Confidential

Independent Market Research on Global and China Automotive Electronics and Automotive Safety Industry Overview

For

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JOYSON ELECTRONICS

2025

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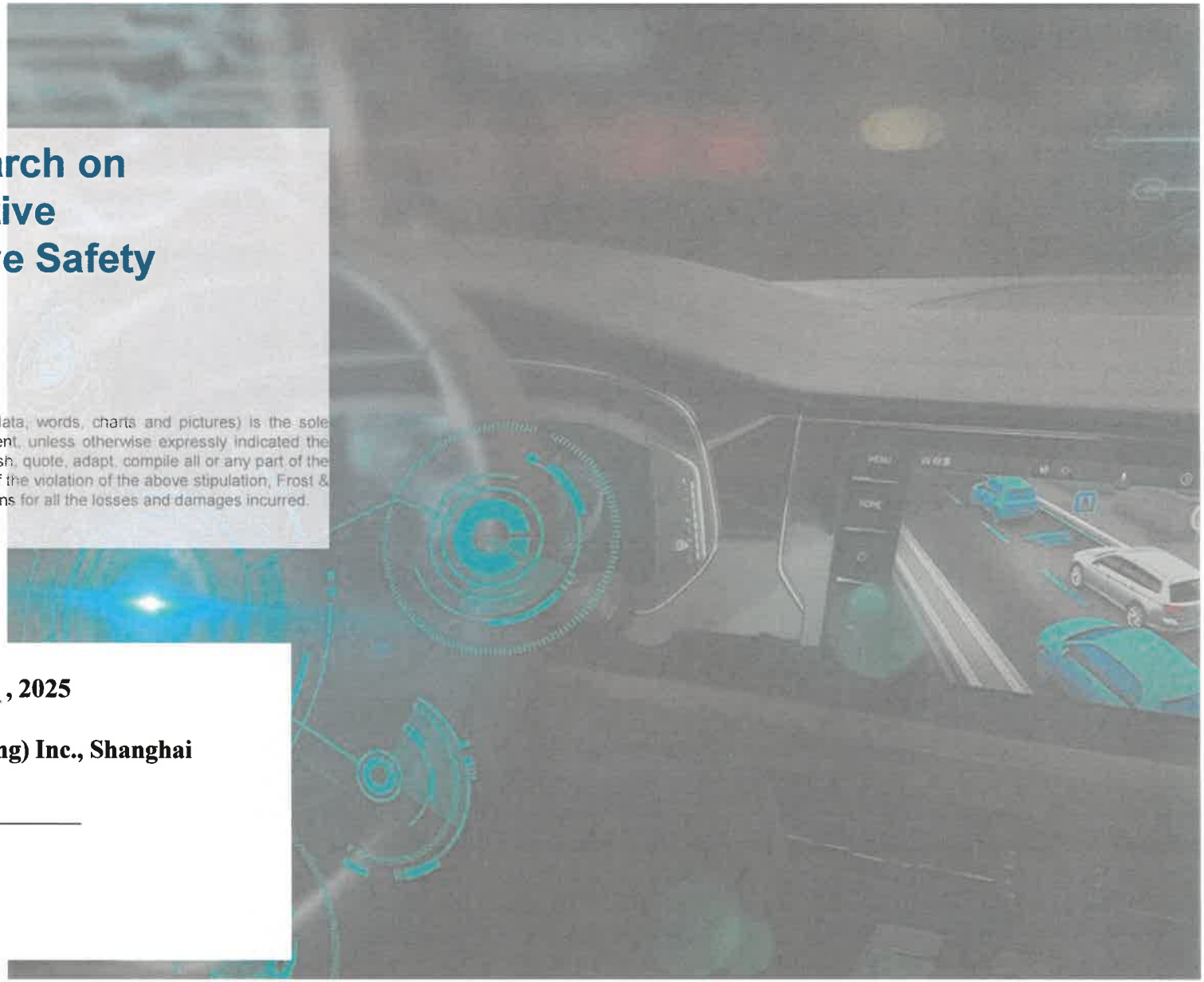


Date: October 28 **, 2025**

For and on behalf of Frost & Sullivan (Beijing) Inc., Shanghai Branch Co.

Name: Terry Tse

Title: Consulting Director

Agenda

PART ONE

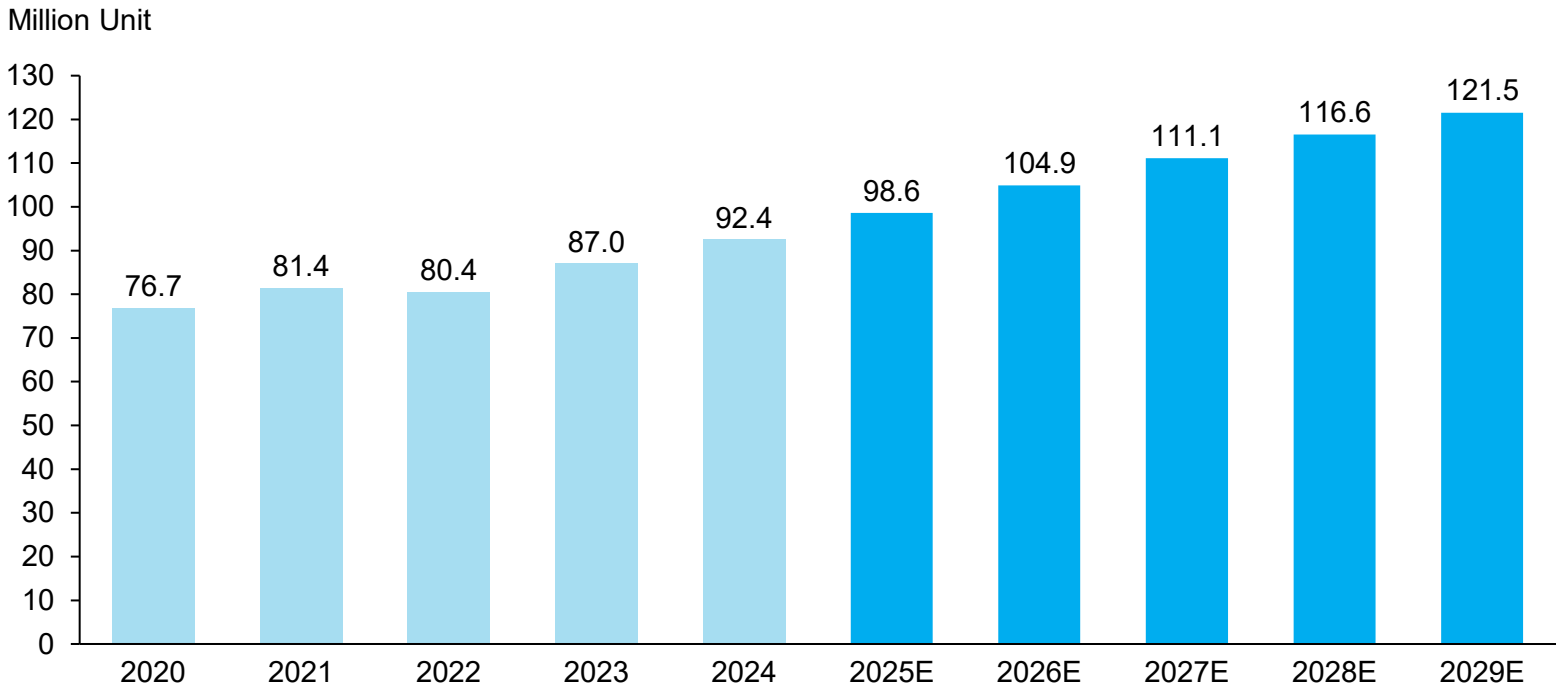
Global Automotive Industry Overview

Global and China Automotive Industry Overview

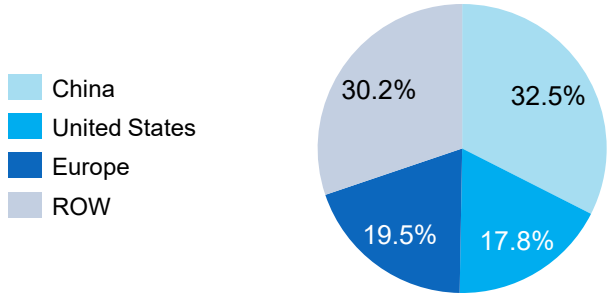
Market Size of Global Automotive Industry

Market Size of Automotive Industry by Sales Volume (Global), 2020-2029E

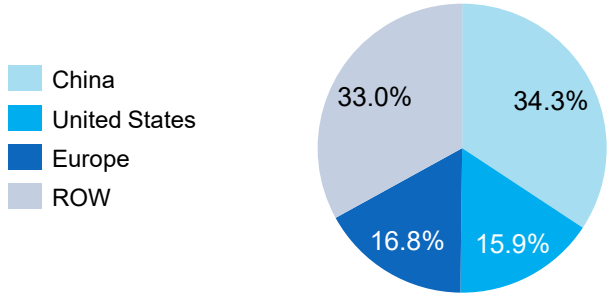
	CAGR 2020-2024	CAGR 2025E-2029E
Global Automobile Sales Volume	**4.8%**	**5.4%**



Breakdown of Automobile Sales Volume in Major Countries and Regions, 2024



Breakdown of Automobile Sales Volume in Major Countries and Regions, 2029E



- The automotive industry has entered its maturity phase after decades of development. In 2024, global automobile sales volume reached 92.4 million units, with China accounting for 32.5% of global sales, making it the largest automotive market worldwide, followed by Europe and the United States. With the ongoing trends in electrification and the increasing integration of advanced technologies, the automotive industry is currently undergoing a significant transformation. Advancement in vehicle intelligence technologies is leading the automotive industry to the “third living space” vision. According to Frost & Sullivan, global automobile sales volume is expected to reach 121.5 million units by 2029, with a CAGR of approximately 5.4% from 2025. Driven by advancements in electrification technology and a large domestic market, it is projected that, China will continue to hold the first position in global automobile sales, with a projected market share of approximately 34.3% by 2029, followed by the United States and Europe.

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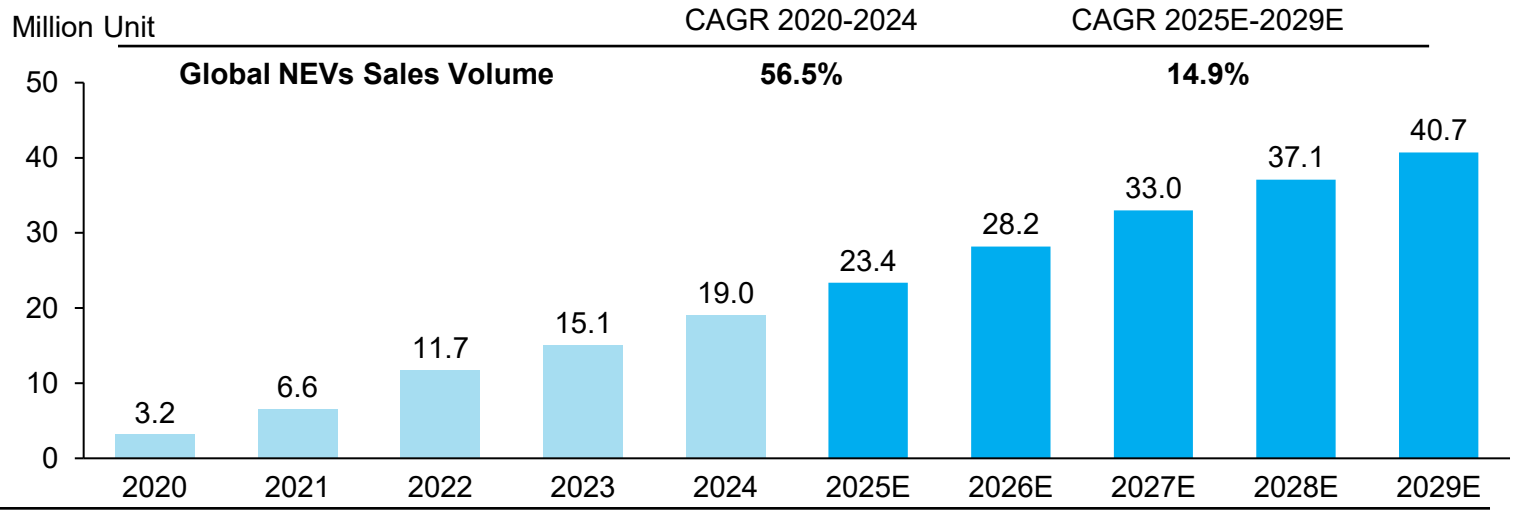
Source: Frost & Sullivan

Global and China Automotive Industry Overview

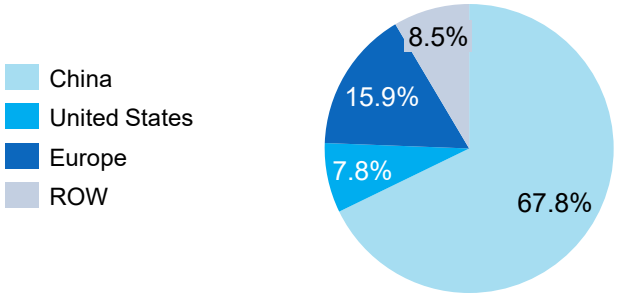
Market Size of Global NEV Industry

Market Size of NEVs Industry by Sales Volume (Global), 2020-2029E

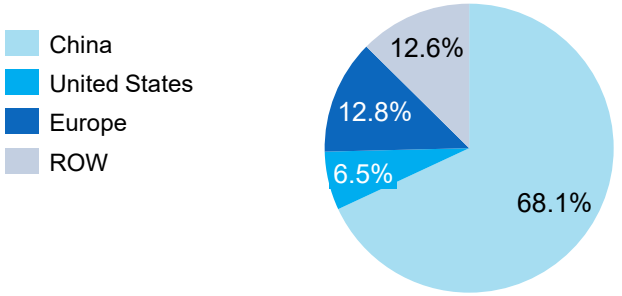


	2020	2021	2022	2023	2024	2025E	2026E	2027E	2028E	2029E
ICE sale volume (Million Unit)	73.5	74.8	68.7	71.9	73.4	75.2	76.7	78.1	79.5	80.8
NEV penetration rate(%)	4.1%	8.1%	14.5%	17.4%	20.6%	23.7%	26.9%	29.7%	31.8%	33.5%

Breakdown of NEVs Sales Volume in Major Countries and Regions, 2024



Breakdown of NEVs Sales Volume in Major Countries and Regions, 2029E



- According to Frost & Sullivan, global sales volume of new energy vehicles (NEVs) increased from 3.2 million units in 2020 to 19.0 million units in 2024. In terms of sales volume, China has the largest NEV market globally in 2024, with a total sales volume reaching 12.9 million units, accounting for 67.8% of global sales, followed by Europe and the United States. Driven by advancements in battery technology, the widespread development of charging infrastructure and growing consumer acceptance, the global NEV market is expected to see increasing market penetration in the coming years. Looking forward, global NEVs sales volume is expected to increase to 40.7 million units in 2029, representing a CAGR of approximately 14.9% from 2025. China will still be the largest NEV market in terms of sales volume by 2029, followed by Europe and the United States. The trend of vehicle electrification has driven the development of intelligent technologies in multiple ways. The E/E architecture of NEVs offers higher integration and scalability, supporting more electronic devices and sensors. This not only lays a solid foundation for the realization of intelligent functions but also provides a more flexible architecture and stable energy supply for the integration of automotive intelligent systems. Furthermore, electrification enhances vehicles' response speed, control precision and computing power, making intelligent decision-making processes more efficient and accurate. This further accelerates the development of automotive intelligence and improves overall performance and user experience.

