Noticeable growth
China’s impact on the semiconductor industry
2012 update
About this report

In 2004, PwC released its original report, China’s impact on the semiconductor industry, in response to our clients’ interest in the rapid growth of the semiconductor industry in China. Specifically, clients wanted to find out whether China’s production volumes would contribute to worldwide overcapacity and a subsequent downturn in the industry. For the past seven years, we have provided updates that included an analysis of both the semiconductor market (consumption) and industry (production). We also covered design, the value chain and possible production growth scenarios along with a number of other topics.

Because the report relies on a number of data sources, we have been unable to deliver it in full until the fourth quarter of the following year. This year, in an effort to get you this vital information in a more timely fashion, we have chosen to release the report in a tiered fashion. This is the third chapter in the series. Please note that figure and table numbering continue from the second chapter, thus the first figure in this chapter is numbered 16 rather than 1. In the coming weeks, we will release additional chapters, until we have covered as much material as in previous reports. At the end of the release period, you will be able to download a complete pdf file of the full report.

Please visit www.pwc.com/chinasemicon over the next several weeks to read or download each chapter of this year’s report.

Chapters released to date include:
1. Market and industry overview
2. China’s semiconductor industry
3. Design in China

Chapter 3:
Table of contents

3.1 Integrated circuit design
3.2 Design enterprises
3.5 Design employees
3.6 Design focus
3.7 Design industry outlook
3.9 Chinese semiconductor companies
The Integrated circuit (IC) design segment of China’s semiconductor industry enjoys the unique distinction of positive year-over-year (YoY) revenue growth for every year since 2000.

There are currently no more than 100—possibly less—local indigenous IC design enterprises that are truly viable fabless semiconductor companies.

In 2011 China reported its first billion dollar IC design company and two of the worldwide top five fastest growing IC design companies.

The 47 major indigenous Chinese semiconductor companies with revenues greater than $30 million reported an average 39% increase in revenues which is notably better than the 0.4% increase for the worldwide semiconductor industry.
**Integrated circuit design**

Integrated circuit (IC) design is the only segment of China’s semiconductor industry that achieved positive year-over-year (YoY) revenue growth for every year since 2000. Its revenue comes primarily from China’s indigenous fabless semiconductor companies, and it has been the fastest growing segment of China’s semiconductor industry since 2000. In fact, China’s IC design industry even grew during the 2008/2009 downturn thanks to booming domestic demand. During 2009, a series of domestic stimulus policies introduced by the government were implemented, driving up demand. China’s fabless semiconductor industry further benefitted from the seemingly endless demand for semiconductors used in cell phones as shipments of mobile handsets designed in China surged by nearly 60% in 2011.

IC design revenues grew from US$178 million in 2001 to $7.3 billion in 2011—experiencing a compounded annual growth rate (CAGR) of 45%. As this sector has grown larger, its YoY growth rate had decreased from a peak of 108% in 2003 to a plateau of about 55% in 2005 and 2006, followed by decreases to 14% in 2008 before improving to 17% in 2009 and 36% in 2010 and 2011. Notably, China’s IC design sector dollar revenues did grow by 14.1% and 16.8% in 2008 and 2009 despite a 2.8% and 9.0% decline in the worldwide semiconductor market for those years; by 36% in 2010 exceeding the worldwide market growth of 32%; and by a further 36% in 2011 far exceeding the worldwide market growth of 0.4%.
China’s IC design revenue growth of 36% in 2011 exceeded that of China’s IC manufacturing, IC packaging and testing, and even the much larger O-S-D sectors. Consequently, the IC design sector’s share of China’s semiconductor industry increased to 16.8% in 2011, as compared to 14.1% in 2010, after having remained flat at 10.8% for three consecutive years through 2008 before increasing to 13.5% in 2009. Most of the revenue in this sector can be attributed to China’s fabless semiconductor companies, which in 2011 has increased to constitute about 10% of the $74 billion worldwide fabless IC industry up from a 1% share in 2001, 4% share in 2004 and a 7% share in 2010.

**Design enterprises**

According to China Center of Information Industry Development (CCID) Consulting, China had 503 IC design enterprises at the close of 2011, an increase from the 485 reported at the close of 2010. Although this number of IC design enterprises is based upon a list maintained by the China Semiconductor Industry Association (CSIA), there has been considerable skepticism by many foreign industry associations and analysts about its size and makeup. CCID advises that “CSIA has the list of 503 companies, but CCID did not get this list” and that the list includes foreign joint venture (JV) and multinational company (MNC) subsidiary company design and research and development (R&D) activities. There is a great diversity among this group of enterprises. It includes: state-owned, OEM-owned subsidiaries and spin-offs; IC design teams affiliated with university research departments; start-ups founded by returning Chinese engineers and local entrepreneurs; and the Chinese staffed development centers of multinational companies.

While the 2008/2009 financial crises had less effect in China than elsewhere, it still hindered many Chinese companies, including some IC design (fabless) companies. With a significant slowdown in the Chinese market and a decline in the worldwide semiconductor market growth in 2008, competition between Chinese IC design companies intensified. Many of these companies’ products had concentrated on low-end consumer applications and the differentiation between enterprises and products became blurred as the applications became more homogeneous. Price wars became the common mode of competition and the slowdown in the start-up of new markets...
further restricted the operations of some IC design companies focusing on those markets. This environment put a severe strain on many of China’s IC design companies and several had difficulty surviving. Several companies went bankrupt in 2008 and more did so in 2009. Last year, many of the survivors grew stronger, but the fundamental issue remains that there are just too many local fabless companies with similar products competing purely on price. Therefore, it is still estimated that there are currently no more than 100, possibly less, of the local indigenous IC design enterprises that are truly viable fabless semiconductor companies.

