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Workshop **上海** Shanghai

October 21, 2015

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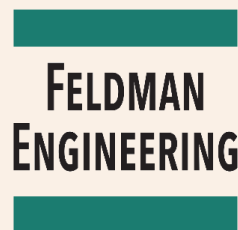
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Keynote
Address

BiTS Shanghai

China's Impact on the Semiconductor Industry

Ed Pausa

Director

Technology Center

PricewaterhouseCoopers

Keynote Address – Abstract & Biography



As Principal Author of PricewaterhouseCoopers' "China's Impact on the Semiconductor Industry – 2015 Update", Mr. Pausa will provide an overview of China and the global semiconductor market. In particular, he will cover why and how China's semiconductor consumption has grown to represent more than half of the worldwide market for the last three years. Even though China's semiconductor production has grown at a faster rate than consumption, China still only represents about 14% of worldwide output. What are the implications of China's ever-increasing integrated circuit (IC) consumption / production gap which reached a record \$120bn in 2014?

Mr. Pausa has been an author of this annual PricewaterhouseCoopers report for over a decade and has significant insight into the dynamics of the semiconductor market. The report is available at www.pwc.com/chinasemicon.

Ed Pausa has been associated with PricewaterhouseCoopers (PwC) for more than twenty years. An experienced multinational corporate executive, Mr. Pausa has more than 40 years of broad experience in the semiconductor industry. This includes 25 years' experience at the corporate officer level in all four segments of the industry: integrated device manufacturer, semiconductor equipment and materials, semiconductor manufacturing services, and fabless semiconductor. During his career he has directed 33 plants and subsidiary companies in 18 foreign countries and 11 plants in six states in the United States. In 1990 Mr. Pausa began his association with PwC when he started consulting with Coopers & Lybrand Managing Consulting Service after his retirement from National Semiconductor Corporation where he had served as Corporate Vice President of International Manufacturing and Services.

Mr. Pausa earned a Bachelor of Science Engineering with honors, a Master of Science in Metallurgy, and a graduate certificate in Business Management from the University of California at Berkeley. He holds the rank of Captain, United States Naval Reserve.

China's Impact on the Semiconductor Industry

Clements “Ed” Pausa
PricewaterhouseCoopers

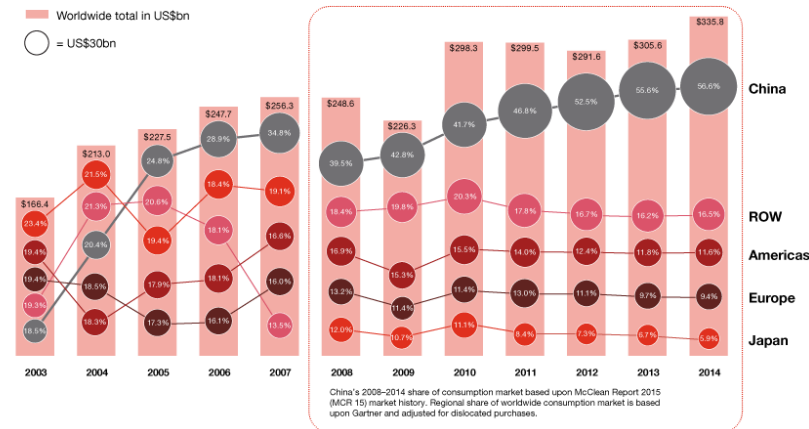


2015 BiTS Workshop
Shanghai
October 21, 2015



Worldwide Semiconductor Consumption Market by Region – 2003-2014

Worldwide semiconductor consumption market by region, 2003-2014



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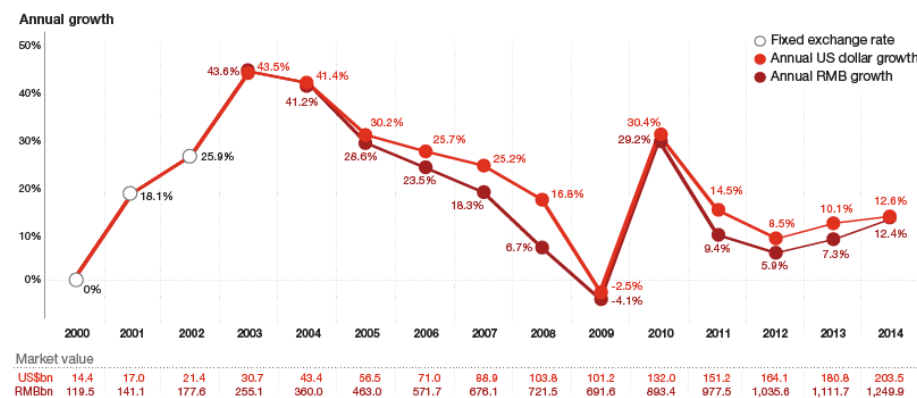
Source: Semiconductor Industry Association (SIA), McClean Report 2015 (MCR 15), Gartner Dataquest (GDQ), CCID Consulting (CCID)

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China's Semiconductor Market Growth—2000-2014

China's semiconductor market growth, 2000-2014



Note: Market reporting has changed since 2003 with sensors and optical semiconductors included as part of the optoelectronics-sensors-discrete (O-S-D) segment which along with integrated circuits make up the total semiconductor market.