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Source: Frost & Sullivan

Global and China Automotive Industry Overview

Market Drivers and Trends of Global and China Automotive Industry (1/3)

Electrification, Intelligence and Connectivity

The automotive industry is undergoing a transformation driven by electrification, intelligence and connectivity. In 2024, the global penetration rate of NEVs reached 20.6%, fueled by expanding charging infrastructure and growing consumer demand for eco-friendly solutions. Extensive application of technologies of intelligent cockpits, intelligent driving and smart connectivity, has significantly enhanced driving convenience, safety and overall enjoyment. Intelligent cockpit technologies such as voice recognition, adaptive systems and AI-driven features, are enhancing convenience, safety and personalized experience for drivers. Connectivity, particularly through 5G-V2X technology, is enabling real-time communication among vehicles, infrastructure and pedestrians, which not only improves road safety but also accelerates intelligent driving. Meanwhile, the rapid advancement of electrification and intelligent technologies is transforming traditional auto parts. Intelligent cockpit systems are gradually replacing traditional buttons with multimodal interactions such as touchscreens, voice recognition and gesture control, while automotive safety products are integrating with intelligent driving technologies to provide proactive hazard warnings and protection. In addition, driven by ongoing technological breakthroughs, these intelligent features are expected to expand from mid-to-high-end models to a broader range of mid-to-low-end models. Together, these trends are redefining the automotive landscape, with vehicles becoming more energy-efficient, intelligent and integrated into the broader ecosystem of smart cities.

Policy-promoted Global Automotive Market

The direction and pace of change in the global automotive industry are significantly influenced by policies of various countries regarding carbon emissions and the promotion of NEVs transformation. In addition, tariff adjustments in key markets such as Europe and the United States, have directly influenced the cost structures and market strategies of multinational automobile manufacturers and other stakeholders across the value chain. The imposition of high tariffs by both Europe and the United States on Chinese NEV manufacturers has prompted these companies to expand their global presence and adopt more diversified international strategies, including developing overseas supply chains and production capacity. Meanwhile, supportive policies in emerging markets, such as Southeast Asia, through tax incentives and relaxed foreign investment regulations, have created new growth opportunities for automobile manufacturers.

Faster Iteration Speed of NEVs

The NEV market faces intense competition as manufacturers strive to increase market share. To remain competitive, they must accelerate product iteration. Meanwhile, NEVs have a clear advantage over traditional ICE vehicles in terms of development cycles, primarily due to greater flexibility in technological upgrades and functional iterations. This agility enables NEVs to respond more quickly to market demands and evolving consumer preferences. The integration of electrification and intelligent technologies allows intelligent electric vehicles to make continuous advancements in areas such as driving range, charging efficiency, intelligent driving capabilities and human-machine interaction experience, driving ongoing innovation within the industry.

Source: Frost & Sullivan

Global and China Automotive Industry Overview

Market Drivers and Trends of Global and China Automotive Industry (2/3)

Increasing Proportion of Automotive Electronics in the BOM

With the continued advancement of electrification and intelligence, both the value and the number of automotive electronics categories are steadily increasing. The proportion of automotive electronics in the Bill of Materials (BOM) has grown from 34.5% in 2020 to 41.3% in 2024. Compared to ICE vehicles, NEVs have higher demands for electronic components in areas such as power management, power conversion, battery management and electric powertrains. In addition, the adoption of intelligent cockpit, intelligent driving and smart connectivity is enhancing the driving experience through advanced human-machine interaction, improved safety and personalized services. These innovations are driving demand for various automotive electronic products, significantly increasing the value contribution of automotive electronics in vehicles. Furthermore, as the computing power and functionalities of chips for intelligent cockpits, intelligent driving and smart connectivity continue to advance the value of automotive electronics is expected to rise notably. As a result, it is projected that the proportion of automotive electronics in the BOM will further increase to approximately 47.9% in 2029.

Increasing Cost per Vehicle of Passive Safety

The increasingly stringent automotive safety regulations have led to an increase in cost per vehicle of passive safety, rising from approximately RMB1,500 in 2020 to approximately RMB1,800 in 2024. To further safeguard pedestrians and occupants, automobile manufacturers have concentrated on enhancing body structure optimization and improving the performance of passive safety products. In response to higher standards for collision safety, especially for side-impact and frontal crash tests, manufacturers have invested more in safety features such as side airbags and pre-tensioner seatbelts. As a result, cost per vehicle of these safety products has grown steadily in the overall vehicle design.

Centralized Automotive E/E Architecture

As automotive E/E architectures shift from distributed to centralized models, domain control system has been introduced, integrating diverse intelligent cockpit functions through a more centralized architecture. For example, intelligent cockpit domain control system centralizes multiple display terminals, which were previously separate, enabling “single chip, multi-screen” (一芯多屏) and “multi-screen integration” (多屏交互). Meanwhile, with the trend toward cockpit-driving integration, the intelligent cockpit domain and the intelligent driving domain are gradually merging into a unified platform, providing users with a more cohesive and immersive in-vehicle experience. Looking ahead, with the continuous R&D of high-performance CCUs, multi-domain integration is expected to accelerate, fostering seamless interaction among various vehicle domains. Centralized E/E architectures will help achieve goals such as cost reduction, improved communication latency and optimized computing resource utilization, thereby jointly advancing vehicle intelligence and enhancing user experience.

Source: Frost & Sullivan

Global and China Automotive Industry Overview

Market Drivers and Trends of Global and China Automotive Industry (3/3)

Globalization Trend

Driven by trade policies and cost advantages, Chinese automobile manufacturers are expanding overseas, transitioning from product exports to a localized “R&D, production and sales” model. Currently, Chinese auto parts suppliers hold leading expertise in areas such as intelligent cockpit, intelligent driving and smart connectivity. This leadership is underpinned by strong R&D, manufacturing and supply chain management capabilities, enabling rapid market adaptation and innovation. As a result, the overseas expansion of Chinese automobile manufacturers has facilitated the global promotion of these advanced technologies, and simultaneously, has also helping Chinese auto parts suppliers penetrate international markets. As they continue to expand their global networks, they are expected to further integrate into the supply chains of foreign automobile manufacturers, promoting the wider distribution of China’s leading intelligent technologies on a global scale.

Evolving Cooperation Models Between Automobile Manufacturers and Tier 1 Suppliers

As market dynamics evolve, automobile manufacturers are increasingly delegating development and manufacturing responsibilities to Tier 1 suppliers, particularly for intelligent vehicles. This shift enables cost efficiency and the delivery of high-quality, customized solutions. In China, foreign manufacturers are partnering with local Tier 1 suppliers to co-develop vehicles tailored to the country’s rapid transition toward electrification and digitalization. As demand for smart, connected and electrified vehicles rises, collaboration between manufacturers and Tier 1 suppliers will deepen, with a stronger focus on advanced technologies such as autonomous driving, AI-powered systems and integrated platforms. In response to the competitive Chinese automotive market, local Tier 1 suppliers with expertise in automotive intelligence have become crucial partners, offering deep market insight and agility in meeting evolving demands. By co-developing solutions tailored to China’s unique needs, these partnerships are driving the intelligent transformation and capitalizing on mutual advancements.

Source: Frost & Sullivan

PART TWO

Global Auto Parts Industry Overview

Global Auto Parts Industry Overview

Overview (1/2)

- Auto parts refer to the individual parts and systems that make up a vehicle, working together to ensure the vehicle's performance, safety and functionality. The diagram below illustrates the representative auto parts included in the major domains of a vehicle:

Intelligent Driving Domain

- Radar sensor
- Camera
- Intelligent driving domain controller

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Chassis Domain

- Steering system
- Braking system
- Suspension system

……

Cockpit Domain

- Cockpit infotainment system
- Driver information system
- Head-up display (HUD) system
- Intelligent cockpit domain control system

……

Power Domain

- Engine system
- Battery system (battery, BMS, electric drive system)
- DC voltage converter
- Booster
- On-board charger

……

Connectivity Domain

- 4G+V2X(Vehicle to Everything)
- 5G+V2X (Vehicle to Everything)

……

Vehicle Body Domain

- Seatbelt
- Airbag
- Steering wheel
- Door and window control system

……

Source: Frost & Sullivan

Global Auto Parts Industry Overview

Overview (2/2)

- The auto parts industry chain is a comprehensive system encompassing upstream raw material suppliers, midstream auto parts suppliers and downstream automobile manufacturers. Upstream raw material suppliers provide essential inputs such as metals, plastics and electronic components. Midstream primarily consists of auto parts suppliers, with intelligent automotive technology solution providers playing an increasingly crucial role by aligning with the growing demand for vehicle electrification and intelligence. Their innovations not only enhance the functionality and efficiency of automobiles but also enable seamless integration of advanced intelligent technologies. Downstream automobile manufacturers incorporate these high-tech components into final vehicle production, which accelerates technological advancements and reinforces their competitive edge in the market.
- As market competition intensifies, automobile manufacturers are shifting their strategies from emphasizing full-stack capabilities to prioritizing cost and efficiency. At the same time, they are gradually delegating development and manufacturing responsibilities to auto parts suppliers, particularly for intelligent vehicles. This shift enables cost efficiency and the delivery of high-quality, customized solutions. In addition, as demand for smart, connected and electrified vehicles rises, collaboration between automobile manufacturers and auto parts suppliers will deepen, with a stronger focus on advanced technologies such as autonomous driving, AI-powered systems and integrated platforms. In response to the competitive Chinese automotive market, local suppliers with expertise in automotive intelligence have become crucial partners for both foreign and domestic automobile manufacturers, offering deep market insight and agility in meeting evolving demands. These partnerships drive intelligent transformation and capitalizing on mutual advancements by co-developing solutions tailored to China's unique needs.

- **Major Cooperation Models Between Automobile Manufacturers and Auto Parts Suppliers**
- **Automobile Manufacturers Self-Development, Auto Parts Suppliers as Manufacturers:** Under this model, automobile manufacturers retain control over core design and technology, while auto parts suppliers take on the responsibility for manufacturing. Automobile manufacturers can continue to drive advancements in design and technology, while auto parts suppliers, leveraging their expertise in manufacturing, ensure the production of high-quality auto parts.
- **Collaboration Between Automobile Manufacturers and Auto Parts Suppliers:** Both parties leverage their respective strengths to advance projects together, driving technological innovation and product optimization.
- **Auto Parts Suppliers Providing Comprehensive Solutions:** Auto part suppliers not only provide products but also play an active role in the entire process, from concept design to mass manufacturing. With their professional expertise and extensive experience, auto parts suppliers deliver tailored, comprehensive solutions, such as intelligent cockpits, intelligent driving and smart connectivity solutions, that enhance the competitiveness of automotive products.

Source: Frost & Sullivan

Global Auto Parts Industry Overview

Entry Barrier Analysis——Auto Parts Industry (1/2)

Entry Barrier Analysis of Auto Parts Industry

Customer Barrier

Leading auto parts suppliers have established long-term partnerships with top-tier automobile manufacturers, built on years of collaboration, mutual trust and a deep understanding of customer needs. These incumbents possess rich industry expertise, allowing them to provide tailored solutions that align precisely with manufacturers' specifications. For new entrants, breaking into these established supply chains is difficult due to the time required to build credibility, the challenge of meeting automobile manufacturers' stringent quality standards and the reluctance of manufacturers to switch from proven suppliers. This creates a substantial customer barrier for new entrants.

Technology Barrier

The development and production of auto parts demand expertise in advanced fields such as AI, algorithms, embedded systems and power electronics. Established suppliers continuously invest in R&D to maintain technological leadership and enhance their manufacturing processes with innovative techniques such as real-time diagnostics, AI-based analytics and precision safety controls. For new entrants, acquiring the required technical expertise, infrastructure and highly skilled talent is both costly and time-intensive, creating a robust technology barrier to entry.

Capital Barrier

Auto parts suppliers operate in a capital-intensive industry that requires substantial financial resources to remain competitive. Investments are necessary for advanced R&D facilities and intelligent manufacturing equipment, and compliance with stringent regulatory and certification standards. In addition, automobile manufacturers require high production volumes, which necessitate the establishment of large-scale production facilities equipped with robust quality control systems. For new entrants, securing the capital needed to meet these demands presents a significant challenge, creating a formidable barrier to entry.

Source: Frost & Sullivan

Global Auto Parts Industry Overview

Entry Barrier Analysis——Auto Parts Industry (2/2)

Entry Barrier Analysis of Auto Parts Industry

Qualification Barrier

The automotive industry is highly regulated, with stringent certification requirements and compliance standards across different regions. For example, meeting ISO certifications, functional safety standards such as ISO 26262, or specialized requirements such as 5G T-box network access licenses involves complex, time-consuming and costly processes. Leading suppliers have already established the necessary qualifications, while new entrants must invest heavily in acquiring certifications and building regulatory expertise, creating a significant qualification barrier.

Customized Service Capability Barrier

Automobile manufacturers increasingly demand highly tailored solutions that integrate both software and hardware to ensure seamless functionality and optimal performance. Leading suppliers meet these needs through advanced customization capabilities and proprietary technologies, such as software algorithms and hardware designs, developed through significant R&D investments. These capabilities create a strong barrier for new entrants, as developing comparable intellectual property and achieving the required level of customization expertise demands extensive time, financial resources and technical know-how.

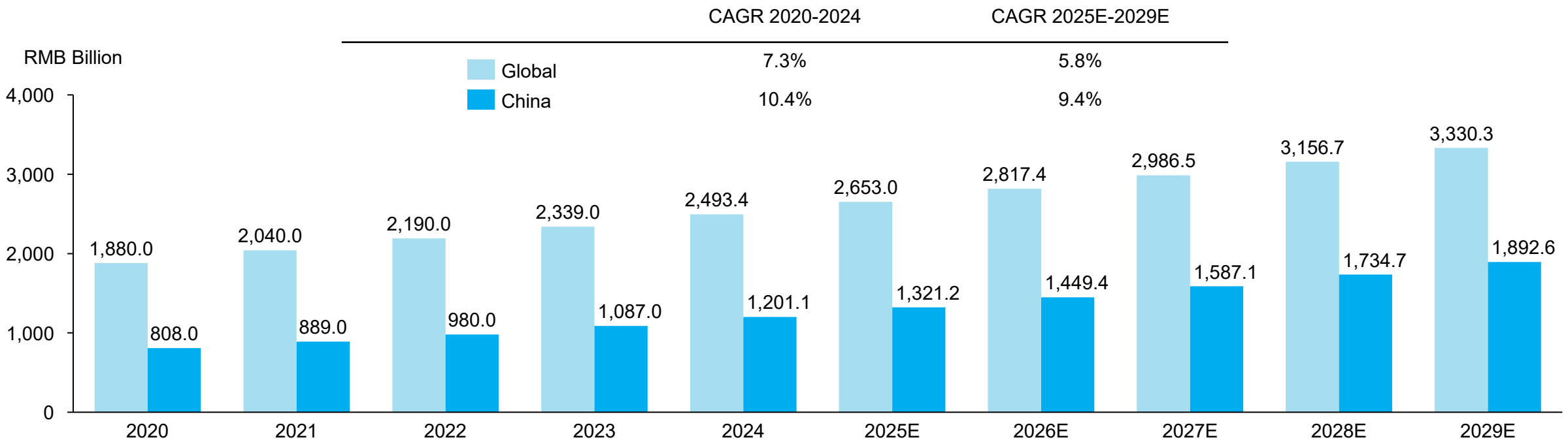
Source: Frost & Sullivan

2.1 Global Automotive Electronics Industry Overview

Global Automotive Electronics Industry Overview

Market Size of Global and China's Automotive Electronics Industry

Market Size of Automotive Electronics by Revenue (Global and China), 2020-2029E



- Automotive electronics are a critical component of both the automotive industry and intelligent automotive technology solutions. They play a key role in driving the comprehensive transformation toward automotive intelligence by enabling advanced technologies such as intelligent cockpit, intelligent driving and smart connectivity.
- With continuous advancements in technologies such as artificial intelligence, cloud computing, big data, 5G communication and the Internet of Vehicles (IoV), as well as the ongoing optimization of related infrastructure, the value of automotive electronics has steadily increased. The market size of automotive electronics has shown consistently upward growth, especially with the promotion of intelligent cockpit, intelligent driving and smart connectivity solutions. In 2024, the global and Chinese automotive electronics markets reached RMB2,493.4 billion and RMB1,201.1 billion, respectively. Looking forward, the development of automotive intelligence is expected to further drive demand for automotive electronics, fueling market growth. It is expected that by 2029, the market size of global and Chinese automotive electronics industries will increase to RMB3,330.3 billion and RMB1,892.6 billion, with CAGRs of 5.8% and 9.4% from 2025.

