

IC The World

Reviews for 2023 Outlook for 2024



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2023 Review and Outlook: Economic Indices Reveal Global Trends

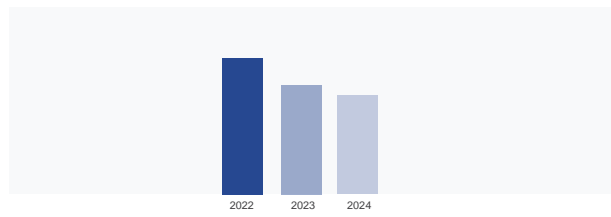
The global economic landscape is becoming increasingly dynamic, showcasing intricate changes and trends. On the whole, the downward trend in the global economy has not yet seen a significant alteration. This article will retrospectively examine the global economic indicators, including the Gross Domestic Product (GDP), Purchasing Managers' Index (PMI) in the manufacturing sector, and Consumer Price Index (CPI) for selected countries, providing insights into the economic conditions of 2023 and offering some predictions for 2024.

Gross Domestic Product (GDP)

According to the World Economic Outlook released by the International Monetary Fund (IMF) in October 2023, the worldwide GDP is on a downward trajectory. It has declined from 3.5% in 2022 to 3.0% in 2023 and is further anticipated to decrease to 2.9% in 2024. This is significantly below the historical average of 3.8% observed from 2000 to 2019.

Developed economies

For developed economies, economic growth has been negatively impacted by policy tightening. The GDP growth rate has decelerated from 2.6% in 2022 to 1.5% in 2023, with a projected further decline to 1.4% in 2024.



Data Source: IMF For the main regions

Region\GDP\Time	2022	2023	2024
Worldwide	3.5	3.0	2.9
Developed economies	2.6	1.5	1.4
USA	2.1	2.1	1.5
Eurozone	3.3	0.7	1.2
Germany	1.8	-0.5	0.9
France	2.5	1.0	1.3
Italy	3.7	0.7	0.7
Spain	5/8	2.5	1.7
Japan	1.0	2.0	1.0
U.K.	4.1	0.5	0.3
Canada	3.4	1.3	1.6
Other developed economies	2.6	1.8	2.2

- The U.S. GDP in 2023 remains unchanged from 2022 at 2.1%, with an anticipated decrease to 1.5% in 2024.
- The Eurozone GDP performance in 2023 is not optimistic, dropping from 3.3% in 2022 to 0.7%. The IMF predicts a rebound to 1.2% in 2024, although still below the 2022 level. Germany's data for 2023 is particularly concerning, with GDP plummeting from 1.8% in 2022 to a negative value (-0.5%). The projected value for 2024 is only 0.9%, below the Eurozone average. Other major Eurozone countries, including France, Italy, and Spain, also experience an overall decline in GDP.
- The UK GDP decreases from 4.1% in 2022 to 0.5% in 2023 and 0.6% in 2024.
- Other developed economies see a decline from 2.6% in 2022 to 1.8% in 2023 and a projected increase to 2.2% in 2024.

Emerging Markets and Developing Economies

For emerging markets and developing economies, the economic growth rates for 2023 and 2024 are expected to experience a slight decrease, dropping from 4.1% in 2022 to 4.0% in both 2023 and 2024.

- **Asia:** Emerging markets and developing economies in Asia show positive momentum in 2023, rising by 0.7% to 5.2% compared to 2022. However, a forecasted decline to 4.8% is expected in 2024. China's GDP is projected to increase in 2023 (3.0% - 5.0%) and reach 4.2% in 2024, while India's GDP experiences a slight decline from 7.2% in 2022 to 6.3% (2023-2024).
- **Europe:** GDP of emerging markets and developing economies in Europe is expected to rebound, reaching 2.4% in 2023 and a projected 2.2% in 2024. Russia's GDP is anticipated to recover in 2023 (-2.1% - 2.2%) and reach 1.1% in 2024.
- **Latin America:** GDP of emerging markets and developing economies in the region shows a downward trend, decreasing from 4.1% in 2022 to 2.3% (2023-2024). Brazil's GDP rises by 0.2% to 3.1% in 2023 but is expected to fall to 1.5% in 2024. Mexico's GDP declines year by year, dropping from 3.9% in 2022 to 3.2% in 2023 and 2.1% in 2024.
- **Middle East and Central Asia:** GDP of emerging markets and developing economies in the region is on a downward trend, decreasing from 5.6% in 2022 to 2.0% in 2023 and 3.4% in 2024. Morocco's GDP, however, continues to rise annually, with IMF forecasting an increase from 1.3% in 2022 to 2.4% in 2023 and 3.6% in 2024. Saudi Arabia's GDP experiences a decline in 2023 (8.7% - 0.8%) but is expected to rebound to 4.0% in 2024.
- **Emerging markets and middle-income economies** maintain stable GDP, staying at 4.0% from 2022 to 2023, and a projected decrease to 3.9% in 2024. Low-income developing countries witness a decline in GDP in 2023 (5.2% - 4.0%) , but are expected to rebound to 5.1% in 2024.

Region\GDP\Time	2022	2023	2024
Emerging Markets and Developing Economies	4.1	4.0	4.0
Asia's Emerging Markets and Developing Economies	4.5	5.2	4.8
China	3.0	5.0	4.2
India	7.2	6.3	6.3
European Emerging Markets and Developing Economies	0.8	2.4	2.2
Russia	-2.1	2.2	1.1
Latin America and the Caribbean	4.1	2.3	2.3
Brazil	2.9	3.1	1.5
Mexico	3.9	3.2	2.1
Middle East and Central Asia	5.6	2.0	3.4
Morocco	1.3	2.4	3.6
Saudi Arabia	8.7	0.8	4.0
Sub-saharan Africa	4.0	3.3	4.0
Nigeria	3.3	2.9	3.1
South Africa	1.9	0.9	1.8
Memo items			
Emerging market and middle-income economies	4.0	4.0	3.9
Low income developing countries	5.2	4.0	5.1

Data Source:IMF

Purchasing Managers' Index (PMI)

Data released by the China Federation of Logistics and Purchasing (CFLP) indicates that the global Purchasing Managers' Index (PMI) for manufacturing in November 2023 was 48%, a slight increase of 0.2% compared to October. The global PMI has remained below 50% for 14 consecutive months, indicating a continued trend of economic weakness.

Regional breakdown

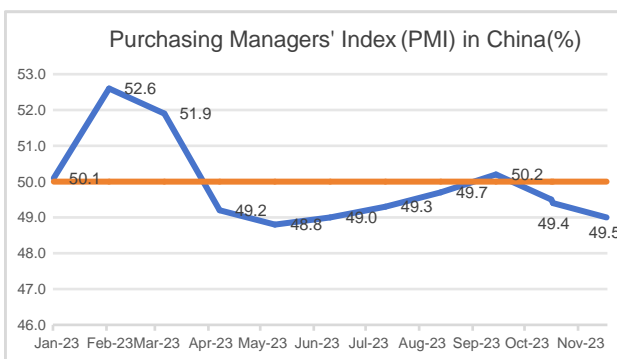
Other Asian regions

As of November 2023, the manufacturing PMI in Asia was 50.3%, maintaining growth above 50% for 11 consecutive months, indicating a relatively stable growth trend. Among developed Asian countries, only Singapore's PMI reached 50.3%, while the rest remained below 50%. In developing countries, notable manufacturing PMI figures were observed in Saudi Arabia (57.5%), India (56%), and Indonesia (52.2%). These countries' manufacturing sectors are primarily concentrated in consumer electronics and automotive industries.

The U.S.

As of November 2023, the manufacturing PMI in the Americas was 47.2%, remaining unchanged month-on-month and staying below 50% for 13 consecutive months, reflecting a sustained weakness in the manufacturing sector. In the U.S., the latest data for December 2023 shows a manufacturing PMI of 48.2%, marking 14 consecutive months below 50%. Mexico's manufacturing sector, benefiting from recent influxes of Chinese and American automotive companies and parts manufacturers, demonstrated a robust PMI of 52.5%.

Regional breakdown China: The National Bureau of Statistics recorded a PMI of 49.0% in December 2023, a decrease of 0.4% from the previous month, signaling a slight decline in the manufacturing sector's business activity. While manufacturing production continued to expand, market demand and business sentiment regarding employment showed a slight retreat.



