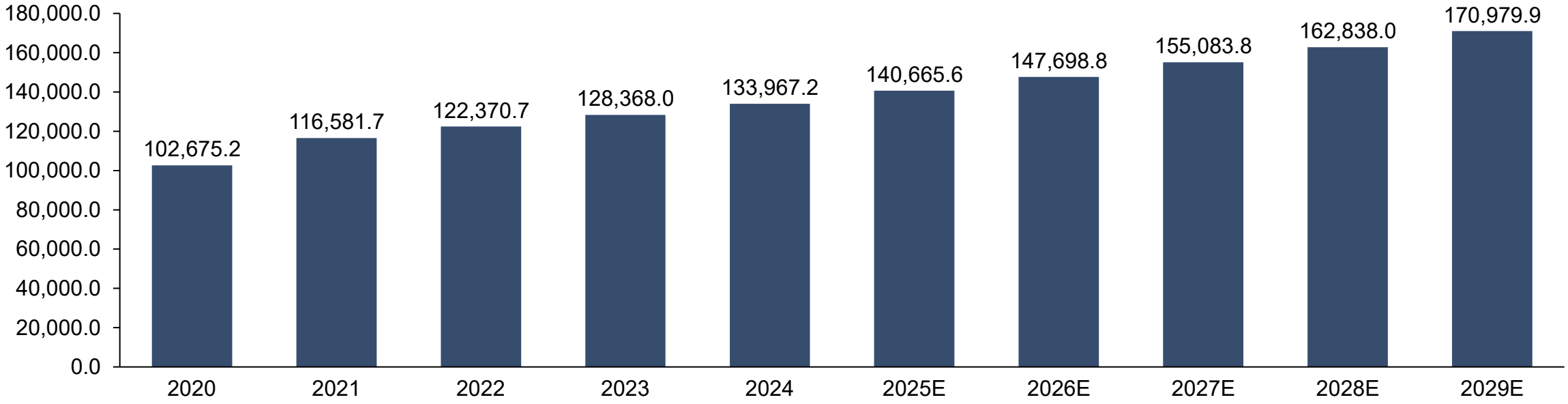


Overview of Macroeconomic Environment in The PRC

Nominal GDP and Nominal GDP Per Capita

Nominal GDP (China), 2020-2029E

	2020-2024	2025E-2029E
CAGR	6.9%	5.0%



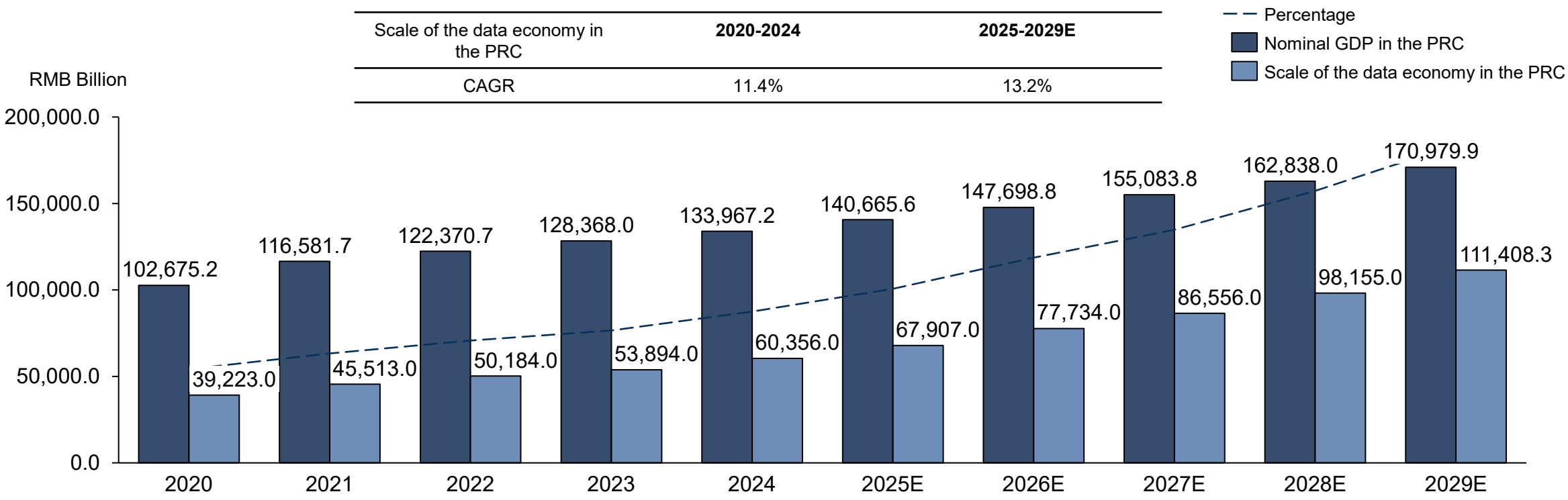
- China's nominal GDP has grown significantly from RMB102,675.2 billion in 2020 to RMB133,967.2 billion in 2024, with a CAGR of 6.9% over the period. In the future, thanks to effective government policies and the shift of the domestic economy from investment-driven to consumption-driven, China's nominal GDP is projected to reach RMB17,0979.9 billion by 2029, with a CAGR of 5.0% from 2025 to 2029.

Overview of Macroeconomic Environment in The PRC

Value added of digital economy and share of GDP

Value Added of Digital Economy and Share of GDP，2020-2029E

Scale of the data economy in the PRC	2020-2024	2025-2029E
CAGR	11.4%	13.2%



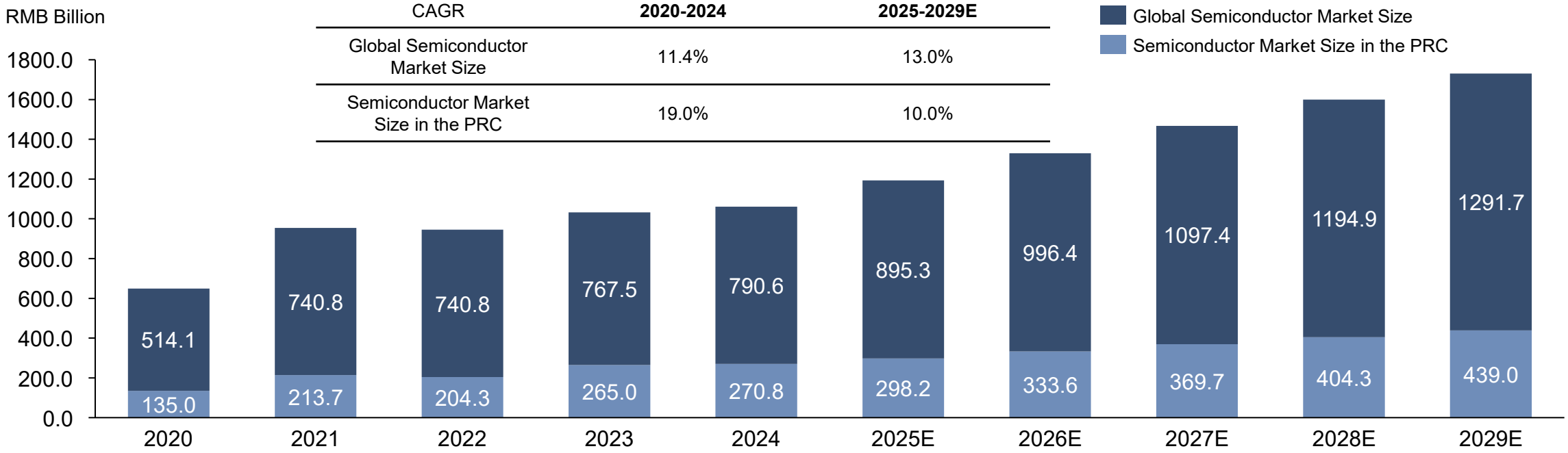
- The size of China's digital economy grew from RMB39,223.0 billion in 2020 to RMB60,356.0 billion in 2024, with a CAGR of 11.4%, accounting for 45% of GDP. The size of the digital economy is expected to grow to RMB67,907.0 billion by 2025 and RMB111,408.3 billion by 2029, with a CAGR of 13.2% during the period, accounting for more than 65% of GDP, making it a core driver of economic growth. This trend reflects that China is accelerating the transformation from traditional manufacturing and investment-driven to digitalization, and technological innovation-driven, laying a solid foundation for building a modern, high-quality, and sustainable economic system.

Overview of Macroeconomic Environment in The PRC

Semiconductor Market Size(Global)

Semiconductor Market Size(Global), 2020-2029E

CAGR	2020-2024	2025-2029E
Global Semiconductor Market Size	11.4%	13.0%
Semiconductor Market Size in the PRC	19.0%	10.0%



- The global semiconductor market size grew from RMB514.1 billion in 2020 to RMB790.6 billion in 2024, with a CAGR of 11.4% during the period. The global semiconductor market size is expected to reach RMB895.3 billion by 2025 and is projected to reach RMB1291.7 billion by 2029, with a CAGR of 13.0%.
- Semiconductor Market Size in the PRC is expanding at a fast pace, growing from RMB135.0 billion in 2020 to RMB270.8 billion in 2024, with a CAGR of 19.0%. China's semiconductor market is expected to reach RMB298.2 billion in 2025, and with China's semiconductor market driven by policy support, domestic substitution and technological innovation, it is projected to reach RMB439.0 billion by 2029, with a CAGR of 10.0% over the period.

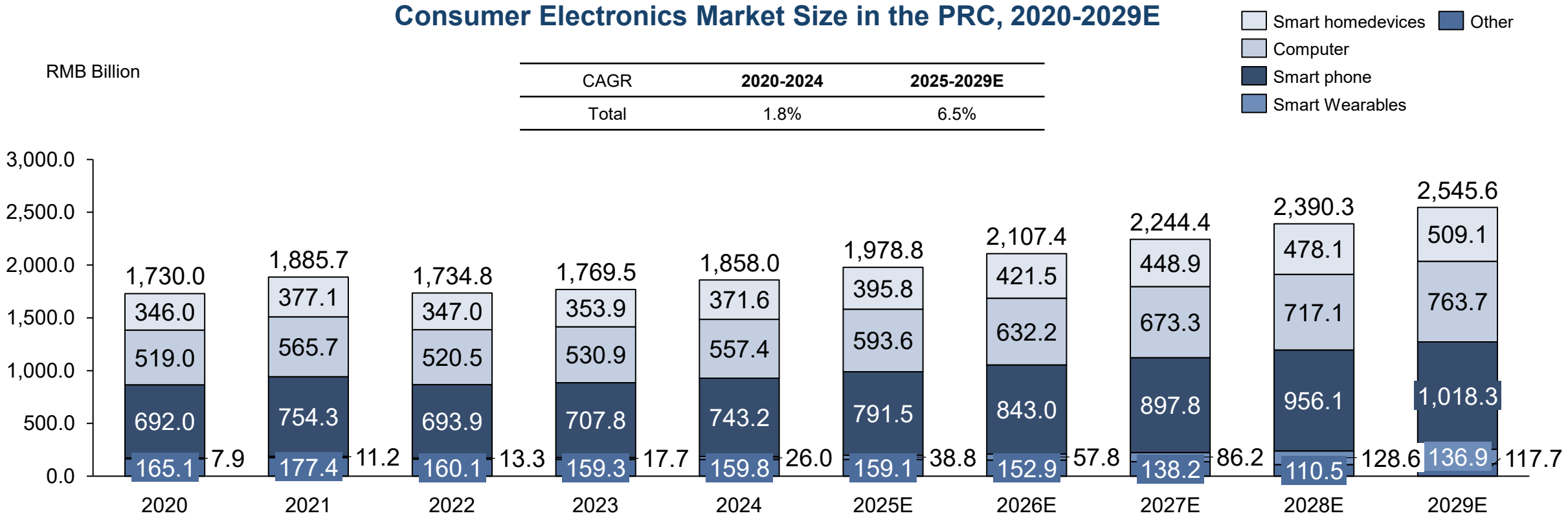
Overview of Macroeconomic Environment in The PRC

Consumer Electronics market size in the PRC

Consumer Electronics Market Size in the PRC, 2020-2029E

RMB Billion

CAGR	2020-2024	2025-2029E
Total	1.8%	6.5%

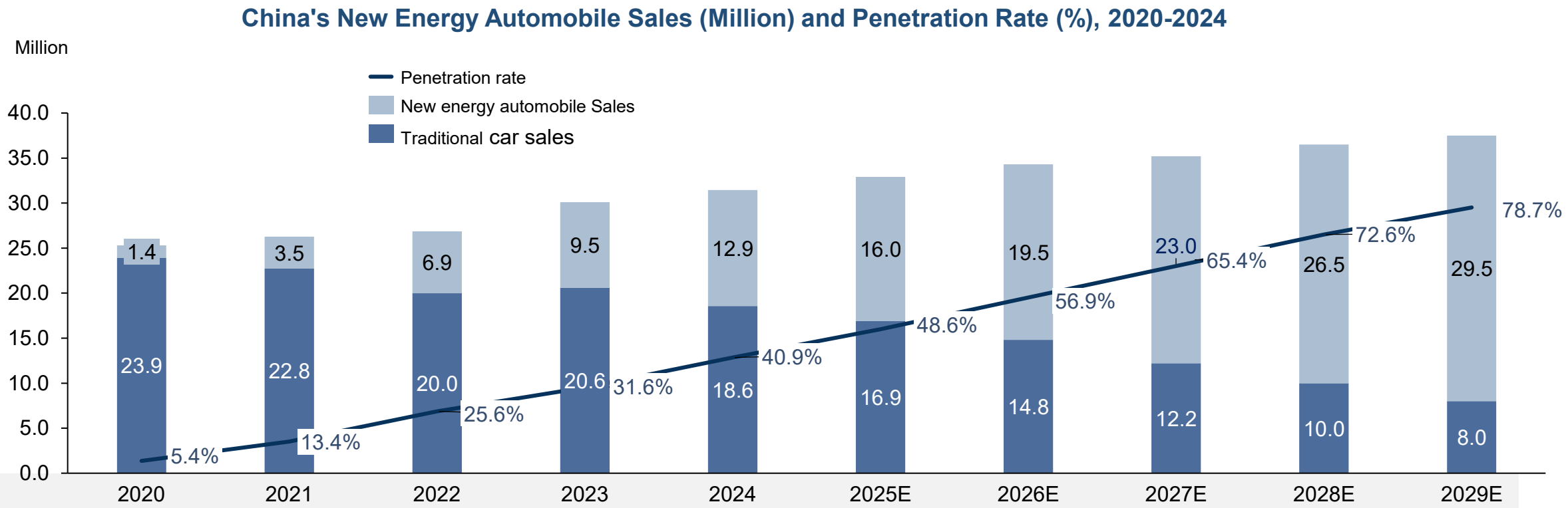


- Consumer electronics sector includes terminal products such as smartphones, computers, smart home devices, and smart wearable devices. China's consumer electronics market grew from RMB1,730.0 billion in 2020 to RMB1,858.0 billion in 2024, with a CAGR of 1.8%. It is expected to reach RMB1,978.8 billion by 2025 and grow at a CAGR of 6.5% to RMB2,545.6 billion by 2029.

Overview of Macroeconomic Environment in The PRC

New Energy Vehicle Sales in the PRC

New Energy Vehicle Sales and Penetration Rate (%) in the PRC, 2020-2024

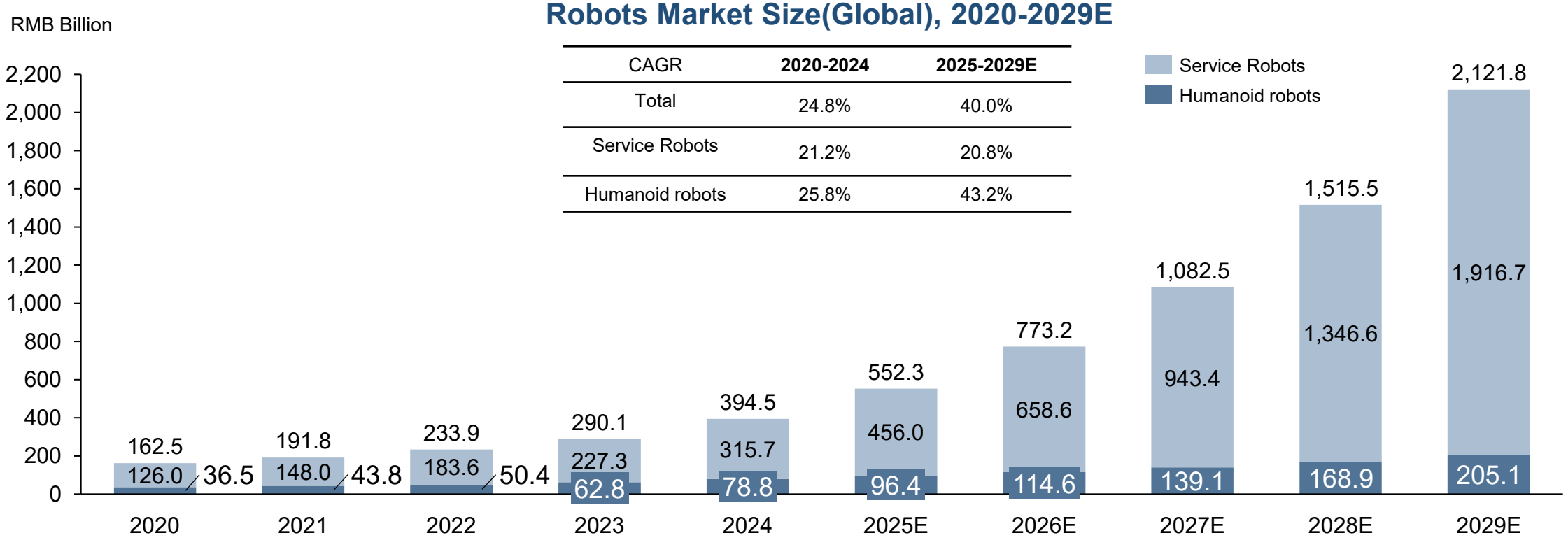


- Sales of new energy vehicles grew from 1.4 million in 2020 to 12.9 million in 2024. As the market is accelerating the transformation of the automotive industry to intelligence and electrification, the penetration rate of new energy vehicles expanded from 5.4% in 2020 to 40.9% in 2024. Booming new energy vehicle market in the PRC brings new opportunities for the power amplifier audio chip sector. Since 2021, the sales of new energy vehicles have increased significantly, the market's acceptance of Intelligent vehicles has steadily increased, and the level of automotive intelligence has become the focus of competition, leading to the continuous expansion of the intelligent vehicle market and created a broad application space for power amplifier audio chips.

Overview of Macroeconomic Environment in The PRC

Sales of Humanoid Robots(Global), 2020-2029E

Robots Market Size(Global), 2020-2029E

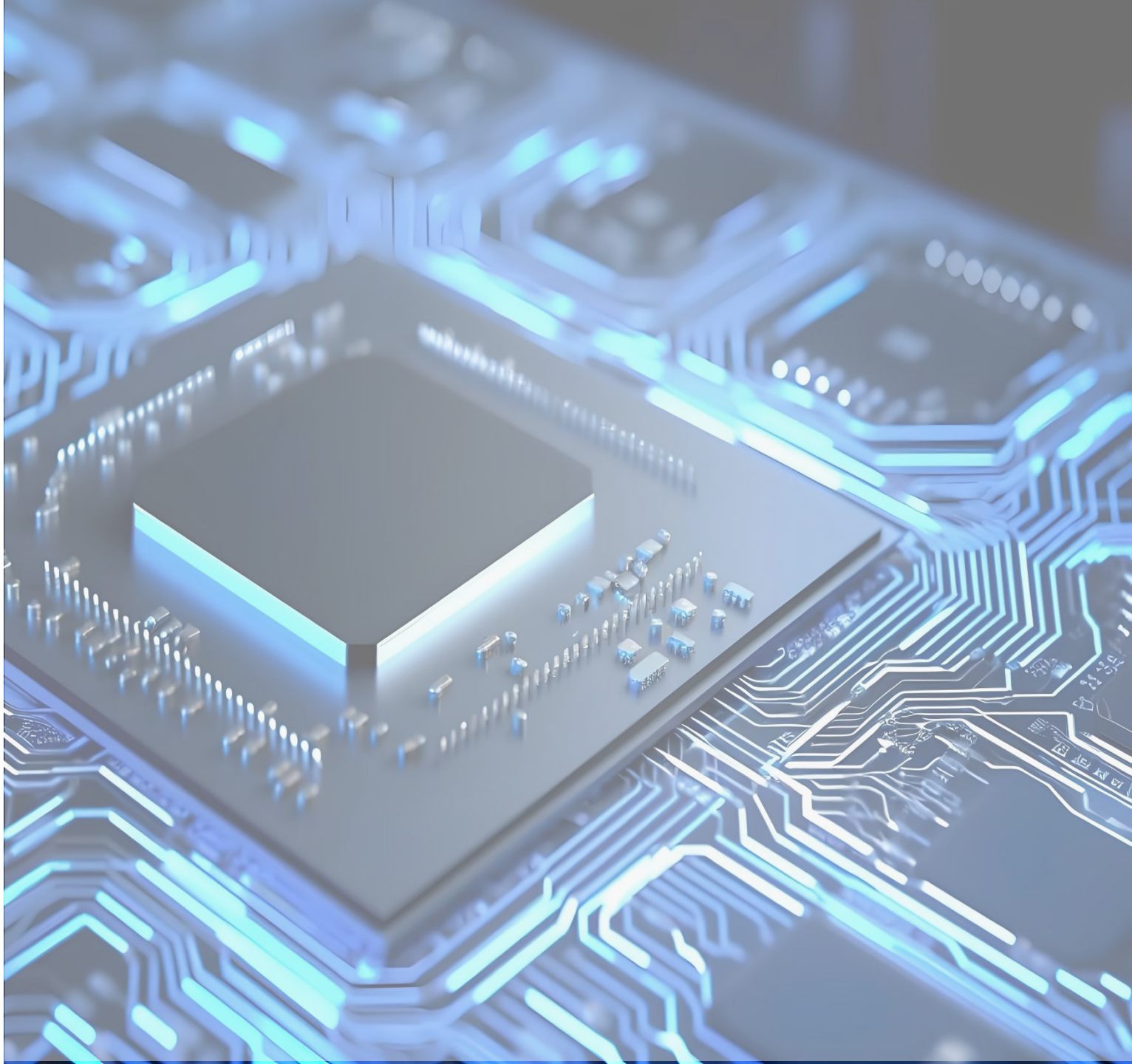


CAGR	2020-2024	2025-2029E
Total	24.8%	40.0%
Service Robots	21.2%	20.8%
Humanoid robots	25.8%	43.2%

- The global robotics market size covers the field of robots including service robots, humanoid robots, etc. The global market for robotics and related industries grew from RMB16.3 billion in 2020 to RMB39.5 billion in 2024, with a CAGR of 24.8%. The global robotics market size is expected to reach RMB 55.2 billion by 2025 and further expand to RMB 212.2 billion by 2029, with a CAGR of 40.0%. Among them, the market size of smart/home service robots grew from RMB3.7 billion in 2020 to RMB7.9 billion in 2024, with a CAGR of 21.2%. It is expected to reach RMB9.6 billion by 2025 and grow to RMB20.5 billion by 2029, with a CAGR of 20.8%.The industrial robotics market size grew from RMB12.6 billion in 2020 to RMB31.6 billion in 2024, with a CAGR of 25.8%. It is expected to reach RMB45.60 billion by 2025 and grow to RMB191.7 billion by 2029, with a CAGR of 43.2%.
- The market size of China's robotics was approximately RMB352.0 billion in 2024, and is expected to grow at a CAGR of 41.0% to RMB1,890.2 billion by 2029.

