

## Market for Silicon Wafers Grew Strongly in 2004

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Revenue from sales of silicon wafers grew by 22 percent in 2004, to \$7.6 billion, aided by a big rise in demand. Shin-Etsu Handotai, the top vendor, extended its lead over SUMCO by capturing 31 percent of the market.

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## ANALYSIS

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### 1.0 Overview of Silicon Wafer Market, 2004

The strong demand for semiconductor devices has meant the market grew 22 percent over 2003 revenue, to reach \$7.6 billion in 2004. Strong growth in demand was also recorded on an area basis, with a 21 percent increase over 2003 figures.

Strong recoveries were seen in all regions in 2004 as the Americas market bottomed out of negative growth in 2003 and turned upward at 5 percent. In particular, Asia/Pacific continued to expand as a global semiconductor production base, resulting in rapid growth of the Korean (51 percent) and Taiwanese (29 percent) markets. Furthermore, the Chinese market more than doubled, albeit from a small base, growing 111 percent over 2003. The market in Japan registered double-digit growth, thanks to a healthy demand for digital electronics. Finally, the European market showed robust growth at 19 percent, after a weak recovery in 2003.

There was good news across the board in terms of wafer type. Revenue for the polished wafer market soared 22 percent over that of 2003, to \$5.1 billion. Epitaxial wafers grew an impressive 23 percent to reach \$2.5 billion, driven by demand for increased production of micros and logic devices. In particular, the epitaxial market in Taiwan, where foundries drive demand, recorded 54 percent growth. Korea, China, and other markets in Asia/Pacific also showed strong increases, although their share of the global epitaxial market remained very small, ranging between 1 and 3 percent.

### 2.0 Area Demand Up 21 percent

Our latest survey of wafer vendors indicates that demand for wafers by area reached an historic high with a growth rate of 21 percent over 2003, and totaling 6,416 million square inches.

There was a strong growth of 9 percent in the first quarter of 2004, which reflected a solid recovery in demand for devices. Momentum continued into the second quarter, resulting in a 6 percent increase. It was thought the trend would carry on into the second half of the year, but expectation was short-lived. In the third quarter, demand for digital electronics slowed — causing shipments to be adjusted — and device production was delayed. The industry's cautiousness in controlling the in-house inventory of materials flattened the demand for wafers. In the fourth quarter, demand was suppressed further — partly due to seasonal factors — and decreased by 9 percent. This fall was the first since 2Q02.

The trend in 2004 can be summarized as follows:

- The 2003 market was primarily driven by limited sectors, such as memory and optoelectronic devices, while the market in 2004 enjoyed across-the-board expansion, including that of standard and leading-edge devices. Gartner Dataquest's analysis indicates that wafer demand for discrete and analog devices in 2004 grew strongly and exceeded an estimated annual rate of 30 percent.
- In a breakdown of wafer sizes, 200-mm and 300-mm wafers contributed greatly to overall market growth. In particular, 300-mm wafers registered over 80 percent growth and reached 740,000 wafers per month in the fourth quarter. Demand for 200-mm wafers reached its highest level of over 6 million wafers per month in the third quarter. Demand for 150-mm wafers increased by 15 percent on an annualized basis due to an increase in consumption of standard devices, but smaller wafers showed only moderate growth, at less than 10 percent.

- Area-based demand achieved double-digit growth in all regions. Asia/Pacific recorded the highest growth rate of 34 percent, and the Americas market recovered from a sluggish 2003 to show an increase of 17 percent. The Japanese and European markets marked strong growth of 11 and 18 percent respectively.

### 3.0 Share Rankings Among Silicon Wafer Vendors in 2004

Table 1 shows market share rankings of wafer vendors in 2003 and 2004. The period showed some signs of change in vendor rankings that had been relatively stable.

Shin-Etsu Handotai strengthened its leading position by increasing its share to 31.1 percent. The company reported annual sales of \$2.4 billion in 2004, a 26 percent increase over the previous year and exceeded the market average of 22 percent. The major contributor was undoubtedly the 300-mm wafer segment, where the company has successfully established a position ahead of its competitors. The strategy to focus on 300-mm wafers, which boast the highest price per unit area, has contributed greatly to the impressive growth.

Sumitomo Mitsubishi Silicon Corporation (SUMCO) maintained its No. 2 position from 2003 with 22.6 percent share. The company also focused on 300-mm wafers in an effort to catch up with Shin-Etsu. But, partly due to a disappointing result in the U.S. market, the company has seen Shin-Etsu widen its lead.

Siltronic and MEMC Electronics Materials were equal third according to our survey. Siltronic maintained its position from the previous year. However, it reported a below-average growth rate of 8 percent in 2004 — totaling \$974 million — mainly due to its deteriorating position in the U.S. during the past few years.

On the other hand, MEMC increased group revenue by 20 percent to \$974 million. Its market share declined slightly to 12.8 percent, but it still managed to join the top three. MEMC has been striving to reinforce its presence in Asia/Pacific by making a joint venture, Taisil Electronic Materials, its wholly owned subsidiary.

