

October 2026 Issue
(Continuously Updated)



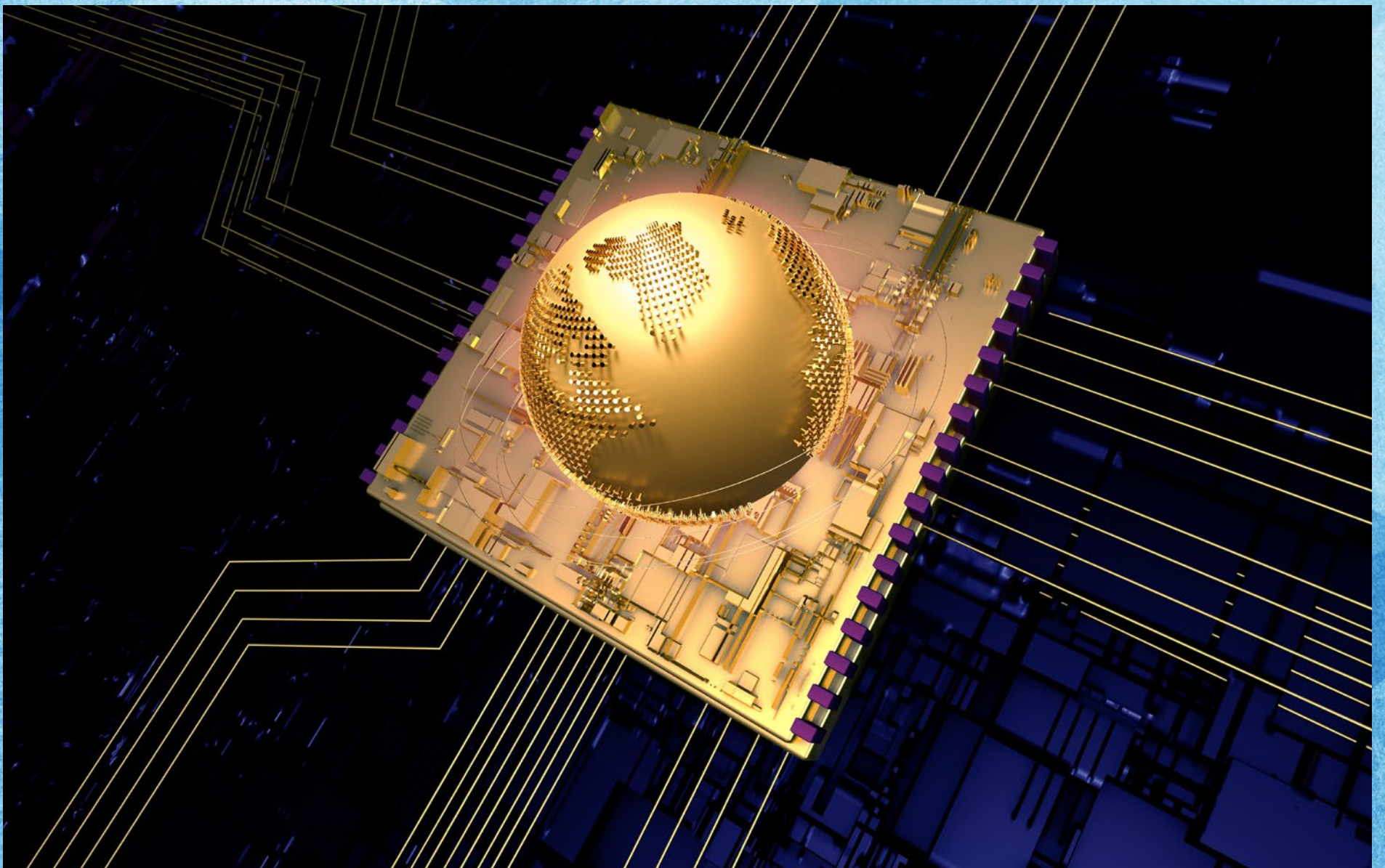
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OCTOBER VERSION

Taiwan at the Core: Strategic Partner in the Global Semiconductor Landscape and Realignment

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Executive Summary

TAIWAN AT THE CORE: STRATEGIC PARTNER IN GLOBAL SEMICONDUCTOR LANDSCAPE AND REALIGNMENT

offers a clear, authoritative, and timely guide to understanding how semiconductors have become the strategic backbone of the modern global economy—and why Taiwan sits at its very center. As chips power everything from artificial intelligence and advanced computing to electric vehicles and defense systems, this book explains how Taiwan’s dominance—commanding over 78% of the global foundry market—has made the island an indispensable anchor of the world’s digital infrastructure.

Written from a policy-oriented and global perspective, the book examines the ongoing “semiconductor strategic realignment,” unpacking Taiwan’s core position in the global semiconductor ecosystem; the revitalization efforts of United States, Japan and Europe; China’s aggressive expansion in mature-node manufacturing amidst advanced-node constraints; South Korea’s pivotal dominance in AI-driven High Bandwidth Memory (HBM); and the emerging roles of economies such as Singapore and India are collectively reshaping the industry. Readers will gain a coherent understanding of the global semiconductor supply chain, the forces driving its reconfiguration, and the geopolitical and economic implications that will define the next decade of technological competition.

Beyond analysis, Taiwan at the Core positions Taiwan as a critical strategic partner for governments and enterprises alike. With its unparalleled AI ecosystem, world-class talent base, and robust intellectual property protection, Taiwan offers a uniquely trusted environment for advanced R&D and regional operations. Crucially, the book underscores a central message: global supply chain resilience and shared prosperity in the Angstrom Era are inseparable from peace and stability across the Taiwan Strait—making Taiwan not only a technological leader, but a cornerstone of the future global order.

Please feel free to reach out to the Economic Division of the Taipei Representative Office in Singapore should you have any enquiries or are seeking partnership opportunities of investment or collaboration in the field of semiconductors and AI in Taiwan.

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Published: Taipei Representative Office in Singapore

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Singapore 119963

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Cover page and digital layout optimized by Liu Fang Ching.

First Digital Book Edition: February 2026

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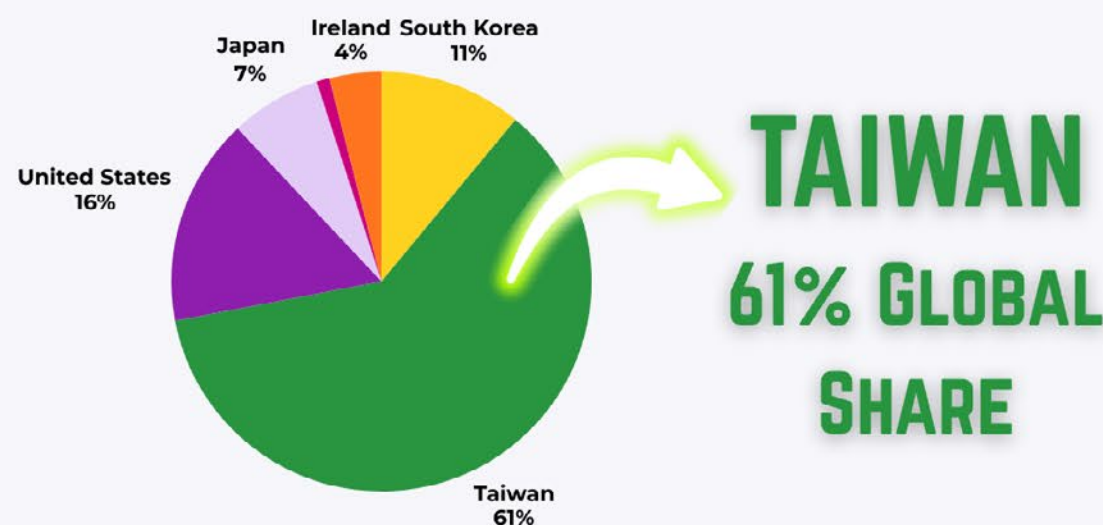
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Taiwan at the Core

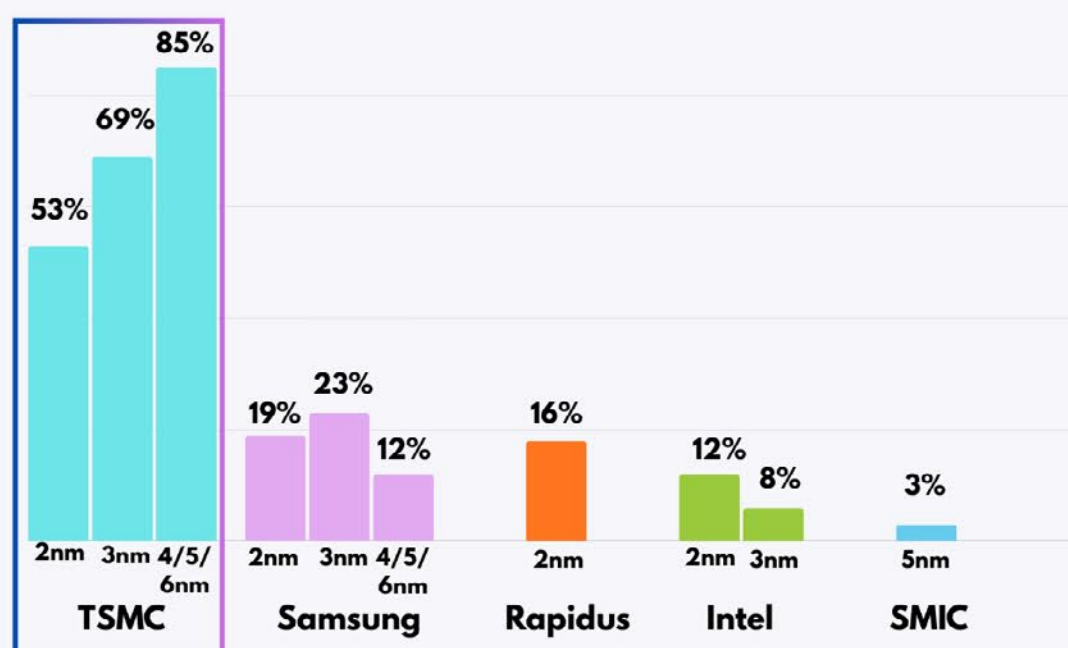
Global Shares and Rankings of Taiwan IC Industry: 2025(p)



Global Sub-6nm Node Capacity Share by Country: 2029



Global Sub-6nm Node Capacity Share: 2029



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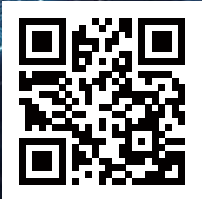
Taiwan Semiconductor Landscape

Discover Taiwan's complete semiconductor ecosystem, with company profiles, industry distribution and market insights.

