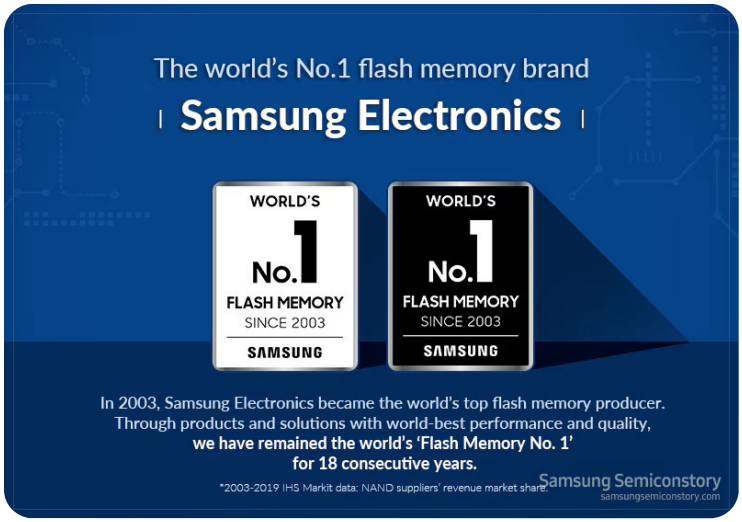
Tech Blog

[How much do you know about flash memory? - Part 4] The World's No.1 Flash Memory Company, Samsung Electronics, and Their Unending Journey

Jun 29, 2020

Through this <플래시메모리, 어디까지 알고 있니> series, Samsung Semiconstory explored the 18-year journey of Samsung Electronics, the Flash Memory No.1 company from 2003 to present. This time, we will review Samsung Electronics' groundbreaking journey from their exclusive flash memory development to changing the paradigm in storage accessories and opening the consumer-use SSD market. Then, we will take a look at why Samsung Electronics is still succeeding as the **Flash Memory No.1** company and why the success will continue.



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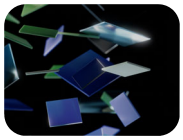

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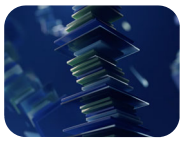

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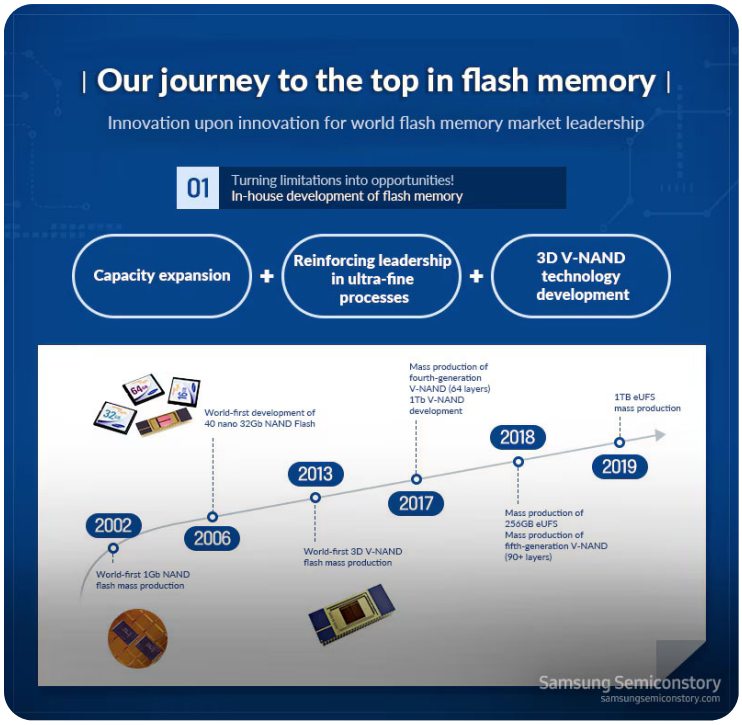
The Journey to Becoming Flash Memory No.1 ① – Exclusive Development of Flash Memory



Even when Samsung Electronics was in the lead in the world's market with their DRAM memory in the 1990s, they did not settle. Instead, they kept moving forward and developed their technologies. And this effort saw light in the 2000s as they achieved excellent milestones in the flash memory industry. The secret to such success lies in their exclusive flash memory development through storage capacity expansion and strengthening their leadership in scaling technology. Back then, Samsung Electronics was the world's first to mass-produce 1GB NAND flash in 2002, succeeded in developing a 40-nano process in 2006, and was the world's first to develop a 40-nano 32GB NAND flash.

