

**Thailand Board of Investment** 555 Vibhavadi-Rangsit Road, Chatuchak, Bangkok 10900, Thailand

Tel : (+66) 2553 8111 Fax : (+66) 2553 8315 E-Mail : head@boi.go.th www.boi.go.th



# THAILAND'S SMART ELECTRONICS

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# NDUS **OVERVIEW**

The world continues to become smaller and smarter. The electronics industry is rapidly evolving and relentlessly moving towards a high-level of wearability, connectivity and mobility. Smart technologies and appliances offer households with real-time information and increased energy efficiency. Combined with advances in digitalization, demand in the global electronics market, especially for sensors, IoT, RFID, and 3D printing technologies will further increase. The global electronics market is expected to reach USD 1.8 trillion by 2017<sup>1</sup>.

### GLOBAL ELECTRONICS PRODUCTION VALUE BY TYPE IN 2017 F<sup>2</sup>

[In trillions USD]

Note



#### **COMMUNICATIONS COMPUTERS & INFORMATION TERMINALS SEMICONDUCTORS** ELECTRONIC COMPONENTS **DISPLAY DEVICES** OTHERS

# THAILAND'S SMART **ELECTRONICS INDUSTRY**

Thailand's electrical and electronics (E&E) industry has rapidly evolved over the past five decades. Thailand was ranked the 14th largest E&E exporter in the world in 2016.<sup>1</sup> The country is the world's second largest manufacturer of air conditioning units,<sup>2</sup> as well as a major exporter in other important components such as Hard Disk Drives and electronic manufacturing services; integrated circuit assembly, packaging and testing; and parts and components for electrical products. The industry's export revenue was worth USD 55 billion in 2016.<sup>3</sup> Thai manufacturers are more than ready to embark on new product developments, innovation, and research and development to harness future technologies, and accelerate the "Smart Electronics Industry" under the Thailand 4.0 policy: Targeted S-Curve Industries.





E&E IMPORT VALUES, 2016<sup>5</sup> [In billions USD]



### **ELECTRONICS INDUSTRY**

Thailand is one of the main suppliers of electronics in the world. In 2016, the country exported over USD 33 billion, accounting for 15% of Thailand's total export value.<sup>6</sup> Thailand is one of the world's largest manufacturers of Hard Disk Drives (HDDs), supplying about 30% of the global market.<sup>7</sup> The country is also a significant regional manufacturer and assembles ICs and PCBs.\*\* Thailand is also recognized for its high quality electronics, as a result of strong supporting industries in many sectors including engine management in the automotive sector, motors and compressors in the electrical appliance and machinery sector, and Hard Disk Drives in cloud computing.



[In billions USD]



1 International Trade Center (ITC) 2 Electrical Electronics, Telecommunications and Allied Industry Club 3.4.5 Electrical and Electronics Institute 6,8 Electrical and Electronics Institute 7 Kasikorn Research Center Note Exchange Rate (BOT, June 1, 2017): USD 1 = THB 34.28

\* Others include Electrical power such as electrical cable, electrical control panel, etc. \*\* IC = Integrated Circuit, PCB = Printed Circuit Board, HDD = Hard Disk Drive \*\*\* Others include Printed Circuit Boards, Diodes, Transistors, etc. Exchange rate (BOT, June 1, 2017): USD 1 = THB 34.28

1. PricewaterhouseCoopers (PwC) Source 2. Japan Electronics and Information Technology Industries Association Exchange Rate (BOT, June 1, 2017): USD 1 = THB 34.28

# HARD DISK **DRIVES** THAILAND'S HDD EXPORT UNITS AND VALUE 2013-2016<sup>1</sup>



Thailand produced over 208 million HDD units in 2016. Most of the total production was exported to other countries such as the US, Hong Kong, the Netherlands, and China.<sup>2</sup> The export value for HDDs has increased at a rate of 31.5% annually since 2013 due to trends in cloud computing and storage. HDD production is also shifting towards larger HDD capacity and enterprise HDDs to serve data centers and cloud computing providers. Since 2013, the country has doubled its HDD export value.

