

ELECTRONICS DRIVING GROWTH FROM SINGAPORE

OCTOBER 2014



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Agenda

1. Electronics Industry in Singapore
2. Megatrends Driving Growth
3. Building Capabilities in Singapore
4. Outcome

Singapore's Electronics Industry

5.4%

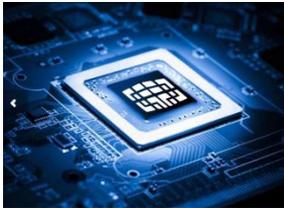
of Singapore's GDP

S\$76B

manufacturing output

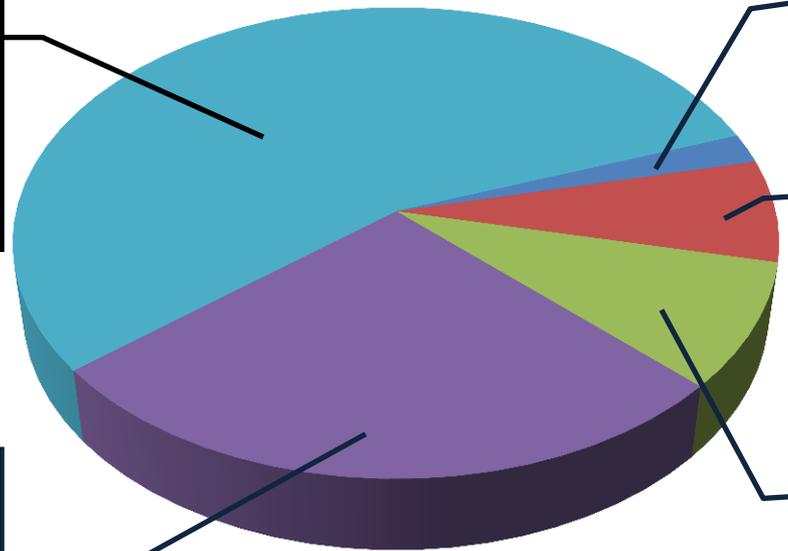
Breakdown of Electronics Industry

Semiconductors (**58%**)



1 in 10 chips worldwide are made in Singapore

Infocomms & Consumer Electronics (**25%**)



Electronic Modules & Components (**2%**)