Source: Frost & Sullivan

Agenda



Overview of the Embodied AI in the PRC

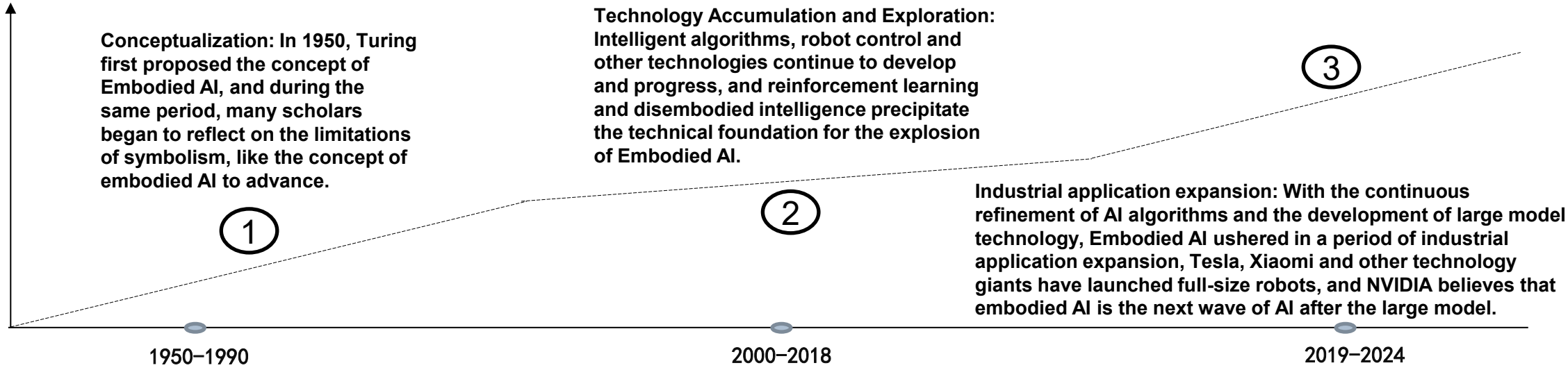
Development history and background of the Embodied AI

Definition of Embodied AI

- Embodied AI (EAI) refers to the integration of perceptual intelligence, decision-making, and execution based on interaction with the environment through a physical body. As the intelligence of downstream application scenarios such as robotics, intelligent vehicles, and consumer electronics evolve, the ability to acquire real-world information and achieve efficient interaction is gradually becoming a fundamental requirement. Embodied AI has undergone four generations of technological accumulation, evolving from cloud intelligence laying the foundation for computing power, to edge intelligence achieving environmental perception, to on-device intelligence completing autonomous decision-making, and finally to an embodied AI capable of proactive interaction. As core capabilities of embodied AI, perception and interaction are continuously growing in importance, driving efficient interaction and collaboration of intelligent agents in various environments.

The Evolution of the Embodied AI，1950-2024

- The development of embodied AI has gone through three stages, from conceptualization to technical accumulation to industrial application. In 1950, Turing first proposed the concept of embodied AI, which prompting the academic community to reflect on the limitations of symbolic AI. Subsequently, the advancement of intelligent algorithms, robot control and other technologies, especially the development of reinforcement learning and large models, laid the technical foundation for embodied intelligence. Nowadays, with the continuous refinement of AI technology, Tesla, Xiaomi and other technology giants have launched full-size robots, and NVIDIA regards embodied intelligence as the next generation of AI wave after big models, marking its formal entry into the industrial application expansion period.



Overview of the Embodied AI in the PRC

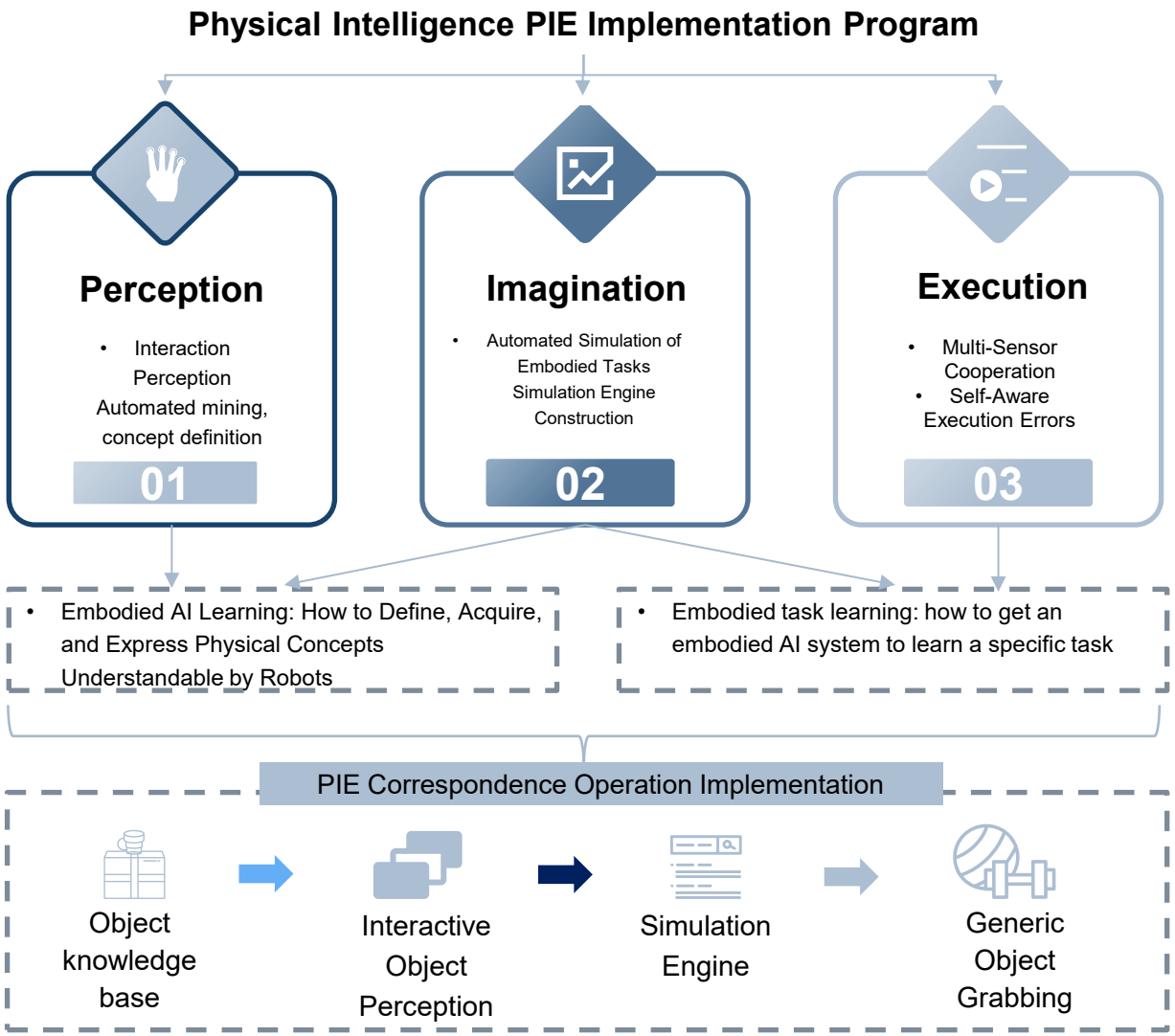
Development history and background of the Embodied AI

Development History of Embodied AI: Co-evolution of Theory, Technology, and Scenarios

Era	Time Span	Core Carrier	Technological Breakthrough	Interaction Capability	Representative Product	Connection with Embodied AI
Cloud Intelligence	2000-2015	Data Center	Distributed Computing Deep Learning Framework	Passive Response (Text/Voice)	Cloud Services	Provide Foundational Computing Power
Edge Intelligence	2015-2020	Gateway/ edge servers	Model Compression Edge Inference Chip	Environmental Awareness (Vision/Sensors)	Industrial Quality Inspection Systems	Achieve Low-latency Environmental Perception
Embodied AI	2020-2023	Terminal Devices	Heterogeneous Computing Sensor Fusion	Real-time Feedback (Multi-modal Input)	Smart Home Robots	Complete the “Perception-decision” loop
Cloud Intelligence	2023-Future	Autonomous Intelligent	Embodiment of Large Models Bionic Drive	Proactive Interaction (Human-like Actions)	Humanoid Robots	Achieve the Full “Perception-decision-execution” Chian

Overview of the Embodied AI in the PRC

Algorithmic Architecture for Embodied AI Technology



The PIE scheme provides a comprehensive technical framework covering perception, imagination and execution for the realization of embodied intelligence. It provides a complete feasible solution for embodied intelligence.

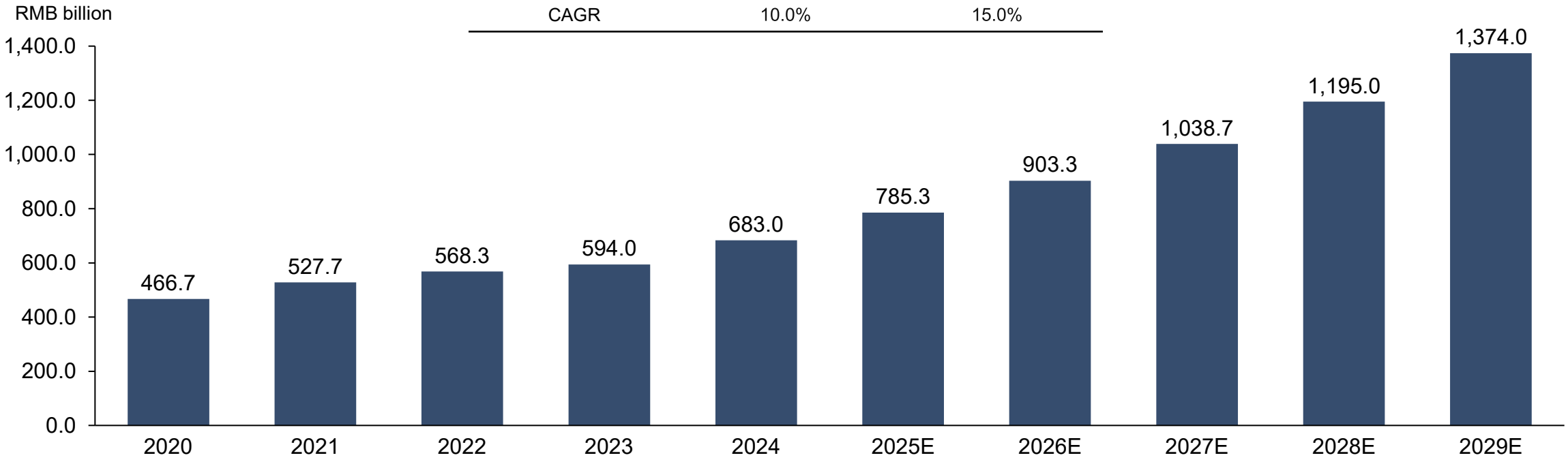
- The PIE scheme provides a comprehensive technical framework for the realization of embodied AI. The program divides embodied AI into three key modules: Perception, Imagination and Execution. The Perception module uses sensor technology to collect information from the physical world; the Imagination module combines an object knowledge base and a simulation construction engine to model and simulate the environment through computer graphics and robotics principles to generate an action plan; and the Execution module translates the simulated plan into actual robot actions, realizing precise drive control and coordinate transformation.
- Through the integration of interdisciplinary technologies, this program provides a complete process from environment sensing to action execution for robots, and promotes the progress of embodied intelligence in both theoretical and applied research. The hardware component of the embodied intelligent humanoid robot consists of three major parts: the perception layer, the overall torso, and the joint drive system. The perception layer includes cameras, millimeter-wave radar, chips, and sensors, which are mainly used to capture and perceive environmental information for modeling the physical world; the overall drive includes battery packs, sensors, cooling systems, and FSD systems, which are used to provide energy power and keep the machine running stably; and the joint drive system includes rotary joints, linear joints, bionic joints, and dexterous hands, which are the final link in the interaction with the physical world. The joint drive system includes rotary joints, linear joints, bionic joints, and dexterous hands, which is the last link to interact with the physical world and requires high precision, flexibility, and coordination.

Overview of the Embodied AI in the PRC

Market Size of the Embodied AI

Market Size of the Embodied AI(Global), 2020-2029E

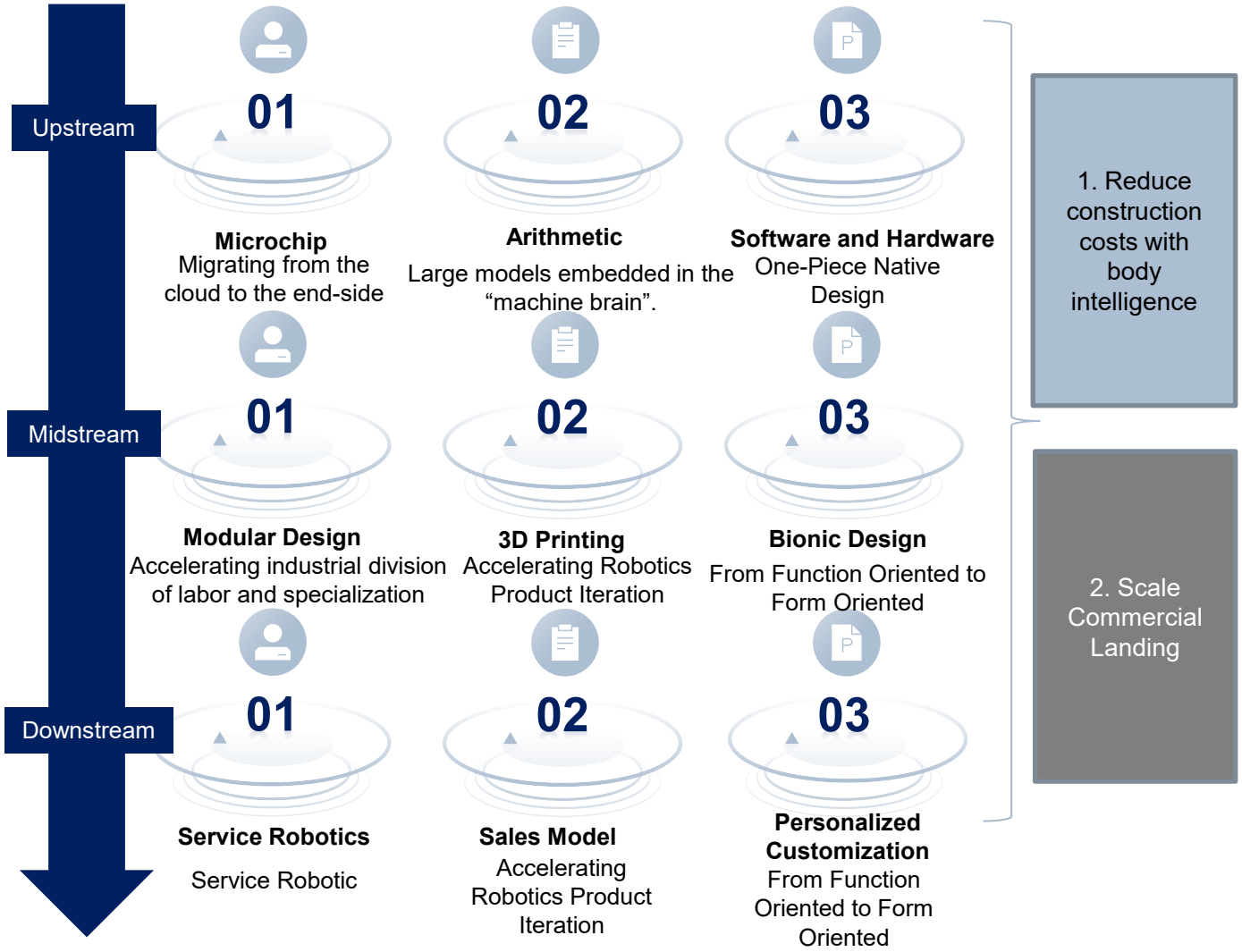
	2020-2024	2025E-2029E
CAGR	10.0%	15.0%



- The global market size of the Embodied AI grows from RMB466.7 billion in 2020 to RMB683.0 billion in 2024, with a CAGR of 10.0%. With the continuous development of the Embodied AI, and the deepening of the degree of intelligence in downstream application scenarios such as robotics, automotive electronics, consumer electronics, etc., driven by technological advancement and market demand, the Embodied AI(Global) market size is expected to continue to grow, and is forecast to reach RMB785.3 billion in 2025, and will expand at a CAGR of 15.0% to RMB1374.0 billion in 2029.

Overview of the Embodied AI in the PRC

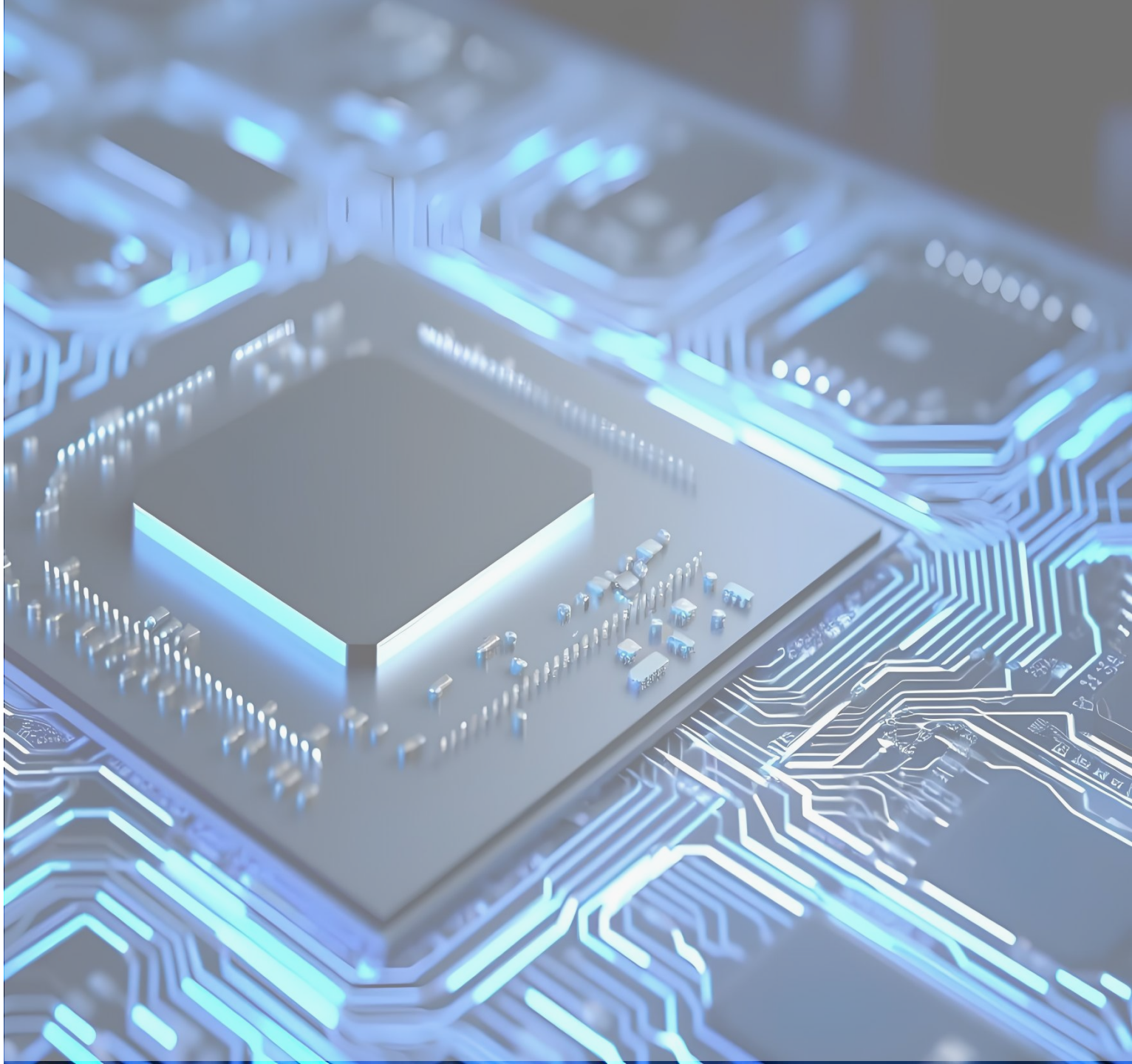
Trends in the Embodied AI



China's Embodied AI is showing two major industrial development trends, one is that the industry is transforming from the experimental exploration stage to large-scale commercial application, and the other is that the industry is developing synergistically to achieve the purpose of cost reduction and efficiency.

