

Electronics

Factsheet 2012

At a Glance

Singapore has developed a strong foundation for the Electronics industries over the last 40 years. They are key contributors to Singapore's economy.

In 2011, Electronics was the major industry that underpinned Singapore's economic growth, contributing an output of S\$86.1 billion and employing more than 82,000 workers. The 2011 investment projects are expected to contribute S\$2 billion in VA per annum to Singapore's Gross Domestic Product (GDP) when they are fully implemented. This is generated by 2011 Electronics investment commitments of S\$7.4 billion in Fixed Assets Investment (FAI), or almost 54% of total manufacturing sector's FAI, and S\$1.5 billion in Total Business Spending (TBS), or 17% of TBS commitments. More than 3,500 skilled jobs are also expected to be created.

Singapore ~ Global Electronics Hub

Industry Vision

EDB aims to develop Singapore into a world-class electronics manufacturing hub with end-to-end R&D capabilities. We will continue to position Singapore as the choice location for companies to create and manage new markets, products and processes, technologies and applications. Electronics in Singapore will also evolve and grow to meet the challenges of a new age. Riding on our existing strengths, we aim to create new businesses and opportunities through emerging growth areas such as Bioelectronics, Green Electronics, Printed Electronics and Security.

Opportunities in Singapore

1. Semiconductor

- The semiconductor industry consists of integrated circuit (IC) design, wafer fabrication, and assembly and test activities.
- The industry started in Singapore in the 1960s with assembly and test facilities.
- In the 1980s, the industry expanded to include wafer fabrication operations.
- Since then, the industry has grown rapidly. Today, there are 14 operating silicon wafer fabs, 20 assembly and test

operations and about 40 IC design centres. This includes four 12-inch fabs (GLOBALFOUNDRIES Fab 7, IM Flash Singapore, UMC Fab 12i, and Micron Fab 7), the world's top three wafer foundry companies, three of the top five assembly and test subcontractor companies, and nine of the world's top 10 fabless semiconductor companies. There are four wafer fab parks in Singapore, occupying more than 200 ha of land in Woodlands, Tampines, Pasir Ris and the North Coast area near Senoko.

- The semiconductor industry currently employs about 4,600 R&D engineers across the value chain, in areas such as IC design, wafer fabrication process development, assembly, package and test development, as well as embedded software development.
- In 2011, Infineon and Mediatek announced significant expansions to their R&D teams in Singapore. Infineon would be investing S\$352 million into R&D and increasing the number of R&D engineers from 260 to 390. Mediatek would double the size of its IC design team to 200 and transform the team to have full System on Chip expertise, integrating capabilities in digital, analog and RF IC design.
- IM Flash Singapore, a joint venture formed between Intel Corporation and Micron Technology Inc, opened its state-of-the-art 300mm wafer fabrication facility in 2011, demonstrating Singapore's competitiveness for highly advanced semiconductor manufacturing.

2. Electronics Components

Advanced Substrates

- Renamed from Printed Circuit Board (PCB) to include activities in flexible circuits, semiconductor packaging substrates, high density interconnects and Low Temperature Co-fired Ceramics (LTCC).
- Key companies include 3M and FCI for flexible circuits, Sanmina-SCI and Hitachi Chemical for PCBs, and Microcircuit for organic substrates.
- In 2011, 3M and Quanta signed an agreement to manufacture and commercialize projected capacitive touch solutions for the personal computing market.

Batteries and Power Electronics Systems

- Singapore has a wide range of activities in the batteries value chain. In manufacturing, both Sony and Energizer manufacture their most advanced lithium products in Singapore. Singapore also hosts R&D for battery management systems by Delphi, ST Kinetics, and STL Energy Technology. GP Batteries has its global headquarters located in Singapore.
- In 2011, Sony established its first corporate university outside of Japan in Singapore, to train its next generation leaders for the AMEA region.

Display

- AFPD, owned by AU Optronics, operates the world's largest Low Temperature Poly-Silicon TFT LCD plant in Singapore.