### **INTEGRATED CIRCUITS (ICS)**

Integrated Circuit (IC) manufacturing is Thailand's second largest electronics export (23.1%).<sup>1</sup> Thailand is home to numerous global IC manufacturers. With advanced assembling technology and excellent quality, ICs produced in Thailand are exported to serve high growth segments such as Electronic Control Unit (ECU) and LED Chips in the automotive sector and Touch Screen Controller and LCD drivers in smartphones.

### **ELECTRONICS DESIGN**

Thailand is also known for its competent human resources in IC design. A number of global leading microelectronics design companies, including Silicon Craft and ROHM, are operating in the country where they have developed their advanced microelectronic designs. Thailand has also become a well-known hub for embedded system design, especially in the automotive sector. ThaiGer Tech and Toyota Tsusho Electronics (Thailand) are two prominent examples of companies that have selected Thailand as their system design base.

HAILAND SMART ELECTRONICS



# ELECTRICAL APPLIANCES

With over 1,060 electrical appliance factories across the country,<sup>1</sup> Thailand has a solid reputation as one of the largest electrical appliance producers in the region. A number of leading global electrical appliance manufacturers have established their production plants in Thailand including Daikin, Electrolux, Fisher & Paykel, Haier, Mitsubishi, Panasonic, Sony, Samsung, LG and Toshiba, among others. The country exported more than USD 16.7 billion in electrical appliances in 2016.<sup>2</sup> The major exported products are air conditioners, cameras, washing machine and refrigerators.







### **SMART HOME APPLIANCES**

Leveraging its competencies in advanced technologies, Thailand is moving towards high-value and sophisticated electrical appliances. Increased government regulations supporting an innovation-based economy are also driving growth in this market. The country is rapidly becoming a hub for manufacturing smart appliances.\* Numerous leading global companies including Samsung and Electrolux have chosen Thailand to produce their premium, advanced technology products ranging from smart refrigerators, smart washing machines to smart air conditioners. The smart appliance market is expected to reach USD 37.2 billion by 2020 globally, at a CAGR of 15.4% between 2015 and 2020.<sup>1</sup> Smart appliances make the lives of consumers much easier and more convenient, e.g. self-ordering and refilling refrigerators, and smart TVs for digital connections. The devices also offer energy optimization and greener technology functions for modern home use.





Sources: 1 Markets and Markets Research

Note

\* A Smart Appliance is an appliance that utilize a modern computer and communications technology to make its functions faster, cheaper and more energy efficient.

# INTERNET **OF THINGS (IOT)**

ALAND SMART ELECTRONICS

The Internet of Things (IoT) is no longer a futuristic concept. Several real products, services, and applications are being developed from the IoT model such as smart watches, fitness trackers and smart glasses. In 2020, the consumer electronics, automotive and healthcare segments will contribute to more than 60% of IoT usage.<sup>1</sup> The global IoT market is expected to reach USD 8.9 trillion in 2020.<sup>2</sup>

Thailand aims to become ASEAN's digital infrastructure hub by 2020. Spending on IoT amounted to USD 57.7 million in Thailand in 2014 and is expected to increase to over USD 900 million in 2020.<sup>3</sup> Most IoT spending is mainly used in the manufacturing and logistics sectors such as GPS navigation system installations in all public buses, trailers and trucks. The government is also determined to drive digital growth through multiple IoT initiatives, including smart city plans for Phuket, Chiang Mai and Khon Kean, in addition to the AgriTech, HealthTech and Smart Car sectors.



1.2 PricewaterhouseCoopers (PwC) Sources 3 Frost & Sullivan Research

# **OPPORTUNITIES**

With accelerating developments taking shape, sensors, smart connected devices and embedded technologies are rapidly improving based on a strong IoT foundation.

