

MEMORY IS HEADED BACK TO THE FUTURE

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**MEMPHIS
MEMORY
ESSENTIALS**

Everything you need to know about the semiconductor memory industry, from legacy technologies to latest innovations.

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Memory is Headed Back to the Future

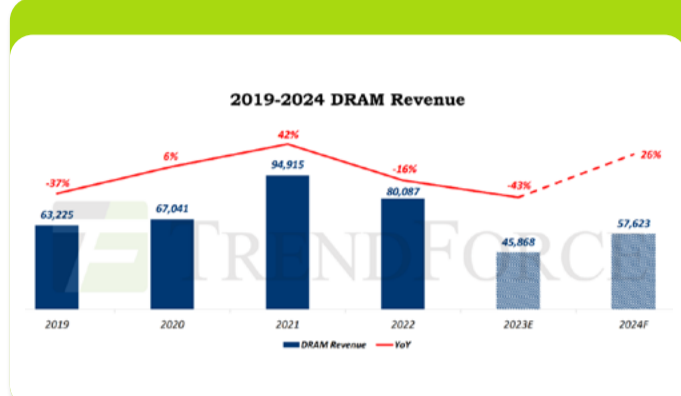
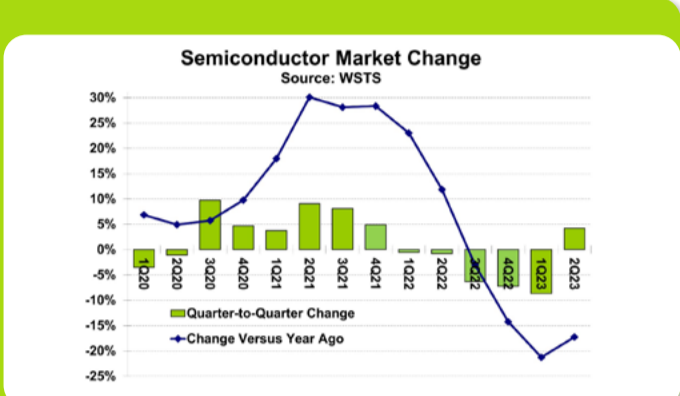
Nothing hurts an industry as much as a full slam on the brakes, as semiconductor memory experienced in the past months. But with sequential IC sales declines beginning to moderate, the global semiconductor industry appears to be nearing the end of a downcycle and is expected to begin to recover in 2024. Industry experts all agree that we have reached an inflection point and we will see an increase in prices as inventory levels go down.

And while TrendForce expects a DDR5 shortage in 2024, the massive cutbacks in wafer starts and capex will inevitably affect other memory technologies as well.

Still, it is encouraging to see that innovation in memory goes on even in a crisis as big as this. NAND scaling is exceeding 300 layers for the first time, there's also research into how to scale DRAM, and MRAM is getting more attention in applications like automotive.

There's no doubt that memory is headed full throttle into the future again. Make sure you are equipped with the memory you need. We can help you assess the delivery situation of the memory products you need and set up a purchasing plan that helps you secure availability while taking advantage of current low prices.

Reach out if you need help. Enjoy the read.



Turnaround in the Semiconductor Market

According to WSTS, the global semiconductor market grew 4.2% in 2Q 2023 compared to the Q1. This growth was the first positive quarter-to-quarter change since 4Q 2021, a year and a half ago! It's still a decline of 17.3% compared to the previous year, but definitely better than the 21.3% year-to-year decline in 1Q 2023.

Most major semiconductor companies experienced revenue growth in 2Q 2023 and are guiding for continued growth in Q3. WSTS concludes that the semiconductor market has finally turned and is headed toward probable double-digit growth in 2024.