Q IC Design

Q IC Manufacturing

Q IC Packaging & Testing



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Preface

Semiconductors—often likened to the “oil” of the twenty-first century—have become the indispensable backbone of the modern global economy. From breakthroughs in artificial intelligence and high-performance computing to the proliferation of electric vehicles, defense systems, and consumer electronics, chips now underpin nearly every dimension of technological and economic activity. As the industry, having surpassed the trillion-dollar scale in 2026, advances toward US\$ 2 trillion by 2027, driven by surging demand for AI and data-intensive applications, Taiwan’s role in the global semiconductor supply chain has never been more crucial.

Taiwan’s centrality is not merely a function of industrial success or market competitiveness. It is deeply intertwined with national security, technological sovereignty, and the strategic industrial policies of major powers. With more than 78 percent of global foundry market share and an overwhelming majority of advanced-node manufacturing capacity, Taiwan’s stability and leadership form a critical pillar of the world’s digital infrastructure. As the industry enters the “Angstrom Era,” Taiwan remains the gravitational center of manufacturing, retaining over 90 percent of its most advanced capacity at home.

In this context, preserving peace and stability across the Taiwan Strait is not simply a regional concern, but a global imperative. Economies committed to sustained growth, technological advancement, and shared prosperity all have a direct stake in safeguarding the resilience of the global semiconductor supply chain—and, inseparably, in maintaining peace and stability across the Taiwan Strait. Taiwan, therefore, is not merely a participant in the semiconductor ecosystem; it is one of the indispensable anchors.

The primary objective of *Taiwan at the Core: Strategic Partner in the Global Semiconductor Landscape and Realignment* is to offer an updated and comprehensive analysis of the forces steering the global semiconductor industry. The book examines the strategic initiatives of the United States; South Korea’s dominance in memory and its pivot toward the AI era; the revitalization efforts of Japan and Europe; China’s expansion in mature-node manufacturing; and the emerging roles of economies such as Singapore and India. Together, these dynamics define an era of “semiconductor strategic realignment,” in which partnership with Taiwan is a strategic necessity rather than an option.

Readers will readily recognize that the semiconductor industry is marked by an extraordinary pace of innovation and an equally dense accumulation of data. Given the breadth of regional coverage and the rapid evolution of market conditions, synchronizing every data point in real time is inherently challenging. Some statistics may therefore reflect minor time lags or discrepancies. The aim of this work is not a static snapshot, but a coherent framework capturing dominant trends, policy directions, and structural transformations.

It is my hope that this book will contribute to a deeper and more nuanced understanding of the challenges and opportunities confronting the global semiconductor ecosystem, and serve as a practical

reference for governments, industries, and academic institutions as they prepare for the next phase of technological transformation.

I would like to express my sincere appreciation to the Industry, Science and Technology International Strategy Center of Taiwan's Industrial Technology Research Institute (ITRI), whose rigorous research capabilities, long-standing policy insight, and comprehensive data support provided an indispensable foundation for this book and greatly facilitated its timely completion. I am also grateful to Mr. Chris Hung, Director General of the Market Intelligence & Consulting Institute at Taiwan's Institute for Information Industry, for his valuable insights and supplementary materials.

I would like to extend my special thanks to TrendForce, a global provider of market intelligence, in-depth analysis, and consulting services for the technology industry. Their professional advice and data support, together with their contributed analyses on overview of semiconductor manufacturing process technology, advanced process capacity shares of major foundries, and shares of advanced and matured semiconductor manufacturing processes by country, have been invaluable in enabling readers to gain a deeper understanding of these critical issues.

My sincere appreciation also goes to Mr. Lu Cheng-Yang, consultant at Barnes & Thornburg (BT) Strategies in Indiana, U.S. I am grateful for his detailed comments on the manuscript and for his enormous contribution to the chapter of Korea's semiconductor industrial policies and development, which strengthened the overall assessment of the global semiconductor landscape.

Finally, I wish to express my heartfelt gratitude to Mr. Fu Kuo-Chang and his publishing team for their steadfast support. Their commitment has enabled this work to reach a wider international audience and to foster a clearer understanding of Taiwan's indispensable role in the global semiconductor supply chain, as well as the broader economic and geopolitical forces shaping the industry's future. Additionally, I would like to thank Serena Liu Fang Ching for her editorial advice on this book as well as providing visual design and touchups to various infographics.



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Taiwan's Representative to Singapore
September 15, 2026

I. Global Semiconductor Market

1. Overall Market

Semiconductors, or “chips,” are integral to our modern world, driving innovation and efficiency across a plethora of applications, from medical devices and clean energy to transportation and advanced defense systems. With increasing demand for semiconductors across sectors, the global semiconductor industry surpassed the trillion-dollar threshold in 2026, well ahead of earlier expectations. The importance of semiconductors, therefore, extends far beyond the realm of technology; they are the lifeline of modern economies and crucial to a nation’s strategic interests.

Integrated circuits dominate that market. In 2024—the last settled baseline before the AI surge—worldwide semiconductor revenue reached US\$ 630.5 billion, of which ICs accounted for US\$ 539.5 billion, or 85.6%; discrete semiconductors, optoelectronics and sensors together made up the remaining 14.4%. Within the IC segment, logic was the largest category at 40.0% of IC revenue, followed by memory at 30.7%, analog at 14.8% and micro components at 14.6%. Logic and memory have since become the two engines of the AI cycle.

The WSTS full-year data for 2025 recorded one of the strongest annual expansions in the industry’s history: global revenue of US\$ 795.6 billion, up 26.2%, with growth accelerating through the year to US\$ 238.9 billion in the fourth quarter alone, 38.4% above the same quarter of 2024. Logic and memory led the expansion, reaching US\$ 299.5 billion (up 38.8%) and US\$ 230.0 billion (up 39.0%) respectively, on demand for AI accelerators, data-center computing and high-bandwidth memory. Sensors (up 10.4%), analog (up 8.7%) and microprocessors (up 7.9%) grew solidly, while discrete devices edged down 1.0% (see Table 1).

Table 1. Global Semiconductor Market: 2022-2025

Unit: US\$ Billion								
Segment	2022		2023		2024		2025	
Analog	89.0	20.1%	81.2	-8.7%	79.6	-2.0%	86.5	8.7%
Discretes	34.0	12.0%	35.5	4.5%	31.0	-12.7%	30.7	-1.0%
Logic	176.6	14.0%	178.6	1.1%	215.8	20.8%	299.5	38.8%
Memory	129.8	-15.6%	92.3	-28.9%	165.5	79.3%	230.0	39.0%
Micro	79.1	-1.4%	76.3	-3.5%	78.6	3.0%	84.9	7.9%
Optoelectronics	43.9	1.2%	43.2	-1.6%	41.1	-4.8%	43.0	4.7%
Sensors & Actuators	21.8	13.7%	19.8	-9.4%	18.9	-4.1%	21.0	10.4%
Total	574.1	3.3%	526.9	-8.2%	630.5	19.7%	795.6	26.2%

Source: World Semiconductor Trade Statistics, “Global Semiconductor Market grows 26% in 2025 to \$796 billion,” March 6, 2026.

The trajectory steepened again in 2026. The WSTS Spring 2026 forecast put the market at US\$ 1,511

billion, or 89.9% annual growth; once actual second-quarter results were incorporated in the update of August 6, 2026, that figure was raised to approximately US\$ 1,655 billion, about 108% growth. IC revenue is projected at US\$ 1,412 billion, with memory and logic growing fastest. Four structural forces underpin the expansion: the proliferation of generative AI, the build-out of AI-accelerated data centers, rising semiconductor content in electric and autonomous vehicles, and the spread of sensors and optoelectronics through smart devices and industrial systems (see Table 2).