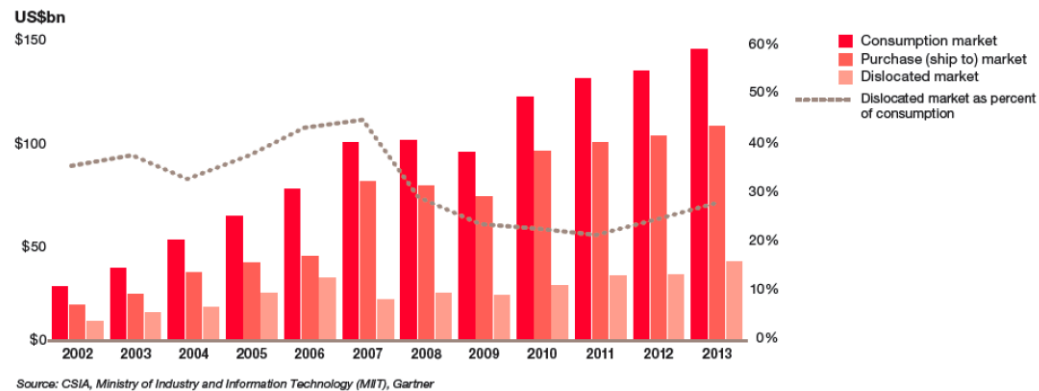
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Source: CCID Consulting (CCID), Semiconductor Industry Association (SIA)

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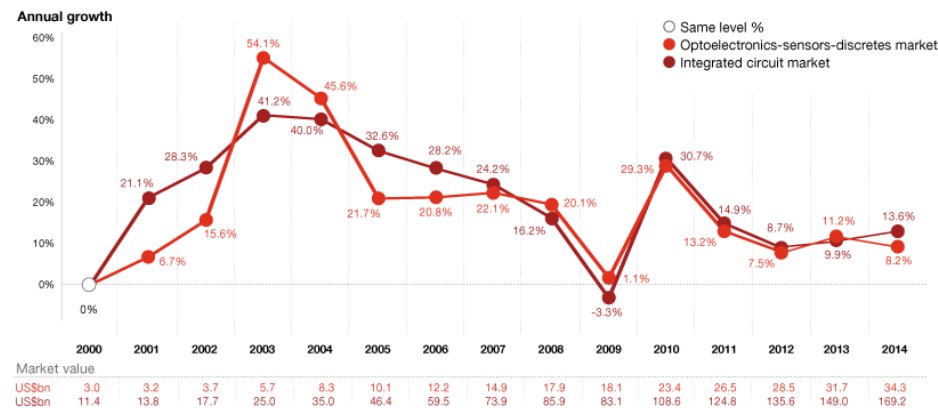
Analysis of China/Hong Kong Consumption vs. Purchasing TAM Semiconductor Market History



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China's IC and O-S-D Market Growth – 2000-2014

China's IC and O-S-D market growth, 2000-2014



Note: Market reporting has changed since 2003 and the definition of O-S-D (Optoelectronics-Sensors-Discretes) now includes sensors and optical semiconductors.



Source: CCID Consulting (CCID), Semiconductor Industry Association (SIA)

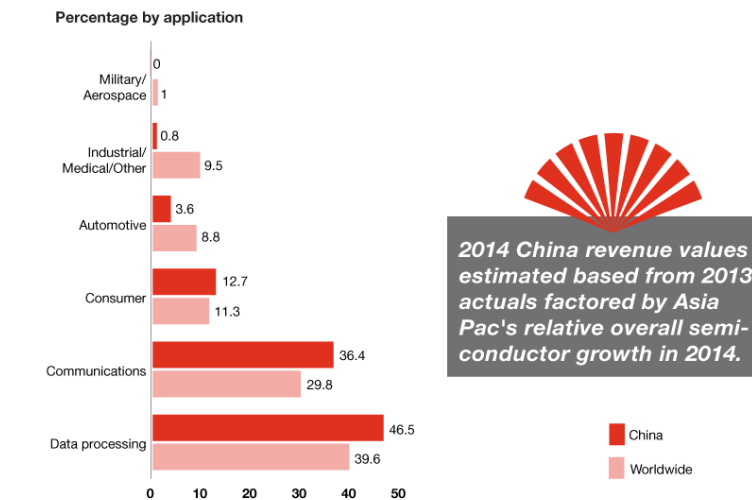
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China Compared with Worldwide Semiconductor Market by Application – 2014