Europe

As of November 2023, the manufacturing PMI in Europe was 45.8%, a 1.2% increase from the previous month and the highest level in the second half of the year. However, the index has remained below 50% for 16 consecutive months, indicating a persistent weakness in the manufacturing trend. Notable performances were observed in the manufacturing sectors of Russia (54.6%) and Hungary (52.76%). However, manufacturing data in the Eurozone is concerning, with a PMI of 44.4% recorded in December 2023. Germany, France, and Switzerland all exhibited manufacturing sectors in a weakened state, each below 44%.

Africa

As of November 2023, the manufacturing PMI in Africa was 48%, maintaining a weak trend for six consecutive months, with the overall sector operating below 50%. Major African countries, including Egypt and South Africa, reported manufacturing PMI figures below 50%, indicating reduced stability in the economic recovery in Africa.

Data Source: China Federation of Logistics and Purchasing (CFLP);
The National Bureau of Statistics; Trading Economics

Consumer Price Index (CPI)

According to the statistics from the National Bureau of Statistics, in November 2023, the Consumer Price Index (CPI) in China decreased by 0.5% year-on-year. This decline was observed as a 0.4% decrease in urban areas and a 0.8% decrease in rural areas. Food prices experienced a significant drop of 4.2%, while non-food prices increased by 0.4%. Consumer goods prices fell by 1.4%, while service prices rose by 1.0%. The average CPI for the first eleven months in 2023 increased by 0.3% compared to the same period last year. Overall, as various macroeconomic policies took effect, the national economy of China continued to show signs of sustained recovery and improvement in November.



other Asian countries

South Korea's CPI in 2023 increased by 3.6% year-on-year in November. Notably, utility prices, including water, electricity, and gas, rose by 20%, contributing to the overall inflation. Prices of agricultural and sideline products increased by 3.1%. In Vietnam, the average CPI for the first eleven months of 2023 increased by 3.22% year-on-year, with a core inflation rate rising by 4.27%. The prices of nine categories of goods and services, including education, housing and building materials, household water, housing maintenance services, beverages, and tobacco, increased. Postal and telecommunications services and transportation experienced price decreases.

the United States

the Consumer Price Index (CPI) in October 2023 decreased from 3.7% to 3.2% year-on-year, lower than the market's expectation of 3.3%. On a month-to-month basis, it remained stable, marking the smallest increase since July 2022. Housing inflation index was the largest contributor to the monthly growth among all inflation indices excluding food and energy.

It is evident that the global economy faces persistent challenges and uncertainties.

The fluctuations in GDP, PMI, and CPI worldwide make the future outlook complex and unpredictable. The ever-changing economic conditions underscore the importance of mitigating the impact of economic fluctuations, promoting global market resilience, and formulating flexible response strategies through collaborative efforts.

Data Source: The National Bureau of Statistics; Statistics Korea; General Statistics Office of Vietnam; U.S. Department of Labor

Clustering of Advanced Manufacturing: A New Eco-system for Industrial Competition

Industry clustering is a common economic phenomenon, and clusters of advanced manufacturing are vital and effective drivers of economic growth in the new era.

Overall, influential manufacturing clusters remain concentrated in the three major global manufacturing center networks: the North American production network centered around the United States and Canada, the European production network centered around Germany, France, the Netherlands, and Italy, and the Asian production network centered around China, Japan, and South Korea. Different production networks seize opportunities for the global rise of different dominant industries, and the leading industries and development characteristics of industrial clusters vary.

Asian advanced manufacturing clusters show rapid development, highlighting emerging characteristics. Key clusters concentrate on new industries such as electronics, new materials, new energy, smart connected vehicles, and power batteries. In the automotive manufacturing sector, apart from China, Japan, and South Korea, Southeast Asian countries such as Thailand, India, and Indonesia have demonstrated significant manufacturing capabilities in 2023.

North American advanced manufacturing clusters demonstrate strong innovation capabilities and prominent international features, with key clusters focusing on biopharmaceuticals, electronics, and aerospace.

European advanced manufacturing clusters boast a solid foundation and outstanding brand characteristics. The central German region dominates in cluster innovation and development, with key clusters focusing on biopharmaceuticals, high-end equipment, automobiles, and consumer products.

In summary, influential industrial clusters will continue to lead global economic growth. The accelerated restructuring of global industrial chains has prompted adjustments in the layout of industrial clusters. Relevant manufacturing clusters in locations like Mexico are gradually rising, and manufacturing clusters in Southeast Asia (led by Vietnam) are growing rapidly. In the future, the world will use next-generation information technologies such as blockchain and big data to facilitate cluster collaboration, collectively explore, and accelerate the construction of low-carbon and nearly zero-carbon industrial clusters.

Green Development and Digital Economy: Global Key Investment fields in the New Era

In recent years, the intensification of global climate and environmental challenges has brought attention to the development of a low-carbon economy characterized by low energy consumption, low pollution, and low emissions. Advancing greening and sustainable development has become a strategic initiative for economic development worldwide. Green development and the digital economy have emerged as key investment areas.

Green Development

In terms of green investments, the industrial chain related to renewable energy is currently mainly led by China and a few developed countries. International investment is concentrated in Brazil, Chile, and Mexico in Latin America; India, Vietnam, and Taiwan in the Asia-Pacific region; South Africa, Egypt, and Kenya in Africa; and Egypt in the Middle East. Solar energy and wind energy are the hot-spots for investment.

In green finance, green bonds, green loans, and carbon markets (including voluntary and mandatory carbon markets) are the primary green financial instruments and market mechanisms today.

Digital Economy

With the increasing depth and breadth of information technology applications in the financial industry, the cutting-edge technologies widely utilized in the financial sector include cloud computing, big data, artificial intelligence (AI), the Internet of Things (IoT), blockchain, and 5G communication technology.

Green bond

It is currently the most mature and widely used financial product in the field of green finance, occupying a dominant position in the market of green financial products. China, the United States, Germany, the Netherlands, and France are the major issuing countries of green bonds worldwide. In terms of industry classification, funds raised through green bonds globally are primarily directed towards the energy, construction, and transportation industry.

Green loan

The green credit market has maintained rapid growth in the past two years, with China introducing special loans to support low-carbon and energy-saving investments. For instance, at the end of 2021, the People's Bank of China launched carbon reduction support tools, promoting the development of key areas such as clean energy, energy conservation, environmental protection, and carbon reduction technologies.

Carbon market

Carbon markets, including voluntary and mandatory markets, use market mechanisms to price carbon emission rights, representing the most mature attempt to monetize environmental benefits. In the realm of carbon quota markets, the European Union Emissions Trading System (EU ETS) is the most well-developed and closely watched carbon emissions trading market, currently covering the energy, industrial, and aviation sectors.

Big Data

As the IoT, e-commerce, and social networks rapidly evolve, the global volume of big data has grown explosively, forming the foundation for the development of the big data industry. Currently, China and the U.S. are the global centers for big data. China's total data generation will reach 48.6ZB, accounting for 27.8% of the global total by 2025. In the U.S., big data applications are primarily led by private enterprises, with the government also playing a role in big data applications.

Artificial Intelligence (AI)

In recent years, AI financing has become a global investment hotspot. In terms of regional development, the U.S. and China have become leaders in AI investment and financing globally. AI finance, utilizing technologies such as facial recognition, machine learning algorithms and other intelligent technologies, has played a crucial role in various scenarios, including payments, customer service, financial advisory, claims processing, risk management, and regulatory compliance.

Major regions issue semiconductor incentives to boost the advancement of the local chip industry

The semiconductor industry is gradually becoming a strategically important, foundational, and leading industry supporting the development of modern economies and ensuring national security. The investment and competitiveness in the semiconductor field are increasing globally. Currently, the distribution of the global semiconductor industry chain is relatively concentrated, with the United States, South Korea, Japan, Europe, the mainland and Taiwan of China collectively holding 98% of the global semiconductor industry chain market share, leaving only 2% for other regions.

To consolidate their competitive advantage in the global semiconductor industry chain, major semiconductor nations such as the United States, Europe, Japan, and South Korea have introduced new semiconductor industry policies in recent years. These policies aim to strengthen the resilience of their domestic semiconductor industry chains and drive innovation in semiconductor frontier technologies through increased investment, subsidies, and measures to curb the development of the Chinese semiconductor industry.