Table 2. Global Semiconductor Market: 2025-2027

Spring 2026	Amounts in US\$M			Year on Year Growth in %		
	2025	2026	2027	2025	2026	2027
Americas	256,476	543,654	701,439	31.4	112.0	29.0
Europe	54,694	86,643	101,587	6.7	58.4	17.2
Japan	44,723	57,050	67,332	-4.3	27.6	18.0
Asia Pacific	439,747	823,900	1,043,326	30.3	87.4	26.6
Total World - \$M	795,640	1,511,248	1,913,683	26.2	89.9	26.6
Discrete Semiconductors	30,728	33,188	35,712	-1.0	8.0	7.6
Optoelectronics	43,042	44,218	46,436	4.7	2.7	5.0
Sensors	20,894	21,516	23,002	10.4	3.0	6.9
Integrated Circuits	700,975	1,412,326	1,808,533	29.9	101.5	28.1
Analog	86,519	95,358	101,662	8.7	10.2	6.6
Micro	84,867	101,655	121,966	7.9	19.8	20.0
Logic	299,547	411,371	522,820	38.8	37.3	27.1
Memory	230,042	803,941	1,062,085	39.0	249.5	32.1
Total Products - \$M	795,640	1,511,248	1,913,683	26.2	89.9	26.6

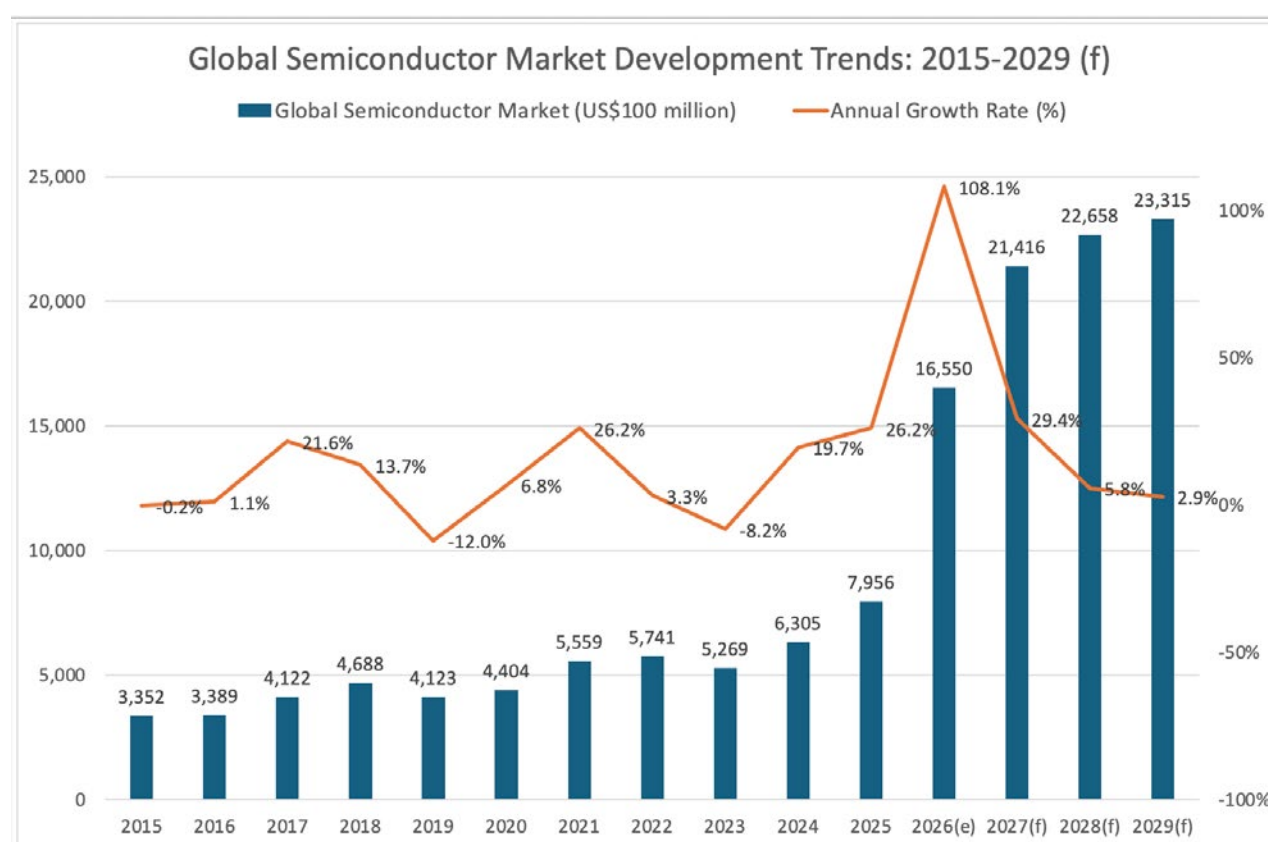
Source: World Semiconductor Trade Statistics, "Global Semiconductor Market Surges Beyond USD 1.5 Trillion in 2026 Driven by Extraordinary Memory Expansion," June 2, 2026.

The half-year data explain the revision. The market reached US\$ 702 billion in the first half of 2026, 102% above the same period of 2025, led by memory, which expanded by an extraordinary 305% year-over-year, and logic, which grew 45%; every other product category also posted positive annual growth. For the full year, memory is now expected to grow by 302%, 53 percentage points above the original spring estimate, and 2027 is put at roughly US\$ 2.1 trillion, or about 29% growth.

This expansion follows a decade of pronounced cyclicality. A strong upcycle in 2017 (21.6%) and 2018 (13.7%) gave way to a 12.0% contraction in 2019; the pandemic years produced a surge in 2021 (26.2%) before growth moderated to 3.3% in 2022 and reversed to -8.2% in 2023 amid inventory correction. The market returned to strong expansion in 2024, reaching US\$ 630.5 billion on 19.7% growth as memory prices recovered and AI investment accelerated.

Looking ahead, WSTS projects continued robust momentum in 2026, with a further 108.1% increase, bringing the market to approximately US\$ 1.66 trillion. Beyond 2026, growth is expected to continue above historical industry trends before normalizing. The market is projected to reach US\$ 2,142 billion in 2027, corresponding to annual growth of 29.4%, and then to expand more moderately to roughly US\$ 2,266 billion in 2028 (5.8%) and US\$ 2,332 billion in 2029 (2.9%). This trajectory suggests a transition from cyclical recovery to structurally driven expansion, underpinned by sustained demand from generative AI, high-performance computing, electric and autonomous vehicles, and the continued scaling of cloud and edge infrastructure, followed by consolidation at a markedly higher plateau (see Figure 1).

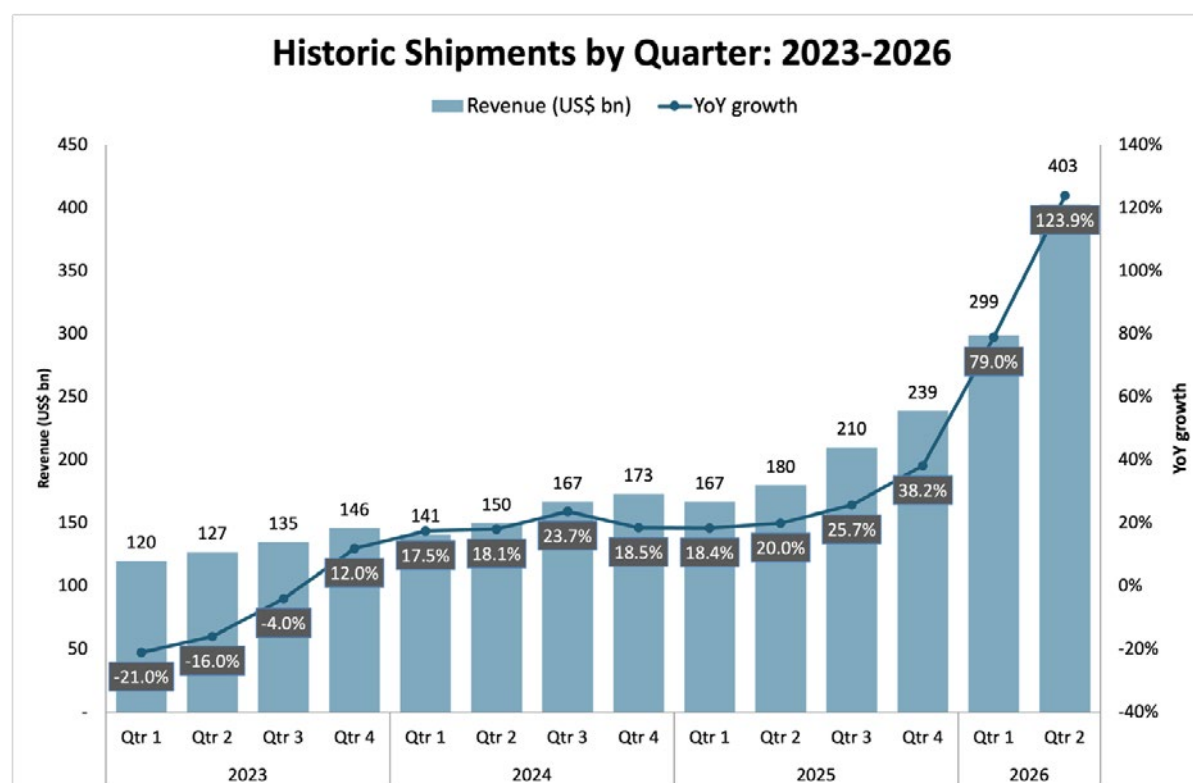
Figure 1. Global Semiconductor Market: 2015–2029(f)



Source: World Semiconductor Trade Statistics, “Global Semiconductor Market records exceptional growth in Q2 2026,” August 6, 2026. Figures for 2027–2029 are projections derived from the WSTS Spring 2026 forecast.

On a quarterly basis, the acceleration is even more striking. Quarterly revenue climbed from US\$ 167 billion in the first quarter of 2025 to US\$ 239 billion in the fourth quarter (up 38 percent year-over-year), then to US\$ 299 billion in the first quarter of 2026 (up 79 percent) and to a record US\$ 403 billion in the second quarter of 2026, a 124 percent year-over-year increase (see Figure 2).