Fifth place was taken by Komatsu Electronic Metals. The company achieved strong growth above the market average (up 24 percent) and its share rose to 9 percent. It recorded growth of more than 20 percent in its principal markets, Japan and Taiwan, while wafer demand for discrete devices made a significant contribution.

A change in ranking has occurred for sixth and seventh places. A close race between Toshiba Ceramics and LG Siltron — strong rivals in recent years — favored the latter in 2004. Toshiba Ceramics, which held a 4.3 percent share in 2003, gained an extra 0.1 percentage point by boosting sales at an annual rate of 25 percent. This was thanks to its strength in the 200-mm wafer market. However, LG Siltron also expanded its sales, which were driven by strong demand from Korean device vendors. The strong currency helped it increase its dollar-based figures by 30 percent, to \$342 million. Its share increased by 0.3 points to 4.5 percent, advancing the company to sixth place.

Okmetic in eighth place achieved more or less the average growth rate of 22 percent and maintained the same ranking as in 2003. A major driver in 2004 was a solid recovery of the European market — over 30 percent compared with the sluggish 2003 market.

Wafer Works in ninth place and Episil Technologies in tenth should attract attention because of strong growth, which is far above the market average, but not reflected in market share as much. Both companies benefited greatly from a healthy market in Taiwan. In particular, Episil expanded business by focusing on epitaxial wafers, especially those for discrete and bipolar devices with a higher price per unit area. This focus seems to have contributed greatly to high growth.

**Table 1. Top 10 Merchant Silicon and Epitaxial Wafer Manufacturing Companies by Revenue, Worldwide, 2003 and 2004**

2003 Rank	2004 Rank	Company	Revenue (\$M) 2003	Revenue (\$M) 2004	Change (%)	2004 Market Share (%)
1	1	Shin-Etsu Handotai	1,881.5	2,372.5	26.1	31.1
2	2	SUMCO	1,404.2	1,725.7	22.9	22.6
3	3	Siltronic	902.6	974.5	8.0	12.8
4	3	MEMC Electronic Materials (Consolidated)	809.0	974.5	20.4	12.8
5	5	Komatsu Electronic Metals	556.4	688.1	23.7	9.0
7	6	LG Siltron	263.1	341.5	29.8	4.5
6	7	Toshiba Ceramics	271.1	338.2	24.8	4.4
8	8	Okmetic	55.5	68.2	22.8	0.9
9	9	Wafer Works	29.3	38.7	32.1	0.5
10	10	Episil	26.6	35.2	32.4	0.5
		<b>All Companies</b>	<b>6,265.9</b>	<b>7,639.5</b>	<b>21.9</b>	<b>100.0</b>

Note: Columns may not add to totals shown because of rounding.

Source: Gartner Dataquest (May 2005)

#### 4.0 Price per Square Inch Increased Slightly in 2004

In 2004, shipments of area-based wafers soared 21 percent, and revenue rose 22 percent. As a result, the average wafer price per unit area increased slightly by 1 percent to \$1.19 per square inch. Gartner Dataquest's survey on wafer prices does not indicate a significant drop in 2004 to reflect the tight supply observed during the year. Furthermore, the average price of 300-mm wafers declined more moderately than expected. But, at the same time, there was no significant price rise. The cost of 200-mm wafers is still declining and is failing to buoy up prices.

In 2004, 300-mm wafers accounted for about 12 percent of total demand and are expected to increase share substantially in the near future. 300-mm wafers are likely to maintain a relatively high average price per unit area, compared with other bulk wafers. The average price will rise with a mainstream shift in demand for 300-mm wafers. More precisely, prices per square inch in the total silicon market will be governed by trends in the price and volume share of 300-mm wafers.

Further growth in demand of 300-mm wafers is expected in 2005, but the average wafer price per unit area is not likely to fall significantly. The trend for the recent few years suggests that a substantial rise in prices is not likely, but that they will level off.

#### 5.0 Gartner Dataquest Perspective

In 2004, sales of 300-mm wafers ramped up considerably. It was the first year that a major shift in share composition, signs of which have been seen since 2000, was visibly felt. The observed change in the vendor share rankings appears to reflect vendors' strategies and reliance on the higher added value of 300-mm wafer business.

In the future, strategic differences between vendors will increasingly affect the dynamics of the market landscape, which is showing definite signs of change. According to our latest outlook for 2005, demand for wafers in general is likely to fall in terms of square inches due to lower demand in the first half. But demand for 300-mm wafers will not be affected by this damping force.

From these perspectives, vendors that focus on the 300-mm wafer business will be less affected by the sluggish demand in 2005, whereas those with heavy reliance on 200-mm or smaller wafers will be hit hard. Naturally, 300-mm demand is by no means completely immune from a major decline, which can be triggered under some circumstances, creating a risk for vendors heavily investing in that capacity.

Gartner Dataquest believes that for vendors to respond well to trends in the market, they must differentiate themselves in terms of their product portfolios, customer relations, and pricing and risk-management strategies.

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