Qimonda

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INTRODUCTION

On April 1, 2006, German based Infineon Technologies AG, announced that it would split off its semiconductor memory business by forming a wholly owned subsidiary named Qimonda (pronounced key-monda). The effective date of the split would occur on May 1, 2006, two months prior to the previously announced date of July 1, 2006. Infineon also announced that it would conduct an initial public offering (IPO) of Qimonda at an unspecified future date, thereby liquidating its majority interest in the company.

Infineon’s memory business generated approximately 40% of its total revenue in fiscal 2005 (end September 30) amounting to 2.83 b Euros or 3.6b dollars (1 Euro = approx $1.28 dollars); earnings were approximately $150m dollars.

After the split, Qimonda would emerge as the 4th largest global manufacturer of DRAM memory components. The company would be headquartered in Munich, Germany and would be organized into 4 Regional locations, including Qimonda North America (See Exhibit 1 for Qimonda details).

QIMONDA NORTH AMERICA/HENRY BECKER

Henry Becker was named the Regional President of Qimonda’s North American operations. Becker had spent his entire career of 23 years working in the semi-conductor industry and had recently been Managing Director of Infineon’s huge memory plant in Richmond, Virginia. The plant comprises 1.3 million square feet, employs 2,300 people and is in the midst of a $1.5b expansion which is estimated to cut production costs by 30 percent.

Becker was excited about the challenges of his new position specifically moving from essentially a plant manager’s role to heading up all operations in North America. He listed three prime strategic issues:

1. The evolution/execution of the Regional President’s position.
2. Creating synergies across the North American Value Chain functions of Qimonda
3. Raising ASP’s (Average Selling Prices) across Qimonda’s DRAM segments.

However, Becker realized that there was an even bigger issue facing both Qimonda and its North American operations, namely the creation of brand awareness for Qimonda. Consider the challenge of growing DRAM memory with a brand that was just coming into existence. Couple this with the fact that Infineon had been formed as recently as 1999 as a Siemens’s spin off. To help with the branding issue, Qimonda issued the following statement regarding its name and vision.
"As a global company we have named ourselves Qimonda which works in all languages and cultural environments. Qimonda carries different meanings and allows associations in different languages. "Qi" stands for flowing or breathing energy, while the combination of the English word "key" and the Latin "mundus" is intuitively understood in the Western World as "key to the world" or as we say: "Qimonda." Our name has universal qualities and it reflects our strong global footprint in R&D and manufacturing, our worldwide customer base and our highly motivated employees. Our vision is to become the world's leading creative memory company."

Although the vision statement was a start, Becker knew that the challenges of brand awareness were seated in a thorough understanding of the semiconductor industry, the DRAM Memory segment, Qimonda’s competitors and determining sources of differentiation advantage in his business.

SEMICONDUCTOR INDUSTRY

1) Overview

The global semiconductor industry in the mid-2000’s, supplies components for a wide range of consumer and industrial electronic products. The personal computer segment holds approximately 30 percent of the industry market share; however the demand for cell phone and digital televisions has driven recent growth.

The industry is very cyclical. Global semiconductor revenue grew 40 percent in 1995 to approx $150b, dropped 10 percent in 1996 and remained flat through 1998. Revenues grew to a record level of $204b in 2000, but fell to $139b in 2001 as a result of the tech crash. After remaining relatively flat in 2002 and 2003., the industry recorded revenues of $213b in 2004. In 2005, revenues grew to $226b.

In 2004, the U. S. semiconductor industry accounted for 46 percent of the total global market with revenues of $98b. Of total shipment values, 69 percent of U.S. produced chips were exported.

2) Semiconductor Manufacturing Process

Semiconductor chips are manufactured in clean rooms, free of contaminating dust. The process starts with the manufacture of thin, round silicon wafers with a diameter of 12 inches and thickness of 250-350 microns (thinner than human hair). Chip makers such as Qimonda purchase these wafers from suppliers and produce memory chips through a series of thermal, metallurgical and chemical
processing steps. During the process, billion of electronic circuits are transferred to the wafers via the creation of a matrix of rectangular chips. The wafers are then sawed into individual chips.

Producers of memory chips continually seek to generate more individual chips, while minimizing defects. To accomplish this, design and process improvements are made to allow more electronic circuits to fit on a smaller chip. Collaborative research, undertaken by chip producers, has resulted in new technology being implemented on a decade by decade time frame.

3) **Semiconductor Industry/Segments**

The semiconductor industry is segmented into 4 broad areas:

A) Memory – Memory chips serve as temporary storehouses of data and pass information to and from computer devices. Leading Memory companies are SAMSUNG, TOSHIBA, MICRON, HYNIX and QIMONDA.

