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Revolutionising Electronics

IC design in Singapore

Singapore Economic Development Board

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EDB
SINGAPORE

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A Dynamic Electronics Capital

Singapore, Programmed for Success

Geographically located in the centre of Asia and home to over 7,000 multinational corporations, Singapore is the choice location for companies to create and manage new markets, products, technologies and applications.

Best business environment in Asia-Pacific

- World's easiest place to do business (Doing Business 2009 Report)
- Most competitive Asian country (Global Competitive Report 2008)
- Best business environment in Asia-Pacific, ahead of Australia and Hong Kong (EIU Country Forecast, February 2008)
- No.1 choice for foreign trade and investment (Globalisation Index 2007)
- Top logistics hub in the world (World Bank, 2007)
- English as the main language of business and education

Global talent

- Best labour force in the world for the last 30 years (Business Environment Risk Intelligence's 2008 Labour Force Evaluation Measure Report)
- Top-notch institutes of higher learning - three universities and five polytechnics
- Strong focus on engineering and science - 21,900 graduates with science or engineering qualifications annually
- Open immigration policy that welcomes foreign talent; least restrictive immigration laws for the import of foreign talent in Asia Pacific (Source: IMD World Competitiveness Yearbook 2006)

World-class R&D infrastructure

- Solid research talent base with more than 27,300 researchers in government research institutes and the private sector
- Dedicated locations with specialised technological facilities

- Best in Asia for intellectual property protection; 2nd worldwide after Switzerland (IMD World Competitiveness Report 2008)
- Competitive GERD* as a percentage of GDP (2.61% in 2007); electronics accounted for 73.1% of the manufacturing sector's R&D expenditure
- Top universities with close affiliations to international research centres and Ivy League universities

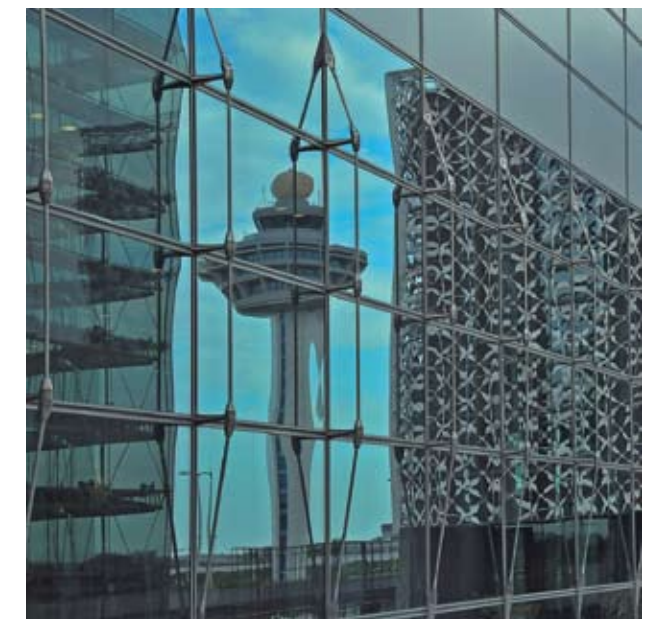
*Gross domestic expenditure on R&D

Strong government support

- Politically stable, neutral pro-business policy
- Least corrupt nation in Asia, ranked 3rd worldwide (TI Corruption Index)
- Financial support to grow IC design talent through scholarships and training

"Singapore offers a unique business and social proposition: a world-class R&D infrastructure, an excellent network to the region, an entrepreneurial government, and above all, an attractive, vibrant, and multi-cultural city that draws the best talents here."

Peter Bauer
CEO, Infineon Technologies AG



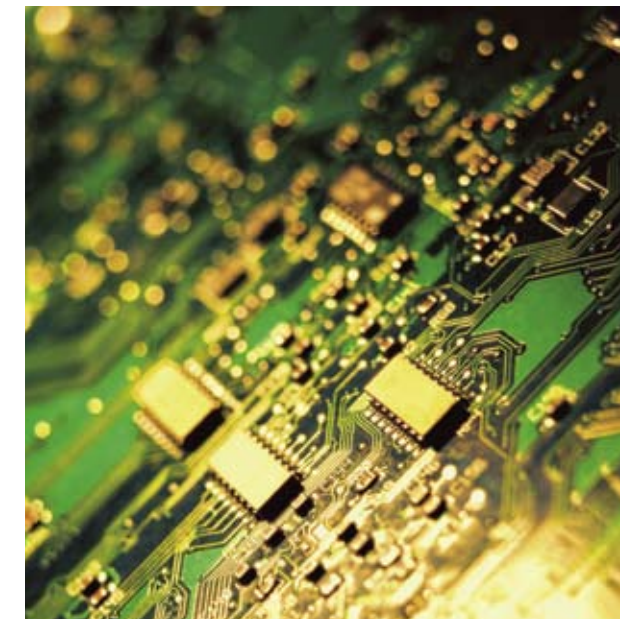
Vibrant Semiconductor Ecosystem

As a key pillar of Singapore's manufacturing sector, semiconductors represent the fastest-growing electronics segment. From modest beginnings, Singapore's semiconductor sector has developed into a vibrant ecosystem with the full value chain of activities.