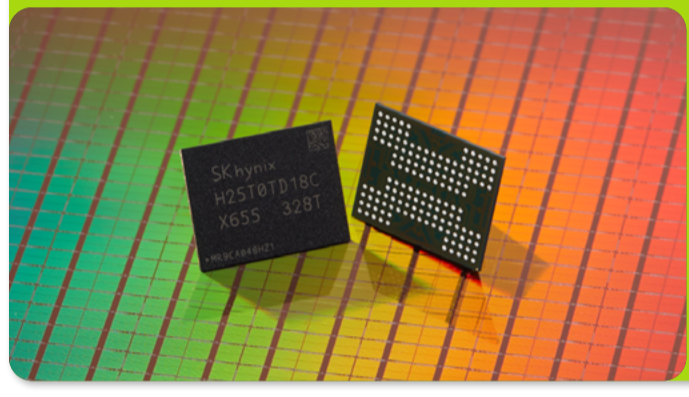
Read the full story [here](#).

DRAM Set for Growth Again

At Flash Memory Summit TrendForce, the sluggish demand, inventory adjustments and falling contract prices have caused DRAM revenue to drop by more than 50% during the recent two years. Looking ahead to 2024, prices and demand are expected to stabilize, thereby allowing DRAM revenue to rebound (but not back to the level of 2021)

Trendforce expects that there will be a DDR5 shortage in 2024 due to the slow ramp-up of production lines with advanced technology, followed by a slow increase of the average selling price for DRAM.

Trendforce's estimated 26% growth are conservative compared to Yole (+55%) and Gartner (+70%), but they all agree that memory is headed back for growth again.



Double Digit Memory Sales Growth

SEMI, in partnership with TechInsights, reports that in Q3 2023, electronics sales are projected to post healthy quarter-on-quarter growth of 10%, while memory IC sales are expected to log double-digit growth for the first time since the downturn started in Q3 2022. Logic IC sales are predicted to remain stable and improve as demand gradually recovers.

Market indicators point to a semiconductor industry bottoming at the end of the first half of 2023, and the industry has since started a recovery, setting the stage for continued growth in 2024. All segments are projected to log year-over-year increases in 2024, with electronics sales surpassing its 2022 peak.

Read more [here](#).

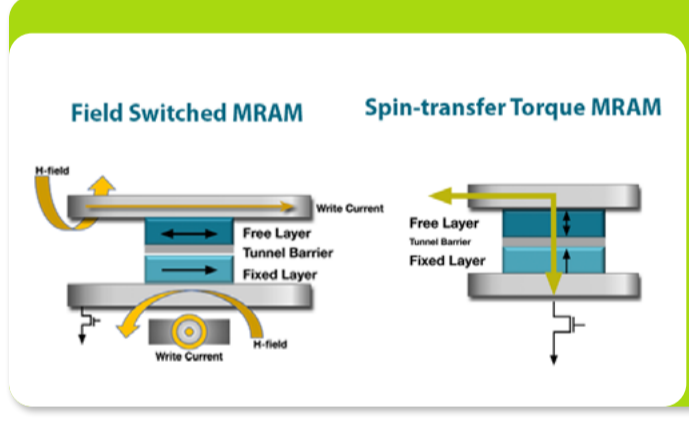
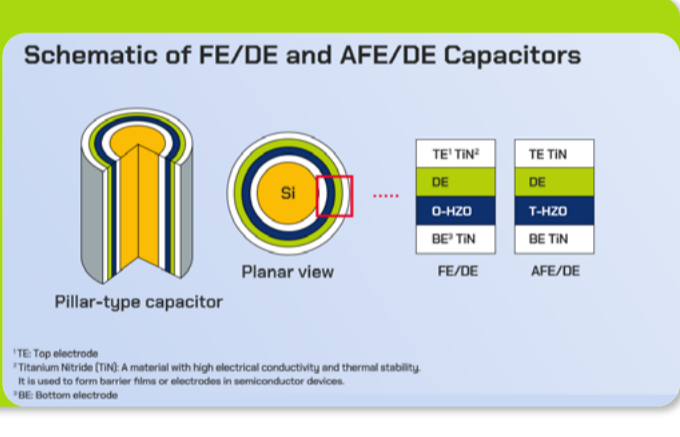
Sk hynix Introduces 300+ Layer NAND

At Flash Memory Summit in 2022, **Sk hynix** revealed its 238-layer NAND. Just one year later it raised the bar and revealed details of its 321-layer NAND flash memory that is planned to enter mass production in the first half of 2025.

