

India's Emerging Semiconductor Ecosystem: Key Players

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India aims to become a notable semiconductor manufacturing hub to reduce import dependencies in electronics production and frontier sectors. We note prominent distributor partners crucial for driving semiconductor adoption and growth across industries as well as beneficiaries under the India Semiconductor Mission.

The global semiconductor industry is rapidly expanding, driven by technological advancements and the increasing demand for electronics across sectors like electric vehicles (EVs), the Internet of Things (IoT), and artificial intelligence (AI). Recognizing the strategic importance of semiconductors, India is making concerted efforts to establish itself as a key player in this ecosystem. In this context, distributor partners become important to the creation of supply networks and domestic production capacity in India.

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While India has long excelled in electronics manufacturing and IT services, the semiconductor industry has traditionally lagged due to the absence of domestic chip manufacturing. However, recent initiatives, including the US\$10 billion India Semiconductor Mission (ISM), aim to transform India into a global semiconductor hub. The ISM program seeks to attract international semiconductor manufacturers, support local start-ups, and provide incentives for research and development.

Key initiatives like "Digital India" and "Make in India" further promote the development of local semiconductor production, intending in the long-term to reduce the country's dependence on imports. With investments in fabs (fabrication plants) and chip packaging units, India's semiconductor ecosystem is poised to benefit traditionally strong manufacturing industries like automotive and electronics, as well as emerging capacity in telecom equipment production.

To stay briefed on the latest developments in this area, follow our article: [India's Semiconductor Sector: Tracking Government Support and Investment Trends](#)

Key distributor partners driving the chip ecosystem in India

Prominent distributors like Mouser, Digikey, Element14, Rochester, and Avnet are key players in India's semiconductor industry. The companies reportedly provide critical technical expertise, logistical support, and supply chain solutions, thereby enabling manufacturers to meet the growing demand across various sectors.

Other distributors such as Future Electronics also facilitate the supply of components, contributing to the expansion of the local market. Some of the **allied component** manufacturing companies in India are:

- Tata Elxsi
- HCL Tech
- Dixon Technologies
- CG Power
- Vedanta
- L&T
- Bharat Electronics
- Hitachi Energy
- MIC Electronics
- Moschip Technologies
- Rajesh Exports
- ABB India
- Kaynes Technology
- SPEL Semiconductor
- Ami Organics
- ASM Technologies
- Praj Industries
- Va Tech Wabag
- RIR Power Electronics
- Surana Telecom & Power

With India's smartphone industry projected to grow to US\$150-200 billion and the electronics sector to US\$400 billion within five years, distributors are set to play an increasingly vital role. The strong presence of precision industries like aerospace and defense in **Bangalore** (capital, state of **Karnataka**) has made the southern Indian city a natural fit for the semiconductor sector's growth in India. However, the government appears now to be pushing for an expansion of regional capabilities under its ISM program.

Distributor partners' role in India's semiconductor ecosystem

As India's semiconductor industry expands, distributor partners are crucial in ensuring the efficient delivery and adoption of semiconductor components. Their roles include:

- **Supply chain management:** Distributors **manage the complex supply chains** of semiconductors, ensuring timely delivery and minimizing disruptions.
- **Technical expertise:** They provide manufacturers with technical guidance, including design support, prototyping, and application engineering, particularly important for local companies with limited semiconductor expertise.
- **Global-local market connection:** Distributors bridge the gap between global semiconductor manufacturers and Indian markets, ensuring that imported components meet local requirements.
- **Collaboration for innovation:** Distributors foster innovation by collaborating with manufacturers, R&D centers, and start-ups, contributing to India's emergence as a semiconductor innovation hub.

Key trends shaping India's semiconductor market

- **5G and telecommunications:** The rollout of 5G networks is driving demand for high-performance semiconductors. Companies like Reliance Jio and Bharti Airtel are heavily investing in 5G infrastructure, pushing innovation in semiconductor technologies.
- **Automotive and EVs:** The growing EV sector in India is a significant consumer of semiconductors, with chips used in sensors, controllers, and power systems.
- **IoT:** Expanding applications of IoT across healthcare, agriculture, and smart cities are fueling demand for specialized semiconductor technologies.
- **AI and machine learning (ML):** The rise of AI across industries in India is increasing the need for semiconductors designed for AI/ML workloads.
- **Local manufacturing:** India's growing talent pool in semiconductor design, coupled with government support, may soon lead to the establishment of local fabs, further boosting domestic production.

The role of semiconductors across key sectors

Semiconductor chips are fundamental to several industries, powering devices from personal electronics to complex machinery. Semiconductors play a critical role in the following sectors:

- **Computing:** Semiconductors like microprocessors and GPUs ensure the smooth performance of computers by executing commands and managing power, preventing overheating during intensive tasks.
- **Telecommunications:** Semiconductors in smartphones and communication devices manage critical functions such as display, battery life, and connectivity. Devices like routers and pagers also rely on these chips.
- **Household appliances:** From refrigerators to washing machines, semiconductors control essential functions like temperature regulation and automation, with their importance growing as smart technology and IoT adoption increases.
- **Banking:** Microchips power online banking systems, ATMs, and security systems, enhancing efficiency and security in financial transactions.
- **Security:** High-performance chips support cybersecurity measures and devices like motion-detection cameras, ensuring quicker responses and better security.
- **Healthcare:** Medical equipment, including surgical machines and pacemakers, rely on semiconductors for precision, safety, and reliability.
- **Transportation:** Semiconductors enable essential functions like GPS, Wi-Fi, and automated systems in cars, airplanes, and trains, improving travel efficiency and safety.
- **Manufacturing:** Factories depend on semiconductors to ensure smooth operations of machinery, reducing risks of delays and breakdowns.