Of the 503 IC design enterprises reported at the end of 2011 as many as 240 could be the design or research & development (R&D) units or activities of foreign-invested or subsidiary multinational companies (MNC). Of this group, PwC analysis has identified over 238 participants. This group is now spread across the more than 280 multinational semiconductor companies and the 100 largest semiconductor-consuming OEM/ODMs identified in the Gartner market share databases. Over the last five years this group has become a bit more concentrated among the smaller companies. It includes the Chinese design activities of 16 of the top 25 multinational semiconductor companies and 17 of the top 25 semiconductor-consuming OEM/ODMs. Thirty-four of the 100 largest, eleven of the middle 100 and forty of the remaining 95 smaller multinational semiconductor companies have design activities in China.

According to an analysis PwC did of the top 280 multinational (MNC) semiconductor companies (not including any Chinese companies) we identified:

- 85 MNC semiconductor companies that have design facilities in China;

Figure 17: Number of IC design enterprises in China, 1990–2011

<table>
<thead>
<tr>
<th>Year</th>
<th>IC design enterprises</th>
</tr>
</thead>
<tbody>
<tr>
<td>2011</td>
<td>503</td>
</tr>
<tr>
<td>2010</td>
<td>485</td>
</tr>
<tr>
<td>2009</td>
<td>472</td>
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<tr>
<td>2008</td>
<td>483</td>
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<td>2006</td>
<td>488</td>
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<td>32</td>
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</tr>
<tr>
<td>1991</td>
<td>17</td>
</tr>
<tr>
<td>1990</td>
<td>15</td>
</tr>
</tbody>
</table>

Source: CCID
84 MNC semiconductor companies that have R&D facilities in China (of which 14 have design facilities in China as well) and

155 MNC semiconductor companies that have either/or design and/or R&D facilities in China.

In addition PwC did a similar analysis of the top 100 semiconductor consuming OEM/ODM companies and identified:

- 74 MNC OEM/ODM companies that have design facilities in China;
- 45 MNC OEM/ODM companies that have R&D in China (of which 36 have design facilities in China as well) and
- 83 MNC OEM/ODM companies that have either/or design and/or R&D facilities in China.

Combining the two analyses of MNC semiconductor companies and OEM/ODM companies we could conclude that:

- 238 MNC semiconductor or OEM/ODM companies that have either/or Design and/or R&D facilities in China.

The reasons for these multinational design and R&D activities in China are many and include:

- Protecting long-term local market share by demonstrating participation in the country’s technology growth initiatives;
- Servicing large Chinese OEMs that are addressing the worldwide market;
- Developing products for the unique and specific standards and requirements of the Chinese market;
- Developing and utilizing China’s large pool of lower cost talent;
- Participating in the government’s economic stimulus and other long-term infrastructure development initiatives and
- Qualifying for NHTE (new and high tech enterprise) status tax incentives.

Many MNC semiconductor companies are investing heavily in their design activities in China which will inevitably provide designs and services in the local market and will compete directly with the local indigenous IC design companies for market and resources. They are viewed by some authorities as posing a challenge to proprietary IC IPR (intellectual property rights) in the country.

Mobile devices have become the major products for China’s IC design industry during the last two years. Companies in the communications sector, particularly smart phones, achieved rapid growth in revenue and size while those in the IC card sector experienced a relative decline. As a result, there has been a significant change in the make-up of China’s top 10 IC design companies. Companies involved in mobile device design—Spreadtrum, RDA, Galaxycore, ZTE Microelectronics and Leadcore—made the top 10 list, while IC chip companies including CEC Huada, Wuxi China Resources Semico, Datang Microelectronics and Beijing Tongfang Microelectronics fell in rank or dropped off the list.

Companies in the communications sector, particularly smart phones, achieved rapid growth in revenue and size while those in the IC card sector experienced a relative decline.
Design employees

Employment growth in China’s IC design sector moderated in 2011. As previously noted, during the past year, the number of reported IC design enterprises in China increased by 4%, to 503. The total number of employees in the IC design sector increased by 9%, to about 110,000. As a result, the increase in the employee density among China’s IC design enterprises continued in 2011. The number of IC design enterprises with more than 500 employees increased by 23% to 32. The number of enterprises with more than 100 employees increased by 7% or 15 enterprises, while the number with less than 100 employees increased by just 1% or three enterprises. Similarly, by the end of 2011, less than 21% of China’s IC design enterprises had less than 50 employees, which is a further reduction from the more than 40% that had been reported at the end of 2009.