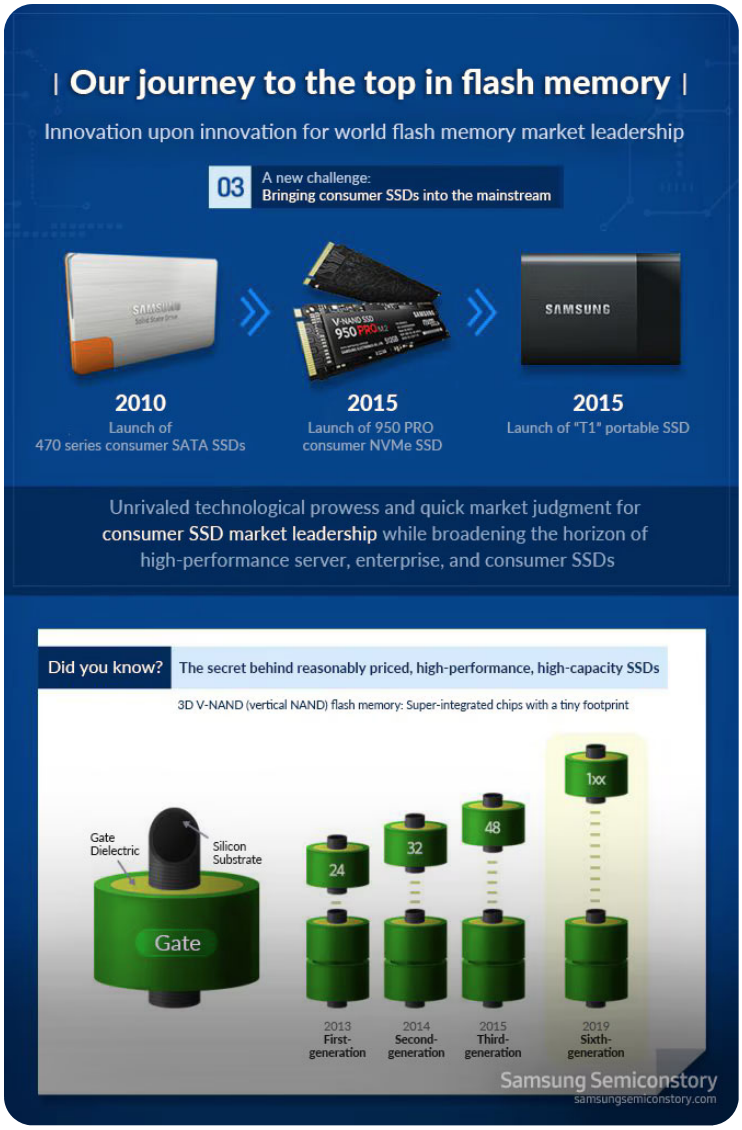
There was one incident that astounded the world in particular. It was in August 2013, when they overcame the limits of the semiconductor scaling technology with their mass-production of 3D Vertical NAND (3D V-NAND) flash memory. More precisely, Samsung Electronics brought a revolution in structures and processing by stacking the horizontally-aligned cells vertically in a 3D form. With the introduction of 10-nano processing, the spacing between the cells dramatically decreased, and this resolved the physical limits in semiconductor scaling of interference caused by electron leakage. They also became the first in the industry to open the era of mass-producing 3D memory. This technology is also hugely significant because it eventually allowed for the mass-production of high-capacity NAND flash, a leading product in the terabyte era.

The Journey to Becoming Flash Memory No.1 ② – Changing and Leading the Paradigm in Storage Devices

With the world's best NAND flash technology, Samsung Electronics changed the paradigm in storage devices. In 2006, the company was the first to commercialize the SSD, starting the new world in the PC storage devices, where the HDD (Hard Disk Drive) was the main device historically.