Semiconductors underpin nearly every significant technological breakthrough today. Intrinsic semiconductors (pure without impurities) and extrinsic semiconductors (modified through "doping") are the two primary types that drive these advancements. Materials like silicon, germanium, and gallium arsenide are commonly used, alongside emerging organic semiconductors.

Semiconductor firms benefiting from the ISM program in India

The India Semiconductor Mission (ISM) has been instrumental in attracting investments and collaborations in the semiconductor sector. Below are some key companies that have leveraged the program:

Tata Group: Tata Electronics signed an MoU with Tokyo Electron (TEL) on September 9, 2024, to acquire equipment and services for its semiconductor facilities in Gujarat and Assam. This collaboration will emphasize workforce training, R&D, and infrastructure development. Tata Electronics is investing INR 910 billion (US\$10.84 billion) in its Gujarat fabrication unit and INR 270 billion (US\$3.21 billion) in its Assam assembly and testing unit. The facilities will produce chips for sectors such as automotive, mobile devices, and AI. TEL plans to utilize India's engineering talent to support its global product development, fostering innovation across multiple technologies. Additionally, Tata Electronics is expanding with two more fabs in Dholera, Gujarat. The first fab, in partnership with Taiwan's PSMC, is under construction and expected to start production in 2026, with a capacity of up to 50,000 wafers per month. The development of the second and third fabs will be determined based on future market conditions. (As of **April 2024**, Tata-PSMC commenced development of 14nm chip technology, supplementing plans to manufacture 28nm nodes at the Dholera fab unit.)

Furthermore, Tata Projects has secured a contract to construct Micron Technology's advanced semiconductor assembly and testing facility in Sanand, Gujarat, which will adhere to LEED Gold Standards with sustainable construction practices.

Also, Tata Consultancy Services (TCS) is set to work with Tata Electronics Pvt Ltd in various stages of the chip manufacturing process. TCS can provide semiconductor design, engineering, software solutions, and IP-based products.

• **Kaynes Semicon:** On September 2, 2024, India's Union Cabinet approved a proposal by Kaynes Semicon to set up a semiconductor unit in Sanand, Gujarat, at a cost of about INR 40 billion (approx. US\$475 million). This will be the fifth semiconductor unit approved under the ISM and the second in Sanand. The facility will produce 6 million chips through OSATs per day for industries such as automotive, electric vehicles, and mobile phones.

• **STMicroelectronics:** Murugappa Group's CG Power and Industrial Solutions Ltd. has partnered with Renesas Electronics America Inc. and Stars Microelectronics (Thailand) Public Co. Ltd. to establish an **outsourced semiconductor assembly and testing (OSAT) facility in Gujarat.** The investment breakdown includes US\$205 million from CG, US\$15 million from Renesas, and US\$2 million from Stars. The JV is pending necessary approvals and subsidies from the government. CG has committed to investing approximately US\$791 million over five years in the OSAT venture.

• **Micron Technology:** Micron Technology's President and CEO, Sanjay Mehrotra, announced that Phase 1 of the company's plant in Sanand, Gujarat, will be operational by early 2025, featuring 500,000 square feet of clean room space for ATMP operations. Micron has already hired 200 people for this facility, who are undergoing training in Mohali and Malaysia. The completed project will create 5,000 jobs in Gujarat, with Phase 2 planned for the latter half of this decade. Per a company press release, "Micron's new facility will enable assembly and test manufacturing for both DRAM and NAND products and address demand from domestic and international markets."

South Korean firm Simmtech, which manufactures high-layer PCBs for semiconductors, had signed a US\$150-million-MoU to set up a plant close to Micron over 30 acres of land. Simmtech has been given a subsidy under the Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS). Simmtech's three largest customers are Samsung Electronics, SK Hynix, and Micron.

• **Samsung Electronics:** Samsung, a key player in India's electronics sector, inaugurated a semiconductor R&D facility in Bengaluru in February 2024, under its subsidiary Samsung Semiconductor India Research (SSIR), to bolster its semiconductor capabilities.

• **Larsen & Toubro Ltd.:** Larsen & Toubro Ltd. plans to invest over US\$300 million in establishing a fabless chip company in India. The company aims to design 15 products by 2027, aligning with India's goal to reduce semiconductor imports and build local capacity.

• **Sahasra Semiconductor:** Sahasra Semiconductor, a participant in India's Scheme for Promotion of Manufacturing of Electronic Components and Semiconductors (SPECS), will begin commercial production of the first made-in-India memory chips at its Bhiwadi plant by late 2023. The facility will start with basic memory products and later expand to advanced packaging. The company receives a 25 percent financial incentive on capital expenditure under SPECS.

• **Foxconn:** Foxconn plans to invest around US\$37.2 million in a joint venture with the HCL Group, holding a 40 percent stake. The decision on the unit's location has been left to HCL, which prefers Uttar Pradesh due to its proximity to its headquarters in Noida. The venture has secured 30 acres of land near the upcoming Jewar airport in Noida, allocated by the Yamuna Expressway Industrial Development Authority (YEIDA), for setting up a semiconductor outsourced assembly and testing unit. This would be the first OSAT unit in Uttar Pradesh, pending central government approval, which has asked the firms for more information, such as a technology document or a technical agreement for OSAT. The UP government provides substantial capital and interest subsidies, but Foxconn-HCL are awaiting approval from the ISM.