China compared with worldwide semiconductor market by application, 2014



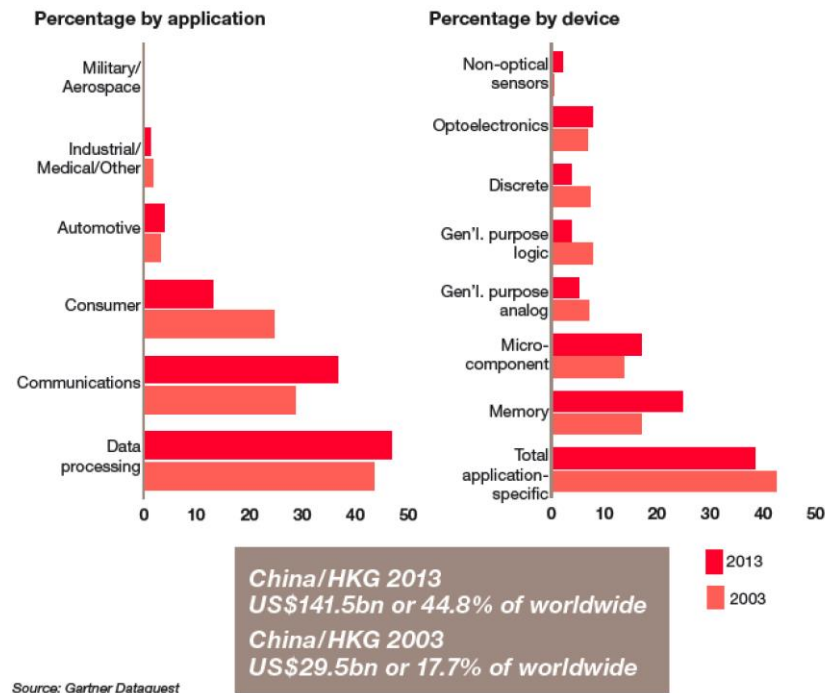
Source: Gartner Dataquest

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China Semiconductor Market by Application and Device – 2003-2013

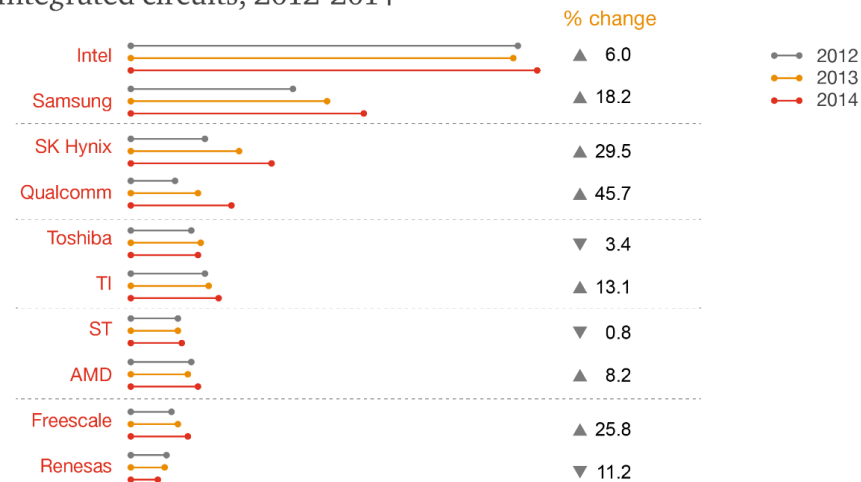


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Semiconductor Suppliers to the Chinese Market—2012-2014

Semiconductor suppliers to the Chinese market

Integrated circuits, 2012-2014



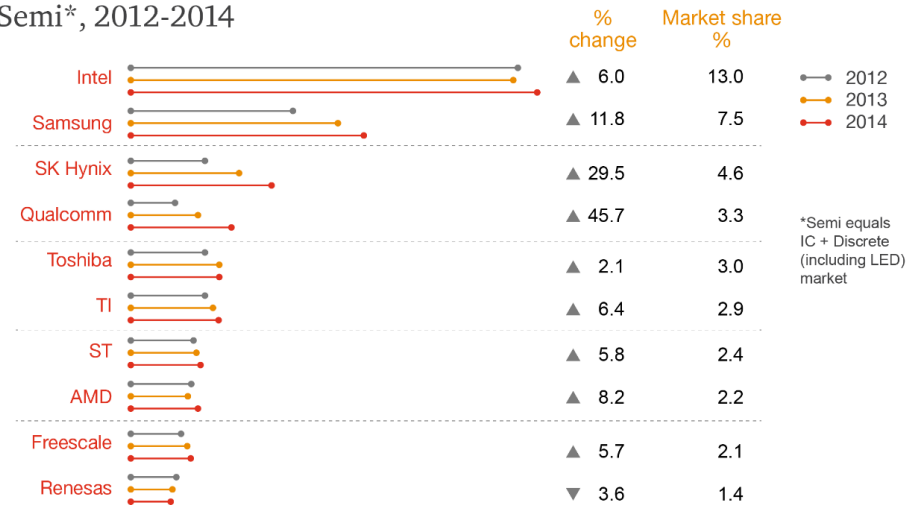
Source: CCID IC Market China 2013 & 2014 Conferences—Mar 2013 & Mar 2014

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Semiconductor Suppliers to the Chinese Market – 2012-2014