Figure 2. Historic Shipments by Quarter: 1Q 2023–2Q 2026



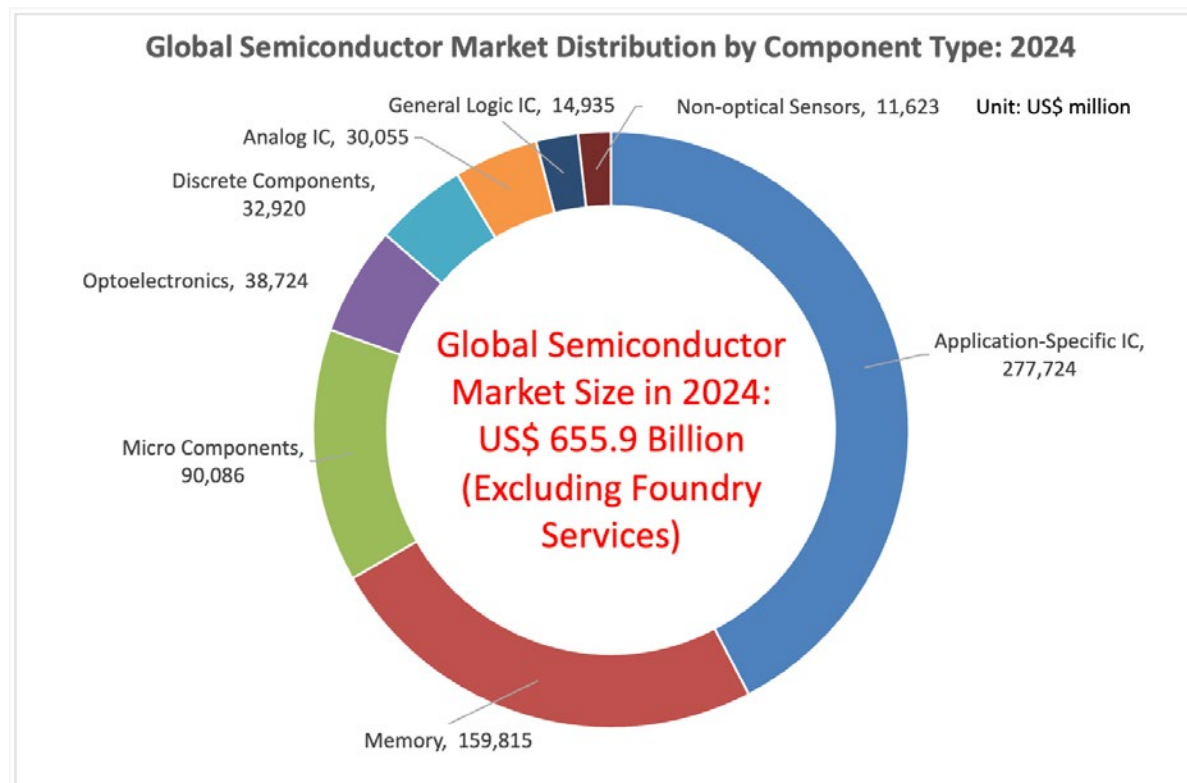
Source: World Semiconductor Trade Statistics, “Global Semiconductor Market records exceptional growth in Q2 2026,” August 6, 2026.

Regional results for the second quarter of 2026 underscore how broadly based the expansion has become. The Americas recorded sales of US\$ 144.6 billion, up 42.6 percent from the first quarter and 160.9 percent from the second quarter of 2025. Asia Pacific (excluding Japan and China) reached US\$ 112.4 billion, an increase of 124.4 percent year-over-year, while China recorded US\$ 108.3 billion, up 35.1 percent sequentially and 112.8 percent year-over-year. Europe reached US\$ 23.0 billion, up 23.7 percent sequentially and 75.2 percent year-over-year, and Japan reached US\$ 15.0 billion, up 23.7 percent sequentially and 39.0 percent year-over-year. The Americas and Asia Pacific together therefore accounted for roughly two-thirds of the global market, a direct reflection of where AI infrastructure investment is being concentrated.

2. Structural Composition

Structurally, the market divides between general-purpose integrated circuits and application-specific ICs. In 2024, on a base of US\$ 655.9 billion excluding foundry services, general-purpose ICs accounted for 57.7% of value and ASICs for 42.3%. Memory was the single largest category at US\$ 159.8 billion, followed by micro components at US\$ 90.1 billion, with optoelectronics, discrete components and analog ICs playing smaller but indispensable enabling roles. The balance reflects a market defined less by scale alone than by the growing strategic value of customized silicon (see Figure 3).

Figure 3. Global Semiconductor Market Distribution by Component Type: 2024



Source: Sayumi Chung, "Market and Technology Trends in AI Semiconductors and IC Design," ITRI, October 28, 2025, p. 7.

Within the ASIC half of the market, discrete GPUs were already the largest single category in 2024 at 11.2% of total semiconductor revenue, ahead of standalone application and multimedia processors at 6.9%; connectivity ICs, integrated baseband and application processors, and power management ICs made up most of the remainder. The result is a dual structure in which general-purpose ICs still dominate by volume, anchored by memory, while ASICs led by GPUs capture the strategic ground as demand shifts toward AI and data-intensive computing.

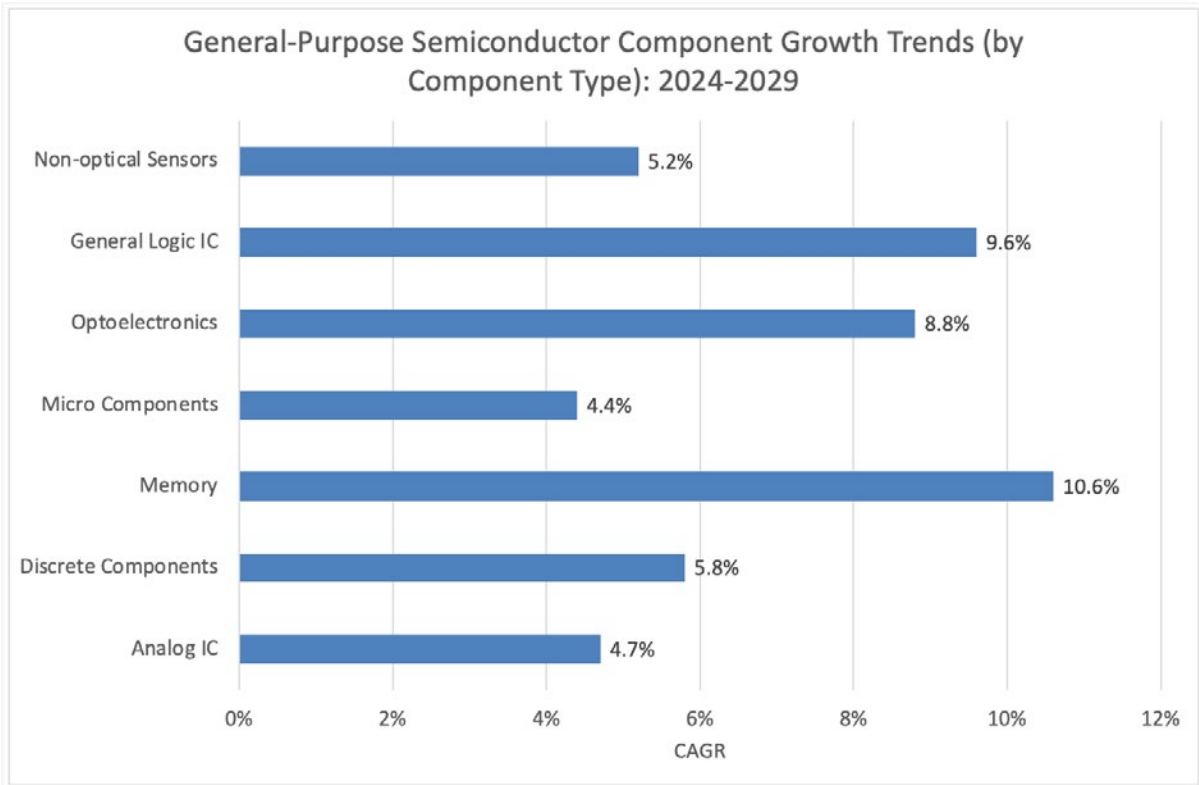
Looking forward, memory is the strongest of the general-purpose categories. Year-over-year growth is projected to exceed 30% in 2026, driven by the rapid build-out of high-bandwidth memory capacity and by rising memory content in AI servers, accelerators and increasingly memory-intensive edge and consumer devices; over 2024–2029 the segment is forecast to compound at 10.6%, the fastest among general-purpose ICs.

TrendForce's May 2026 research points the same way. As AI development shifts from large-scale model training toward inference-centric agentic applications, memory demand expands structurally: continuous iterative cycles and larger context windows scale key-value cache capacity in proportion. The overall memory market is projected to reach US\$ 889.3 billion in 2026 and to exceed US\$ 1.28 trillion in 2027. DRAM revenue could reach US\$ 618.7 billion in 2026, up 303%, and US\$ 903.3 billion in 2027; NAND flash is expected to rise 280.7% to US\$ 270.6 billion in 2026 and to approach US\$ 379.4 billion in 2027.

Optoelectronics and general logic ICs should provide steadier support through the second half of the decade, drawn by displays, optical communications and sensing in data centers, automotive systems and

industrial automation (see Figure 4).

