

IC EYES THE WORLD

The internal material is read for free.



02

Apr-Jun 2023

Information on global fab construction
in semiconductor industry

Sales volume of passenger vehicles
in the first quarter of 2023 in China

What are the prospects for the semiconductor
and automotive industries in Southeast Asia?

Semiconductor-related policies
in major regions of the world

Will the chip market reverse the
depression in 2023?

R&A Market Report :

The Analysis of Sales Reports for
January and February in 2023

The Analysis of the logistics and part inspections

AUTO
IC

中国国际汽车电子高峰论坛

Global Auto-Electronics Innovation and Development Summit

A28

World-Class Sourcing and Quality



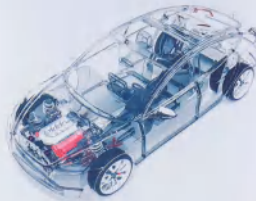
汽车电子产品环境及可靠性实验

发射类: 辐射发射 传导发射 瞬态传导发射

抗干扰类: 辐射抗干扰 静电抗干扰 瞬态传导抗干扰 电磁兼容抗干扰

机械可靠性: 振动/三综合振动 机械冲击与碰撞

环境可靠性: 光老化 化学试剂腐蚀 温湿度项目 防水防尘 气候腐蚀



R&A Electronics是 亚洲发展最快的半导体分销商之一
并在全球迅速扩张
为全球OEM/EMS/ODM客户提供 供应链解决方案

我们在全球拥有160名员工

6个分支机构 香港、深圳、上海、德国、新加坡、台湾

和众多行业领先的内部 ISO认证防务实验室

我们的目标是成为全球电子制造商提供世界的采购需求并

R&A库存范围广泛, 提供一流供应商的质量和充足的电子元件供应

依循我们"精益求精和 庞大的供应商网络

以最佳的成本和最快的质量为客户提供半导体供应

伯仲&新阳联合检测实验室

通过 国家CNAS认证, 依托检测中心的可靠性设备, 高精度的分析仪

可用于 车载产品 设计阶段测试验证, 及制造过程中不同的测试阶段分析

并有能力提供 可行性改善建议和方案的增值服务



严格的质检流程



R&A appeared at the China International Auto-Electronics Summit Forum 新加坡·台湾

As one of the fastest-growing semiconductor distributors in Asia, R&A Electronics appeared at the China International Auto-Electronics Summit Forum on February 23, hosted by AspenCore. Based on the advantages of channels and platforms accumulated in the semiconductor and automotive fields for leveraging years, R&A discussed the future trends of the automotive electronics market and the supply-demand situation of automotive chips, creating opportunities for cross-industry exchanges and promoting the advancement of the automotive electronics industries.



As the world's largest automotive market, China is making every effort to embrace the the transformation of the auto industry. According to Omdia, the value of the automotive semiconductor industry will soar at a compound annual growth rate (CAGR) of 12.3% by 2025. New energy, intelligence, and networking have become the current trend, and the proportion of electronic systems in the vehicle system is growing rapidly. From sensors to MCUs, from memory chips to connectors, from power devices to digital chips, the importance of automotive chips has become increasingly prominent.

In March 2023, R&A Electronic and Beijing Yi Angel Charity Foundation jointly launched the "Rural Education Program" in Guizhou Province, China to help local primary schools build libraries.

The company donated 450,000 yuan, and a total of 10 libraries to 13,052 students at 10 rural primary schools. Now all the libraries have been established.

Books carrying hopes light the sky in children's heart--R&A never gives up



An R&A official said the goal is to "donate books to rural students" as well as "change the life of students." We handpick quality reading materials of the right age, and combine with reading sharing activities held by local primary schools, which not only lets students read, but also makes them think and discuss.

Through this activity, we hope that students are able to foster the habit of reading from childhood, build their own opinions, and create a colorful life.



Love condenses light and heat! The original intention and goal of the R&A and Beijing Yi Angel Public Welfare Foundation is to focus on the growth of rural students, offering age-appropriate and high-quality books, and then making every child read books and enjoy reading.

Integrity is the foundation of enterprises' operation. Giving back to society is a bounden responsibility of an enterprise. In the future, R&A still persevere to concern about the reading status of rural children with more charities, providing an increasing number of superior books for students in rural areas, and helping rural children to broaden their horizons.



Pouring Vitality Builds Futuristic Chip World!

R&A Electronics always adheres to "discovering and cultivating talents and promoting entrepreneurship," in a bid to create a "learning, sharing, exploring, building and excelling" platform for graduates with dreams and pursuits.

In March, during the peak period of campus recruitment, R&A crossed the north and south to visit major universities in an effort to seek out appropriate talents. We struggle to strengthen our talent pool, and provide better and more professional service to its customers!

R&A's recruiting team appeared on the campuses of top universities in China such as Peking University, Beijing Institute of Technology, Nanjing University, Central South University, East China Normal University, Hunan University, Wuhan University, etc.

At the job fair, R&A recruiters wholeheartedly answered industry doubts and career-related questions for job-seeking students, which aroused great interest among the students and received a large number of resumes.

This is not only recognition of R&A's corporate strength but also a manifestation of confidence in the semiconductor industry.

With courage and an original intention to hold firmly, and not stop for ideal, R&A Electronics has a complete "training system," offering a sustainable development platform for every "newbie" who has just left the campus.

Expanding talent pool supports R&A's sustainable development.

- UIBE Beijing ● Feb 28th
- BIT Beijing ● Mar 1st
- NNU Nanjing ●
- CUFE Beijing ● Mar 2nd
- WUT Wuhan ●
- UPC Beijing ● Mar 3rd
- CCNU Wuhan ●
- HNU Changsha ● Mar 4th
- Hunan Normal University ●
- WHU ZUEL ●
- HUST Wuhan ●
- CSU Changsha ● Mar 5th
- BUAA Beijing ● Mar 7th
- BNU Beijing ● Mar 8th
- Guangdong University of Foreign Studies Guangdong ● Mar 16th
- NPU Xian ●
- XJTU 西安 ● Mar 17th
- ECNU 上海 ●
- PKU Beijing ● Mar 18th
- Southeast University Nanjing ● Mar 19th
- NJU Nanjing ●



01 Global Online

- [05] Semiconductor-related policies in major regions of the world.
- [07] Information on global fab construction in semiconductor industry.
- [10] Will the chip market reverse the depression in 2023?
- [13] Can DDR5 usher in the recovery in 2023?

02 Industry News

- [15] Sales volume of passenger vehicles in the first quarter of 2023 in China
- [20] The vehicle sales show a “tragicomedy”
- [23] Auto-Related Policies in Major Regions of the World
- [28] It is poised for memory and analog chips for automobiles to grow
- [32] The next stage of Automobile intelligence: intelligent cockpit+autonomous vehicles
- [38] SiC will play a leading role in new energy car
- [41] What are the prospects for the semiconductor and automotive industries in Southeast Asia?

03 Market Report

- [44] The Analysis of Sales Reports for January and February in 2023
- [47] The Analysis of the logistics and part inspections in February

IC EYES THE WORLD

◦ Editorial team ◦

Editor Grace Jade Jola
Sarah Tom

Proofreading Grace Jade Jola
Sarah Tom

Typesetting Sarah Grace

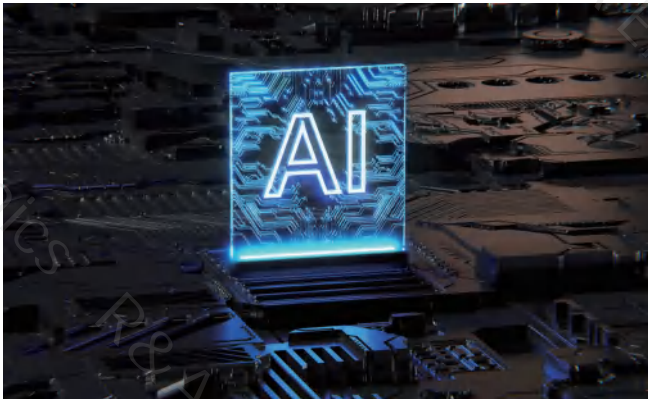




Semiconductor-related policies in major regions of the world

Jola

Governments around the world launched a string of incentives to encourage the chip industry with the aim of coping with the rising demand and the short supply.



The U.S. has announced new restrictions on China's chip industry

The U.S. has announced new restrictions on China's chip industry, and stops granting export licenses for China's Huawei with the intention of completely restricting the export of Huawei chips.

Furthermore, the Biden administration is also preparing to issue an executive order to restrict US investment in the sensitive Chinese technology industry.

The U.S. Department of Commerce has added 28 Chinese firms to its trade blacklist, including 4Paradigm Technology Co., Inspur Group Co., Ltd., Loongson Technology, and National Research Center for Parallel Computer Engineering and Technology etc.

China is considering restricting export of some key chip technology

China is considering restricting export of some key chip technology, including solar wafer production technology, electronic device manufacturing technology, semiconductor device manufacturing technology, sensor manufacturing technology, etc.

South Korea plans bigger tax breaks to boost its chip investments

South Korea plans bigger tax breaks to boost its chip investments, the government will apply a higher tax credit rate of 15% on facility investment in the chip industry for conglomerates, higher than the recently passed revision of 8%. The rate for small and medium-sized businesses will also rise from 16% to 25%.

The European Commission officially passed the European Chip Act

The European Commission officially passed the European Chip Act in January, which requires the EU to establish a chip diplomacy mechanism and establish investment and trade agreements or other diplomatic measures with partners to strengthen their relationships and ensure chip security.

The Netherlands' government plans to curb chip exports to China, and will impose export controls on certain DUV lithography equipment and semiconductor technologies.

Germany plans to ban certain components from Chinese companies Huawei and ZTE in its telecoms networks. The components already installed in the network will require operators to remove and replace

Japan plans to tighten chip exports to China

Japan plans to tighten chip exports to China in the field of core semiconductor equipment such as lithography machines and materials.

However, Japan may relax South Korea export controls on semiconductor materials, and consider adding South Korea to its "white list" of export management.

Reference: Haiwai Net; China Development Observation;

LEXOLOGY; MBB Net; Ministry of Commerce of the People's Republic;

Sina Finance; EE Times; ESMC

Information on global fab construction in semiconductor industry

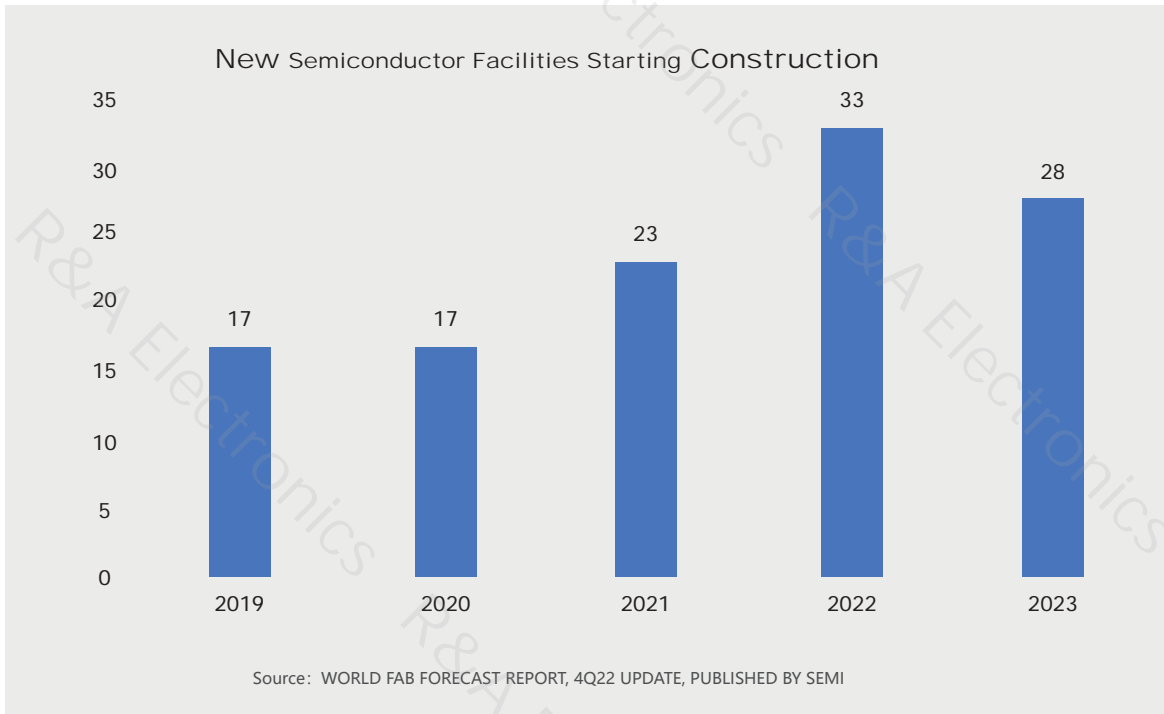
Jola

During the period from 2020 to 2022, with the emergence of variable factors such as the pandemic, digital transformation, and weak consumer electronics, the industry's demand for high-intensity computing has become stronger than ever before. More companies have deployed data centers, driving digitalization towards the cloud, and the demand for memory chips in the server market will also expand.



IC EYES THE WORLD

The SEMI World Fab Forecast reports that the global semiconductor industry is expected to build 28 new fabs in 2023, a slight drop from 2022.



The report also lists the regions where new fabs and semiconductor facilities are located around the world from 2021 to 2023.

China is set to outnumber all other regions with 20 facilities although these are supporting mature technologies.

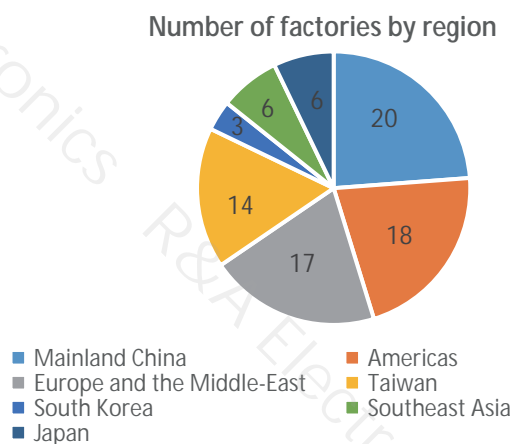
The Americas region will see 18 wafer fabs and semiconductor facilities start construction from 2021 through the end of 2023.