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Source: Frost & Sullivan

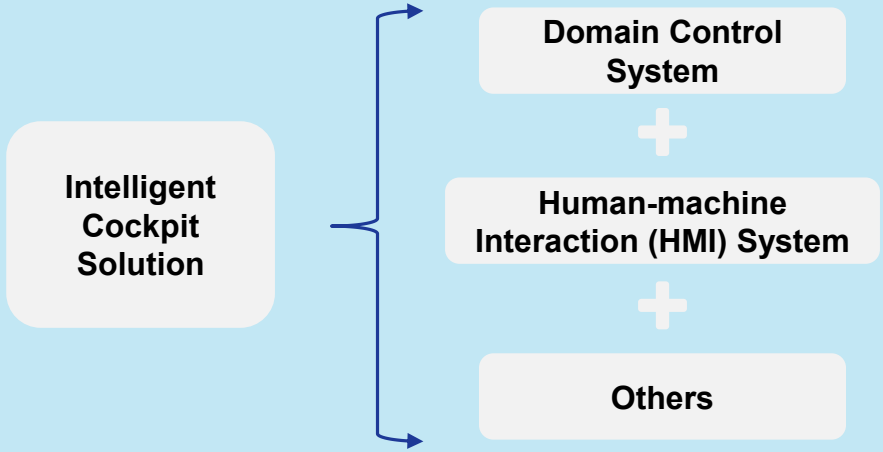
2.1.1 Global Intelligent Cockpit Solution Industry Overview

Global Intelligent Cockpit Solution Industry Overview

Definition and Classification

Definition and Classification of Intelligent Cockpit Solution

- The intelligent cockpit solution refers to an integrated solution for automotive cockpits equipped with intelligent in-vehicle products and systems. It consists of hardware and software that encompass the main components of the intelligent cockpit. Through intelligent interaction between humans and the vehicle, it provides drivers and passengers with multimodal intelligent perception, interaction and an immersive digital automotive experience through its products and services.
- Classified by product types, the intelligent cockpit solution specifically includes intelligent cockpit domain control system, human-machine interaction (HMI) system and others. Intelligent cockpit domain control system, through a more centralized architecture, enables control of functions such as entertainment, navigation, air conditioning, seat adjustments and more, resulting in a more intuitive, efficient and responsive driving experience. HMI system provides products including cockpit infotainment system, driver information system, head-up display (HUD), streaming media rearview mirror and other relevant interior accessories. HMI system serves as an interface between users and intelligent cockpits. Other systems among the intelligent cockpit solution mainly include other cockpit electronic devices and related supporting software.

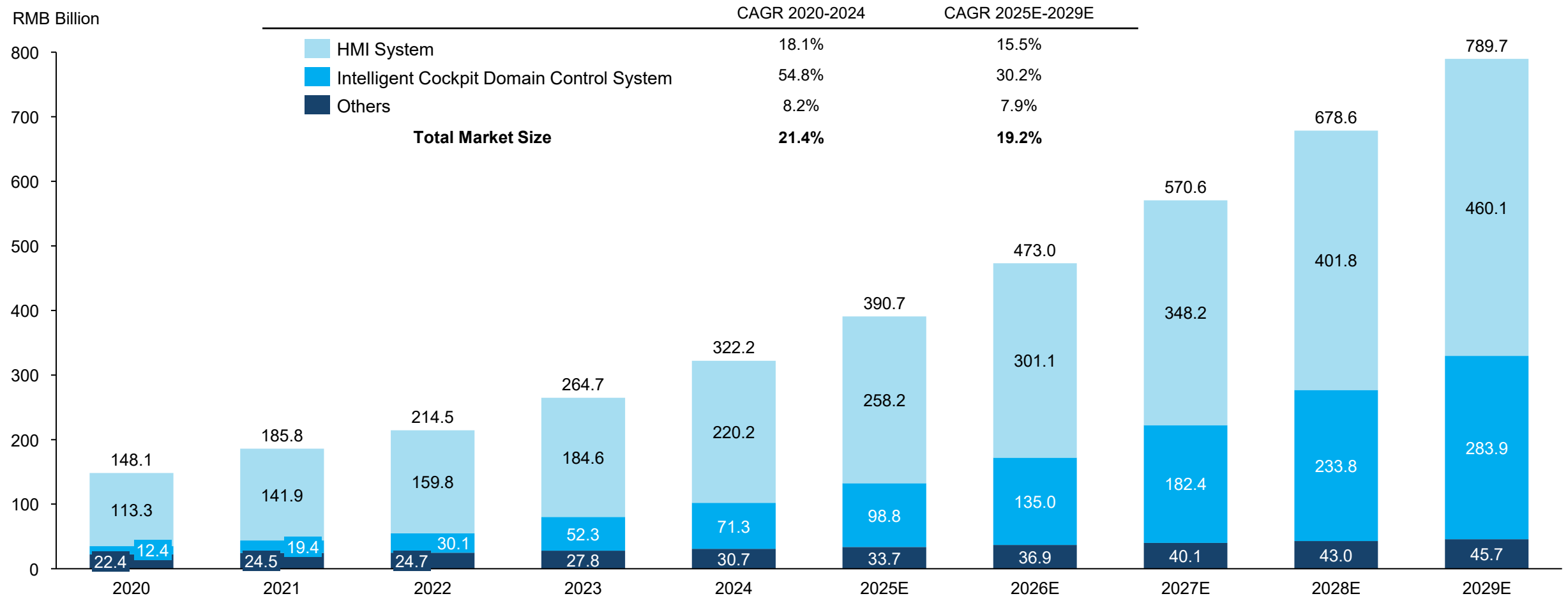


Source: Frost & Sullivan

Global Intelligent Connected Vehicle Solution Industry Overview

Market Size of Global Intelligent Cockpit Solution Industry

Market Size of Intelligent Cockpit Solution Industry by Revenue (Global), 2020-2029E



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Source: Interviews with Industry Experts, Frost & Sullivan

Global Intelligent Connected Vehicle Solution Industry Overview

Market Size of Global Intelligent Cockpit Solution Industry

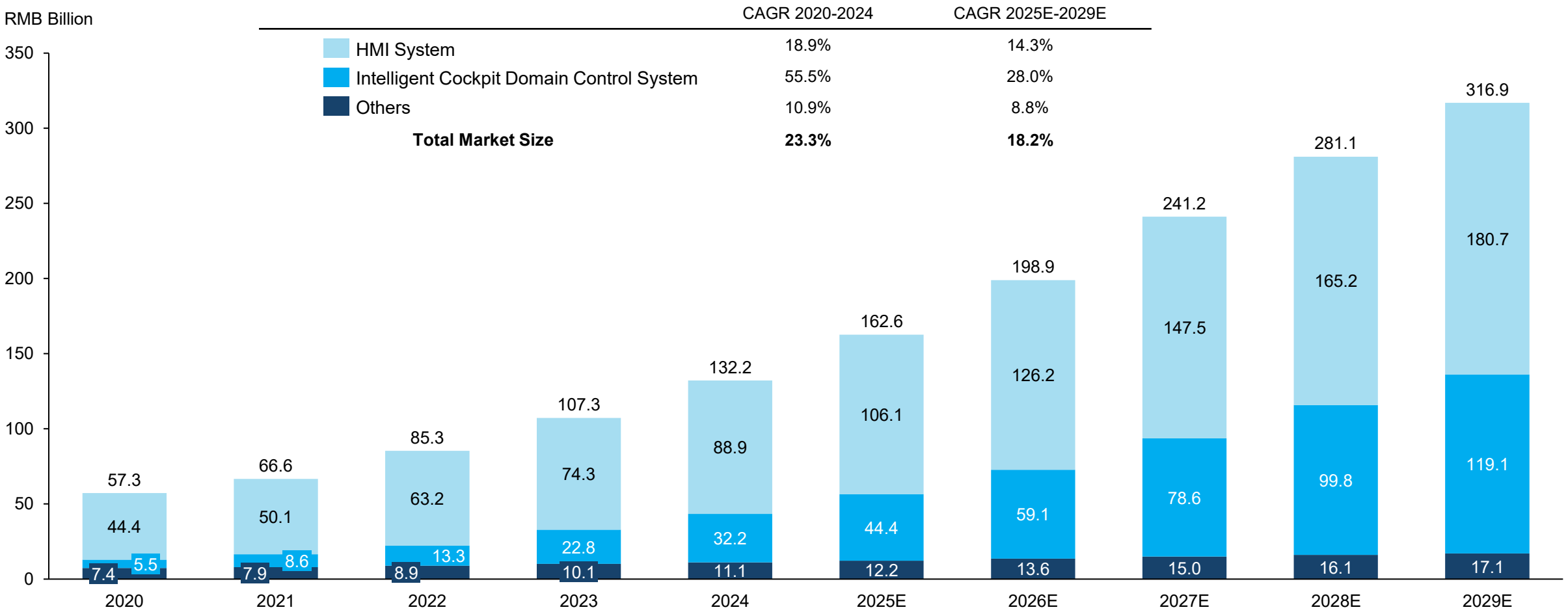
- Driven by technological advancements, the global cockpit industry has evolved from mechanization to the electronic and intelligent stages. For example, large-size, full-LCD dashboards have replaced traditional instrument clusters. In addition, the traditional central control screen has transformed into the cockpit infotainment system that offers multifunctionality, such as audio, video and Bluetooth. With consumers' increasing demand for cockpit entertainment and safety features, a variety of new intelligent cockpit products, such as HUDs and streaming media rearview mirrors, have emerged and are expected to gain greater market penetration in the coming years. From 2020 to 2024, the market size of global intelligent cockpit solution industry increased from RMB148.1 billion to RMB322.2 billion. Driven by continuous advancements in intelligent cockpit technologies, the penetration rate of these products will further increase. It is projected that the global intelligent cockpit solution industry will reach RMB789.7 billion in 2029 at a CAGR of approximately 19.2% from 2025.
- The market size of global HMI system industry reached RMB220.2 billion in 2024, and is expected to increase to RMB460.1 billion in 2029, representing a CAGR of 15.5% from 2025. As vehicle E/E architecture continues to evolve, the shift from distributed to centralized "functional domain" architectures has become a key trend, which has led to the development of the intelligent cockpit domain control system. The market size of global intelligent cockpit domain control system reached RMB71.3 billion in 2024, and is expected to increase to RMB283.9 billion in 2029, representing a CAGR of 30.2% from 2025.

Source: Frost & Sullivan

Global Intelligent Connected Vehicle Solution Industry Overview

Market Size of Global Intelligent Cockpit Solution Industry

Market Size of Intelligent Cockpit Solution Industry by Revenue (China), 2020-2029E



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Source: Interviews with Industry Experts, Frost & Sullivan

Global Intelligent Connected Vehicle Solution Industry Overview

Market Size of China Intelligent Cockpit Solution Industry

- Promoted by leading intelligent cockpit technologies, the intelligent cockpit solutions industry in China has experienced rapid growth over the past few years. From 2020 to 2024, the market size of intelligent cockpit solution industry in China increased from RMB57.3 billion to RMB132.2 billion. According to Frost & Sullivan, it is estimated that the market size of intelligent cockpit solution industry in China will reach RMB316.9 billion by 2029, representing a CAGR of approximately 18.2% from 2025.
- The market size of Chinese HMI system industry reached RMB88.9 billion in 2024, and is expected to increase to RMB180.7 billion in 2029, representing a CAGR of 14.3% from 2025. The market size of intelligent cockpit domain control system in China reached RMB32.2 billion in 2024, and is expected to increase to RMB119.1 billion in 2029, representing a CAGR of 28.0% from 2025.

Source: Frost & Sullivan

Global Intelligent Cockpit Solution Industry Overview

Market Drivers and Trends Analysis

Increasing Demands for Better Driving Experience

Consumers' desire for a higher quality of life and driving experience is accelerating the transformation of automotives from traditional transportation tools to mobile living spaces. This trend has created significant market development opportunities for intelligent cockpit solutions and related industry chains. An increasing number of consumers are inclined to choose NEVs equipped with diverse and high-performance intelligent cockpit systems, seeking the ultimate driving experience. The intelligent development of cockpits not only enhances the convenience and safety of driving but also provides passengers with a wide array of services and entertainment experience.

Upgrades of Intelligent Cockpit Products Driven by Emerging Technologies

Intelligent cockpit solution providers are enhancing the HMI experience in mobile scenarios by deeply integrating interior design, safety information, entertainment systems and data. With the acceleration of technological innovation, intelligent cockpit solutions are evolving towards multi-screen collaboration, multimodal interaction and AI proactive interaction. Specifically, multi-screen collaboration technology improves information sharing and operational convenience. Multi-modal interaction includes various methods such as voice, gesture and touch, optimizing the flexibility and intuitiveness of user experience. Meanwhile, advancements in AI proactive interaction technology, particularly in emotional recognition and response, enable intelligent cockpits to identify passengers' emotions and needs, providing more personalized and proactive services. In the future, the development of intelligent cockpits will center on user needs and experience, driven by specific scenarios to continuously meet consumers' diverse demands for intelligent mobility.

More Integrated Ecosystem

Intelligent technology is transforming vehicle cockpits by equipping them with advanced capabilities in perception, cognition, judgment and decision-making. In the evolving era of human-vehicle relationships, intelligent cockpit solution providers aim to integrate hardware and software while creating a "third space" that is intelligent, interactive, emotional and resonant. This space is designed to meet users' diverse needs for travel, work, entertainment and leisure, making the cockpit a personalized, multifunctional environment. In the future, intelligent cockpits will enable full integration into the ecosystems of smart transportation and smart cities, where vehicles become a central part of an interconnected, digital lifestyle, fostering deeper interactions between people and technology.

Source: Frost & Sullivan

Global Intelligent Cockpit Solution Industry Overview

Competitive Landscape of China Intelligent Cockpit Solution Industry——Intelligent Cockpit Domain Control System

Top Five Providers in the Intelligent Cockpit Domain Control System Industry by Revenue (Global and China), 2024

Global

Ranking	Company	Revenue (RMB Billion)	Market Share
1	Company A	7.5	10.5%
2	Company C	7.2	10.1%
3	Company B	6.5	9.1%
4	**the Company**	**6.3**	**8.9%**
5	Company D	5.0	7.0%
	CR5	**32.5**	**45.6%**
	Total	**71.3**	

China

Ranking	Company	Revenue (RMB Billion)	Market Share
1	Company C	7.0	21.7%
2	**the Company**	**2.1**	**6.5%**
3	Company E	1.4	4.3%
4	Company F	1.4	4.2%
5	Company I	1.3	4.0%
	CR5	**13.1**	**40.8%**
	Total	**32.2**	

- The intelligent cockpit solutions industry is relatively fragmented, and industry competition is gradually shifting from single-product competition to integrated intelligent cockpit solutions. Leveraging advantages in technology, cost, supply chain management and services, Chinese companies are progressively gaining more influence in the global intelligent cockpit solution market. In 2024, the top five intelligent cockpit domain control system providers worldwide accounted for a total market share of 45.6%. The Company's revenue in the global intelligent cockpit domain control system industry was RMB6.3 billion, with a market share of approximately 8.9%, ranked fourth globally. In 2024, the top five intelligent cockpit domain control system providers in China accounted for a total market share of 40.8%. The Company's revenue in the intelligent cockpit domain control system industry in China was RMB2.1 billion, with a market share of approximately 6.5%, ranked second among all market participants in China.