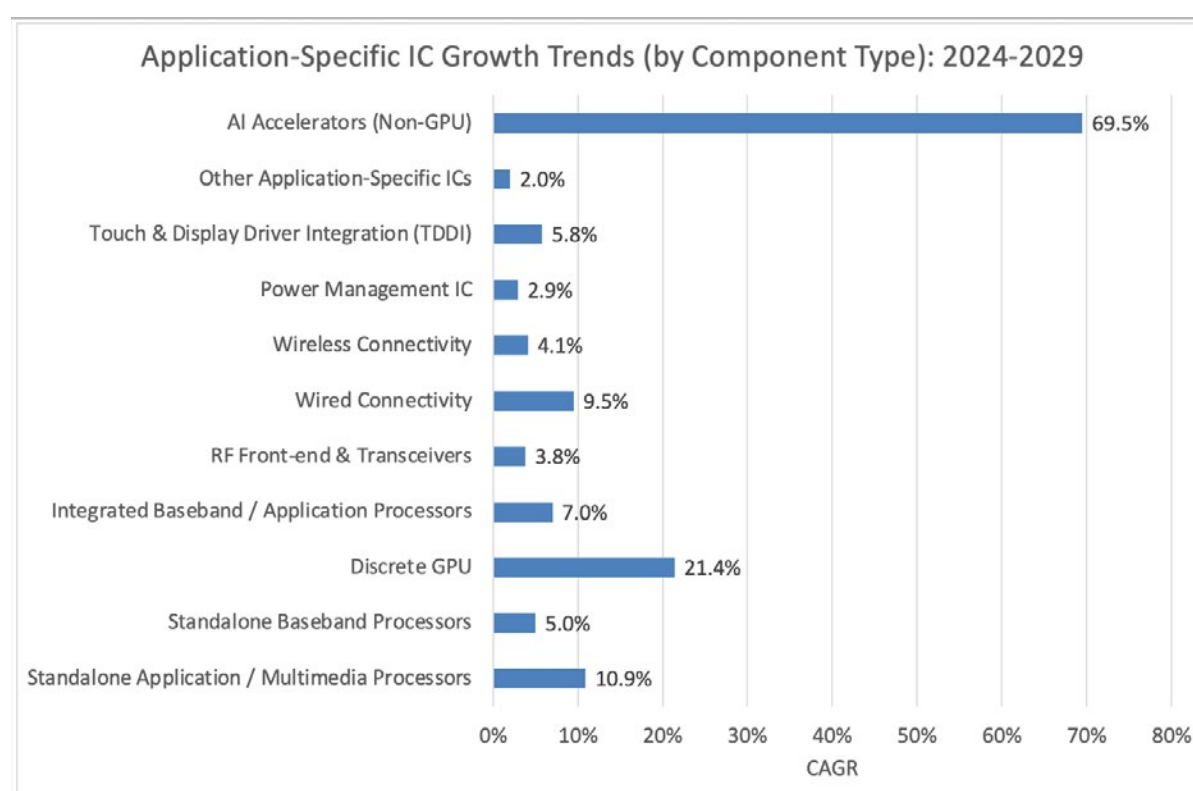
Figure 4. General-Purpose Semiconductor Component Growth Trends (by Component Type): 2024-2029



Source: Sayumi Chung, “Market and Technology Trends in AI Semiconductors and IC Design,” ITRI, October 28, 2025, p. 8.

Within ASICs, AI processors are the most dynamic category, projected to grow 143.2% in 2025 and to compound at 69.5% over 2024–2029—the highest rate in the segment—led by Broadcom, which held 45.2% of the market in 2024, and Alchip Technologies. Discrete GPUs, which became the largest ASIC category in 2024, are expected to grow 57.4% in 2025 and 23.1% in 2026, with NVIDIA commanding 93.3% of that market. Standalone application and multimedia processors remain resilient, compounding at 10.9%, with Apple accounting for 42.4% of 2024 share (see Figure 5).

Figure 5. Application-Specific IC Growth Trends (by Component Type): 2024-2029

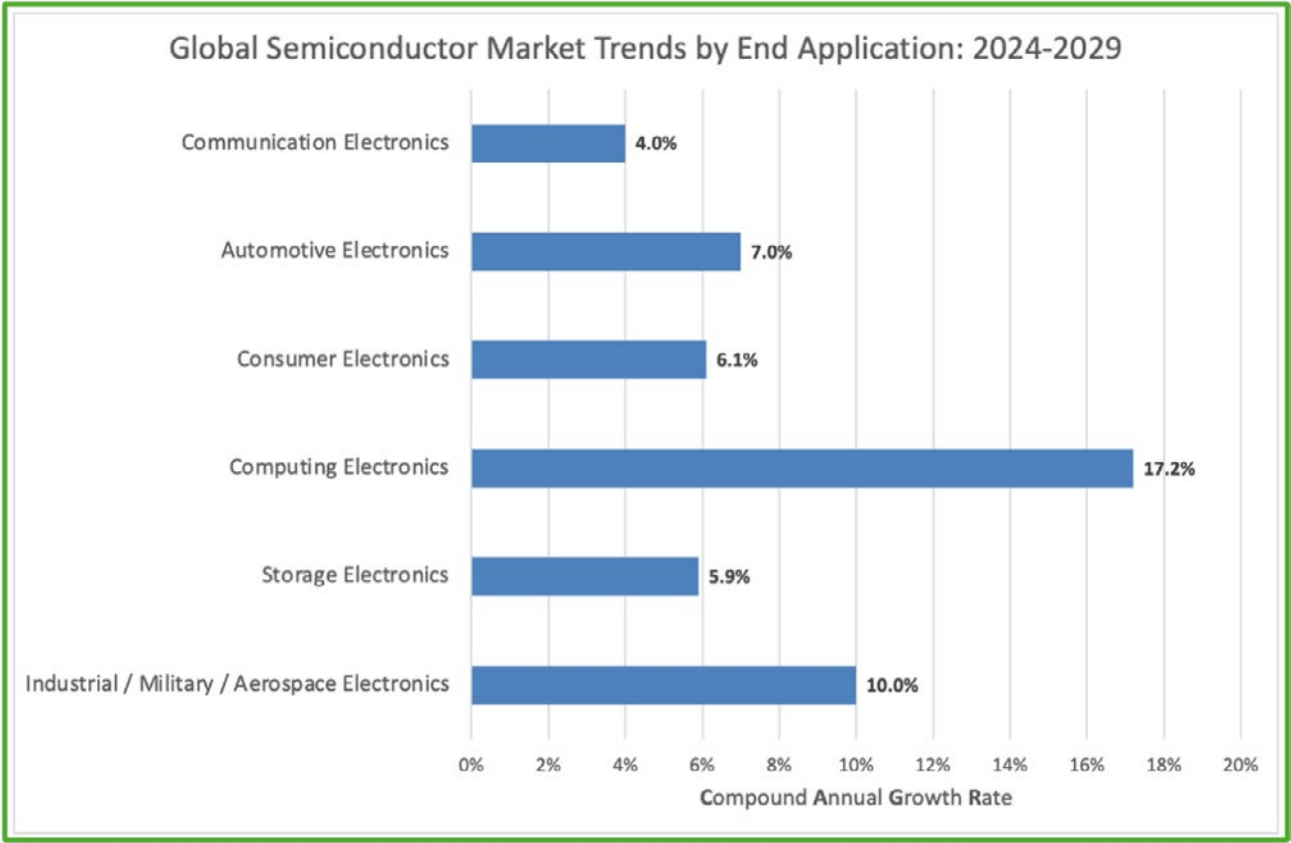


Source: Sayumi Chung, "Market and Technology Trends in AI Semiconductors and IC Design," ITRI, October 28, 2025, p. 8.

3. End Application

On the demand side, Gartner's 2025 data show computing electronics as the largest application market at US\$ 323.7 billion, or 40.8%, followed by communication electronics at US\$ 211.2 billion (34.4%) and automotive electronics at US\$ 87.4 billion (11.3%). ITRI projects computing electronics to be the fastest-growing segment, compounding at 17.2% over 2024–2029, ahead of industrial, military and aerospace electronics (10.0%), automotive (7.0%), consumer (6.1%), storage (5.9%) and communication electronics (4.0%). Automotive semiconductors are expected to pass the US\$ 100 billion mark in 2026 at US\$ 107.7 billion, with average semiconductor content per vehicle more than doubling from US\$ 860 in 2024 to US\$ 1,902 by 2034 (see Figure 6).

