



OBJECTIVE ANALYSIS

Semiconductor Market Research

OBJECTIVE ANALYSIS ALERT!

April 1, 2008

Numonyx Makes its Debut

Strong Company Emerges in Tough Market

On Monday, March 31, Numonyx was officially formed. This company, the combination of the NOR flash and certain other businesses from Intel and STMicroelectronics, instantly takes the first-ranked position in NOR and the third position in overall nonvolatile memory.

Originally announced last May, the new company has been several months in the making. Several news items have already been written about how this deal will work, but we attempt here to explain why it makes sense.

Synergy

Both STMicroelectronics and Intel used to manufacture their NOR on facilities shared with other non-memory products. This posed the companies three disadvantages:

1. The manufacturing process was not optimized for flash, so it was more costly than processes used by competitors who manufactured using the same line widths.
2. Since these production lines manufactured logic they had an equipment set that was not balanced to a flash process. This caused the depreciation costs in these fabs to be much higher than in competing "flash-only" fabs, further increasing costs.
3. NOR has been unprofitable for a number of years, discouraging parent companies from dedicating any shared fab's wafer starts to NOR. In some cases the memory divisions of these companies were forced to cancel orders when their wafer starts were reduced, with a disastrous result to customer relationships.

As a dedicated flash manufacturer Numonyx will be able to fine-tune their manufacturing to flash, bringing production costs in line with their major competitors, while avoiding any unpleasant surprises from lost wafer starts.

Furthermore, neither company had a large enough sales base to warrant investment in a \$6-8 billion 300mm wafer fab, yet the transition from 200mm to 300mm provides a cost savings of roughly 30%. The trouble is that a 300mm fab needs to be supported by about \$2.5 billion in annual sales. By joining forces the combined company reaches a revenue level of about \$3 billion, which crosses that threshold with some margin.

Although Numonyx is more than a year behind Spansion in opening a 300mm fab, Numonyx is in the lead with process technology, with 65nm parts in full production and

45nm set to sample soon. This could offset the lack of the 30% cost advantage by providing a die size advantage of roughly 45%.

Phase-Change

It is universally held that flash will stop scaling at some point, and when it does, phase-change and a handful of other technologies show the ability to scale far beyond that limit. PCM is Numonyx' bet on the future.

We have always read something into the spelling of Numonyx' name. Both Intel and ST (as well as their competitor Samsung and several other companies) license their phase-change technology from Ovonyx. We interpret the strange spelling "Numonyx" as a sign that the company anticipates a significant change in its technology when they finally reach the day that they can no longer produce flash, but will support their customers with phase-change memory (PCM or PRAM). Numonyx is sampling a PCM chip today, and expects to ship small volumes of a production device by the end of this year.

Both partners bring a lot of research to the table, and appear to be in an advanced position in phase-change technology. We are not placing any bets that the market will develop as we see it today, but it is clear that Numonyx has a vision for the future.

Financial Data

Some of the financial data disclosed at the onset of the deal has changed, so we thought it worth presenting here:

	May 22	March 31
Intel Ownership	45.1%	45.1%
ST Ownership	48.6%	48.6%
Francisco Ownership	6.3%	6.3%
Intel Long-Term Debt	\$432M	Unclear
ST Long-Term Debt	\$468M*	\$155.6M
Francisco Cash Investment	\$150M	\$150M
Term Loan**	\$1.3B†	\$450M
Revolving Credit	\$250M	\$100M
Numonyx Cash	~\$500M	\$585M
Intel Loss Posted	Unclear	\$300M
ST Loss Posted	\$850-900	\$150M
Employees	~ 4K Intel & 4K ST	7,000

* In May ST said that the company would contribute \$2.4B in assets, getting \$1.55B (\$468M cash + 48.6% ownership) and planned to take an \$850-900M loss to account for the difference.

** "Proceeds from the term loan will be used for working capital and payment to Intel and STMicroelectronics for the purchase price."

† Included \$900M to parents as a cash payment, but this seems to have been renegotiated.

We are not sure what to make of the significant changes in the debt figures, and Numonyx didn't wish to elaborate, but it appears that the parent companies made some unforeseen concessions perhaps to help with the rumored difficulties Numonyx encountered in raising debt.

Another concession that works to Numonyx' advantage is the way that staffing was performed. Employees of both ST and Intel had to apply for jobs with the new company with the burden of layoffs falling to the parent companies. This assures that Numonyx goes into business with the best possible team of employees who have asked to be spun off and have been chosen over others for their strengths. Meanwhile, Numonyx suffers from none of the financial and administrative burdens associated with reductions in force.

Competitive Landscape

If memory serves us correctly, Intel was the leading nonvolatile memory manufacturer from the creation of that market in the 1970s until Samsung out-stripped it in 2003. This was the result of extreme NAND growth, a market Samsung owned and Intel avoided. A further loss was suffered when AMD and Fujitsu spun off their NOR companies to form Spansion, a company that took NOR leadership away from Intel in 2006.

With the creation of Numonyx, Spansion loses its NOR leadership. Meanwhile most high-density NOR makers are backing out of the market. Sharp and Renesas no longer migrate their NOR products to contemporary technologies, and Toshiba ships almost all of its NOR to Japan's cell phone market. Macronix has always been relatively small in the high-density NOR business, and does not support densities larger than 128Mb. With one exception, all other NOR makers focus on low-density parts. The one exception, though, is Samsung, a company that has expressed a desire to take the leadership position of the NOR market.

This is a big threat to Numonyx and Spansion. Should Samsung make an effort to dominate NOR they will have to buy their way into the market. Samsung certainly has the power to make such a move. The result will be a pricing catastrophe for all involved. We will have to wait and see whether Samsung continues down this path, or if they change their plans.

Even without Samsung we expect profits to be hard-won in the high-density NOR market. In most duopolies both players can profit from the lack of widespread competition. The difference with NOR is that high-density parts compete against a 2-chip NOR/NAND solution. In camera phones – the key market for high-density NOR – designers can choose either to use one high-density NOR chip, or a combination of a low-density NOR chip and a low-density NAND chip. Both solutions work well. This means that the high-density NOR chip must compete against NAND which is often priced at cost. This puts substantial pressure on NOR prices, a scenario that should not change over the foreseeable future.

Summary

From our perspective Numonyx is in an excellent competitive position in a difficult market. Threats from NAND and Samsung are very real, and management will not be able to relax for one moment, but the hiring process assures that a very strong team is in place and should be able to rise to the occasion.

The company's phase-change technology may not provide an immediate advantage, but it shows that the company is in a position to continue its business whenever NOR hits its inevitable brick wall.

We are bullish for Numonyx' prospects in the markets it serves.

Jim Handy

+1 (408) 356-2549

Objective Analysis

PO Box 440

Los Gatos, CA 95031-0440

USA

www.Objective-Analysis.com