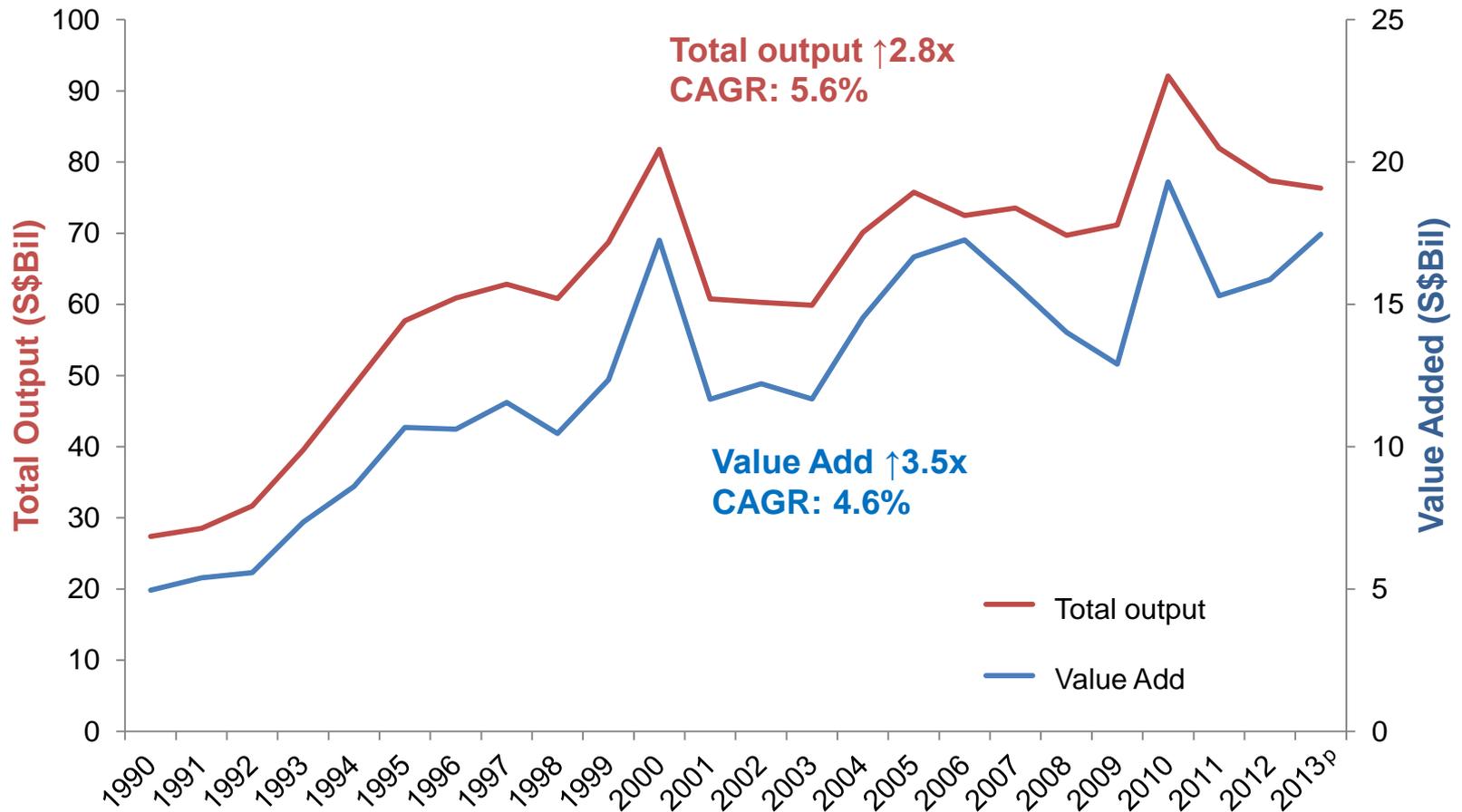
Data Storage (**6%**)



Computer Peripherals & EMS (**9%**)



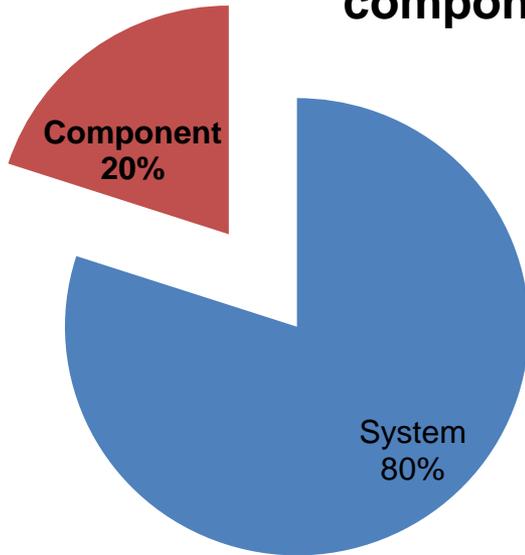
Strong Historical Performance



Electronics = semiconductors + data storage + infocomms and consumer electronics (ICE) + computer peripherals + other modules and components (EMC)