This moderate increase in employee density, coupled with a much greater increase in revenues, resulted in improved sales per employee productivity for the IC design sector. During 2011, the average sales per employee for China’s IC design sector increased by almost 25%, from $55,000 in 2010 to $69,000. By comparison, although it decreased by 3%, the average sales per employee of the 168 worldwide fabless semiconductor companies reported in the Global Semiconductor Alliance (GSA) Global Financials Report for 2011 was $525,000. Part of the large difference between these two productivity measures may be the result of the different population of companies being reported upon. The GSA report covers only public fabless companies, which are relatively larger, established and profitable companies. It does not include any of the other thousand start-up and pre-IPO fabless companies. By contrast, the vast majority of China’s reported 503 IC design com-
The average 2011 sales per employee of those nine Chinese fabless companies was $418,000, which is about 80% of the GSA report worldwide average.

A more relevant comparison may be made with just the nine Chinese fabless companies that are included in the GSA report. The average 2011 sales per employee of those nine Chinese fabless companies was $418,000, which is about 80% of the GSA report worldwide average. Of the nine Chinese IC design companies that were reported in the GSA’s Global Financials Report, only two—Spreadtrum Communications with 670 employees and RDA Microelectronics with 350 employees—exceeded the worldwide average, reporting 2011 sales per employee of $1,006,000 and $825,000 respectively. One other, Hangzhou Silan Microelectronics, with 560 employees, improved their sales per employee to $435,000 in 2011, up from $331,000 in 2010. The other six were lower and diverse: Shanghai Fudan Microelectronics with 300 employees ($320,000); Vimicro with 324 employees ($228,000); Beijing Fuxing Xiaocheng Electronic Technology Stock Co., Ltd. with 307 employees ($154,000); Nationz Technologies Inc. with 612 employees ($148,000); Ingenic Semiconductors with 192 employees ($135,000) and Actions Semiconductor with 480 employees ($99,000).

**Design focus**

China’s IC design industry continued to achieve some reportable qualitative improvements during 2011. There was a modest migration of design capabilities to finer design line widths. According to CSIA and CCID, the number of design enterprises with design capabilities of equal to or less than 0.25 micron...
has increased to more than 43% of all enterprises, up from 41% in 2010. In particular, 53 of these enterprises had design capabilities for equal to or less than 90 nanometers, eight more than in 2010. At the same time, the percentage of IC design enterprises with legacy technologies greater than 1.0 micron has decreased, although their number increased by one.

Another change is that more Chinese IC design companies are licensing intellectual property cores and software developed by foreign IP providers. In a late 2011 report, EE Times noted that ARM has reached licensing deals with more than 34 Chinese companies for its Cortex processor and Mali graphics processor cores and that MIPS has more than 20 licensing agreements in China. That same report stated that 9% of the companies responding to their EE Times China 10th annual IC Design House Survey were mass producing digital ICs using 45nm or below process technologies. Similarly, 23% and 28% of respondent companies were using 0.13μm process technologies to make analog and mixed signal ICs.

Also, Chinese IC design companies now have access to finer process technology nodes at foundries outside of Mainland China such as TSMC in Taiwan. EE Times also reported that 63% of respondent companies used foundries in Taiwan in 2011 compared with 57% in 2010, while 19% and 15% indicated that SMIC and CSMC were their best suited foundries. It is believed that the Chinese stimulus package has helped

**Design industry outlook**

We may have to wait for history to validate whether 2011 did in fact represent the expected turning point in the development of the Chinese semiconductor industry and of its IC design industry in particular. Although the absolute RMB growth achieved by the IC design industry in 2011 was slightly less than that forecast by CCID at the start of the year, the absolute dollar growth and growth rate of 36.3% were both greater than that attained in the 2010 recovery year. Further, in 2011 China reported its first billion dollar IC design company, HiSilicon Technologies, and two of the worldwide top five fastest growing IC design companies, Spreadtrum Communications and RDA Microelectronics. In addition to economic stimulus packages funded by state and provincial governments in response to the global financial crises, this transition has been driven by the following factors:

- China’s push for the adoption of a TD-LTE wireless specification plus other domestic standards;
- China’s IC design companies leveraging a range of intellectual property cores from foreign suppliers;

Further, in 2011 China reported its first billion dollar IC design company, HiSilicon Technologies, and two of the worldwide top five fastest growing IC design companies, Spreadtrum Communications and RDA Microelectronics.
Chinese system and IC design companies success in aggressively capturing the market for the flood of Android-based products sweeping the global mobile and consumer markets; and

TSMC’s provision of advanced semiconductor processes previously unavailable to companies headquartered in Mainland China.

c. the continuing improvement of cost and performance from growing design skill experience and the adoption of advanced process technologies;

d. an ability to respond to the consumer market’s need for very short cycle time and volume flexibility;

e. an ability to survive on lower gross margins; and

By the end of 2011, 29 Chinese semiconductor companies had become publicly listed companies for a combined IPO funding of more than $4.8 billion, including 11 IC design companies for a combined IPO funding of $1.2 billion.

Furthermore, the wealth effect created by listing on the GEM (Global Enterprise Board) or other local financial markets has attracted more and more start-up funds and talent into China’s IC design industry. By the end of 2011, 29 Chinese semiconductor companies had become publicly listed companies for a combined IPO funding of more than $4.8 billion, including 11 IC design companies for a combined IPO funding of $1.2 billion.

