



SEMICONDUCTOR INDUSTRY OUTLOOK-2023



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Understanding the Current Global Semiconductor Shortage, Preparing for the Future

Since the last two years, the semiconductor market has been highly volatile, and industry experts anticipate that supply chain issues will continue into late 2023 or early 2024. S&P Global Engineering Solutions devotes extensive, one-on-one time with our clients to focus on the electronic component supply chain and the causes of this complicated problem in order to handle changing market conditions. In this post, we'll offer some of our opinions on the present labour crisis and the measures that business professionals are taking to address it.

Why is there a semiconductor shortage?

Professionals in the semiconductor industry are familiar with shortages, also known as allocations, as they are cyclical in nature. Natural disasters, variations in the semiconductor material supply, shifting economic conditions, or other geographic and political events can all result in shortages. These allocation periods for electronic components have typically been brief (between six months and a year), but the current chip shortage represents an unprecedented buck in that pattern.

The market has witnessed numerous companies transition to just-in-time inventory strategies over the past ten years. When there are no shortages in the supply chain, this is economical and efficient because a just-in-time system allows companies to reduce their supply chain inventory while saving on costs and storage space. In order to accurately increase and decrease production based on their anticipated orders and inventory pipeline, businesses rely on factory capabilities. The majority of semiconductor manufacturing facilities, or "fabs," run at about 80% capacity utilisation and adjust this operating level to account for demand fluctuations. Due to the disruption caused by the unpredictability of the past two years' events, businesses are currently dealing with supply chain shortages.

Factors causing the semiconductor chip shortage

There were other unanticipated incidents that stopped semiconductor production and exacerbated worldwide supply chain problems, in addition to the Covid-19 outbreak and its effects on the supply chain:

- In March 2021, a fire at the Renesas fab in Japan forced the suspension of microcontroller production for three months. The automotive industry was largely assisted by these gadgets.
- A Texas ice storm in February 2022 caused a power outage that shut down NXP, Samsung, and Infineon factories.
- Early in 2019, a fire in Ukraine stopped the production of a substance needed to package semiconductors.
- Production was hampered by labour constraints brought on by China's ongoing lockdowns during the outbreak.
- In March 2021, a cargo ship became trapped in the Suez Canal, obstructing traffic for more than a week and affecting the delivery of chips in route.
- In October 2021, 77 ships were backed up outside the ports in Los Angeles and Long Beach as a result of a manpower shortage.

As chip producers battled to fulfil demand, each of these occurrences contributed to shortages or stops in the semiconductor supply chain.

Semiconductor Trends in 2023

The top 3 semiconductor trends will be discussed:

- Consumer electronics facing low demand
- Automotive Chips fuelling semiconductor growth
- The US-China chip war continuously harming the industry

Consumer Electronics Facing Low Demand

The consumer electronics sector, which includes tablets, PCs, and cell phones, has seen a decline due to weak demand. IDC projects that there will be 1.27 billion smartphones shipped globally in 2022, a 6.5% YoY reduction. IDC also notes that global shipments of PCs and tablets will fall by 12.8% and 6.8% to 305.3 million and 156.8 million units, respectively, in terms of personal computing devices.

Table 1 2022 shipments of global consumer electronics

Consumer electronics	2022 shipments (units) (E)	Growth rate compared to 2021
Smartphones	1.27 billion	-6.5%
PCs	305.3 million	-12.8%
Tablets	156.8 million	-6.8%

The semiconductor industry has taken on a negative outlook as a result of this decline. People are waiting to see how the iPhone 14 performs as a result. The demand for the iPhone 14 Pro and 14 Pro Max is increasing even while the demand for the iPhone 14 and 14 Plus is lower than anticipated (down from 96 to 90 million units). The renowned Apple analyst Ming-Chi Kuo has noted that the iPhone 14 Pro is expected to see a 10% increase in shipments in 4Q22, along with orders for the iPhone 13 and iPhone 14 Pro Max, which might offset the reductions in the iPhone 14 and 14 Plus production. In other words, they are eager to see if the iPhone 14 can change the course of events.

According to IDC, the PC and tablet industry will still be in a downturn in 2023, with a 2.6% decrease rate predicted. Fortunately, the smartphone market is anticipated to increase at a favourable pace of 5.2% in 2023, albeit being distant from the 24.5% growth rate in 2021.

Automotive Chips Fuelling Semiconductor Growth

On the other hand, automotive chips are now what's fueling the rise of the semiconductor industry. According to McKinsey, this industry would increase at a rapid CAGR of 13% from USD 42 billion in 2021 to USD 125 billion in 2030. Power control, central control, environmental perception, Internet of Vehicles, audio and video, AI functions, and more are all part of the growth momentum. As a result of the need for powerful computational power for cutting-edge features like self-driving, ADAS, and real-time road monitoring, the market for automotive chips with advanced processes is expected to develop at a CAGR of 24% over the next ten years.