United States

The U.S. is focusing on intensifying its R&D and innovation leadership in the semiconductor industry chain. It has implemented various policies, including increased investment, tax incentives, fiscal subsidies, and the establishment of regional technology centers. The notable "CHIPS and Science Act" aims to strengthen the entire semiconductor industry chain from research and development to manufacturing, talent cultivation, defense applications, and collaboration with allies.

The U.S. is also enhancing cooperation with allies to create a comprehensive blockade against China's semiconductor industry. The global semiconductor industry involves multiple segments, with U.S. companies leading in semiconductor design and research globally. The U.S., Japan, and Europe hold advantages in semiconductor equipment. For instance, the U.S. has formed a "Quad Alliance" with Japan, South Korea, and Taiwan of China, restricting the export of advanced semiconductor manufacturing equipment to China through agreements with Japan and the Netherlands. This squeezes China's global development space in the semiconductor industry. The U.S. also imposes restrictions on China's semiconductor industry through export controls and investment limitations. The U.S. Department of Commerce's Bureau of Industry and Security (BIS) announced revisions to the Export Administration Regulations (EAR), intensifying restrictions on China's access to advanced computing chips, the development and maintenance of "supercomputers," and the capability to manufacture advanced semiconductors. Several Chinese semiconductor companies are included in the U.S. export control list. The Biden administration is planning new executive orders to limit U.S. investments in high-tech companies in the Chinese semiconductor and other sectors.

India

In recent years, the Indian government has issued several supportive measures to nurture and stabilize the growth of its electronics industry. In September 2014, the Indian government announced the implementation of the "Make in India" initiative to transform its economic and industrial structure, aiming to position India as a global manufacturing hub.

In 2019, the government unveiled the "National Policy on Electronics 2019," intending to increase the revenue of the Electronics System Design and Manufacturing (ESDM) sector to \$400 billion by 2025, promoting local production and exports. In December 2021, the Indian government approved a \$10 billion incentive plan to attract investments from semiconductor and display manufacturing companies.

Negotiations with semiconductor giants such as Foxconn, TSMC, and Israel's Tower Semiconductor (TSEM) are underway to establish semiconductor manufacturing facilities in India. In September 2022, the Indian government modified the \$10 billion Production-Linked Incentive (PLI) scheme, providing up to 50% joint funding for the project costs of constructing semiconductor and display manufacturing plants.

Europe

Europe places high importance on the advancement of the semiconductor industry and its significance for future economic growth. In March 2021, the European Commission presented the "2030 Digital Compass: the European Way for the Digital Decade" with goals such as mastering 2nm advanced processes, doubling the global market share of advanced chips to 20%, manufacturing the first quantum computer within five years, and investing around €140 billion over the next 10 years in boosting the next generation of digital industries. In February 2022, the European Commission debuted the "European Chips Act," with EU member states reaching an agreement on specific content in April 2023. According to the act, the EU would invest over €430 billion in public and private funds to support chip production, pilot projects, and startups. The act aims to ramp up the EU's semiconductor ecosystem, resilience, and supply chain to reduce dependencies on other regions. The EU emphasizes cooperation with like-minded countries, involving policy coordination and communication in information sharing, supply chain enhancement, supply disruption solutions, international standardization activities, and export controls. Compared to the U.S., the EU stresses shaping and cultivating its own capabilities but also conveys the intention to promote partnerships with the U.S. on export control lists.

South Korea

In May 2021, South Korea announced its "K-Semiconductor Strategy" with the vision of creating the world's strongest semiconductor supply chain. The goal is to increase semiconductor annual exports to \$200 billion and related job positions to 270,000 by 2030. In June 2023, the South Korean president chaired the "National Semiconductor Strategy Conference," upgrading previous semiconductor support policies and formulating the "Semiconductor Cultivation Policy Direction" to propel South Korea towards becoming a semiconductor superpower. In line with the U.S. sanctions on Chinese semiconductors, South Korea declared participation in the U.S.-led "Quad Alliance" meeting as early as August of the previous year. China is a major export destination for South Korea's semiconductor industry, with nearly 60% of semiconductor products sold to China in 2021. South Korea has taken restrictive measures in the semiconductor field against China, leading to a significant increase in the inventory of South Korean semiconductor products. In January of this year, the sales-to-inventory ratio for South Korean chips reached 265.7%, the fastest increase in chip inventory in 27 years.

Japan

In June 2023, the Ministry of Economy, Trade and Industry of Japan released the revised "Semiconductor and Digital Industry Strategy," proposing to double the domestic semiconductor sales to over 15 trillion JPY (approximately \$108 billion) by 2030. The revised strategy also provides clear deployment for various segments, including promoting the mass production of 2nm computing chips, enhancing the performance of NAND memory, and other technological goals. The Ministry of Economy, Trade and Industry of Japan stated that the revised strategy aims to further strengthen Japan's ability to develop and produce cutting-edge semiconductors, crucial for economic security and the development of advanced technologies like generative AI.

In terms of international cooperation, in May 2022, Japan and the U.S. reached the "Basic Principles of Semiconductor Cooperation" to improve the semiconductor supply chain resilience with the U.S. and allied nations through bilateral cooperation. In the July 2022 U.S.-Japan Economic Policy Agreement Committee meeting, both sides agreed to promote joint research and development and protect critical emerging technologies. Additionally, to respond to the U.S., Japan announced semiconductor export controls to China in May 2023, covering six major categories of 23 products, mainly targeting high-end semiconductor manufacturing equipment. The new semiconductor industry policies of developed economies will have multiple impacts on the global semiconductor industry's development.

The Mainland of China

Mainland China is formulating consistent policies to support the semiconductor industry, fostering domestic companies for semiconductor "self-sufficiency" while attracting foreign investments. Simultaneously, Chinese companies attempt strategic acquisitions of global semiconductor companies, but increased scrutiny by the United States on national security grounds has failed most acquisitions.

Policy measures, including subsidies and tax incentives, may offer up to a 20% subsidy for the purchase of domestically produced equipment.

By the end of 2022, there were reports of China developing a semiconductor industry support plan exceeding CNY 1 trillion (\$139.1 billion).

Core policy: This CNY 1 trillion (\$139.1 billion) industry support plan is one of the largest recent fiscal stimulus plans. It is expected to be implemented as early as the first quarter of 2024, with a five-year allocation period. The majority of financial assistance will be directed towards subsidizing Chinese companies' purchases of domestic semiconductor equipment, mainly for semiconductor manufacturing or wafer fabrication. These companies will be eligible for a 20% allowance on procurement costs, aiming to back domestic semiconductor production and research activities through subsidies and tax offsets.

Taiwan of China

On January 7, 2023, Taiwan, China's so-called "Legislative Yuan" passed amendments to Article 10-2 and Article 72 of the Industrial Innovation Act, commonly known as the "Taiwanese version of the chip act." The legislation introduces several preferential measures for companies involved in technological innovation with international supply chain status, such as semiconductors, 5G, and electric vehicles. The act became effective on January 1, 2023, with a seven-year implementation period.

Core policy: The policy is primarily on tax incentives, allowing key enterprises to offset 25% of innovative research and development expenses against taxes (an improvement from the previous 10%-15%). A 5% tax offset is also available for the purchase of advanced process machinery or equipment, with no upper limit, and the total offset amount for both categories cannot exceed 50% of the current year's payable corporate income tax.

Developed economies are using substantial subsidies as direct support for the semiconductor industry. The competition in the semiconductor industry among different economies is accelerating the iteration and upgrading of cutting-edge industrial technologies. From a global perspective, the measures taken by developed economies to strengthen their domestic industrial advantages and control over key technologies may lead to a profound adjustment in the global division of labor in the semiconductor industry. As semiconductor giants like Intel and TSMC strengthen their semiconductor manufacturing bases in their home countries, India, Germany, and Japan, global competition in semiconductor outsourcing will intensify further.

Semiconductor Investment and Factory Construction Plans

The "World Fab Forecast" shared by SEMI indicates that in 2024, the Americas will see the addition of 6 new wafer fabs, with chip production capacity growing by 6% year-on-year, reaching 3.1 million wafers per month. With the commissioning of four new wafer fabs, the production capacity in Europe and the Middle East is expected to grow by 3.6% in 2024, reaching 2.7 million wafers per month. Southeast Asia is preparing to increase its capacity by 4% in 2024, reaching 1.7 million wafers per month with the initiation of four new wafer fab projects.