There are several factors that support the continuing realization of this transition for China’s IC design sector into a significant worldwide fabless semiconductor participant including:

a. the growth of China’s local electronic equipment manufacturers in both the domestic and worldwide (especially developing countries) market place, creating more opportunities for local fabless semiconductor suppliers;

b. the increasing need for IT infrastructure from government and state-owned enterprises, creating more demand for state-owned fabless semiconductor suppliers;

c. the continuing improvement of cost and performance from growing design skill experience and the adoption of advanced process technologies;

d. an ability to respond to the consumer market’s need for very short cycle time and volume flexibility;

e. an ability to survive on lower gross margins; and

f. a favorable government industrial policy environment.

There are also some factors that could hinder this transition including:

a. the pressing local and international economic environment with appreciation of the RMB, rising costs in raw materials and labor, changing domestic credit policy and uncertain international economic situation;

b. the increasingly fierce competition from the international industry as overseas-funded enterprises have occupied a dominant position in China’s IC industry with a share of more than 80% which affects the development of local enterprises;

c. a domestic IC industry supply chain that is severely disconnected, with more than 80% of products for domestic consumption relying on imports, while nearly 80% of domestic products are for export, a situation encouraged by the export refund of the 17% value-added tax that is imposed on domestic sales;
d. narrow or limited product offerings in leading technologies as most companies have focused on the low-end and low average selling price (ASP) market with just a follower strategy;

e. a limited design service and business engagement with MNC tier 1 electronic equipment manufacturers due to limitations in technology and operations; and

f. a narrow business vision and market scope that increases vulnerability to sustainable developmental risk.

As noted above, at the end of 2011 there were reported to be more than 500 IC design enterprises in China. International and local venture capitalists and private equity have been injecting funding through IPPs and M&A deals. The new State Council Document No. 4 issued in January 2011 has made it clear that encouragement will be given for financing activities in a number of ways, including investment from within the central government budget, industrial investment funds, bank loans and enterprise self-raised funds. With the encouragement given to newly established IC design companies by the No. 4 document, authorities expect China will have another wave of start-up IC design companies in the next couple of years and a rapid increase in the total number of IC design enterprises. For this reason, CCID’s current forecast is for China’s IC design sector industry to grow by a 22.4% CAGR over the next three years to reach $14 billion by 2014. If this forecast is realized, China’s IC design sector would represent almost 14% of worldwide fabless semiconductor revenues and about 4.2% of the worldwide IC market.

**Chinese semiconductor companies**

Table 4 lists the top 50 Chinese semiconductor companies that had the largest revenues in 2011. By definition, the companies on the list are the largest indigenous Chinese companies that design, manufacture (or have manufactured, the legal term for outsourcing), market and sell semiconductor devices. Therefore, neither foundries nor packaging and testing companies are included on the list. They, along with foreign semiconductor companies manufacturing in China, are included in Table 10.

The threshold for inclusion in this 2011 listing has increased to US$44 million up from the US$30 million threshold used since the 2007 list. The number of companies qualifying in 2011 increased to the maximum of 50 from 43 on the 2010 list. Thirty-nine of the same companies qualified, although many changed their relative ranking in 2011. Two companies were dropped from the list due to declining revenues: Ingenic Semiconductor Co. Ltd., which reported a 22% reduction and Beijing Sigma Jinghua Microelectronics which reported a 6% reduction in revenues in 2011. Two other companies, Beijing Huahong IC Design Co. and Jinan Jingheng Co., Ltd., failed to meet the higher revenue threshold for inclusion despite reporting revenue increases of 8% and 6% and were also dropped from the list. Eleven new companies, **The new State Council Document No. 4 issued in January 2011 has made it clear that encouragement will be given for financing activities in a number of ways, including investment from within the central government budget, industrial investment funds, bank loans and enterprise self-raised funds.**
### Table 4: Major Chinese semiconductor companies by revenue, 2011