Europe and the Middle-East will start construction of 17 fabs between 2021 and 2023.

Taiwan's new facility count is 14 while Japan and the Southeast Asia are expected to begin building 6 facilities each over the forecast period.

South Korea is forecast to start construction on 3 large facilities.

In summary, a total of 84 fabs were added:



Data source: SEMI World Fab Forecast

Factory Information

Americas

Honda and LG Energy Solution will jointly build a battery plant in the US state of Ohio in 2023, the factory is expected to be operational by the end of 2025 with an annual production capacity of approximately 40 GWh.

Tesla will build a factory in the northern Mexican city of Monterrey. It is not yet clear what type of products the factory will produce when it goes into operation.

Volkswagen will build its first North American EV battery plant in Canada, granting its cars access to both Canadian and U.S. subsidies.

Onsemi has expanded its silicon carbide (SiC) facility in Hudson, New Hampshire, which will increase its SiC boule production capacity by five times year-over-year.

Europe

Infineon has won approval to begin work on a 5-billion-euro (\$5.35 billion) semiconductor plant in the German city of Dresden due to start production in 2026. The plant will produce power semiconductors and analog/mixed-signal components.

ST built fabs in France and Italy in 2022, and plans to invest about US\$4 billion in 2023 to increase the production capacity of 12-inch wafers, as well as the production capacity of SiC chips and substrates.

Bosch invested more than 400 million euros in expanding its wafer fabs in Dresden and Reutlingen, Germany in 2022, and plans to invest around 50 million euros for the wafer fab in Reutlingen.

Wolfspeed plans to cooperate with auto parts supplier ZF to build a highly automated, cutting-edge 200 mm wafer fabrication facility in Saarland, Germany in 2023.

Asia-Pacific

TSMC is considering building its second chipmaking plant in Japan in southwestern Kumamoto prefecture, and plans to mass produce 2nm chips in 2025. TSMC's first plant in Japan, set to come online in late 2024, is also in Kumamoto.

Neta Auto's Thailand Ecological Smart Factory has recently laid the foundation stone. In the future, it will become the main manufacturing base for Neta Auto to build right-hand drive electric vehicles and export them to ASEAN.

Foxconn has signed an agreement to set up a factory in India's southern Telangana state, the investment scale and products are not yet clear.

Reference: ESM China; CENA; IT Home; Sina News; SiC and resurgence of semiconductor vertical integration by Majeed Ahmad, elecfans

Will the chip market reverse the depression in 2023?

Jade

The semiconductor market is currently complex and ever-changing. With the US restrictions on the import of high-end chips to China, many chip manufacturers and equipment makers lost the largest chip consumer market in China and moved their chip manufacturing plants to Southeast Asia. The localization of Chinese chips is imminent, but the development of high-end chip technology is still flawed. The restructuring of the semiconductor industry chain has increased uncertainty for 2023.

The global semiconductor size in 2022 was US\$573.5 billion, an increase of 3.2% over 2021. The revenue of the top 15 chip manufacturers in Q4 of 2022 fell by 14% quarter-on-quarter.

The largest decrease was in memory manufacturers, down 25%, and non-memory manufacturers down 9%.

Recently, WSTS released a list of the top 15 chip manufacturers by global revenue in Q4 of 2022, as shown in the figure below.

Top Semiconductor Companies' Revenue					
Change versus prior quarter in local currency					
	Company	US\$B 4Q22	Reported 4Q22	Guidance 1Q23	Comments on 1Q23
1	Samsung SC	15.9	-13%	n/a	Inventory adjustments
2	Intel	14.0	-8.4%	-21.7%	Excess inventory in PCs
3	Broadcom	8.9	-0.3%	n/a	4Q22 is 3Q22 guidance
4	Qualcomm (IC)	7.9	-20%	-2.4%	Inventory adjustments
5	SK Hynix	6.1	-30%	n/a	PC market decline
6	Nvidia	6.0	1.2%	n/a	4Q22 is 3Q22 guidance
7	AMD	5.6	0.6%	-5.3%	Declines in client & gaming
8	TI	4.7	-11%	-6.9%	Declines except automotive
9	STMicro	4.4	2.4%	-5.1%	Auto & industrial strong
10	Infinion	4.2	-4.6%	-1.3%	Auto & industrial strong
11	Micron	4.1	-39%	-7.0%	Inventory levels improving
12	MediaTek	3.6	-24%	-10%	Inventory adjustments
13	NXP	3.3	-3.9%	-9.4%	Auto & industrial strong
14	Analog Devices	3.3	0.1%	-1.5%	Growth in industrial & auto
15	Kioxia	2.1	-26%	n/a	PC & smartphone weak
Total of above			-14%	n/a	
Memory Cos. (US\$)			-25%	n/a	Samsung-Hynix-Micron-Kioxia
Non-Memory Cos.			-9%	-10%	

Fig.1:
Source: WSTS

Gartner released the ranking list of the world's top 10 chip manufacturers in 2022. According to the data, the annual revenue of the global chip industry in 2022 will be US\$601.7 billion, an increase of 1.1% from US\$595 billion in 2021. Among them, the memory market is the worst performer, with revenue down 10% year-on-year, and it may be even worse in 2023.

In this situation, most memory chip manufacturers have announced reductions in expenditures in 2023.

Non-memory chip revenue increased by 5.3%, and there are differences in different market segments.

The strongest growth was in the analog chip market, followed by discrete device market, which increased by 19% and 15% respectively year-on-year. Gartner indicated that the growth in analog

chips and discrete devices was driven by growing trends in vehicle electrification, industrial automation and energy transition.

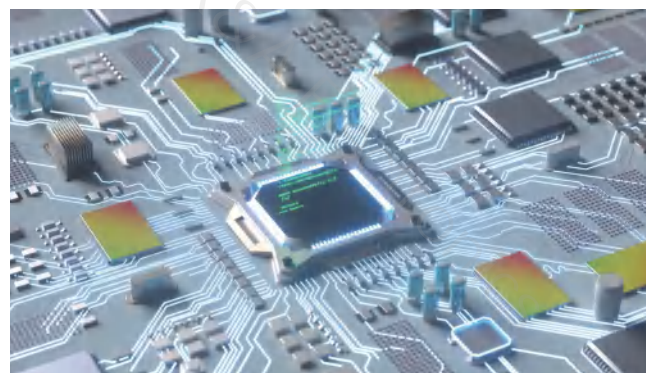
2022 Rank	2021 Rank	Vendor	2022 Revenue	2022 Market Share (%)	2021 Revenue	2021-2022 Growth (%)
1	1	Samsung Electronics	65,585	10.9	73,197	-10.4
2	2	Intel	58,373	9.7	72,536	-19.5
3	3	SK Hynix	36,229	6.0	37,192	-2.6
4	5	Qualcomm	34,748	5.8	27,093	28.3
5	4	Micron Technologies	27,566	4.6	28,624	-3.7
6	6	Broadcom	23,811	4.0	18,793	26.7
7	10	AMD	23,285	3.9	16,299	42.9
8	8	Texas Instruments	18,812	3.1	17,272	8.9
9	7	MediaTek	18,233	3.0	17,617	3.5
10	11	Apple	17,551	2.9	14,580	20.4
		Others (outside top 10)	277,501	46.1	271,749	2.1
		Total Market	601,694	100.0	594,952	1.1

Fig.2:
Source: Gartner

Will the big reversal of 2020 be repeated in 2023? Affected by COVID-19, the global semiconductor industry began to decline significantly in Q2 of 2020. Except the wafer foundry, IDM, IC design, packaging and testing and other subdivisions have been impacted to various degrees.

At that time, there were about 10 institutions predicting the growth of the semiconductor industry in 2020. Although there were some differences in the forecasts, most institutions were not optimistic.

The most optimistic institution predicted an increase of 3.3%, and the most pessimistic institution forecasted a decline of 11.7%.



The following were the industry forecasts of the most authoritative institutions for 2020 at that time:

IC Insights had lowered its global semiconductor market sales forecast for two consecutive months. In April, IC Insights lowered it again, pointing out that the global semiconductor industry would decline by 4% year-on-year in 2020.

IC EYES THE WORLD

Gartner predicted that global semiconductor market sales would increase by 0.9%, which is a decline from the 12.5% year-on-year growth forecast at the end of 2019. Sales were lower to \$415.4 billion, down \$55 billion from the previous forecast.

WSTS indicated that the global semiconductor market in 2020 increased by 3.3% year-on-year, reaching 425.9 billion US dollars.

In fact, starting from Q3 of 2020, demand in the chip market has surged, driving substantial growth throughout the year. Contrary to the forecasts of many institutions, semiconductor sales in 2020 will be US\$439 billion, a year-on-year increase of 6.5%.

By the second half of 2022, the memory market will be sluggish, and consumer electronics market will continue to decline. Except for automotive chips, other products will begin to oversupply. Especially after entering 2023, the industry situation will take a turn for the worse, with negative news such as order cuts, price cuts, and layoffs.

For the trend in 2023, all major institutions have given negative forecast data.

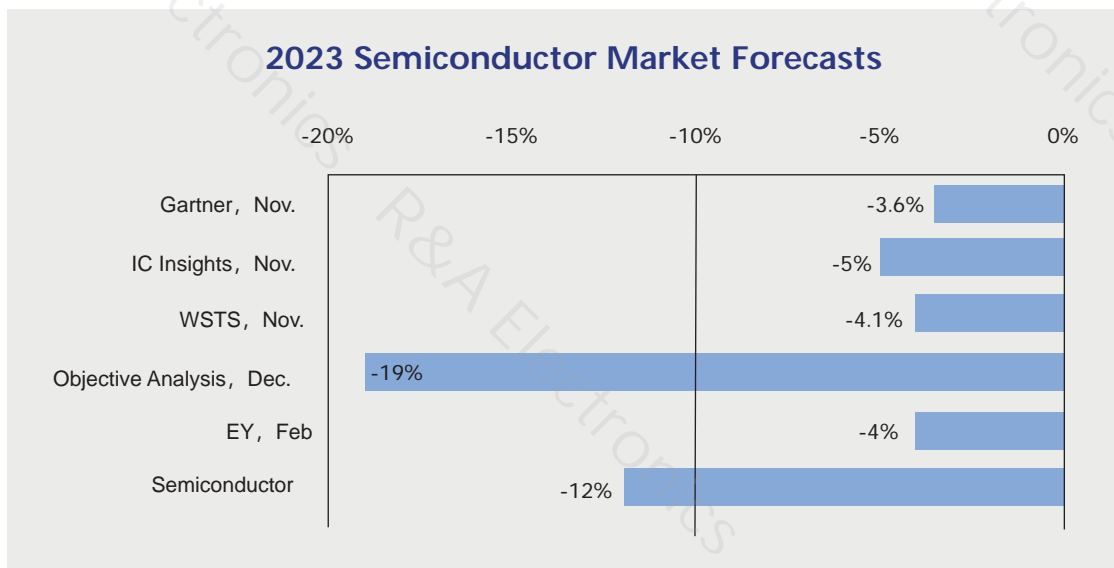


Fig.3:

From the current revenue data released by major chip manufacturers, the semiconductor industry will still be in a downward trend in Q2.

As for whether there will be a big reversal after Q2 of 2023 like in 2020, the electrification and intelligence of automobiles and industrial automation will be the main growth drivers of the semiconductor market.

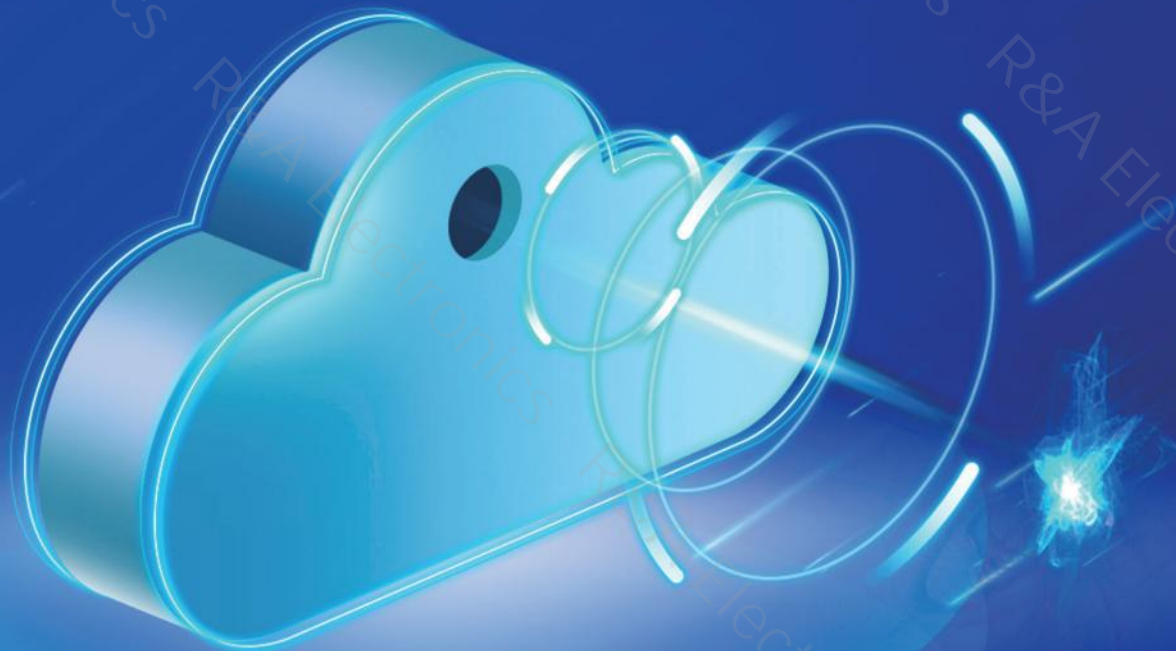
The memory inventory is slowly declining, and Omdia expects the market to recover continuously in the second half of this year.

At present, the semiconductor market is complex and changeable, and the U.S. has imposed restrictions on the import of high-end chips from China. Many chip manufacturers and chip equipment manufacturers have lost the largest chip consumer market (China), and moved their manufacturing plants to Southeast Asia.

