

# Electronics

Factsheet 2011

## 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 2010, Electronics was the major industry that underpinned Singapore's economic growth, contributing an output of S\$89.9 billion and employing more than 80,000 workers. The 2010 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 2010 Electronics investment commitments of S\$5.8 billion in Fixed Assets Investment (FAI), or 45% of total manufacturing sector's FAI, and S\$1.8 billion in Total Business Spending (TBS), or 21% of TBS commitments. More than 2,600 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 TECH Semiconductor), the world's top three wafer foundry companies, three of the world's top five assembly and test subcontractor companies, and nine of the world's top 10 fabless IC design 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 3,500 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

## 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, and Sanmina-SCI and Hitachi Chemical for PCBs. Microcircuit manufactures organic substrate in Singapore.

### 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.

### 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 a major hard disk media manufacturing location 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.
- Going forward, this sector will be further enhanced with the extension into storage subsystems and network storage systems.

### Peripherals

- Singapore is a key hub for Hewlett-Packard's Imaging and Printing business. Other companies like Kodak, Océ and Toshiba TEC are also undertaking product and process development activities in Singapore.
- Dell's Singapore operations have 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 (which launched its Asia Pacific Distribution Centre in 2010), 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. This includes EMC's Asia Pacific Innovation & Development

Centre which conducts interoperability testing and disk drive qualification, and proof-of-concept collaborative projects with regional partners.

#### EMS

- Several of the world's top 10 EMS companies have a significant presence in Singapore. Their operations range from design, high value manufacturing, supply chain management, and 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. in 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. For example, Dyson announced in November 2010 its plans to expand its Singapore R&D centre from 30 staff to 200 over the next two years. Companies like Philips and Sennheiser, undertake the full 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, set up its compound wafer fab for high power LEDs in Singapore in Nov 2006.

#### 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. In 2010, IBM announced the launch of its Singapore Technology Park, a S\$90 million manufacturing and fulfilment facility for 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. In 2010, HP and IBM, both set up 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](http://www.sedb.com)

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