<table>
<thead>
<tr>
<th>Name of company</th>
<th>Rank</th>
<th>Sales revenue (RMB:100M)</th>
<th>$</th>
<th>Sector</th>
<th>Sales revenue (US$M)</th>
<th>$</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>HiSilicon Technologies Co., Ltd.</td>
<td>1</td>
<td>1</td>
<td>44.16</td>
<td>66.68</td>
<td>51.0%</td>
<td>652</td>
<td>1032</td>
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<tr>
<td>Spreadtrum Communications Inc.</td>
<td>2</td>
<td>2</td>
<td>25.00</td>
<td>42.88</td>
<td>71.5%</td>
<td>260</td>
<td>663</td>
</tr>
<tr>
<td>RDA Microelectronics, Inc.</td>
<td>3</td>
<td>3</td>
<td>12.61</td>
<td>18.19</td>
<td>42.0%</td>
<td>189</td>
<td>281</td>
</tr>
<tr>
<td>Sanan Optoelectronics</td>
<td>4</td>
<td>4</td>
<td>8.63</td>
<td>17.47</td>
<td>102.4%</td>
<td>128</td>
<td>270</td>
</tr>
<tr>
<td>No. 55 Research Institute of China Electronics Group</td>
<td>5</td>
<td>5</td>
<td>8.11</td>
<td>16.24</td>
<td>100.3%</td>
<td>120</td>
<td>251</td>
</tr>
<tr>
<td>Hangzhou Silian Microelectronics Co., Ltd.</td>
<td>6</td>
<td>6</td>
<td>10.03</td>
<td>13.30</td>
<td>32.6%</td>
<td>123</td>
<td>206</td>
</tr>
<tr>
<td>Tianjin ZhongHuan Semiconductor Co., Ltd.</td>
<td>7</td>
<td>7</td>
<td>7.70</td>
<td>12.60</td>
<td>63.6%</td>
<td>114</td>
<td>195</td>
</tr>
<tr>
<td>Galaxycore Inc.</td>
<td>8</td>
<td>8</td>
<td>8.40</td>
<td>11.68</td>
<td>39.0%</td>
<td>124</td>
<td>181</td>
</tr>
<tr>
<td>Shenzhen State Microelectronics Co., Ltd (SSMEC)</td>
<td>9</td>
<td>9</td>
<td>4.13</td>
<td>10.40</td>
<td>33.0%</td>
<td>116</td>
<td>161</td>
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<tr>
<td>MLS Co., Ltd.</td>
<td>10</td>
<td>10</td>
<td>10.00</td>
<td>11.00</td>
<td>10.0%</td>
<td>148</td>
<td>170</td>
</tr>
<tr>
<td>Foshan Nationstar Optoelectronics</td>
<td>11</td>
<td>11</td>
<td>7.82</td>
<td>10.40</td>
<td>33.0%</td>
<td>116</td>
<td>161</td>
</tr>
<tr>
<td>Leadcore Technology Co., Ltd.</td>
<td>12</td>
<td>12</td>
<td>8.15</td>
<td>10.20</td>
<td>25.2%</td>
<td>120</td>
<td>158</td>
</tr>
<tr>
<td>Elec-Tech International Co., Ltd.</td>
<td>13</td>
<td>13</td>
<td>3.90</td>
<td>4.99</td>
<td>62.9%</td>
<td>91</td>
<td>127</td>
</tr>
<tr>
<td>BCD Semiconductor Manufacturing Ltd.</td>
<td>14</td>
<td>14</td>
<td>5.91</td>
<td>7.89</td>
<td>33.0%</td>
<td>82</td>
<td>101</td>
</tr>
<tr>
<td>Wuxi China Resources Huajian Microelectronics Co., Ltd.</td>
<td>15</td>
<td>15</td>
<td>11.00</td>
<td>11.00</td>
<td>10.0%</td>
<td>163</td>
<td>139</td>
</tr>
<tr>
<td>Suzhou Good-Ark Electronics Co., Ltd.</td>
<td>16</td>
<td>16</td>
<td>8.33</td>
<td>8.36</td>
<td>0.4%</td>
<td>123</td>
<td>129</td>
</tr>
<tr>
<td>CEC Huada Electronics Design Co., Ltd. (HED)</td>
<td>17</td>
<td>17</td>
<td>5.01</td>
<td>8.24</td>
<td>64.5%</td>
<td>74</td>
<td>127</td>
</tr>
<tr>
<td>Wuxi China Resources Semico, Ltd.</td>
<td>18</td>
<td>18</td>
<td>6.17</td>
<td>8.04</td>
<td>30.2%</td>
<td>91</td>
<td>124</td>
</tr>
<tr>
<td>Changzhou Galaxy Electrical Co., Ltd.</td>
<td>19</td>
<td>19</td>
<td>8.00</td>
<td>7.55</td>
<td>-6.3%</td>
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<td>116</td>
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<td>ShenZhen Si Semiconductor Co., Ltd.</td>
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<td>11.00</td>
<td>8.45</td>
<td>-23.2%</td>
<td>163</td>
<td>131</td>
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<td>21</td>
<td>8.33</td>
<td>8.36</td>
<td>0.4%</td>
<td>123</td>
<td>129</td>
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<td>Fuzhou Rockchip Electronics Co., Ltd.</td>
<td>22</td>
<td>22</td>
<td>5.55</td>
<td>6.33</td>
<td>14.1%</td>
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<td>Datang Microelectronics Technology Co., Ltd.</td>
<td>23</td>
<td>23</td>
<td>6.14</td>
<td>6.24</td>
<td>1.6%</td>
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<td>97</td>
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<td>24</td>
<td>24</td>
<td>5.96</td>
<td>6.10</td>
<td>2.6%</td>
<td>91</td>
<td>97</td>
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<td>25</td>
<td>5.01</td>
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<td>64.5%</td>
<td>74</td>
<td>127</td>
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<tr>
<td>Shenzhen Netcom Electronic Co., Ltd.</td>
<td>26</td>
<td>26</td>
<td>6.17</td>
<td>8.04</td>
<td>30.2%</td>
<td>91</td>
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<tr>
<td>Shanghai Belling</td>
<td>27</td>
<td>27</td>
<td>8.00</td>
<td>7.55</td>
<td>-6.3%</td>
<td>118</td>
<td>116</td>
</tr>
<tr>
<td>Nationz Technologies Inc.</td>
<td>28</td>
<td>28</td>
<td>5.86</td>
<td>6.02</td>
<td>2.7%</td>
<td>97</td>
<td>93</td>
</tr>
<tr>
<td>Guangzhou Hongli Optoelectronics</td>
<td>29</td>
<td>29</td>
<td>7.02</td>
<td>5.69</td>
<td>-19.0%</td>
<td>104</td>
<td>88</td>
</tr>
<tr>
<td>Foshan Blue Rocket Electronics Co., Ltd.</td>
<td>30</td>
<td>30</td>
<td>4.38</td>
<td>5.50</td>
<td>25.6%</td>
<td>65</td>
<td>85</td>
</tr>
<tr>
<td>NingBo Hualong Electronics Co., Ltd.</td>
<td>31</td>
<td>31</td>
<td>4.51</td>
<td>5.38</td>
<td>19.3%</td>
<td>67</td>
<td>83</td>
</tr>
<tr>
<td>Beijing Huadazhibao Electronic Systems Co., Ltd.</td>
<td>32</td>
<td>32</td>
<td>5.03</td>
<td>5.20</td>
<td>3.3%</td>
<td>74</td>
<td>80</td>
</tr>
<tr>
<td>Beijing Weico Inc.</td>
<td>33</td>
<td>33</td>
<td>3.72</td>
<td>4.84</td>
<td>30.2%</td>
<td>55</td>
<td>75</td>
</tr>
<tr>
<td>Jiangsu Wennrun Optoelectronics</td>
<td>34</td>
<td>34</td>
<td>4.20</td>
<td>4.20</td>
<td>0.0%</td>
<td>65</td>
<td>65</td>
</tr>
<tr>
<td>Xi’an Microelectronics Technology Institute</td>
<td>35</td>
<td>35</td>
<td>3.86</td>
<td>4.20</td>
<td>8.9%</td>
<td>57</td>
<td>65</td>
</tr>
</tbody>
</table>