The localization of Chinese chips is imminent, but high-end chip technology is still a weakness of China. The restructuring of the semiconductor industry chain has increased uncertainty in 2023.

Can DDR5 usher in the recovery in 2023?

Jade



During the period from 2020 to 2022, with the emergence of variable factors such as the pandemic, digital transformation, and weak consumer electronics, the industry's demand for high-intensity computing has become stronger than ever before. More companies have deployed data centers, driving digitalization towards the cloud, and the demand for memory chips in the server market will also expand.

IC EYES THE WORLD

According to Omdia Research on February 11, the adoption of DDR5 chips in server DRAM will be slower than expected this year.

DDR5 was previously expected to account for 28% of the server DRAM market, but this has now been adjusted to 13%.

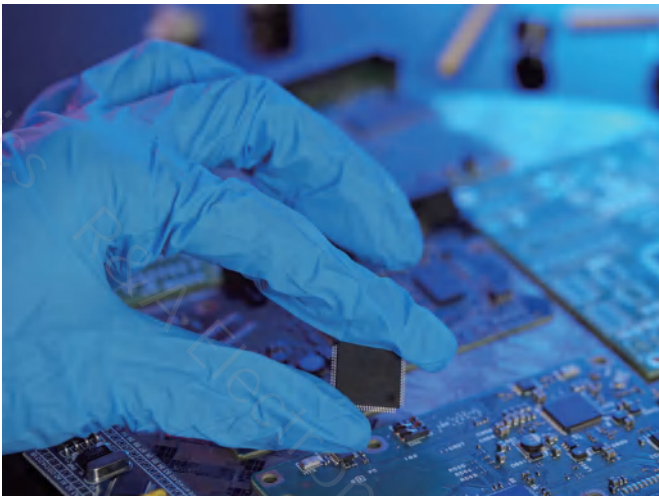
Omdia claimed that this phenomenon is due to a slower-than-expected speed of recovery in the server DRAM market. With global inflation and high inventories of memory chips, the global market is in a downturn. In addition, Intel recently launched the fourth-generation Xeon CPU, but the time is slower than expected, which is one of the reasons for the delay in the adoption of DDR5 in the server memory market.



According to Omdia data, DDR5 will account for only 3% of the server DRAM market in Q1, and 8% in Q2. This proportion will increase to 15% in Q3 and 24% in Q4.

At present, in the face of weak demand in the consumer market, the demand growth of memory chips in industries such as PCs and smartphones has slowed down, but emerging markets such as data centers and automobiles have gradually shown greater room for growth.

Many analysts pointed out that the growth in demand for servers is becoming a new driving force for the memory chip market. From 2020 to 2022, with the emergence of variable factors such as COVID-19, digital transformation, and weak demand for consumer electronics, the industry's demand for high-intensity computing is stronger than ever.



More companies have deployed data centers, driving digitalization to gradually develop on the cloud, and the demand for memory chips in the server market will also expand. In the future, data centers and servers will become the key driver of the memory market.

Digitimes predicts that the server market will rise against the trend in 2023, with shipments expected to grow by 5.2%. The growth momentum comes from the acceleration of global data center construction.

In the medium and long term, driven by the growing demand for cloud, HPC, and edge servers, and the successive introduction of next-generation CPUs by major chip manufacturers, the compound annual growth rate of global server shipments will reach 6.1% from 2022 to 2027.

In fact, the original factory has been paying attention to the server market since 2020, and it is expected that the proportion of server DRAM production will reach a record high of 40% in 2025, replacing mobile DRAM as the focus of manufacturers.

Samsung Electronics stated that considering AI, 5G and other key infrastructure investments, it will increase products for servers and data centers in 2023. SK Hynix emphasized that in the medium and long term, it may reduce local IT expenditures and turn to using more Cloud services, the memory demand of the data center will continue to grow.

Facing the market trend, the production capacity allocation of the memory factory will also be adjusted, and the excess production capacity will flow to the server market.

As the new energy transformation trend of China's passenger car market is basically confirmed, and the rise of independent brands is accelerating, the auto market in China will show strong growth characteristics in the future.

Sales volume of passenger vehicles in the first quarter of 2023 in China.

Tom



IC EYES THE WORLD

In January 2023, 1.649 million vehicles were sold in China, down 35% year-on-year. The sales of commercial vehicle arrived 180,000 units with declines of 47.7% year-on-year and 37.1% month-on-month, the 408,000 sales of new energy vehicles, with a availability rate of 24.7%. The sales of electric commercial vehicles completed 15,000 units, with a penetration rate of 8.3%. It is reported that the annual penetration rate of new energy vehicles decreased by 0.9%, the passenger by 1.0% , and the commercial by 1.9%.

By the end of February 2023, automobile sales achieved 1.973 million, in which 324,000 commercial vehicles were shipped, electric automobiles of 525,000 with a penetration rate of 26.6%. The sales of electric commercial vehicles brought about 240,00 units with a penetration rate of 7.4%.

The automotive sales reached 3.625 million vehicles amid January and February, cutting by 15.2% year-on-year. In the first two months, 504,000 commercial vehicles were sold, falling by 15.4% year-on-year, in which electric commercial vehicles occupied 390,00 units, up 54.1% year-on-year; The annual penetration rate of new-energy vehicles presents 25.7%, slightly ahead 0.1%, including passenger cars of 28.6%, climbing 0.8%; Commercial vehicles of 7.7%, dropping 2.5%.

The Chinese Spring Festival and tight policy shocks the vehicle market, resulting in a decline of 19.8% year on year during January and February.

Yield of vehicles in February						
	Sedan	MPV	SUV	Sum	Mini bus	Total
February	760,000	670,00	836,000	166,400,0	280,00	169,200,0
January	601,000	590,00	687,000	134,600,0	230,00	136,900,0
Feb of last year	700,000	500,00	746,000	149,700,0	260,00	152,200,0
Year-on-year	8.7%	33.3%	12.1%	11.2%	7.8%	11.1%
Month-on-month	26.6%	14.3%	21.8%	23.6%	18.8%	23.6%
Total of Jan-Feb	136,000,0	126,000	152,100,0	300,700,0	510,00	305,800,0
Total of Jan-Feb of last year	166,900,0	129,000	174,800,0	354,500,0	570,00	360,200,0
Year-on-year of the two months	-18.5%	-2.4%	-13.0%	-15.2%	-11.1%	-15.1%

Fig.1:
Source: CPCA

Limousines generated 200,000 retail sales in February, uplifting 23% year-on-year and 8% month-on-month. Last year, the yield of luxury cars impeded by chip in short supply gradually improves at the moment, and relevant market gradually strengthened.

In February, self-owned brands sold 710,000 vehicles, up 29% year-on-year and 12% month-on-month. The retail share of self-owned brands took up 51.1% in February 2023, along with a year-on-year growth of 7%. From January to February, the retail share of self-owned brands summed 50%, climbing by 5.4% compared with the same period in 2021. The brands attained 53.3% alone in February, an increase of 9.8% from the same period last year. The own brands evidently account for increasingly large of retail share in the new energy exports. The top and traditional automobile enterprises performed well in transformation and upgrading, including BYD, Changan Automobile, Geely and Chery Automobile.

Major joint venture brands retailed 480,000 cars in February, shrinking by 12% year on year but extending by 2% month on month. In February, the retail share of German brands held 20.6%, up 0.2% year on year, while Japanese brands seized 17.6% of that, descending 5.4% versus the same period of last year. American brands obtained 7.5% of the share, slipping by 1.6% from February last year.

Automobile exports:

Entire automobile exports this year maintain the growth as robust as that for the fourth quarter of last year. In the first two months of 2023, the vehicles exports achieved 682,000 units, surging 43.2% year on year with the value of \$14.02 billion, a rise of 65% year on year. In the light of statistics of CPCA, an Association of passenger car in China, the exports of passenger cars in February totaled 250,000 units, with a year-on-year growth of 89% and a month-on-month of 8%.

In January-February, 488,000 passenger cars passed through customs, spiking by 61% from the same period of 2022. Electric vehicles accounted for 31% of total vehicle exports in February. Since the improvement of export capacity, the exports of self-owned brands reached 194,000 vehicles in February, a leap of 122% year-on-year and 5% month-on-month. Joint venture and luxury brands exported 58,000 units, a rise of 28% year on year.

Automotive Production Capacity:

In February, 1.664 million passenger cars were produced, up 11.2% year-on-year and 23.6% month-on-month. As the epidemic lockdown little shocks the industrial chain basically at the moment, the yields and sales of automobile enterprises gradually revive to normal after the Spring Festival.

The output of luxury cars crept up 26% year-on-year and 21% month-on-month, whereas one of Joint venture brands decreased by 17% year-on-year but increased by 27% month-on-month. The yields of self-owned brands enlarged by 34% year-on-year and 23% month-on-month.

Wholesales and retails of vehicles in February						
Retail sales	Sedan	MPV	SUV	Sum	Mini bus	Total
February	656,000	820,00	651,000	139,000,0	290,00	141,800,0
January	610,000	600,00	623,000	129,300,0	110,00	130,400,0
Feb of last year	602,000	660,00	590,000	125,900,0	260,00	128,500,0
Year-on-year	9.0%	24.1%	10.3%	10.4%	12.6%	10.4%
Month-on-month	7.7%	36.2%	4.5%	7.5%	158.6%	8.8%
Total of Jan-Feb	126,400,0	143,000	127,200,0	267,900,0	400,00	271,900,0
Total of Jan-Feb of last year	160,400,0	168,000	156,800,0	334,000,0	450,00	338,500,0
Year-on-year of the two months	-21.2%	-14.8%	-18.9%	-19.8%	-12.0%	-19.7%
Wholesales	Sedan	MPV	SUV	Sum	Mini bus	Total
February	722,000	720,00	824,000	161,000,0	270,00	164,500,0
January	632,000	570,00	759,000	144,800,0	110,00	145,900,0
Feb of last year	688,000	530,00	728,000	146,900,0	150,00	148,300,0
Year-on-year	5.0%	35.4%	13.2%	10.2%	83.3%	10.9%
Month-on-month	14.2%	26.9%	8.6%	11.7%	137.6%	12.7%
Total of Jan-Feb	135,500,0	129,000	158,300,0	306,600,0	380,00	310,400,0
Total of Jan-Feb of last year	171,300,0	135,000	178,100,0	362,900,0	450,00	367,400,0
Year-on-year of the two months	-20.9%	-5.0%	-11.1%	-15.5%	-14.7%	-15.5%

Fig.2:
Source: CPCA

Some major enterprises strongly adjusted production capacity in an effort to balance inventory of the dealer system, especially following the Federal Reserve interest rate hike and the upstream resource prices decline during February.

Vehicle Wholesale in February:

The wholesale cars completed 1.618 million units in February, with a year-on-year rise of 10.2% and a month-on-month of 11.7%. Pushed by the new energy market, some auto enterprises perform variously.

Amid February, own enterprises output 859,000 vehicles, growing by 37% year on year and 13% month on month. Dominate joint ventures shipped 510,000 vehicles at wholesales prices, contracting by 19% from previous year and stretching by 10% from previous month. The wholesale volume of luxury cars was 250,000 units, up 16% year-on-year and 9% month-on-month.

Amid February, own enterprises output 859,000 vehicles, growing by 37% year on year and 13% month on month. Dominate joint ventures shipped 510,000 vehicles at wholesales prices, contracting by 19% from previous year and stretching by 10% from previous month. The wholesale volume of luxury cars was 250,000 units, up 16% year-on-year and 9% month-on-month.

BYD, Changan, Geely, Chery, Tesla in China, Gac-Toyota, BMW-Brilliance and Beijing Mercedes-Benz, which are leading manufacturers of automobile, all achieved significant positive growth compared with last February.

Inventory:

The production lines recovered in February. Wholesales of vehicles keep in a solid space. Inventory reduction is proceeding. The outputs are 50,000 vehicles more than automotive wholesales that are 20,000 cars less than retail vehicles.

After the issue of the "New Ten Measures" for epidemic prevention and control, retail fuel vehicle surged and inventory gradually reduced as we expected at the end of last year.

The destocking of 300,000 vehicles eased the pressure on channel inventory during December last year to February this year. The channel inventory was soaring in February 2022. Therefore, some major automotive firms limit their productions in light of sales in that carmakers keep reducing the channel inventory to ensure safety in February.

Thanks to stable inventories, passenger car exports maintain an incredibly high of around 250,000 units per month since the second half of 2022.

New energy vehicles:

Electric passenger vehicles in February were wholesaled 496,000 units, jumping 56.1% year on year and 27.5% month on month. Tight incentive policy brought about a large dip in new energy vehicle sales in January this year, while the new energy vehicle market came to revive in February. Retail sales of electric passenger vehicles in February gained 439,000 units, ascending by 61.0% year-on-year and 32.8% month-on-month.

Wholesales:

The penetration rate of EV wholesales market in February was 30.6% exceeding 21.6% in February 2022. In February, self-owned brand new energy vehicles arrived the availability rate of 45.7%; Electric luxury cars penetrate by 35%; And electric vehicles of major joint venture brands permeate by only 3.1%.

Amid February, battery vehicles wholesaled 347,000, mounting by 41.5% year on year and crabbing by 70% of total electric vehicles; Plug-in hybrid vehicles were shipped 149,000 units, a rise of 105.8% year on year, accounting for 30% of whole new energy vehicles, an increase of 7% compared with the same period of 2022.

B-class electric vehicles achieved sales of 121,000 units in February, up 42% year-on-year and 15% month-on-month, holding by 35% of battery vehicles. A00+A0 class economic battery vehicle market shows a booming trend with a wholesale of 40000 vehicles of A00-class, a dent of 40% year-on-year, an increase 17% month-on-month with a proportion of 12% share of battery cars; A0-class vehicles presented a wholesale of 100,000 units, securing by 29% of the battery automobile market; A-class electric vehicles harvested sales of 81,000 units, winning by 23% of the market.

With the inevitable transition trend of new energy in China's passenger car market and the increasing arise of own brands, China's car market is going to dramatically extend in the future. Cost is the key to electric transformation of vehicles.

When it comes to continuous breakthrough of battery technology, battery cost is to dwindle in the future with quick-acting charging, extending mileage. In particular, battery cost is about to slump since the price of lithium Carbonate drops recently. Meanwhile, energy densities will also be significantly promoted. Battery vehicles are still mainstream in the future.