Source: Interviews with Industry Experts, Annual Reports of Listed Companies, Frost & Sullivan

Global Intelligent Cockpit Solution Industry Overview

Competitive Landscape of China Intelligent Cockpit Solution Industry——Company Profile

Company A: The company was founded in 2000 and is listed on the Nasdaq Stock Market, primarily engaged in digital instrument clusters, automotive displays, infotainment systems, intelligent cockpit domain control systems and other related products.

Company B: The non-listed company was founded in 1886, providing a comprehensive product portfolio encompassing infotainment systems, display and interaction systems, intelligent cockpit domain control systems and other related products.

Company C: The company was founded in 1986 and is listed on the Shenzhen Stock Exchange, with a business focus on infotainment systems, automotive displays, HUDs, driver information systems, intelligent cockpit domain control systems and other related products.

Company D: The company was founded in 1994 and is listed on the New York Stock Exchange, with a business focus on integrated vehicle cockpit displays, navigation systems, domain control systems and other related products.

Company E: The non-listed company was founded in 2018, primarily engaged in intelligent cockpit domain control systems and other related products.

Company F: The company was founded in 2017 and is listed on the Nasdaq Stock Market, with a business focus on infotainment systems, intelligent cockpit domain control systems and other related products.

Company I: The non-listed company was founded in 2014, with a focus on developing vehicle domain control systems, intelligent connectivity software and other related products.

Source: Frost & Sullivan

Note: Chinese Companies*

2.1.2 Global Intelligent Driving Solution Industry Overview

Global Intelligent Driving Solution Industry Overview

Definition

An intelligent driving solution is an integrated system that assists people in controlling vehicles and ultimately achieves autonomous driving. It consists of hardware and software components that cover both the perception and decision-making layers of intelligent driving systems. Classified by products, intelligent driving solution typically includes radar sensors (e.g., millimeter-wave radars, ultrasonic radars, lidars), cameras (e.g., front cameras, surround cameras), intelligent driving domain controllers and other relevant automotive electronics and supporting software. As one of the key hardware components in an intelligent driving solution, the intelligent driving domain controller is a core control unit responsible for managing and processing the vehicle's intelligent driving functions. It integrates tasks such as vehicle perception , decision-making and execution into a single domain for centralized processing. The major functions of the intelligent driving domain controller include but are not limited to the following:

- **Perception Data Processing:** The intelligent driving domain controller receives data from various sensors such as lidars, millimeter-wave radars and cameras. It then fuses and analyzes the data to create accurate environmental awareness.
- **Decision Making and Planning:** Based on the processed perception data, the intelligent driving domain controller plans and makes decisions such as when to accelerate, decelerate, steer, or stop to achieve intelligent driving functionality.
- **Control Execution:** The intelligent driving domain controller sends the decision outcomes to vehicle actuators (e.g., steering, braking) to ensure the vehicle follows the planned route safely.
- **Communication and Coordination:** The intelligent driving domain controller communicates with other domain controllers such as body control and power control units and external networks to synchronize the vehicle's operation.

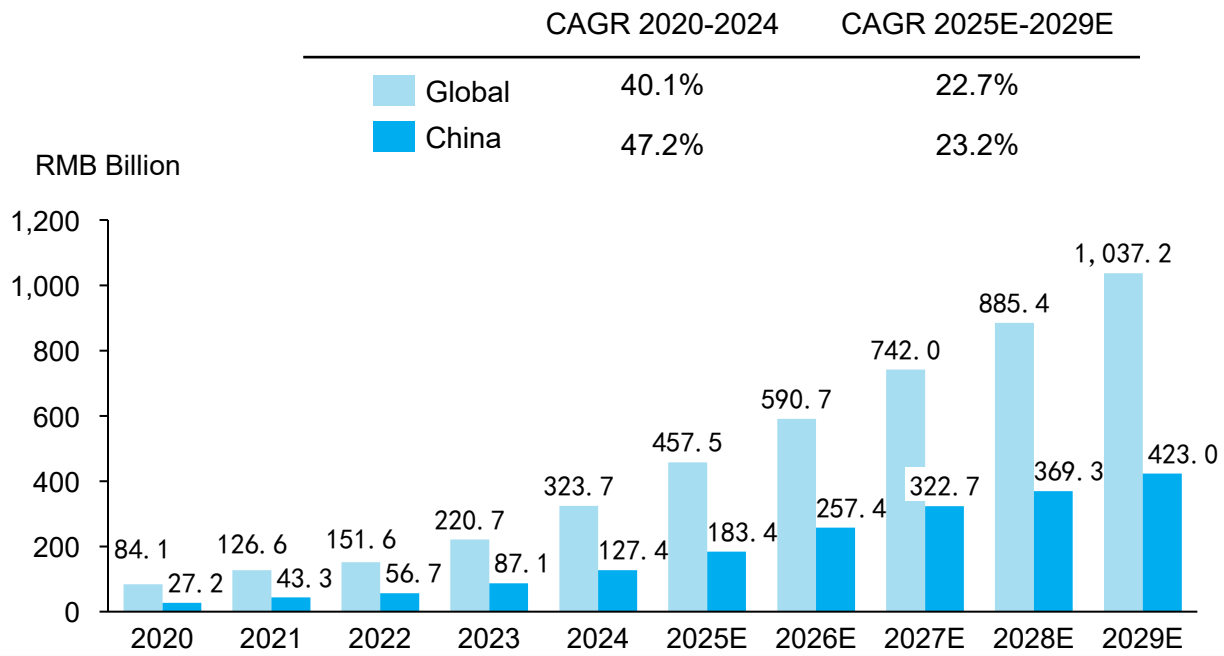
The CCU is emerging as a core technology in the intelligent driving solution industry, gaining attention for its ability to centralize control functions into a high-performance computing platform. It integrates data from multiple domains, such as intelligent driving, intelligent cockpit and body control, enhancing system coordination and responsiveness. By processing real-time sensor data, the CCU ensures safe and efficient vehicle operation in diverse environments while providing the computational power needed for intelligent driving and rapid decision-making. Additionally, the CCU enables system optimization and functionality expansion through software updates, simplifying traditional distributed ECU systems and enhancing vehicle intelligence.

Source: Frost & Sullivan

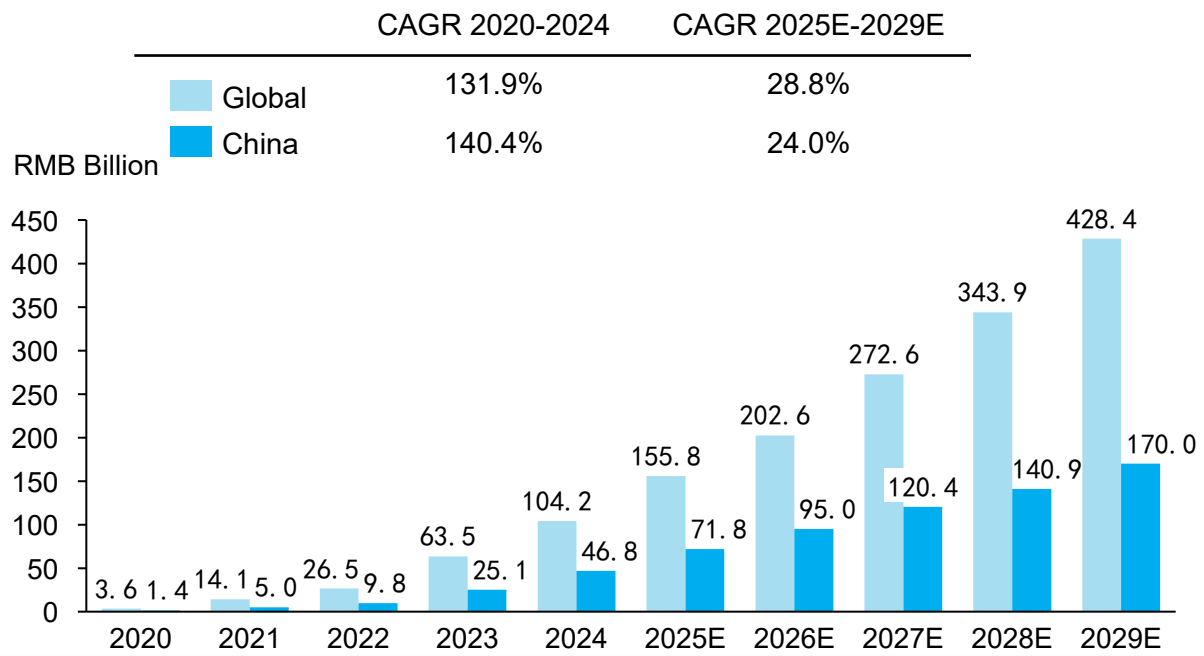
Global Intelligent Driving Solution Industry Overview

Market Size of Intelligent Driving Solution Industry and Intelligent Driving Domain Controller Industry

Market Size of Intelligent Driving Solution Industry by Revenue (Global and China), 2020-2029E



Market Size of Intelligent Driving Domain Controller Industry by Revenue (Global and China), 2020-2029E



- Intelligent driving solution industries in China and worldwide have grown rapidly, driven by advancements in technology, rising consumer demand for safer and more comfortable driving and supportive government policies. In 2024, the market size of intelligent driving solution industry by revenue reached RMB323.7 billion globally and RMB127.4 billion in China, and is projected to grow to RMB1037.2 billion and RMB423.0 billion by 2029, with CAGRs of 22.7% and 23.2% from 2025, respectively. Intelligent driving domain controllers, as the core computational hubs for decision-making, represent the fastest-growing segment, driven by the automotive shift toward domain control and widespread adoption of intelligent driving features. The market size of intelligent driving domain controller industry reached RMB104.2 billion globally and RMB46.8 billion in China in 2024 and is expected to grow to RMB428.4 billion and RMB170.0 billion by 2029, accounting for nearly 40% of the intelligent driving solution market. China is taking a leading position in the global intelligent driving solution market. As the largest market in the world, China is at the forefront of large-scale deployment and commercialization of intelligent driving technologies. This is driven by strong government support, extensive infrastructure and domestic competitors' focus on cost-effective solutions and cutting-edge technologies.

Notes: The graph above refers to intelligent driving solutions for passenger vehicles.

Source: Interviews with Industry Experts, Frost & Sullivan

Global Intelligent Driving Solution Industry Overview

Market Drivers and Trends Analysis, Competitive Landscape Analysis

"Drive-Park Integration" Speeding up Intelligent Driving Domain Controller Market Growth

As the integration of ADAS functions continues to improve, intelligent driving domain controller with the functions of "Drive-Park Integration" have become the industry's mainstream solution. This controller combines both driving and parking functions on a single platform, offering more efficient system integration and a smarter driving experience. This trend is not only driving the rapid development of automotive automation but also simplifying the software and hardware architecture, enhancing overall stability and user experience.

CCU Driving the Trend of Integration Trend of Intelligent Driving Platforms

In intelligent driving solutions, the CCU is becoming a core technological platform. With advanced computational power and multi-domain integration, it efficiently handles complex tasks and meets growing system integration demands. As automotive electronic architectures shift from distributed to centralized designs, the CCU will integrate intelligent driving, cockpits and connectivity, simplifying hardware, improving system performance and enabling cost-effective solutions through streamlining the E/E architecture. This accelerates the adoption of software-defined vehicle (SDA) architectures, paving the way for higher levels of intelligent driving.

Competitive Landscape Analysis

- The global intelligent driving solution market is highly fragmented due to the industry's complexity and diversity. In recent years, a growing number of new entrants, including automobile manufacturers, auto parts suppliers and technology companies, have entered the intelligent driving solution industry. This influx of diverse players has led to a more fragmented and dynamic industry landscape. In 2024, there were thousands of companies in the intelligent driving solution market globally. With ongoing technological advancements, the complexity of perception, control and decision-making systems in intelligent driving continues to grow, alongside increasing information exchange and control integration with other vehicle systems. Leading companies possess R&D and mass production capabilities closely collaborating with automobile manufacturers to equip their products across various models.

Source: Frost & Sullivan

2.1.3 Global Smart Connectivity Solution Industry Overview

Global Vehicle Intelligent Connected System Industry Overview

Definition and Classification (1/2)

Overview of Vehicle Intelligent Connected System

- The vehicle's smart connectivity solution integrates smart connectivity technologies and services. Based on system-level collaborative perception, decision-making and control, smart connectivity solution provides key operational services such as smart connectivity, intelligent safety, smart mobility and intelligent maintenance, to deliver a safe, energy efficient, comfortable and efficient travel experience. In addition, it empowers automobile manufacturers with diversified services, including cloud-based vehicle management and big data analysis.
- Smart connectivity solution is a crucial foundation for the development of IoV, intelligent driving and intelligent transportation. Its overall architecture can be divided into several key layers, encompassing the collaborative operation of in-vehicle terminal layer, communication network layer, data processing and decision-making layer, cloud platform layer and external environment layer. The following sets forth the introduction to the in-vehicle terminal layer:

Classification of Vehicle Intelligent Connected System

Vehicle Intelligent Connected System

In-vehicle Terminal Layer

- The in-vehicle terminal layer is the core of the smart connectivity solution, primarily responsible for information exchange, data collection and processing between the vehicle and the outside world. It mainly consists of the following components:

T-box (automotive telematics control unit)

- As the communication core of the vehicle, T-box integrates GPS and communication modules, interacting with the vehicle through the controller area network (CAN) bus. It provides functions such as driving data collection, driving trajectory recording, vehicle fault monitoring and remote vehicle control, allowing the owner to monitor the vehicle's status in real time and perform remote operations. The T-box supports vehicle-to-everything (V2X) technology, including vehicle-to-vehicle (V2V), vehicle-to-infrastructure (V2I), vehicle-to-pedestrian (V2P) and vehicle-to-network (V2N) modes. The core functionalities of the T-box are the microprocessor unit (MPU) and microcontroller unit (MCU). The MPU is used to implement application functions, such as viewing vehicle information through an app, unlocking doors, or remotely starting the vehicle. The MCU primarily manages power control and connects to the vehicle's CAN bus.

Smart Digital Antenna System

- Smart digital antenna is responsible for optimizing the transmission and reception of signals both inside and outside the vehicle, ensuring stable and efficient communication with external networks. Smart digital antenna integrates multi-band technology, allowing it to simultaneously handle various signals such as 4G/5G, GNSS and Wi-Fi, thereby enhancing the reliability and coverage of communications.