### **SENSING: SENSORS**

Thailand also offers a massive opportunity for the sensors market. Over 112 million sensors are expected to be used in the automotive industry in 2017, growing 13.1% from last year.<sup>1</sup> To further increase the country's competitiveness and readiness, Thailand is generating "The strategic roadmap for the improvement of sensor technology," in collaboration with THAIST\* and NECTEC.\*\*

### **CONNECTIVITY: SMART CONNECTED DEVICES**

People are becoming more reliant on electronics devices in their daily lives. In 2016, over 23 million smartphones were sold in Thailand at a total value of USD 4 billion.<sup>2</sup> By offering competitive labor costs, an abundance of locally made electronic components with affordable prices and attractive tax benefits, Sony established its premium smartphone production plant in Thailand, producing over a million units per year.



1 Kasikorn Research Cente 2 IDC Research Notes

Exchange Rate (BOT, June 1, 2017): USD 1 = THB 34.28 \* THAIST stands for Thailand Advanced Institute of Science and Technology \*\* NECTEC stands for National Electronics and Computer Technology Center

# RFID

RFID is increasing its important role in several industries, ranging from transportation, organizing warehouse inventories to tagging livestock for agricultural management. RFID technology is, therefore, undergoing rapid growth in Thailand. Its market value increased to USD 145 million in 2016.<sup>1</sup> This increase is the result of growing demand in e-commerce and the logistics industries. The value of Thailand's e-commerce rose to USD 72 billion, with a CAGR of 12.4% in 2015-2016.<sup>2</sup>

### COMPUTING: EMBEDDED SYSTEMS

Thailand is an attractive investment location for embedded software testing and development given its reliable electricity supply, stable internet connectivity, as well as its readiness of a skilled and affordable workforce. Many educational institutes offer courses in embedded systems. In 2016, over 9,000 students graduated with software and electronics degrees.<sup>1</sup>

Driven by the country's strategy to drive Thailand through innovative technologies, the Thai government is providing strong support to the software industry. Embedded software production in Thailand is expected to reach USD 193 million in 2017.<sup>2</sup> Numerous global firms are currently using Thailand as their research and development testing centers, including ThaiGerTec Co., Ltd., Toyota Tsusho Electronics (Thailand) Co., Ltd., and Silicon Craft Technology Co., Ltd.



2 Ministry of Digital Economy and Society

Many leading technology companies that have tapped into Thailand's advanced RFID capabilities include Datamars, Smartrac Technology, Silicon Craft and Stars Microelectronics.



Sources: 1 Office of the Higher Education Commission 2 Digital Economy Promotion Agency (DEPA)

**NO.** 1

AUTOMOTIVE PRODUCER IN

SOUTHEAST ASIA

IN 2016<sup>2</sup>

# **3D PRINTING**

Global demand for 3D printing is expected to increase dramatically from USD 1.6 billion in 2015 to USD 13.4 billion in 2018, at a CAGR of 103.1%.<sup>1</sup> This strong demand is being driven by the aerospace, electronics, automotive, jewelry, education and healthcare industries. Thailand is currently the largest desktop/personal 3D printer producer in the world, accounting for 25% market share in 2016.<sup>2</sup> With this unique combination, Thailand provides all of the attributes necessary to complete the value chain, including skilled labor, a strong supporting industry and robust raw material supplies (PLA filament \*).

### THE GLOBAL LEADING 3D Printer Company In Thailand

Cal-Comp Electronics (Thailand), the subsidiary of New Kinpo Group (NKG), is dedicated to manufacturing cost-effective personal and business 3D printing. All of the company's 3D printers are produced in Thailand. The company's products are sold and shipped under the XYZprinting, Inc. brand. The company sold about 80,000 3D printers in 2016, and expects to sell 130,000 – 150,000 3D printers in 2017.