Top eight passenger car brands in wholesales for February



BYD · Song : 52,400



Model Y : 51,412



BYD · Yuan : 33,612



BYD · Qin: 30,540



Model 3: 22990



Sylphy : 34457



Dolphin : 22,990



Sagitar : 20725

The vehicle sales show a “tragicomedy”

Jade

Due to the tightening of new EV subsidy policies and the shortage of chips, the sales of cars in various countries have declined in January this year.

The EV industry may trigger a wave of bankruptcies and mergers.

Tight preferential policies for new energy vehicles combined with the lack of semiconductors for vehicles, which is why the car sales of some countries present a decline in January this year. However, the U.S. as an enormous auto market, stays robust growth in automobile sales during January and February. Its shipments totaled 160,895 vehicles, up 8.4% from a year earlier in February. Amid the first two months of 2023, automotive sales in the U.S. summed 2,246,900 vehicles with a rise of 7.0% versus the figure of the same period last year.

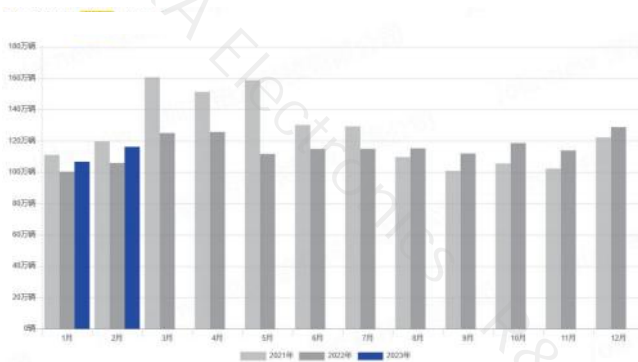


Fig. 1 USA - Automotive Sales volume, 2023

United States

In the United States, there was 992,000 new energy vehicles sold in 2022, an increase of nearly 52% year-on-year, manifesting the annual penetration of 6.9% with 2.7% higher than that in 2021. At present, the field in the United States is still on the rise.

New car sales in Europe (EU + EFTA + UK) keep climbing in January 2023, with a rise of 10.7% from the same period of last year to 911,064 vehicles. The countries in Northern Europe lead the way in electrification, like Norway holding 66.5% of the EV market in Europe. Iceland occupies 26.8% of the EV market, while Finland gains 26%. The UK, France and Germany own 13.1%, 13.1% and 10.1% separately, which shows the positive market. However, electric vehicles have a little influence in Spain and Italy, with 4.8% and 2.6% respectively.

Europe

In the UK, 26,000 new energy vehicles were sold in January with tight incentives for electric vehicles.

Availability rates of battery vehicles in France were anticipated to flourish as a result of a proposed rental subsidy scheme, selling 25000 new energy vehicles in January.

Norway introduced two new taxes that applied to battery vehicles for the first time, carrying out 1400 sales of new energy vehicles in January.

An increased bonus responding to new energy since 2023 generated 9500 battery vehicles sold in Italy amid January.

Spanish MOVES III provided allowance for buyers of electric cars. Thus, there were 7200 new energy automobiles shipped in Spain during January.

Finland's sales volume of new energy vehicles were 3200 units under the incentives.

Portugal government brought forward tax breaks for new energy cars: battery auto are exempt from corporate income tax and plug-in hybrid electric vehicles enjoy reduction policy of the tax. The country attained 3900 sales of the automobiles in January.

Sweden revoked aids for electric cars, presenting 7600 electric vehicles sold.

Southeast Asia

Southeast Asia possesses huge potential in new energy vehicle market, luring most of carmakers. In recent years, Thailand's

electric vehicle market has entered a leap stage, which is sales from 1,000 vehicles in 2021 to nearly 10,000 ones in 2022. In January 2023, more than 3,000 battery vehicles were registered in Thailand.

BYD Auto beat Tesla to become the best-selling vehicles in Thailand. In contrast, the markets for new energy vehicles present an enormous vacancy in Vietnam, Indonesia, Malaysia and the Philippines as BYD and Tesla have not marched into these countries.

The most popular brand is the Wuling Hongguang Mini EV in those markets. But 500 vehicles of BYD ATTO 3 arrived in Malaysia in January.

In recent years, Singapore actively promoted the development of new energy vehicles in response to the global trend. In a bid to encourage people to buy new energy vehicles, the Singapore government promulgated a string of policies from 2021 to waive fees for owners of new energy vehicles. Sales of new energy vehicles in Singapore were sluggish, with 1,888 cars sold in January, according to Marklines. Nevertheless, The car market gradually rebounded in February.

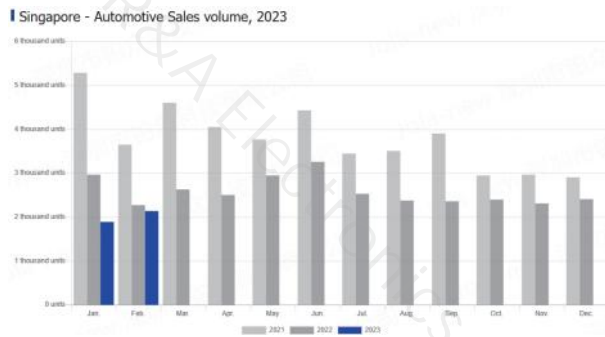
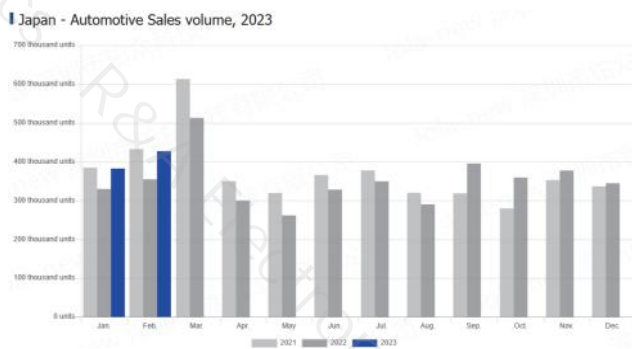


Fig. 2 Singapore - Automotive Sales volume, 2023

Japan's car sales keep rising in the first two months in 2023, equivalent to that in the same period of 2021.

Japan

There were 382,338 vehicles sold in Japan in January, ascending 11% from the previous month, while 426,726 cars were shipped in February, up 11.6% from January.



Source: MARKLINES

In a January report, analysts at Bloomberg NEF brought forward five predictions for the global electric vehicle market by 2023.

1. global electric vehicle sales is forecast to hit a record in 2023, but grow slightly;
2. BYD battery vehicle sales may surpass Tesla;
3. Battery prices are most likely to creep up, \$152 per kilowatt-hour on the average.;
4. the United States is officially engaging in electric car and battery manufacturing;
5. there will be a wave of bankruptcies and mergers in the new energy industry.

Nowadays, the door to electric vehicle market has shut down, thus the number of electric car makers supposedly falls this year. The rest areas of the EV value chain are expected to perform well, but their market shares may shrink.



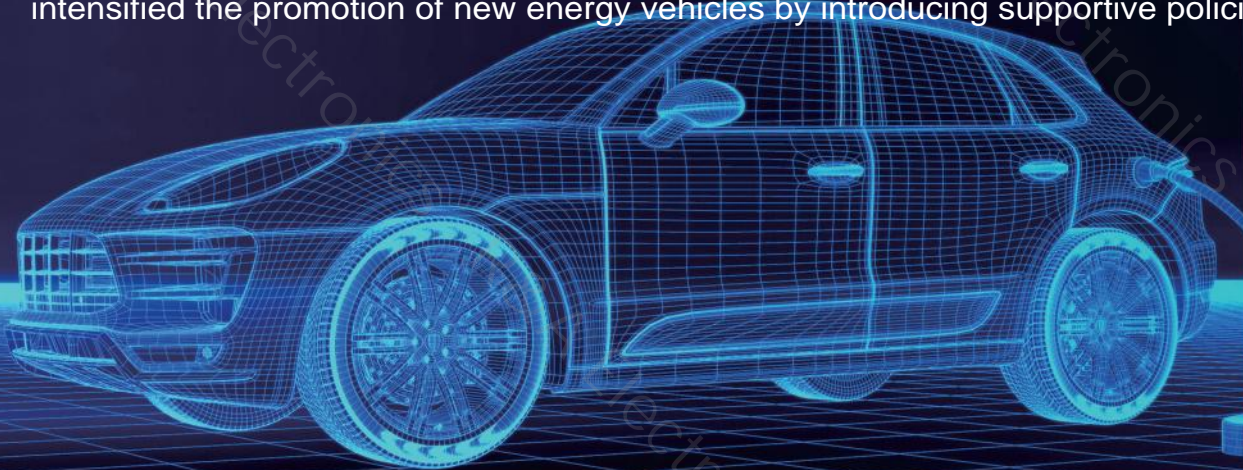
Auto-Related Policies in Major Regions of the World

Jola



新能源

In recent years, with rapid growth, new energy vehicles evolve into a new highlight of consumption growth and industrial development. Countries around the world intensified the promotion of new energy vehicles by introducing supportive policies.



IC EYES THE WORLD

The U.S. On February 15, U.S. time, the Biden administration issued long-awaited final rules on its national electric vehicle charger network.

The policy requires that all chargers must be built in the U.S. immediately, any iron or steel charger casings must be assembled and manufactured in the U.S., and with 55% of their cost coming from U.S.-made components by 2024.

The new policy mainly makes regulations on the chargers subsidy objects. Overall, the US government's support for the construction of chargers remains unchanged, and the growth logic of the US charger market has not changed.

This regulation only restricts the production and assembly of the charging shells in the United States, and the charging module and other components are not affected.

Therefore, in the short term, the exports will not be affected in Chinese charger companies. In the long term, the manufacturing



capacity in the U.S. is weak, and the cost and selling price are much higher than that in China.

Chinese charger companies can take advantage of cost advantages to gain profit by building factories locally and strive for the US market.

Inflation Reduction Act: vehicle subsidies lure consumers and automakers

US president Joe Biden signed the Inflation Reduction Act in 2022. The legislation clearly states that subsidies are provided for consumers to purchase new and used electric vehicles(EVs) assembled in the U.S. after January 1, 2023.

For the consumer side of new energy vehicles, the vehicle whose key metal raw materials contained in automotive power battery plants are extracted and processed in the U.S. or in any country that has signed a valid free trade agreement with the U.S., or the vehicle whose recycling rate reaches more than 40% before January 1, 2024, can receive a tax credit of US\$3,750.

Another tax credit of \$3,750 is available for vehicles with more than 50% of the localized value of batteries manufactured and assembled in North America. Therefore, the maximum credit

remains at \$7,500 per vehicle. The duration of this policy is 10 years, from December 3, 2022 to December 31, 2032.

The Act imposes certain restrictions on the following conditions for consumers: the upper limit of personal gross income for buying new cars is \$150,000 per year, and the upper limit for used cars is \$75,000 per year. The retail price of eligible cars does not exceed \$55,000, and prices of other models do not exceed \$80,000.

For the production of new energy vehicles, the construction of EV factories in the U.S. can be subsidized, which is very attractive to automakers. Reuters reported that Audi plans to build an EV plant in the U.S. in March. Audi CEO Markus Duesmann said in an interview with German media that the Act made it very attractive to build an EV factory in the U.S.

Germany Starting from 2023, Germany will reduce the subsidies for pure EVs, and plug-in hybrid electric vehicle(PHEVs) will no longer enjoy subsidies. The implementation of the subsidy policy is similar to that in China, and the cost of the subsidy will still be shared by the government and auto companies.

France France will launch an electric car rental subsidy program, which will make the monthly rent of an electric car as low as 100 euros (about 685 yuan). The price is lower than the cost of gasoline for many traditional fuel car users.



Norway Norway used to have zero tax and VAT on electric cars, but two new taxes are imposed on pure electric vehicles in 2023. The current (2023) taxes and fees are at 25% VAT for the price above 500,000 NOK (about 47,000 euros), as well as 12.5 NOK per kg for cars weighing over 500 kg.

Sweden In 2023, the Swedish government's new energy subsidy budget is SEK 2.99 billion, which is mainly used to pay subsidies for the purchase of new energy vehicles (including pure EVs and PHEVs) before November 7, 2022.

From 8 November 2022, the government no longer offered incentives for this, but road tax was still exempt. Meanwhile, the Swedish government will add 1.61 billion Swedish kronor and 1.12 billion Swedish kronor for charging infrastructure construction subsidies in 2024 and 2025, respectively.

U.k. The U.k. has canceled subsidies for pure EVs or PHEVs in 2022, and now shifts subsidy allocations to infrastructure construction such as charging networks and the electrification transformation of other types of vehicles.

The vehicles such as taxis, motorcycles, trucks and wheelchairs are still eligible for subsidies (certain conditions should be met).

Netherlands On January 6, 2023, the Netherlands government announced that there will be a total of 99.4 million euros in subsidies in 2023, of which 67 million euros will be used to buy or lease new vehicles, and 32.4 million euros will be used to buy old ones.

Vehicles to receive the subsidy must be pure EVs and the cost for new vehicles must be between 12,000 euros and 45,000 euros. Anyone who buys or leases a new EV can expect to receive a €2,950 subsidy.

Italy From 2023, the subsidy for individuals with an income of less than 30,000 euros to purchase pure EVs and PHEVs will increase to 4,500/3,000 euros per vehicle. Receive a subsidy of 5000/4000 euros per vehicle respectively. For scrapped vehicles and people with an income of more than 30,000 euros, the purchase of pure EVs/PHEVs will receive a subsidy of 5,000/4,000 euros per vehicle respectively.



On February 14th, European time, the European Parliament in Strasbourg endorsed the European zero-emission agreement for new cars and vans in 2035 reached by the European Commission and the European Council with 340 votes in favour, 279 against and 21 abstentions. The European Union agreed to a 55% CO2 emission reduction target for new cars and 50% for new vans by 2030, and a 100% CO2 emission reduction target for both new cars and vans by 2035.