Source: Frost & Sullivan

Global Vehicle Intelligent Connected System Industry Overview

Definition and Classification (2/2)

Vehicle Intelligent Connected System

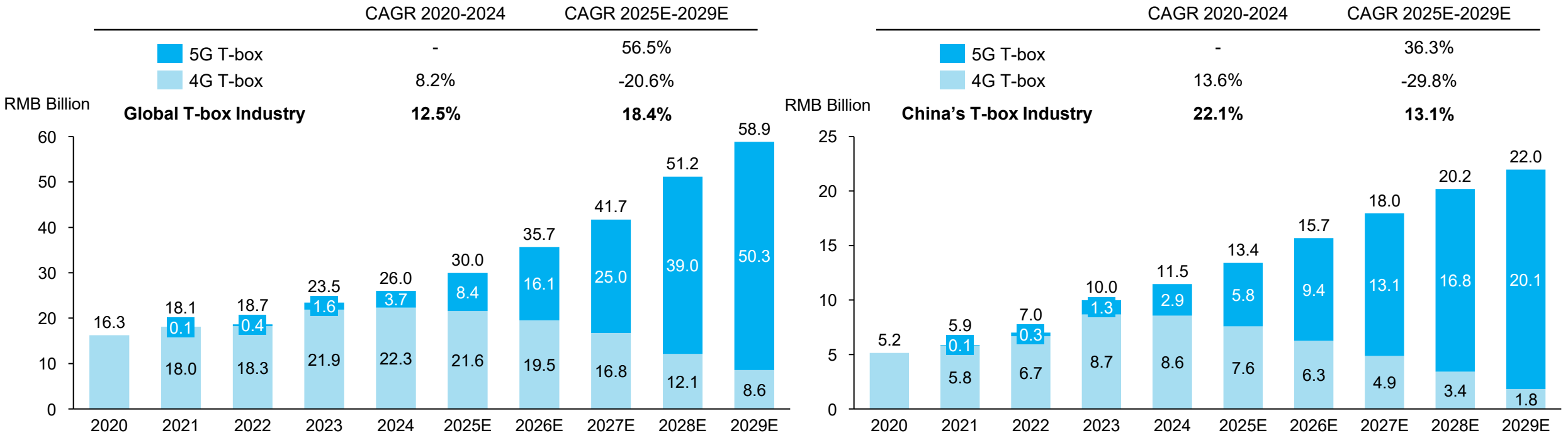
Communication Network Layer	• The communication network layer serves as a bridge between vehicles and the external world, ensuring fast data transmission and low latency. For 4G/5G communication networks, they provide high bandwidth and low latency data transmission. In particular, 5G technology supports the interconnection of a massive number of devices, meeting the real-time communication needs of V2X, especially in applications such as intelligent driving and remote control. For V2X technology, it enables real-time information exchange between vehicles and other vehicles, infrastructure, pedestrians and networks through cellular networks (C-V2X) or dedicated short-range communication (DSRC), assisting vehicles in achieving collaborative perception and safe driving.
Data Processing and Decision-making Layer	• The data processing and decision-making layer is responsible for computing and analyzing the data transmitted by the vehicle, providing intelligent decision-making and assistance functions. This includes onboard computing platforms, edge computing, and more.
Cloud Platform Layer	• The cloud platform layer is a crucial foundation of the intelligent connected vehicle system, providing remote services and large-scale data processing capabilities for vehicles.
External Environment Layer	• The external environment layer encompasses the interactions between vehicles and surrounding infrastructure and other participants, such as traffic infrastructure (traffic lights, road signs, traffic cameras, etc.) and external participants such as pedestrians and other vehicles.

Source: Frost & Sullivan

Global Vehicle Intelligent Connected System Industry Overview

Market Size of Global and China's T-box Industry

Market Size of Global and China's T-box Industry by Revenue, 2020-2029E



- The 5G network features high speed and low latency. To meet the deployment needs of automobile manufacturers for 5G technology, T-box suppliers have been launching and mass-producing various advantageous 5G products since 2021. In the future, the global T-box supply landscape is expected to grow rapidly with the ongoing expansion of 5G networks overseas and the upgrading of T-box products. From 2020 to 2024, the market size of global T-box industry has increased from RMB16.3 billion to RMB26.0 billion. It is expected that the market size of global T-box industry will increase to RMB58.9 billion in 2029, at a CAGR of 18.4% from 2025. T-box products in China have already achieved a high level of integration with 5G technology. From 2020 to 2024, the market size of Chinese T-box industry has increased from RMB5.2 billion to RMB11.5 billion. It is expected that the market size of Chinese T-box industry will increase to RMB22.0 billion in 2029, at a CAGR of 13.1% from 2025.

Note: T-box industry in the graph above only refers to T-box implemented in the passenger vehicles.

Source: Interviews with Industry Experts, Frost & Sullivan

Global Vehicle Intelligent Connected System Industry Overview

Market Drivers and Trends Analysis

Application of Advanced Communication Technologies

- V2X technology enables real-time communication between vehicles, infrastructure, pedestrians and networks via cellular (C-V2X) or DSRC, supporting collaborative perception and safe driving. 5G-V2X, with its high bandwidth, low latency and massive connectivity, powers smart connected vehicles by facilitating V2V, V2I, V2P and V2N communication. It enables more complex driving scenarios, driven by national policies and growing manufacturer demand. The rise of 5.5G and 6G technologies will further enhance the industry's innovation, offering a more stable, efficient and secure communication environment for connected vehicles.

Increasing Demand for Automotive Intelligence and IoV

- The focus of the IoV is gradually shifting from early infotainment functions to achieving smart capabilities in individual vehicles. Features such as over-the-air updates (OTA) and remote control (e.g., remote start, remote locking/unlocking) have become representative applications of the IoV. These functionalities also place increasing demands on the speed, bandwidth and stability of automotive communication networks, fueling the transition of vehicle communication technologies from 4G to 5G and accelerating the advancement of IoV technology. As the need for automotive intelligence continues to shape the evolution of the IoV, smart connectivity solution industry is positioned for significant growth.

Evolution of the T-box

- Driven by the rapid development of smart connectivity technologies and the growing emphasis by automobile manufacturers on OTA capabilities, the installation volume and rate of T-box systems in passenger vehicles continue to rise. The T-box facilitates seamless communication between vehicles and external networks, enabling key functions such as remote control and real-time data transmission. With advancements in technology, the T-box is evolving from a standalone communication module into an information and communication domain control system. This evolution simplifies the in-vehicle electronic architecture and enhances support for high-level ADAS, further propelling the development of smart connected vehicles.

Source: Frost & Sullivan

Global Vehicle Intelligent Connected System Industry Overview

Competitive Landscape Analysis

Competitive Landscape Analysis of T-box Industry

- The global T-box market is characterized by a relatively concentrated competitive landscape, with more than 50 existing companies in the industry, mainly covering products including 4G T-box and 5G T-box with different functionalities, such as high-precision positioning, V2X capabilities, smart antennas, etc. These features enable enhanced vehicle connectivity, real-time data processing and interaction with external systems, making T-boxes crucial components for smart connected vehicles. The competitive landscape of the global T-box industry is shaped by a combination of technological innovation, cost efficiency, strategic collaborations, regulatory compliance and the ability to deliver scalable, secure and future-proof solutions. Companies that can navigate these factors effectively will be well-positioned to lead in the growing market for smart connected vehicles.

Source: Interviews with Industry Experts, Frost & Sullivan

2.1.4 Global New Energy Management System Industry Overview

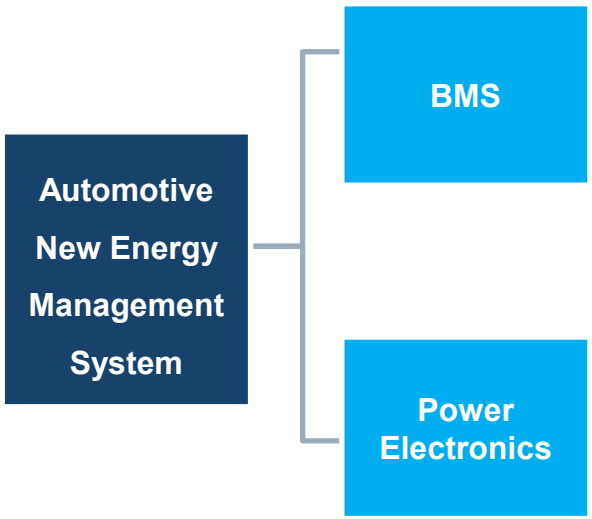
Global New Energy Management System Industry Overview

Definition and Classification

Definition and Classification of New Energy Management

- The automotive new energy management system is an integrated solution that collects and manages data from various subsystems within NEVs, and its main objective is to efficiently coordinate, allocate and control the energy usage within the vehicle's power systems. The system typically consists of two major components: the battery management system (BMS) and on-board power electronics. These technologies are crucial in ensuring optimal performance, safety and energy efficiency of the vehicles.

Main Components of New Energy Management System



- BMS is a core component of power batteries that ensures battery safety, improves durability, enhances performance and extends driving range. BMS works by closely integrating with sensors on the power battery to monitor the battery's voltage, current and temperature in real time. The collected data is then fed into the controller, enabling comprehensive management of the electric system. The system's primary functions include balancing the battery's charge, monitoring its health, estimating its state, diagnosing faults, managing the charging process and controlling thermal conditions. These features are designed to maximize the battery's lifespan, enhance driving performance and extend the vehicle's range, all while ensuring safety.

- On-board Power Electronics: On-board power electronics convert electrical energy between different voltage levels and frequencies, enabling the transmission of electrical power across various systems. On-board power electronics primarily consist of Boosters, DC/DC converters and on-board chargers (OBCs). They play a crucial role in ensuring efficient vehicle charging and addressing concerns such as range anxiety.

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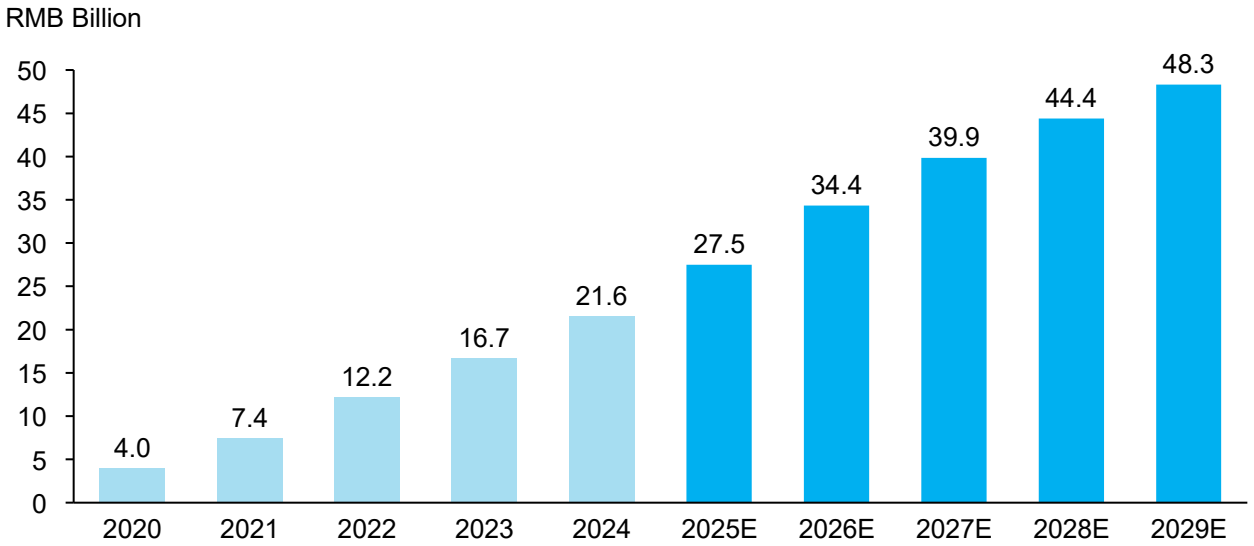
Source: Frost & Sullivan

Global New Energy Management System Industry Overview

Market Size of Global and China's BMS Industry by Revenue

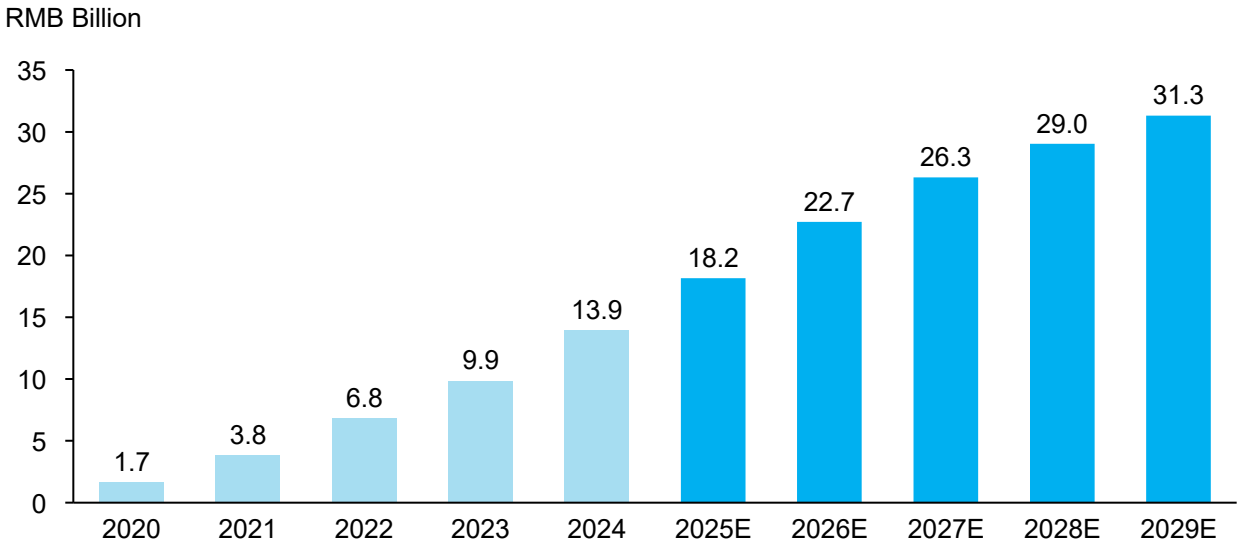
Market Size of BMS Industry by Revenue (Global), 2020-2029E

	CAGR 2020-2024	CAGR2025E-2029E
Market Size of Global BMS Industry	52.4%	15.1%



Market Size of BMS Industry by Revenue (China), 2020-2029E

	CAGR 2020-2024	CAGR2025E-2029E
Market Size of China's BMS Industry	70.4%	14.6%



- Driven by rapid expansion of NEVs and advances in battery technology that require sophisticated management system, both the global and Chinese BMS market has seen significant growth from 2020 to 2024. The global BMS market size expanded from RMB4.0 billion in 2020 to RMB21.6 billion in 2024. BMS solutions have become indispensable for monitoring, controlling and optimizing battery performance, which is critical for both safety and efficiency in NEVs. According to Frost & Sullivan, the accelerated adoption of fast-charging technologies, the increasing integration of intelligent features in NEVs and ongoing innovations in BMS capabilities are expected to drive the growth of the global and Chinese BMS markets. The global BMS market size, in terms of revenue, is expected to reach RMB48.3 billion in 2029, achieving a CAGR of 15.1% from 2025. As the largest NEV market in the world, China is expected to maintain a stable market share of around 60% in the BMS industry, sustaining steady growth.

Note: BMS industry in the graph above only refers to BMS implemented in the NEVs.