Semiconductor suppliers to the Chinese market

Semi*, 2012-2014

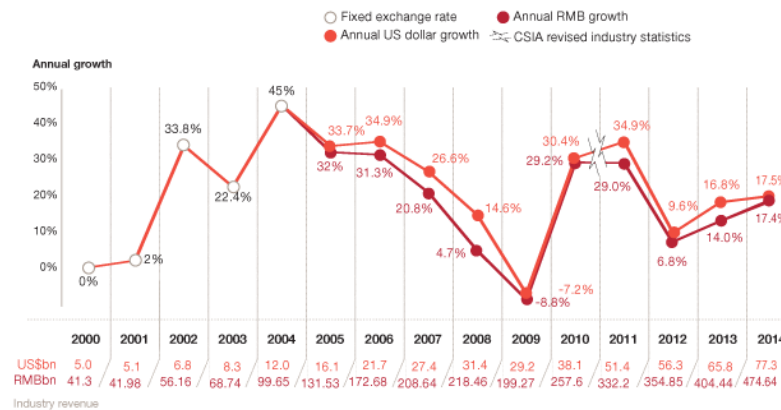


Source: CCID IC Market China 2013 & 2014 Conferences—Mar 2013 & Mar 2014

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China's Semiconductor Industry Revenue and Growth – 2000-2014

China's semiconductor industry revenue and growth 2000-2014



Source: CCID, CSIA

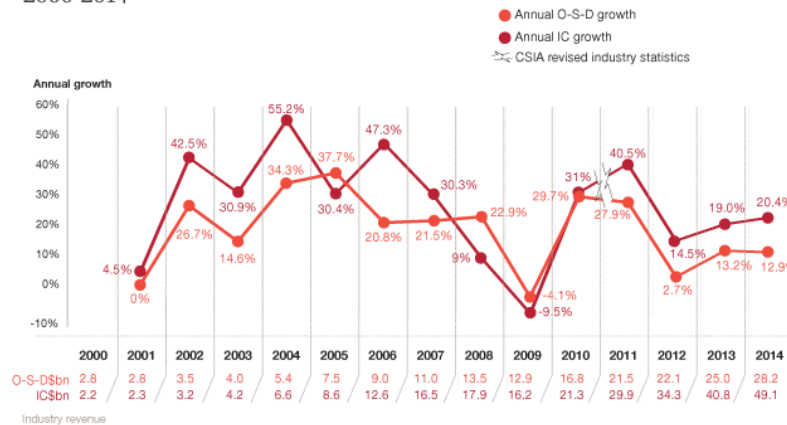
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China's O-S-D and IC Industry Revenue and Growth – 2000-2014

