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Kaynes OSAT Plant — India's Semiconductor Indigenisation Milestone

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Kaynes OSAT Plant — India's Semiconductor Indigenisation Milestone

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✍ WHY IN NEWS

PM Narendra Modi inaugurated the Rs 3,307 crore Kaynes Technology Outsourced Semiconductor Assembly and Test (OSAT) facility at Sanand, Gujarat, on March 31, 2026 — the first semiconductor assembly plant in India to achieve commercial production, under the India Semiconductor Mission (ISM).

WHAT OSAT MEANS — THE SEMICONDUCTOR VALUE CHAIN

The Four Stages of a Chip's Life

Understanding where Kaynes fits requires understanding how semiconductors are made:

STAGE	ACTIVITY	GLOBAL LEADER	INDIA'S STATUS
Design	Chip architecture (RTL, layout)	USA (Qualcomm, AMD, Apple), UK (ARM)	Strong — 20% of global chip designers are Indian
Fabrication (Fab)	Etching circuits on silicon wafers	Taiwan (TSMC ~60%), South Korea (Samsung), USA	Weak — Tata's Dholera fab (under construction)
OSAT	Assembly, packaging, testing	Taiwan, China, Malaysia	Kaynes (operational), Tata OSAT (Assam, upcoming)
Equipment	Machines for fab/OSAT	Netherlands (ASML), USA (Applied Materials)	Minimal

Kaynes operates at Stage 3 — it receives finished wafers from fabs elsewhere and performs assembly, packaging, and testing before the chips go into products.

What Intelligent Power Modules (IPMs) Are

Kaynes's commercial production focuses on **Intelligent Power Modules (IPMs)** — integrated semiconductor packages that combine power transistors, gate drivers, and protection circuits. IPMs are critical for:

- **Electric vehicles:** motor controllers that regulate battery-to-motor power flow
- **Industrial drives:** factory automation, HVAC, compressors, elevators
- **Renewable energy:** solar inverters, wind turbine converters
- **White goods:** air conditioners, washing machines (inverter-based energy-efficient models)

India imported ~₹12,000 crore worth of IPMs and similar power semiconductors in FY 2024-25 — most from Japan, South Korea, and China.

INDIA SEMICONDUCTOR MISSION — ARCHITECTURE

Policy Background

India's semiconductor push has three roots:

- 1 **COVID supply chain shock (2021):** Global chip shortage halted auto production; India lost ~₹20,000 crore in auto output
- 2 **Geopolitical concentration risk:** Taiwan produces ~60% of global chips; a conflict would devastate India's electronics manufacturing

3 PLI for Electronics + Atmanirbhar Bharat: Vision to make India a global electronics hub by 2026

ISM Approved Projects (as of 2026)

COMPANY	PARTNER	LOCATION	TYPE	OUTLAY
Tata Electronics	PSMC (Taiwan)	Dholera, Gujarat	Semiconductor Fab (28nm)	₹91,000 crore
Tata Electronics	—	Jagiroad, Assam	OSAT	₹27,000 crore
CG Power	Renesas (Japan) + Stars Micro (Thailand)	Sanand, Gujarat	OSAT	₹7,600 crore
Kaynes Technology	—	Sanand, Gujarat	OSAT	₹3,307 crore ✓ <i>operational</i>

The **Dholera fab** (Tata + PSMC) is the crown jewel — India’s first silicon wafer fabrication plant, targeting 28nm logic chips. It is under construction and expected to produce its first wafers by 2027-28.

Financial Incentive Structure

Under ISM, the government provides **50% of project cost** as fiscal incentive for:

- Semiconductor fabs
- Display fabs
- Compound semiconductor/sensor/MEMS fabs
- OSAT facilities
- Semiconductor design companies (via Design Linked Incentive, DLI)

STRATEGIC IMPLICATIONS

Supply Chain Security

India currently imports **~85% of semiconductors** it consumes. The ISM aims to reduce this dependence — but realistically, even by 2030, India will only substitute a fraction of import requirements. The Dholera fab’s 28nm technology will produce chips suitable for:

- Automotive electronics
- IoT devices

- Power management
- Industrial controls

It will NOT compete with TSMC’s advanced 3nm/5nm chips used in smartphones and AI processors — those remain a Taiwan-USA-Korea monopoly for the foreseeable future.

Geopolitical Dimension

The Keynes inauguration coincides with:

- US CHIPS Act (2022, \$52.7 billion) incentivising Intel, TSMC, Samsung to build fabs in America
- EU Chips Act (2023, €43 billion target)
- Japan’s RAPIDUS project (TSMC partnership at Kumamoto)
- India’s ISM (₹76,000 crore total outlay)

All major democracies are simultaneously trying to de-risk semiconductor supply chains from Taiwan and China. India’s advantage: **design talent** (20%+ of global chip designers are of Indian origin; Indian-origin CEOs at Intel, Google, AMD, Microsoft).

UPSC RELEVANCE

OSAT; IPM; India Semiconductor Mission (ISM); MeitY; Keynes Technology; Sanand (Gujarat); Dholera fab (Tata-PSMC); DLI scheme.

MAINS GS-3:

“Semiconductors have become the new ‘oil’ of the global economy — analyse India’s strategy to build a domestic chip ecosystem against global competition.”

INTERVIEW:

“India is strong in chip design but weak in fabrication. Can OSAT plants alone provide strategic autonomy in semiconductors?”

★ FACTS CORNER — KNOWLEDGEPEDIA

KAYNES TECHNOLOGY OSAT:

Location: Sanand, Gujarat

Investment: ₹3,307 crore

Type: OSAT (assembly + packaging + testing)

Products: Intelligent Power Modules (IPMs) — EVs, industrial, renewable energy

Capacity: ~6.3 million units/day (full scale)

First semiconductor facility to reach commercial production under ISM

Inaugurated: March 31, 2026 by PM Modi

INDIA SEMICONDUCTOR MISSION (ISM):

Launched: December 2021

Nodal ministry: MeitY (Ministry of Electronics and IT)

Total incentive outlay: ₹76,000 crore

Incentive: 50% of project cost for approved facilities

Design Linked Incentive (DLI): 50% cost + 6% net revenue (up to 5 years) for chip design startups

MAJOR ISM-APPROVED PROJECTS:

Tata Electronics + PSMC: Dholera fab (₹91,000 crore; 28nm; Gujarat)

Tata Electronics: Assam OSAT (₹27,000 crore)

CG Power + Renesas + Stars Micro: Sanand OSAT (₹7,600 crore)

Kaynes Technology: Sanand OSAT (₹3,307 crore) ← operational

GLOBAL SEMICONDUCTOR CONTEXT:

TSMC (Taiwan): ~60% of global foundry capacity; 3nm/5nm chips

US CHIPS Act (2022): \$52.7 billion domestic semiconductor investment

Samsung (South Korea): ~17% foundry market share

India's import dependency: ~85% of chips consumed are imported

India's semiconductor consumption (2024): ~\$30 billion/year

Target by 2030: \$100 billion semiconductor market

OTHER RELEVANT FACTS:

ASML (Netherlands): makes EUV machines used for sub-7nm chips — monopoly; export-controlled to China

28nm node: mature but critical for automotive, IoT, industrial (not cutting-edge mobile/AI)

ARM architecture: used in ~95% of smartphones; UK company; acquired attempts blocked by regulators

India chip designers: ~20% of global workforce; concentrated in Bengaluru, Hyderabad, Pune

Sources: [PIB](#), [MeitY](#), [BusinessToday](#), [GKToday](#)

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