On June 18, 2023, Israeli Prime Minister Benjamin Netanyahu announced that U.S. chip giant Intel will invest \$25 billion to build a new wafer manufacturing plant in Israel, expected to begin operations in 2027. This marks the largest overseas investment in the country's history. Additionally, Intel claimed, on June 16, a fund of \$4.6 billion to build a new wafer manufacturing plant in Poland.

As of now, Intel has unveiled investments in building factories or research centers in countries and regions such as the United States (Ohio), Germany, France, Italy, Spain, Poland. The future investment is anticipated to increase to \$100 billion for the construction of eight manufacturing facilities. Furthermore, the Chairman of Intel China, disclosed that Intel's Chengdu factory has completed expansion in the past two years, and there are plans for investment promotion in the Chengdu facility in the future.

U.S. storage chip giant Micron Technology stated its plan to plunge over \$597.7 million in the next few years in its packaging and testing plant in Xi'an, China, on June 16. This covers the acquisition of packaging equipment from PowerTech Technology (Xi'an), aiming to better meet the demands of Chinese customers. On top of that, Micron is slated to input over \$5 billion for new plants and new equipment in Japan and India.

AMD intended to invest \$400 million in India over the next 5 years and establish its largest design center in Bangalore. Foxconn unveiled an intention of a \$2 billion investment in the next 5 years and new factories establishment in India. Alongside this, the U.S.-based Applied Materials considered a \$400 million fund to build an engineering center in India.

Chip market update

reviews for 2023
outlook for 2024

Highlights

- Chip Market Reviews for 2023
- Memory chip prices are ascending
- The earning report of top Wafer foundries for the third quarter of 2023



Collect and Analyze the Official Reports

IC The World is a showcase for the global economy and semiconductor industry. We analyze all relevant data to dissect the global economy and chip market. This issue of the journal aims at the trending sector--Artificial intelligence, analyzing the applications of AI in various areas and its influence on the whole market.



In-depth Research

We delve into diverse aspects of the semiconductor market, including technological trends, market share, and competitive landscape.

Chip market update – reviews for 2023, outlook for 2024

International chip makers' days sales of inventory							
CPU/GPU/FPGA/SOC							
	22Q1	22Q2	22Q3	22Q4	23Q1	23Q2	23Q3
Intel	113	113	130	139	155	137	131
AMD	65	65	85	102	122	137	134
NVIDIA	92	95	138	198	175	101	88
Lattice	126	130	141	154	184	176	169
Qualcomm	87	94	110	150	152	162	153
MCU							
ST	101	95	96	116	122	126	114
Microchip	125	127	127-132	152	157-164	-	-
Renesas	92	100	103	97	107	109	103
Analog devices							
TI	124	122	129	149	182	198	203
ADI	76	89	96	104	117	122	125
Onsemi	133	133	126	134	150	156	160
Radio Frequency chip							
Broadcom	55	57	57	60	66	63	59
Skyworks	109	125	131	162	169	172	157
QORVO	96	109	112	124	123	183	142
Memory chip							
Samsung	-	90	94	89	104	111	-
SK Hynix	133	139	177	174	224	180	161
Micron	109	139	215	154	169	171	162
Western Digital	104	108	124	135	140	1356	123
Power devices							
Infineon	122	121	134	139	145	152	-
NXP	88	93	107	127	135	137	133
Vishay	87	94	90	93	98	94	96
ROHM	193	197	197	199	233	240	244
Passive component							
Murata	142	176	171	180	185	-	209
TDK	98	122	110	103	99	-	103
Taiyo Yuden	132	171	175	169	156	-	148
Chinese chip makers' days sales of inventory							
CPU/SOC							
MediaTek	105	104	111	126	128	115	90
Loongson	639	582	587	545	974	764	897
Hygon	309	183	173	164	235	184	155
Rockchip	151	154	245	276	609	475	409
Allwinner	203	202	212	203	304	190	177
MCU							
SinoWealth	80	106	173	240	313	271	329
Nuvoton	109	105	112	128	147	147	146
Chipsea	147	136	184	207	465	313	226
Cmsemicon	259	258	646	467	493	426	369
Nations Technologies	190	311	340	413	459	373	305
AI Chip							
Jingjia Micro	270	1081	1019	374	2033	560	1184
Cambricon	1061	653	1084	232	1438	1387	2003
iflytek	118	94	80	63	152	84	85
FPGA							
Shanghai Anlogic Infotech	163	213	256	344	484	481	598
Guoxin Micro	240	266	244	221	443	317	352
Shanghai Fudan Microelectronics	295	318	298	401	639	727	685
Memory chip							
GigaDevice	128	132	179	258	240	172	211
BIWIN	-	-	244	248	477	393	336
Ingenic	155	193	209	276	315	292	281

Dosilicon	201	197	323	452	630	672	623
Giantec Semi	123	139	179	241	283	258	226
Analog chip							
Realtek	109	111	131	187	191	118	98
SGMICRO	119	116	145	133	285	262	234
3Peakic	71	63	84	173	221	217	360
NOVOSENSE	141	126	155	228	227	442	446
Shenzhen Fine Made Electronics	197	331	410	259	384	246	245
Shanghai Bright Power Semiconductor	186	206	173	107	109	86	103
Radio Frequency chip							
Maxscend Microelectronics	219	361	462	517	410	281	171
Vanchip Tianjin Technology	174	386	377	293	372	159	123
Shenzhen Microgate	77	75	70	71	74	69	61
AWINIC	156	141	299	254	297	168	113
Power device							
WINGTECH	50	54	65	67	71	66	72
STARPOWER	115	112	111	112	152	161	182
China Resources nMicroelectronics	86	86	97	104	116	102	108
Hangzhou Silan Microelectronics	134	138	160	183	191	162	161
Passive components							
Chaozhou Three-Circle(CCTC)	251	238	302	261	234	189	179
Xiamen Faratronic	105	108	100	105	112	99	108
Beijing Yuanliu Electronic Technology	135	150	220	176	309	238	338
Nantong Jianghai capacitor	111	100	125	110	119	107	104

The inventory days of chip manufacturers, both Chinese and international, indicate a significant decrease in inventory during the second and third quarters of this year. Regionally, the overall inventory for overseas manufacturers is lower than that of Chinese manufacturers who primarily serve consumer-oriented clients, but the latter are experiencing a faster decline in inventory. There is a relatively noticeable recovery in the consumer electronics market.

In terms of specific areas, international manufacturers show no significant decrease in CPU/SOC/FPGA inventory; in fact, there is a slight increase. In contrast, Chinese chip makers presented a great drop in related inventory, owing to the rapid gain of the mid-to-low-end consumer electronics market, where local chips have a price advantage.

Regarding MCUs, overseas giants largely serve industrial and automotive clients, resulting in overall inventory not being excessively high. However, the inventory still rises due to the impact of sluggish industrial demand. Domestic manufacturers focus mainly on consumer products, resulting in relatively higher overall inventory. Nevertheless, after the first quarter of this year, inventory has been rapidly decreasing.

In the realm of RF chips, Broadcom's chip inventory remains at a low level. Both domestic and international manufacturers have seen a decrease in inventory starting from the second quarter of this year, attributed to the growth in sales of consumer electronics such as smartphones, PCs, and laptops.

For memory chips, there is a noticeable drop in inventory, although it is still relatively high compared to the industry's conventional inventory of 80-100 days. Analog chip stock for both home and abroad companies has ascended, posed by a depressed industrial market.