Plug-and-play environment

With a first-class physical infrastructure comprising of four specialised wafer fab parks that occupy more than 200 hectares, and end-to-end semiconductor R&D capabilities from IC design and process enhancement to embedded software and system development, Singapore provides a plug-and-play semiconductor environment for companies globally.



Skilled IC design talent with analog focus

Home to more than 1,100 IC designers today, Singapore provides a ready pool of skilled design talent for complex and advanced IC design. In particular, the island-state's high proportion of analog, mixed-signal and RF IC designers (accounting for 44% of Singapore's IC design pool) helps to address the worldwide shortage of high quality analog IC designers, and offers Singapore-based companies a competitive advantage.

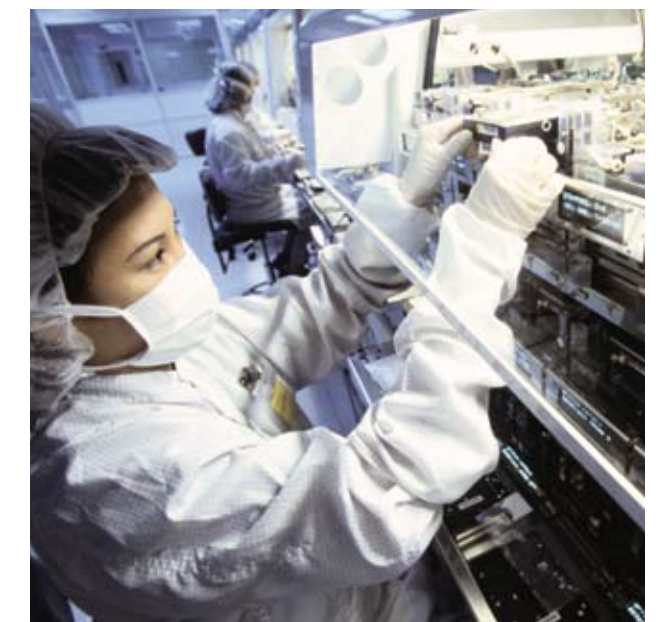
With the increasing need for miniaturisation, multi-functionality and energy efficiency in electronics devices, designing ICs has become ever more complex. To ensure a steady stream of highly skilled

IC design talent to meet local industry demands, the Singapore Economic Development Board has developed a series of capability development programs and scholarships to attract and nurture highly skilled IC designers.

At a glance

The No.2 city worldwide (behind Hsinchu) in terms of fab capacity, Singapore is home to:

- 40 IC design companies, 14 silicon wafer fabrication facilities and 20 assembly and test houses
- Nine of the world's top ten fabless companies with R&D activities
- Top three foundries in the world
- Three of the world's top five outsourced assembly and test companies



Centre of Talent & Excellence

Recognising that human capital drives economic growth, Singapore is committed to nurturing skilled engineering talent that meets the needs of the semiconductor industry, with progressive partnerships and programmes.

Integrated Circuit Design Postgraduate Scholarship (ICPS)

The Singapore Economic Development Board (EDB) has allocated S\$16 million to this new initiative, aimed at encouraging students to take up IC design at a postgraduate (Masters or PhD) level within Singapore's two main universities, Nanyang Technological University (NTU) and National University of Singapore (NUS). The ICPS is expected to benefit 150 IC designers between 2009 and 2014, providing 100% sponsorship covering research, course fees and stipends. ICPS recipients will also be able to hone their design skills through attachment and training opportunities with local companies.



Specialist Manpower Programme (SMP) IC Design

SMP IC Design is a scholarship sponsoring undergraduates in their final year of studies in IC design. The scholarship is co-funded by EDB (70%) and the industry (30%). Upon completion of their studies, SMP recipients are required to serve a bond with the sponsoring company.

"IC design is a knowledge-intensive and innovation-intensive activity which is a critical part of the semiconductor value chain. The ICPS will help to address Singapore's IC design talent needs by nurturing high quality IC designers."