China's O-S-D and IC industry revenue and growth
2000-2014



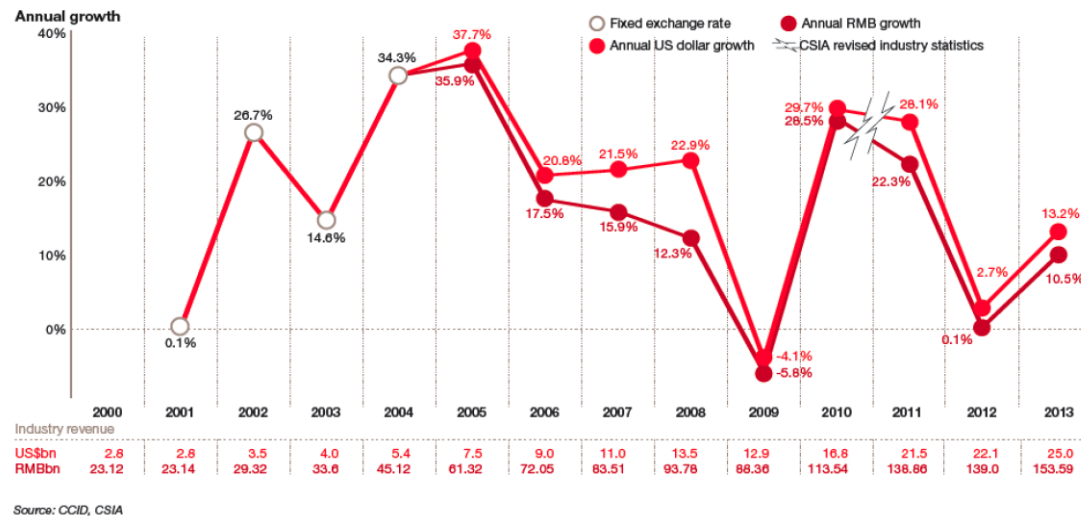
Source: CCID, CSIA

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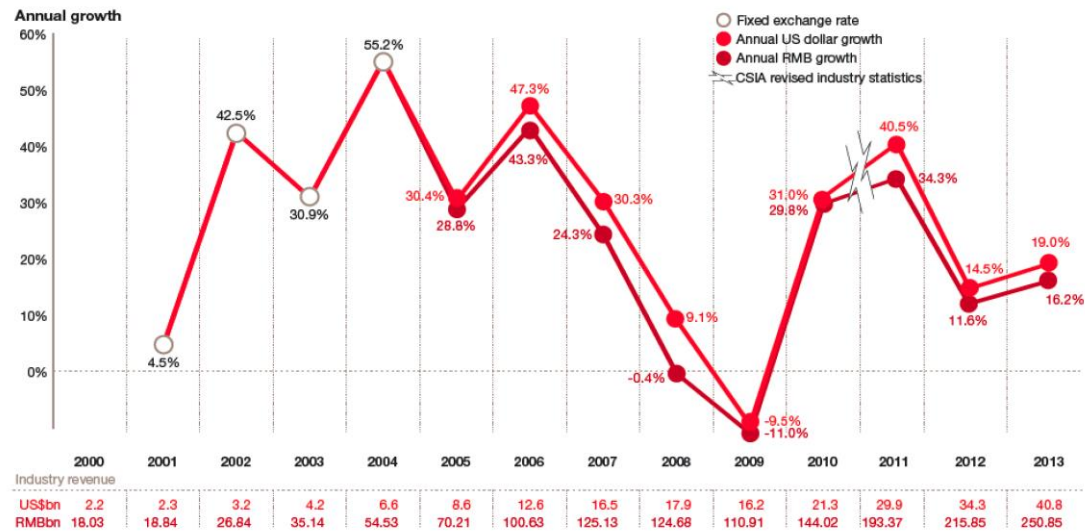
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China's O-S-D Industry Revenue and Growth – 2000-2013



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China's IC Industry Revenue and Growth – 2000-2013

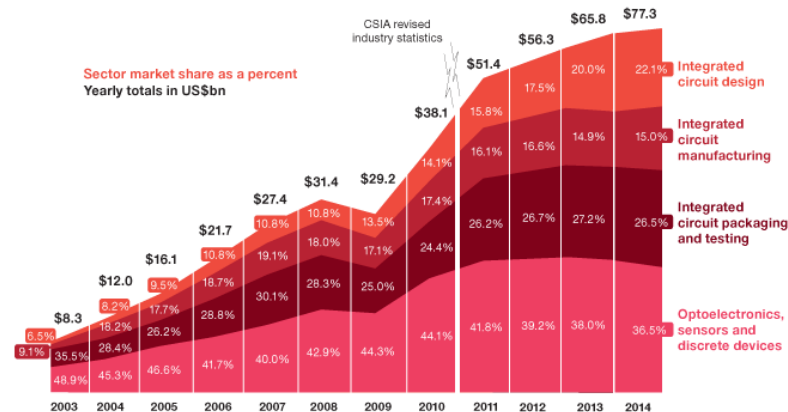


Source: CCID, CSIA

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China's Semiconductor Industry by Sector – 2003-2014

China's semiconductor industry by sector
2003-2014



Source: CCID, CSIA

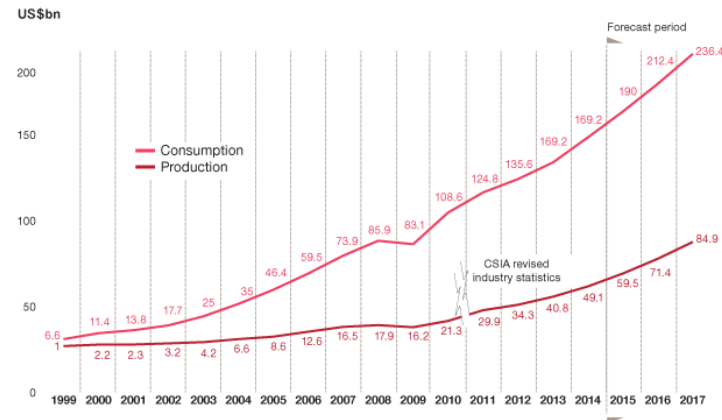
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Comparison of China's Integrated Circuit Consumption and Production – 1999-2017

Comparison of China's integrated circuit consumption and production 1999-2017



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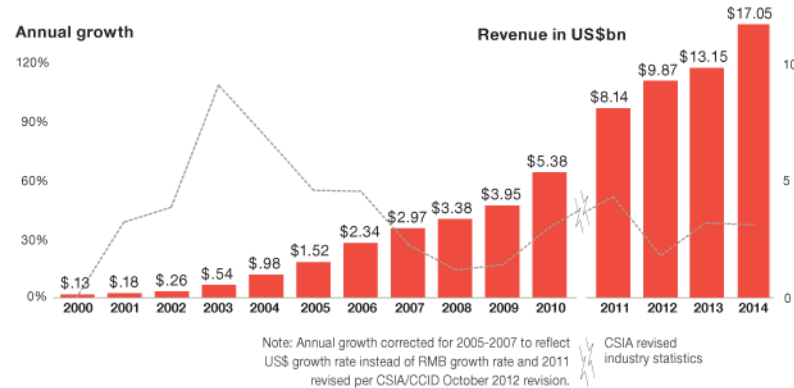
Note: Actual annual average FX rates used for 1999-2014 and 2014 average FX rate used for forecast 2015-2017
 Source: CCID, CISA, PwC 2004-2015.