- China's Embodied AI is gradually moving from the experimental exploration stage to large-scale commercial applications. Numerous manufacturers have launched commercialized the Embodied AI products one after another, and these products have already realized landing in multiple application scenarios. For example, Tesla's L4 fully automated driving vehicles have been put into operation in some areas of the United States, and DJI's drone delivery has also realized commercialized takeaway delivery services in some areas of Shenzhen.
- In the future, in order to further promote the commercialization of embodied intelligence and reduce costs, it is necessary to look for opportunities for synergistic development and technological applications in all links of the industry chain. In this way, the vision of reducing costs and increasing efficiency and promoting the large-scale industrialization of embodied intelligence will ultimately be realized.

Agenda



Overview in Perceptual Intelligence Industry the PRC

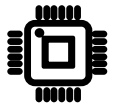
Definition, Classification and Introduction of Perceptual Intelligence

Definition, Classification and Introduction of Perceptual Intelligence

- Perceptual intelligence is a key technology field in the era of embodied AI. It refers to the technology that uses sensors, artificial intelligence technology, and perceptual algorithms to simulate human perceptual and interactive abilities, enabling machines to perceive, understand, and respond to the external environment. Classified according to the simulation of the human sensory system, Perceptual intelligence can be divided into visual perception, auditory perception, smart audio, haptic perception, and other forms of perception. In the diversified technology field of perceptual intelligence, smart audio and haptic drivers are two major directions. Smart audio significantly enhances scenario-based user experience by achieving efficient processing and optimized output of audio signals: haptic drivers enhance operational immersion and interaction through precise force and vibration feedback.
- From a market perspective, as core scenarios for physical world interaction, consumer electronics, intelligent vehicles, and robotics show a growing demand for perception and interaction capabilities.

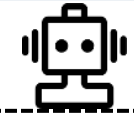
Visual perception: Environmental modeling, target recognition, navigation and obstacle avoidance, multi-spectrum perception.
Visual processing (multi-spectrum perception): Object recognition, pose estimation, and combining RGB, infrared, and depth cameras to achieve complex scene perception and enhanced perception in low-light/occluded environments.

Auditory perception: Sound comprehension, sound expression, ambient sound perception.
Auditory processing: Achieving environmental acoustic modeling, event recognition, and spatial positioning through acoustic signal analysis, simulating the human auditory system by combining physical acoustics and neural coding mechanisms.

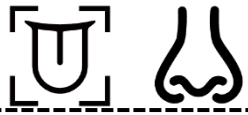


Smart audio: Achieving efficient processing and optimized output of audio signals through technologies such as power control algorithms and audio effect algorithms.
Audio processing: Focusing on the output and intelligent amplification of voice and audio signals to achieve optimization of human-computer interaction and enhancement of acoustic scene comprehension.

Haptic perception: Simulating the function of nerve endings in human skin through mechanical sensors to achieve bio electric signal conversion and analysis of physical contac parameters.
Haptic processing: Simulating the function of mechanoreceptors in 、human skin through a network of mechanical sensors to achieve signal conversion and analysis of physical contact parameters, forming the capability for digital modeling of object surface properties and structural states.



Haptic simulation: Generating virtual mechanical stimuli through force/ vibration/ Temper ature feedback devices to create a haptic experience for human – computer interaction.
Haptic simulation processing: Haptic feedback technology relies on the precise control of linear motors by linear motor driver chips, converting digital commands into physical vibrations to achieve realistic haptic feedback.



Others: Taste, smell, etc.
Taste processing: Ion sensing and liquid chemical component identification for simple taste simulation; the current development of the taste processing technologies is slightly lagging.
Olfactory processing: Gas sensor arrays analyzing chemical components through machine learning. Applicable in fields such as industrial process control, Environmental protection, and medical diagnostics

Overview in Perceptual Intelligence Industry the PRC

Key Application Scenarios of Perceptual Intelligence

Consumer Electronics

- Consumer electronics scenarios include smartphones, smart home devices, smart displays,smart speakers, and smart wearables, where multi-modal perception technology is revolutionizing the interactive experience. In visual interaction, smartphones/tablets use cameras for face ID and gesture control; in auditory interaction, smart speakers achieve whole-house surround sound effects through high signal-to-noise ratio audio output, while VR devices combine 3D audio technology to create immersive spatial audio effects; in haptic interaction, smart wearables enhance the realism of virtual buttons and improve the immersion of human-computer interaction through haptic drivers.
- The market size of China's consumer electronics market was approximately RMB1,858.02 billion in 2024, and is expected to grow at a CAGR of 6.5% to RMB2,545.65 billion by 2029.

Intelligent Vehicle

- The intelligent vehicle scenario mainly refers to intelligent connected vehicles and autonomous vehicles, which, unlike traditional vehicles, have higher demands for intelligent experiences and interactive capabilities. The core demands are reflected in aspects such as immersion, interaction intelligence, and environmental adaptability. Visual perception, voice perception, and smart audio are core components, and the importance of sound is increasing. In 2024, the installation rate of in-vehicle audio interaction exceeded 80.0%, and it is becoming the second-largest interaction portal after the central control screen.
- The market size of China's intelligent vehicles market was approximately RMB922.17 billion in 2024, and is expected to grow at a CAGR of 8.0% to RMB1,354.97 billion by 2029.

Robotics

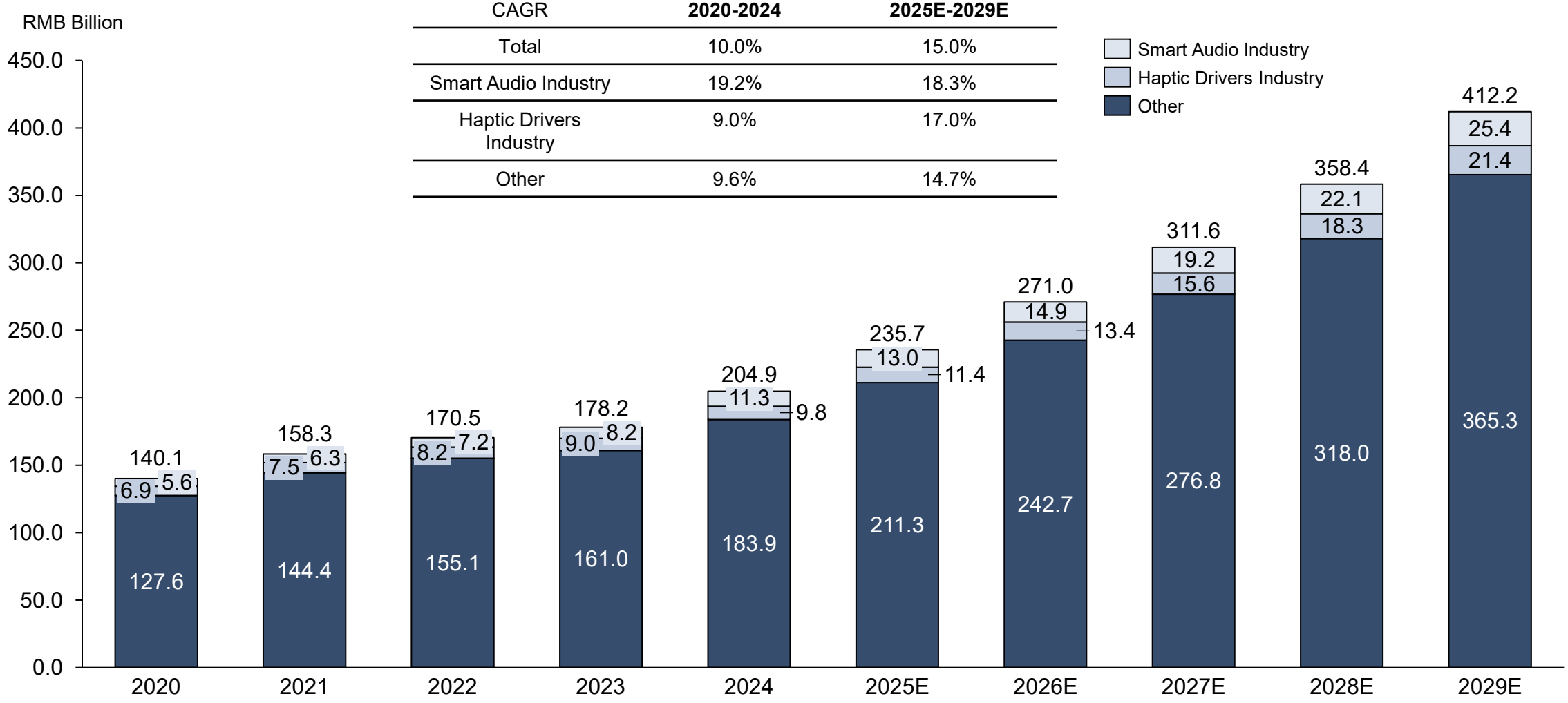
- Robotics scenarios include service robots and humanoid robots. In the era of embodied AI, humanoid robots and service robots are evolving from single-function devices into "intelligent agents" capable of deep interaction with the physical world. Among these, multi-modal perception and interaction technologies, such as visual sensors, voice recognition, and haptic feedback, collectively determine the accuracy of environmental perception, responsiveness, and the naturalness of human-robot collaboration. Among these, multi-modal perception and interaction technologies, such as visual sensors, voice recognition, and haptic feedback, collectively determine the accuracy of environmental perception, responsiveness, and the naturalness of human-robot collaboration.
- The market size of China's robotics was approximately RMB182.0 billion in 2024, and is expected to grow at a CAGR of 21.0% to RMB472.1billion by 2029.

Overview in Perceptual Intelligence Industry the PRC

Market size of Perceptual Intelligence Industry in China,2020-2029E

Market Size of Perceptual Intelligence Industry the PRC, 2020-2029E

CAGR	2020-2024	2025E-2029E
Total	10.0%	15.0%
Smart Audio Industry	19.2%	18.3%
Haptic Drivers Industry	9.0%	17.0%
Other	9.6%	14.7%



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Overview in Perceptual Intelligence Industry the PRC

Market size of Perceptual Intelligence Industry in China,2020-2029E

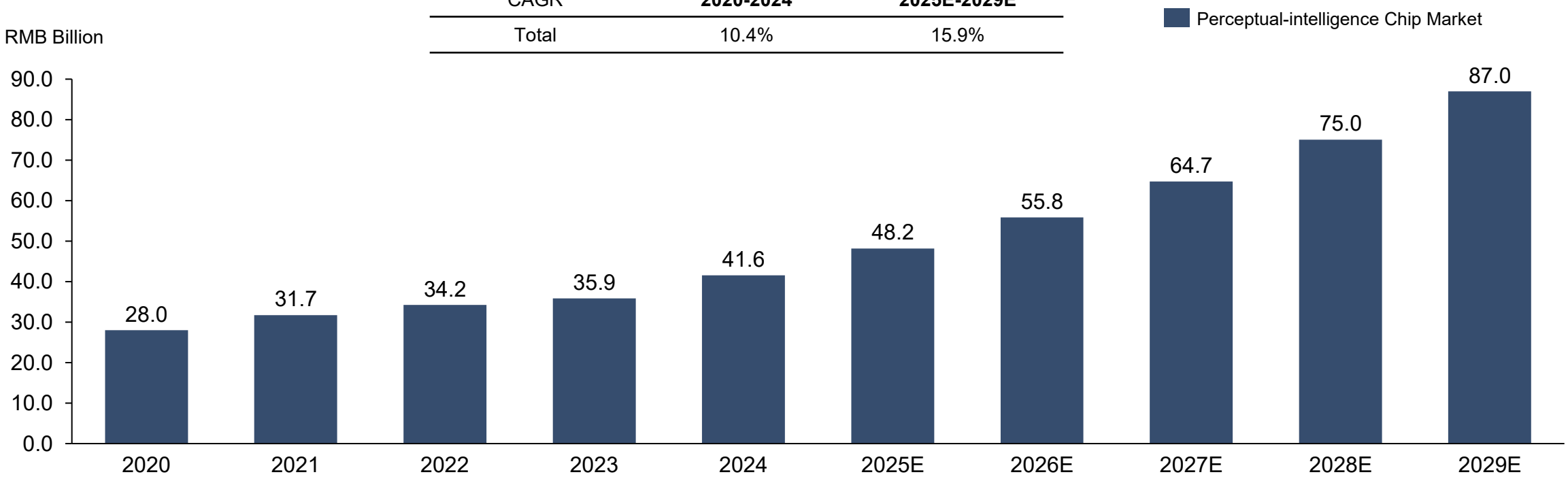
- The market size of China's perceptual intelligence industry grew from RMB140.05 billion in 2020 to RMB204.91 billion in 2024, with a CAGR of 10.0%. In the future, driven by technological advancements and market demand, and is projected to reach RMB235.65 billion in 2025 and grow at a CAGR of 15.0% to RMB412.15 billion by 2029.
- Among these, the smart audio market leads in growth, with its size increasing from RMB5.59 billion in 2020 to RMB11.27 billion in 2024, representing a CAGR of 19.2%. Driven by scenarios such as VR/AR, intelligent vehicles, and robotics, the market is projected to reach RMB12.96 billion in 2025 and RMB25.39 billion in 2029, with a CAGR of 18.3%.
- The haptic drivers market size grew from RMB6.91 billion in 2020 to RMB9.76 billion in 2024, with a CAGR of 9.0%. Driven by the accelerated domestic substitution and demand from intelligent cabins, the market size is projected to reach RMB11.42 billion in 2025, and grow at a CAGR of 17.0% to RMB21.42 billion by 2029. The Shipment Volume of its core technology, linear motor drivers, reached 300 million units in 2024 and is projected to grow at a CAGR of 38.0% to 1.53 billion units by 2029.

Overview in Perceptual Intelligence Industry the PRC

Market Size Analysis of Perceptual Chip Industry in China,2020-2029E

Market Size of Perceptual-intelligence Chip Industry in China, 2020-2029E

CAGR	2020-2024	2025E-2029E
Total	10.4%	15.9%



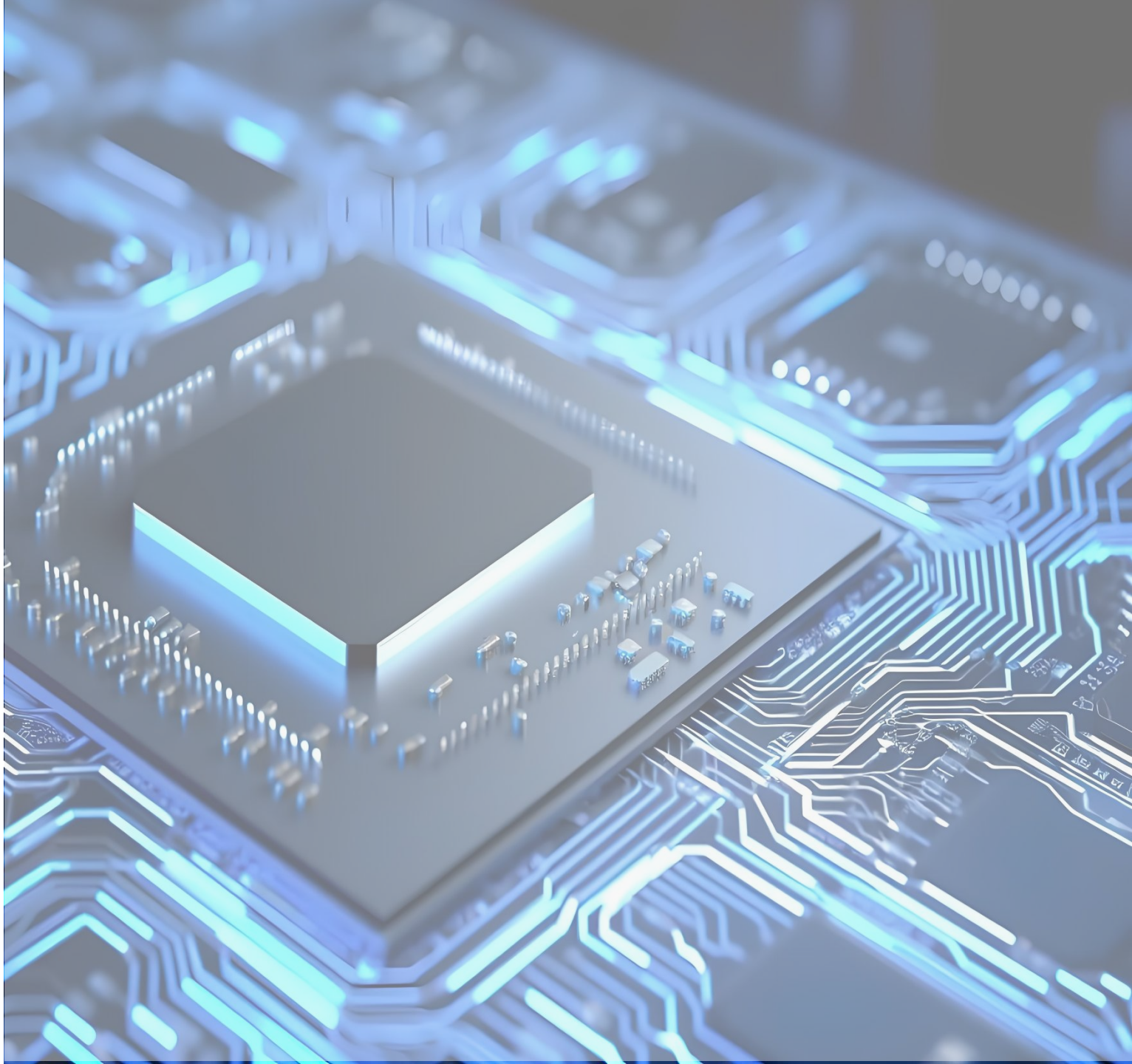
- Perceptual-intelligence chips, by integrating perception and processing algorithms, convert multi-dimensional environmental signals (such as visual, sound, tactile, olfactory, gustatory) into digital signals, forming the core hardware foundation of Perceptual Intelligence. The perceptual-intelligence chip industry is highly competitive and the industry is growing rapidly. The market size of China's perceptual-intelligence chip market has grown from RMB28.01 billion in 2020 to RMB41.56 billion in 2024, at a CAGR of 10.4%. In the future, as the level of intelligence in core downstream scenarios increases, the perceptual-intelligence chip market is projected to reach RMB48.17 billion in 2025 and grow to RMB86.99 billion by 2029, at a CAGR of 15.9%.

Overview in Perceptual Intelligence Industry the PRC

Development Trends of China's Perceptual Intelligence and Perceptual Chip Market

Expansion of AI Carrier Types	• Traditional devices such as smartphones and PCs are being upgraded into interaction cores by integrating AI operating systems, giving rise to new categories like AI phones and AI PCs. By 2029, global Shipment Volumes of AI phones are expected to exceed 900 million units, and the penetration rate of AI PCs is projected to surpass 70%. Meanwhile, hardware carriers are expanding from "single devices" to "all-scenario portals." The deep integration of AI and hardware is incubating innovative carriers like AI glasses and embodied AI robots. In the smart home and automotive sectors, the acceleration of intelligence and AI implementation means more devices will be equipped with sound, light, and haptic interaction capabilities.
Chips integrated with on-device AI algorithms	• The combination of signal processing, edge computing, and on-device AI is driving the continuous evolution of perceptual intelligence. Leading companies are embedding AI algorithms into edge modules to enable on-device analysis and real-time computational adjustments, significantly enhancing adaptability to various scenarios.
Multi-sensory fusion	• Single-modal analysis struggles to cope with complex scenarios. The industry is trending towards using AI algorithms to fuse multiple data sources (such as sound and light), building cross-modal feature fusion models to achieve technological interoperability and market integration across different senses. This gives companies focusing on a single sense the opportunity to participate in more markets.

Agenda



Overview of Power Amplifier Audio Chips Industry

Definition and Classification of Power Amplifier Audio Chips

Definition of Power Amplifier Audio Chips

- A power amplifier audio chip is a chip module based on mixed-signal design, with some or all of the following features: built-in or external supporting audio algorithms, digital interface input, built-in audio effect modules such as gain, equalizer, and dynamic range adjustment, and built-in voltage, current or load detection. These chips achieve efficient processing and optimized output of audio signals through technologies such as power control algorithms and audio effect algorithms. Its features include high performance, low power consumption, high integration, and smart control to meet the customization needs of downstream industries or products. Furthermore, due to their high performance and high integration, power amplifier audio chips are widely used in scenarios with high requirements for compact space and intelligence, such as consumer electronics (such as smartphones, tablets, smart wearables, smart displays, and smart speakers), intelligent vehicles (such as automotive audio systems, and in-vehicle displays), and robotics.

Classification of Power Amplifier Audio Chips

Low Power Audio Chips： Low Power audio chips are widely used in various consumer devices, including smartphones, tablets, smart wearables, and VR/AR devices, to maximize sound quality and volume within the constraints of compact speaker designs. With algorithms, low power audio chips accurately predict or measure the physical limits of a speaker (such as real-time power, membrane excursion speaker current and voltage, and speaker coil temperature). The chip's internal signal processing unit adjusts the signal output in real time to enable the speaker to operate in its optimal state, achieving maximum output without damaging the speaker and ensuring reliability. Furthermore, the accompanied audio enhancement and scene adaptive algorithms maximize the overall audio performance of devices. Compared to the traditional audio's operating principle of one-way transmission without feedback or algorithms, power amplifier audio chips can significantly improve audio performance.