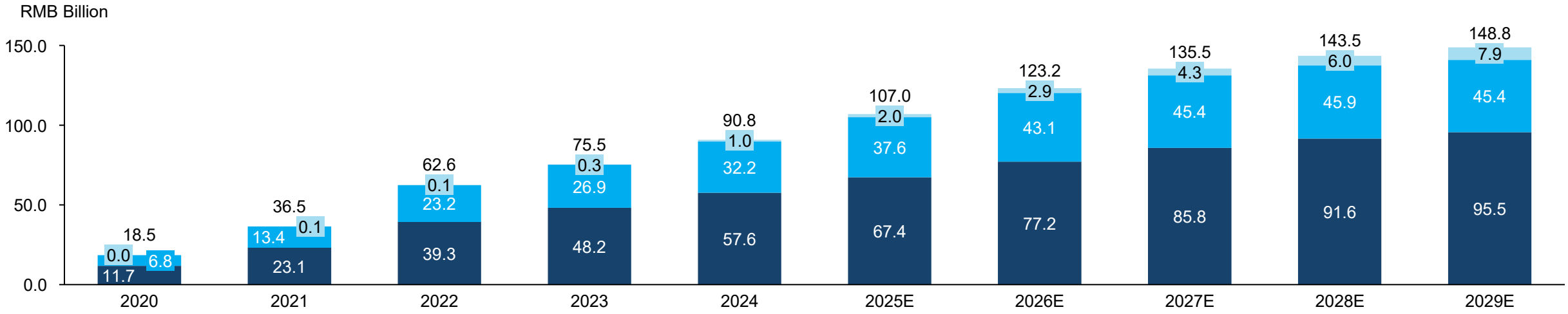
Source: Frost & Sullivan

Global New Energy Management System Industry Overview

Market Size of Global On-board Power Electronics Industry by Revenue

Market Size of On-board Power Electronics Industry by Revenue (Global), 2020-2029E

	CAGR 2020-2024	CAGR2025E-2029E
Boosters	201.2%	41.6%
DC/DC Converters	47.6%	4.8%
On-board Chargers	48.9%	9.1%
Total Market Size	**48.8%**	**8.6%**



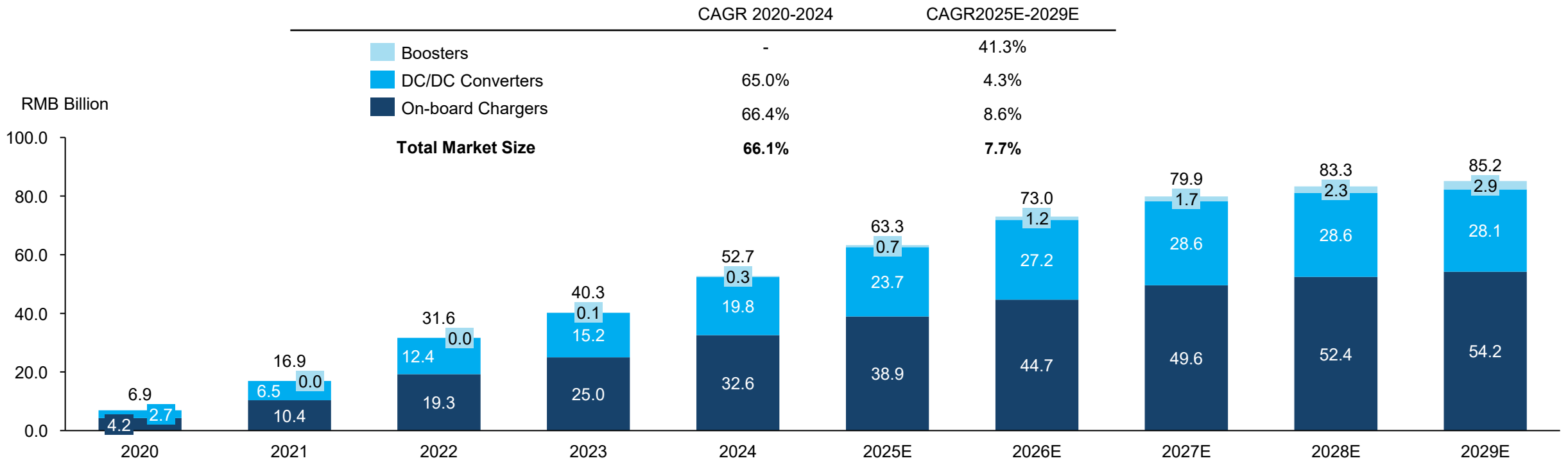
- 800V high-voltage platform enables higher charging power, resulting in shorter charging times, while reducing energy loss and improving overall charging efficiency. Boosters were first applied in 2020 in Porsche's 800V high-voltage platform and serve as a core component of high-power, high-voltage fast-charging solutions within power electronics. Meanwhile, DC/DC converters and OBCs remain essential components of on-board power electronics and are expected to undergo gradual upgrades in line with the trend toward smarter technologies, ensuring support for emerging electronic control needs. As a result, the global on-board power electronics market, in terms of revenue, is projected to increase to RMB148.8 billion in 2029, at a CAGR of 8.6% from 2025. The market size of global DC/DC converter and OBCs industries is expected to increase to RMB45.4 billion and RMB95.5 billion in 2029, respectively. The market size of global Boosters in terms of revenue is expected to reach RMB7.9 billion in 2029, at a rapid CAGR of 41.6% from 2025.

Source: Frost & Sullivan

Global New Energy Management System Industry Overview

Market Size of China's On-board Power Electronics Industry by Revenue

Market Size of On-board Power Electronics Industry by Revenue (China), 2020-2029E



- Similar to the development trends in the global on-board power electronics market, Chinese on-board power electronics market, in terms of revenue, is expected to increase to RMB85.2 billion in 2029, with a CAGR of 7.7% from 2025. As the world's largest market for NEVs, the proportion of Chinese on-board power electronics market in the whole global market is projected to reach approximately 60% by 2029. Meanwhile, the trends of intelligent and electric vehicle technologies will drive the iterative upgrading of major products, with DC/DC converters and OBCs maintaining substantial market shares, projected to reach RMB28.1 billion and RMB54.2 billion, respectively in 2029. The market size of Boosters in China is expected to increase to RMB2.9 billion in 2029 with a rapid CAGR of 41.3% from 2025.

Source: Frost & Sullivan

Global New Energy Management System Industry Overview

Market Drivers and Trends Analysis of Global BMS Industry

Rise of Fast-Charging Technologies and High-Voltage Platforms

In recent years, fast-charging technology has gained popularity from both NEV manufacturers and consumers due to its ability to dramatically reduce charging times. Within this context, the 800V high-voltage platform has emerged as a key technology for improving charging efficiency and addressing consumer concerns about driving range and charging time. The accelerated commercialization of the 800V high-voltage platform not only enhances the performance and user experience of electric vehicles but also drives new demand for new energy management systems.

Continuous Demand for On-board Power Electronics

As the industry progresses from 400V to 800V platform, the related supply chain is set to experience new growth opportunities. During this transition, it is crucial to ensure the seamless integration of both high- and low-voltage components. Consequently, the demand for on-board power electronics, such as Boosters and DC/DC converters, is expected to rise steadily in the coming years. These products play a vital role in voltage conversion and energy management, with their performance directly impacting electric vehicles' charging efficiency, range and overall safety. Suppliers of these critical components will take on an increasingly important role in the automotive electrification transformation. To meet automobile manufacturers' demands for higher voltage platforms, suppliers specializing in on-board power electronics are expected to increase their R&D investments, driving technological innovation to improve conversion efficiency and system stability.

Intelligent Development of New Energy Management Systems

As the level of automotive intelligence continues to rise, the core technologies of new energy management systems, such as estimation techniques, balancing management and power conversion technologies, are increasingly integrating smart features. Estimation technology, as the core of the BMS, will lead to greater efficiency in battery applications, along with more precise control and state analysis of the battery core. The intelligence of balancing management is mainly reflected in the application of active balancing technology, which more effectively reduces loss discrepancies between batteries and systems. Power conversion technology, as the core of on-board power electronics, is trending toward lighter, more compact, highly efficient and integrated designs to support the application of new 800V high-voltage platforms. The active balancing capabilities of these systems will become the mainstream direction for future industry development.

Source: Frost & Sullivan

Global New Energy Management System Industry Overview

Competitive Landscape of China's Third-party BMS Industry by Global Revenue

- In the BMS market, the main participants include automobile manufacturers, battery manufacturers and independent third-party BMS suppliers. Automobile manufacturers and battery manufacturers participate in the BMS market through bundled offerings with vehicles or battery packs. In recent years, leading independent third-party BMS suppliers have gradually become important players in the BMS market, leveraging advantages in cost, economies of scale, process capabilities and professional experience. These suppliers are able to respond flexibly to the diverse demands of automobile manufacturers, rapidly accumulate technologies and solutions, effectively improve development efficiency and reduce costs. With the rapid expansion of the NEV market, cost control has become a core competitive factor. Independent third-party BMS suppliers, serving a wide range of downstream customers, enjoy significant economies of scale. Moreover, the continuous increase in the market penetration of NEVs and the growing specialization of the industrial chain will further drive improvements in efficiency and cost reduction. As a result, traditional automobile manufacturers undergoing transformation and emerging NEV OEMs are increasingly inclined to outsource the manufacturing of core NEV components to third-party suppliers with rich experience, resource advantages and cost benefits. In the future, the further development of the NEV industry will bring opportunities for independent third-party BMS suppliers. Meanwhile, these suppliers will also face increasingly intense market competition and technological challenges.

Source: Frost & Sullivan

2.1.5 Global NEV Charging and Power Distribution System Industry Overview

Global NEV Charging and Power Distribution System Industry Overview

Introduction of NEV Charging and Power Distribution System

- The NEV charging and power distribution system market includes both external charging infrastructure, such as charging piles, and in-vehicle systems that manage power conversion and distribution within NEVs. The in-vehicle segment is further divided into in-vehicle charging system products (e.g., charging sockets, high-voltage charging harnesses, charging doors) and in-vehicle power distribution system products (e.g., BDUs, PDUs, EVCC). These systems are essential for ensuring charging efficiency, power safety, and reliable energy flow across NEVs.

NEV Charging Products

- NEV charging products, such as AC/DC charging piles, chargers, and charging guns, serve as essential interfaces for replenishing energy to NEVs.

In-vehicle Charging and Power Distribution Systems

In-vehicle charging system products mainly include:

- Charging sockets: The physical connection ports that interface with external charging devices, enabling current to flow into the vehicle.
- High-voltage charging harnesses: Cables that safely transfer high-voltage electricity to the power battery system.
- Charging doors: Electrically or mechanically controlled access points that protect charging sockets and improve system durability and ease of use.

In-vehicle power distribution system products mainly include:

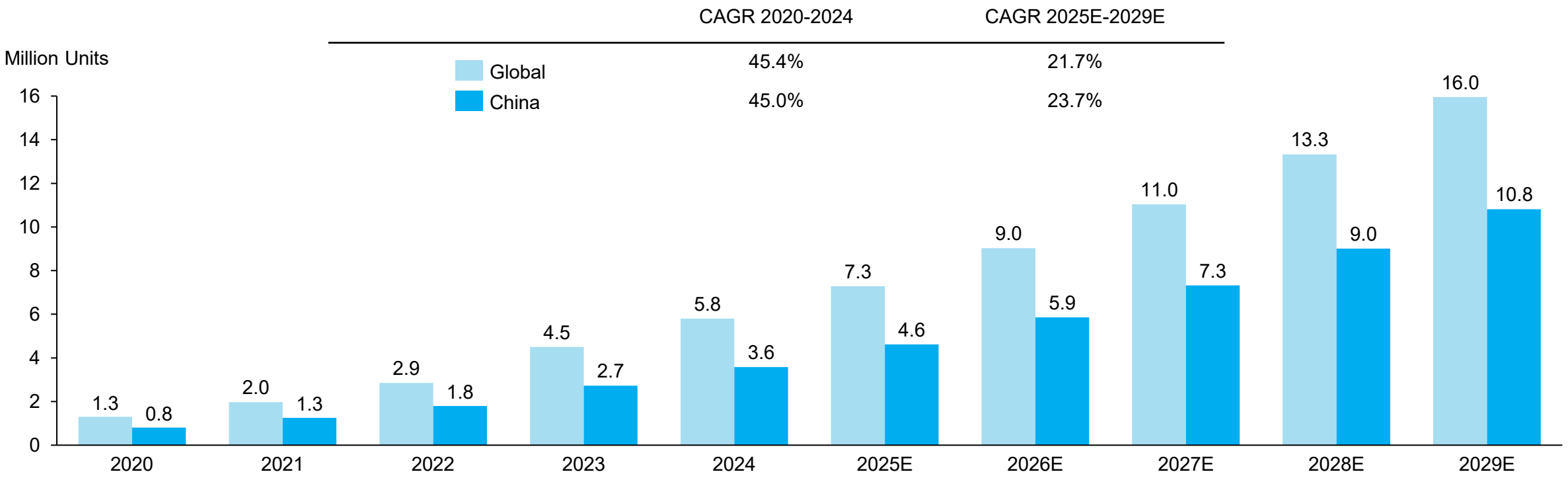
- Battery Disconnect Units (BDUs): Devices that provide circuit protection and isolation, ensuring safety during abnormal events such as overcurrent or accidents.
- Power Distribution Units (PDUs): Units that allocate power to various subsystems, including the motor drive system, air conditioning compressor, and onboard chargers.
- Electric Vehicle Communication Controllers (EVCCs): Modules that facilitate communication between the vehicle and the external charger, enabling functions such as charging protocol handshake and real-time monitoring.

Source: Frost & Sullivan

Global NEV Charging and Power Distribution System Industry Overview

Number of Global and China's Public Charging Piles

Number of Public Charging Piles (Global and China), 2020-2029E



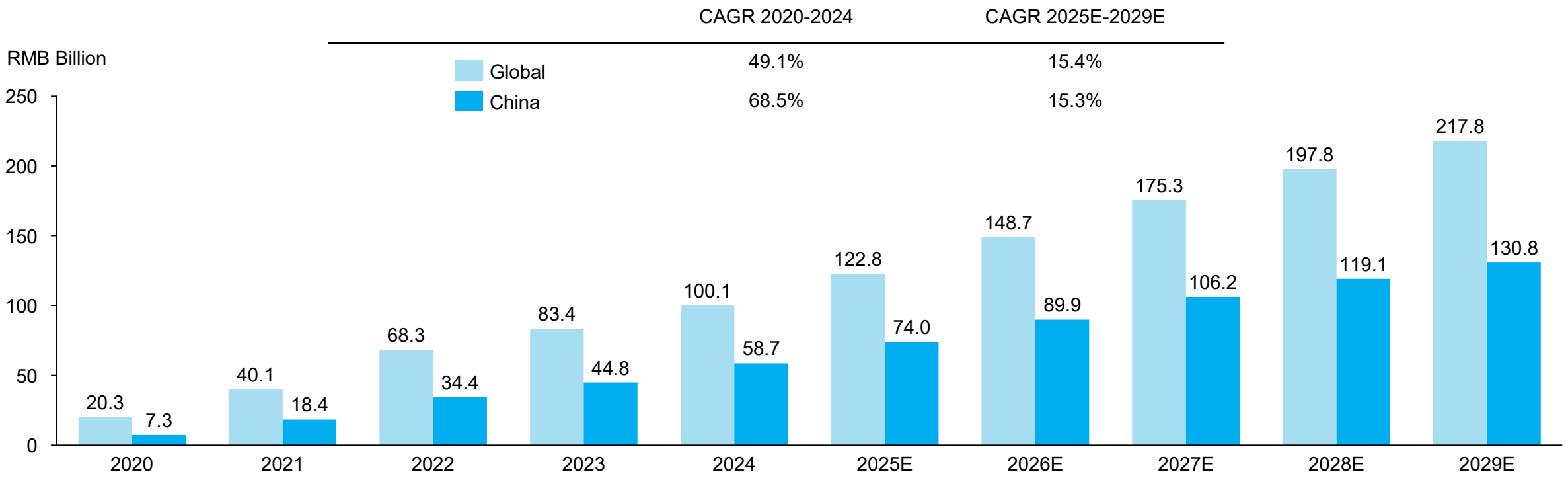
- The global and Chinese NEV charging pile markets are expanding rapidly, driven by the accelerating adoption of NEVs, rising demand for fast charging, and supportive policy frameworks. As of 2024, the number of public charging piles reached approximately 5.8 million units globally, with China accounting for 3.6 million, reflecting its leading position in charging infrastructure deployment. Promoted by continued investment in fast charging, digitalized network management, and the integration of charging infrastructure with renewable energy and smart grid systems, it is expected that the number of public charging piles will to rise to approximately 16.0 million globally and 10.8 million units in China in 2029, respectively.