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China's IC Design Industry Revenue and Growth – 2000-2014

China's IC design industry revenue and growth
2000-2014



Source: CCID, CSIA

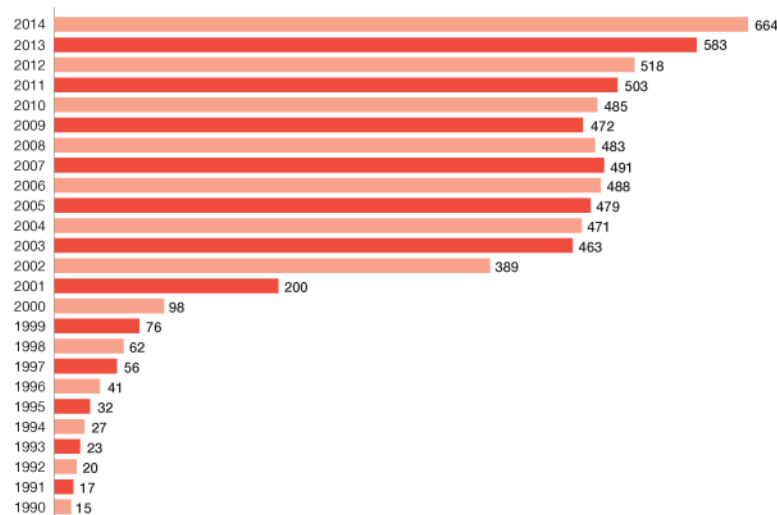
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IC Design Enterprises in China – 1990-2014

Number of IC design enterprises in China
1990-2014



Source: CCID, CSIA

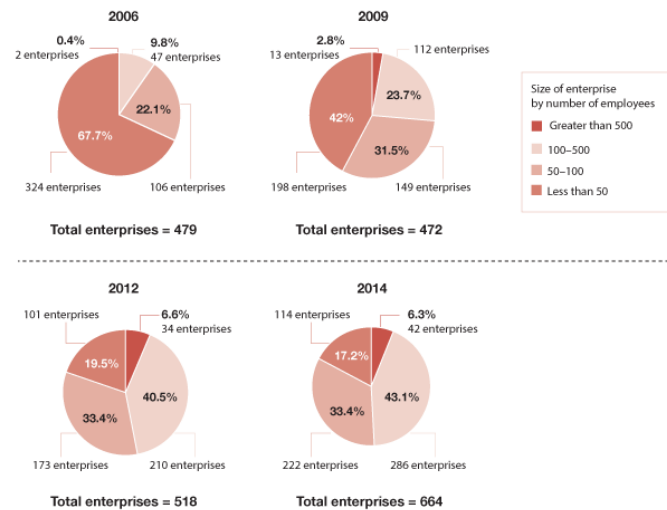
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China's IC Design Enterprises by Employee Count

China's IC Design Enterprises by Employee Count
2006-2014



Source: CCID

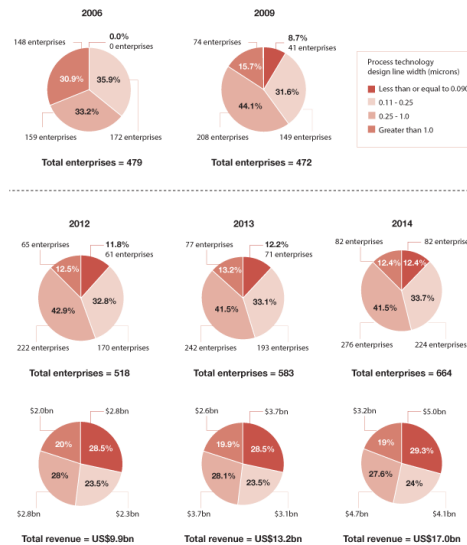
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China's IC Design Industry by Process Technology

China's IC Design Industry by Process Technology
2006-2014



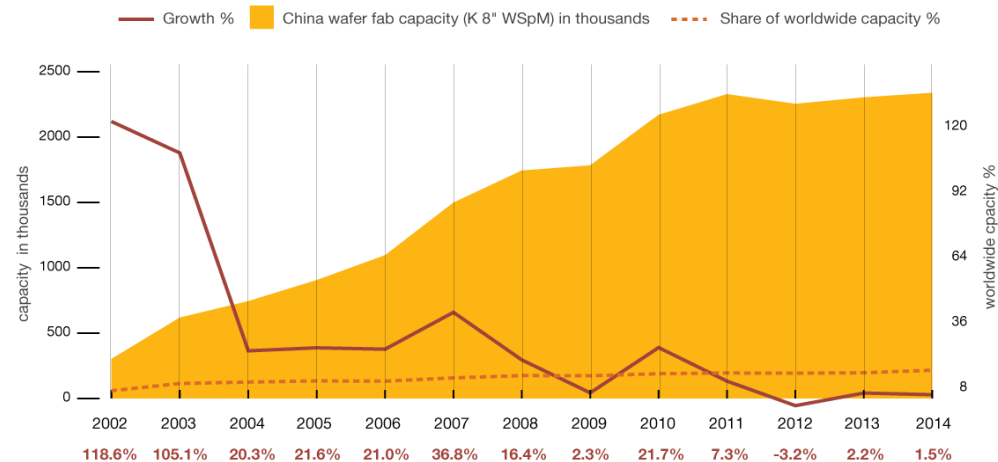
Source: CCID

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China's Wafer Fabrication Capacity and Share of Worldwide Capacity – 2002-2014