Overview of Power Amplifier Audio Chips Industry

Definition and Classification of Power Amplifier Audio Chips

Classification of Power Amplifier Audio Chips

Low Power Audio Chips：

- **Smart Power Control（adaptive power control audio chip）Audio Chips：** adaptive power control audio chip refers to the process where the audio chip analyzes the customer's acoustic cavity structure through modeling and uses algorithms to dynamically adjust input and output signals in real time to match the acoustic environment. This enables the speaker to operate in an optimal and safe state. Meanwhile, the overall audio effect of the system is maximized through audio enhancement and scene adaptive algorithms.
- **Low Power Audio Chips:** Compared to the adaptive power control audio chip series, low power audio chip audio chip adds current and voltage sensing. By detecting the speaker's current and voltage in real time, the chip can detect and control the speaker more accurately, thus achieving a complete closed-loop system. At the same time, low power audio chip audio chip usually has higher output power and better analog performance, generally resulting in better audio effects.

Mid/high Power Audio Chips: Audio signal amplification and driver chips with an output power of over 10W convert audio signals into high-power output by controlling audio effect algorithms (such as dynamic range enhancement technology, power consumption reduction, and smart audio amplifier control) to drive speakers, addressing core needs like high-fidelity playback, low distortion, and high-volume output. Mid/high power audio chips are mainly used in devices such as smart displays, soundbars, and car audio systems.

- Among them, automotive-grade power amplifier audio chips are special high-power audio power amplifier chips specifically designed for in-vehicle environments. In intelligent vehicles, automotive-grade power amplifier audio chips are widely used in intelligent cabins, automotive infotainment system, AVAS (Acoustic Vehicle Alerting System) and T-BOX, among others. Through high-precision digital signal processing technology, they achieve stable output of high-fidelity sound, enhance the naturalness and reliability of human-computer interaction, and support a safe and comfortable driving experience. Automotive-grade amplifiers are required to have high reliability, high fault tolerance, and high stability. Automotive-grade power amplifier audio chips typically need to pass AEC-Q100 product certification to meet the demanding usage requirements of the complex and harsh in-vehicle environment.

Overview of Power Amplifier Audio Chips Industry

Definition and Classification of Power Amplifier Audio Chips

Representative Case Studies of Output-side Products

Company	Product	Output side support information	Application Scenarios
iFlytek	Speech Synthesis Chip	• Simulates human speech characteristics (volume, tone, rhythm, pauses) • Dynamically generates volume, intonation, and cadence variations • Auto-adjusts volume based on ambient noise • Optimizes sound output for different devices	• Bank smart teller machines • Automotive emergency voice alerts • Educational pronunciation devices
AAC Technologies	Rich Tap Haptic Engine	• Precisely replicates real-world tactile sensations (e.g., button clicks, water flow, metal vibrations) • Dynamically matches vibrations to on-screen content • Auto-adjusts intensity using environmental feedback	• Smartphone under-display fingerprint vibration feedback • Automotive steering wheel warning systems • Immersive haptic feedback for game controllers • AR glasses virtual touch interaction

Capability	Traditional Amplifier	Power Amplifier Audio Chip	Corresponding Policy
Scenario Adaptability	Fixed Gain Output	Dynamic Sound Field Modeling + Environmental Noise Suppression	"13th Five-Year Plan": "Cloud-Edge Interactive Integration"
Human-Like Expression	Mechanical Voice Output	Intonation & Cadence Control + Emotional Expression Output	Policy Objective: "Human-Like Language"

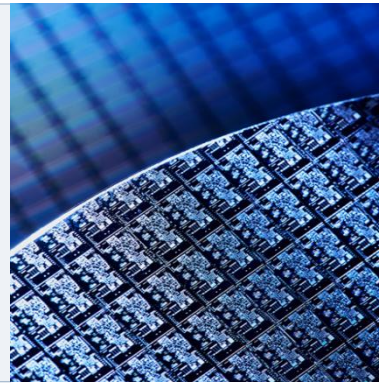
- The company's audio chips are classified as “smart” technology. These technologies include special computer instructions designed to enhance sound quality and protect speakers, a built-in digital signal processor (DSP), solutions capable of clearly processing various types of sound, methods to maintain sound clarity at any volume, and smart circuits specifically designed to protect speakers. With these technologies, the company's chips can automatically adjust based on actual conditions, consume extremely low power, actively protect speakers from damage, integrate multiple functions into a single chip, and deliver significantly superior audio quality.

Overview of Power Amplifier Audio Chips Industry

The Key Technology of Power Amplifier Audio Chips

Integration Process

- **Flip chip packaging:** The active surface of the chip is faced downward and directly interconnected with the substrate through solder balls. This configuration features an extremely short signal path, reducing parasitic parameters, making it suitable for high-frequency signal transmission (such as audio signals), and offers excellent heat dissipation (with thermal resistance reduced by 30% - 50%). The solder ball array enables high pin density.
- **3D Packaging：** Adopting a multi-layer stacking architecture, it realizes interlayer connection through Through-Silicon Vias (TSVs) or micro-bumps. This reduces the volume by 40%-60%, allows mixed integration of chips with different processes, has ultra-low interconnection delay (<1 ns), and supports high - speed parallel processing.
- **Wafer-Level Packaging (WLP)：** Packaging is completed before wafer dicing, and the Redistribution Layer (RDL) process is used for wiring. The packaging size is extremely small (nearly the size of the bare die, and can be thinner than 0.3 mm). Wafer-level batch processing reduces costs and improves yield, while the lead-free structure shows strong resistance to high - frequency vibration.



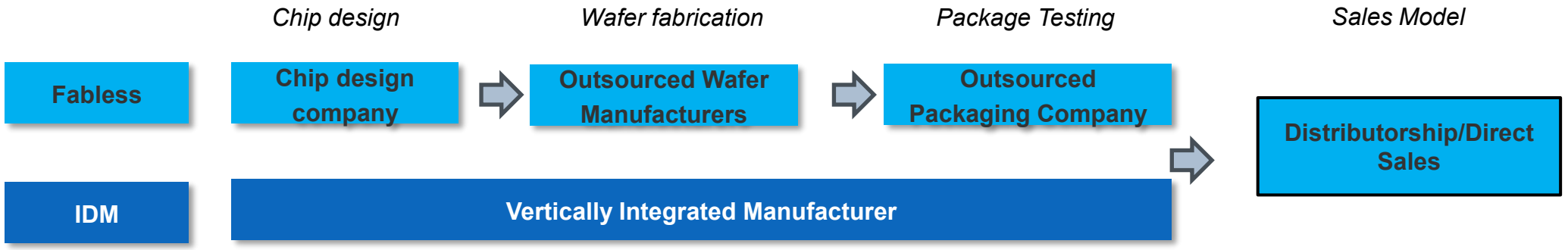
Key Technology

- **Smart amplifier protection control circuits and algorithms：** Smart amplifier protection control circuits and algorithms integrate advanced real-time monitoring and protection mechanisms into audio amplifier systems to ensure optimal performance, reliability, and longevity. This technology employs intelligent circuits and adaptive algorithms to continuously track critical parameters such as temperature, current, voltage, and load impedance. By dynamically adjusting operational thresholds and mitigating risks like overheating, overcurrent, or short circuits, it safeguards both the amplifier and connected audio components (e.g., speakers) from damage under extreme conditions.
- **High-Performance Audio DACs and ADCs：** This technology encompasses cutting-edge DACs and ADCs engineered to deliver ultra-precise signal conversion for high-fidelity audio reproduction and capture. The DACs transform digital audio signals into analog outputs with exceptional clarity, while the ADCs accurately digitize analog inputs, preserving nuanced details across the entire audio spectrum.
- **High-efficiency PWM Modulation:** This technology optimizes power conversion in audio amplifier systems by precisely controlling pulse-width modulation signals to minimize energy loss and maximize output efficiency. It dynamically adjusts switching frequencies and duty cycles to maintain high-fidelity audio reproduction while reducing heat generation and power consumption.
- **High-reliability, High-voltage, High-power, Low-EMC Driver Technology:** Delivering robust and precise control over high-voltage, high-power audio amplification systems while minimizing electromagnetic interference, this technology integrates advanced circuit design and adaptive algorithms to manage extreme electrical loads, ensuring stable performance in demanding environments.
- **Ultra-low-power Circuits:** Ultra-low-power circuits minimizes energy consumption in audio amplifier systems while maintaining robust performance, enabling extended battery life and sustainable operation in power-constrained environments.

Overview of Power Amplifier Audio Chips Industry

Analysis of the Business Model of the Power Amplifier Audio Chip Market

- The power amplifier audio chip industry primarily has two operating models: Fabless, IDM, and design service models.
- **The Fabless model (Fabrication-Less)** refers to a model where a company focuses on chip design and sales, while outsourcing production processes like wafer fabrication, packaging, and testing to specialized foundries and packaging/testing companies. They have strong in-house design capabilities and their production collaborations are not limited by their own production lines, production capacity is more resilient, allowing for more flexible market responses.
- **The IDM (Integrated Device Manufacturer) model** refers to a model where a company handles all stages of the industry chain, from chip design, manufacturing, packaging, and testing to product sales. Due to its asset-intensive nature, few companies in the industry adopt this model, which is more common among large overseas integrated manufacturers.
- **The design service model (also known as the virtual IDM model)** is an intermediate model between Fabless and IDM. In this model, the company focuses on chip integration design using third-party technologies, does not own its own wafer production lines, and relies mainly on external IP, completing production and delivery through collaboration with third-party suppliers.
- The figure below lists the main differentiating dimensions of the three major business models:



Overview of Power Amplifier Audio Chips Industry

Characteristics of the Power Amplifier Audio Chips Market

Application Scenario Customization and Rapid Iteration	• Power amplifier audio chip manufacturers provide differentiated solutions based on the pain points of different scenarios relating to requirements through functional integration and process optimization. For example, in intelligent vehicle cabin scenarios, automotive-grade power amplifier audio chips are used to provide maximum power and drive multiple high-impedance speaker units, offering multi-channel audio processing capabilities that support active noise cancelation and surround sound. Due to the rapid updates in power amplifier audio chip technology, customization and iteration capabilities are an importan competitive dimension in the industry. The annual iteration rate of power amplifier audio chips exceeds 30%, and companies lacking customization capabilities will lose opportunities to secure customers due to excessively long development cycles.
Prevalence os	• Due to the wide range of downstream applications, distributors typically play an important role in the sales process of power amplifier audio chips. Through distributor networks, power amplifier audio chip companies can reach dispersed end customers and reduce sales costs. The distributorship system plays an irreplaceable role for power amplifier audio chip companies in terms of regional coverage, product delivery, logistics optimization, inventory buffering and responsiveness to small-batch orders.

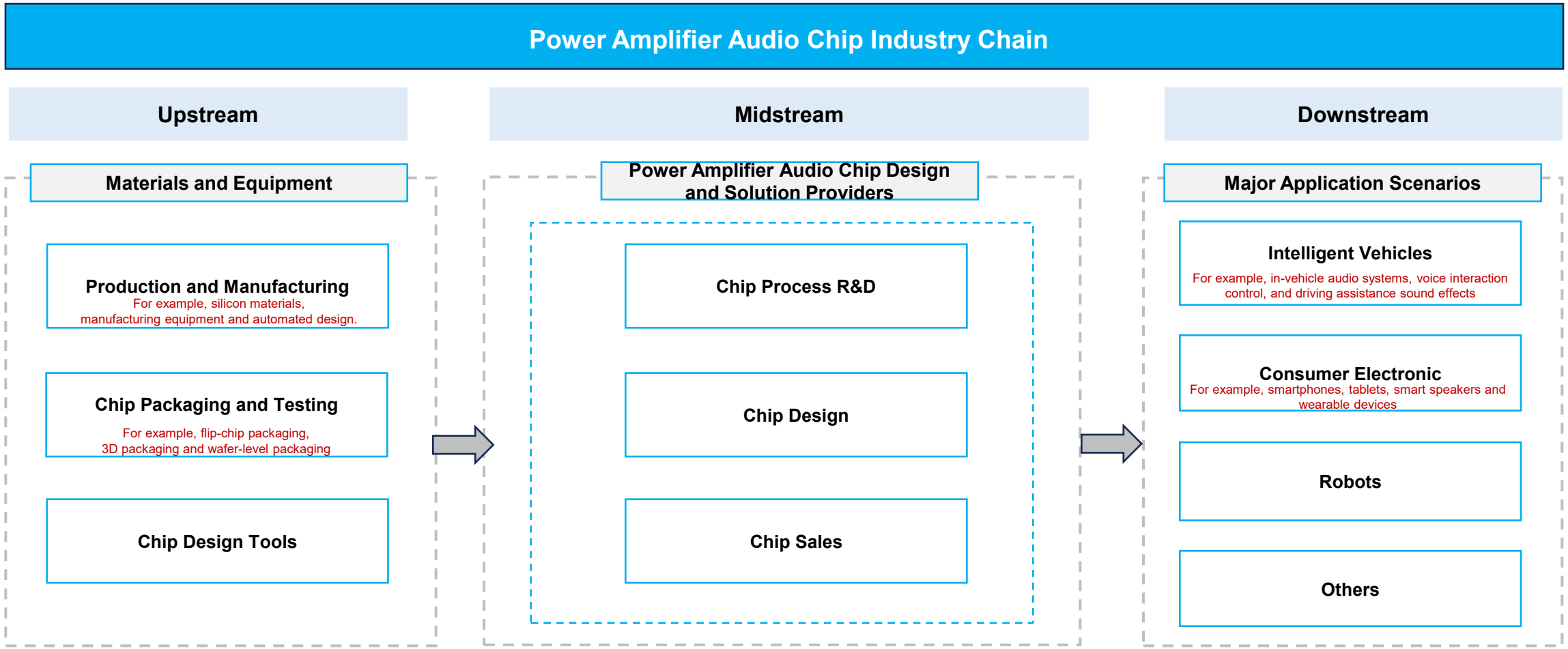
Overview of Power Amplifier Audio Chips Industry

Analysis of Laws, Regulations and Industry Policies in the China Power Amplifier Audio Chip Market

Number	Name of Regulations	Release time	Document-Issuing Agency	Main Content
1	《Guidelines on Promoting the Work of Strengthening Enterprises through Skills Development》	2025.1	The Ministry of Human Resources and Social Security and other eight departments	Support the cultivation of digital talents in enterprises, focusing on the development of new digital occupations in areas such as big data and artificial intelligence.
2	《Notice on Promoting Non-Bank Financial Institutions to Support Large-Scale Equipment Upgrades and Used-Product Exchange Programs for Consumer Goods》	2024.9	National Financial Supervisory Administration	Encourage the upgrading and renovation of industry equipment, support financial companies in innovating business models such as the first-of-a-kind equipment and integrated circuit equipment, and enhance the ability to support industrial upgrading and advanced manufacturing.
3	《Implement and carry out the "National Standardization Development Outline"》	2024.3	The State Administration for Market Regulation, the Cyberspace Administration of China, and other relevant departments	Strengthen efforts in researching key technical standards, focusing on areas such as integrated circuits, artificial intelligence, and intelligent connected vehicles, and accelerate the development of core standards.
4	《Implementation Opinions on Promoting Future Entrepreneurship and Innovation Development》	2024.1	Seven departments including the Ministry of Industry and Information Technology	Promote the upgrading of advanced materials, develop key materials such as high-performance carbon fibers and semiconductors, and accelerate the application of cutting-edge innovations in areas like superconductors.
5	《Electronic Information Manufacturing Industry in 2023》	2023.8	Ministry of Industry and Information Technology, Ministry of Finance	Improve the standard system for electronic components, semiconductors, integrated circuits, etc., and accelerate the formulation and implementation of key standards.
6	《Guidelines on Promoting the Development of the Energy Electronics Industry》	2023.1	The Ministry of Industry and Information Technology and six other departments	Accelerate the promotion of semiconductor devices in fields such as new energy vehicles and rail transportation, and promote the application of new types of semiconductors in scenarios like smart cities and smart homes.
7	《Intelligent Vehicle Innovation Development Strategy》	2020.2	The National Development and Reform Commission of the People's Republic of China and 11 other departments	By 2025, a complete Chinese standard intelligent vehicle system covering technological innovation, industrial ecosystem, regulations and standards, and cybersecurity will be basically established. Conditional autonomous driving vehicles will achieve large-scale production, and highly autonomous driving vehicles will be commercially applied in certain scenarios.
8	《promoting the high-quality development of the integrated circuit industry and software industry in the new era》	2020.1	State Council	Provide comprehensive support in terms of taxation and funds to promote the high-quality development of the integrated circuit and software industries, and encourage innovation in downstream applications (such as consumer electronics and intelligent vehicles)

Overview of Power Amplifier Audio Chips Industry

Analysis of the Industrial Chain of China's Power Amplifier Audio Chip Market（1/2）



Overview of Power Amplifier Audio Chips Industry

Analysis of the Industrial Chain of China's Power Amplifier Audio Chip Market（2/2）

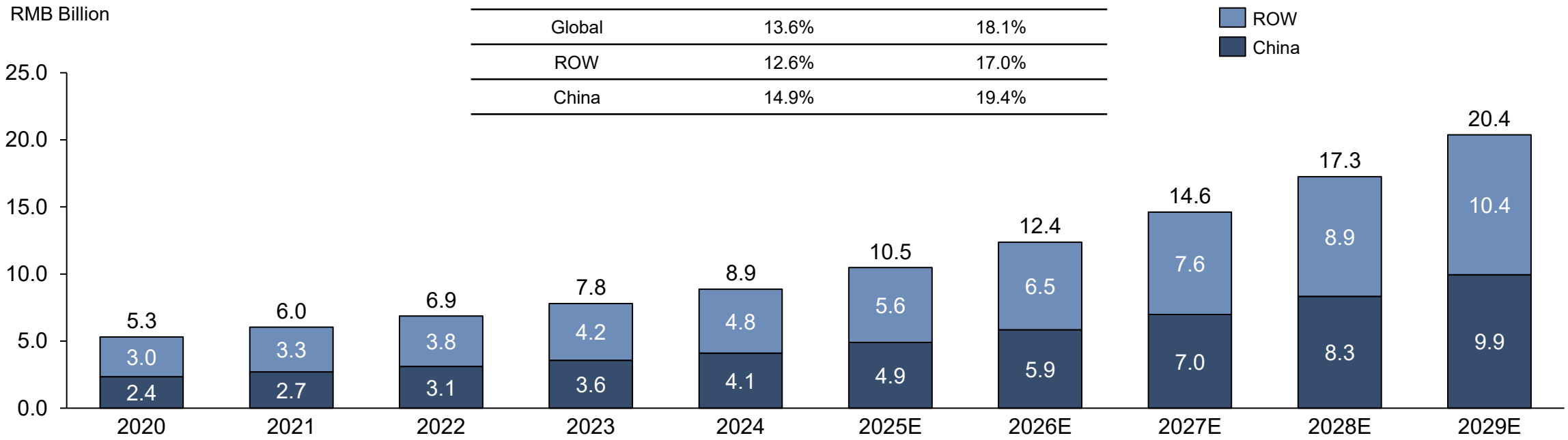
- Chips are one of the "Four Foundations" of industry, and power amplifier audio chips are a key category therein. Their industry chain can be divided into upstream, midstream, and downstream
- The upstream of the power amplifier audio chip industry mainly includes wafer fabrication, chip packaging and testing, and chip design tools, which provide the necessary technological foundation and manufacturing prerequisites.
- The midstream consists of chip design and sales companies, which complete chip R&D, design, and sales based on their innovative R&D capabilities and accumulated professional knowledge.
- Downstream is distributed across scenario domains such as consumer electronics, Intelligent vehicles, and robotics. The diversity of downstream demand drives power amplifier audio chip design and manufacturing companies to establish comprehensive product libraries to meet the needs of different customers.

Overview of Power Amplifier Audio Chips Industry

Analysis of the Market Size of Power Amplifier Audio Chip Market, 2020-2029E

Global Power Amplifier Audio Chip Market Size，2020-2029E

CAGR	2020-2024	2025E-2029E
Global	13.6%	18.1%
ROW	12.6%	17.0%
China	14.9%	19.4%



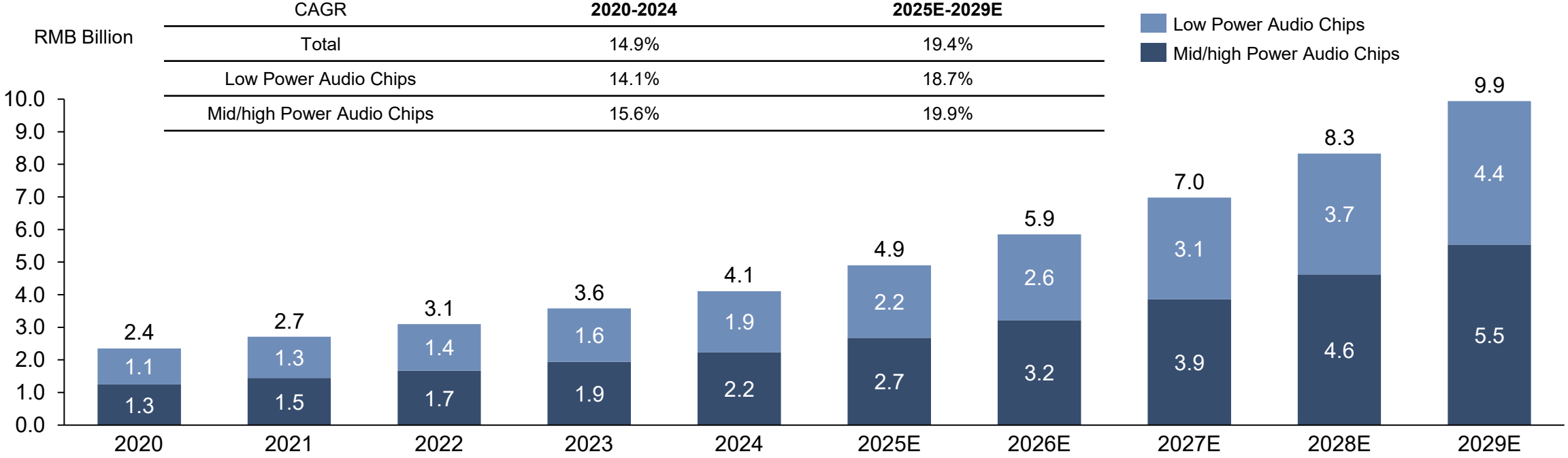
- In recent years, the market size of the global power amplifier audio chip industry has continued to grow. In terms of total revenue, the global power amplifier audio chip market size grew from RMB5.3 billion in 2020 to RMB8.9 billion in 2024, with a CAGR of 13.6% during the period. Driven by technological advancements and the further expansion of downstream applications, the global power amplifier audio chip industry is expected to reach RMB20.4 billion by 2029, with a CAGR of 18.1%.
- Among which, driven by the strong demand from the consumer electronics and smart car industries, China's power amplifier audio chip market is growing faster than the global market. In terms of total revenue, the power amplifier audio chip market size in China grew from RMB2.4 billion in 2020 to RMB4.1 billion in 2024, with a CAGR of 14.9%. Driven by technological advancements and the further expansion of downstream applications, the market size of China's power amplifier audio chip industry is expected to grow steadily to RMB9.9 billion by 2029, with a CAGR of 19.4%.