Source: IEA, Interviews with Industry Experts, EVCIPA, Frost & Sullivan

Global NEV Charging and Power Distribution System Industry Overview

Market Size of Global and China's NEV Charging and Power Distribution System Industry

Market Size of NEV Charging and Power Distribution System Industry by Revenue (Global and China), 2020-2029E



- Meanwhile, the global and Chinese NEV charging and power distribution system markets are witnessing robust growth, driven by the rapid electrification of vehicles, continuous technological innovation, and increasing demand for safe, efficient energy management for NEVs. In 2024, the market size reached RMB100.1 billion globally and RMB58.7 billion in China. In 2029, the global and Chinese markets are projected to grow to RMB217.8 billion and RMB130.8 billion, respectively. This expansion is fueled by the growing penetration of high-voltage platforms, the need for faster and more reliable charging, and the shift toward more integrated and intelligent in-vehicle energy architectures.

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Source: China Association of Automobile Manufacturers, Interviews with Industry Experts, Frost & Sullivan

2.1.6 Global Automotive Air Management System Industry Overview

Global Automotive Air Management System Industry Overview

Introduction of Automotive Air Management System

- The automotive air management system market primarily refers to air vents used in vehicles, which play a key role in enhancing in-vehicle comfort and driving experience by ensuring optimal air flow and temperature. As vehicle intelligence and consumer expectations continue to rise, these systems have evolved from basic mechanical vents to electric vents that combine precise control, advanced sensing, and user-friendly interfaces. Driven by the rising demand for intelligent and user-friendly interior features, automotive air management systems are becoming an important component of vehicle interior quality.

Mechanical Vents

- Traditional mechanical air vents are manually operated using levers or knobs to control airflow direction and volume. These systems are simple, cost-effective, and reliable, commonly used in mid- to low-end vehicles where ease of use and durability are prioritized.

Electric Vents

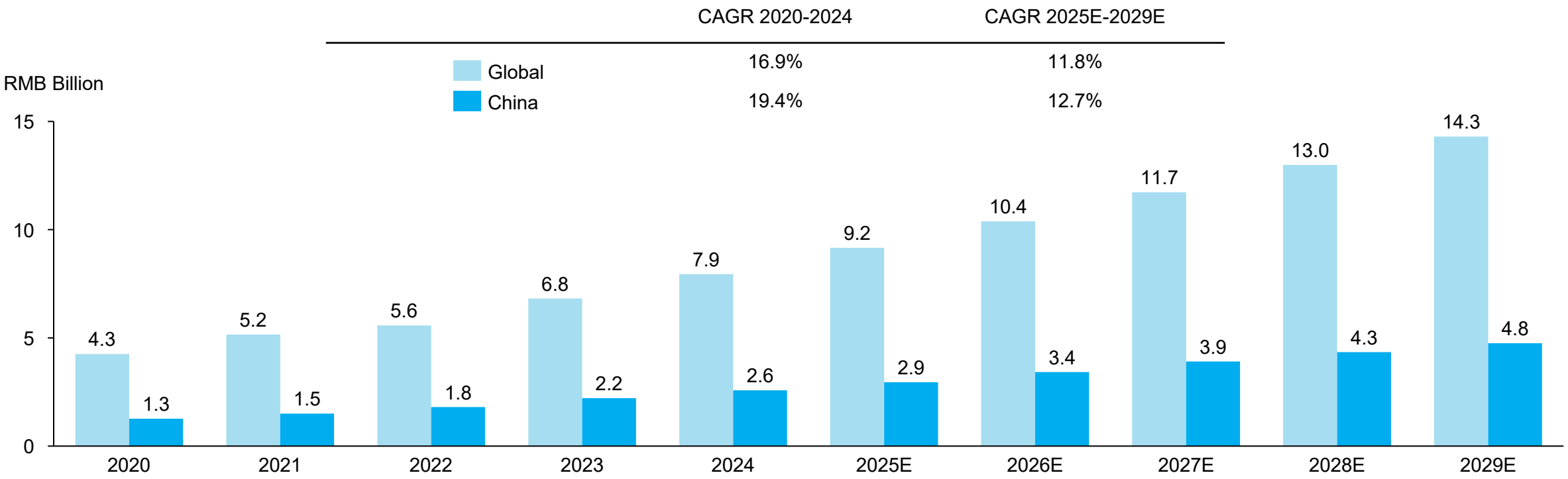
- Electronic air vents use electric actuators and sensors to automatically adjust airflow based on climate control settings or occupant preferences. These vents enable more precise control, integrate with smart cockpit systems, and support personalized airflow for enhanced passenger comfort. They are increasingly adopted in mid-to high-end vehicles.

Source: Frost & Sullivan

Global Automotive Air Management System Industry Overview

Market Size of Global and China's Automotive Air Management System Industry

Market Size of Automotive Air Management System Industry by Revenue (Global and China), 2020-2029E



- The global and Chinese automotive air management system markets are steadily expanding, supported by the growing demand for enhanced cockpit comfort and the continuous evolution of vehicle interior systems. In 2024, the global and China's market size reached RMB7.9 billion and RMB2.6 billion. In 2029, these figures are projected to increase to RMB14.3 billion and RMB4.8 billion, respectively, reflecting a shift toward more intelligent automotive air management solutions. This growth is driven by the integration of additional functionalities, such as automated airflow adjustment, ambient lighting, and noise control. With the development of vehicle electrification and intelligent cockpit, automotive air management systems are transitioning from simple airflow devices to multifunctional components that contribute to a more personalized and seamless passenger experience.

Source: Interviews with Industry Experts, Frost & Sullivan

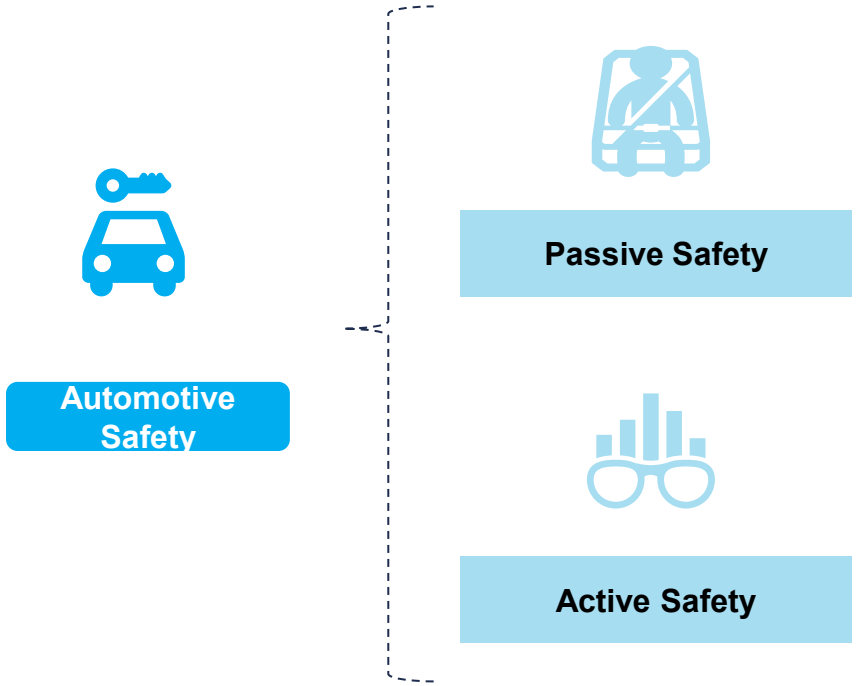
2.2 Global Automotive Safety Industry Overview

Global Automotive Safety Industry Overview

Definition and Classification of Automotive Safety

Definition and Classification of Automotive Safety

- Automobile safety has long been a critical issue in the automotive industry. With the advancement of new technologies and the strengthening of safety standards, modern vehicles' safety features have become increasingly sophisticated and comprehensive.
- Automotive safety is typically divided into two the following categories:



- The primary function of passive safety is to protect drivers and occupants during an accident and reduce the severity of injuries caused by the crash. Key components of passive safety primarily include steering wheel, seatbelt and airbag.

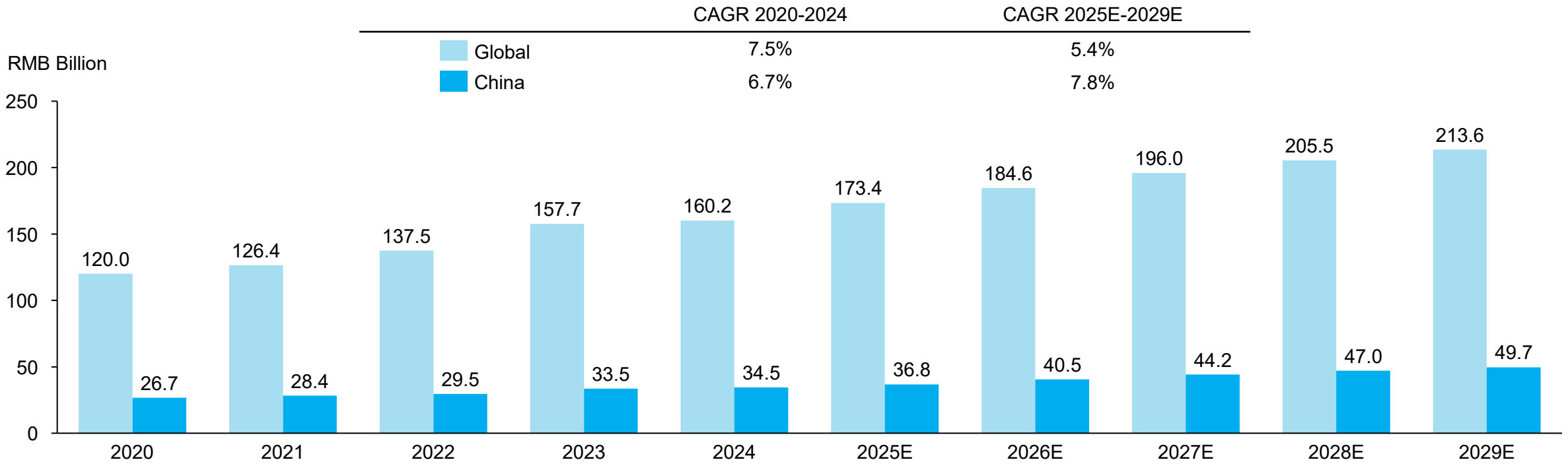
- Active safety is designed to prevent accidents before they occur by intervening in critical moments. It assists drivers by reducing human error, alerting them to potential hazards and prompting corrective actions.

Source: Frost & Sullivan

Global Automotive Safety Industry Overview

Market Size of Global and China's Automotive Safety

Market Size of Automotive Passive Safety Industry by Revenue (Global and China), 2020-2029E



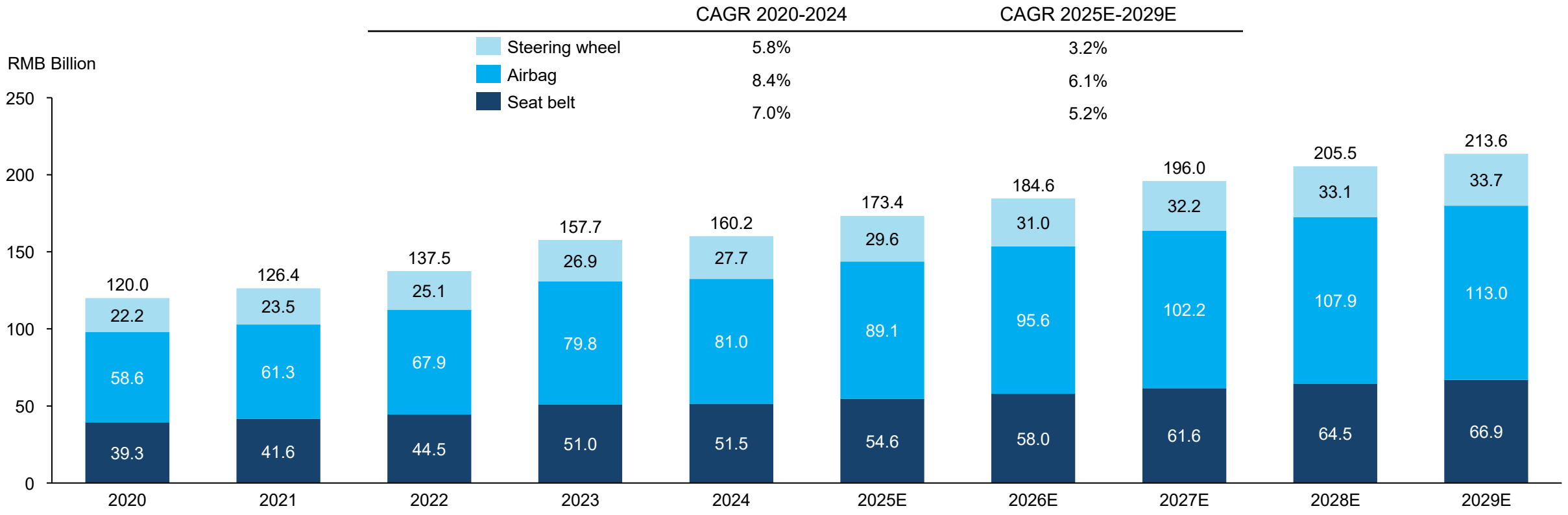
- The market size of global automotive passive safety industry increased from RMB120.0 billion in 2020 to RMB160.2billion in 2024. Looking forward, driven by the continuous strengthening of safety standards and increasing emphasis by automobile manufacturers on vehicle safety performance, the market is expected to sustain steady growth. It is projected that the market size of global automotive passive safety industry will grow to RMB213.6 billion in 2029 at a CAGR of 5.4% from 2025.
- The market size of automotive passive safety industry in China increased from RMB26.7 billion in 2020 to RMB34.5 billion in 2024. The market is expected to reach RMB49.7 billion in 2029, representing a CAGR of 7.8% from 2025.