Mr Damian Chan
Director of Electronics, EDB

Capital of knowledge and innovation

- Nanyang Technological University

Listed among the world's top 100 universities, NTU is a forerunner in research-intensive education. NTU has developed strong collaborations with leading global institutions including Cornell University, Stanford University, MIT, Cambridge University, Peking University and Waseda University. Stressing scientific and engineering fundamentals, its school of Electrical & Electronic Engineering has an enrolment of 3,500 undergraduates and over 1,200 graduate students.

- National University of Singapore

Singapore's flagship university adopts a transformative global education with a focus on Asian perspectives. NUS attracts over 30,000 students from over 100 countries with its strengths in engineering, natural sciences and biomedicine. In particular, 2,800 students are enrolled in its Department of Electrical &

Computing Engineering. Ranked amongst Asia's top universities, NUS shares affiliations with 22 university-level institutions, 16 national-level institutes and close to 80 faculty-based research centres.

- Singapore University of Technology and Design

Singapore's fourth public-funded university has chosen Massachusetts Institute of Technology to help develop its science and technology curriculum and kickstart major research projects. Led by the former Dean of the MIT School of Engineering, Professor Thomas Magnanti, the university will admit its first intake of 500 students in 2011, eventually aiming to cater to 4000 undergraduate and 2000 graduate students. It will house a S\$146 million international design centre, partnering MIT to fuse architecture, engineering and information systems, aimed at providing technological solutions for issues in Singapore and the region.



Prototypes of Success

- Institute of Microelectronics (IME)

A member of the Agency for Science, Technology and Research (A*STAR), IME performs cutting-edge R&D across the semiconductor value chain in areas such as IC and system design, semiconductor process technology, 3D packaging and reliability testing. IME has also set up programmes to focus its R&D efforts in new technologies such as bioelectronics, MEMs, silicon photonics and nanoelectronics. Its efforts have enabled local enterprises to become technologically competitive, cultivating a technology talent pool to inject new knowledge to the industry.

- VIRTUS, Singapore's IC Design Centre of Excellence

This centre is a collaboration between three parties - A*STAR, NTU and the industry that aims to train at least 50 MEng and 50 PhD postgraduate students in analog and mixed signal design over the next five years. It will also develop key technologies in new growth areas such as low power management and energy harvesting, which could serve as key technology drivers for medical technology, automotive and consumer electronics applications. The centre's establishment will

enhance Singapore's semiconductor ecosystem by encouraging the growth of both IC design and manufacturing activities in Singapore.

"Marvell values Singapore's vibrant enterprise network, its world-class research institutes that foster knowledge and a research-based economy, and the talent pool that can be drawn upon for Marvell's cutting-edge technology design centre."

Dr Hoo Kuong
VP and GM, Marvell Asia

Semiconductor companies have established IC design activities in Singapore to leverage on its skilled engineering talent and R&D infrastructure. Companies can attract top-notch design talent from the region and create future-ready chips for the global marketplace, all out of Singapore.

Broadcom Corporation

Broadcom Corporation is a global leader in semiconductors for wired and wireless communications. Broadcom provides the industry's broadest portfolio of state-of-the-art, system-on-a-chip and software solutions to manufacturers of computing and networking equipment, digital entertainment and broadband access products, and mobile devices. Since its establishment in Singapore in 1999, Broadcom Singapore has grown into an Asia-Pacific HQ, with an IC design centre of over 60 IC design engineers developing a wide range of digital, analog and mixed-signal system-on-a-chip solutions for exciting consumer and enterprise applications.



Freesystems

Freesystems is one of Singapore's local fabless IC design companies that specialises in digital wireless audio RFICs and baseband ICs technology. Its proprietary FreeSpan™ technologies enable products such as digital wireless headphones and wireless speakers to receive uncompressed CD quality wireless digital audio. Freesystems' customers include Philips, Pioneer, Sanyo and Yamaha. Being one of the specialists in this field, FreeSystems has been awarded many patents for its wireless audio technology, particularly in the US and Singapore.





Infineon Technologies

Infineon Technologies offers semiconductor and system solutions that address three central challenges to the modern society - energy efficiency, communications and security. Infineon is one of the top three companies in the global target markets of power semiconductors, chip card ICs, industrial and automotive electronics. Infineon has a 40-year presence in Singapore, with operations encompassing advanced manufacturing, research and development, sales, marketing and supply chain management, with about 2,100 employees. Singapore is a key R&D hub for Infineon with approximately 400 R&D engineers of which over 200 are IC designers developing microcontrollers, power management devices and ASICs. Besides IC design, other activities include Wafer Level Packaging, system prototyping, as well as customer support for mobile solutions based on Infineon ICs. In 2007, Infineon won the prestigious National Technology Award for outstanding contribution to the development of high performance and robust next generation broadband technology.