- **IC Design**
- **Discrete**
- **Discrete (LED)**
- **Foundry**
- **IDM**
including ten discrete/LED plus one IC design company, were added to the list: Sanan Optoelectronics; MLS Co., Ltd.; Foshan Nationstar Optoelectronics; Elec-Tech International Co., Ltd.; Shandong Inspur Huaguang Optoelectronics Co. Ltd.; Guangzhou Hongli Optoelectronics; Jiangsu Wenrun Optoelectronics; Wuhan HC Semitek Co. Ltd.; Changelight Co., Ltd.; Epilight Technology Co., Ltd.; and Beijing Fuxing Xiaocheng Electronics Technology Stock Co. At least nine of these eleven new companies, eight discrete/LED plus the one IC design company, are companies that had qualified for listing in 2010 but were overlooked.

The top two of the five largest companies—HiSilicon Technologies, and Spreadtrum Communications—reained their first and second rankings and the third company, RDA Microelectronics, moved from number 4 in 2010 to number 3. Five other companies improved their rankings, one other company retained its rank and 30 companies lost rank position. One company, Tianjin ZhongHuan Semiconductor Co., Ltd., had been previously incorrectly ranked based upon reported revenues that included other than semiconductor device revenues.

Together these top 50 companies constituted 55% of China’s IC design sector, 12% of China's discrete sector and 9% of China's IC chip manufacturing sector.

This group of major Chinese semiconductor companies continues to report superior performance. Overall, these 50 companies reported an average 39% increase in dollar revenues during 2011, which is better than the 14% increase reported for China’s overall semiconductor industry and notably better than the 0.4% increase reported for the worldwide semiconductor industry. As a result, these 50 companies accounted for 36% of China’s semiconductor industry growth and for 16% of China’s semiconductor industry revenues in 2011, up from 12% in 2010. There were four of these Chinese companies whose revenues more than doubled in

---

**Table:**

<table>
<thead>
<tr>
<th>Name of company</th>
<th>Rank 2010</th>
<th>Sales revenue (RMB:100M) 2010</th>
<th>Rank 2011</th>
<th>Sales revenue (RMB:100M) 2011</th>
<th>Change 2010</th>
<th>Sector 2010</th>
<th>Sector 2011</th>
<th>Change</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wuhan HC Semitek Co., Ltd.</td>
<td>38</td>
<td>3.51</td>
<td>39</td>
<td>3.98</td>
<td>13.4%</td>
<td>▼</td>
<td>52</td>
<td>62</td>
</tr>
<tr>
<td>Changelight Co., Ltd</td>
<td>38</td>
<td>2.97</td>
<td>37</td>
<td>3.77</td>
<td>26.8%</td>
<td>▲</td>
<td>44</td>
<td>58</td>
</tr>
<tr>
<td>Shantou Huashan Electronic Device Co., Ltd.</td>
<td>26</td>
<td>4.83</td>
<td>40</td>
<td>3.73</td>
<td>-22.9%</td>
<td>▲</td>
<td>71</td>
<td>58</td>
</tr>
<tr>
<td>Forward Semiconductor Company</td>
<td>35</td>
<td>3.31</td>
<td>41</td>
<td>3.49</td>
<td>5.4%</td>
<td>▲</td>
<td>49</td>
<td>54</td>
</tr>
<tr>
<td>Tongfang Microelectronics Company</td>
<td>33</td>
<td>3.44</td>
<td>42</td>
<td>3.42</td>
<td>-0.7%</td>
<td>●</td>
<td>51</td>
<td>53</td>
</tr>
<tr>
<td>Hangzhou Silian Azure Co., Ltd.</td>
<td>30</td>
<td>3.93</td>
<td>43</td>
<td>3.41</td>
<td>-13.2%</td>
<td>▲</td>
<td>58</td>
<td>53</td>
</tr>
<tr>
<td>Yangzhou JingLai Semiconductor (Group) Co., Ltd.</td>
<td>36</td>
<td>3.23</td>
<td>44</td>
<td>3.40</td>
<td>5.3%</td>
<td>▲</td>
<td>48</td>
<td>53</td>
</tr>
<tr>
<td>Chendu Sino Microelectronics Systems Co., Ltd.</td>
<td>34</td>
<td>3.32</td>
<td>45</td>
<td>3.17</td>
<td>-4.5%</td>
<td>●</td>
<td>49</td>
<td>49</td>
</tr>
<tr>
<td>China Electronics Technology Group Corporation No. 58 Institute</td>
<td>37</td>
<td>2.92</td>
<td>46</td>
<td>3.07</td>
<td>5.2%</td>
<td>▲</td>
<td>43</td>
<td>47</td>
</tr>
<tr>
<td>Hangzhou Youwang Electronics Co., Ltd.</td>
<td>38</td>
<td>2.85</td>
<td>48</td>
<td>2.99</td>
<td>5.0%</td>
<td>●</td>
<td>42</td>
<td>46</td>
</tr>
<tr>
<td>Actions Semiconductor Co., Ltd.</td>
<td>40</td>
<td>2.45</td>
<td>49</td>
<td>2.96</td>
<td>20.6%</td>
<td>●</td>
<td>36</td>
<td>46</td>
</tr>
<tr>
<td>Shanghai Epilight Technology Co., Ltd</td>
<td>50</td>
<td>2.31</td>
<td>47</td>
<td>2.85</td>
<td>23.6%</td>
<td>▼</td>
<td>34</td>
<td>44</td>
</tr>
</tbody>
</table>