Source: Frost & Sullivan

Global Automotive Safety Industry Overview

Market Size of Global and China's Automotive Safety

Market Size of Automotive Safety System Industry by Revenue by Product (Global), 2020-2029E



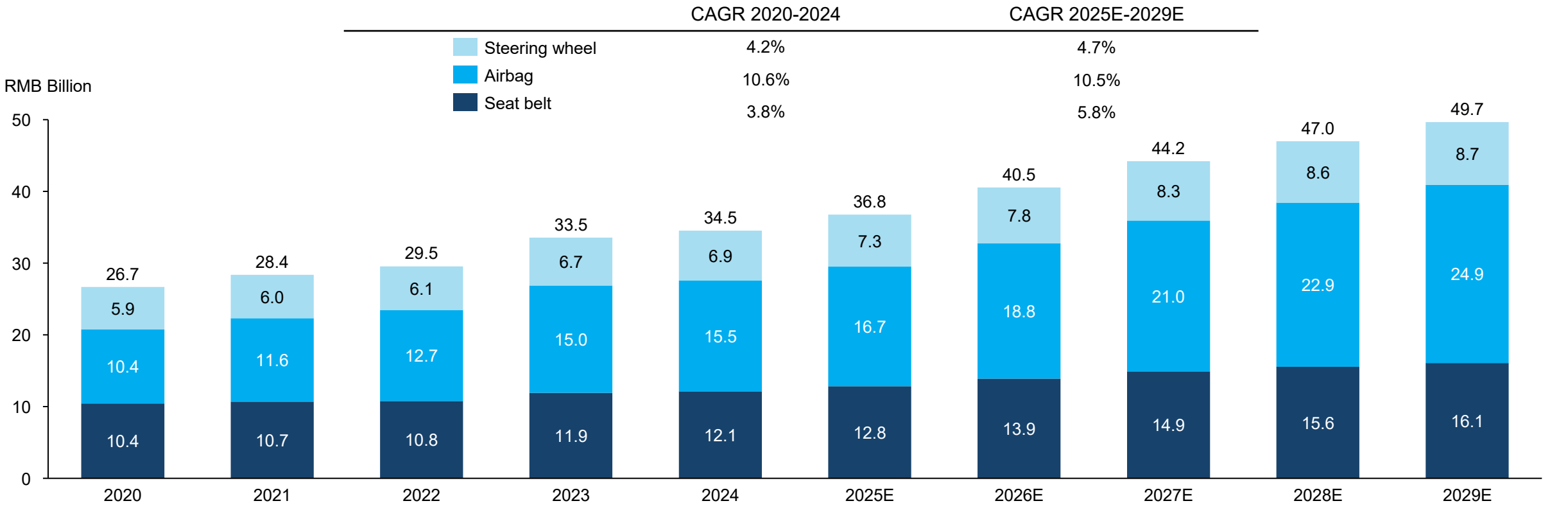
- In 2024, the global market sizes for steering wheels, airbags and seat belts in terms of revenue were RMB27.7 billion, RMB81.0 billion and RMB51.5 billion, respectively, capturing market shares of 17.3%, 50.5% and 32.1%. It is projected that in 2029, the revenues of global steering wheel, airbag and seat belt markets will reach RMB33.7 billion, RMB113.0 billion and RMB66.9 billion, respectively.

Source: Frost & Sullivan

Global Automotive Safety Industry Overview

Market Size of Global and China's Automotive Safety

Market Size of Automotive Safety System Industry by Revenue by Product (China), 2020-2029E



- In 2024, the market sizes for steering wheels, airbags and seat belts in China by revenue were RMB6.9 billion, RMB15.5 billion and RMB12.1 billion, respectively, capturing market shares of 20.1%, 44.9% and 35.1%. It is projected that in 2029, the revenues of China's steering wheel, airbag and seat belt markets will reach RMB8.7 billion, RMB24.9 billion and RMB16.1 billion, respectively.

Source: Frost & Sullivan

Global Automotive Safety Industry Overview

Market Drivers of Global and China Automotive Safety Industry (1/2)

Continuously Enhancing Safety Standards as Intelligence Level of Automotive Industry Develops

With the improvement of automotive safety standards across various countries and regions globally and the ongoing development of automotive intelligence, the automotive safety industry is experiencing an accelerated pace of technological upgrades.

In terms of automotive active safety, the European Union and China have mandated the installation of systems such as Driver Monitoring Systems (DMS). Since July 2022, the EU has requires DMS in newly approved vehicles, while China has implemented DMS mandates for certain commercial vehicles with the 2022 national standard, with a national standard of "the Performance Requirements and Testing Methods for Driver Attention Monitoring Systems (GB/T 41797-2022)" (《駕駛員注意力監測系統性能要求及試驗方法(GB/T41797-2022)》) published in October 2022.

In terms of automotive passive safety, the number of airbags per vehicle has gradually increased with the introduction of regulatory requirements and industry standards. Developed countries and regions such as Europe, the United States and Japan have implemented regulations mandating the installation of front airbags in vehicles. In China, with the continuous updates to the "Motor Vehicle Operation Safety Technical Conditions (GB 7258)" (《機動車運行安全技術條件(GB 7258)》) the requirements for vehicle collision safety performance have become increasingly stringent, particularly regarding side-impact and frontal crash test standards. In addition, a series of standards have been issued in recent years to further strengthen vehicle safety requirements, including "The Protection of the Occupants in the Event of a Frontal Collision for Motor Vehicle (GB 11551-2014)" (《汽車正面碰撞的乘員保護(GB 11551-2014)》), "The Protection of the occupants in the event of a lateral collision (GB 20071-202X)" (《汽車側面碰撞的乘員保護(GB 20071-202X)》), "The Requirements of Safety in the Event of Rear-end Collision for Passenger Vehicle (GB 20072-202X)" (《乘用車後碰撞安全要求(GB 20072-202X)》), "The Frontal airbag-Technical Requirements of Protection for out of Position Occupant (GB/T 37437-2020)" (《正面安全氣囊離位乘員保護技術要求(GB/T37437-2020)》), "The Methods and Requirements of Airbag System Abuse Test for Automobile (GB/T 37474-2020)" (《汽車安全氣囊系統誤作用試驗的方法和要求 (GB/T37474-2020)》) and "The Performance Requirements of Side Airbag and Curtain Airbag Module (GB/T 38795-2020)" (《汽車側面氣囊和簾式氣囊相關標準(GB/T 38795-2020)》). Furthermore, automotive safety has become crucial for shaping brand image. Manufacturers are developing airbags that protect multiple body parts, including head, chest, neck, legs and knees, with rear side, knee and curtain airbags becoming more common. Additionally, smart steering wheels and electronic seatbelts are enhancing vehicle safety, driving market growth.

Source: Frost & Sullivan

Global Automotive Safety Industry Overview

Market Drivers of Global and China Automotive Safety Industry (2/2)

Integration of Active Safety and Intelligent Driving

With the rapid advancement of intelligent driving technologies, active safety is emerging as a central focus in the automotive safety industry. As vehicles become increasingly intelligent, active safety goes beyond merely detecting the surrounding environment in real time to assist drivers in avoiding potential risks. They also offer advanced risk mitigation strategies, significantly enhancing road safety. The deep integration of active safety with intelligent driving technologies will not only provide more comprehensive safety protection for future vehicles but also drive continuous upgrades in safety functionalities, making active safety an essential component of the broader intelligent vehicle ecosystem. This evolution will not only improve accident prevention but also contribute to the development of intelligent driving, setting new standards for vehicle safety.

Innovation in Automotive Safety Products Driven by Evolvement of Automotive Industry as well as Emergence of New Way of Transportation

As transportation technology evolves, the continuous innovation of automotive safety products becomes critical in addressing emerging demands. For instance, pedestrian safety solutions, such as pyrotechnic actuators like active hood lifters, are designed to mitigate injuries by lifting the vehicle hood during collisions, reducing head impacts and complying with ECE R-127 regulations. In addition, battery protection systems for NEVs, such as pyrotechnic battery disconnect technology, safeguard drivers and occupants by cutting electrical connections in the event of battery overloads or short circuits. Furthermore, the rise of flying cars, a groundbreaking innovation in transportation, introduces new safety challenges, particularly in ensuring operational safety during flight. This necessitates the adaptation and enhancement of existing automotive safety products, driving advancements in technology research, regulatory frameworks and standardization to meet the unique demands of aerial mobility. These innovations collectively reflect the automotive safety industry's progression from traditional vehicle safety measures toward comprehensive, multi-dimensional safety products designed to meet the needs of evolving transportation technologies.

Source: Frost & Sullivan

Global Automotive Safety Industry Overview

Competitive Landscape Analysis of Automotive Passive Safety Industry

Top 3 Suppliers in the Automotive Passive Safety Industry by Revenue (Global and China), 2024

Ranking	Company	Revenue (RMB Billion)	Market Share
1	Company G	74.0	46.2%
2	**the Company**	**36.7**	**22.9%**
3	Company H	36.4	22.8%
	CR3	**147.2**	**91.9%**
	Total	**160.2**	

Ranking	Company	Revenue (RMB Billion)	Market Share
1	Company G	14.1	40.7%
2	**the Company**	**9.0**	**26.1%**
3	Company H	6.1	17.6%
	CR3	**29.2**	**84.5%**
	Total	**34.5**	

- In 2024, the global automotive passive safety market reached RMB160.2 billion in terms of revenue. The top three suppliers in the global automotive passive safety industry accounted for about 91.9% of the total market size. The Company ranked second globally with a revenue of RMB36.7 billion in 2024, holding a market share of 22.9%.
- In 2024, Chinese automotive passive safety market reached RMB34.5 billion in terms of revenue. The top three suppliers in Chinese automotive passive safety industry accounted for about 84.5% of the total market size. Among them, the Company ranked second with a revenue of RMB9.0 billion in 2024, holding a market share of 26.1%.

- Company G: The company is founded in 1956 and listed on the New York Stock Exchange and Stockholm Stock Exchange, which designs, develops and manufactures passive safety products for the automotive industry.
- Company H: The company is a non-listed company founded in 1915. It is a global technology group providing passive safety products for vehicles.

Source: Annual Reports of Listed Companies, Interviews with Industry Experts, Frost & Sullivan

Global Automotive Safety Industry Overview

Competitive Landscape Analysis of Automotive Passive Safety Industry

Top 3 Suppliers of Major Automotive Passive Safety Products by Revenue (Global), 2024

Top 3 Suppliers in the Steering Wheel Industry by Revenue (Global), 2024

Ranking	Company	Revenue (RMB Billion)	Market Share
1	Company G	11.5	41.5%
2	**the Company**	**10.0**	**35.9%**
3	Company H	5.9	21.3%
	CR3	**27.4**	**98.7%**
	Total	**27.7**	

Top 3 Suppliers in the Seat Belt Industry by Revenue (Global), 2024

Ranking	Company	Revenue (RMB Billion)	Market Share
1	Company G	24.0	46.6%
2	**the Company**	**11.4**	**22.1%**
3	Company H	11.0	21.4%
	CR3	**46.3**	**90.1%**
	Total	**51.5**	

Top 3 Suppliers in the Airbag Industry by Revenue (Global), 2024

Ranking	Company	Revenue (RMB Billion)	Market Share
1	Company G	38.5	47.6%
2	Company H	19.5	24.1%
3	**the Company**	**15.4**	**19.0%**
	CR3	**73.4**	**90.7%**
	Total	**81.0**	

- In 2024, the revenues of global steering wheel market, seat belt market and airbag market reached RMB27.7 billion, RMB51.5 billion and RMB81.0 billion, respectively. In 2024, the Company generated revenues of RMB10.0 billion from steering wheels, RMB11.4 billion from seat belts and RMB15.4 billion from airbags. The Company ranked second globally in the steering wheel and seatbelt industry, and ranked third globally in the airbag industry in 2024, with a market share of 35.9%, 22.1% and 19.0%, respectively.

Source: Annual Reports of Listed Companies, Interviews with Industry Experts, Frost & Sullivan

Appendix

Appendix

Global TOP 10 OEMs by Sales Volume（2024）

Ranking	OEMs
1	Toyota
2	Volkswagen
3	Hyundai Motor
4	General Motors
5	Stellantis
6	Renault-Nissan-Mitsubishi Alliance
7	Ford
8	Honda
9	BYD
10	Suzuki

China TOP 10 OEMs by Sales Volume （2024）

Ranking	OEMs
1	BYD
2	Geely
3	Chery
4	Changan Automobile
5	SAIC
6	GWM
7	GAC
8	BAIC
9	FAW
10	Dongfeng Motor

Note: Auto part manufacturing companies in which an automobile manufacturer holds less than a 50% equity stake.*

Appendix

- The industry trends of intelligence and electrification are ushering the global automotive industry into a new era. Numerous emerging OEMs are rapidly springing up disruptive intelligent electrification technologies.
- Such trends present both opportunities and challenges for traditional OEMs, prompting them to embrace new technologies and solutions. As intelligent cockpits, intelligent driving and other user-centric intelligent functions become crucial factors in consumers' purchase decisions, global OEMs are placing increasing importance on intelligent automotive technologies.
- OEMs in the automotive industry generally require systematic price reduction from their suppliers.
- The Company is among the world's pioneering suppliers to achieve mass production of 800V high-voltage platform products.
- The Company developed the world's first high-voltage Booster and DC/DC converter in 2020.
- The Company is the world's first company to mass-produce 5G-V2X solutions for OEM customers.
- The Company is one of the industry's pioneers in the BMS sector, with more than a decade of experience in this field.
- TISAX assessment is an information safety standard widely recognized by participants across the global automotive industry supply chain. TISAX AL3 certification is the highest level of TISAX assessment.
- XPeng AeroHT is developing "flying cars", which fall under the category of eVTOLs (electric Vertical Take-Off and Landing vehicles).
- ASIL-D level certification of A-SPICE process is the highest level of automotive functional safety.
- The Company is at the forefront of R&D for next-generation automotive safety products, including advanced airbag materials, DMS, OMS, PBD and hood lifters.
- It is in line with industry norms that auto parts suppliers may reduce the selling price for their products and solutions annually.
- The insurance coverage of the Company is in accordance with the commercial practices in the industry.
- The non-current portion of the Company's prepayments primarily consists of payment to OEMs which represents an initial payment required from the Company by OEMs when entering into new projects, in line with the industry norm.
- The key production steps in the automotive electronics industry mainly include: SMT, DIP insertion, de-panelling, AOI/X-Ray, ICT/Flash, coating, injection molding and spray painting, assembly and testing.
- The Company's OEM customers represented a combined market share exceeding 90%.
- The Company's customer base covered the top ten OEMs in both China and the world and had a broad and in-depth engagement with leading EV brands worldwide.
- Chinese OEMs are accelerating the expansion of their production capacity and market presence overseas.

Appendix

- Amidst the shift towards electrification, the global presence of Chinese OEMs is expected to grow.
- Overseas OEMs highly value historical partnerships when choosing suppliers, resulting in substantial entry barriers.
- The Company is one of the few Chinese intelligent automotive technology companies that have built a highly global platform.
- The predecessor of Joyson Safety Systems is one of the earliest in the world to produce automotive safety products.
- Sophisticated automotive intelligence products generally have higher profitability.

Research Methodologies

- Frost & Sullivan is an independent global consulting firm, which was founded in 1961 in New York. It offers industry research and market strategies and provides growth consulting and corporate training. Its industry coverage includes automotive and transportation, chemicals, materials and food, commercial aviation, consumer products, energy and power systems, environment and building technologies, healthcare, industrial automation and electronics, industrial and machinery, and technology, media and telecom.
- The Frost & Sullivan's report includes information on global and China automotive electronics and automotive safety industry.
- Frost & Sullivan has conducted detailed primary research which involved discussing the status of the industry with certain leading industry participants and conducting interviews with relevant parties. Frost & Sullivan has also conducted secondary research which involved reviewing company reports, independent research reports and data based on its own research database. Frost & Sullivan has obtained the figures for the estimated total market size from historical data analysis plotted against macroeconomic data as well as considered the above-mentioned industry key drivers.
- Frost & Sullivan's Market Engineering Forecasting Methodology integrates several forecasting techniques with the Market Engineering Measurement-based System. It relies on the expertise of the analyst team in integrating the critical market elements investigated during the research phase of the project. These elements include:
  - ✓ Expert-opinion forecasting methodology
  - ✓ Integration of market drivers and restraints
  - ✓ Integration with the market challenges
  - ✓ Integration of the Market Engineering Measurement trends
  - ✓ Integration of econometric variables
- In compiling and preparing the Report, Frost & Sullivan has adopted the following assumptions:
  - ✓ The social, economic and political environment of the world and China is likely to remain stable in the forecast period
  - ✓ Related industry key drivers are likely to drive the market in the forecast period