B) Microprocessor – These are central processing units that contain the basic logic to perform tasks. Intel dominates this segment.

C) Commodity Integrated Circuit (CIC) – “Standard” chips produced in large batches for routine processing purposes. This segment has thin profit margins and is dominated by large Asian companies.

D) Complex SOC (System On a Chip) – an integrated circuit with an entire system’s capability on it. This emerging segment caters to growing demand for consumer products that possess new features.

Memory chips are further divided into these sub-segments:

A) **DRAM (Dynamic Random Access Memory pronounced D-RAM).**

B) **DDR-SRAM (Static RAM – pronounced S-RAM)**

C) **FLASH**

This case will focus primarily on the DRAM sub-segment. (See Exhibit 2 for Glossary of Terms).

In 2005, global DRAM revenues were $26b and accounted for approximately 50 percent of the Memory chip market. DRAM’s are used mainly in personal computers, but this usage declined from 80 percent in 1990 to 63 per cent in 2005. Other major users of DRAM chips are the graphics (gaming consoles) and mobile phone industries.

4) **Memory Segment/Supply and Buy Chains (See Exhibit 3)**

A) **Supply Chain:** Historically, chipmakers controlled the entire production process from design to final manufacture. In essence, they controlled their supply chains. However a major change occurring in
the supply chain is the movement of wafers manufactured in house (FAB) to outsourcing the manufacture such wafers (FABLESS).

Many smaller companies completely outsource the manufacture of chips to a foundry which produces chips on a contract basis. The same is true with the emergence of specialized designers and chip testers who provide outsourced services.

Suppliers of raw materials provide discounts to large chip companies since an abundance of such suppliers exist. Another group of suppliers to the memory industry are semiconductor equipment companies such as Applied Materials, Tokyo Electron and KLA – Tencor.

B) **Buy Chain:** The memory buy chain for personal computers is somewhat fragmented, with no single buyer or OEM (Other Equipment Manufacturer) controlling more than 20% of the global PC Market in 2005; there is also no dominant mobile phone producer. Since memory represents from 5 to 10% of material cost for these OEM’s, tough price negotiations exist between chip makers and the OEM’s.

5) **Memory Segment/Trends and Forecasts**

Beyond 2005, the memory industry is expected to experience the following trends and forecasts.

a. Continuation of “Moore’s Law”, which states that technology, will result in the doubling of capacity on the same size chip every two years.

b. A shift of focus from business and corporate sales to consumer based products. For example, consumers purchase 30 percent of all PC’s and 90 per cent of cell phones. The trend toward "all in one" mobile phones with color displays that also serve as cameras, 2-way radios and data centers will continue.

c. Huge growth is expected in high definition digital televisions and digital cameras.

d. DRAM market is especially prone to boom and bust cycles. DRAM prices fell in 2005 after a record increase in 2004. In an environment where cutting edge chips became obsolete in a short period of time, manufacturers must cut prices to stay competitive. On average DRAM prices decline about 28% annually but have plunged by 75% or increased by 200% in a matter of months.

e. Shift to a new type of DRAM called DDR2 (SRAM). There chips can process data at faster speeds while consuming less power. It is expected that DDR2 will account for over 50% of total DRAM output in 2006.
f. Ability to shift manufacturing capacity from DRAM to FLASH Chips depending on market conditions. FLASH chips provide higher margins to manufacturers; therefore the ability to convert DRAM manufacturing to FLASH during periods of DRAM decline is important.

g. From the standpoint of capital spending, the following trends will emerge:

1) Move towards larger wafer sizes, from the 200mm standard (8 inches) to 300mm (12 inches).
2) Move towards smaller line widths, specifically from 130 nanometers (nm) to 90nm and smaller.
3) More chip manufacturers will go fabless (semiconductor companies that design and market their own chips, but rely on others to build them). Due to the high price of operating cutting edge fabs, merger and acquisition activity is expected to increase.

MEMORY/DRAM COMPETITORS – (See Exhibit 4 for Competitor Breakout)

1) SAMSUNG: The largest global producer of DRAM memory chips in 2005 was Samsung, the huge South Korean conglomerate. When Intel exited the DRAM business in 1984, Samsung invested more than $100M in DRAM R&D. It continued this investment in the late 1980’s and 1990’s and emerged as the undisputed industry leader by 1992, when it pioneered the move to 8 inch wafers.

Samsung offers over 1200 different variations of DRAM products. Given that most of these products are considered commodities, the ability to produce such a range of products provides significant differentiation Advantage for Samsung. This allows Samsung the ability to customize products to satisfy a wide range of consumer demand.