Lantiq

Lantiq powers the broadband experience by offering a broadband communication portfolio encompassing analog, digital and mixed-signal ICs, along with comprehensive software suites, enabling system manufacturers to design high-speed data and telecommunication systems solutions for broadband access and customer premises equipment. Lantiq builds upon a strong foundation of more than 20 years in the telecommunications industry and continues to drive innovation and integration, partnering with the key players around the world to develop next-generation Access and Home Networks. Lantiq employs more than 100 R&D engineers in Singapore, 80 of which are IC Designers.

“Singapore continues to be an important and strategic site for Infineon not only as a business and innovation hub, but also as the centre of excellence for leadership and competencies development in Asia-Pacific.”

Mr Pow Tien Tee
Regional President and Managing Director,
Infineon Technologies Asia-Pacific

MediaTek Inc.

MediaTek Inc. is Asia's largest and the world's third-ranked fabless IC design company, focusing in wireless communications and digital multimedia chipset solutions. In 2004, MediaTek Singapore Pte Ltd was established to design and develop RF transceiver ICs, GPS receiver chipsets and other intellectual property blocks. The work of the 100-man local R&D team has contributed to MediaTek being a pioneer and market leader in providing cutting-edge System-On-Chip (SOC) solutions to the mobile handsets, high-definition DTVs, optical storage, DVDs and other high-end consumer electronics products.

"The Singapore centre helped MediaTek maximise its global human resources. Besides Singaporeans, the centre has assisted the company to attract top IC designers from India, China and other countries in the region."

Mr Tsai Ming Kai
Chairman, MediaTek

Silicon Laboratories

Silicon Laboratories ("Silabs") is one of the top 20 fabless semiconductor companies in the world, with strong expertise in analog and mixed-signal ICs. It first established its international headquarters in Singapore to oversee its non US business, which accounts for more than 80% of global revenues today. In 2006, Singapore was chosen to be Silabs' first microcontroller IC design centre outside of the US

and has since expanded its presence. The Singapore team will also grow to become the company's first centre of excellence for Touchsense human interface MCUs. Notably, Silabs' Singapore-designed F336 MCU has received international recognition as the best product in the MCU category by Germany's E&E Magazine in 2008.



Solomon Systech Limited

Solomon Systech Limited is a leading semiconductor company providing display IC products on an international basis under its own global brand. Adopting a "fabless" business model, the group specialises in proprietary IC products and system solutions that enable a wide range of display applications. In 2004, Solomon Systech established its first design centre outside of Greater China in Singapore, and since then, the headcount has since grown to 36, engaging in R&D for intellectual property (IP), multimedia processor SoCs and embedded software for mobile multimedia devices. Being a pioneer in the field, Solomon Systech's Singapore technology centre develops the world's leading High Speed Serial Interface ICs and Multimedia SoCs, offering exciting and challenging opportunities at the forefront of technology.

ST Microelectronics N.V.

ST Microelectronics N.V. is a Switzerland headquartered Integrated Device Manufacturer ("IDM") that possesses a diverse portfolio of products including consumer, automotive, computer, industrial & smartcards, and telecom infrastructure. Its operations in Singapore spans the entire range of IDM activities and hires more than 5,000 employees. Product segments supported by the multiple IC design teams in Singapore include analog devices, storage and consumer products.

"Singapore embodies all the attractive attributes a company can seek in a business partner: world-class infrastructure, flexibility, excellent education system, technology mindset, pro-business environment, manpower capabilities and an excellent springboard into the region."