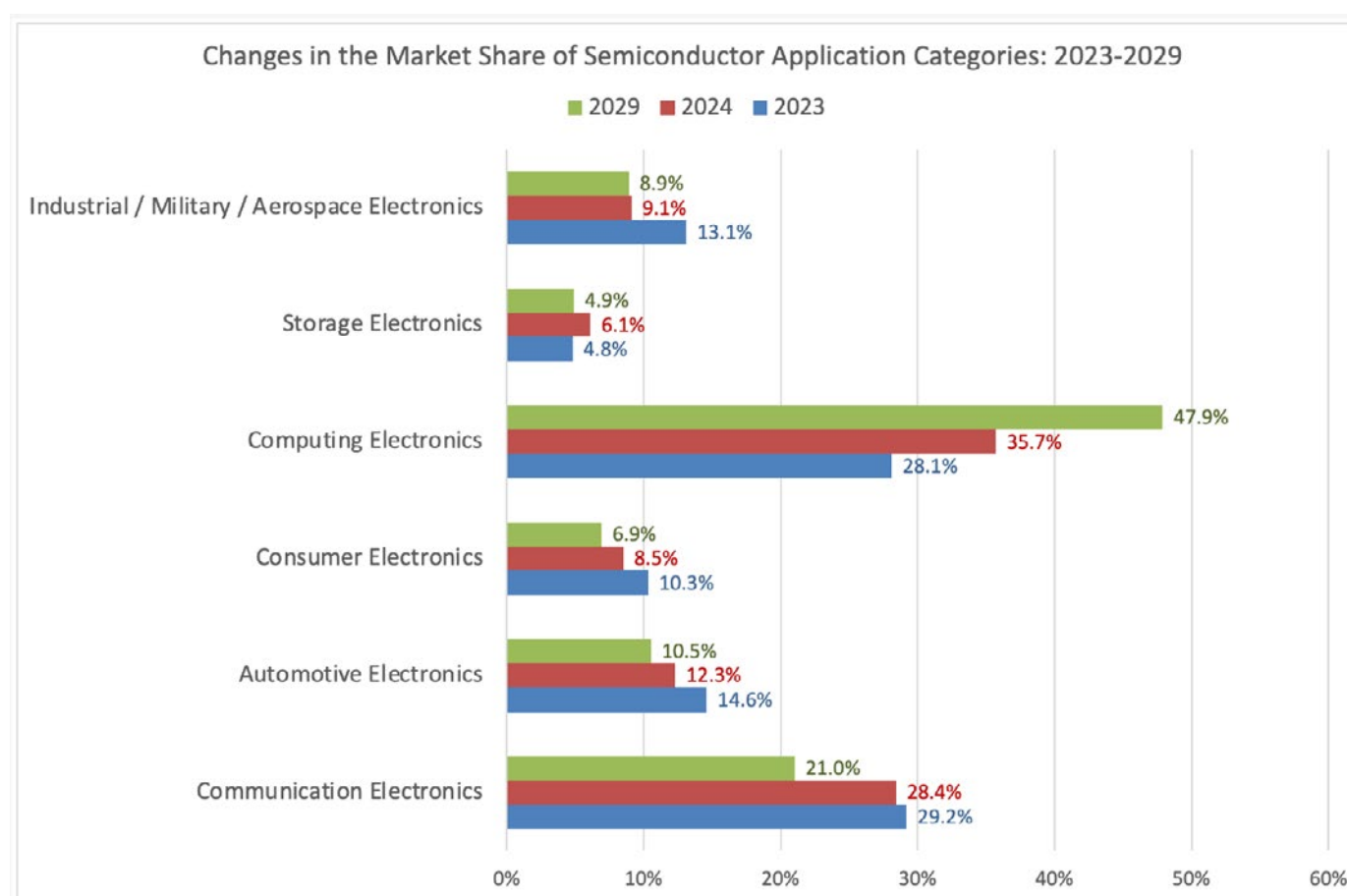
Figure 6. Global Semiconductor Market Trends by End Application: 2024-2029



Source: Sayumi Chung, "Market and Technology Trends in AI Semiconductors and IC Design," ITRI, October 28, 2025, p. 3.

The order of these markets has changed. Communication electronics was still the largest segment in 2023 at 29.2%, ahead of computing at 28.1%; computing overtook it in 2024 on 53.9% annual growth and, ITRI projects, will reach 47.9% of the market by 2029, with communication electronics falling to 21.0% and automotive to 10.5%. WSTS data for 2025 confirm the pattern: the computer segment expanded by more than 60% year-over-year, government-related demand by 15%, and industrial by 5% as earlier inventory corrections eased (see Figure 7).

Figure 7. Changes in the Market Share of Semiconductor Application Categories: 2023-2029



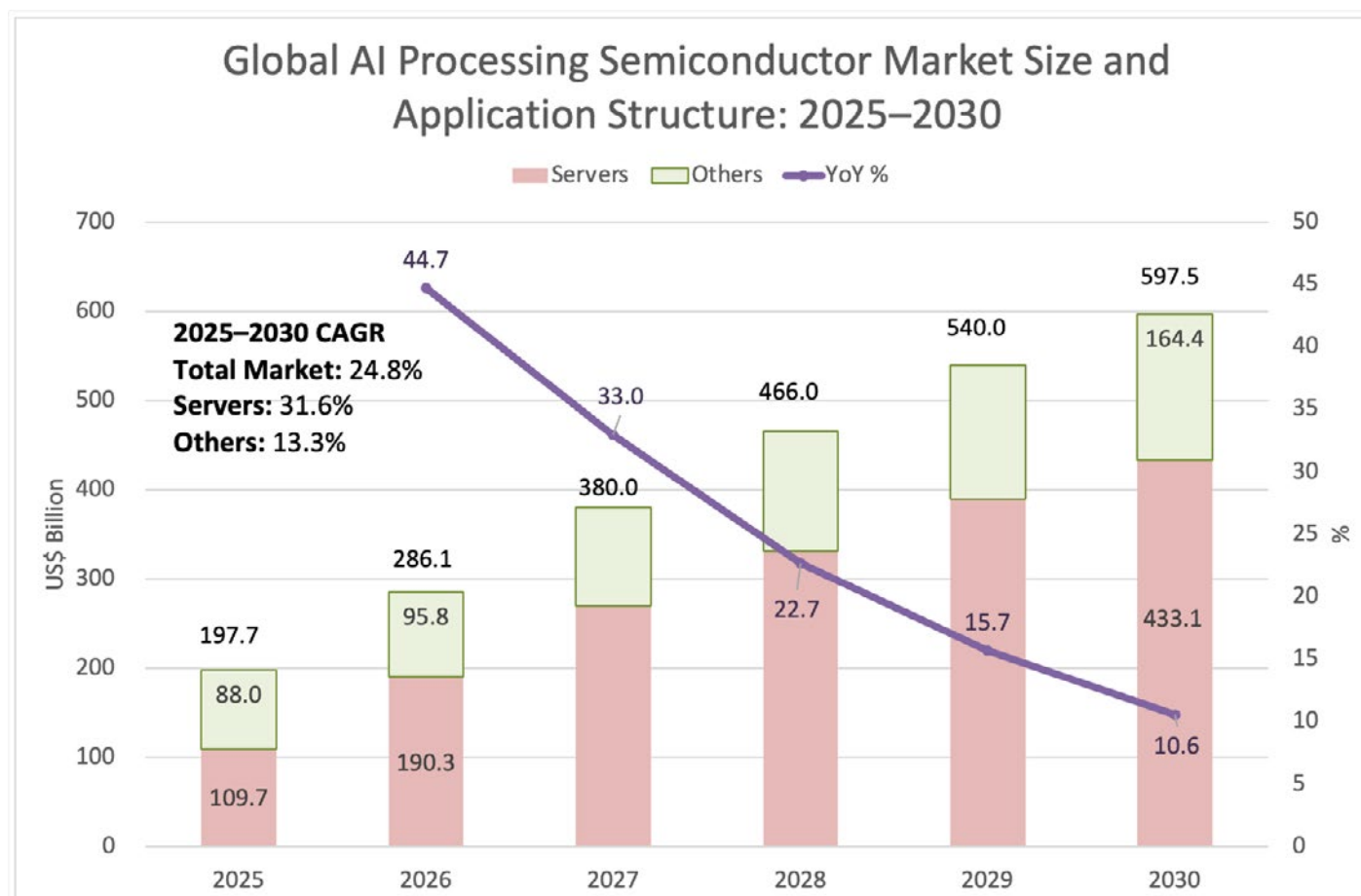
Source: Sayumi Chung, "Market and Technology Trends in AI Semiconductors and IC Design," ITRI, October 28, 2025, p. 4.

4. AI-oriented Semiconductors

AI-oriented semiconductors are now the primary growth engine of the industry. Gartner's first-quarter 2026 forecast puts the global AI processing semiconductor market at US\$ 286.1 billion in 2026, a 44.7% annual increase, rising from US\$ 197.7 billion in 2025 to US\$ 597.5 billion by 2030—a 24.8% compound rate. The expansion is overwhelmingly driven by servers: server-oriented AI semiconductor revenue is projected to rise from US\$ 109.7 billion in 2025 to US\$ 190.3 billion in 2026, a 73.5% increase, and to compound at 31.6% through 2030, lifting the server share of AI semiconductor demand from 55.5% in 2025 to 72.5% by 2030.

Non-server applications—PCs, smartphones, edge devices and automotive systems—continue to expand slowly, from US\$ 88.0 billion in 2025 to US\$ 164.4 billion by 2030, a 13.3% compound rate, as AI infrastructure spending concentrates in large-scale computing environments (see Figure 8).

Figure 8. Global AI Processing Semiconductor Market Size and Application Structure: 2025–2030



Source: Ashley Ju, “2026 Global AI Chip Market Dynamics and Structural Shifts,” ITRI, June 2, 2026, p. 2.

Within AI servers, GPUs remain dominant but are ceding market share: from 82.2% in 2025 to 80.0% in 2026 and 64.9% by 2030, even as GPU revenue compounds at 25.5%. AI accelerators and other non-GPU custom silicon are projected to compound at 53.3% over 2025–2030 and to hold 27.1% of the AI server semiconductor market by 2030, as cloud service providers design proprietary chips to improve performance per watt and lower operating cost.