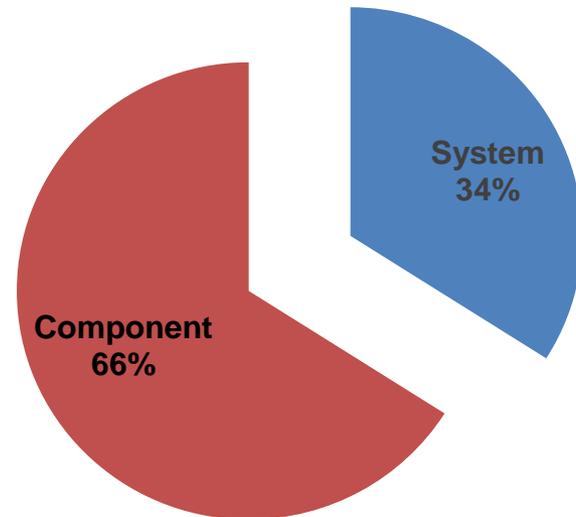
Transformation Of Electronics Industry

Shift from systems manufacturing to higher-value components manufacturing



1990

Total VA: S\$6B



2012

Total VA: S\$16B

Singapore Continues To Attract Investments

Last 3 years, **S\$16B** in fixed asset investments and **7,700** skilled jobs committed.

Highlights:

Mfg **R&D**

STATSChipPAC

World #4 OSAT company will invest US\$500 mil over the next 3 years to develop and mfg next gen IC packaging

Mfg

GLOBALFOUNDRIES

World #2 wafer foundry will convert a wafer fab from 200mm to 300mm to improve factory output by 70%

Mfg

IOR

World leading power management company opened its state of the art wafer processing facility for Power ICs

R&D

Seagate

World #1 HDD company broke ground for a \$100 mil design and R&D centre for ultrathin HDDs

HQ **R&D**

REALTEK

World leading fabless semiconductor opened a US\$150 mil regional HQ and IC design centre for IoT applications

HQ **R&D**

KONICA MINOLTA

Leading printing and imaging companies opened its RHQ and Business Innovation Centre for the SEA market

HQ **R&D**

QUALCOMM

World #1 fabless semiconductor company opened a IHQ and 100-RSE IC design and engineering centre

HQ **R&D**

NXP

3rd largest European semiconductor company will invest over \$125 mil to set up its twin HQ and expand its R&D

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4 Growth Areas For The Future



9% CAGR to US\$19b by 2017

Communications

1. *Enables devices to communicate with one another*
2. *Enables a richer multimedia experience*



6.7% CAGR to US\$23b by 2016

Power management

1. *Enables longer battery life*
2. *Helps to reduce carbon emissions (e.g. Energy efficient data centres)*



13% CAGR to US\$21b by 2017

Sensors & actuators

1. *Enables devices to “sense” the real world (contextual awareness) so they can “react” intelligently*



SSD: 35% CAGR to \$21b by 2016
Hi-capacity HDDs: 30% CAGR thru 2017

Enterprise storage

1. *Enables data to always be available when needed*

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Capabilities In Each Of The Growth Areas



Communications

1. *System architecture*
2. *RF and photonics*
3. *Advanced packaging*



Power management

1. *Power controllers*
2. *Specialty wafer fabs*



Sensors & actuators

1. *MEMS*



Enterprise storage

1. *Enterprise drives*
2. *Disk media*
3. *NAND flash*
4. *SSDs*

Leveraging Singapore's Strengths

Communications



Power



Sensors & actuators



Enterprise storage



Supported by a strong manufacturing and research ecosystem:



Case Study: The Internet Of Things

MEDIATEK

- 4th largest fabless semiconductor company
- Plans to invest another **S\$250 mil** over the next 6 years to expand R&D.
- The R&D Center (currently 250 men) will focus on the **development of high performance ICs such as high speed CPUs and GPUs.**
- Will establish an **innovation center** to develop new **IOT applications in the industrial end market.**
- Singapore is also the regional hub for logistics



"We will strengthen local enterprise capabilities and enable more ideas to be carried out. We intend for the local companies to adopt our open platform and work together with the Government on projects"

Andrew Chang, VP

Case Study: Smart City Solutions



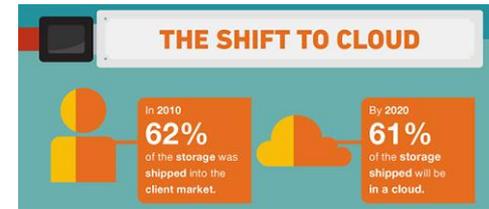
- 3rd largest European semiconductor company
- Established its **Asia Research Lab** to work with government agencies (e.g. LTA and EMA) and private sector partners (e.g. ST Electronics) to test-bed solutions in **urban mobility, smart grid and intelligent buildings**.
- Established **NFC academy** to work with local polytechnic students to develop prototype solutions using NXP's core IPs.