Dr. Zhou Yushan, secretary-general of the Guangdong Society of Automotive Engineers, analyzed that although the agreement was passed last week, the winning party did not gain an overwhelming advantage in this vote, which adds uncertainty to the subsequent implementation. Opposition to the proposal within the EU cannot be ignored, with industry groups including the Verband der Automobilindustrie (VDA) trying to lobby lawmakers against the plan. Moreover, Europe's charging infrastructure policy is still unclear, so it is too early to commit to this goal.

The original intention of this agreement is to allow European car companies to take the lead and consolidate their advantages in pure EVs in the European market. After Europe launched an agreement to ban the sale of fuel vehicles, car giants Benz and Volkswagen Group expressed their support for the new regulations. But for Chinese car companies, there are also benefits. Europe is one of the main export destinations of China's electric vehicles, more than a dozen Chinese car companies are selling EVs to Europe at present. After the agreement was passed, Europe is bound to transform to the pure EV market faster, and the total market will be larger. As China is the world's largest producer of power batteries, Chinese supply chain companies represented by power batteries are also speeding up their overseas expansion.

China: Delisting of state subsidies for new EVs: sales declined in January, a large number of car companies are under pressure

In 2023, many local governments will introduce subsidy policies in the form of subsidies, purchase tax reductions and consumer coupons to help the market smoothly pass the period for when the state subsidy exits.

The new energy car purchase subsidy ended on December 31, 2022. Zhang Hong, Secretary-General of the New Energy Automobile Branch of the China Automobile Dealers Association, said that the national subsidy has contributed a lot to the development of China's new EV industry into the world's largest production and sales country and market, but the decline of subsidies is also a must in the development of new energy vehicles.

After the subsidy was cancelled, except for Tesla, BYD, and Ideal, which increased by 286.5%, 62%, and 23% year-on-year respectively, almost the entire new energy car market experienced varying degrees of sales decline in January. Industry insiders believe that after the reduction of the state subsidy, most car companies, except BYD and Tesla with strong industrial chains and rich product chains, will face pressure to increase prices. Not only small and medium-sized companies, but also distributors between consumers and car companies will also be greatly affected.

Many places continue to implement the car purchase subsidy policy.

Peking In 2023, the subsidy policy for replacing passenger cars with new energy vehicles will continue, and the subsidy standards and methods will be consistent with those in 2022. During the period from March 1 to August 31, 2023, individual consumers can get a subsidy of 8,000 yuan or 10,000 yuan if they scrapped or

transferred passenger cars registered in this city for more than one year, and purchased new energy passenger cars from car sales companies in this city.

Shanghai Before June 30, 2023, if an individual consumer scraps or transfers out a small passenger car registered in Shanghai and meets the relevant standards, and purchases a pure electric vehicle, a financial subsidy of 10,000 yuan per vehicle will be given.

Guangdong Guangzhou continues to implement the direct allocation of new energy indicators, and in the first half of this year, an additional 30,000 energy-saving vehicle incremental indicator allocation quotas will be added. Shenzhen will provide elimination subsidies to individual consumers who eliminate qualified old cars and purchase new qualified new energy vehicles. The total subsidy for preferential car purchases in Zhuhai High-tech Zone is 10 million yuan, and both fuel vehicles and new energy vehicles can participate.

Guangxi Starting from February 24, Nanning will allow individual consumers to apply for a 2,000-yuan consumer coupon if they purchase a new small or mini passenger car with a value of 80,000 yuan or more, issue a uniform invoice for the sale of motor vehicles and obtain a Nanning license plate.

In addition, some places such as Henan province will continue the original subsidy policy in 2022. Other places such as Qinghai province, Fujian province, Shanxi province, Tianjin, Shenyang and Lishui have also launched a new round of Spring Festival promotional subsidy activities to boost car consumption.

Cui Dongshu, secretary-general of the National Passenger Cars Association, said that with the implementation of the price adjustment policy for new energy car companies, consumers are more sensitive to prices, and the market is gradually returning to normal.



Japan

Japan has increased subsidies for the purchase of pure EVs and PHEVs in 2022. The subsidies for new EVs will be extended until the end of 2023. Meanwhile, the tax reduction measures for environmentally friendly vehicles with good fuel efficiency will also be extended from the end of April 2023 to the end of 2023.

South Korea:

In January 2023, South Korea introduced a new EV subsidy policy, reducing the maximum national subsidy from 7 million won to 6.8 million won, and the total fuel efficiency subsidy and mileage subsidy to 5 million won. However, the new subsidy includes an additional 150,000 won subsidy plan for EVs, provided that the vehicles adopt "V2L (vehicle-to-load)" technology. In addition, the new subsidy also includes an additional 150,000 won subsidy plan for automakers who have installed more than 100 fast charging piles in the past three years.

Thailand:

The Thai government has exempted import taxes on EVs, and new EVs can enjoy a preferential tax rate of 2%. Meanwhile, the import of key components of new EVs such as batteries can enjoy the preferential policy of exempting import taxes.

If an OEM plans to start production in Thailand within 3 years, the government will provide an additional subsidy of 70,000-150,000 baht (approximately 13,900-29,800 yuan) per vehicle. The specific subsidy amount depends on the model.

Indonesia:

In December 2022, the government plans to provide subsidies of up to 80 million Indonesian rupiah (approximately US\$5,130) for each electric vehicle. Each PHEV will get about Rs 4 crore in subsidies.

Malaysia:

Malaysia has launched EV tax relief measures, announcing that 100% of electric vehicle import tax and consumption tax, and road tax for the import of completely built-up EVs will be exempted before December 31, 2023. There is also a 100% sales tax exemption for the import of completely knock-down EVs until December 31, 2025.

Reference: Orient Securities; Ijiwei; DeHeng Law Offices; Gasgoo; PC Auto; IT Home; Netease Technology; Provincial and Municipal People's Governments

With the electrification, intelligence and digitization of vehicles, many related applications provide opportunities for memory products, pushing up the demand for analog chips. In the next few years, whether it is in terms of size or technology, analog chips are about to make rapid progress.



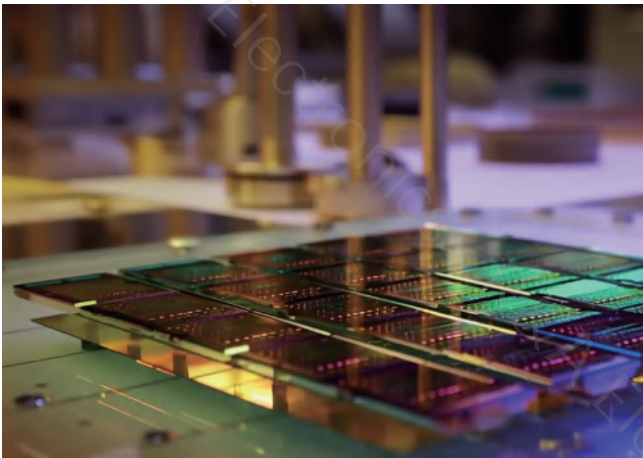
Analog chips pick up firmly: demand for automotive analog IC surges

Jade

Analog chips pick up firmly: demand for automotive analog IC surges

The analog chips have a huge room for growth in the whole semiconductor design area.

Analog chips are broadly utilized in consumer electronics, communication equipment, industrial control, medical devices, automobiles, as well as the Internet of Things, new energy, smart wearable, artificial intelligence, smart home, intelligent manufacturing, 5G communications.



WSTS classifies analog chips as general and special analog. Dedicated analog is categorized as consumer, computing, communications, automotive, industrial and others on the basis of end market. Telecommunications and automobiles take up a majority of the market.

The terminal markets of communications cover mobile phones, networking and communication devices, with the global market size at \$26.2 billion in 2022, holding 32% of the entire analog chip market.

Automotive is the fastest growing downstream market in the dedicated analog IC market, with a market share of \$13.7 billion, up by 17% YOY in 2022. General and dedicated analog dies account for 40% and 60%, respectively.

General analog chips essentially compose of battery management (BM) and signal chain. In a broad sense, radio frequency is the third-importance component of general analog. Battery management integrated circuit (BMIC) mainly refers to the management circuit of battery and electricity, embracing charge management chip, converters, charge protection chips, wireless

charging chips, driver IC, and so on. Signal chain IC is used to process signals, including linear products, converters, interface products, etc.

The downstream application of battery management chips covers communications, consumer electronics, automobiles and the Internet of Things. The market space is vast. Thanks to new technologies and end markets, signal-link chips achieve a stable growth.

The global market size of signal chain of analog chips is anticipated to clamber from \$8.4 billion in 2016 to \$11.8 billion in 2023, with a compound annual growth rate of around 5% between 2016 and 2023, according to IC Insights. For example, amplifiers, comparators and converters win largest market scales, seizing roughly 75% of the market size of signal chain analog chip.

Frost&Sullivan statistics point out the market scale of China's analog chip obtained 273.1 billion yuan, in a proportion of nearly 70%. China is the major market across the planet, as the growth rate is faster than that of the global analog chip market.

Along with the sprawl of automobile electrification, the internet and implementation of self-driving, the sorts of automobile semiconductors stretch from MCU, power semiconductor devices (IGBT, MOSFET), sensors to advanced driver assistance systems, COMS, laser radar, MEMS, etc.

iHS and Melexis analyzed, electrification has significantly augmented the demand for analog components of single vehicle in every class A to E.

For instances, A-class fuel vehicles use about 100 analog chips, while A-class battery electric vehicles (BEV) require more than 350; in B-class vehicles, the number of analog chips per vehicle enlarges from 160 per fuel vehicle to nearly 400 per battery vehicle.

The BEVs in E class utilize over 650 analogs.

Thanks to electrification, intellectualization and network connection, the internal of vehicles are installed an increasing number of sensors, power semiconductors and motors, which requires plenty of BMICs for current and voltage conversion, promoting the rise of BMICs. The major suppliers of BMIC for cars involve ADI (AFE products mainly from the acquired Maxim and Linear), TI, Infineon, NXP, Renesas (AFE mainly from the acquired Intersil product line), ST, and Onsemi.

Since needs for AFE chips used in battery management systems of automobiles are proportional to the amount of cells and to the voltage, the number of AFE for 800V voltage platforms doubles compared to 400V platforms. A 400V system requires about eight AFEs and one isolated chip, while an 800V system needs about 16 AFEs and one isolated chip.

Signal-link chips for automobile provide support for internet of vehicles and information interaction and play a variety of roles in cars. The signal chain is classed as radio-frequency IC and ASSP/ASIC. Initially, radio-frequency IC and modules furnish cars with wireless communication, which consists of the four major wireless communication solutions for automobiles including cellular network system, WLAN, GNSS(global navigation satellite system) and V2X (vehicle to everything). secondly, application specific standard parts (ASSP/ASIC) that bridge sensors and processors.

Sensors converts the real signal outside world into the analog one which is finally transmitted to the MCU for processing through the amplifier and the analog-to-digital converter.

The electrification and intelligentization of vehicles propel the demand for analog chips. In the next few years, analog chips will make rapid progress both in terms of market scale and technology.

As consumer electronics languish, memory for vehicle is poised for growth

Looking into the market trend of memory chips in 2023, TrendForce estimates that the price decline of DRAM in the first quarter will be limited to 13% to 18%, but the end of its downward is not yet in sight.

The price of NAND flash memory chip decreases by 10%~15%.

The price drop is under control somehow as some original manufacturers reduce the production of memory chips.

What new opportunities will the storage market gain in the currently sluggish market in the coming future? What are the core factors affecting the future trend of the storage market? Which demand growth for terminal market will lift shipments of original factory?

The flourishing new energy vehicle market is the new force to push memory market rise. Driven by electrification, network connection, intelligence and sharing of vehicles, the memory chip carrying data and transmission is playing an increasingly important role in the development of automobile intelligence, and the demand for vehicle storage is constantly climbing.

Automobile memory capacity is set to rapidly step from GB level to TB level. The expansion of capacity brings huge potential market value, which is one of the indispensable elements of the memory industry rise in the future.

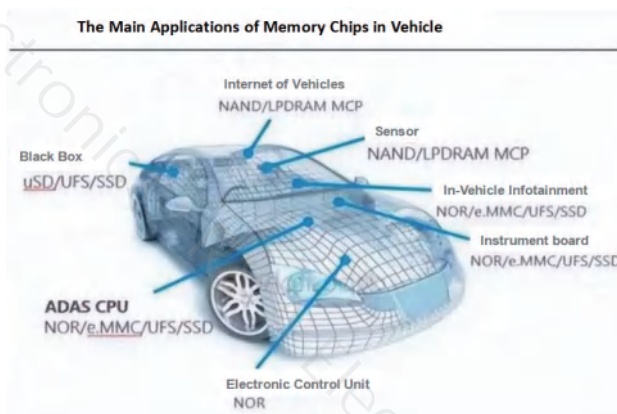


Fig. 2

Source: Micron Technology and industry analysts

In the short and medium term, the ADAS upgrade and cockpit are the central growth of automotive storage, and also the focus of auto manufacturers in recent years. ADAS and In-Vehicles Infotainment (IVI) forcefully promote demand for automotive DRAM. In the long term, the upgrade of autonomous driving technology will be the fundamental force to enhance the vehicle storage market.

Globally, the growth rate of automotive memory chips is ahead of the overall growth rate of memory chip market, according to IHS research. The automobile storage market will be a high-increase semiconductor segment, with an obvious and prominent position in the memory chip and semiconductor investment landscape.

BlueWeave Consulting survey demonstrates the global automotive memory market (including DRAM and NAND flash) is worth \$3.4753 billion in 2021 and is expected to reach \$172.506 billion by 2028. The compound annual growth rate(CAGR) from 2022 to 2028 is 23.9%. DRAM and NAND for cars are projected to account for nearly 90% of automotive memory revenue.

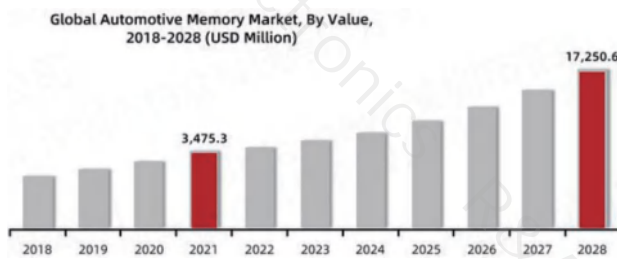


Fig. 2
Source: BlueWeave Consulting

Who will be the winner in the vehicle memory market?