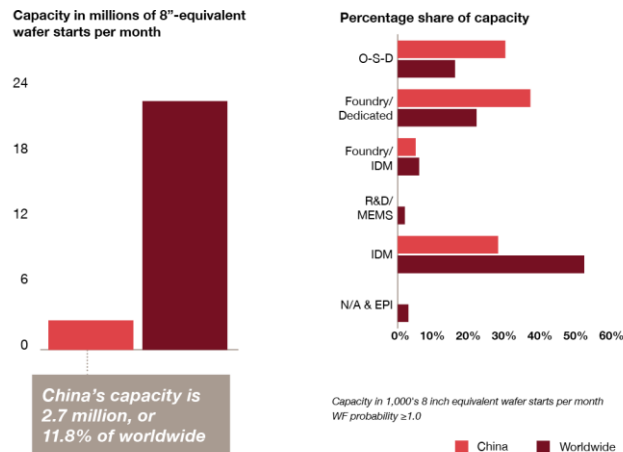


Source: World Fab Watch 2002-2015

Notes: Capacity is in thousands of 8-inch equivalent wafer starts per month/Fully ramped. This is the maximum number of wafers in wafers per month that could be started each month if the fab were fully equipped as defined in the fab design specifications and if the equipment were fully utilized.

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Current and Committed Wafer Fab Capacity Comparison, China and Worldwide, 2013



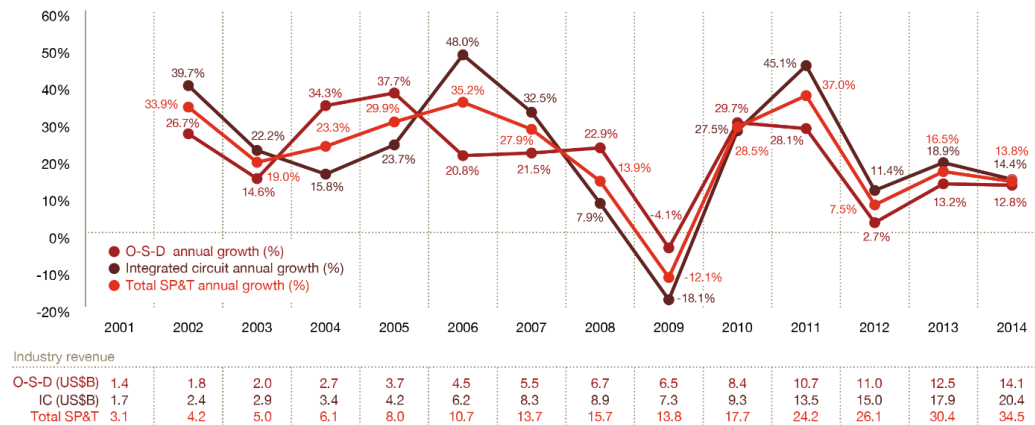
Source: SEMI Wafer Fab Watch, Feb. 2014

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China's Semiconductor Packaging & Testing Industry Revenue & Growth – 2000-2014

China's Semiconductor Packaging & Testing Industry Revenue and Growth, 2000-2014

Annual growth

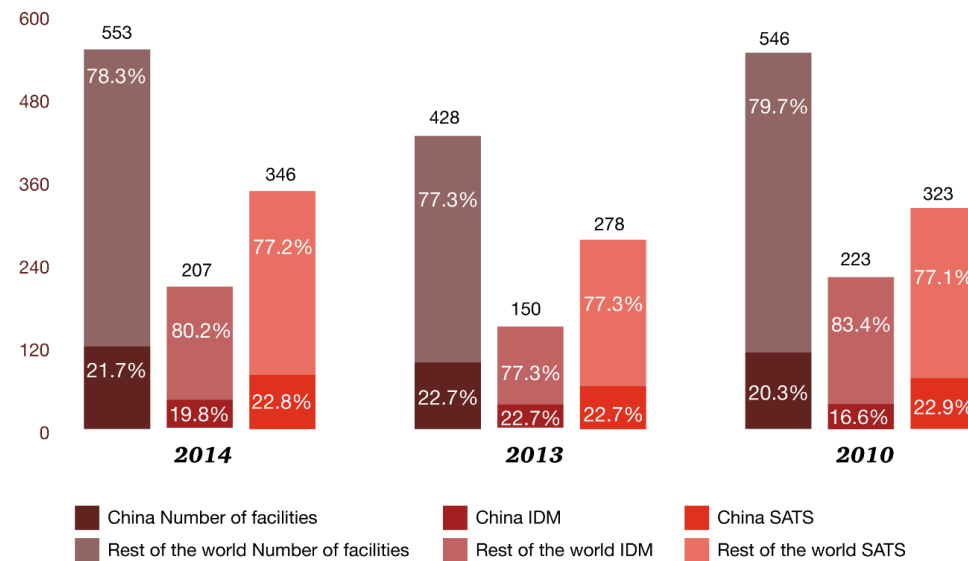


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China vs. Worldwide Semiconductor Packaging & Testing Capacity