Future automobile OEMs and foundries may work together directly. As a result, skipping Tiers 1 and 2 in favour of joining the supply chain becomes popular. For instance, Volkswagen has already begun corresponding with foundries like TSMC and Global Foundries as well as chip designer Qualcomm.

Additionally, in order to have better control over semiconductor devices, automakers are investing in self-designed processors.

The US-China Chip War Continuously Harming the Industry

China and the US are engaged in a furious chip war. The CHIPS and Science Act was introduced by the Biden administration earlier in August to safeguard US technological advancement. This bill underlined how important it is to improve domestic manufacturing and supply chain management in the US rather than relying on other nations. The following is the crucial data:

- The US provides roughly USD 52 billion in funding to businesses like Nvidia, Intel, TSMC, Samsung, and others that invest in American semiconductor production.
- Companies that receive funding are prohibited for five years from expanding their advanced chip manufacturing capabilities in China.
- In order to avoid purchasing Chinese-made semiconductors, US buyers are requesting a "proof of provenance."

Actually, most tech companies can't thrive without China's sizable home market. Additionally, it has been working hard to lessen its reliance on Western nations.

Companies are compelled to pick between the US and China for cooperation because they are the two most significant tech giants in the semiconductor sector. Industry efficiency is unavoidably impacted by deglobalization. All the players in this industry will suffer greatly if this fight continues through 2023.

Global Semiconductor Industry Outlook 2023

Gartner's Forecast

Gartner Forecasts Worldwide Semiconductor Revenue Growth to Decline 3.6% in 2023

The most recent projection from Gartner, Inc. predicts a 3.6% reduction in global semiconductor revenue in 2023. The market is expected to expand 4% in 2022 and reach \$618 billion.

According to Richard Gordon, Practice Vice President at Gartner, "the short-term forecast for semiconductor sales has worsened." The semiconductor market will suffer in 2023 as a result of the rapidly deteriorating global economy and declining consumer demand.

In 2023, the global semiconductor market is expected to generate \$596 billion in revenue, down from the previously predicted \$623 billion (see Table 2).

Table 2 -Semiconductor Revenue Forecast, Worldwide, 2021-2023 (Billions of U.S. Dollars)

	2021	2022	2023
Revenue	595	618	596
Growth (%)	26.3	4.0	-3.6

The consumer-driven markets and the enterprise-driven markets are currently at odds with one another in the semiconductor business. The decline in disposable income brought on by rising

inflation and interest rates is a major factor in the weakness of the consumer-driven markets. However, shifting consumer discretionary spending away from technology purchases and toward other areas such as travel, leisure, and entertainment is also having a negative impact.

On the other hand, despite a projected macroeconomic slowdown and geopolitical worries, the enterprise-driven markets, such as enterprise networking, corporate compute, industrial, medical, and commercial transportation, have so far been rather resilient.

"Strategic investments by organisations aiming to upgrade their infrastructure to continue supporting their work-from-home workforce, corporate development ambitions, and continuous digitization goals" are what Gordon attributed to the relative strength in the enterprise-driven markets.

Memory Revenue to Decline 16% in 2023

The memory industry is experiencing waning demand for the rest of 2022, bloated stockpiles, and consumers pushing for significantly reduced costs. As a result, it is anticipated that the memory market would experience no change in 2022 and a revenue decline of 16.2% in 2023.

The manufacturing of smartphones, PCs, and other consumer electronics is being badly impacted by the weakening economic outlook, which will lead to an excess of DRAM for the rest of 2022 and the first three quarters of 2023. According to Gartner researchers, DRAM revenue will drop 2.6% to \$90.5 billion in 2022 and will then drop another 18% to \$74.2 billion in 2023.

The first quarter of 2022's NAND fab outage raised prices and concealed the rapidly deteriorating demand climate, leading to surplus inventory in the third quarter of 2022 that is anticipated to last until the first half of 2023. Revenue from NAND is anticipated to rise 4.4% to \$68.8 billion in 2022, but it is expected to fall 13.7% to \$59.4 billion in 2023.

KPMG's Forecast

Industry executives have a positive outlook for 2023

The 18th annual global semiconductor industry survey was carried out in the fourth quarter of 2022 by KPMG LLP and the Global Semiconductor Alliance (GSA). Insights from 151 semiconductor executives regarding their expectations for the sector in 2023 and beyond are gathered in the poll. The majority of responders work for businesses with yearly revenues above \$1 billion.

For the following year, the Semiconductor Industry Confidence Index score is 56. (a value above 50 indicates a more positive outlook than negative). This is lower than each of the previous four years, but it makes sense given the recent geopolitical upheaval and economic unpredictability.

Below are other important findings that are described. Early in 2023, the whole Global Semiconductor Industry Outlook report will be made available.