Passive Components

- Manufacturing is carried out by industry leaders including TDK-EPC for SAW filters, Murata for ceramic capacitors and Panasonic Electronic Devices (PED) for SAW filters, capacitors and resistors.
- PED also undertakes R&D on Micro-Electro-Mechanical Systems (MEMS), Power Management as well as Substrate and Mounting Technology, for medical, energy and environmental applications.

Storage

- Singapore is the world's largest supplier of hard disk media with top players such as Showa Denko, Western Digital and Seagate expanding their media manufacturing operations here.
- Top hard disk drive companies such as Seagate and Western Digital also have significant R&D operations here in Singapore.
- Beyond current technologies, A*STAR's Data Storage Institute and leading memory companies are also embarking on R&D in next generation non volatile memory technologies in Singapore.

Peripherals

- Singapore is a key hub for Hewlett-Packard's Imaging and Printing business.
- Other companies like Océ and Toshiba TEC also undertake product and process development activities in Singapore.
- Dell Singapore has global responsibilities for displays and printing products, from development to procurement.

3. Electronics Systems

Network Storage

- Leveraging our rich ecosystem of HDD manufacturers, component suppliers and logistics providers, network storage companies, such as Hitachi Data Systems have found it efficient to conduct configure-to-order, testing, and distribution operations in Singapore for regional markets.
- Leading network storage players have also chosen Singapore for knowledge-intensive projects. For instance, EMC conducts interoperability testing and disk drive qualification, and proof-of-concept collaborative projects with regional partners.

EMS

- Several of the top 10 EMS companies have a significant presence in Singapore. Their operations range from design, high value manufacturing, supply chain management, to regional management.
- Key players include Foxconn, Flextronics, Jabil, Sanmina-SCI, Celestica, Venture, and Beyonics. Prominent ODM players such as Lite-on Technologies also have HQ operations coupled with R&D functions in Singapore.
- High value manufacturing in Singapore is supported by a growing ecosystem of suppliers in the immediate region (e.g. Iskandar Malaysia, Batam, Bintan and Karimun) that provide a cost-efficient supply chain by leveraging Singapore's physical and trade connectivity with the region.

Consumer Electronics & Lighting

- Singapore is the regional headquarters for leading consumer electronics players such as Samsung Electronics, LG Electronics, Panasonic, Electrolux, BSH and Karcher.

- Companies have also found Singapore to be a suitable location to conduct R&D. Companies like Dyson, Philips and Sennheiser, undertake a range of activities in Singapore including R&D, product development and intellectual property management.
- For lighting, Philips Lumileds, which produces LED chips for Philips Lighting, has its compound wafer fab for high power LEDs in Singapore.

4. Infocomm Products

- Key products manufactured in Singapore include mission-critical and secure computing products such as high-end servers, ATMs, point-of-sales systems, networking equipment, and smart cards. For instance, IBM's manufacturing and fulfilment facility produces IBM System z mainframes and high-end POWER systems for Asia, Africa and Europe.
- Singapore is particularly suited for such production because of its high-quality, high-mix-low-volume manufacturing expertise that is further supported by an established ecosystem of precision component manufacturers, EMS companies & logistics service providers.
- Leading infocomm product companies, such as HP, IBM and Dell, have established regional and global headquarters with the full value chain of activities in Singapore: from R&D and supply chain management to manufacturing, logistics and shared services.
- Singapore is also an attractive location for companies to both develop and commercialize new infocomm products and solutions. HP and IBM both have research labs in Singapore. HP Labs Singapore focuses on cloud computing research, and performs translational research for HP's existing and future intellectual property, while one of the areas that IBM Research's Smarter Cities Research Collaboratory will focus on is R&D related to urban living problems such as water, transport and energy.

About the Singapore Economic Development Board

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. EDB dreams, designs and delivers solutions that create value for investors and companies in Singapore. Our mission is to create for Singapore, sustainable economic growth with vibrant business and good job opportunities. EDB's 'Host to Home' strategy articulates how we are positioning Singapore for the future. It is about extending Singapore's value proposition to businesses not just to help them improve their bottom line, but also to help them grow their top line through establishing and deepening strategic activities in Singapore to drive their business, innovation and talent objectives in Asia and globally.

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

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