The memory chip market is highly concentrated. For the DRAM market, Samsung, Micron and SK Hynix take more than 94% of the market share. Six companies in the NAND Flash area--Samsung, KIOXIA, SK Hynix, Western Digital, Micron and Intel--have a combined share of over 95%.

Micron ranks first in DRAM memory sales when it comes to the automotive storage. Reportedly, the market share of Micron in 2021 was about 45%, followed by Ingenu Semiconductor Inc. (15%), Nanya Technology Corporation (9.5%) and Winbond Electronics Corp (8.56%) from China. In contrast, the vehicle NAND market is still dominated by overseas manufacturers.

Micron's automotive revenue grew 30% year-over-year in September-November of 2022. The demand for next-generation IVI systems and more advanced driver assistance systems particularly boosts a strong rise in the vehicle storage market through 2023. Micron speculates the CAGR of automotive DRAM and NAND is twice as fast as the overall DRAM and NAND market over the next five years.

Market pattern of sorts of memory chips

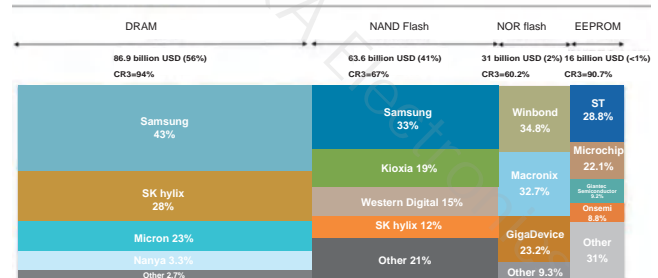


Fig. 3
Source: IC Insights

With the restructuring of the industrial chain generated by the transformation of the automobile industry, it is likely to break the traditional form of OEM+Tier1+Tier2 automobile supply chain, the original mode -- OEM dominates the vehicle architecture and Tier1 manufacturers provide various functional components of vehicles -- gradually evolves into direct cooperation between OEM and Tier2 who masters key technologies.

On the plus side, the multitude of applications resulting from the digitization of the car creates opportunities for memory products. Structural increase propels the demand for NOR Flash products, which are quite diversified in automotive electronics applications.

Automotive applications contribute to most of the growth in NOR flash products, in light of the performance statistics of several NOR flash manufacturers released by IC Insights. In the competitive landscape, Chinese enterprises -- MXIC Corporate, Winbond and GigaDevice -- occupy the vast majority of market shares. Major memory chip manufacturers such as Samsung, Micron, SK Hynix, Winbond, MXIC, Nanya have launched automotive storage products.

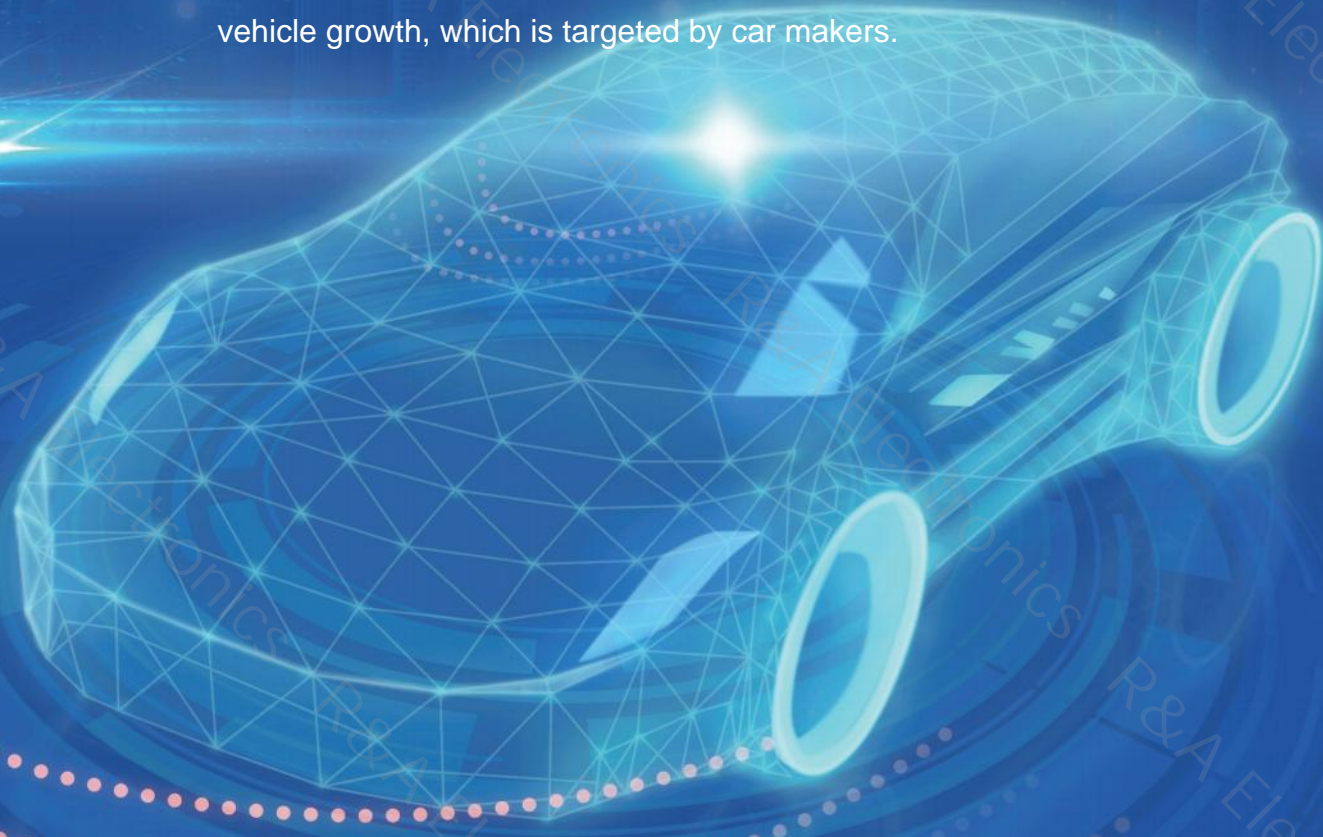
Sources: EE Times China, Huxiu.com, gasgoo

The next stage of Automobile intelligence: intelligent cockpit+autonomous vehicles

Sarah

China's automobile sales have won the crown in the world for many consecutive years by grabbing a relatively high automobile market scale. In particular, the market share of new energy vehicles increased to 65% in 2022. Apparently, electric vehicles constantly penetrate and flourish beyond expectation. However, as peak prosperity is inevitably followed by stagnation, the current growth of the automobile industry has eased.

Automobile intelligence and the internet have become the new breakthrough for vehicle growth, which is targeted by car makers.





Since the birth of the first three-wheeled vehicle in 1769, automobiles have gone through the age of steam, internal combustion engines and gasoline, and are now entering the new energy era. Automotive sales have been ranked first in the world for many years, and it has a relatively high automotive market scale in China.

In particular, the market share of new EVs has increased to 65% in 2022. The penetration of new energy vehicles continues to exceed expectations, and vigorous momentum is obvious to all.

The penetration rate of new EVs in China continues to exceed expectations, showing a trend of prosperity.

However, the market will inevitably return to flatness after rapid prosperity. At present, the growth rate of the market size of the automobile industry has slowed down, and the intelligentization and networking of vehicles have become new growth breakthrough points by various car manufacturers.

Intelligence

At present, as new EVs enter the second half, intelligence has become a hot word to leverage the future growth of vehicles. According to the forecast of relevant institutions, smart vehicles will become a major force in the automotive consumer market. Smart driving, smart cockpit, smart networking, smart electric, and car cloud services have become the five key areas of vehicle intelligence.

1. Smart driving

With the development of intelligent driving technology and the gradual production of driver assistance functions, the public has higher expectations for the market space of intelligent driving. According to data released by the China Automobile Association and other relevant organizations, the market penetration rate of autonomous driving in L2 and above level has reached 39% in Q422.

The autonomous driving level of L2+ models is close to L3, with a penetration rate of 5%. It is estimated that by 2025, the sales of smart cars in L2 and above is expected to exceed 10 million in China, with a penetration rate of 49.3%.

Intelligent driving technology has always been highly concerned by governments, car companies and suppliers, consumers and investment institutions. The European Union, the United States, and Japan are all taking turns to introduce policies to seize the opportunity. The European Union, the U.S., and Japan are all taking turns to introduce policies to seize the opportunity. China's high-level intelligent driving such as L3 and L4 has been gradually piloted in 2022, and technology and standards are becoming more and more perfect.

Penetration rate of each autonomous driving level

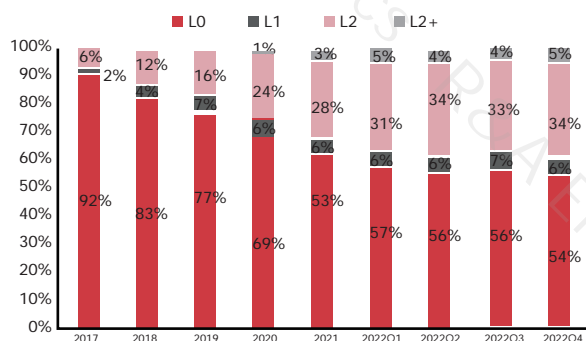


Fig. 1



In the intelligent driving system, the popularity of HD Maps has plummeted. In the 2023 intelligent driving development plan released by Li Auto and NIO successively, reducing the weight of HD Map in the automotive system and focusing on perception algorithms to achieve assisted driving seems to have become the mainstream trend of many automakers. New technologies represented by lidar and automotive AI chips have made significant progress.

2018-2022 Ranking of ADAS Pre-installed Mass Production by Regions

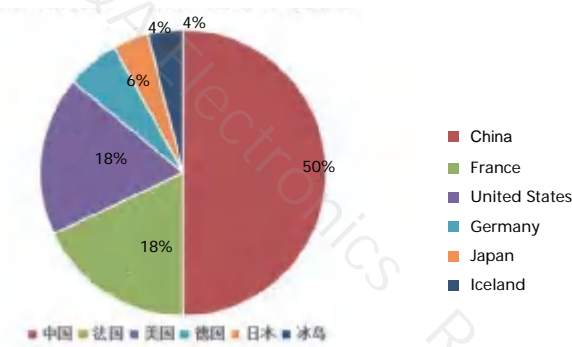


Fig. 2

In the Report on the Application of LiDAR in the Automotive and Industrial Fields 2022 released by Yole, two of the top 10 lidar suppliers are from China, Hesai and Robosense. Hesai Technology has captured 27% of the global market share for forward-facing lidars, ranking first in the world. Robosense ranks second in China and third globally, with a 16% market share. Chinese LiDAR manufacturers are expected to gradually take a dominant position in the coming years.

Top 15 LiDAR Company Ranking	
1	Trimble
2	Hexagon AB
3	Sick AG
4	Topcon
5	RiegI
6	Hesai
7	BEA(Haima)
8	Faro
9	Pepperl+Fuchs
10	RoboSense
11	Hokuyo Automatic
12	Teledyne Optech
13	Velodyne LiDAR
14	Vaisala
15	Ouster

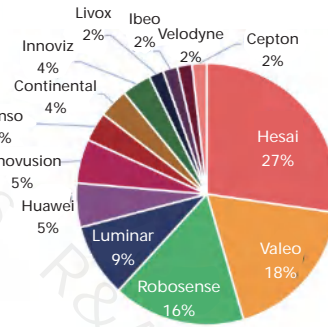


Fig. 3 2022 Market share of suppliers of LiDAR

Source: Yole; GUOSEN Securities Economic Research institute

In February 2023, Hesai successfully debuted on the US stock market, becoming the first listed lidar company in China. They plan to continue expanding their production capacity on a larger scale, with an annual capacity of approximately 1.2 million units.

Robosense is committed to building a "Shenzhen-Dongguan-Guangzhou" intelligent manufacturing cluster to ensure production capacity. The first phase of their smart manufacturing cluster has invested over 1 billion yuan, with a production cycle of 12 seconds per unit and an annual planned production capacity of over one million units.

Compared to the rapid expansion of start-up LiDAR suppliers such as Hesai and Robosense, some traditional LiDAR automotive suppliers such as Valeo have released their third-generation SCALA scanning LiDAR, which is expected to be mass-produced in 2024.

At the CES exhibition in January 2023, Bosch showcased a long-range LiDAR for L4 autonomous driving. Continental also exhibited the HRL131 high-performance LiDAR jointly developed with AEye and plans to start production in 2024 for L3 and L4 level autonomous driving solutions.

As major automakers develop their own "intelligent driving schedules" LiDARs are entering a phase of mass production. As shown in the following figure, more and more mainstream automakers are incorporating LiDARs into their new vehicles.

Chinese Domestic Vehicle Companies			
Vehicle type	Suppliers	Series	Genre
ET7	Innovusion	Falcon	Semi-solid State
ET5	Innovusion	Falcon	Semi-solid State
P5	Livox	Horizon HAP	Semi-solid State
G9	RoboSense	RS-LIDAR-M1	Semi-solid State
Li Auto L9	Hesai Technology	AT128	Semi-solid State
Aion LX Plus	RoboSense	RS-LIDAR-M1	Semi-solid State
IM Motors L7	RoboSense	RS-LiDAR-M1	Semi-solid State
Rising Auto R7	Luminar	Lris	Semi-solid State
Sar-motor	IBEO	IbeoNEXT	Solid State
WEY DHT	IBEO	IbeoNEXT	Solid State
AVATR E11	HUAWEI	96-Line	Semi-solid State
ARCFOX S	HUAWEI	96-Line	Semi-solid State
Hozon Auto S	HUAWEI	96-Line	Semi-solid State

Other National Vehicle Companies Worldwide			
Vehicle type	Suppliers	Series	Genre
Mercedes-Benz New S-Class	Valeo	Scala 2	Semi-solid State
Volkswagen BUZZ	Aeva	Aeries	Solid State
Audi e-tron	Aeva	Aeries	Solid State
Legend Hybrid EX	Valeo	Scala 2	Semi-solid State
Mirai	Continental AG	HFL110	Solid State
Mirai	Continental AG	HFL110	Solid State
Lexus New LS	Continental AG	HFL110	Solid State
Otosan	Velodyne	Velarray H800	Solid State

Fig. 4: Major vehicle companies' LIDAR installation

This wave of intelligence has also raised higher requirements for chip computing power. Currently, two international companies, NVIDIA and Mobileye, hold the major positions in the market for autonomous driving SoC chips. Chip manufacturers in China such as Horizon Robotics, Black Sesame Technologies, Cambricon Singgo Technology, and SemiDrive Technology have also emerged one after another. Huawei's Ascend 910 and Horizon Journey 5 and other smart driving chips have been officially launched for production, and computing power increased exponentially compared with the previous generation. Traditional ICT companies such as Huawei and new automakers such as Leapmotor are also conducting research and development of automatic-driving SoC chips.