*Note 9 companies estimated based upon sectors’ average 2011 growth including 5 previously estimated based upon 2010 sector growth.

Source: CSIA, CCID, GSA, GDQ, PwC
Five of the eleven new companies on the list are from a group of 15 Chinese companies with LED wafer fabrication facilities that were in production by 2011, each with total investments of US$50 million or greater. The five are:

**Elec-Tech International Co., Ltd. (Elec-Tech)** was established in 1996 and is based in Zhuhai. It is mainly engaged in the design, production and sale of opto-electronics, including LED epitaxy, LED chips, encapsulation, LED lighting and LED display, SDA (Small Home Appliances), Mini & Particular Motor, and Wind Power Equipment in the People’s Republic of China and internationally. The company offers LED lighting products, which include commercial lighting products, such as panel, par, spot, down, table and retrofit lights, as well as fluorescent tubes and bulbs, outdoor lighting products comprising LED street and tunnel lights and decorative strip lighting products. The company exports its products primarily to North America, Europe, Australia, New Zealand, South America, Asia and Africa. The company was listed on the Shenzhen Stock Exchange in 2004, with the share code being 002005 and was one of the first eight enterprises listed out of the Small and Medium-sized Enterprise Board.

**Sanan Optoelectronics Co. Ltd.** engages in the research, development, production and sale of light emitting diode (LED) products primarily in central China. It is based in Xiamen, China. The company provides products in the categories of LED wafers, including aluminum-gallium-indium-phosphide (AlGaInP) series and gallium nitride series; LED chips, such as AlGaInP series, nickel-gold chips, indium tin oxide chips, and high power chips, as well as personal identification number photodiode chips, including high linearity incept chips and general incept chips. It also sells its products in the United States, the United Kingdom, Korea, Japan, India, Turkey, Malaysia, Singapore, Austria and Russia. The company was formerly known as Tianyi Science & Technology Co., Ltd.

**Xiamen Changelight Co., Ltd** was established in February 2006 as a high-tech enterprise specializing in research, development, production and sales of high-quality quaternary alloy AlGaInP of red, orange, yellow LED wafers, chips and high-performance GaAs solar cells. The company is located at the national level Torch Industrial Park (Xiang’an District, Xiamen) with high standard clean room facilities. It has introduced world-class, high-end equipment for manufacturing and testing from USA, Germany, Japan, UK, etc. It employs an efficient team composed of domestic and foreign experts with extensive industrial experience, and operates in strict compliance with the ISO9001 and ISO14000 Quality System Standards for the purpose of providing stable quality and high performance of the products. Changelight claims that its quaternary alloy AlGaInP LED epitaxial wafers and chips are leading-edge by virtue of their uniformity, consistency and reliability and have achieved the leading domestic level in scale, output and sales. They are widely applied in digital, dot matrix, full-color screen and traffic lights, etc. Furthermore, Changelight reports that its high-performance GaAs solar cell has reached the international advanced level. Changelight has obtained many patents and undertaken a number of R&D projects sponsored by the state and ministries. The company has always been devoted to researching, developing and producing green products with high quality; to providing customers with the most satisfactory products and services; and to moving forward to become an outstanding corporation in the opto-electrical industry.

**Epilight Technology Co., Ltd** was founded in April 2000 and was the first domestic Chinese enterprise to pioneer the research and manufacturing of gallium nitride-based blue light epitaxial wafers and chips. Located in Shanghai Zhangjiang National Hi-tech Park, Epilight was one of the technology transfer receivers to commercialize the achievements from China’s Optoelectronics Project of National High Technology Program (863 Plan). Their technology is based on the major technology achievements undertaken by Peking University as part of the 863 Plan. Epilight’s commercialization of the technology for gallium nitride-based high-brightness luminescent materials was identified as one of the national engineering demonstration projects for new materials by the National Development and Reform Commission as well as the Shanghai high-tech Transformation Project. Epilight has recruited many professional staff from the US and Taiwan. With first-class equipment, technologies and professional staff, and the company claims that it has advanced its technology and product quality to the international level. Their main products are gallium nitride-based high-brightness blue and green EPI wafers and LED chips.

