



OBJECTIVE ANALYSIS

Semiconductor Market Research

OBJECTIVE ANALYSIS ALERT!

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HYNIX AND SANDISK CROSS-LICENSE NAND & FORM JV

In a release issued March 21 in Korea, Hynix and SanDisk have announced that:

- The companies have reached a flash chip patent cross license agreement
- The companies signed a memorandum of understanding outlining a joint venture to manufacture memory chips and sell NAND memory system solutions.
- The joint venture will involve equal capital investments by both companies in dedicated production capacity at Hynix.

Context

The x4 (4-bits per memory cell) technology cooperation was started between msystems and Hynix before msystems was acquired by SanDisk. After friction arose between msystems and supplier Samsung, the relationship between Hynix and msystems became strategic. The fact that msystems was a key provider of MLC intellectual property added significant value to this relationship.

What does this mean to the industry?

The impact of this news will be different for different players in this market. This is a company-by-company view of this announcement:

Hynix today has a NAND cost structure that is higher than that of their competition for two key reasons: Low shipments of MLC and limited 300mm production. This relationship will provide the company valuable MLC (multilevel cell, or 2-bit cells) know-how, and the dedicated production capacity (which is certain to be 300mm) will help bring the company's costs into competition with those of other NAND suppliers.

Toshiba has been a steadfast partner with SanDisk and its exclusive NAND fab partner until today. We do not see the Hynix relationship threatening the good position Toshiba enjoys, but there is now competition for this important supply relationship that will keep Toshiba on its toes.

STMicroelectronics has been Hynix' NAND partner to date, and is also locked in a patent infringement suit with SanDisk. Meanwhile ST is taking steps to spin off its flash (NAND and NOR) business. So far ST's NAND business has been small, constrained, we believe, by a cost-based transfer price from Hynix. Lower costs at Hynix should similarly benefit ST, allowing its NAND business to expand.

SanDisk has taken a possibly confusing situation and has turned it around to the company's advantage. Before the purchase Hynix was ST's partner and ST was in a patent battle against SanDisk. Hynix was an important supplier to msystems and msystems promised IP to Hynix. With this move Hynix still gets the IP, SanDisk gets

another supply relationship similar to the one that has worked so well with Toshiba, and ST may end up becoming an important customer, which may encourage them to settle on terms more favorable to SanDisk.

Samsung has enjoyed a fantastic position in the NAND market to date partly because the company's phenomenal resources allow it to grow costly 300mm capacity by itself as it needs it. As other companies pool resources to construct similar facilities, they chip away at the Samsung's advantage in this area. One difficulty that thwarted Samsung until recently has been the company's troubles getting its MLC NAND to yield, a problem which was solved without outside help in the second half of last year. Since Samsung is a key supplier to SanDisk, we will be watching to see whether Samsung becomes a licensee of the msystems x4 technology in the near future.

Intel, Micron, IMFT, and Lexar are on the outside of this relationship to their detriment. Lexar (recently acquired by Micron) prevailed in its lawsuit against Toshiba and meanwhile established strong ties to Samsung. Intel and Micron with their IMFT (Intel Micron Flash Technology) joint venture are jointly investing in massive 300mm capacity. This will make them contenders on an equal footing with Toshiba and Samsung from a capacity standpoint, but rumors indicate that there are still-unresolved IP issues that could get in the way of either or both of these companies shipping MLC NAND. We might add that neither has announced a license for the x4 technology that promises to bring future costs to the next-lower level.

Independent Card Vendors may profit from the availability of very inexpensive x4 parts made by Hynix on a 300mm line. If so, this will occur at a later time, well after SanDisk has been able to reap the profits the way they did with MLC in the early years. MLC was adopted by the rest of Toshiba's customers well after SanDisk had converted the bulk of its cards to MLC, mainly because SanDisk had MLC-compatible controllers long before such controllers became available on the open market.

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