Samsung also enjoys cost advantage in many of its products that leads to lower prices. For example, in 2004, the price of a specialized 16mbit chip was $18.50, while the price of the mainstream 256mbit chip was only $4.55. Samsung continually is able to maintain this cost advantage; however, there are concerns that the emergence of Chinese firms could threaten Samsung’s future dominance especially in “lower technology” segments.

In addition to its leading position in the memory industry, Samsung has divisions that produce TV’s, AV equipment and computers, mobile phones, HDTV’s, desktop monitors and appliances. Since Memory chips are used in many of these products, Samsung has control and power over its supply and buy chains.
In 2005, Samsung entered the wafer foundry market via a venture with Chartered Semiconductor and IBM to develop a common manufacturing platform based on 90nanometer technology. A short time later, Samsung announced the successful launch of a 65 nanometer system. These developments strengthen Samsung’s ability to further control its supply chain.

Because of its size and cash generation ability, Samsung has maintained a leadership position in R&D spending. In 2001, it began diversification efforts into the FLASH segment of the memory industry. By 2005, it attained market share leadership of such segment.

2) **MICRON:** Micron is an example of a “pure play” Memory company with little diversification outside this segment. It is based in Boise, Idaho and is the sole U.S. producer of memory products. It began operations in 1978 and during its 28 year existence has suffered significant ups and downs related to the cyclicality of the DRAM segment.

In 1998, Micron purchased the memory chip business of Texas Instruments and then purchased Dominion Semiconductor, a unit of Toshiba with a plant in Northern Virginia.

During 2003, over 95% of Micron’s business was in DRAM sales. However, in late 2003, it received $500M from Intel to diversify into the NAND flash segment of the memory business. The primary use of the NAND flash chips are in the consumer electronics industry, (MP3 player, and digital cameras). Intel subsequently entered into a $2.4b joint venture with Micron to produce flash memory chips for use in computers and consumer products.

In June 2006, Micron announced that it would increase its bid to acquire FLASH Memory products maker, Lexar Media, Inc. In a share for share transaction, Micron would increase its offer from $688 million to $827 million. Lexar’s share holders would vote on this offer in late June 2006.

By 2007, Micron’s DRAM business is expected to decline to 70% of total revenues compared to 18% or more (depending on Lexar deal).for the emerging NAND flash segment. The remaining revenues will come from still another diversification effort, the CMOS image sensor business.

**QIMONDA**

1) **HISTORY**

Infineon Technologies was formed in 1999 as a separate legal entity within the Siemens group. In connection with the company’s formation, Siemens
retained the right to use approximately 20,000 patent rights transferred to Infineon within the scope of its business for an unlimited period of time. Shares of Infineon have been publicly traded since March 2000, and Siemens still holds a large minority shareholder interest in the company. Siemens is also Infineon’s largest single customer, accounting for 14% of net sales in FY 05.

Infineon operated through three principal business groups: automotive, industrial and multimarket (37% of FY 05 sales); communication (21%); and memory products (42%). Sales are made primarily through a direct sales force, with distributors accounting for 14% of sales in FY 05.

On May 1, 2006 Infineon split off its memory products business forming QIMONDA.

2) MARKET POSITION

Qimonda positions itself as “the World’s leading Creative Memory Company” holding a strong regional presence in all major memory markets (Europe, North America, Asian Pacific and Japan). This position is attained through relationships with global OEM’s, local players and channel partners and strong development and manufacturing partnerships worldwide.

The position is further strengthened by the company achieving a number one position in power saving “Trench” technology and a top two market share position with computer and server end users.

3) BUSINESS SEGMENTS/CUSTOMERS (See Exhibit 5)

Qimonda’s Memory segments include the following:

A. Computing/Infrastructure - Primarily the PC Industry
B. Graphics – Includes high end/game consoles
C. Mobile – Mobile phones and PDA’s; also digital still camera.
D. Consumer – Includes digital TVs, set top boxes, and printers
E. FLASH – Emerging segments.

QIMONDA has established a slide? Customer base in its computing/infrastructure segments with companies such as HP, Dell and IBM. It has also gained new and emerging customers in its other segments.

4) MANUFACTURING AND R&D FACILITIES

On a global basis, Qimonda has five (5) 300mm wafer manufacturing sites on three continents.
Fully Owned: Dresden (Germany) and Richmond (USA)
Joint Venture: INOTERA (TAIWAN)
Foundries: SMIC (China) and WIN band (TAIWAN)

Use of the joint ventures and foundries allows Qimonda to improve its market position with reduced capital requirements; this also permits flexible capacity increases. Qimonda has begun production based on 90nm technology while gearing up for 70nm technology.