Leaders are optimistic about revenue growth

- 81% of business owners anticipate that their company's revenue will increase in the upcoming year, and 50% anticipate growth of more than 10%. Given the current economic climate and attitudes regarding industry inventory levels noted below, even if these numbers are lower than those from the previous year's poll (95 percent and 68 percent, respectively), they are nonetheless positive.
- Leaders have slightly less optimism about the expansion of industry revenue. 64 percent of respondents said that industry income will increase in the upcoming year, with 19 percent

forecasting growth of above 10 percent. These are also considerably lower than in the previous year's poll (97 percent and 49 percent, respectively).

- The crisis between Russia and Ukraine might be to blame for the industry's lower-than-expected sales growth. 41 percent of respondents are worried that the war will significantly slow industry revenue growth in 2023. Only 25% of respondents to a pulse survey by KPMG and the GSA in May 2022 expressed this worry.

Automotive takes the pole position as the most important revenue driver

- For the first time, poll participants categorically state that the automotive industry will be the main source of revenue for semiconductor companies over the upcoming year. KPMG forecasts that automotive semiconductor revenue would top \$250 billion by 2040 and reach \$200 billion yearly by the middle of the 2030s.
- The industry's long-recognized top revenue generator, wireless communications, drops to second place in the 2023 projection.
- The third, fourth, and fifth most significant technologies are the Internet of Things, cloud computing, and artificial intelligence.
- The importance of the metaverse for boosting semiconductor business income in the following year was ranked last (out of 10) in the survey's first year. It will be interesting to see how this viewpoint alters if usage of the metaverse technology grows in the ensuing years.

The end of the semiconductor shortage is in sight

- 65 percent of the executives polled expect that the shortage of semiconductors will lessen in 2023, and 15 percent think that the balance between supply and demand for the majority of products has already been reached. Only 20% of them believe that the scarcity will continue until 2024 or later.
- The study also asked participants to predict the timing of the next surplus supply of semiconductor inventory because the semiconductor business is cyclical. 24 percent of respondents think there is now a surplus, while 31 percent predict it will happen in 2023. 36 percent of respondents anticipate the surplus will occur between 2024 and 2026, while 9 percent think demand will continue to rise and there won't be an excess of inventory in the upcoming four years.
- Leaders do not anticipate the Russia-Ukraine conflict having a significant effect on the semiconductor supply chain in 2023. Less than one-third (29%) of respondents are concerned about this, down from 39% in the KPMG and GSA pulse study from May 2022.

Talent remains a crucial priority

- Over the next three years, talent risk is anticipated to be the industry's biggest challenge.
- 71 percent of respondents said they planned to increase their global staff in 2023, underscoring the industry's continuing demand for experts in this fast-growing, cutting-edge field. Although this is less than previous year (87 percent), it is still a reasonable forecast given the state of the economy.
- The survey also reveals that talent development and retention remain industry executives' top strategic priorities, with 67% ranking it in the "top 3" of their priorities. It still clearly outperforms supply chain flexibility (53 percent) and digital transformation (32 percent) this year, albeit being lower than the 77 percent figure from last year's poll.
- Despite looming mandated reporting obligations, only 15% of semiconductor executives regard formalising ESG reporting as a "top 3" strategic priority and 15% rank reducing cybersecurity risk in that same category.

The nationalization of semiconductor technology is the biggest geopolitical concern

- The impact of the nationalisation of semiconductor technology, which has consequences for supply chains, talent acquisition, and access to government subsidies, is the geopolitical issue that executives are most concerned about (e.g., the enacted CHIPS Act in the U.S. and the proposed European Chips Act).
- The nationalisation of semiconductor technology ranks as the second-biggest problem the sector will have to deal with in the coming three years (tied with global inflation).
- The importance of Taiwan in the supply chain, trade agreements, taxes, and the long-term effects of the Russia-Ukraine conflict are some other major geopolitical worries.

India's Take

Manufacturing and exports in the electronics and semiconductor sector grew steadily in 2022, particularly in the mobile sector. The updated semiconductor strategy allowed the government to contribute 50% to all types of plants. Four task groups have recently been established by the telecom department to clear obstacles, provide recommendations, and strengthen the ecosystem of domestic telecom manufacturing. Another fantastic programme by the Indian government supporting manufacturing businesses is the Production Linked Incentive Scheme. Now, we anticipate that some of the proposals will be accepted during the coming few months.

Currently, a significant amount of semiconductor and electronics items are imported. We need to decide which items to develop in India over the next ten years. To turn India into a product-based nation, this needs to be encouraged. This will increase demand for the proposed semiconductor plants. In the current geopolitical environment, India can take China's place as a reliable supplier of goods. To encourage design, as was done for the telecom sector, we propose adding 1% to all PLI projects.

Conclusion

The year 2023 might not be good for the global semiconductor market. Consumer electronics demand will continue to be weak, the US-China chip war will continue, and there will be rising inflation. Fortunately, semiconductors are propelled by strong growth momentum from automotive chips. The semiconductor market is expected to experience a 2.5% fall in 2023; fortunately, 2024 will be a better year.