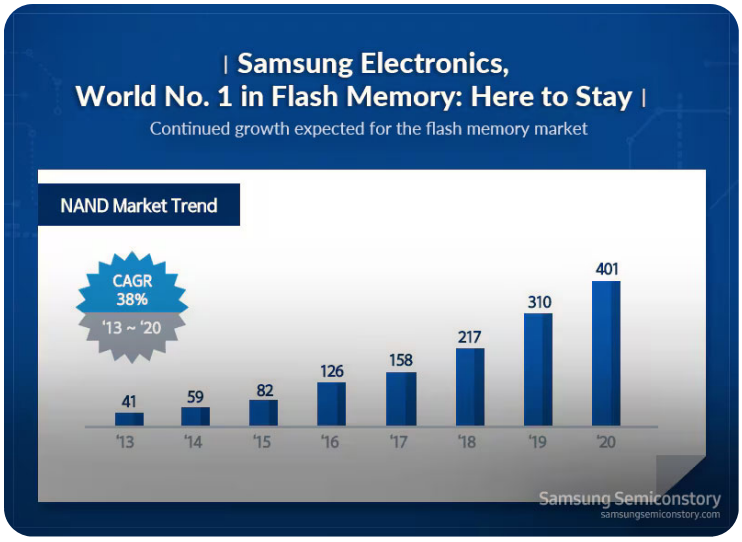
HDDs save data by rotating a disk, which causes noise and requires a high level of electricity use. They are also big and slow. On the other hand, SSDs save data on semiconductors and are run digitally. This increases the rate of data processing and does not heat up nor cause noise as there is no mechanical motor running it. With complete faith in the SSD to bring a paradigm change in storage devices, Samsung Electronics began fully investing themselves to develop their SSD technology that made it inaccessible to the general consumers with its high prices and big sizes at the time. Then, in 2006, they became the first to open the new market for digital PCs without hard disks with their release of the 32GB SSD laptop PC (SenseQ30+) and the ultra-mobile PC (SenseQ1). Since 2006 to present, Samsung Electronics has maintained the top market share in the world's SSD market.

The biggest reason Samsung Electronics could reach the top in the SSD market is that they internalized the technology for the key SSD components like the NAND flash, controller, firmware, and more. Furthermore, in 2013, they became the world's first to successfully mass-produce 3D V-NAND, gaining the biggest competitive edge in the cost of production. This allowed general public consumers access to high-performance and high-capacity SSDs at a reasonable price, a key moment in popularizing SSDs.