Overview of Power Amplifier Audio Chips Industry

Analysis of the Market Size of China's Power Amplifier Audio Chip Market, 2020-2029E

Market Size of China's Power Amplifier Audio Chip Market (By Product Type), 2020-2029E

CAGR	2020-2024	2025E-2029E
Total	14.9%	19.4%
Low Power Audio Chips	14.1%	18.7%
Mid/high Power Audio Chips	15.6%	19.9%



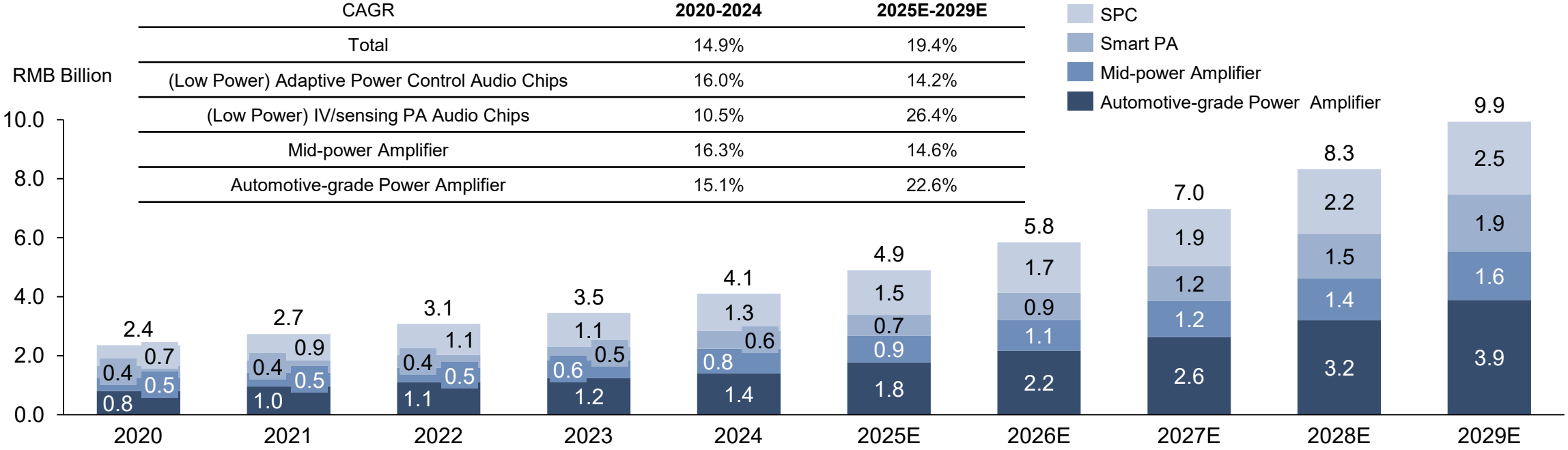
- The market size of China's power amplifier audio chip market can be mainly divided into the markets for low power audio chips and Mid/high Power Audio Chips. The market size for low power audio chips grew from RMB1.1 billion in 2020 to RMB1.9 billion in 2024, with a CAGR of 14.1% during the period. With the deepening of AI applications in consumer electronics and the upgrading of audio solutions, growth is expected to accelerate in the future, reaching RMB4.4 billion by 2029, with a CAGR of 18.7% from 2025 to 2029.
- Driven by the continuous growth in the use of in-vehicle speakers and the surge in demand for AI tuning, Mid/high power audio chips have shown higher growth potential. The market size grew from RMB1.3 billion in 2020 to RMB2.2 billion in 2024, and is expected to further grow at a CAGR of 19.9% to RMB5.5 billion by 2029.

Overview of Power Amplifier Audio Chips Industry

Analysis of the Market Size of China's Power Amplifier Audio Chip Market, 2020-2029E

Market Size of China's Power Amplifier Audio Chip Market (By Product Type), 2020-2029E

CAGR	2020-2024	2025E-2029E
Total	14.9%	19.4%
(Low Power) Adaptive Power Control Audio Chips	16.0%	14.2%
(Low Power) IV/sensing PA Audio Chips	10.5%	26.4%
Mid-power Amplifier	16.3%	14.6%
Automotive-grade Power Amplifier	15.1%	22.6%



- The total market for China's power amplifier audio chip industry is expected to grow from RMB 2.4 billion in 2020 to RMB 4.1 billion in 2024 at a CAGR of 14.9%; it is projected to reach RMB 4.9 billion in 2025 and will expand at a CAGR of 19.4% to RMB 9.9 billion in 2029.

Overview of Power Amplifier Audio Chips Industry

Drivers of China's Power Amplifier Audio Chip Market

Rapid Upgrade in Demand for Audio Interaction in Consumer Electronics	• As the demand for intelligent voice interaction in consumer electronics increases, there is a need for simultaneous enhancement of technologies like power amplifier audio chips and audio power control algorithms. For example, smartphones use low power audio chip to achieve precise speaker control, high-power output, heat dissipation, and electromagnetic interference suppression, ensuring sustained performance in compact, high-power-density environments.
Upgraded Demand for Audio Quality in Display Devices	• The trend of integrating audio and display is becoming more prominent. Display devices are evolving from simple video outputs to smart terminals that provide high-quality audio-visual and interactive experiences, driving the growth of the power amplifier audio chip market that supports high-end audio experiences. In 2024, the global Shipment Volume of power amplifier audio chips used in smart displays was approximately 90.0 million units. It is projected to continue expanding at a CAGR of 12.0%, reaching a Shipment Volume of 160.0 million units by 2029. In 2024, the Shipment Volume of China's domestically produced power amplifier audio chips for smart displayswas approximately 45.0 million units. With the replacement and wide penetration of domestic products in smart displaydevices, it is projected to continue expanding at a CAGR of 15.0%, with Shipment Volumereaching 90.5 million units by 2029.
Upgrade of In-vehicle Audio Software and Hardware Configuration	• In 2024, audio systems have begun to be deeply involved in the integration of various functions of the intelligent cabin, such as music recommendations and audio-visual-electrical linkage. The application of multi-channel audio systems has become more widespread, including more overhead speakers and subwoofer configurations. The mainstream in-vehicle speaker configurations in the market have gradually upgraded from around 4 speakers to 15 or more in 2024, and it is expected that more and more vehicle models will be equipped with over 20 speakers in the future. At the same time, the increase in automotive safety requirements has driven market expansion, for instance, the requirement to install AVAS to emit warning sounds while driving to ensure pedestrian safety, and the integration of T-BOX with audio systems to realize vehicle monitoring and intelligent communication functions. At the same time, customized tuning and AI audio algorithms are continuously driving industry upgrades. The ability to automatically adjust audio effects based on user preferences and the current environment through AI algorithms has become a key area of competition.

Overview of Power Amplifier Audio Chips Industry

Development Trends in China's Power Amplifier Audio Chip Market

Migration of Power Amplifier Audio Chips towards Signal Chain

- Power amplifier audio chips in China are accelerating their migration towards signal chain, breaking through the limitations of audio processing and extending towards full-chain capabilities in signal acquisition, conversion, transmission, and processing. Intelligent cabin audio solutions, on the other hand, integrate high-precision operational amplifiers and sensor interfaces to simultaneously process voice commands and in-cabin acoustic data, supporting multi-modal interaction and forming a complete in-vehicle signal chain ecosystem. Leading power amplifier audio chip manufacturers, with their accumulated full-chain technologies in design, integration, and algorithms, are capable of expanding their business into the signal chain field.

Cost Trends

- The cost structure of power amplifier audio chips is mainly composed of wafer fabrication, packaging and testing, and design tool licensing. To reduce overall costs, companies are gradually adopting various cost-reduction measures, such as implementing tiered wafer cost control through a mixed-process strategy (e.g., locking in the mature 0.18μm BCD process for low-end products, while using 90nm/65nm processes with optimized layouts for mid-to-high-end products), which can reduce the cost per transistor by 30%−35%; shortening R&D cycles and reducing design verification costs by 70% by designing key IP in-house and reusing IP (maximizing the use of validated IP), ensuring a high success rate for development; amortizing small-batch production costs through multi-project wafer (MPW) technology, with single designs costing only 5%−10% of a full mask; additionally, companies reduce procurement costs by signing long-term agreements with foundries and packaging and testing vendors to lock in production capacity and prices; in the testing phase, cooperating.

Overview of Power Amplifier Audio Chips Industry

Analysis of Driving Factors in the Power Amplifier Audio Chip Market — Consumer Electronics Scenarios

Consumer Electronics Scenario: The Implementation of Edge AI, Increase in Voice Interaction, and Growth in the Number of Audio - Equipped Devices

- Edge AI is a way to implement artificial intelligence applications, focusing on sinking AI capabilities to the device side, reducing dependence on cloud services, thus achieving faster response speeds, better privacy protection, and lower network requirements. In 2024, the market size of China's edge AI was 306.36 RMB billion. It is predicted that by 2029E, its market size will reach 3013.22 RMB billion, with a compound annual growth rate of 58%. Technological progress and the emergence of edge computing are the driving factors for the development of the edge AI industry. In the future, edge AI will be combined with cloud AI for use as hybrid AI. The adoption of hybrid AI can achieve cost - effectiveness, energy efficiency, performance improvement, privacy protection, enhanced security, and personalized services on a global scale.

Implementation of Edge AI	• The market size of China's edge AI in 2024 was RMB306.4 billion. Before 2024, edge AI technology had been implemented and applied in multiple fields. And with the development of AIGC and cloud computing technologies, the supercomputing market is expected to usher in new growth.
Increase in Voice Interaction	• Since 2023, AI phones and AI PCs have started to emerge. The huge market demand for both will support the rapid development of the edge AI industry in the future. Among them, AI phones can achieve faster image processing, voice recognition, and natural language processing functions by integrating NPU or AI accelerators, and then provide richer intelligent services, such as intelligent assistants, real - time translation, health monitoring, etc., increasing voice interaction and greatly enhancing the user experience. The application of edge AI will continue to expand to new fields, such as smart homes, health care, and industrial automation.
Growth in the Number of Audio-Equipped Devices	• In 2025, the global Shipment Volume of personal smart audio devices will reach 533 million units, a year-on-year growth of 8%. Combined with the hardware-level upgrades brought by the improvement of interaction demand, the acoustic hardware industry chain welcomes the opportunity of simultaneous growth in volume and price, and the number of audio - equipped devices will continue to increase.

Overview of Power Amplifier Audio Chips Industry

Analysis of Driving Factors in the Power Amplifier Audio Chip Market — Consumer Electronics Scenarios

Requirements for Interaction Capabilities with the Physical World for Consumer Electronic Products

- The consumer electronics field includes smart speakers, TWS earphones, smart wearable devices, etc. Their core functions include audio power amplification, noise reduction, etc. There is a higher requirement for audio chips to have a high signal-to-noise ratio and small-size technology to ensure the clarity and integration degree of sound power amplification. The audio processing requirements of consumer electronic products are evolving from “being audible” to “being understandable, accurately distinguishable, and naturally integrated”. Technology is the core driving force for the continuous development of the audio industry. With the development of audio technology, the improvement of audio-visual clarity, the enhancement of audio spatial perception, the improvement of audio transmission stability, and the enrichment of audio content acquisition methods, audio products are promoted to be updated and iterated, realizing the accurate capture, intelligent analysis, and scenario-based response of sound signals in the physical world, and ultimately building a more immersive, safe, and healthy human-machine interaction experience.

Hardware Capability Matching and Enhancement	• The improvement of AI interaction capabilities requires a matching enhancement of hardware capabilities. In the AI era, audio terminals such as earphones are not just audio playback devices. They will add audio functions, eliminate noise, and improve sound quality, becoming important media for human-machine interaction. The systematic upgrade of hardware capabilities essentially reconstructs the “sensory nervous system” of earphones. Breakthroughs in performance thresholds of traditional devices are needed in both signal acquisition and information processing.
Signal Acquisition with High Signal-to-Noise Ratio	• AI-driven active noise reduction and voice interaction rely on high-precision sound field modeling. Earphones with a high signal-to-noise ratio can support interaction in noisy environments, expand application scenarios, and improve the user experience. The compound annual growth rate of MEMS microphones with a signal-to-noise ratio higher than 64dB in the consumer field will reach 8.7%. It is predicted that the sales volume will be nearly 3.5 billion units by 2029E.
Information Processing with High Computing Power and Low Power Consumption	• AI-driven real-time audio processing puts forward new requirements for computing power, which need to break through the capability boundaries of traditional DSP. For example, integrating an NPU to improve energy efficiency. At the same time, the improvement of computing power also requires a simultaneous reduction in power consumption to ensure battery life.

Overview of Power Amplifier Audio Chips Industry

Analysis of Driving Factors in the Power Amplifier Audio Chip Market — Smart Vehicles Scenarios

Application Scenarios of Smart Vehicles: Popularization of Smart Cockpits, Upgrade of Sound Solutions, and Localization

- With the development of China's new energy vehicles driving the growth in demand for automotive-grade audio chips, the upgrade of smart cockpits promotes the development of audio chips towards high-quality sound and intelligent noise reduction. Domestic chips, leveraging their cost - performance advantages, are accelerating the replacement of imported ones, and their market share is continuously increasing.

Popularization Rate of Automotive Smart Cockpits	• Driven by the rapid development of the domestic new energy vehicle market, the automotive-grade audio chip industry has broad prospects. The penetration rate of global smart cockpits is continuously increasing and will maintain stable growth in the next few years. Meanwhile, domestic audio chips, with their high cost-performance advantages, are expected to gradually break the market monopoly of international manufacturers.
Upgrade of Sound Solutions	• Chinese power amplifier audio chips are rapidly moving towards intelligence. The new generation of intelligent algorithm technology will integrate higher-level intelligent perception and adaptive processing capabilities. Relying on AI algorithm technology, it will achieve high-precision sound field modeling, dynamic noise suppression, and multi - sound source positioning.
Localization	• Domestic audio chips, leveraging their high cost-performance advantages, are accelerating the replacement of imported products, driving the continuous improvement of the localization rate of China's smart car chips. Their market share is expected to further expand in the future.

Overview of Power Amplifier Audio Chips Industry

Analysis of Driving Factors in the Power Amplifier Audio Chip Market — Smart Vehicles Scenarios

Requirements for Interaction Capabilities with the Physical World Put Forward by Intelligent Vehicles and Intelligent Re - aggregation

- Smart vehicles audio technology is evolving from basic voice recognition and synthesis functions to more complex directions such as noise reduction, sound field management, multi-modal interaction, and personalized experience. In the future, with the continuous progress of AI, DSP chips, and large-model technologies, the audio interaction systems of intelligent vehicles will become more intelligent, immersive, and humanized, bringing users a more natural, convenient, and comfortable intelligent travel experience.

Sound Field Management and Sound Effect Enhancement	• Automotive audio frequency dividers will place more emphasis on refined adjustment and optimization. In terms of filtering technology, future audio frequency dividers will adopt more advanced digital filtering algorithms to achieve high-precision separation and processing of audio signals, reducing interference and distortion between signals, and improving the clarity and sense of hierarchy of sound.
High-Precision Voice Recognition and Noise Reduction	• The smart cockpit audio system, through innovative AI and large-model voice pickup and noise reduction technologies, uses advanced front-end processing algorithms to effectively suppress environmental noise, greatly improving the clarity of in-vehicle calls and the accuracy of voice interaction. At the same time, the system uses intelligent audio processing technology to optimize sound quality and sound effects. It can not only provide a personalized independent sound zone experience for each seat but also create an immersive shared sound field through multi-channel surround technology to meet audio needs in different scenarios.
Multi-Modal Interaction	• The voice interaction of the smart cockpit will deeply integrate multi-modal technologies, achieving more intuitive operations through “visible-to-speak”. The system combines face/voiceprint recognition to automatically retrieve personalized settings, uses eye tracking and gesture recognition to capture user intentions, and cooperates with an emotion engine to achieve anthropomorphic dialogue. This multi-modal integration can enhance the naturalness of interaction, predict needs through situational perception, and create a seamless intelligent experience.

Overview of Power Amplifier Audio Chips Industry

Analysis of Driving Factors in the Power Amplifier Audio Chip Market — Robots Scenarios

Robot Scenario: Requirements for Physical Intelligence Robots' Language Interaction

- In embodied AI, audio amplification and tactile motor drivers form critical modules enabling precise perception and dynamic human-robot interaction. These systems require tight integration of environmental sensing, real-time decision-making, and physical action execution, extending beyond conventional NLP to demand contextual awareness, multimodal coordination, and actionable response capabilities for seamless "understanding-interaction-execution" loops.

Audio Power Amplifier interaction	• Digital power amplifier chips, as a key functional module of intelligent audio chips, are specifically responsible for efficiently amplifying audio signals. Through digital processing technology, they enhance the sound quality and energy efficiency of devices such as smart screens, significantly improving the audio experience. For instance, in service robots in public places, directional beam speakers are deployed. Through audio amplifier technology, voice information is projected to target users within 5 meters, avoiding interference in the public area sound field and increasing the accuracy of information transmission from 76.0% to 94.0%.
Perception accuracy and dynamic response	• The perception system consists of modules such as image recognition, depth perception, and tactile feedback. Common technologies include CNN, SLAM, and laser radar. The embodied perception module utilizes sensor technology to collect information from the physical world; the embodied imagination module combines an object knowledge base and simulation construction engine, and uses principles of computer graphics and robotics to model and simulate the environment, generating action plans.

Overview of Power Amplifier Audio Chips Industry

Analysis of Driving Factors in the Power Amplifier Audio Chip Market — Robots Scenarios

Audio Chip Penetration Rate

- The global robot market is expected to reach 55.23 RMB billion by 2025 and will further expand to 212.18 RMB billion by 2029. More robots will be produced and applied, creating conditions for the integration of audio chips, which is conducive to increasing their penetration rate. For example, humanoid robots need to use audio chips for voice interaction to understand human instructions and respond. Moreover, many chip companies have actively entered the robot field, indirectly reflecting the growth trend of the penetration rate of audio chips in robots.

The Requirement for Multimodal Fusion of Robots

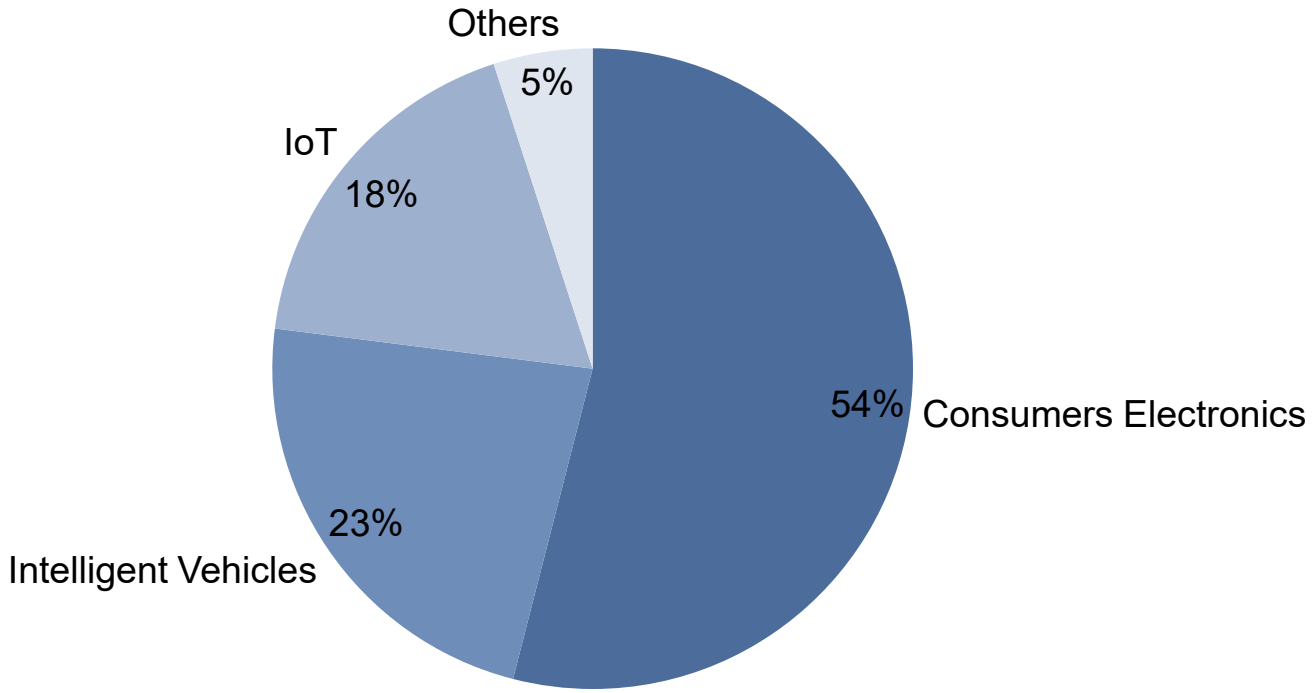
- Robot multimodal fusion refers to the process of integrating information from various sensory modalities (such as vision, hearing, touch, etc.) to enhance the robot's perception of the environment, interaction efficiency, and task execution accuracy. This technology holds significant importance in the fields of artificial intelligence and robotics, especially in autonomous decision-making and human-robot interaction in complex environments.