The 321-layer 1Tb TLC 4D NAND comes with a 59% improvement in productivity, compared with the earlier generation of 238-layer 512Gb, thanks to the technology development that enabled stacking of more cells and larger storage capacity on a single chip, the total capacity that can be produced on a single wafer has increased.

With the growth of generative AI, the demand for high-performance and high-capacity memory products that process more data at a faster pace is growing rapidly.

Read the full press release [here](#).



Tackling DRAM Scaling Challenges

As DRAM cell scaling reaches its limit, SK hynix is conducting various studies to continue the advancement of DRAM technology. One of the most significant issues that DRAM manufacturers face is the required capacitance must be maintained even if the area of the DRAM cell capacitor is reduced.

At the IEEE EDTM conference 2023, SK hynix presented the results of a study that looked to develop ultra-thin dielectric (DE) materials with a higher dielectric constant (K) and low-leakage currents. For the study, SK hynix researchers fused ultra-thin ferroelectric (FE) and anti-ferroelectric (AFE) materials, respectively, with ultra-thin dielectric materials to determine whether FE or AFE materials are more suitable for use as a DRAM cell capacitor.

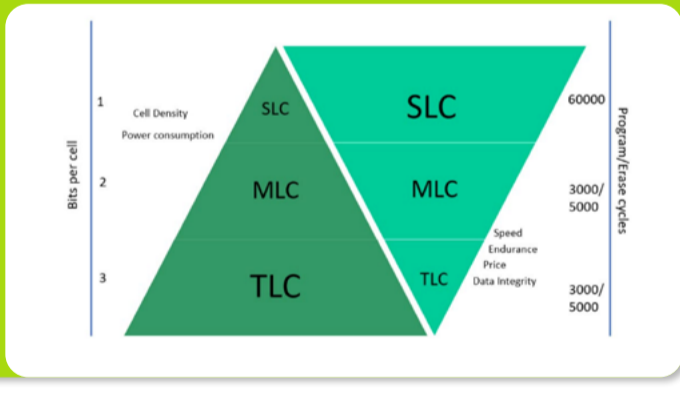
Read more about the results [here](#).

MRAM gets More Attention

There are still plenty of niches when it comes to MRAM. That has limited MRAM to a niche role over the past couple decades. Still, MRAM's footprint appears to be widening. Newer developments have helped overcome its historical limitations. At the same time, flash is limited at leading-edge nodes, and MRAM is particularly well suited to automotive applications.

In this article, Semiconductor Engineering outlines the technological advances of MRAM, its advantages and disadvantages. It seems there are a number of near-term and long-term developments in the works for MRAM.

Read the full article [here](#).



Understanding Flash Memory

What is the difference between SLC, MLC and TLC Nandflash? And when do you use each of these technologies? [Intelligent Memory](#) has put together a white paper that explains the dependencies between density, power consumption and erase cycles in #flashmemory. So depending on what is most important for your application: speed, endurance, data integrity or even price, you need to make the right trade-off.

Read more [here](#).

Summer Playlist

It's summertime and the living is easy. Two good reasons for a bit of fun with our "memory song" playlist, filled only with songs that have some relation or mention of memory (and only one to Memphis).

The playlist ranges from Maroon 5, to Cats, to Metallica, to David Guetta, to Dean Martin, to the Rolling Stones... the list goes on. And even if you listened in before, it's worth tuning in, we have some new additions to the [list!](#)

What songs are we missing? Do you have any suggestions? Let us know in the comments! Happy weekend and happy listening.

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Are going to this year's Engineering Design Show (EDS) in Coventry? Then make sure to drop by our booth to get some insights into the semiconductor memory market. Based on our 32+ years of experience in the global distribution of memory products, and our unmatched line card, we can provide advice on current pricing and delivery trends in DRAM and Flash components as well as modules.

Plus, we are highlighting our DRAM Module Configuration Service. You simply select the relevant criteria like DRAM technology, form factor, capacity, speed, data width, temperature range etc., and MEMPHIS will configure and manufacture the specific DRAM modules over the required product lifetime. Cool, right?

Read more about our presence at the show [here](#).

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