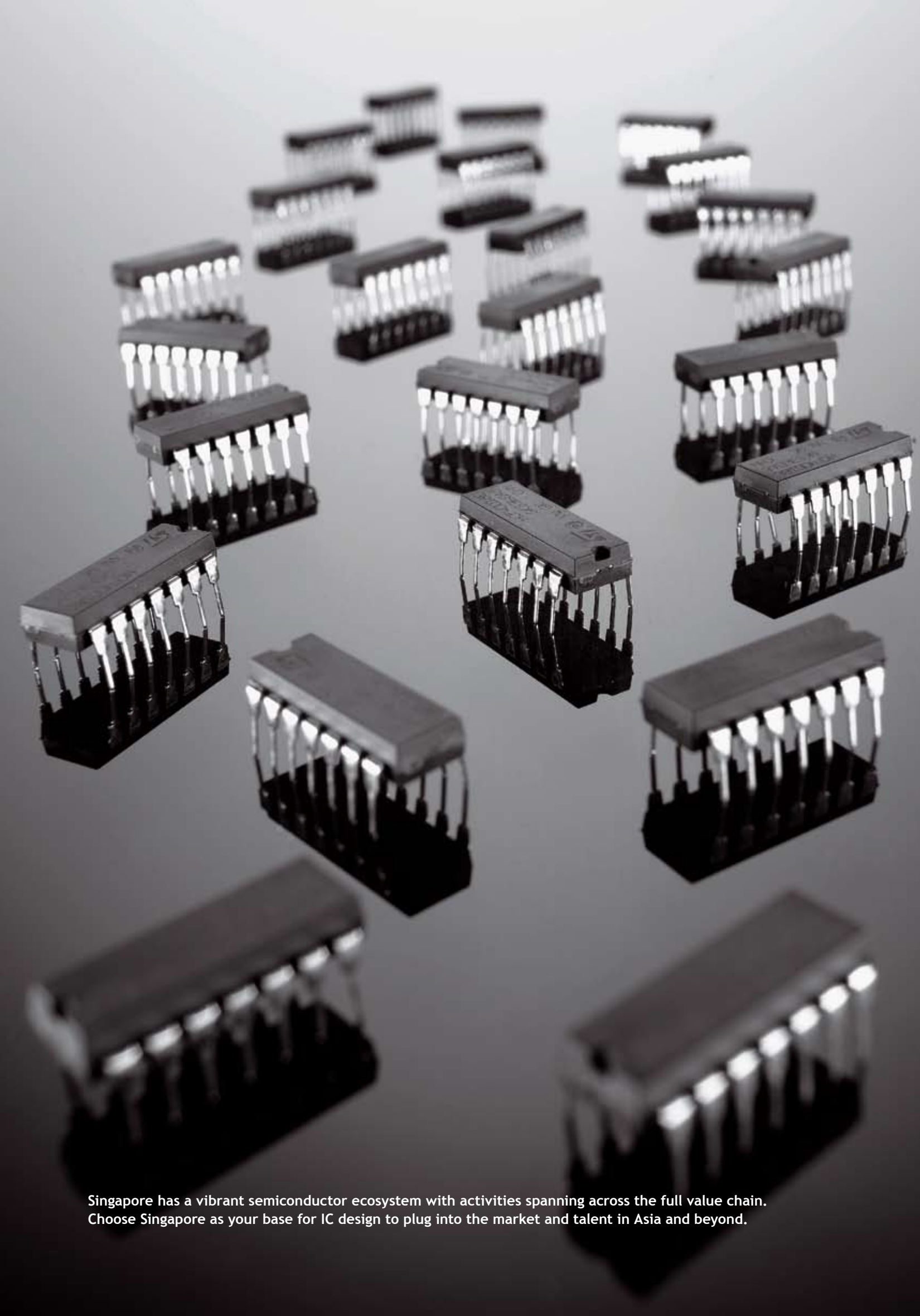
Pasquale Pistorio
Former CEO & President, ST Microelectronics NV

Wipro

Wipro is India's 3rd largest IT services company and the largest third party R&D service provider in the world. With the acquisition of Oki Techno Centre Singapore in 2007, Wipro became the first Indian company to set up an IC design services centre in Singapore. Remarkably, the centre has grown to a team of about 40 over the past two years and accounts for a steady percentage of its revenue in Product Engineering Services (PES) today. Wipro Techno Centre Singapore focuses on offering design services in the VLSI space with emphasis on wireless

and other high speed domains, including baseband and RF communication technologies. Its presence will help to support the circuit design needs of semiconductor and electronics system companies in Singapore and around the world.





Singapore has a vibrant semiconductor ecosystem with activities spanning across the full value chain. Choose Singapore as your base for IC design to plug into the market and talent in Asia and beyond.

About the Singapore Economic Development Board

EDB is the lead government agency for planning and executing strategies to enhance Singapore's position as a global business centre and grow the Singapore economy. We dream, design and deliver solutions that create value for investors and companies in Singapore. In so doing, we generate economic opportunities and jobs for the people of Singapore; and help shape Singapore's economic future.

'Host to Home' articulates how EDB is sharpening its economic development strategies to position Singapore for the future. It is about extending Singapore's value proposition to businesses not just in helping them improve their bottom line, but also in helping them grow their top line. EDB plans to build on existing strengths and add new layers of capabilities to enable Singapore to become a 'Home for Business', a 'Home for Innovation' and a 'Home for Talent'.

For more information on how EDB can help your business, please visit www.sedb.com

Pictures courtesy of Institute of Microelectronics, Infineon Technologies, Silicon Laboratories and Wipro.