	Manufacturers	Products	Algorithmic power	Power consumption
Self-Driving SoC Chips Energy Efficiency Comparison	NVIDIA	Xavier	30TOPS	30W
		Orin	254TOPS	65W
	Tesla	Dual-chip FSD platform	144TOPS	72W
			Ascend 310	16TOPS(INT8)
	HUAWEI	Ascend 910	512TOPS(INT8)	310W
			Horizon	Journey 5
	Black Sesame	A1000Pro	106TOPS(INT8)	25W
			Leap Motor	Lingxin 01

Fig. 5
Source: AUTO Byte

2.Intelligent Cockpit:

As the core carrier of the "third living space," the intelligent cockpit has a relatively lower technological implementation difficulty compared to intelligent driving, and its commercialization process is far ahead. In 2022, the delivery of cockpit domain controllers reached 1.7265 million units, and the front-loading rate reached 8.66%, accounting for 21.72% of the delivery volume of intelligent digital cockpits.

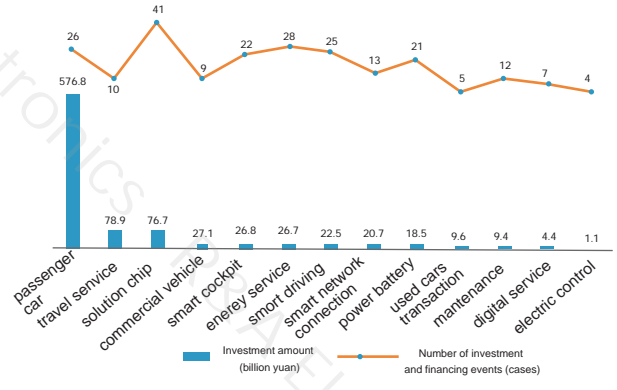


Fig. 6: 2022 Investment and Financing Amount and Number of Events in China's Intelligent EV Tracks
Source: Iyiou Data

(There were 12 financing events for intelligent cockpits in 2021, with a financing amount of 1.08 billion yuan.)

According to ICVTank's forecast, by 2026, the global automotive intelligent cockpit market size will reach 44 billion US dollars, with China becoming the main consumer market for intelligent cockpits and the market size exceeding 18.3 billion US dollars.

Penetration Rate of Smart Cockpit in New Vehicles

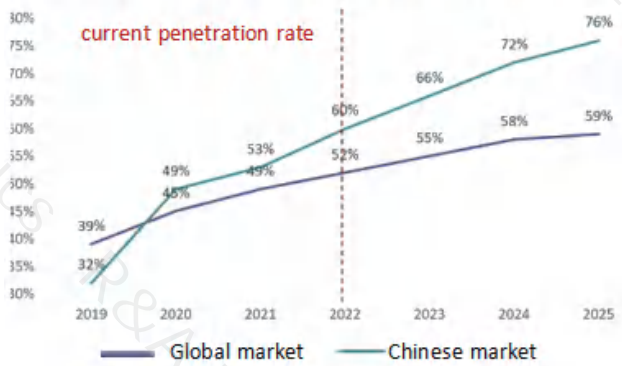


Fig.7
Source: IHS Market

Smart cockpit market size (100 million U.S. dollars)

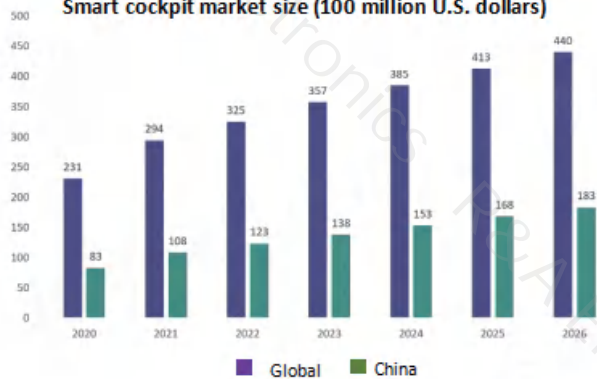


Fig.8
Source: ICVTank

The smart cockpit system chip of Xiaopeng P7 is equipped with Qualcomm Xiaolong 820A, which can accommodate more apps and supports mini-program extensions, making it highly practical and entertaining.

Currently, new and established car companies including BMW, SAIC, NIO, Xiaopeng, and Li Auto are upgrading their intelligent cockpit systems.

While car companies are fiercely competing in the "intelligent cockpit" race, some Internet technology companies and consumer electronics industry players are also entering the field.

Alibaba has achieved the integration of intelligent cockpit, autonomous driving, and other software through its car-machine operating system.

Baidu has launched XiaoDu vehicle to provide partners with digital solutions for intelligent cockpits, and is continuously working on key intelligent cockpit technologies such as cabin framework integration, fully offline millisecond-level voice, 3D dynamic human-machine co-driving maps, and the elimination of a large number of physical buttons.

Huawei's intelligent cockpit deeply integrates the computing, communication, positioning, and navigation capabilities of mobile phones and car machines.

Skyworth released its intelligent cockpit Skylink2.0 on March 8, 2023, and its self-developed 15.6-inch high-definition central control screen is the first to support HDMI2.1 4K 60-frame quality, applying the mature LocalDimming backlight partition technology from Skyworth's televisions to the automotive field.

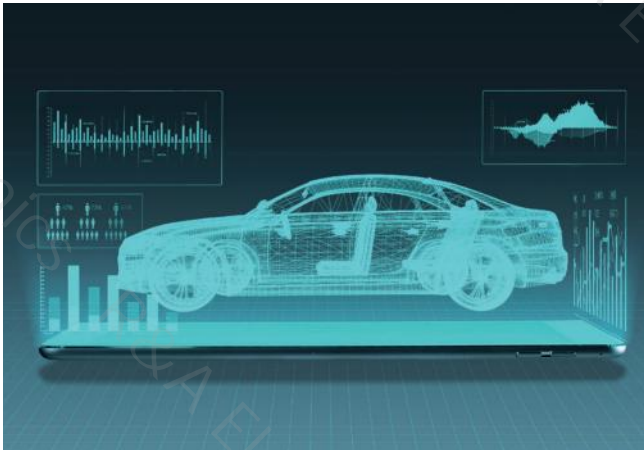
Tesla is planning to incorporate games including augmented reality types into its cars.

Audi will deploy XR holographic entertainment applications in the whole European markets, as well as Canada, the United States, Japan, and China.

Mercedes-Benz will begin equipping its new models with 5G telematics to enhance and optimize the in-car information and entertainment services.

Li Auto's L9 intelligent cockpit is equipped with two Qualcomm Snapdragon 8155 chips as standard, with 24GB of memory and 256GB of high-speed storage capacity.

Zeekr 001 is equipped with an upgraded new generation intelligent cockpit that uses a 7nm process 8-core CPU, 16GB of memory, and 128GB of storage space.



In this process, the domain controller has become the main battlefield of competition. The cockpit systems based on the Qualcomm platform account for more than 30%, taking over from Nvidia and Intel as the mainstream choice of major car companies, with rising momentum from companies such as Renesas and AMD.

Multiple Chinese local cockpit Tier1 companies such as Neusoft, Desay SV, PATEO, and Nobo have successively received front-loading orders and will begin to deliver them on a large scale from 2023.

The next-generation vehicle computing platform jointly developed by ECARX and AMD (AMD Ryzen Embedded V2000 processor and AMD Radeon RX 6000 series GPU) is expected to be mass-produced for the global market by the end of this year.

Bosch also secured the first customer project in the Chinese market last year and was advancing the cross-domain integration of intelligent cockpits and intelligent driving.

According to data from the High-Tech Intelligent Automotive Research Institute, by 2022, 566,200 units of passenger cars with Qualcomm platform cockpit domain controllers will be equipped as standard in the Chinese market (excluding imports and exports), a year-on-year growth of over 100%.

Ranking	Company	Market share
1	Visteon	27.18%
2	Desay SV	24.21%
3	Nobo Automotive	14.72%
4	Bosch	5.77%
5	Ecarx group	5.56%

Figure 9: Top passenger car smart cockpit (Qualcomm platform) domain controller suppliers' front-end market share, 2022
Source: GaoGong Intelligent Vehicle Research Institute

In short, as automotive intelligence enters the second half, intelligent driving and intelligent cockpit will become critical elements of competition for various brand models, both for car companies and suppliers.

SiC will play a leading role in new energy car?

Jade

The largest downstream application market for SiC devices is new energy vehicles.

It is estimated that in 2027, the market share of SiC in new EV applications will account for 79% of the global market.



Silicon carbide (SiC) is the third generation of breakthrough semiconductor materials: devices made of SiC versus the previous semiconductor materials, possess outstanding heat resistance, voltage resistance and quite low on-off energy loss.

Therefore, It is the ideal material for manufacturing high-voltage power and high-power RF devices. Downstream applications of SiC cover new energy, photovoltaic, energy storage, communications

The analysts of Yole forecasts that the global SiC power semiconductor market will grow from \$1.1 billion in 2021 to \$6.3 billion in 2027, with a compound annual growth rate (CAGR) of over 34%. SiC devices are broadly functioned in energy areas including new energy vehicles, charging stations, smart grids, photovoltaic inverters and wind power generation.

New energy vehicles act as the largest downstream application market for SiC devices. Moreover, China serves as the largest market for new energy vehicles, whereas its production techniques of SiC devices still lag far behind the international level.

At present, the upper and middle stream amid industry chain of SiC is mostly monopolized by enterprises in the United States, Japan, Europe. Additionally, in recent years, governments in world have intensified the incentive policies for the research, development and manufacturing of the new generation of chips, so that overseas giants rapidly expand production capacity and occupy the market.

As mentioned above, new energy vehicles are supposed to dominate the silicon carbide market. 79% of the global silicon carbide market is predicted to be held by the market share of silicon carbide in new energy vehicle application in 2027.

Although silicon (Si) is always the mainstream semiconductor material, the permeability of the third generation semiconductor is set to increasingly creep up year by year. Yole foresaw that devices made of Si will continue to play a leading role in the semiconductor market in the future, and the market penetration rate is expected to remain over 80%.

Four driving forces to enhance SiC permeability

The goal of "carbon peak and carbon neutrality" in each country

Improvement of mileage and power of new energy vehicles

Miniaturization of on-board batteries

The constant decline at price of SiC devices

The permeability of third-generation semiconductor materials probably exceed 10% in 2024. The market penetration of SiC is estimated to be close to 10%, and that of GaN is forecast to reach 3%.

There are four driving forces to enhance SiC permeability:

- 1) the goal of "carbon peak and carbon neutrality" in each country;
- 2) Improvement of mileage and power of new energy vehicles;
- 3) Miniaturization of on-board batteries;
- 4) The constant decline at price of SiC devices.

The global SiC substrate market is mainly managed by corporate in the United States, Japan, Europe, among which Wolfspeed, II-VI, SiCrystal (ROHM) own the advanced technology and large market share. The three companies alone take a combined global market share of more than 90%, with Wolfspeed accounting for more than 60% of the substrates market. The SiC power device market is dominated by the US and Europe: in terms of the SiC device market, STMicroelectronics and Infineon seize over 50% of the global SiC power device market.

Nowadays, SiC substrate is mainly 4-6 inches. Enlarging the chip size can effectively improve product yield and production efficiency. The major substrate manufacturers set to develop and massively yield the 8 inch substrate. 8 inch substrate will turn into the mainstream of the market.



What are the prospects for the semiconductor and automotive industries in Southeast Asia?

Grace

The EV market in the ASEAN region has good growth conditions, stable and sustainable development goals, and is expected to develop into one of the largest automotive markets in the world.

IC EYES THE WORLD

The semiconductor industry in **Southeast Asia** is generally at the low end of the industry chain, but it plays an important role in the division of labor in the global semiconductor industry. Under the impetus of international geopolitical conflicts and Chips for America, the transfer of the global semiconductor industry chain has been accelerated. Giants in the semiconductor industry have deployed in Southeast Asia one after another, driving some links in China's semiconductor industry chain to migrate to Southeast Asia.

In recent years, semiconductor industry chain in Singapore has become more and more complete. Singapore is the global headquarters of Micron and the location of Infineon's Asia-Pacific headquarters.



Whether it is distribution network, wafer manufacturing, semiconductor equipment, or packaging and testing, related companies or factories in Singapore have played a supporting role in the integrity of the industrial chain.

According to IC insights data in 2021, Singapore will account for nearly 5% of the global fab capacity and a 19% market share in the global semiconductor equipment market.

Malaysia occupies an important position in the packaging and testing market in Southeast Asia. According to SEMI data, Penang, Malaysia accounts for about 8% of the back-end production of the global semiconductor industry, becoming the world's leading microelectronics assembly, packaging and testing region.

Thanks to factors such as labor costs, talent base and business environment, a third of Vietnam's electronics companies are foreign-invested, and 99 of the top 100 electronics companies in Vietnam are foreign-funded. It is reported that Vietnam has attracted investment from Samsung, LG, Intel, Panasonic and Canon.

The trend of semiconductor giants betting on Southeast Asia has also provided supply chain support for the Southeast Asian automobile manufacturing industry. In the past two years, the popularity of EVs has entered a stage of rapid development. The EV market in Southeast Asia has great potential, especially in Thailand and Indonesia, the two largest markets in the ASEAN region, are growing faster than expected.

In order to keep up with the global development trend of pure EVs, Thailand has introduced pure EV consumption incentives, which have successfully attracted most of the mainstream car companies, including cutting import taxes and consumption taxes, and depending on the model.