MCU

manufacturer	product	23Q4 Lead time/weeks	23Q3 Lead time/weeks	23Q2 Lead time/weeks	23Q1 Lead time/weeks	Lead time trend	price trend
Cypress	8-bit MCU	10-14	26-52	26-52	45-52	shrink	steady
	32-bit MCU	10-52	10-52	26-52	45	shrink	steady
	USB	42-52	42-52	42-52	52+	shrink	steady
	Automotive materials	32-45	32-45	32-45	32-45	steady	steady
Microchip	8-bit MCU	4-16	26-52+	36-52+	36-52+	shrink	steady
	32-bit MCU	4-28	26-52+	36-52+	36-52+	shrink	steady
	PHY/Ethernet	8-16	26-30	28-52	30-52	steady	Drop
	USB	4-16	42	42	52+	shrink	steady
	32-bit MPU	4-24	30-52	30-52	30-52	steady	steady
NXP	8-bit MCU	13-39	26-52	35-52	35-52	shrink	steady
	32-bit MCU	13-39	13-52	26-52	26-52	shrink	steady
	Automotive materials	18-52	35-52	35-52	35-52	shrink	steady
	32-bit MPU	18-52	18-52	32-52	32-52	shrink	steady
Renesas	Network Processor	18-52	18-42	26-42	26-42	shrink	steady
	8-bit MCU	12-28	18-24	18-24	40	shrink	steady
	32-bit MPU	18	18	18-24	40	shrink	steady
	Automotive materials	45	45	45	45	steady	steady
	32-bit MPU	18-26	18-26	18-26	45	steady	steady
ST	8-bit MCU	10-24	35-52	35-52	48	shrink	steady
	Automotive materials	40-52	40-52	40-52	40-52	steady	steady
	32-bit MPU	16-20	16-20	16-20	20-26	shrink	steady
	STM32F0	10-12	10-12	16-20	22	shrink	steady
	STM32F1	16-20	16-20	16-20	22	shrink	steady
	STM32L	16-20	16-20	16-20	22	shrink	steady
	STM32F2/F4/F7/ H7	10-20	20-28	35-48	48	shrink	steady
Infineon	Automotive materials	shortage	shortage	shortage	shortage	steady	steady

The lead times of MCU chips from top manufacturers such as Cypress, NXP, Renesas, and ST, have all contracted. By contrast, most manufacturers' lead times for automotive materials remain relatively long, exceeding 40 weeks, apart from a slight decrease in NXP's. Particularly, Infineon's automotive-grade chips are scarce, with no improvement in the supply.

Memory chip

manufacturer	product	23Q4 Lead time/weeks	23Q3 Lead time/weeks	23Q2 Lead time/weeks	23Q1 Lead time/weeks	Lead time trend	price trend
Samsung	PC(business)DRAM	52-54	52-54	52-54	52-54	steady	steady
	Memory module	52-54	52-54	52-54	52-54	steady	steady
	eMMC	52-54	52-54	52-54	52-54	steady	steady
	SSD	52-54	52-54	52-54	52-54	steady	steady
ST	EEPROM	12-26 (shortage)	12-26 (shortage)	12-26 (shortage)	12-26 (shortage)	steady	steady
Microchip	NOR Flash	4-52	26-52	52-99	52-99	shrink	steady
	EEPROM	4-52	52-99(some models in short supply)	52-99(some models in short supply)	52-99(some models in short supply)	shrink	steady
	SRAM	4-11	46-48	46-48	46-48	shrink	steady
ADATA	Memory module	6-8	6-8	6-8	8-10	steady	steady
	eMMC	6-8	6-8	8-10	10-12	steady	steady
	Memory card	8-10	8-10	8-10	8-10	steady	steady
	SSD	8-12	8-12	8-12	8-12	prolong	rise
Alliance Memory	PC(business)DRAM	2-20	2-20	2-20	2-20	steady	steady
	Mobile DRAM	12-16	12-16	12-16	16-52	steady	steady
	SRAM	8-30	8-30	12-45	12-45	shrink	steady
	NOR Flash	12-20	12-20	12-20	12-20	steady	steady
	NAND Flash	8-24	8-24	8-24	8-24	shrink	steady
	eMMC	8-12	8-12	8-12	14-16	steady	steady
Greenliant	NOR Flash	8-16	8-16	16-26	16-26	steady	steady
	eMMC	12-18	12-18	16-26	16-26	steady	rise
	Memory card	8-16	8-16	8-16	8-16	steady	steady
	SSD	8-16	8-16	8-16	8-16	prolong	rise
Kingston	PC(business)DRAM	2-4	2-4	4-6	4-6	steady	rise
	Memory module	2-6	2-6	2-6	2-6	steady	Fluctuation in line with market demand
	eMMC	2-6	2-6	4-8	4-10	prolong	rise
	Memory card	2-10	2-10	2-10	2-16	steady	steady
	SSD	4-8	4-8	4-8	4-8	prolong	rise

Examining figures from manufacturers like Samsung, Kingston, ADATA, etc., the overall lead times for memory chips are stable, with most in a normal supply situation. However, some product prices, such as SSDs and eMMC, gradually creep up. ST's automotive-grade storage devices are still in short supply.



Analog chip

manufacturer	product	23Q4	23Q3 Lead	23Q2 Lead	23Q1 Lead	Lead	price trend
		Lead time/weeks	time/weeks	time/weeks	time/weeks	time trend	
Diodes Incorporated	Multi-source analog/ supply power	20-32	30-40	30-40	30-40	steady	steady
	Switching Regulator	20-45	25-45	25-45	25-45	steady	steady
Infineon	sensors	18-52	18-52	18-52	18-52	steady	rise
	Switching Regulator	20-52	40-52	40-52	40-52	steady	steady
	automotive analog and supply power (CAN/LIN/Smart FET)	45-52	45-52	45-52	45-52	steady	steady
Microchip	Amplifier and Data converter	4-10	30-40	30-40	30-40	shrink	steady
	timing devices	7-12	30-40	30-40	30-40	shrink	steady
	Switching Regulator	4-25	40-50	40-50	40-50	shrink	steady
NXP	sensors	20-42	45-50	45-50	45-50	shrink	steady
	Interface	16-52	16-52	16-52	16-52	steady	steady
	automotive analog and supply power (CAN/LIN/Smart FET)	20-30	26-30	26-30	36-52	shrink	steady

Panasonic	sensors	16-26	16-26	16-26	16-26	prolong	steady
Renesas	Amplifier and Data converter	24-36	36-40	36-40	36-40	shrink	steady
	timing devices	50	50	50	50	steady	steady
	Interface	24-36	36-40	36-40	36-40	shrink	steady
	Switching Regulator	36-40	36-40	36-40	36-40	shrink	rise
		0					
ST	sensors	12-18	12-18	18-20	12-24	shrink	steady
	Amplifier and Data converter	14-24	20-36	28-40	28-40	shrink	steady
	Multi-source analog/ supply power	20-42	40-50	40-50	40-50	steady	steady
	Switching Regulator	20-40	40-50	40-50	40-50	steady	steady
	automotive analog and supply power (CAN/LIN/Smart FET)	40-52	40-52	40-52	40-52	steady	steady
ONsemi	sensors	18-52	18-52	18-52	18-52	steady	Fluctuation in line with market demand
	Amplifier and Data converter	18-26	26-42	26-42	26-42	shrink	steady
	timing devices	20-42	35-42	35-42	35-42	steady	steady
	Multi-source analog/ supply power	20-40	35-42	35-42	35-42	steady	steady
	Switching Regulator	20-40	35-50	35-50	35-50	steady	rise
ROHM	sensors	24-52	24-52	24-52	24-52	prolong	rise
	Switching Regulator	20-40	50	50	50	steady	steady

The lead times for analog chips have entirely shrunk. For instance, Microchip's related devices showed a great drop in the lead times in Q4. The delivery times of analog signals saw a reduction, including Microchip, ST, Renesas, and Analog Devices. Sensors from Infineon, Panasonic, and ROHM are experiencing lead-time extensions and price hikes.