Tactile Simulation	• Tactile simulation enables robots to perceive and respond to human tactile inputs, enhancing the quality of interaction between robots and humans as well as the "intelligent" perception level for humans. These methods can be used individually or in combination to achieve different forms of human-robot interaction, such as voice commands and visual gestures, thereby realizing a more natural interaction experience.
Environmental perception and navigation	• Sound localization is an important function of the auditory system of mobile robots, and it can also be applied in teleconferencing systems to guide their cameras to automatically capture the facial images of the speakers. In practical applications, sound localization is usually carried out in reverberant environments. Robots can identify the sources of sounds in the environment and use this information for navigation. Moreover, audio can also be used for obstacle detection and environmental modeling to enhance the autonomy of robots in complex environments.

Overview of Power Amplifier Audio Chips Industry

Analysis of Market Share of Power Amplifier Audio Chips and Haptic Feedback Drivers in Downstream Applications

Market Share of Power Amplifier Audio Chips and Haptic Feedback Drivers in Downstream Applications

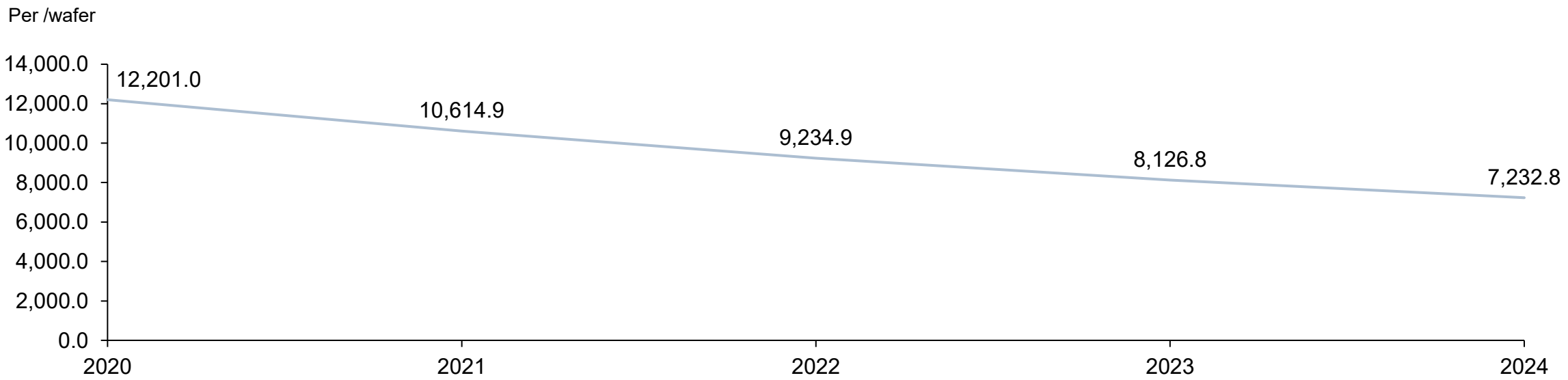


- Since 2023, the unit price of the products has declined, but the application proportion of power amplifier audio chips and haptic feedback drivers in the downstream consumer electronics market has reached 54%. This indicates that the company's products still have a considerable market demand in the consumer electronics field.

Overview of Power Amplifier Audio Chips Industry

Major Cost and Price Trends in the Power Amplifier Audio Chip Industry (1/3)

Average Price Trend of Wafers in China, 2020-2024

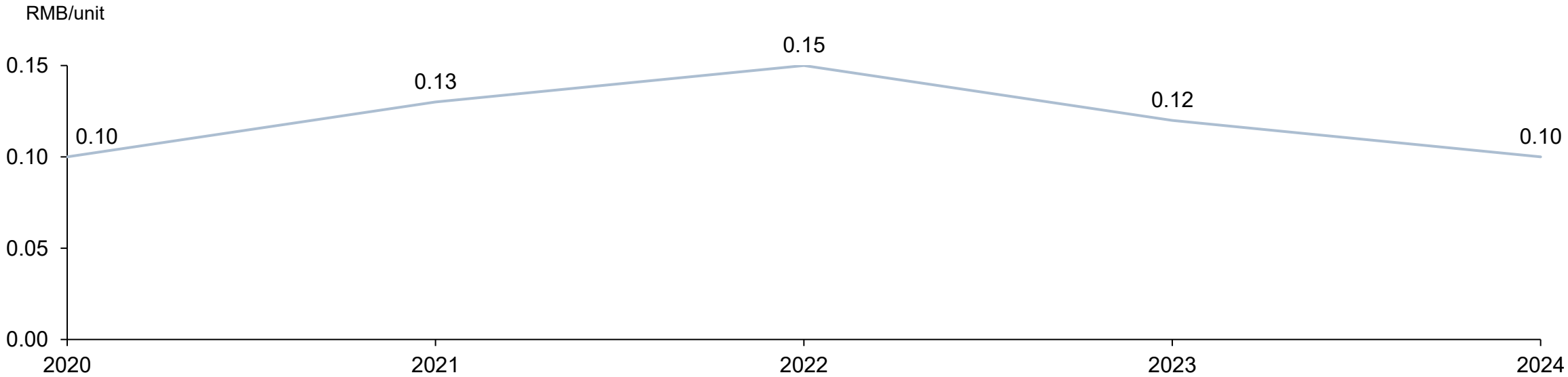


- The main costs of power amplifier audio chips are composed of wafer fabrication, packaging and testing, and IP design tool licensing among others. Changes in the prices of major raw materials have driven a downward trend in the historical sales prices of audio chip companies' final products. The average unit price of power amplifier audio chips decreased from RMB1.6 per unit in 2020 to RMB1.2 per unit in 2024, a drop of 25%.
- Over the past three years, wafer prices in China have shown a downward trend. In 2020, the price was RMB12,201.0 per wafer. Due to fierce market competition, various wafer manufacturers have reduced prices. At the same time, technological advancements leading to cost reductions and economies of scale have also driven wafer prices down, reaching RMB7,232.8 per wafer in 2024.

Overview of Power Amplifier Audio Chips Industry

Major Cost and Price Trends in the Power Amplifier Audio Chip Industry (2/3)

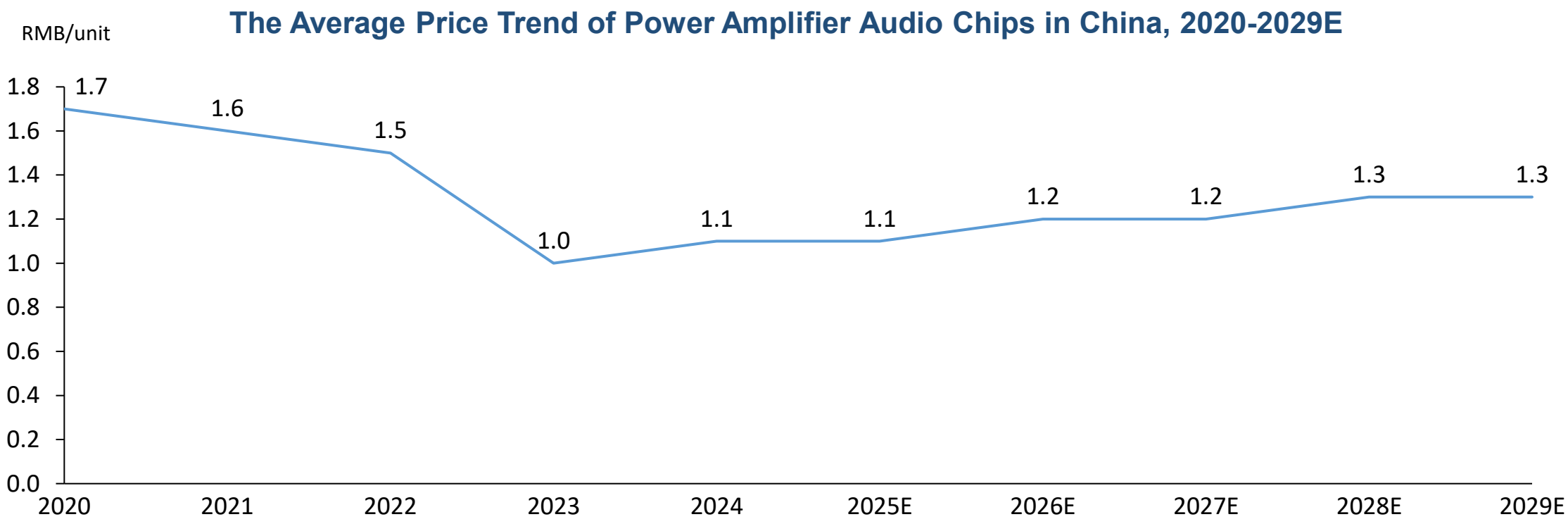
Average Price Trend of Packaging in China, 2020-2024



- As power amplifier audio chips mainly use high-end packaging such as wafer-level packaging (WLP), the average price rose from RMB0.10 per unit in 2020 to RMB0.15 per unit in 2022. In 2024, with improved yield rates and process standardization, the average unit price decreased to RMB0.10 per unit.

Overview of Power Amplifier Audio Chips Industry

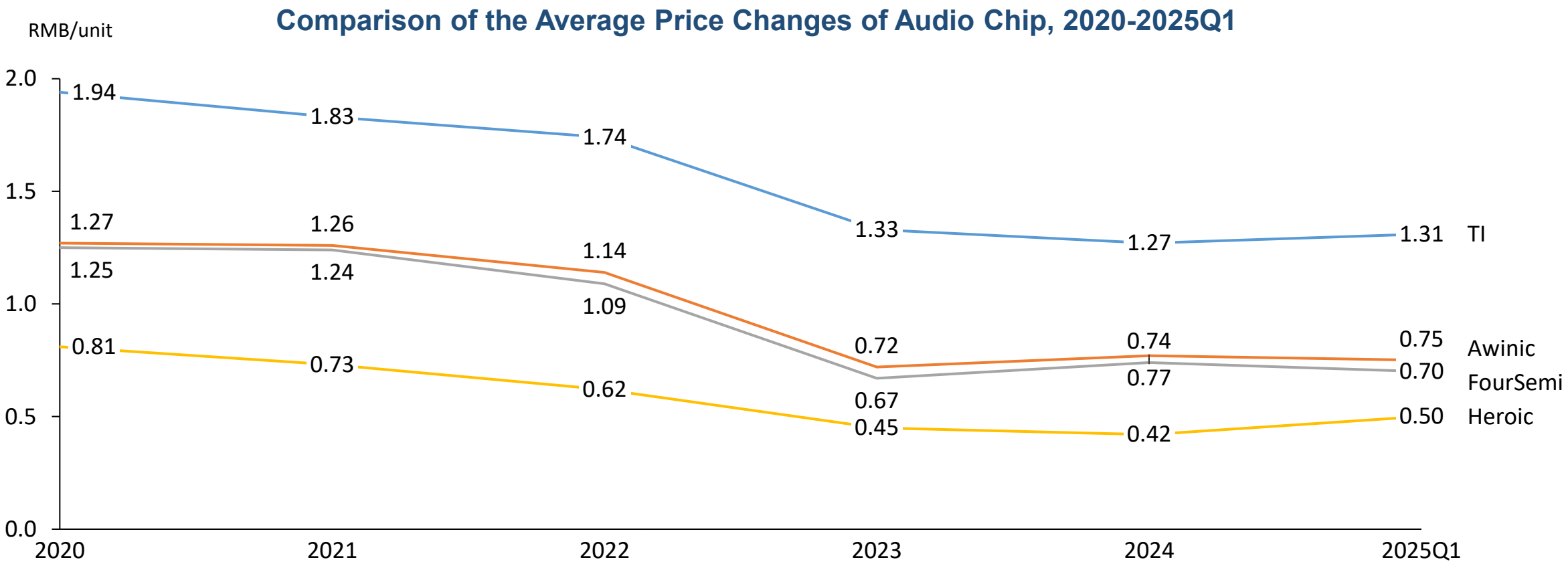
Major Cost and Price Trends in the Power Amplifier Audio Chip Industry (3/3)



- From 2020 to 2023, the price of audio chips in China showed a downward trend. The average price in 2020 was approximately RMB 1.7 per unit, driven by three key factors: matured chip technology, optimized supply chain localization, semiconductor inventory adjustment in 2023 and price wars among various manufacturers. Especially during 2022-2023, the entire industry entered an inventory adjustment period. All enterprises were forced to adjust prices to clear inventory, leading to a decrease in the average price of chips across the industry. By 2023, the average selling price of chips had dropped to about RMB 1.0 per unit, a decrease of 41% compared to 2020.
- After 2024, the inventory adjustment for various manufacturers will come to an end. The selling price of audio chips will gradually stop declining from 2025 and enter a stable recovery period. It is predicted that the average selling price of chips will recover to RMB 1.3 per unit by 2029.

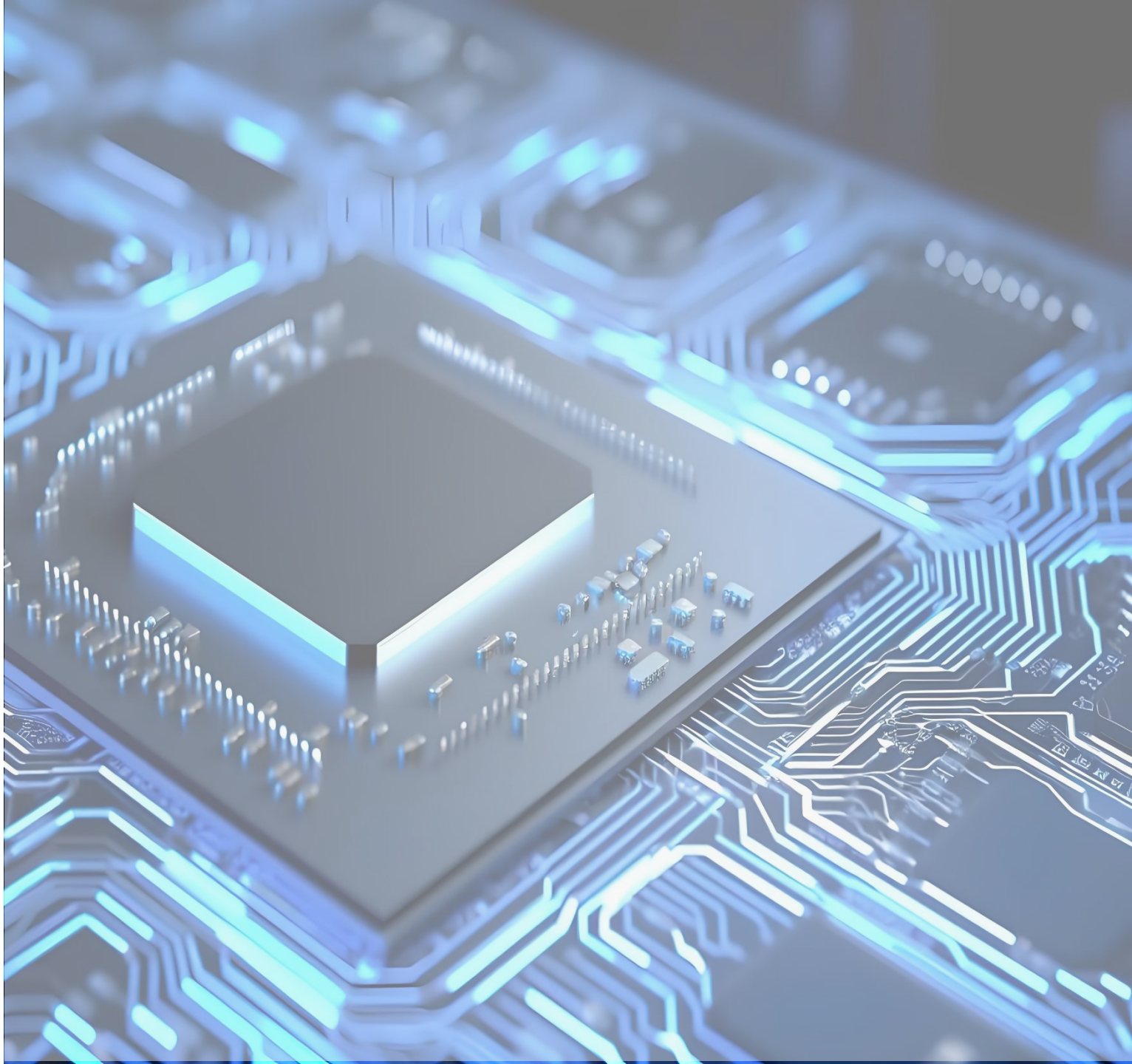
Overview of Power Amplifier Audio Chips Industry

The changes and trends in the average selling prices of products from major players in the audio chip market



- The average selling price of foreign company Texas Instruments dropped from RMB 1.94 per unit in 2020 to RMB 1.33 per unit in 2023; the price of domestic leading company Awinic also decreased from approximately RMB 1.27 per unit to RMB 0.72 per unit. The company's selling price has decreased from an average of RMB 1.25 per unit to RMB 0.67 per unit. Meanwhile, the prices of Heroic's power amplifier audio chips fell to RMB 0.45 per unit in 2023. However, the unit price has shown an upward trend since 2023.

Agenda



Analysis of Competition

Global Power Amplifier Audio Chip Market Competitive Landscape and Market Share

Enterprise Ranking in Global Power Amplifier Audio Chip Market, by Revenue / Shipment Volume, 2024

Ranking	Company	Revenue (RMB billion)	Market Share（%）
1	Company C	2.47	27.8%
2	Company A	0.72	8.2%
3	Company B	0.64	7.2%
4	The Company	0.36	4.1%
5	Company D	0.31	3.5%
Top Five Total		4.50	50.8%
Total		8.87	100.0%

Ranking	Company	Shipment Volume（100 million Units）	Market Share（%）
1	Company A	6.8	13.5%
2	Company B	6.5	13.0%
3	The Company	4.6	9.2%
4	Company C	4.4	8.8%
5	Company D	2.5	5.0%
Top Five Total		24.8	49.5%
Total		50.0	**100.0%**

- In 2024, the global shipment volume of power amplifier audio chips was approximately 5.0 billion units. Our Company achieved a total annual global shipment volume of 460 million power amplifier audio chips, accounting for a global market share of approximately 9.2%, ranked third among power amplifier audio chip companies globally and holding a leading position. By revenue, our Company, accounting for a global market share of approximately 3.9%, ranked fourth among power amplifier audio chip companies globally.

Analysis of Competition

China's Power Amplifier Audio Chip Market Competitive Landscape and Market Share

Enterprise Ranking in China's Power Amplifier Audio Chip Market, by Revenue / Shipment Volume, 2024

Ranking	Company	Revenue (RMB billion)	Market Share (%)
1	Company A	0. 54	13.2%
2	Company C	0. 48	11.6%
3	The Company	0. 35	8.5%
4	Company D	0. 31	7.6%
5	Company B	0. 22	5.4%
Top Five Total		1. 90	46.5%
Total		4. 10	100.0%

Ranking	Company	Shipment Volume (100 million Units)	Market Share (%)
1	Company A	5.1	20.3%
2	The Company	4.0	15.8%
3	Company C	3.1	12.4%
Top Three Total		12.1	48.5%
Total		25.0	**100.0%**

- In 2024, the shipment volume of power amplifier audio chips in the China region was approximately 2.5 billion units. Our Company achieved a total annual shipment volume of 450 million power amplifier audio chips in China, accounting for a market share of approximately 18.0%, ranked second among power amplifier audio chip companies in China and possessing a significant advantage in market position. By revenue, our Company, accounting for a market share of approximately 8.5%, ranked third among power amplifier audio chip companies in China market.

Analysis of Competition

Global Smart Display Power Amplifier Audio Chip Market Competitive Landscape and Market Share

Enterprise Ranking in Global Smart Display Power Amplifier Audio Chip Market, by Global Shipment Volume, 2024

Ranking	Company	Shipment Volume (10,000 units)	Market Share (%)
1	Company E	1,461.6	16.2%
2	Company C	1,320.0	14.7%
3	The Company	1,067.7	11.9%
4	Company F	960.0	10.7%
Top Four Total		4,809.3	53.4%
Total		9,000.0	**100.0%**

Ranking	Company	Revenue (RMB billion)	Market Share (%)
1	Company C	0.03	15.9%
2	The Company	0.03	12.0%
3	Company E	0.02	11.5%
4	Company F	0.01	5.8%
5	Company B	0.01	2.3%
Top Four Total		0.10	47.6%
Total		0.22	100.0%

- In 2024, the global Shipment Volume of power amplifier audio chips for smart displayswas approximately 90 million units. The Company achieved a total annual global Shipment Volume of 10.7 million power amplifier audio chips for smart screens, accounting for a market share of approximately 11.9%, ranking third among power amplifier audio chip companies for smart displaysglobally and possessing a significant advantage in market position. By revenue, our Company, accounting for a market share of approximately 12.0%, ranked second among power amplifier audio chip companies in global market.