Vehicles can receive a direct cash subsidy of 70,000 to 150,000 baht. The purpose of this incentive is to focus on encouraging the widespread use of EVs in Thailand as soon as possible in 2022-2023, thereby driving the increase in pure EV sales during this period, and promoting the increase in Thailand's local pure EV production from 2024-2025.

According to the data, the automotive production in Thailand in January 2023 was 157,844, and the automotive production in January 2022 was 151,747, a year-on-year increase of 4%.

Indonesia's automotive production in January 2023 was 132,163, increasing 10.7% year-on-year compared with 113,004 units in January 2022. Malaysia's automotive production in January 2023 was 58,527 units, with a year-on-year increase of 36.2% compared with 42,961 units in January 2022. In 2023, the auto market in Southeast Asia has a good start and maintains stable growth.

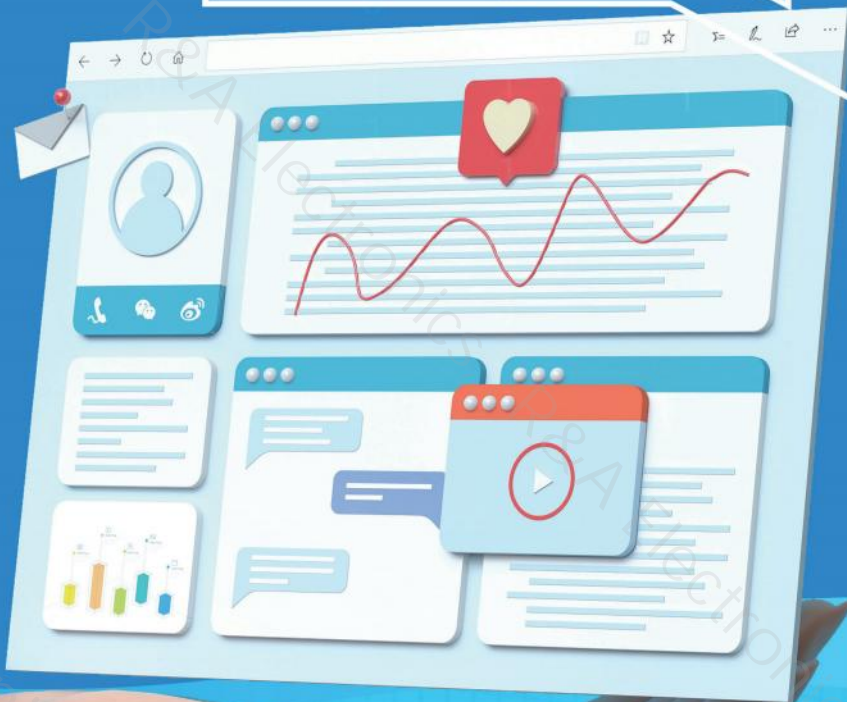
Southeast Asia has a large population, but the current vehicle ownership and utilization rates are not high. With the popularity of EVs and the increased acceptance of consumers, as well as policy guidance, the automobile market in Southeast Asia has great potential.

In March, NETA auto laid the foundation for an ecological smart factory in Thailand. In the future, it will become the main manufacturing base for NETA auto to build right-hand drive EVs and export them to ASEAN. In Indonesia, the government is actively promoting the investment of auto companies such as Tesla and Hyundai.

In Southeast Asia, well-equipped upstream and downstream automotive industry chains, skilled labor, sufficient automotive-related practitioners and electrification strategies all provide a suitable environment for automotive manufacturing and sales. The EV market in the ASEAN region has good growth conditions, stable and sustainable development goals, and the potential to be one of the largest global automotive markets in the future.

The Analysis of Sales Reports of R&A Electronics for January and February in 2023

Grace





A market report released by R&A Electronics in terms of the company's monthly sales, analyzes the market trend by observing market developments and sales data, so as to grasp market demand and provide purchasing strategies for customers.

In the report, R&A Electronics lists the nonconforming products with abnormal labels identified by R&A anti-counterfeiting laboratory, with the aim of preventing any rejected chips from entering the market through the firm, warning risks for our customers as well as effectively protecting the benefits of customers.

Top five purchasing chip models of R&A

In January, R&A's inventory procurement demonstrated that the



Fig.1: Source: Top five purchasing chip models of R&A

best-selling brands contained STMicroelectronics (ST) and Texas Instruments (TI), especially the needs for automotive chips.

Driven by the sharp rise of new energy vehicles, the demand for automobile semiconductors remains flourishing. At the same time, Shortages of automotive chips from chipmakers such as TI, ST, NXP, ON Semiconductor, and Infineon, remain widespread and will last for some time.

The hottest chip models of suppliers

Texas Instruments gained \$4.67 billion of revenue for the fourth quarter in 2022, down 11% QoQ and 3% YoY, with automotive and industrial accounting for 65% of total revenue. Its net revenue fell to \$1.96 billion.



Fig.2: Source: The hottest chip models of suppliers

Revenue for the first quarter of 2023 is expected to be between \$4.17 billion and \$4.53 billion, TI said on Feb. 14, which would represent two consecutive quarters of shrinkage. The company noted analog and logic chip markets will grow with a slowdown.

DIODES earned a high record of \$2 billion in 2022, elevating by 10.8% from \$1.8 billion in 2021. "the automobile chip market

IC EYES THE WORLD

contributes to the company's remarkable growth, a rise of 40% over 2021, occupying 15% of entire businesses" said the company's Chairman. Notably, automotive and industrial devices maintain hiking up in DIODES.

For instances, transistors, MOSFET devices are out of supply. R&A as a sophisticated distributor works on providing high-quality and reliable procurement services of electronic components for customers around the world with abundant supply networks and dependable suppliers.

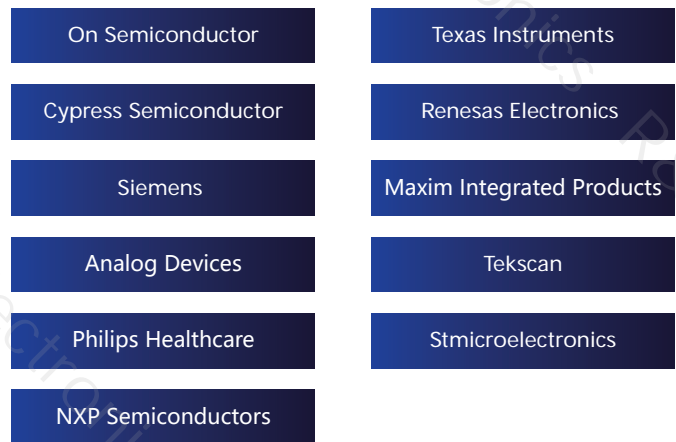
production capacity from consumers to renewable energy and power infrastructure.

The semiconductor market is cyclical. Currently, with the rapid development of new energy vehicles and the constant upgrading of intelligence, the automotive semiconductor market is still in a stable upward period. Look at the global medical device market, it continues to ascend steadily, occupied by the top 20 international medical device giants, including Johnson & Johnson, Siemens, Abbott, Medtronic, GE, and J&J, who account for nearly 45% of the global market share with their strong R&D capabilities and sales networks.

The top semiconductor suppliers for medical electronics involve:



Fig.3: Source: The brands with most inquiries and highest gross profits



Semiconductor market situation

R&A analysis presents that popular chips for automobile are still in short supply, but there are signs of relief and price reduction for some of them when many suppliers are dumping some automotive chips.

Infineon recently claimed that it expected the shortage of automotive MCUs to mitigate in the second half of this year. For the 2023 fiscal year, Infineon's automotive business product capacity has been fully booked. Given depressing needs for consumer device, the company stated that it might transfer parts of MOSFET

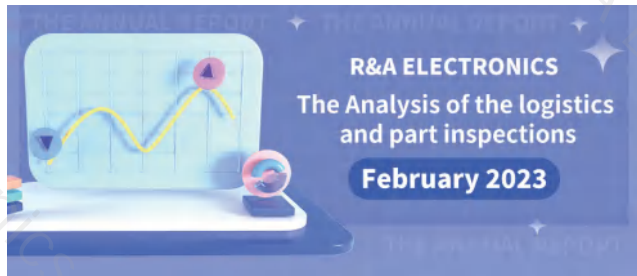


Fig.4: Source: Semiconductor market situation



The Analysis of the logistics and part inspections from R&A in February

Grace



A market report released by R&A Electronics in terms of the company's monthly sales, analyzes the market trend by observing market developments and sales data, so as to grasp market demand and provide purchasing strategies for customers.

In the report, R&A Electronics lists the nonconforming products with abnormal labels identified by R&A anti-counterfeiting laboratory, with the aim of preventing any rejected chips from entering the market through the firm, warning risks for our customers as well as effectively protecting the benefits of customers.

The Analysis of the logistics and part inspections from R&A in February

In February, R&A received 224 shipments in the warehouse, a 19.1% increase compared to the same period of last year when 188 products arrived.

The orders steadily mounted. Among the all arrival of goods, Texas Instruments accounted for 27%, Infineon for 15%, On Semiconductor for 13%, STMicroelectronics for 9%, while Diodes, NXP, and Analog Devices picked up 5%, 5%, and 4%, respectively.

The rest of other brands held by 22%. As for the management of inventory, R&A efficiently integrates procurement, storage, quality control, logistics, and distribution processes through its system. This not only enables inspection and transportation of products swift to meet interdepartmental collaboration but also saves logistics time for customers.

Based on the brands of R&A's procurement during February, it is evident that demand for Texas Instruments remains the strongest, which is attributed to demand from network base stations, artificial intelligence, new energy vehicles, and the Internet of Things.

Consequently, most of products of TI are in short supply but the needs for it are still climbing.

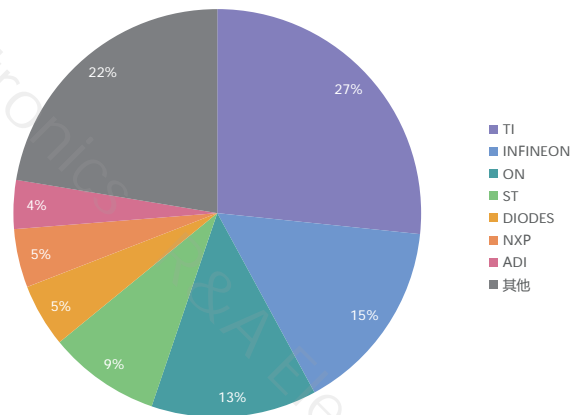
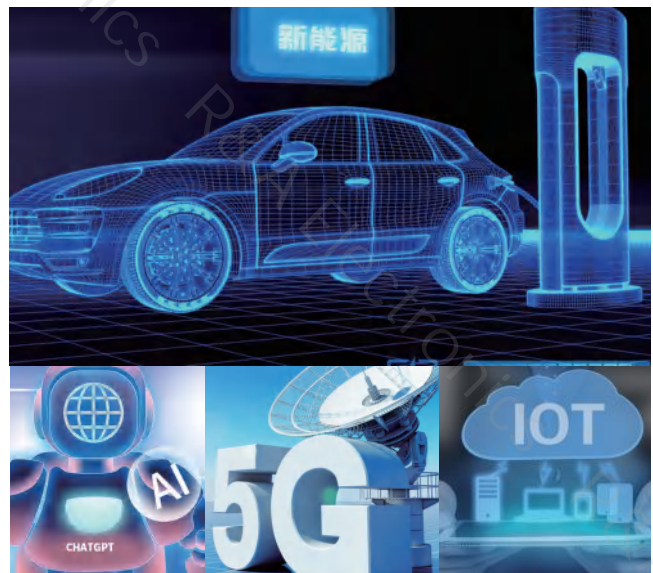


Fig.1: Source: The ratio of procurement of R&A in February

Infineon possesses a unique advantage in the automotive field, particularly in areas such as in-vehicle sensors, battery management, safety and signal chains, and connectivity technology.

By contrast, it is dull for overall demand for products of NXP and Analog Devices whose inventories remain high levels as a result. Nowadays, their high-end chips are the main needs of customers.

The delivery of devices for consumers and general purpose is gradually shrinking.



Device Models with Unqualified Labels in February

Find out and rule out the nonconforming products on the grounds of abnormal labels with different fonts, forms, distribution, ink and serial numbers from the labels of original factories.









Model	Brand
IPW65R080CFDA	
IPD90P04P4L-04	
IPW65R080CFDA	
TPS57060QDQGQRQ1	
OPA2377AIDR	
DS90UB940NTNKDRQ1	
PGA2505IDBR	
LT1076IQ#TRPBF	

Fig.2:

The proportion of brands with abnormal labels is roughly similar to that of procurement of R&A.

As the above figure, products of TI and INFINEON with counterfeited labels seized the largest ratio including MOSFET and automotive battery management chips most. On account of the long-term scarcity of MOSFET and automotive chips, the price stays inflated resulting in counterfeits entering the market.

Nonconforming Device Models failing visual inspections

Find out and rule out the nonconforming products based on inspection results of marking, leads, indent through digital microscope.

Returned brands: ADI
Returned models: LTC6992IS6-1#TRPBF
Reason for return: Class C to Class I
Returned brands: INFINEON
Returned models: IPD80P03P4L-07
Reason for return: Severe oxidation of the body

fig.3:

Deep inspections reports in February

Find out and rule out the nonconforming products after the failure analysis by observing internal structure of die.

Type of chips sent for testing	28
Total number of tests sent	31
Type of test item	19
Number of samples/packages tested	36

Fig.4:

R&A anti-counterfeiting testing laboratory is outfitted with technical testing equipment and a complete quality management system to rigorously control the quality of products. All purchased products must experience a strict quality inspection process.

R&A is committed to providing high-quality solutions for customers.

IC EYES THE WORLD



www.randa.hk

Shenzhen

Address: 54, Block A, NEO Building, No. 6009 ShenNan Road, Futian District, Shenzhen PRC

Tel: 86-755-83170380

Hong Kong

Address: A1-A2 20/F TML Tower 3 Hoishing Road Tsuen Wan N.T. Hong Kong

Tel: 852-69920331

Printing units: Shenzhen Shenjiao Jing Ya Printing Co.,LTD Publisher: R&A Electronics CO.,LTD Printing date: April 13, 2023