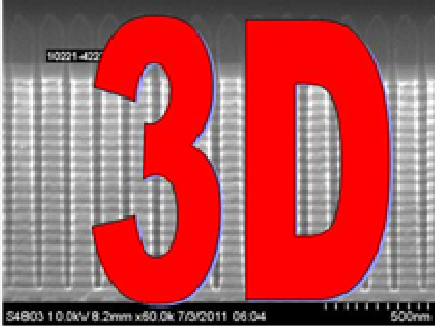


# Samsung Samples 3D NAND SSD



## OBJECTIVE ANALYSIS SEMICONDUCTOR MARKET RESEARCH



### First Sighting of V-NAND

Samsung on July 1 released a new SSD based on its second-generation V-NAND technology. The SSD, dubbed the 850 PRO Series, comes in 128, 256, 512, and 1,024GB capacities. General availability is scheduled for this month.

#### A Big Surprise

The absolute absence of any sign of Samsung 3D NAND several months after the company's first announcement of "mass production" last August led most market followers into a sense of complacency. It seemed clear that Samsung was nowhere near production, and common wisdom indicated that actual sampling of production parts could be months, or even years away.

Suddenly, without signs that any chips were sampled outside of Samsung itself, the company explains that it will ship V-NAND-based SSDs to consumers within the month!

This gives rise to speculation: What did Samsung do to get to this point?

While it is possible that the company somehow managed to raise its yields to an acceptable level without shipping any product in any visible way, it seems more likely that the V-NAND in these SSDs has been produced at low yields on pilot production lines and may even be sold at a loss. Samsung could be doing this to force itself down the learning curve faster than its competition, a reasonable strategy as long as it isn't found to violate any trade laws. This would be an ambitious move.

Another possibility is that these samples have been provided to the press, but production volumes will develop slowly, allowing Samsung to take credit for having produced V-NAND SSDs without immediately following through. We would not expect for such a move to harm the company's reputation, since consumers would interpret unavailability as higher-than-anticipated demand.

#### What this Means for Samsung's Image

Samsung has done an excellent job over the past few years of creating an image beyond the company's actual execution. At the 20nm generation, when its competitors were shipping NAND flash with more aggressive processes than Samsung, the company coined the term: "20nm-class" to describe its 27 nanometer technology. The press mistakenly took this to mean that Samsung was ahead of its competition and was shipping 20nm product. Since this worked so much in the company's favor, it was no surprise when Samsung introduced its 19nm NAND by calling it a "10nm-class" product. Once again, the press

misunderstood and broadcast to the world that Samsung was ahead of all of its competitors, and reporters gave little coverage to announcements of 16nm products from Micron and Hynix, or the SanDisk-Toshiba 15nm product.

Samsung's claims to be in "mass production" of its 3D V-NAND last August has created similar misunderstandings. Although these parts have been impossible to find until now (and we have been asking everyone we encounter), competing flash makers came under intense pressure from investors to catch up to Samsung's perceived standing.

The fact that Samsung has now irrefutably sampled 3D NAND will help support its image of process leadership, and will end all talk of the parts being totally unavailable.

### **Next: Can Samsung Execute?**

There is still considerable skepticism of whether Samsung, or any company, can get 3D NAND to yield at an acceptable level within the next few years. A number of NAND chip and process designers, as well as process engineers I converse with, cannot understand how Samsung could move such an elaborate process into volume production as quickly as the company tells us it has. 3D NAND is an enormously different process from any previous semiconductor that has ever been made, and it would be nothing short of amazing for Samsung to have brought its yield to a sufficiently economic level to allow it to produce volumes of this SSD.

The entire reason to move from planar NAND to 3D is to reduce costs, and that can't be done unless yields are high. High yields are very challenging to achieve with any new process, no matter how similar it is to the previous generation, and since the 3D process is not a linear shrink of existing technologies, it would be amazing for it to come on-line at high yields in the short space of a year.

All eyes will be on Samsung from this point to see whether this is a press stunt or if the company has truly mastered its V-NAND process in record time.

### **What Does This Mean to the Competition?**

Samsung has taken an interesting tact in its SSD merchandising. While other companies downplayed their use of 3-bit NAND in consumer products, using advanced controller design to support the use of this lower-performing flash to compete against other companies' 2-bit NAND products, Samsung loudly promoted its use of 3-bit MLC (also called TLC) in SSDs, making this out to be a feature. This campaign was successful, and Samsung is now similarly promoting the 850 PRO series' V-NAND as a feature.

It is not clear why a consumer would make a purchase decision based on such a feature, but if it works for Samsung, then good for them.

What is more important is to consider Samsung's overall SSD strategy, which ties back to its corporate culture. Samsung sells undifferentiated products at low prices based on economies of scale. While Samsung's SSDs offer admirable specifications, few consumers are sophisticated enough to appreciate that fact. Instead they focus on price, and to a degree on the manufacturer's reputation. Samsung offers SSDs at a low price and the company has a strong reputation.

The V-NAND-based 850 PRO is a different matter. According to some reports from reviewers, this SSD will be offered at a significant price premium over that of Samsung's flagship 840 series. This implies that Samsung will initially sell only to enthusiasts who want to own a V-NAND based SSD simply because of the technology inside.

This, in turn, means that very little will change from a competitive standpoint: SSD companies will compete against Samsung's 840, and flash companies will continue to ship chips to SSDs that compete against the 840 i.e. SSDs that use standard planar flash.

Flash makers will, though, come under renewed pressure from investors who will perceive that Samsung is well ahead of them in 3D, and this will certainly make life unpleasant for their management. Once the dust has settled, though, it is likely that investors, too, will come to understand that the advent of 3D NAND from one company doesn't mean instant collapse competitors that don't yet ship the technology.

Objective Analysis publishes reports detailing NAND flash and SSD markets. These reports can be purchased for immediate download from our [website](#).

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