“As Singapore is an important regional hub, and the headquarters for our APAC operations, it was a strategic decision for us to extend our geographical R&D base here”

Hans Rijns, CTO

Our Research Institutes' Capabilities



Communications



- Si-Photonics (IME-GF)
- Advanced packaging

Power



- Power device design on III-V materials (IME-NXP)

Sensors & actuators



- MEMS lab-to-fab (IME-GF)
- MEMS twin lab (IME-Masdar Institute-GF)

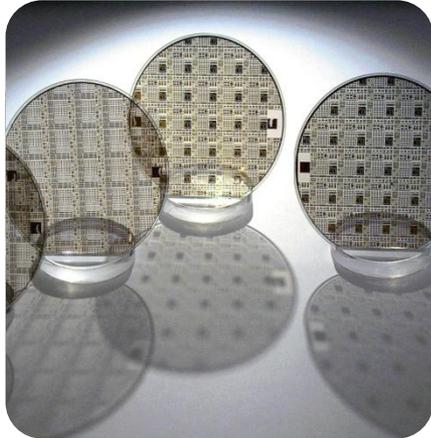
Enterprise storage



- HD media (DSI-WD/Showa Denko)
- STT-MRAM (DSI-Micron, IME-GF)



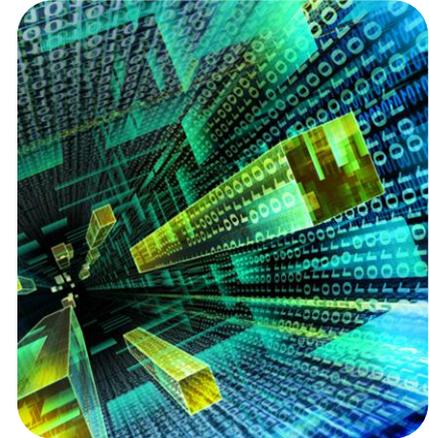
Pre-Position For Disruptive Technology



Compound Semiconductors
CAGR of 64% to US\$1.8b by 2022



Si-Photonics
CAGR of 21% to US\$182m by 2017



Next-gen NVM
CAGR of 7% to US\$91b by 2017



Data Institute Storage
Data Storage Institute
Exploit Technologies
Institute of Microelectronics



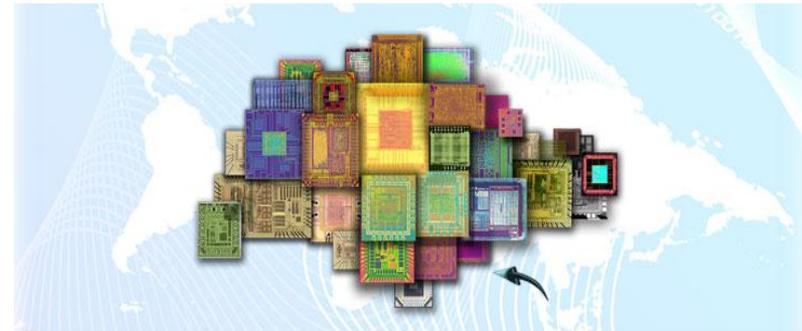
Our Partner: VIRTUS IC Design COE



- Collaboration with **industry partners and top universities globally**
- Building capabilities in **Communications and Power Management** (eg. analogue & mixed signal; power management; RF and mm-wave).
- Training a **globally competitive pool of analogue and mixed signal design engineers** (>100 Masters and PhD IC-design engineers trained with industry partners).