Discrete devices							
manufacturer	product	23Q4 Lead time/weeks	23Q3 Lead time/weeks	23Q2 Lead time/weeks	23Q1 Lead time/weeks	Lead time trend	price trend
Diodes	Low Voltage MOSFET	8-16	18-52	26-54	26-54	shrink	Fluctuation in line with market demand
	TVS Diode	8-14	8-14	18-24	18-24	shrink	steady
	Bridge Rectifiers	8-30	8-30	14-32	14-32	steady	steady
	Schottky diode	14-20	14-35	14-35	14-52	shrink	steady
	rectifier	8-30	8-30	14-32	14-32	steady	steady
	Switching Diode	12-20	12-52	12-52	12-52	steady	steady
	Small signal MOSFETs	12-30	20-30	30-45	30-45	shrink	steady
	Zener diode	12-20	14-35	14-35	14-45	shrink	steady
	bipolar transistor	12-20	14-30	14-35	14-45	shrink	steady
	Digital Transistor/REST	12-20	14-35	14-35	14-45	shrink	steady
Infineon	General Purpose Transistors	12-20	14-35	14-35	14-45	shrink	steady
	Logic Devices	8-10	8-10	20-22	30-40	steady	steady
	Low Voltage MOSFET	10-36	18-48	20-52	26-54	shrink	Fluctuation in line with market demand
	High Voltage MOSFET	12-40	39-56	50-54	50-54	shrink	steady
	IGBT	14-52	39-50	39-50	39-50	shrink	steady
Infineon	Wide Bandgap MOSFET	26-52	42-52	42-52	42-52	steady	steady
	Digital	6-50	12-52	12-52	12-52	shrink	steady

	General Purpose Transistors	10-40	12-45	20-65	20-52	steady	Fluctuation in line with market demand
	Logic Devices	13-20	13-20	20-30	20-30	shrink	steady
ST	Low Voltage MOSFET	50-54	50-54	50-54	50-54	shrink	steady
	High Voltage MOSFET	14-40	39-52	47-52	47-52	shrink	steady
	IGBT	14-52	47-52	47-52	47-52	shrink	steady
	ESD	21-32	30-45	30-45	30-45	shrink	steady
	Wide Bandgap MOSFET	42-52	42-52	42-52	42-52	steady	steady
	Thyristor/Triac	15-16	15-16	15-16	30-40	steady	steady
	TVS Diode	25-30	30-40	30-40	30-40	steady	steady
	Rectifiers	14-16	14-30	44-46	44-46	steady	Fluctuation in line with market demand
	bipolar transistor	40-52	40-52	40-52	20-52	steady	steady

Lead times for discrete devices in the fourth quarter have shortened dramatically. High and lowvoltage MOSFETs and IGBTs from Analog Devices, Infineon, and ST have notably shorter leadtimes.

		RF/ WiFi				Lead time trend	price trend
manufacturer	product	23Q4 Lead time/weeks	23Q3 Lead time/weeks	23Q2 Lead time/weeks	23Q1 Lead time/weeks		
Microchip	WiFi Module	16-26	16-26	24-26	24-26	steady	steady
	Bluetooth module	12-26	12-26	24-26	24-26	steady	steady
	transceiver/receiver	18-20	18-20	18-20	18-20	steady	rise
NXP	Multiprotocol chip	26-36	52-56	52-56	52	shrink	rise
	transceiver/receiver	24	24	24	24	steady	steady
	RFID	13 (shortage)	20-40 (shortage)	20-40(shortage)	26-52 (shortage)	steady	steady
	High-power IC	12-16	52	52	52	shrink	steady
ST	Bluetooth module	10-12	12-16	12-16	20-52	shrink	steady
	transceiver/	12 (spirit radio	52 (spirit radio	52 (spirit radio	52 (spirit radio	steady	steady

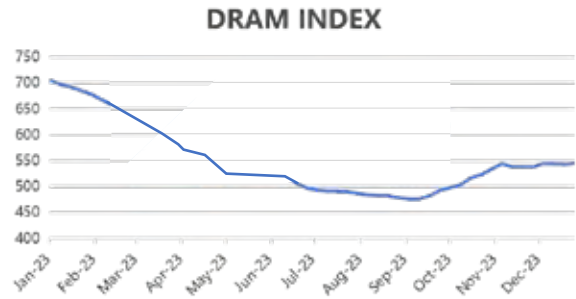
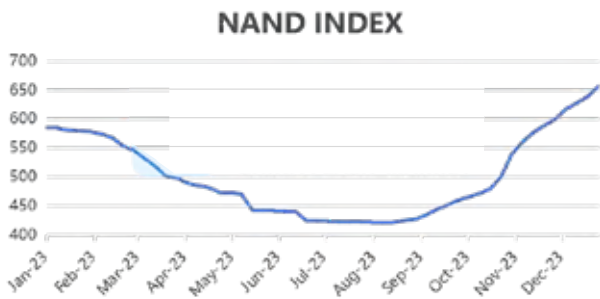
	receiver	limited capacity)	limited capacity)	limited capacity)	limited capacity)		
	RFID	20 (ST25R39 series in short supply)	30-40 (ST25R39 series in short supply)	30-40 (ST25R39 series in short supply)	30-40 (ST25R39 series in short supply)	shrink	steady
	High-power IC	20-30	52	52	52	shrink	steady
	Bluetooth module	12-26	12-26	12-26	26-52	steady	steady
	WiFi Module	12-26	12-26	12-26	26-52	steady	steady
u-blox	Cellular module	12-26 (shortage)	12-26 (shortage)	12-26 (shortage)	26-52 (shortage)	shrink	steady
	GPS	12-26 (some models in short supply)	12-26 (some models in short supply)	12-26 (some models in short supply)	26-52 (some models in short supply)	shrink	steady

The lead times for NXP's multi-protocol chips continue to be clipped from 52-56 weeks to 26-36 weeks. High-power ICs presented a sharp contraction of the delivery time from 52 weeks to 12-16 weeks. Lead times for ST's Bluetooth modules, RFID, and high-power ICs reduced remarkably. However, RFID series chips are still lacking. Prices for Microchip's transceiver/ receiver went up. U-blox's cellular modules show a sliding trend in lead times but are still in short supply.

The overall chip market is experiencing a trend of shorter lead times, with gradual improvement in the supply of most high-end materials. However, there is still a shortage of automotive semiconductors, and SSDs have seen an obvious price rise.

Memory chip prices are ascending

As a new round of price increases looms upstream, the end-of-year memory spot market maintains a slow upward trend. Despite a dull market atmosphere and strong observation sentiment, the main theme of the market still revolves around the rise in storage prices. The market is accepting the prices of new costs, while spot prices for storage realized a small rise by the end of December 2023.



Due to a significant uplift in NAND prices, the NAND index rebounded rapidly. However, as the overall supply of spot DRAM overflows, the DRAM market started rising more slowly. According to CFM research, the NAND index surged by 55.6% from its lowest point, with a 12.2% leap for the whole year. The DRAM index jumped by 14.6%, down 22.7% for the whole year

Flash Wafer

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
1Tb QLC	5.50	5.50	5.40
1Tb TLC	6.10	6.10	6.00
512Gb TLC	3.15	3.15	3.05
256Gb TLC	1.70	1.70	1.60

DDR

Product	Jan, 9, 2024 (Dollars)	Dec, 26, 2023 (Dollars)	Dec, 19, 2023 (Dollars)
DDR4 16Gb 3200	2.95	2.90	2.85
DDR4 16Gb eTT	2.45	2.42	2.40
DDR4 8Gb 3200	1.45	1.42	1.40
DDR4 8Gb eTT	1.10	1.08	1.07
DDR4 4Gb eTT	0.70	0.70	0.68

Looking at recent quotes, Flash Wafer prices constantly climb, and DDR prices steadily grow.

SSD (channel prices)

Product	Jan. 9, 2024 (Dollars)	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
SSD 120GB SATA 3	7.70	7.70	7.70	7.60
SSD 240GB SATA 3	12.40	12.40	12.40	12.00
SSD 480GB SATA 3	22.00	21.40	21.40	20.60
SSD 256GB PCIe 3.0	14.20	13.90	13.70	13.60
SSD 512GB PCIe 3.0	24.20	23.50	23.00	22.60
SSD 1TB PCIe 3.0	44.00	41.00	41.00	39.00
SSD 512GB PCIe 4.0	32.00	30.6	29.50	28.00
SSD 1TB PCIe 4.0	46.00	43.00	42.00	41.00
SSD 2TB PCIe 4.0	85.00	82.00	78.00	75.00

SSD (market prices)

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
SSD 256GB SATA 3	18.00	18.00	18.00
SSD 512GB SATA 3	32.00	32.00	32.00
SSD 1TB SATA 3	55.00	55.00	55.00
SSD 256GB PCIe 3.0	20.00	20.00	20.00
SSD 512GB PCIe 3.0	34.00	34.00	34.00
SSD 1TB PCIe 3.0	58.00	58.00	58.00
SSD 512GB PCIe 4.0	36.00	36.00	36.00
SSD 1TB PCIe 4.0	60.00	60.00	60.00
SSD 2TB PCIe 4.0	99.00	99.00	99.00

The channel market for solid-state drives experiences a slight uptick, with better demand in overseas markets. In recent weeks, high-capacity SSDs have seen varying degrees of price hikes.