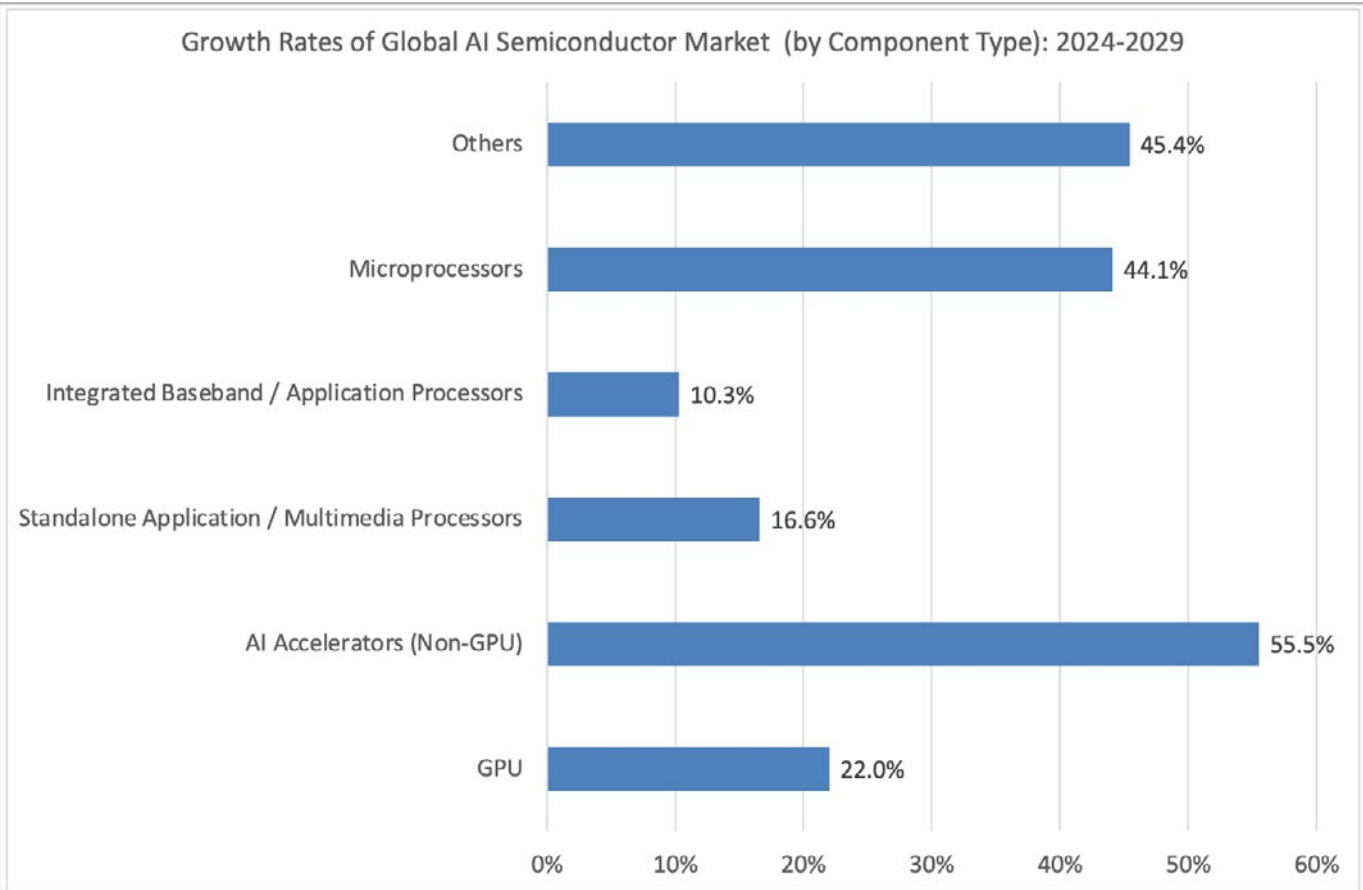
The most consequential shift is from training to inference. Gartner expects 2026 to be the first year in which AI inference revenue exceeds training revenue, rising from US\$ 51.0 billion (46.4% of the market) in 2025 to US\$ 102.0 billion (53.4%) in 2026 and 77.1% of AI server semiconductor revenue by 2030. Agentic AI, enterprise deployments and increasingly sophisticated reasoning models drive the change: as systems perform multi-step reasoning, verification and decision-making, inference-token consumption is expected to grow roughly fivefold a year.

The composition of the AI semiconductor market is changing as fast as its size. From US\$ 138.8 billion in 2024, the market is projected to reach US\$ 438.5 billion in 2029. GPUs remain the largest category throughout, but their share falls from 51% to 44%—diversification rather than weakness, since GPU revenue still compounds at 22%.

The sharpest structural change comes from non-GPU AI accelerators, whose share rises from 7% to 21% on a 55.5% compound rate, making them the second-largest category by 2029 as hyperscalers invest in in-house ASICs for efficiency and cost control. Integrated processors fall from a combined 34% to 21%

in relative terms while still compounding in the low-to-mid teens, and microprocessors rise from 7% to 13% on a 44.1% compound rate. The result is not a zero-sum transition but a multi-layered ecosystem in which several architectures grow at once, each matched to distinct performance, cost and deployment requirements (see Figure 9).

Figure 9. Growth Rates of Global AI Semiconductor Market (by Component Type): 2024-2029



Source: Sayumi Chung, “Market and Technology Trends in AI Semiconductors and IC Design,” ITRI, October 28, 2025, p. 20.

The penetration of AI PCs is accelerating rapidly. It is projected that AI PCs will account for 55% of global PC shipments in 2026, climb to 77% in 2027, and surpass 90% to reach a 91% market share by 2028, driven by the end of Windows 10 support and the demand for edge computing privacy.

Simultaneously, edge AI is entering a new era with the launch of advanced mobile processors utilizing TSMC’s third-generation 3nm process in late 2025. This includes Apple’s M5 chip 7, Qualcomm’s Snapdragon 8 Elite Gen 5 (featuring an “Agentic AI” architecture for proactive intent understanding), and MediaTek’s Dimensity 9500.

5. Data Center Processors

Generative AI workloads—large language models, multimodal systems and AI cloud services—require massive parallelism, high memory bandwidth and energy efficiency, which favors GPUs and custom AI ASICs over CPU-centric architectures. In 2024 the data center processor market remained heavily GPU-centric: GPUs accounted for roughly 70% of value, CPUs 16%, DPUs and SmartNICs 7%, and AI ASICs 6%. By 2029 the GPU market is projected to approach US\$ 190 billion and the AI ASIC market to reach around US\$ 60 billion.

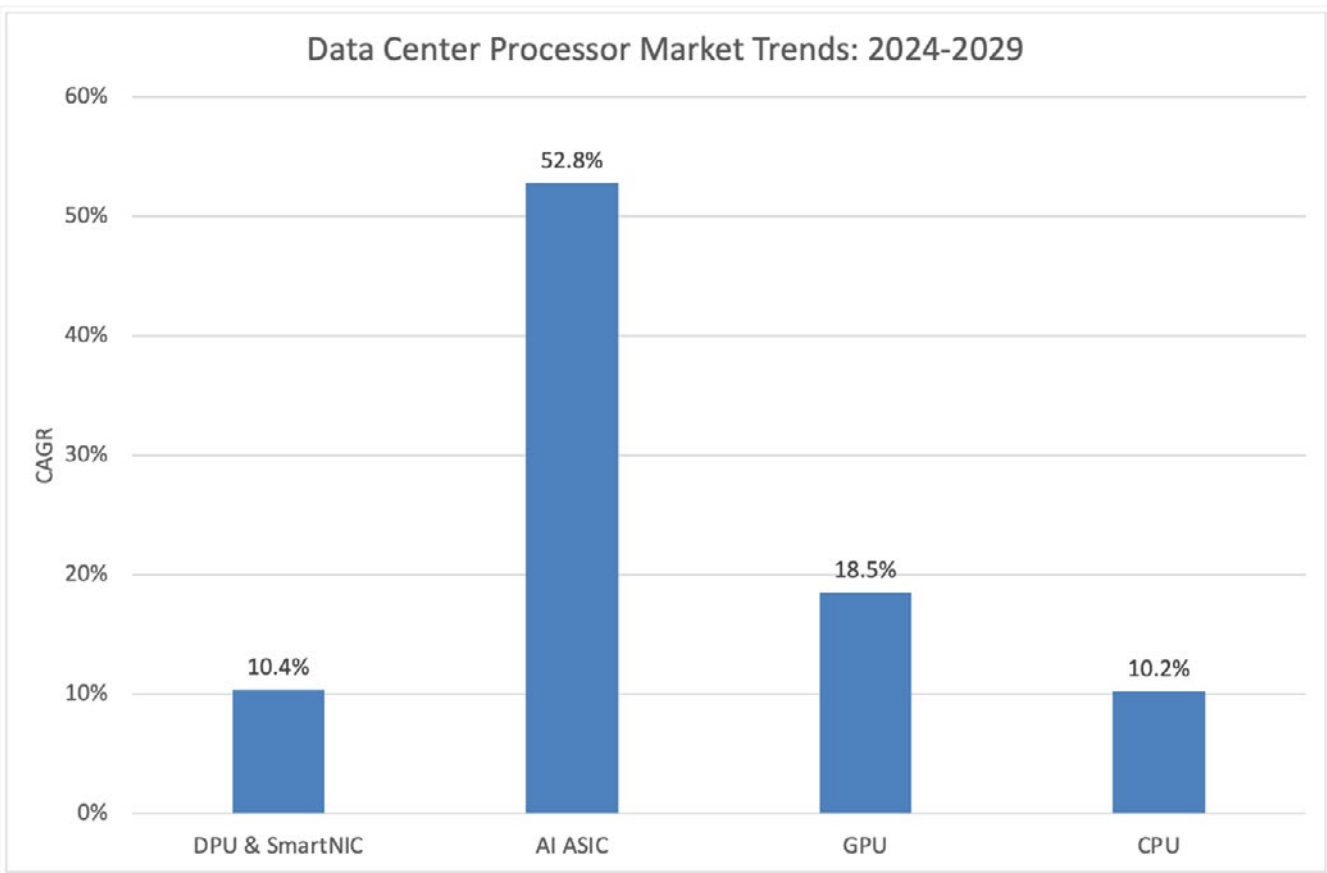
NVIDIA continues to push the boundaries of AI computing. Following its Blackwell Ultra architecture in 2025, NVIDIA is introducing the Rubin architecture in 2026, which integrates the new proprietary Vera CPU and HBM4 memory, paving the way for the future Feynman architecture planned for 2028.