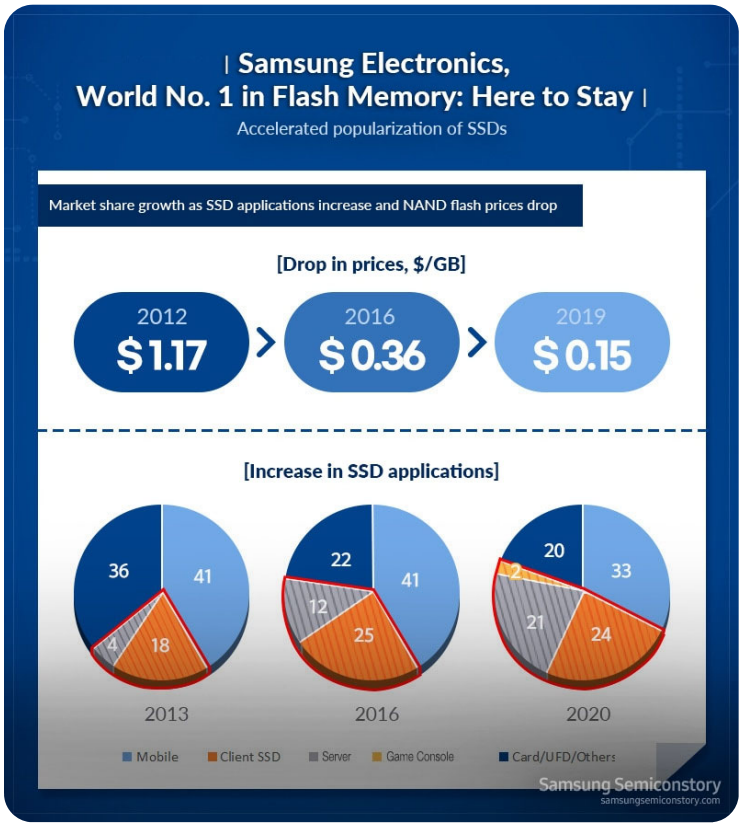


Samsung Electronics, after they had expanded the use of SSDs in corporate and server markets and the laptop market, dreamed of popularizing SSDs. So, they challenged themselves to develop SSDs for general consumers. After the 2010 release of the consumer-use SATA SSD 470 Series, to respond to the consumers' needs that now had capacity and performance on top of reasonable prices, they released a PCIe-based NVMe interface product in 2015 to go beyond the speed limit. And that same year, they released T1, the portable external SSD storage, which was unheard of at the time. Through all of this, they proved themselves as the powerful leading company in consumer-use SSD products.

Flash Memory No.1 Samsung Electronics is Still Going



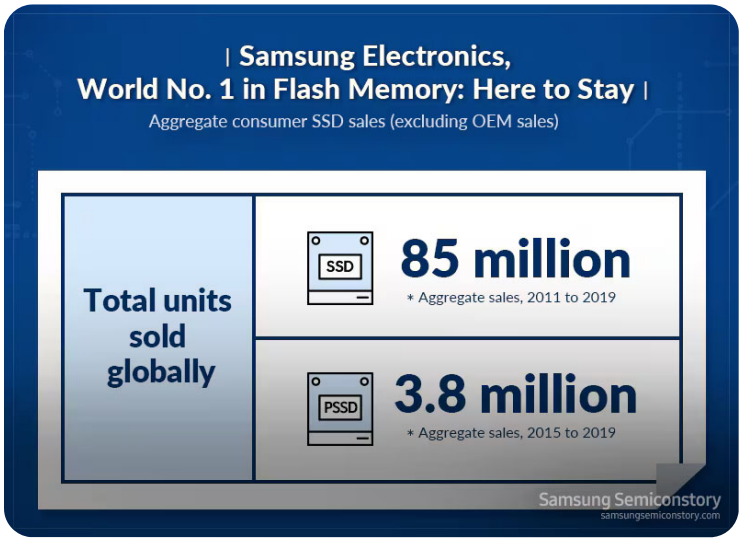
Samsung Electronics will continue to live up to the brand name as the world's **Flash Memory No.1** by keeping up with new innovations and development. Thankfully, the flash memory market has a very bright prospect. With accelerated investments in big data and cloud industries by global IT companies, the demand for data centers is rising dramatically, growing the demand in the NAND flash market as well.



In particular, in the recent times, its use has become more versatile in products like game consoles, and the decrease in NAND prices is contributing to the popularization of consumer-use SSDs. The profit from SSDs in the flash memory market is consistently growing.

This is the case in Samsung Electronics' global sales record of general consumer SSDs as well. Starting at 280,000 in 2011, the total sales reached 10,000,000 in 2014 and 85,000,000 in 2019. In 2020, it is close to reaching 100,000,000 sales.

The sales of portable SSDs (PSSD) is also consistently growing. Since the initial launch in 2015, they have reached 1,000,000 sales in 2017 and 3,800,000 sales in 2019.



Samsung Electronics, already sensing the increase in NAND flash demand due to the changing lifestyles, built a NAND flash memory production line at Pyeongtaek Campus Line 2. They also announced that they will begin mass-producing cutting-edge V-NAND products from the latter half of next year. Samsung Electronics continue to innovate to maintain their position as the top figure in the flash memory market. Please look forward to their journey as they continue to maintain their brand reputation as the "World's No.1 Flash Memory" company with historical innovations and active investment.

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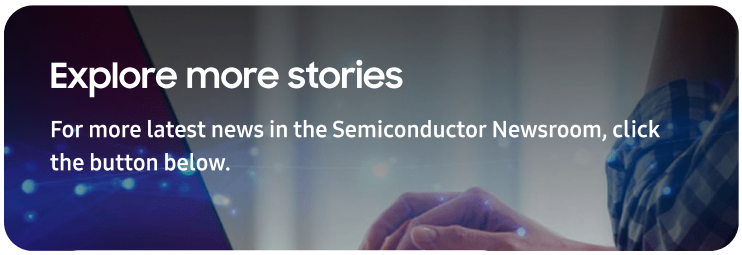

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