The market prices are stable, with no changes. SSD and DDR memory market prices remain unchanged.

DDR4 (channel prices)

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
DDR4 UDIMM 8GB 3200	12.20	12.20	12.20
DDR4 UDIMM 16GB3200	22.50	22.50	22.50
DDR4 UDIMM 32GB3200	43.00	43.00	43.00

Channel prices of DDR4 memory remain stable.

DDR4 (market prices)

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
DDR4 SODIMM 4GB3200	9.00	9.00	9.00
DDR4 SODIMM 8GB3200	15.50	15.50	15.50
DDR4 SODIMM 16GB3200	26.00	26.00	26.00

After intense production cuts by DRAM manufacturers, server memory prices grew at first, with DDR4 RDIMM 16GB/32GB/64GB prices at \$39/\$58/\$110, respectively.

Product	Jan. 2024 (Dollars)	Dec. 2023 (Dollars)
DDR4 RDIMM 16GB3200	39.00	38.00
DDR4 RDIMM 32GB3200	58.00	54.00
DDR4 RDIMM 64GB3200	110.00	107.00

eMMC

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
eMMC 8GB 5.1	1.90	1.90	1.90
eMMC 16GB 5.1	2.40	2.40	2.40
eMMC 32GB 5.1	2.60	2.60	2.60
eMMC 64GB 5.1	3.80	3.80	3.80
eMMC 128GB 5.1	6.80	6.80	6.60
eMMC 256GB 5.1	13.30	13.30	13.00

eMCP

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
eMCP(eMMC+LPDDR4X)64GB+32Gb	12.00	12.00	12.00
eMCP(eMMC+LPDDR4X)128GB+32Gb	15.00	15.00	15.00
eMCP(eMMC+LPDDR4X)128GB+48Gb	18.00	18.00	18.00

Prices for cards and USB drives remain stable, with no significant changes at the end of the year. The embedded chip market is solid, with a small expansion of some eMMC and UFS prices. There is remarkable growth in high-capacity products owing to tight supply.

LPDDR4X

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
LPDDR4X 96Gb	9.00	9.00	9.00
LPDDR4X 64Gb	16.00	16.00	16.00
LPDDR4X 48Gb	12.00	12.00	12.00
LPDDR4X 32Gb	7.50	7.50	7.50
LPDDR4X 16Gb	3.30	3.30	3.30
LPDDR4X 8Gb	2.20	2.20	2.20

uMCP

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
uMCP(LPDDR4X+UFS2.2)4GB+128GB	14.50	14.50	14.50
uMCP(LPDDR4X+UFS2.2)6GB+128GB	19.00	19.00	19.00
uMCP(LPDDR4X+UFS2.2)8GB+128GB	23.00	23.00	23.00
uMCP(LPDDR4X+UFS2.2)8GB+256GB	29.50	29.50	29.50

UFS

Product	Jan. 2, 2024 (Dollars)	Dec. 26, 2023 (Dollars)	Dec. 19, 2023 (Dollars)
UFS 64GB	4.40	4.40	4.40
UFS 128GB	7.30	7.30	7.00
UFS 256GB	13.80	13.80	13.50

At the end of 2023, a new round of price inflation occurred in the upstream of memory, especially for some SSDs, and this upward trend will last until early 2024.

The market's contradictions between supply and demand are getting prominent, in the face of the end of the traditional peak season for stocking up, weak demand, and persistent price hikes of NAND Flash. The memory market presented that manufacturers fiercely raise the memory chips' prices with sluggish demand in customers. Enhance, channel prices broadly drop away from the ex-factory prices. Price hikes in upstream combined with oversupply are expected to linger into 2024. The spot market for memory remains dull during Christmas and New Year's Day when related manufacturers are about to ramp up prices continuously, with both supply and demand sides currently in a wait-and-see attitude, continuing to digest inventory and waiting for new market signals.

According to reports on January 3rd, major memory giants such as Samsung and Micron plan to raise DRAM prices in the first quarter of 2024, with an expected increase of 15% to 20%. It is reported that Samsung has explicitly stated that starting from the first quarter of 2024, DRAM prices will rise by at least 15%. Although there is currently no clear signal of a price increase in NAND flash memory, the market generally expects it to follow the upward trend of DRAM prices.

For the first quarter of 2024, TrendForce predicts that the DRAM market will show a seasonal average increase, estimated to be between 13% and 18%. Mobile DRAM prices may have a significant growth, while that of server DRAM is relatively conservative.

The earning report of top Wafer foundries for the third quarter of 2023

Company	Q3 earning	YoY (%)	QoQ (%)	Capacity utilization rate	Note
TSMC	\$17.18 billion	-10.8	13.7	Towards the end of 2023, the utilization rate of 7/6nm production capacity is maintained at 70%, while 5/4nm is approaching 80%, and the monthly production capacity of 3nm is around 60,000 to 70,000 wafers by the end of this year.	Apple is expanding its product lineup. Additionally, Companies like NVIDIA, Qualcomm, and MediaTek are expected to embrace the 3nm era in the second half of 2024. TSMC's gross margin is projected to be between 51.5% and 53.5%.
Global Foundries	\$1.8 billion	-11		Capacity utilization rates have increased from 85% for Q1 to 88% for Q2, and Q3 is expected to be consistent with Q2.	The firm is securing stable orders from special fields such as U.S. aerospace, defense, and healthcare for chip manufacturing, as well as long-term agreements (LTAs) with automotive-related customers.
UMC	\$1.8 billion	-24.3	1.37	The capacity utilization rate has decreased from 71% in Q2 to 67% in Q3, showing a significant decline. The expected rate for Q4 is around 61% to 63%.	Short-term demand in the computer and communication sectors is gradually recovering, while the automotive market remains challenging. The company's gross margin for Q3 is 35.9%, with an expectation of decreasing to 31% to 33% in Q4.
SMIC	\$1.63 billion	-10.56	6.03	Q3 production capacity is equivalent to approximately 795,750 8-inch wafers, with a utilization rate of 77.1%.	The sales revenue for Q4 is expected to grow by 1% to 3% sequentially; however, the gross margin will continue to face pressure from new capacity depreciation, estimated between 16% and 18%.
Huahong Group	\$571 million	-5.13	-8.08	The utilization rate reaches 86.8%, with the monthly production capacity of 8-inch wafers increasing to 358,000 pieces.	The estimated gross margin is between 2% and 5%.
VIS	\$1.46 billion		7.1	The Q4 utilization rate is expected to slash to around 55% to 60%.	The gross margin continued to decline to 22%-24%. There are reports that the company may reduce prices by up to 5% in the second half of 2023, and customers with large orders may even receive a discount of up to 10%. Q1 of 2024 is expected to see further single to double-digit percentage reductions.
PSMC	\$44.59 million loss	Down	Down	Utilization rate is about 60%.	The company has already cut prices for customers by about 4% to 5%, and the gross margin is also impacted by idle capacity losses, dropping to 9.2%.

For the entire foundry industry, TrendForce predicts a gradual increase in the utilization rate of 8-inch wafer production capacity in 2024, due to the wafer used to manufacture products like MOSFET, IGBT, and PMIC. Noticeably, the 12-inch wafer capacity will constantly expand in the coming years.

Advanced processes are also advancing in the field of high-performance computing (HPC) driven by demand. TrendForce forecasts a slight growth of 6.4% in the global wafer foundry industry in 2024.



Anti-Counterfeiting
Testing Laboratory

R&A Blue Book

Analysis Report of Quality
Inspection Data in
November



Highlights

- R&A QC Data Analysis Report
- Abnormal Part Cases Sharing

Currently, the chip trading market is plagued by various deceptive practices, from counterfeit labels to substandard chips, causing significant losses for many individuals and businesses.

Through counterfeit cases detected by R&A Laboratory, we aim to demonstrate how we ensure product quality through a multi-layered protection process to safeguard our customers' products. Additionally, we want to raise awareness about which products are more susceptible to counterfeiting.



First-tier interception

The packaging label of the product is checked by comparing it with the label and packaging of the manufacturer that are recorded in our label database. This step can verify and prohibit 90% of counterfeit products.