**Shandong Huaguang Optoelectronics Co., Ltd.** is a hi-tech enterprise engaged in research, production and sale of compound semiconductor epitaxy material and optoelectronic devices. It was jointly established in November 1999 by Weifang Investment Co., Ltd. and Shandong University. Factories are set up in Jinan and Weifang, covering an area more than 200 mu (30 acres). The company offers products such as epitaxial wafers, optoelectronic devices, semiconductor light-emitting diodes (LEDs), commercial laser diode (LD) wafer, chips, devices and applications. Shandong Inspur Huaguang Optoelectronics Co., Ltd. is based in Weifang, China.
Beijing Fuxing Xiaocheng Electronic Technology Stock Company Limited was established in 2000 as a high-tech enterprise specializing in integrated circuit research and design. The company specializes in comprehensive and highly accurate automatic metering and monitoring solutions, including the automatic meter reading system, smart card prepayment systems, general packet radio service (multifunction meter monitoring systems) and data collection units, all based on pioneering technology. They manufacturer a series of super scale integrated circuits developed with independent intellectual property rights, such as the PL2000 series, PL3000 series etc. Most of their products supply a gap in the Chinese market, and some products keep ahead in the overseas market. Currently the company has been the biggest supplier for PLCC (Power Line Carrier Communication) modulation/demodulation special purpose ICs in China, with more than 70% of the domestic market in the PLCC meter reading field and has also sold products to Asian, African and European countries. They claim to supply good-performance integrated circuits for clients from electric power, water supply, gas supply and other industries as well as supplying intelligent system solutions with PLCC technology and accumulated practice for relevant industries. Their chips are used by nearly 50% of the Smart Grid in China and they have contributed much to China’s Smart Grid with the support of the Ministry of Industry and Information Technology, China Electric Power Research Institute and the National and State Electrical Grids Service. The company is “driven by the need to produce and supply long-lasting, quality, cost-effective products on demand; products that honor intellectual property rights and meld human innovation and creativity with cutting-edge, government-approved technology.”
of US$30 million or more. The 29 companies had an average 2005 revenue of US$47 million and together only accounted for 0.6% of the 2005 worldwide semiconductor industry revenues. Over the next six years, 32 more Chinese companies grew to be qualified with revenues of US$30 million or more and were added to the list, while 11 companies were dropped from the list. The 50 companies on this year’s list had average 2011 revenues of US$140 million and together accounted for 2.3% of worldwide semiconductor revenues, up from US$108 million and 1.6% in 2010. During the last six years, the number of Chinese semiconductor companies with revenues of US$30 million or greater has almost quadrupled from 14 to 55, their average revenue has nearly tripled from US$47 million to US$140 million and the revenue of the largest company on the list increased by more than 660%, from US$155 million to US$1,032 million.

Industry awareness of Chinese semiconductor companies continues to be slowly increasing. By definition, all 50 of these largest Chinese semiconductor companies should be included in the semiconductor market share reports compiled by industry analysts. However, only 22 of these companies were included in third-party research firm Gartner’s database entitled “Top Companies (ALL) Revenue from Shipments of Total Semiconductors—Worldwide (Millions of $US)” which ranked 295 companies by their 2011 revenues. Six of the top 10 were included, with the Chinese company with the largest 2011 revenue, HiSilicon Technologies, ranked 67th among worldwide semiconductor companies. According to Gartner, HiSilicon’s ranking among worldwide semiconductor companies has improved from 156 in 2007 to 108 in 2008 to 82 in 2010 and now to 67 in 2011. More than half of the largest Chinese semiconductor companies missing from the Gartner database continue to be discrete companies, including all five of the new LED wafer fabrication facilities, which is an indication of the industry’s general lack of awareness of the significance of China’s discrete semiconductor industry sector. The Gartner database did include three additional Chinese semiconductor companies with 2011 revenues less than US$30 million, for a total of 25 Chinese companies, which is six more than they included in their 2009, 2008 and 2007 databases of 270+ worldwide companies and an notable increase from the 15 out of 227 in their 2005 database.

Industry awareness of Chinese semiconductor companies is now also being hindered by what appears to be an increasing opacity on the part of the local Chinese industry associations and authorities. Individual company data for a number of previously reported companies is now missing from CSIA reports and their and other listings of top companies by industry sectors contain obvious omissions. As a result, the 2011 revenues for nine of the private companies included in our Table 4 had to be estimated based upon sector average growth rates. This is an increase from five companies for 2010 revenues and three companies for 2009 revenues. In addition, the new LED wafer fabrication segment seems to have been completely missed or ignored and as a result there could be some companies missing from our Table 4.

**Coming soon**

Check back at www.pwc.com/chinasemicon for our next chapter in this series coming in a few weeks. It will highlight the semiconductor industry and market in Greater China.

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If your company is facing challenges doing business in China, or you just want to have a deeper discussion about what’s happening in the market and how we can help, please reach out to one of the technology industry leaders listed below.

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