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# AUTOMOTIV Electronics

With the emergence of a new generation of vehicles, increasing adaption of electric vehicle technology has provided a huge opportunity for electronics manufacturers worldwide. It is expected that by 2030, electronics will account for 50% of automobile manufacturing costs, increasing from one-third today.<sup>1</sup>

As the largest automotive production hub in the region, Thailand is home to 18 leading auto assemblers and over 2,400 auto part producers, ranging from Tier 1 to Tier 3.<sup>3</sup> To further develop its competitiveness, Thailand has intensively enhanced its technologies and capabilities to supply advanced automotive electronics components such as sensors, headers, connectors, electrical systems and embedded modules. For instance, Delta Electronics Thailand has produced the charging on board devices for Tesla Inc. The country is ready to produce high technology electronic parts for both domestic and global demand.

Sources: 1 Gartner 2 XYZprinting company Note: \* PLA = Polylactic Acid Sources: 1 PricewaterhouseCoopers (PwC) 2 OICA as of March 2017 3 Thai Automotive Industry Association and the Thailand Automotive Institute

### ROBUST HUMAN RESOURCES

Thailand's E&E employment is one of the biggest in the region, encompassing approximately 730,000 workers.<sup>1</sup> In 2016, over 29,500 students graduated with engineering degrees.<sup>2</sup> The abundance of workers covers every process of production in Thailand's electronics and electrical industry. Equipped with the requisite knowledge, skills, and experience in the industries, they are more than ready to support and drive your business.



### **PURSUING TRADE LIBERALIZATION**

Thailand has ratified a total of 12 free trade agreements (FTAs) with other countries, including China, Australia, Japan, India, New Zealand, and the 10 member states of ASEAN.<sup>3</sup> Furthermore, Thailand is in the process of establishing additional free trade agreements with Hong Kong and Pakistan to strengthen its competitiveness. These trade agreements will provide unrivaled opportunities for manufacturers.



ces: 1 Electrical and Electronics Institute 2 Office of the Higher Education Commission 3 Department of Trade Negotiations



Thailand is known for its world-class industrial capacities with efficient manufacturing processes, competitive labor and robust expertise. Thailand also stands at the forefront when it comes to the smart electronics industry.

### **EXCELLENT INFRASTRUCTURE**

Located in the heart of Southeast Asia, the country is well-connected to two billion people in Southeast Asia and China. With many direct flights and freight routes, Thailand is strategically located as a smart electronics production hub. The improvement in roadways and rail links, in addition to the expansion of U-Tapao airport and Laem Chabang deep-sea port will also provide the important connectivity needed for the smooth transport of goods.



### ACTING AS SUPPORTING INDUSTRY

The E&E market is enormous in Thailand. Various industries are actively expanding to meet the increasing need for E&E products. This includes Thailand's automotive sector which reached a capacity of 1.9 million units in 2016<sup>1</sup> and the electrical appliance sector which is the world's second largest exporter of air conditioners.<sup>2</sup>



# INVESTMENT INCENTIVES **BOI INCENTIVES**

BOI recognizes the importance and value of the smart electronics industry, and offers a wide range of tax and non-tax incentives for projects that meet national development objectives.

#### TAX INCENTIVES **ELECTRICAL PRODUCTS AND PARTS** INCENTIVES ELIGIBLE GROUP **CORPORATE INCOME EXEMPTION OF ACTIVITIES** TAX EXEMPTION **IMPORT DUTY\*** Manufacture of advance technology electrical products A2 **8 YEARS** with product design · Manufacture of advanced technological electrical products A3 **5 YEARS** · Manufacture of electrical equipment for industrial use such as power inverters, distribution transformer, main circuit breaker with design process • Manufacture of advance technology electrical products without product design · Manufacture of air conditioners, A4 refrigerators, freezers, washing **3 YEARS** and drying machines · Manufacture of electrical equipment for industrial use such as power inverters, distribution transformer, main circuit breaker without design process Manufacture of LED lamps · Manufacture of compressors and/ or motors for electrical appliances · Manufacture of, and parts for A2 organic and printed electronics **8 YEARS** (OPE) · Manufacture of, and parts for emissions, transmissions and reception devices used in fiber-optic and wireless communication systems · Manufacture of, and parts for electronic controls and measuring instruments for industrial/ agricultural use · Manufacture of, and parts for security control equipment · Manufacture of solar cells and/or raw materials for solar cells · Manufacture of, and parts for electronic controls and measurement instruments for medical/scientific devices and the automotive industry