Qimonda has five (5) major R&D facilities, two in Germany, two in the USA and one in Asia. It employs over 1,700 engineers in R&D and utilizes developmental partnerships on a worldwide basis to improve economies of scale.

5) ORGANIZATION/STRATEGIC ISSUES

Qimonda’s global organization is headquartered in Munich, Germany. From an Operations standpoint Qimonda has four operating regions including North America headed by Henry Becker. In addition to running the huge manufacturing plant in Richmond, Va, Becker also has responsibility for R&D Marketing and Sales, Finance, Human Resources and Information Technology in North America. (See Exhibit 6)

Since each operating region has distinct end customers with varying memory needs, coordination of all Qimonda’s North American operations was a key strategic issue facing Becker. This would be a challenge considering that the two R&D locations were in Vermont and North Carolina, Marketing and Sales in San Jose, California and key customers throughout all of North America.

To the successful in North America, Becker knew that communication across the value chain activities of Qimonda was crucial (See Exhibit 7). This started with determining key consumer wants and needs both on a short and long-term basis. For example, what would drive each customer’s business in the future. Then the task was to design, manufacture, market, sell and provide excellent service to such customers. He also knew that in order for Qimonda to compete, it must attain product differentiation and be able to effectively price its products.

Pricing had been a significant issue for Qimonda in the past because of product mix. For example, DRAM chips sold to computer manufacturers generated lower prices than chips sold to cell phone or gaming console manufacturers. Because Qimonda sold more chips to computer manufacturers, its Average Selling Price (ASP) across all chips sold was
lower than its competitors. To raise ASP's, it will be necessary to sell higher margin chips to new end users or dramatically lower costs of existing chips.

Becker felt that achieving differentiation and controlling pricing could be accomplished by developing and implementing synergies across Qimonda's Value Chain. He also felt that Qimonda possessed technology advantages over its competitors.

6) **QIMONDA'S "TRENCHING" TECHNOLOGY**

Qimonda's prime source of technology differentiation is its power saving "Trench" process, which relies on getting more memory on a given computer chip. This technology enables server systems to incorporate higher densities and maximize system performance. Data Centers benefits from this as infrastructure demand grows and energy costs begin to exceed equipment costs.

The "Trenching" process involves tearing down what had been one level chip construction and digging under the surface of the chip to create "floors" below or sub levels/floors. This contrasts to "Stacking" technology which involves adding "floors" on top of the chip much like an apartment building. Both the "Trenching" and "Stacking" technologies have advantages. While Infineon and Micron use "Trenching", Samsung uses the "Stacking" technology.

7) **THE BRAND AWARENESS ISSUE**

The biggest issue facing Becker was how to create awareness of the Qimonda brand, given the fact that Samsung and Micron had both higher DRAM market shares and enjoyed higher DRAM average selling prices (ASP's).

To create brand awareness, companies traditionally rely on marketing programs/expenditures directed toward the end consumer, such as a personal computer buyer. However semiconductor companies essentially supply components (chips) for use in end products made by OEM's companies such as Dell, Sony and IBM.

Intel, the leading semiconductor manufacturer and supplier of micro processors sought to increase brand awareness via television commercials
featuring the “Intel inside” logo for products containing Intel chips. An example of such a product was an IBM laptop computer that had an Intel Pentium sticker affixed to its surface. In essence, Intel partnered with IBM and other OEM’s to promote its brand through the OEM brand.

A bigger issue for Qimonda and Becker was that DRAM chips in many applications were considered a commodity, driven competitively by pricing. Therefore, does creating brand awareness for a commodity make sense?

In looking at other industries, two very successful advertising campaigns have been used to promote “commodity” type products.

A) **Batteries:** The “Energizer Bunny” campaign was successful in promoting a differentiation feature in batteries—longer lasting batteries, with higher pricing. This campaign has been in existence for 17 years and has enabled Energizer Holdings to attain a strong #2 market share position in the U.S. primary battery business.

B) **Eggs:** Eggland’s Best attempt at branding eggs appears to be working, resulting in an approximate 30% increase in pricing for the brand. TV commercials (seen frequently on Jeopardy) extol the benefits of the higher quality Eggland Egg. Eggland’s points of differentiation are a better taste and nutritional profile coming from the special feed supplied to its chickens.

So much for batteries and eggs; the question becomes how to create brand awareness for Qimonda’s DRAM chips. What unique selling proposition offers Qimonda an advantage over its competitors? What sources of differentiation can Qimonda create that can drive branding? What type of creative marketing and selling can be employed?