China vs Worldwide Semiconductor Packaging & Testing Capacity

Number of facilities

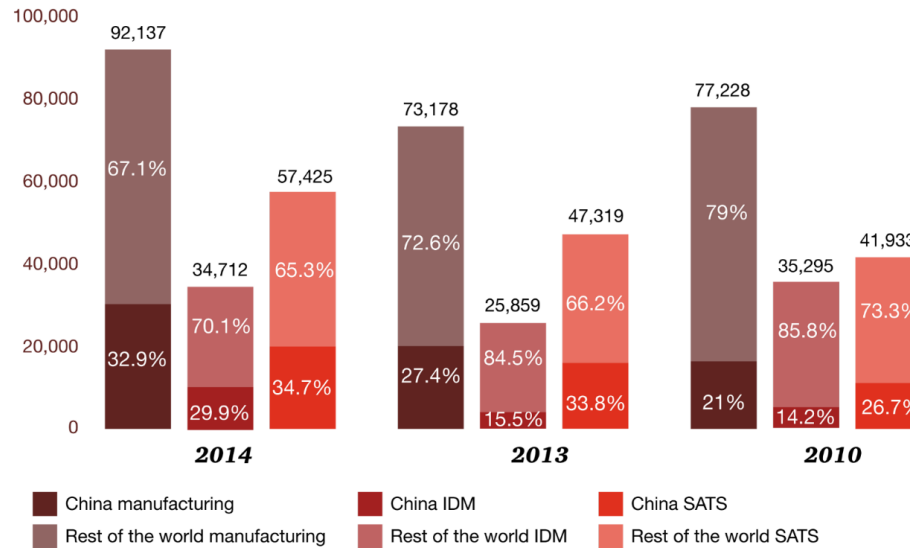


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China vs. Worldwide Semiconductor Packaging & Testing Capacity

China vs Worldwide Semiconductor Packaging & Testing Capacity

Manufacturing Sq Ft (1,000)

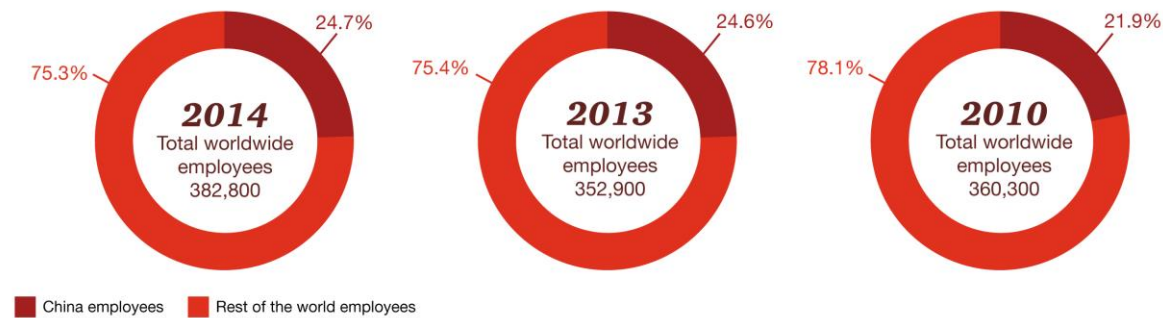


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China vs. Worldwide Semiconductor Packaging & Testing Capacity

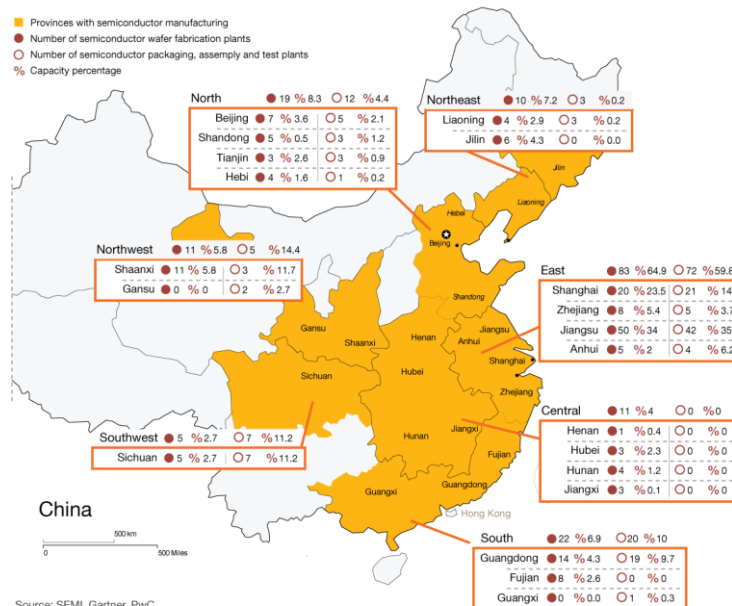
China vs Worldwide Semiconductor Packaging & Testing Capacity

Employees



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China's 2014 Semiconductor Manufacturing Capacity by Province and Region



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Thank you.

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