#### TAX INCENTIVES FI FOTRICAL DRODUCTS AND DARTS

GROUP	ELIGIBLE		INCENTIVES		
	ACTIVITIES		COR T/	RPORATE INCOME Ax exemption	EXEMPTION O Import Duty
A2	<ul> <li>Manufacture of advanced hard disk drives and/or parts (excluding top covers, base plates or peripherals)</li> <li>Manufacture of solid state drives and/or parts for solid state drives</li> <li>Manufacture of high density energy storage( high density battery/supercapacitor)</li> <li>Manufacture of flexible printed circuits and/or multi-layer printed circuit boards and/or parts with system design</li> </ul>		>	8 YEARS	~
A3	<ul> <li>Manufacture of and/or parts (ex base plates or</li> <li>Manufacture of equipment for products</li> <li>Manufacture of and/or parts fo</li> <li>Manufacture of parts for photon for photonic int</li> <li>Manufacture of</li> <li>Manufacture of circuits and/or circuit boards a system design</li> </ul>	f hard disk drives ccluding top covers, peripherals) f parts and/or solar - powered f semiconductors r semiconductors f equipment and/or nic devices and/or egrated systems f flat panel displays f flexible printed multi-layer printed and/or parts without	>	5 YEARS	~
A4	<ul> <li>Manufacture of visual products</li> <li>Manufacture of electronics</li> <li>Manufacture of plates or peripl drives</li> <li>Manufacture of board assemb electro-magne</li> </ul>	f and parts of audio f and parts of office f top covers, base herals for hard disk f printed circuit ly (PCBA), tic products,	>	3 YEARS	~

\* Exemption of import duty on machinery and raw or essential used in manufacturing export products

Note



(EETIC) the industry.

Note: \* Exemption of import duty on machinery and raw or essential used in manufacturing export products

# BOI'S WORLDWIDE NETWORK

### OFFICE OF THE BOARD OF INVESTMENT

555 Vibhavadi-Rangsit Road., Chatuchak, Bangkok 10900 Tel: +66 (0) 2553-8111 Fax: +66 (0) 2553-8315 Website: www.boi.go.th Email: head@boi.go.th

#### ONE START ONE STOP INVESTMENT Center (OSOS)

18th Floor, Chamchuri Square Building, 319 Phayathai Road., Pathumwan, Bangkok 10330 Tel: +66 (0) 2209-1100 Fax: +66 (0) 2209-1199 Website: osos.boi.go.th Email: osos@boi.go.th

#### ONE STOP SERVICE CENTER FOR VISAS AND WORK PERMITS

18th Floor, Chamchuri Square Building, 319 Phayathai Road., Pathumwan, Bangkok 10330 Tel: +66 (0) 2209-1100 Fax: +66 (0) 2209-1194 Email: visawork@boi.go.th

#### **OVERSEAS OFFICES**

#### SHANGHAI

Thailand Board of Investment, Shanghai Office Royal Thai Consulate-General, 2rd Floor, 18 Wanshan Road, Changning District, Shanghai 200336, P.R.C. Tel: +86-21-5260-9877 Fax: +86-21-5260-9873 Email: shanghai@boi.go.th

#### BEIJING

Thailand Board of Investment, Beijing Office Royal Thai Embassy, No.40 Guang Hua Road., Beijing 100600 P.R.C. Tel: +86-10-6532-4510 Fax: +86-10-6532-1620 Email: beijing@boi.go.th