Second-tier interception

Based on IDEA-STD-1010B testing standards, the inspectors observe the surface, markings, and leads of chips by digital microscope and proceed with dimensions measurement, acetone, and scratch test to verify if there is oxidation, scratches, resurfacing, plating or contamination on the chips.



Third-tier interception

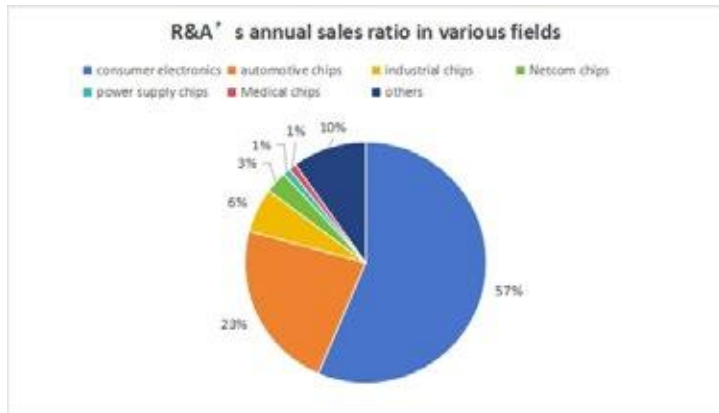
Deep inspections are executed to observe the internal structure and elements of chips, involving X-RAY, decapsulation, solderability, cross-section, and electrical test

R&A QC Data Analysis Report in November

To ensure that the quality of the products meet the highest standards in the industry, R&A is committed to conducting comprehensive and strict quality inspections. Monthly, we compile and analyze incoming data, laboratory inspection results, and records of intercepted abnormal parts, generating analytical reports. R&A aims to safeguard customer products by implementing controls and protective measures to effectively prevent and detect counterfeit components, providing a secure and reliable solution.

Incoming Data Analysis in November

In comparison to October, R&A's incoming goods data for November has witnessed a month-on-month increase of 29.31%, indicating a steady rise in customer order volumes. Figure 1 illustrates R&A's annual customer type distribution, with major clientele concentrated in fields such as consumer electronics, automotive electronics, industrial, telecommunications, and medical sectors.



Among the quality inspection brands in November, the 5 brands with highest proportion are NXP (16.67%), TI (13.33%), ONSEMI (12%), Microchip (8.67%) and Infineon (4%), and the remaining brands account for 45.33%, with a total of 44 semiconductor brands undergoing quality inspection.

R&A Laboratory Testing Status in November

R&A possesses an independent laboratory capable of providing global clients with all the required testing projects and procedures outlined in AS6081. This enhances risk management in terms of product traceability, ensuring that any issues can be identified and promptly addressed at any stage of the supply chain.

In the November testing data, examinations covering all AS6081 required testing projects accounted for 22.22% of the total inspections. Other testing projects included Decapsulation (44.44%), general visual inspections (22.22%), and X-RAY inspections (11.11%), all of which fall under the subcategories of the AS6081 testing process.

■ AS6081 ■ Decapsulation ■ visual inspection ■ X-RAY

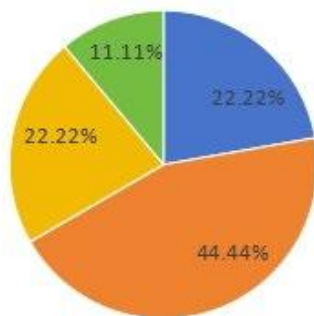


Figure 2 Proportion of R&A laboratory testing items

AS6081 certification is considered the gold standard in the electronic components industry for detecting and preventing counterfeit products. Every batch of components inspected through the AS6081 standard signifies that the electronic components/supplier with this certification possesses enhanced capabilities in ensuring the authenticity of parts. R&A's operational center in Hong Kong obtained the AS6081 certification in November 2023, demonstrating the ability to meet specific inspection and laboratory testing requirements for components used in aerospace applications in the open market.

Abnormal Part Interception in November

First-Level interception : By comparing labels with our label database during the verification process, 90% of counterfeit components can be intercepted, including the comparison of the incoming labels with original factory labels and packaging.

Counterfeit parts detected by R&A Lab in Nov.

Brand	MPN	Made/Assy in
ONSEMI	NSR10F30NXT5G	MALAYSIA
TI	ULN2803ADWR	MALAYSIA



Second-Level interception : In accordance with the IDEA-STD-1010B testing standard, inspections are carried out through appearance, printing, dimensional microscope inspection, acetone and scratch tests, etc. Secondary interception is conducted for oxidation, scratches, secondary coatings, copper leakage and other phenomena on the body.

Counterfeit parts detected by R&A Lab in Nov.

Brand	MPN	Made in	Interception Reason	Solution
TOSHIBA	TPCC8007(TE12L.VM)	MALAYSIA	Oxidation	Return



Through the rigorous laboratory grading and interception process, R&A can accurately and swiftly assist buyers in identifying counterfeit electronic components, filtering out substandard products in the component market, and reducing the risks in the supply chain.

R&A 2023 Charity Activities Footprint Review

Station 1: "Rural Assistance Program" in Sansui County

In March 2023, R&A partnered with the Beijing YITIANSHI Public Welfare to launch the "Rural Assistance Program" in Sansui County, Guizhou Province. The initiative aimed to assist local primary schools in building heartwarming libraries. The donation amounted to 150,000 RMB, resulting in 10 libraries benefiting 10 rural primary schools and 13,052 students.

Through the book donation activity, R&A carefully selected age-appropriate quality reading materials for students and organized reading and sharing sessions at local primary schools. R&A's philanthropic goal goes beyond donating materials; it aims to "change lives," fostering reading habits and shaping students' perspectives, aiding in their growth and development.



Station 2: "One Billion Trees" Project in SEE Conversation

In April 2023, R&A collaborated once again with Society of Entrepreneurs and Ecology (SEE) to continue the "One Billion Trees" project, supporting the planting of "R&A No.3 Public Welfare Forest" in areas suitable for forestry. Since the inception of "R&A No. 1 Public Welfare Forest," we have consistently contributed to planting 30,000 trees over three years.

R&A's objective is to restore desert vegetation, improve the local ecological environment, curb desert expansion, and help enhance the livelihoods of herders. Upholding the principle of harmonious coexistence between humans and nature, we remain committed to respecting and protecting nature, contributing to the green cause.



Station 3: "Supporting the Happy Growth of 'Star Children'" in Shantou City

In December 2023, R&A visited the Shantou Xuekang Children's Rehabilitation Center and met a group of "children from the stars." These children perceive the world differently, often exhibiting unique behaviors. The current treatment at the rehabilitation center involves continuous guidance, aiming to establish connections with the world through companionship and professional courses.

Through understanding their needs, R&A made a targeted donation of 100,000 RMB through the Charity Foundation to assist children facing treatment difficulties. We hope to formulate higher-quality courses for these children and their parents by making donations and establishing contacts with experts in the field of autism.



Station 4: "Beach Cleaning" at Shenzhen Bay

In December 2023, R&A volunteers headed to Shenzhen Bay, dedicating 3 hours to cover 5 kilometers of beach in a "cleaning" initiative to protect the beautiful coastline of Shenzhen. Using sustainable garbage pickers and eco-friendly garbage bags, our volunteers focused on recovering non-degradable waste like marine plastics, clearing debris such as plastic products, cigarette butts, discarded household items, and paper scraps.

Through this charitable activity, R&A aims to raise awareness among the public about the importance of environmental issues and waste management. By reducing the potential for pollution and damage to marine ecosystems, we seek to promote societal recognition and support for environmental actions, realizing the concept of sustainable development.





World-Class Sourcing and Quality

R&A Electronics

Since our inception in 2015, we have been diligently developing our channels and leveraging our business intelligence and an expansive supplier network to procure inventory directly from toptier suppliers. Our objective is simple: offering world-class procurement services to global OEM/EMS/ODM partners at a highly competitive pricing. R&A has positioned ourself as one of the most rapidly growing semiconductor distributors in the world.

IC The World

IC The World is a showcase for the global economy and semiconductor industry. We dissect the global economy and chip market based on all relevant data. We delve into diverse aspects of the semiconductor market, including technological trends, market share, and competitive landscape.

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