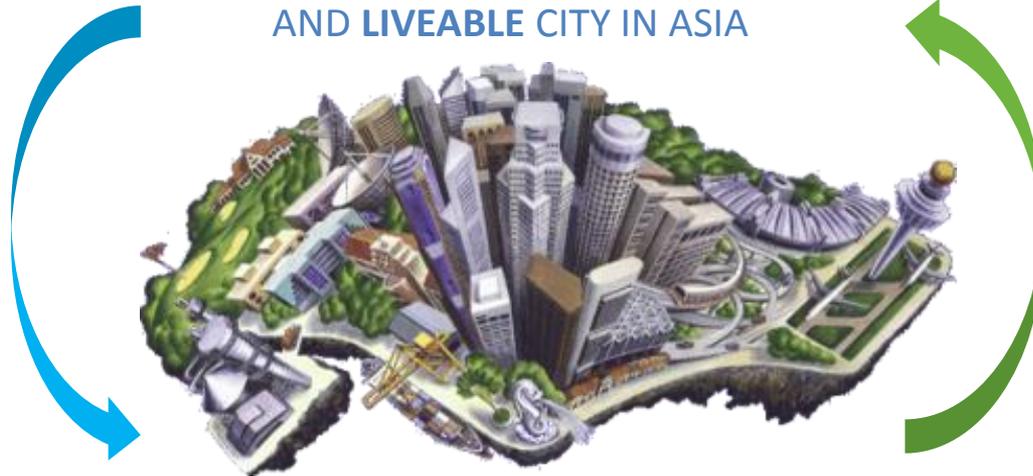
NANYANG
TECHNOLOGICAL
UNIVERSITY



1. Electronics Industry in Singapore
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Singapore As A Smart Nation

THE LEADING SMART, SUSTAINABLE
AND LIVEABLE CITY IN ASIA



A GLOBAL LEADER IN INNOVATING AND COMMERCIALIZING
SOLUTIONS FOR THE REGION



“We will make full use of new technologies to develop sustainable and innovative solutions that improve our lives. We will make Singapore a Smart Nation: enabling safer, cleaner and greener urban living, more transport options, better care for the elderly at home.”

President Tony Tan, May 2014, Parliament reopening speech.

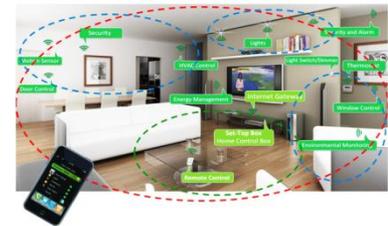
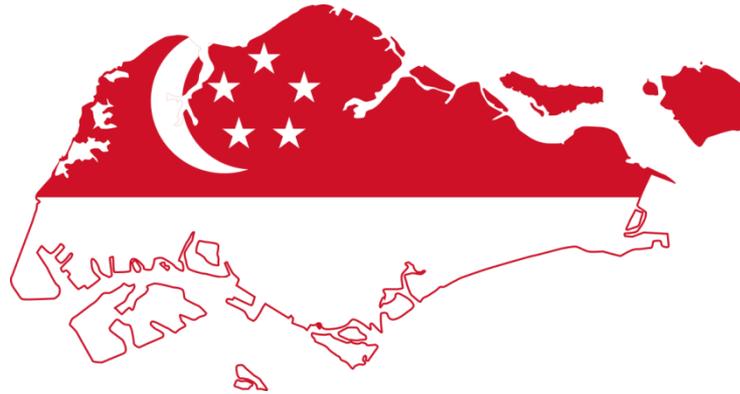
More "Singapore Inside" Products



Mobile Devices

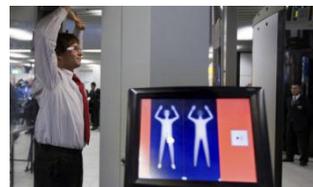


Wearable Devices



Smart Homes

Intelligent Transportation



Safety & Security

Green Infrastructure



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