#### GUANGZHOU

Thailand Board of Investment, Guangzhou Office Investment Promotion Section, Royal Thai Consulate-General, Guangzhou No.36 Youhe Road, Haizhu District, Guangzhou, P.R.C. 510310 Tel: +86-20-8385-8988

Ext. 220-225 , +86-20-8387-7770 (Direct line) Fax: +86-20-8387-2700 Email: guangzhou@boi.go.th

#### TAIPEI

Thailand Board of Investment, Taipei Office Taipei World Trade Center, 3rd Floor, Room 3E 39-40 No.5 Xin-Yi Rd., Sec. 5 Taipei 110, Taiwan R.O.C. Tel: +886-2-2345-6663 Fax: +886-2-2345-9223 Email: taipei@boi.go.th

#### TOKYO

Thailand Board of Investment, Tokyo Office Royal Thai Embassy, 8th Floor, Fukuda Building West, 2-11-3, Akasaka, Minato-ku, Tokyo 107-0052 Japan Tel: +81 (0) 3-3582-1806 Fax: +81 (0) 3-3589-5176 Email: tyo@boi.go.th

#### OSAKA

Thailand Board of Investment, Osaka Office Royal Thai Consulate-General, Bangkok Bank Building, 7th Floor, 1-9-16 Kyutaro-Machi, Chuo-Ku, Osaka 541-0056 Japan Tel: +81 (0) 6-6271-1395 Fax: +81 (0) 6-6271-1394 Email: osaka@boi.go.th

#### SEOUL

Thailand Board of Investment, Seoul Office #1804, 18th Floor, Koryo Daeyeongak Center, 97 Toegye-ro, Jung-gu, Seoul,100-706, Korea Tel: +82-2-319-9998 Fax: +82-2-319-9997 Email: seoul@boi.go.th

#### MUMBAI

Thailand Board of Investment, Mumbai Office Express Tower, 12th Fl., Barrister Rajni Patel Marg, Nariman Point, Mumbai, Maharashtra 400021 Tel: +(91 22) 2204 1589-90 Fax: +(91 22) 2282 1525 Email: mumbai@boi.go.th

#### NEW YORK

Thailand Board of Investment, New York Office 7 World Trade Center, 34th Floor. Suite F, 250 Greenwich Street, New York, New York 10007, U.S.A. Tel: +1 (0) 212 422 9009 Fax: +1 (0) 212 422 9119 Email: nyc@boi.go.th Website: www.thinkasiainvestthailand.com

#### LOS ANGELES

Thailand Board of Investment, Los Angeles Office Royal Thai Consulate-General, 611 North Larchmont Boulevard, 3rd Floor, Los Angeles CA 90004, U.S.A. Tel: +1 (0)-323-960-1199 Fax: +1 (0)-323-960-1190 Email: boila@boi.go.th

#### FRANKFURT

Thailand Board of Investment, Frankfurt Office Investment Section, Royal Thai Consulate-General Bethmannstr. 58,5.0G 60311 Frankfurt am Main, Federal Republic of Germany Tel: +49 (069) 92 91 230 Fax: +49 (069) 92 91 2320 Email : fra@boi.go.th

#### PARIS

Thailand Board of Investment, Paris Office Ambassade Royale de Thaïlande 8, rue Greuze, 75116 Paris, France Tel: +(33-1) 56 90 26 00 Fax: +(33-1) 56 90 26 02 Email: par@boi.go.th

#### STOCKHOLM

Thailand Board of Investment, Stockholm Office Stureplan 4C 4th Floor, 114 35 Stockholm, Sweden Tel: +46 (0) 8463 1158, +46 (0) 8463 1174-75 Fax: +46 (0) 8463 1160 Email: stockholm@boi.go.th

#### SYDNEY

Thailand Board of Investment, Sydney Office Suite 101, Level 1,234 George Street, Sydney New South Wales 2000, Australia Tel: +61-2-9252-4884 +61-2-9252-4882 Email: sydney@boi.go.th