Source: Frost & Sullivan

Analysis of Competition

China's Smart Display Power Amplifier Audio Chip Market Competitive Landscape and Market Share

Enterprise Ranking in China's Smart Display Power Amplifier Audio Chip Market, by Shipment Volume in China, 2024

Ranking	Company	Shipment Volume (10,000 units)	Market Share (%)
1	The Company	1,063.4	23.6%
2	Company C	912.00	20.3%
3	Company F	800.0	17.8%
Top Three Total		2,775.4	61.7%
Total		4,500.0	**100.0%**

Ranking	Company	Revenue (RMB billion)	Market Share (%)
1	The Company	0.03	24.1%
2	Company C	0.02	21.1%
3	Company F	0.01	9.6%
4	Company E	0.01	6.9%
Top Four Total		0.07	61.7%
Total		0.22	100.0%

- As a high-potential application scenario for smart audio, smart displays had a Shipment Volume of approximately 45 million units in China in 2024. The Company achieved a total annual Shipment Volume of 10.6 million power amplifier audio chips for smart screens, accounting for a market share of approximately 23.6%, ranking first in the smart screen market in China and possessing a significant advantage in market position.

Analysis of Competition

China's Haptic Driver Market Competitive Landscape and Market Share

Enterprise Ranking in China's Haptic Driver Market, by Shipment Volumein China, 2024

Ranking	Company	Shipment Volume (10,000 units)	Market Share (%)
1	Company A	6,768.0	22.6%
2	Company C	1,550.0	5.2%
3	Company B	650.0	2.2%
4	The Company	584.5	1.9%
5	Company G	400.0	1.3%
Top Five Total		9,952.5	33.2%
Total		3,0000.0	**100.0%**

Ranking	Company	Revenue (RMB billion)	Market Share (%)
1	Company A	0.20	21.8%
2	Company C	0.08	8.6%
3	Company B	0.02	2.2%
4	Company G	0.01	0.9%
5	The Company	0.01	0.6%
Top Five Total		0.31	34.0%
Total		0.90	**100.0%**

- In 2024, our Company achieved a shipment volume of 5.8 million haptic drivers in China, accounting for a market share of approximately 1.9%, ranked fourth among haptic driver companies in China.

Analysis of Competition

Global and China's Power Amplifier Audio Chip Market Competitive Landscape and Market Share

Enterprise Ranking in Global Power Amplifier Audio Chip Market, by Shipment Volume，2022-2024

Ranking	Company	2024 Shipment Volume（100 million Units）	Market Share（%）	2023 Shipment Volume（100 million Units）	Market Share（%）	2022 Shipment Volume（100 million Units）	Market Share（%）
1	Company A	6.8	13.5%	3.0	10.1%	2.1	11.6%
2	Company B	6.5	13.0%	2.8	9.3%	1.1	6.1%
3	The Company	4.5	9.0%	2.2	7.3%	1.2	6.7%
4	Company C	4.4	8.8%	1.8	6.0%	0.7	3.9%
5	Company D	2.5	5.0%	0.9	3.0%	0.5	2.8%
Top Five Total		24.7	49.3%	10.7	35.8%	5.6	31.1%
Total		50.0	**100.0%**	30.0	**100.0%**	18.0	**100.0%**

- In 2024, the global Shipment Volume of power amplifier audio chips was approximately 5.0 billion units. The Company achieved a total annual global Shipment Volume of 450 million power amplifier audio chips, accounting for a market share of approximately 9.0%, ranking third among power amplifier audio chip companies globally and holding a leading position,Ranked third in both 2023 and 2022.

Source: Frost & Sullivan

Analysis of Competition

China's Patent Numbers of Power Amplifier Audio Chip Vendors in China (by Power Amplifier Audio Chip Related Patents)

China's Patent Numbers of Power Amplifier Audio Chip Vendors in China (by Power Amplifier Audio Chip Related Patents), 2024

Ranking	Company	Total Patent Quantity (item)
1	Company A	169
2	The Company	30
3	Company H	23
4	Company D	17

- With respect to patents, as of the Latest Practicable Date, Fourier Semi had 30 registered patents, including 27 patents for inventions and 3 utility model patents, and filed 17 patent applications which are pending.

Comprehensive Strength Comparison

China Domestic Power Amplifier Audio Chip Market Process Comparison (Based on Key Product), 2024

China Domestic Power Amplifier Audio Chip Market Process Comparison (Based on Key Product)							
low power audio chip		Mid/High-Power Audio Chips		Automotive Grade Audio Chips		Market Process (Volume Production)	
The Company	2017 China's First	The Company	2021 China's First	The Company	2023 Dec China's First AEC-Q100 certified	Company A	Fourth Stage
Company A	2018	Company A	In 2024	Company A	AEC-Q100 certified by 2023	The Company	Third Stage
Company D	2019	Company D	2024	Company D	2025	Company D	Second Stage

In 2017, Fourier Semi launched [FS1601] the first ASIC DSP low power audio chip in the industry, using ASIC DSP to realize low power audio chip algorithm hardware, relative to the traditional open class DSP (OPEN DSP) ASIC with lower power consumption, lower latency, smaller chip area, etc.; in 2021, Fourier Semi launched [FS2105] China's first localized medium and high power audio chip; In 2023, Fourier Semi launched [FS5024E] China's first automotive-grade audio chip, marking a pioneering step in the field of domestic audio technology.

Automotive Grade Audio Chips are in four core phases: the first phase is the proof of concept and requirements analysis phase, the second phase is the development and prototype testing phase, the third phase is the scale-up production and supply chain optimization phase, and the final phase is the commercialization promotion and market operation phase.

Analysis of Competition

Comparison of China's Power Amplifier Audio Chip Technology Capabilities，2024

Comparison of China's Intelligent Audio Chip Technology Capabilities,2024

Comparison of Technical Capabilities for Power Amplifier Audio Chips, 2024

Key Technical Metrics	Low Power Audio Chip			Mid/high Power Audio Chip			Automotive-grade Power Amplifier Audio Chip		
	Our Company FS1999	Company A	Remarks	Our Company FS2105	Company C	Remarks	Our Company FS5024	Company C	Remarks
Signal-to-Noise Ratio	119dB	110dB	Higher signal-to-noise ratio	112dB	111dB	Higher signal-to-noise ratio	95dB	89dB	Higher signal-to-noise ratio
Output Power	5.5W	5.3W	Higher output power, better sound dynamic range	2*24W	2*23W	Higher output power, better sound dynamic range	4*75W	4*75W	/
Operating Voltage Range	2.7V-5.5V	3.0V-5.5V	Wider operating power supply voltage	4.5V-26.4V	4.5V-26.4V	/	4.5V-26.4V	4.5V-26.4V	/
Package Type	FOWLP-36	WLCSP-42	Smaller package size	TSSOP-28	TSSOP-28	/	HSSOP-56	HSSOP-56	/
Noise floor	7.5 μV	14μV	Lower noise floor	36μV	37μV	Lower noise floor	43μV	70μV	Lower noise floor

1. *Signal to Noise Ratio: The ratio of signal power to noise power，the larger the SNR is, the smaller the distortion will be.*
2. *Output Power: The amount of usable power that a device or system produces, greater output power leads to better sound dynamics*
3. *Output Voltage Range: Wider output voltage range enables the regulator to deliver desired performance across more applications.*
4. *Encapsulated type :* Chips' packing type，FOWLP is an advanced packaging technology, featuring miniaturization and high performance
5. *Noise floor: The lowest level at which signal can be distinguished from background noise, the lower noise floor, the clear the signal will be*

- It can be seen from the technical parameter comparison table that FourSemi has formed significant advantages in the four core areas of SNR, output power, output voltage range, and noise floor.

Source: Frost & Sullivan

Analysis of Competition

Comparison of China's Power Amplifier Audio Chip Technology Capabilities，2024

Comparison of China's Power Amplifier Audio Chip Die Size ,2024			
Die Size(mm ~2)	**The Company**	**Peer company1**	**Peer company2**
Non-DSP low power audio chip(FS1943F)	2.075*1.725=3.579	2.139*2.131=4.558	2.62*2.51=6.576
Percentage reduction in area	/	-21.48%	-45.57%
DSP low power audio chip(FS1999F)	2.09*2.09=4.368	2.60*3.13=8.138	2.51*3.55=8.911
Percentage reduction in area	/	-46.32%	-50.98%

Die Size is a core parameter in semiconductor manufacturing and directly determines the number of chips that can be produced from a single wafer. The smaller the area, the more chips a single wafer can produce, the lower the unit cost, and at the same time, a small die size can reduce the impact of defects, improve yields, and have advantages in performance and power consumption.

- As can be seen from the Die Size comparison table, FourSemi low power audio chip demonstrates a significant advantage in size.

Top 10 Global Smartphone Manufacturers， 2018		
Ranking	Brand	Shipment Volume（Hundred million units）
1	三星（Samsung）	2.93
2	苹果（Apple）	2.09
3	华为（Huawei）	2.06
4	传音（Transsion）	1.24
5	小米（Xiaomi）	1.23
6	OPPO	1.13
7	vivo	1.01
8	闻泰科技	0.90
9	华勤（Huaqin）	0.85
10	龙旗（Longcheer）	0.58
TOP10		14.02
Total		14.56

Top 10 Global Smartphone Manufacturers， 2024		
Ranking	Brand	Shipment Volume（Hundred million units）
1	苹果（Apple）	2.26
2	三星（Samsung）	2.23
3	传音（Transsion）	2.01
4	小米（Xiaomi）	1.65
5	华勤（Huaqin）	1.40
6	OPPO	1.20
7	龙旗（Longcheer）	1.07
8	vivo	1.00
9	闻泰科技	0.80
10	荣耀（Honor）	0.75
TOP10		14.37
Total		15.80

Top 10 Global Smartphone Manufacturers， 2025 Q1		
Ranking	Brand	Shipment Volume（Million units）
1	三星（Samsung）	60.0
2	小米（Xiaomi）	41.0
3	华勤（Huaqin）	30.0
4	龙旗（Longcheer）	30.0
5	OPPO	23.0
6	vivo	22.0
7	传音（Transsion）	21.0
8	闻泰科技	<20.0
9	荣耀（Honor）	12.0
10	联想	<7
TOP10		< 239
Total		359.0

Top 10 Global TV Manufacturers， 2024		
Ranking	Brand	Shipment Volume（Million units）
1	三星（Samsung）	58.9
2	海信（Hisense）	29.1
3	TCL	24.5
4	LG Electronics	20.8
5	小米（Xiaomi）	10.4
6	创维（Skyworth）	<10.4
7	飞利浦（Philips）	<10.4
8	索尼（Sony）	<10.4
9	夏普（Sharp）	<10.4
10	Vizio	<10.4
TOP10		195.7
Total		208.0

Top 10 Global TV Manufacturers， 2025 Q1		
Ranking	Brand	Shipment Volume（Million units）
1	三星（Samsung）	9.1
2	TCL	6.5
3	海信（Hisense）	5.7
4	LG Electronics	5.1
5	小米（Xiaomi）	2.6
6	创维（Skyworth）	<2.0
7	飞利浦（Philips）	<2.0
8	索尼（Sony）	<2.0
9	夏普（Sharp）	<2.0
10	Vizio	<2.0
TOP10		<38.9
Total		47.5

Top 10 China Smartphone Manufacturers， 2024		
Ranking	Brand	Shipment Volume（ Million units）
1	龙旗（Longcheer）	172.9
2	华勤（Huaqin）	125
3	闻泰科技	80
4	vivo	49.2
5	小米（Xiaomi）	45.0
6	荣耀（Honor）	42.6
7	OPPO	42.3
8	三星（Samsung）	<10
9	传音（Transsion）	<3
10	联想	<1
TOP10		< 571
Total		> 600

Top 10 China Smartphone Manufacturers， 2025 Q1		
Ranking	Brand	Shipment Volume（Million units）
1	华勤（Huaqin）	30
2	龙旗（Longcheer）	30
3	闻泰科技	<20
4	小米（Xiaomi）	13.3
5	荣耀（Honor）	12
6	OPPO	11.2
7	vivo	10.3
8	三星（Samsung）	<0.6
9	传音（Transsion）	<0.1
10	联想	<0.1
TOP10		< 127.6
Total		<130

TOP 10 China TV Manufacturers , 2024		
Ranking	Brand	Shipment Volume（Million units）
1	视源（CVTE）	27.3
2	茂佳（MOKA）	16.7
3	视讯（BOE VT）	8.2
4	海信（Hisense）	8.0
5	小米（Xiaomi）	7.1
6	TCL	6.8
7	创维（Skyworth）	6.1
8	长虹(Changhong)	<1.7
9	康佳(KONKA)	<1.7
10	海尔（Haier）	<1.7
TOP 10		<79.2
Total		91

Source: Frost & Sullivan

TOP 10 China TV Manufacturers , 2025 Q1		
Ranking	Brand	Shipment Volume（Million units）
1	视源（CVTE）	8.0
2	茂佳（MOKA）	3.7
3	TCL	2.0
4	视讯（BOE VT）	1.8
5	小米（Xiaomi）	1.8
6	海信（Hisense）	<1.6
7	创维（Skyworth）	<1.6
8	长虹（Changhong）	<0.4
9	海尔（Haier）	<0.4
10	康佳（KONKA）	<0.4
TOP 10		<21.7
Total		24.3

Source: Frost & Sullivan

Analysis of Competition

The Global Mobile Phone Market Competition Landscape

The Global Mobile Phone Market Competition Landscape						
	2019	2020	2021	2022	2023	2024
Market Size(Shipment Volume, 100 million units)	16.91	16.42	15.89	13.33	13.86	14.36
Transsion Information Technology	1.37	1.74	1.97	1.56	1.94	2.01
Market Share	8.10%	10.60%	12.40%	11.70%	14.00%	14.00%
Ranking	Top4	Top4	Top4	Top4	Top3	Top3

Analysis of Competition

The Global Competitive Landscape of ODM/IDH Mobile Phone Industry

The Global Competitive Landscape of ODM/IDH Mobile Phone Industry						
	2019	2020	2021	2022	2023	2024
Market Size (Shipment Volume, 100 million Units)	3.90	4.10	5.20	4.80	4.56	5.00
Moqin Intelligent Technology Co	0.85	1.40	1.35	1.20	1.40	1.40
Market Share	21.79%	26.83%	25.96%	25.00%	30.70%	28.00%
Ranking	Top1	Top1	Top1	Top2	Top1	Top1
Longcheer Technology Co	0.75	1.10	1.08	1.38	1.17	1.07
Market Share	19.23%	26.83%	20.77%	28.75%	25.66%	21.40%
Ranking	Top2	Top2	Top2	Top1	Top2	Top2

- Moqin Intelligent Technology Co and Longcheer Technology Co, as ODM manufacturers of intelligent products in the industry, use the audio chip products of Fourier Semi Company.
- Moqin Intelligent Technology Co and Longcheer Technology Co are downstream customers of Fourier Semi Company.
- Longcheer Technology are downstream customers of Fourier Semi Company.

Analysis of Competition

The competitive landscape and market share of China's Perceptual Intelligent Chip Industry.

Enterprise Ranking in China's Smart Perceptual Chip Market, by Relevant Revenue ,2024				
Ranking	**Company**	**Revenue (RMB Million)**	**Market Share (%)**	**Segment**
1	Company I	4500.0	10.8%	Visual Perception
2	Company J	4000.0	9.6%	Visual Perception
3	Company K	3150.0	7.6%	Visual Perception
4	Company A	2050.0	3.6%	Visual Perception
5	Company L	1500.0	4.9%	Smart Audio+ Tactile Simulation
6	Company M	1200.0	2.9%	Auditory perception
7	Company B	620	1.5%	Smart Audio
8	Company N	590.0	1.4%	Haptic Perception
9	Company O	480.0	1.2%	Haptic Perception
10	The Company	360.0	0.9%	Smart Audio+Tactile Simulation
11	Company P	60.0	0.1%	Taste Perception
12	Company Q	50.0	0.1%	Olfactory Perception
Top Twelve Total		18560.0	44.7%	
Total		41560.0	**100.0%**	

- In 2024, the Company achieved revenue of RMB 360.0 million from perceptual intelligent chips in China, accounting for approximately 0.9% of the market share and ranking tenth among perceptual intelligent chip companies in China. The Company is a leading player in the perceptual intelligent chip industry, focusing on power amplifier audio chips and haptic drivers

Notes:

1. *All figures in the above have been rounded*

2. *Company A (AWINIC), is a publicly listed company headquarter in China. It primarily engages in the research and development as well as chips fabrication for intelligent audio amplifiers and power management.*

3. *Company B (Cirrus Logic), is a publicly listed company headquarter in United States. It primarily engages in the development of high-performance audio and industrial chips.*

4. *Company C (TI)，is a publicly listed company headquarter in United States. It primarily engages in the development of high-efficiency intelligent audio amplifiers, digital signal processor(DSP), and analog circuit components.*

5. *Company D (Goodix), is a publicly listed company headquarter in China. It primarily engages in the development of high-performance mixed-signal integrated circuit, intelligent audio amplifiers and low-power Bluetooth technology.*

Notes:

6. *Company E (NF), is a privately held company headquartered in Korea, it primarily engages in the development and fabrication of intelligent sound effect processing, digital signal processor, all-digital PWM modulator.*

7. *Company F(ESMT), is a publicly listed company headquartered in Taiwan, China. It primarily engages in the design, manufacturing and sales of high-performance integrated circuit, digital power amplifier chips and others .*

8. *Company G (Dongwoon Anatech), is a listed company headquartered in Korea. It primarily engages in the development of tactile feedback and auto focus.*

9. *Company H (Actions), is a publicly listed company headquarter in China. It primarily engages in the development and design of chips for intelligent audio and internet of Things based on Artificial intelligence (A LOT).*

Notes:

10. *Company I (Hikvision), is a publicly listed company headquarter in China. It primarily engages in the development of high-performance visual perception, artificial intelligence and big-data technology.*

11. *Company J (OFILM) , is a publicly listed company headquarter in China. It primarily engages in the development of high- performance visual perception technology(OFILM)*

12. *Company K (Keyence), is a privately held company headquarter in China. It primarily engages in the development of visual perception technology, and measuring instrument.*

13. *Company L(DaHua), is a privately held company headquarter in China. It primarily engages in the development of high-performance visual perception technology.*

14. *Company M (IFLYTEK),is a publicly listed company headquarter in China. It primarily engages in the development of auditory perception, smart audio and artificial intelligence.*

Notes:

15. *Company N (Novosense), is a publicly listed company headquarter in China. It primarily engages in the development of haptic perception and computer system integration and electron component.*

16. *Company O (Broeas Technologies), is a privately held company headquarter in China. It primarily engages in the development of haptic perception, optical technology and computer hardware and software.*

17. *Company P(INSTENT), is a privately held company headquarter in Japan. It primarily engages in the development of taste perception*

18. *Company Q(AI-SENSING), is a privately held company headquarter in China. It primarily engages in the development of olfactory perception*

19. *Company R(Giantec), is a publicly listed company headquarter in China. It primarily engages in memory chips, haptic drivers.*

Analysis of Competition

Entry Barriers in The Power Amplifier Audio Chip Market（1/2）

Customer Barriers	• In the power amplifier audio chip industry, especially for highly customized scenarios in intelligent vehicles, consumer electronics, and robotics, customers have strict audit and certification systems for suppliers, involving certifications for functional safety (e.g., JESD22-A113), and requiring compliance with reliability standards such as automotive-grade AEC-Q100 and the quality management system standard (ISO9001). Suppliers must undergo a product verification period of one to three years, requiring them to have strong capabilities in technology, supply, and quality control. After a partnership is established, high switching costs and strong dependence on major customers make it difficult for new entrants to break through quickly.
Talents Barriers	• The types of power amplifier audio chips are diverse and complex, requiring support from manufacturing processes with high intellectual property. Chip design relies heavily on the experience of engineers, creating a high R&D barrier. The level of experience accumulated by design personnel plays a crucial role in the technological level and overall performance of the designed products. Power amplifier audio chip engineers typically need 5 to 10 years to be able to independently complete a chip design, which raises the entry threshold for R&D and design personnel. Currently, technical and management talent in the domestic chip design industry, especially in the power amplifier audio chip sector, remains relatively scarce.
Technological Barriers	• Power amplifier audio chip products have high performance requirements in terms of anti-interference capability, detection accuracy, power consumption, and size. Moreover, with the continuous upgrading of audio effects in various consumer electronics and intelligent vehicles, new requirements are being brought up, such as tuning technology, customized design, algorithms, and technology for power amplifier audio chips. For new market entrants, it requires a long time and substantial resources to carry out technological R&D and to pass patent applications and reviews by relevant authorities. Therefore, the industry has high technological barriers.
Capital Barriers	• The power amplifier audio chip industry in China caters to highly customized scenarios, requiring substantial R&D capital investment to continuously drive product iteration and upgrades. This involves advanced technologies, designs, and algorithms, with annual R&D expenditures in the tens of millions of RMB, which constitutes a capital barrier for new entrants.

Analysis of Competition

Entry Barriers in The Power Amplifier Audio Chip Market（2/2）

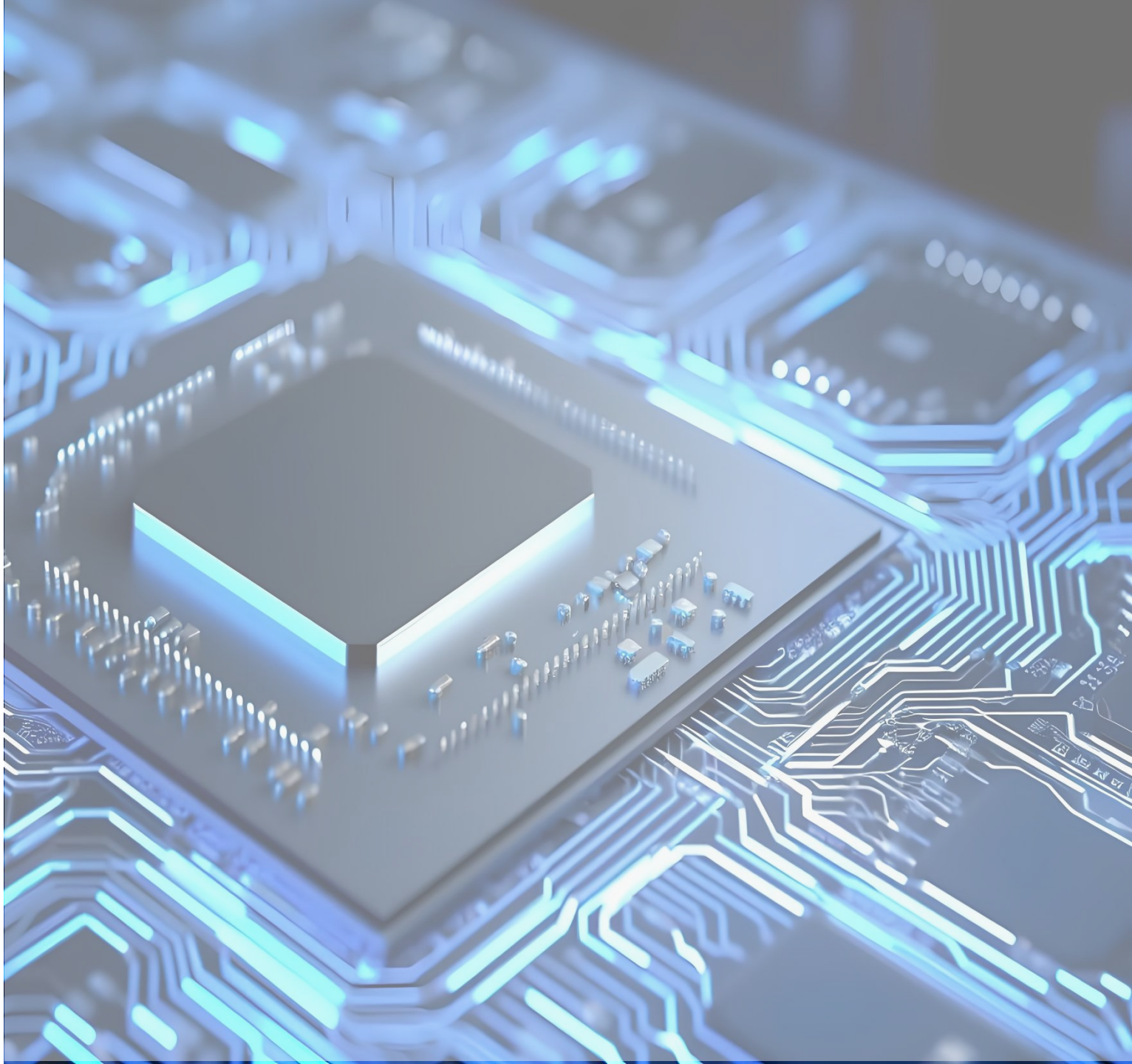
Supply Chain Barrier

- The power amplifier audio chip industry in China requires a stable supply chain system. Companies must secure a long-term and stable supply of wafer foundry and packaging and testing capacity by locking in capacity resources through prepayments and long-term agreements; otherwise, they will face the risks of delays in mass production and cost premiums

Industry Opportunities and Challenges

- The power amplifier audio chip industry faces multiple opportunities and challenges. Market opportunities mainly stem from the promotion of 5G technology and the wide penetration of smart home devices, intelligent vehicles, and wearable devices, which also give rise to new demands such as immersive audio. However, the industry also faces threats, such as intensified competition between international companies and domestic enterprises, and an increased risk of technological obsolescence due to the accelerated iteration of consumer electronics. On the technology front, it is necessary to overcome the challenge of balancing high-fidelity sound quality with heat dissipation and power consumption. On the cost side, there is pressure from rising raw material prices and complex designs. Regulatory compliance requirements are becoming stricter, covering areas such as electromagnetic safety and environmental standards. Furthermore, supply chain fluctuations and the pressure for R&D innovation continue to test the development of enterprises.

Agenda



Appendices

- In the perceptual world, user experience is crucial, and individual user experience preferences are different. With the rich experience of comany team in the audio industry, company have established a series of technical support systems from the initial stage of customer projects, such as audio cavity design reference, audio chip selection, peripheral circuit design, algorithm integration, driver integration, cavity modeling, sound debugging, etc., which realizes a complete and closed-loop solution from the cradle to the grave. Especially in the sound debugging, the company has set up a strong tuning team, serving more than 100 tuning projects per year, with a deep understanding of the customer's differentiated tuning needs, and can provide differentiated tuning services to different customers, increasing the stickiness with customers.
- In the development of audio algorithms, the company has formed three series of algorithms such as Smart Speaker Protection (SDG), Audio Enhancement, and Intelligent Scene Adaptation, etc. These algorithms can be flexibly configured in a variety of application environments and application scenarios for terminal customers, including Qualcomm, MTK, Spreadtrum, and other types of cell phone platforms for all kinds of operating systems, including Android, Linux, Windows, etc. More than 200 million phones use Fourier various audio algorithms in 2024, Linux, Windows, etc. In 2024, more than 200 million cell phones use Fourier's various audio algorithms.
- In terms of ASIC DSP, the company is the first in the industry to use ASIC DSP to realize low power audio chip algorithms in hardware. Compared with traditional OPEN DSP, ASIC has the advantages of lower power consumption, lower latency, and smaller chip area, etc. Moreover, the company's self-developed ASIC DSP architecture can avoid the use of third-party IP suppliers to reduce costs and provide a more controlled supply chain. Moreover, the company's self-developed ASIC DSP architecture avoids the use of third-party IP suppliers, which reduces costs and makes the supply chain more controllable. The company's first product based on ASIC DSP program FS1601, the chip area is 20% lower than similar products, the digital part of the power consumption is reduced by 10%. Currently, more than 200 million power amplifier audio chips equipped with ASIC DSP technology have been shipped.In addition to audio performance, the company's strong R & D capabilities, in the chip area in the industry leader, similar chips based on the same node process, the company's product chip area than peers to reduce 10-30%.The company also walks in the industry's leading process expansion, at present more than 50% of the company's products use the BCD process on the advanced 65nm and 90nm process, more advanced process helps the company to obtain higher performance and lower cost. Company ASIC DSP-integrated products subsequently achieved mass production and were well-received by comany customers, indicated by cumulative Shipment Volumes exceeding 200 million units, demonstrating successful commercialization.
- In 2023 and 2024, the Company's R&D expenses will account for [35%]%, [35%]% and [17%]% of revenue, respectively. The industry average is [30%], which exceeds the industry average.
- Through automated test management system (TMS), the company tracks CP/FT data in real time, combined with adaptive power control audio chip statistical process control to achieve dynamic optimization of yield, and the PPM value of key parameters reaches the leading level in the industry.
- The company operate under the fabless model and focus on the design of ICs. company outsource wafer fabrication and chip packaging and substantially all testing activities for mass production to third-party business partners. Company conduct a limited portion of testing in house to [enable more efficient product development and customization]. Comany internal testing includes performance benchmarking and reliability validation. Performance benchmarking assesses the chip’s reaction speed, latency and power efficiency under specified conditions, while reliability validation verifies stable operation during extended runtime or under extreme conditions, which detects functional errors and prevents performance degradation. By concentrating comany resources on product design and R&D processes, company can swiftly respond to evolving market demands and continuously innovate comany product offerings. the fabless business model is consistent with the increasing trend of specialized division of labor within the semiconductor industry, allowing fabless companies to focus attention and resources on design and R&D.
- Due to the wide range of downstream applications, distributors usually play an important role in the sales process of power amplifier audio chips. Through the distributor network, power amplifier audio chip companies can reach scattered small and medium-sized customers and reduce sales costs. The distribution system has an irreplaceable role for power amplifier audio chip companies in terms of regional coverage, product delivery, logistics optimization, inventory buffer and small-volume order response. The direct sales model mainly serves the head strategic customers.

Appendices

- China's power management chips market grew from RMB76.8 billion in 2020 to RMB124.6 billion in 2024, achieving a CAGR of 12.9%. The segment is expected to maintain strong momentum and expand to RMB223.4 billion by 2029, representing a CAGR of 12.1% from 2025 to 2029.
- FourSemi project development cycles, ranging from just two to five months, are among the fastest in China's power amplifier audio chip market. This agility enables us to achieve precise control of the development timeline and capture time-sensitive opportunities in fast-moving application sectors such as the consumer electronics industry, typical industry wide development cycle is usually 6-12 months.
- The company's low power audio chips are down in 2023 due to the consumer electronics price war, while medium and high power audio chips are up driven by automotive/high-end scenarios, in line with industry trends.
- The company targeted brand customers' mid-to-high-end flagship models, thus boosted sales of higher-margin products, mainly haptic drivers.
- In the semiconductor industry chain, it is a common practice for wafer fabs and foundries to invest in companies specializing in audio chips, RF chips, power devices, and other fields to achieve technology synergy, capacity integration, or market expansion. Examples, Sino-IC Integration (芯联集成) As a semiconductor foundry, Sino-IC Integration invests in automotive power chips (e.g., IGBT, SiC) and analog IC manufacturers to build capabilities in design, manufacturing, and packaging, aligning with market demand. OnMicro (昂瑞微) A 5G RF front-end design company, OnMicro collaborates with wafer foundries like Huahong Semiconductor (华虹半导体) to develop SOI (Silicon-on-Insulator) process technology. The foundry secures production capacity priority through equity investments. CanSemi (粤芯半导体) invests in analog chip design companies (e.g., Silergy Corp/矽力杰) to match its 12-inch analog wafer production capacity, ensuring supply chain stability and technological synergy.
- High supplier and customer concentration is common in the power amplifier audio chip industry. For example, The procurement share of Awinic's（艾为电子） top five suppliers (including TSMC(台积电), JCET(长电科技), Tongfu Microelectronics(通富微电), etc.) exceeds 90%, with wafer fabrication and packaging/testing heavily reliant on leading industry players. In 2020, Awinic's revenue from its top five customers consistently accounted for over 60%, with smartphone manufacturers (Huawei(华为), Xiaomi(小米), OPPO, vivo, Transsion(传音) and ODM suppliers (Huaqin(华勤), Wingtech(闻泰科技)) contributing an increasing share of total revenue, rising from 57.05% to 77.85%. The 2024 financial report shows that the top five customers still accounted for 51.62% of revenue, with the largest customer contributing 18.52%. Similarly, Goodix (汇顶科技)Technology adopts a fabless model, with its core manufacturing processes relying on wafer foundries such as TSMC(台积电)and SMIC(中芯国际), as well as packaging and testing companies like JCET(长电科技)and Tongfu Microelectronics(通富微电). The mobile phone business accounts for over 90% of its revenue: from 2018 to 2020, domestic smartphone brands including Huawei(华为), OPPO, vivo, and Xiaomi(小米)contributed more than 90% of Goodix Technology's total revenue.
- The Power Amplifier Audio Chip industry warranty is typically 24 months, which is in line with industry standards.
- Company mid/high-power audio chip has been adopted by eight out of the top 10 china TV manufacturers in 2024;Company power amplifier audio chips has been adopted by nine out of the top 10 global smartphone manufacturers in 2024.
- Company have established a contracted partnership with one of the world's largest renewable energy vehicle manufacturers for our automotive-grade power amplifier audio chips.
- The company warranty term is typically 24 months, generally in line with the industry norm, company maintain proactive communication with our customers after sales and diligently collaborate with them to resolve any quality concerns. In case of product failure within the warranty period, company will arrange for repair or replacement of products and/or services without extra charge.

Appendices

- Given the large number of distributors in the market which are often tied to specific end customers and geographic regions, the number of distributors engaged by chip providers may vary year-to-year based on sales conditions. Company average distributor value increased during the Track Record Period as company expanded our business. Company recorded a decrease in the average transaction value of distributors in 2023 as the number of transactions outpaced the increase in revenue which is not indicative of business performance or relationship with the distributors.
- The company dedicated and experienced R&D team is led by Mr.QIAN Shun, who possesses nearly two decades of profound industry experience.
- As of the Latest Practicable Date, over 200 million units of company ASIC DSP-enabled power amplifier audio chips had been shipped.
- In 2024,over 200 million mobile devices integrated company smart audio algorithms.
- The company launched China's first mid-power power amplifier audio chip, FS2119, in 2021. This significant development marks a milestone in breaking the long-standing foreign dominance in this segment and addressed a critical gap in the domestic market. The FS2119 series has since achieved mass production and has been widely adopted in multiple branded televisions and audio systems.
- In 2017, company launched China's first ASIC DSP-integrated low power audio chip product, offering audio processing and protection features. This launch effectively filled a critical gap within the domestic market. company ASIC DSP-integrated products subsequently achieved mass production and were well-received by our customers, as indicated by company cumulative Shipment Volumes exceeding 200 million units, as of the Latest Practicable Date.
- The company project development cycles, ranging from just two to five months, are among the fastest in China's power amplifier audio chip market. This agility enables to achieve precise control of the development timeline and capture time-sensitive opportunities in fast-moving application sectors such as the consumer electronics industry.
- Audio quality is a critical success metric in many devices, yet subjective preference profiles exhibit significant individual divergence. This inherent audio perception variability necessitates substantial investment by company leading customers in signature sound development, requiring simultaneous optimization for mass-market acceptance and audiophile-grade scrutiny, in order for them to establish differentiated acoustic identities.
- by 2024, the adoption rate of in-car audio interaction systems surpassed 80%, making it the second-largest interaction interface after the vehicle's central control screen. As technologies advance and user engagement deepens, the demand for power amplifier audio chips in different scenarios as well as the expectation for their output performance are expected to continue to grow. According to the same source, the increasing demands for automotive safety have also driven market expansion, such as the requirement to install Acoustic Vehicle Alerting System (AVAS), which emit warning sounds during driving to ensure pedestrian safety, and the integration of Telematics Boxes (T-BOX) with audio systems to enable vehicle monitoring and intelligent communication functions.
- In 2023, company entered into the intelligent vehicles industry by launching China's first automotive-grade AEC-Q100-certified power amplifier audio chip. AEC-Q100 is a rigorous stress test qualification standard for automotive-grade chips, ensuring they withstand extreme conditions while powering advanced audio systems with up to 4*75W output and reliable performance from -40° C to 125° C, which is ideal for application in intelligent vehicles. Launching the first domestic automotive audio chip to obtain AEC-Q100 certification, company will have a first-mover advantage in this industry. In addition, company have also established a contracted partnership with one of the world's largest renewable energy vehicle manufacturers.

Appendices

- In 2024, global Shipment Volumes of smart wearable devices are expected to exceed 1 billion units, with products equipped with smart audio interaction technology accounting for 45% of the total. For instance, smart speakers require a combination of acoustic design and sound field calibration technology to maintain high-power audio output. Additionally, AI noise reduction algorithms are increasingly used to suppress environmental noise, significantly improving the user experience in voice interactions.
- In 2021, the company revenue in the C round was RMB 50.27 million, with a market share of 1.86%. In 2022, the company revenue increased to RMB 103 million, with a growth rate of 104.9%, and the market share rose to 3.31%. This clearly demonstrates that the company revenue and market share have both seen significant growth.
- Huaqin Technology achieved revenue exceeding RMB 35.3 billion in 2019 and RMB109.9 billion in 2024, ranking among the top 3 companies in the downstream smart hardware industry.
- Transsion Holdings achieved revenue exceeding RMB 37.8 billion in 2020 and RMB 68.7 billion in 2024, ranking among the top 10 companies in the downstream mobile industry.
- Huaqin Technology is a leading ODM and consumer electronics manufacturer Its revenue in 2018 was RMB 30.9 billion, and in 2019, it was RMB 35.3 billion. Its global rankings were first and second respectively. And in 2024, its ranking was first globally with a 28% market share.
- Transsion Holdings is a leading smartphone brand. Its revenue in 2019 was RMB 25.3 billion, and in 2020 it was RMB 37.8 billion, ranking ninth and seventh globally respectively. In 2024, its global ranking was third with a 14.0% market share in global Shipment Volumes.
- In 2020, the market size of the SAR industry in China was RMB 505 million. In 2022, the State Administration for Market Regulation and the Standardization Administration of China jointly issued the "Limits for Electromagnetic Radiation Exposure of Mobile Communication Terminals"《移动通信终端电磁辐射暴露限值》, which will be officially implemented in 2024. The implementation of this standard will further standardize the consumer electronics industry, enhance the competitiveness of Chinese products, and drive the demand for chips used in related electronic products. It is expected that by 2024, the market size will reach RMB 608 million, with a CAGR of 5.3%.Driven by the development of consumer electronics and the radiation exposure standards, the market size of the SAR industry continues to grow. It is expected that by 2025, the market size will reach RMB 627 million, and by 2029, it will reach RMB 856 million, with a CAGR of 8.1%.
- Low Power audio chips are widely used in various consumer electronics devices, including smartphones, smart wearable devices, and more. AI technology has expanded the boundaries of audio applications, driving the growth of the entire audio market. In 2024, the Chinese consumer electronics market is expected to reach approximately RMB 185.8 billion, with a projected CAGR of 6.5% to reach RMB 254.5 billion by 2029. The consumer audio market in 2024 is estimated to be approximately RMB 616.04 billion, and is expected to exceed RMB 1,510.04 billion by 2032. AI audio voice interaction has gradually become widespread in portable consumer electronics devices. For example, in 2024, the Shipment Volume of smart TWS earbuds supporting voice interaction wake-up functionality is expected to account for 75% of the global market. By 2025, global Shipment Volumes of personal smart audio devices (such as smart TWS earbuds and smart speakers) are projected to reach 533 million units, representing an 8% year-over-year increase. AI audio voice interaction features (such as real-time noise cancellation and voice wake-up) have become standard. The deepening application of artificial intelligence and the upgrading of audio solutions have driven the growth of low power audio chips, demonstrating that the deepening application of AI has stimulated demand for power amplifier audio chips.

Appendices

- The term "power amplifier audio chip" is widely understood and used throughout the industry to describe a specific type of advanced audio chip. Major global companies like Texas Instruments (TI) and Cirrus Logic popularized this term in the 2010s when they launched products called things like "Smart Power Control" or "low power audio chip." Other important players, including Chinese firms like Awinic Electronics, consistently use this same language in their public materials. While there's no official government definition for "power amplifier audio chip," the fact that all these leading companies use it shows there's clear agreement in the industry about what it means.
- The big difference between a "smart" audio chip and a basic, traditional one comes down to intelligence and built-in smarts. Unlike basic chips that mainly just make sound louder (like older speaker technology), power amplifier audio chips constantly listen to the speaker itself. They automatically fine-tune their power output in real-time to make the sound better and protect the speaker from harm. This smart control also makes them much better at saving battery power, especially at lower volumes, helping devices like phones and earbuds last longer on a charge. They have strong built-in safety features to prevent damage from getting too hot or electrical problems, reducing the need for extra protective parts. Plus, they have a built-in computer brain (called DSP) right on the chip that handles sound processing, leading to noticeably better sound quality and more features than basic chips can offer.
- The Company's audio chips are firmly in this "power amplifier audio chip" category. They achieve this using the Company's own key technologies. These include special instructions for better sound and speaker protection, ways to clearly handle all types of sounds, methods to keep sound crisp at any volume level, and intelligent circuits designed specifically to guard the speaker. Because of these technologies, The Company's chips automatically adjust themselves based on what's happening, use very little power, actively protect speakers from damage, combine multiple jobs into one chip, and deliver significantly better sound quality. This puts The Company's products in direct competition with the power amplifier audio chips sold by major players like TI, Cirrus Logic, and Awinic Electronics.
- The primary functions of the company’s distributors vary depending on the profile of the end customer. In collaborations with major brand customers, the distributors primarily handle logistics and payment settlement on our behalf, Given the numerous and geographically dispersed manufacturing plants of these major brands, as well as their diverse delivery requirements utilizing distributors enhances the efficiency of chip delivery, reduces our sales-related operational expenses, and shortens our collection cycle. For small and medium-sized brand customers. The distributors additionally assist the Company in market promotion by introducing products and facilitating order acquisition, thereby expanding the market coverage of the company’s products.
- According to our research on semiconductor industry in China based on public information, the Company's use of the business model is well-established in the fabless semiconductor industry, and the Company’s adoption of this distributorship business model. including the fact that a significant portion of its revenue is derived from distributors, is consistent with the practices of comparable industry peers. The research include industry norms, market trends, and in particular, the operating and financial performance(including the revenue attributable to distributors and inventory turnover periods), the adoption of distributorship business model and the inventory management practice of other market players during the Track Record Period.

The Company respectfully submits that "largest consumer electronics multinational corporation headquartered in South Korea" refers to Samsung.

The Company respectfully submits that the "nine of the top ten global smartphone manufacturers" refers to Samsung, Transsion(传音), Xiaomi, Huaqin, OPPO, Longcheer(龙旗科技),vivo, Wingtech(闻泰科技), and Honor in 2024 according to F&S. The aggregate revenue rising from such nine end customers is RMB293.1 million in 2024, representing approximately 82.4% of the Company's total annual revenue, and RMB131.9 million in the six months ended June 30 2025, representing approximately 74.6% of the total revenue in such six months. The Company's average revenue rising from such nine end customers are RMB37.7 million and RM16.5 million in 2024 and first half of 2025.

The Company respectfully submits that the "eight of the top ten China TV manufacturers" refers to CVTE(视源), BOE VT(视讯), Hisense(海信),Xiaomi,TCL, Skyworth(创维), Changhong(长虹), and KONKA(康佳) in 2024 according to F&S. The aggregate revenue rising from such eight end customers is RMB12.1 million in 2024, representing approximately 45.9% of the Company's total annual revenue of mid/high power amplifier audio chips, and 7.4 million in the six months ended June 30 2025, representing approximately 56.9% of the total revenue in such six months. The Company's average revenue rising from such eight end customers are RMB3.0 million and RMB1.9 million in 2024 and first half of 2025.

The Company further respectfully submits that the Company is not able to disclose respective revenue contribution during the Track Record Period primarily because our distributors are unable to provide such information because of the Non-Disclosure Agreements they have entered into with end customers.