By 2029 the structure shifts markedly toward accelerators. GPUs remain the largest segment at around 64%, but AI ASICs exceed 20% as hyperscalers deploy workload-optimized silicon, while the CPU share falls to about 10%. The data center is moving toward a model in which GPUs supply scalable general-purpose AI compute, AI ASICs deliver efficient customized acceleration, and CPUs increasingly serve as orchestration and control engines rather than the primary source of computing power.

The AI ASIC market alone is estimated at US\$ 14.2 billion in 2025 and is projected to exceed US\$ 25 billion by 2027. Google’s TPU is the clear pioneer and leader, with roughly 40.2% of the 2025 market, built on early investment in TPU architecture and deep integration with internal workloads. AWS ranks second at an estimated 29.3% on the rollout of Trainium 2, followed by Huawei at 17.6%, Intel Gaudi at 4.5%, and Microsoft and Meta at 1.4% and 0.4% respectively.

Custom accelerators are therefore no longer niche solutions but a strategic pillar of cloud infrastructure investment alongside GPUs (see Figure 10).

Figure 10. Data Center Processor Market Trends: 2024-2029



Source: Sayumi Chung, “Market and Technology Trends in AI Semiconductors and IC Design,” ITRI, October 28, 2025, p. 25.

Driven by the expanding deployment of AI infrastructure, global Cloud Service Providers (CSPs) are significantly accelerating their investments. According to TrendForce’s latest findings in August

2026, the combined capital expenditures of the world's top nine CSPs—Google, AWS, Meta, Microsoft, Oracle, ByteDance, Tencent, Alibaba, and Baidu—are projected to exceed US\$ 886.7 billion in 2026, representing a massive 90% YoY growth, with the five North American hyperscalers accounting for nearly 90% of the total. The pace of CapEx expansion among North American CSPs exceeds the global average, underscoring that AI infrastructure has become a core long-term strategic priority, with investments increasingly concentrated in high-performance GPU clusters, in-house ASICs, and next-generation data centers.

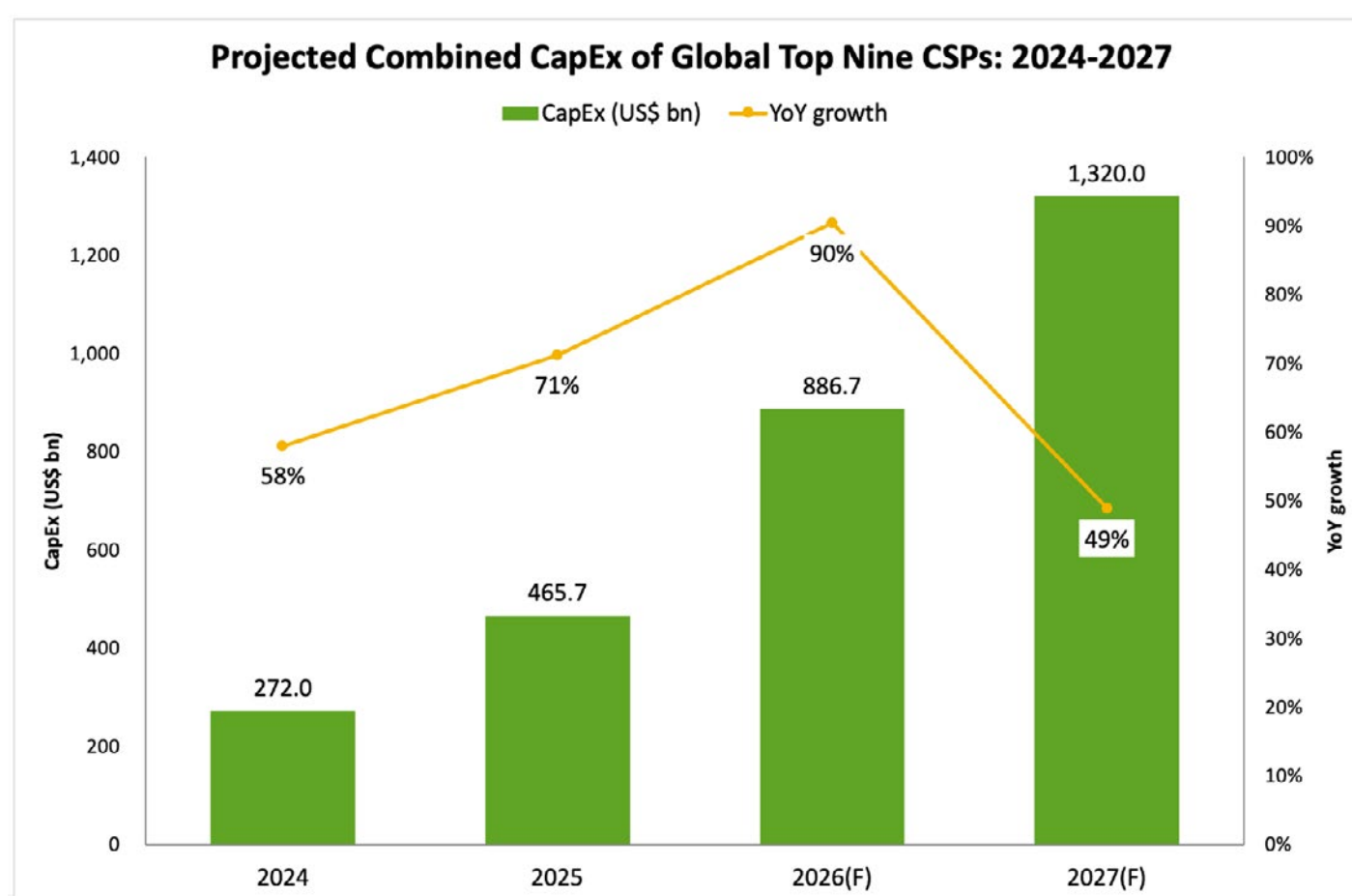
Chip strategies differ by provider. Google, whose 2026 capital expenditure guidance has been raised to US\$ 180–190 billion, expects next-generation TPU v8 systems to account for nearly 78% of the AI servers it takes, further widening the gap with GPU-based systems. Amazon Web Services expects capital expenditure above US\$ 230 billion, with Trainium 3 ramping from the second quarter of 2026 but GPUs still representing close to 60% of its AI server build-out. Meta has raised its range to US\$ 125–145 billion and remains more than 80% reliant on NVIDIA and AMD GPUs as its in-house MTIA platform works through hardware–software tuning. Microsoft has lifted its outlook to US\$ 190 billion and continues to deploy Maia 200 chips for high-efficiency inference alongside NVIDIA rack-scale systems.

Chinese providers—ByteDance, Tencent, Alibaba and Baidu—are advancing in-house ASICs such as Baidu's Kunlun line and working with local partners to diversify their sources of compute. Alibaba is focusing on localized nodes and sovereign cloud offerings, extending its footprint to 29 regions and 94 availability zones, while ByteDance is the most geographically aggressive, expanding through TikTok across eight countries with major investments in Europe, Thailand and Malaysia; TrendForce estimates that over half of ByteDance's investment will go to AI chips, drawing on both NVIDIA H200 systems and domestic alternatives such as Cambricon, subject to U.S.–China regulatory developments.

The build-out has physical consequences. Total installed data center power capacity is expected to reach roughly 155 GW in 2026, a 29% increase, and AI servers are projected to overtake general-purpose servers in total electricity consumption during the year, supporting demand for HVDC power and liquid-cooling systems. In August 2026 TrendForce raised its 2026 AI server shipment forecast from 28% to nearly 31% year-over-year growth.

Looking to 2027, TrendForce estimates that the combined CapEx of the top nine CSPs will reach about US\$ 1.32 trillion, representing nearly 50 percent year-over-year growth. While the growth rate moderates against a much higher comparison base, this does not suggest any decline in AI investment (see Figure 11).

Figure 11. Projected Combined CapEx of Global Top Nine CSPs: 2024-2027F



Source: TrendForce, "AI Server Shipments Forecast Raised to Nearly 31% YoY in 2026 as 90% Surge in CSP CapEx Fuels Infrastructure Expansion, Says TrendForce," August 3, 2026.

6. Capital Expenditure

Between 2021 and 2025 semiconductor capital expenditure moved away from a classic boom-and-bust cycle toward structural rebalancing. Industry spending rose from US\$ 153.1 billion in 2021 to US\$ 182.0 billion in 2022, corrected to US\$ 164.0 billion in 2023 and US\$ 155.0 billion in 2024, then recovered to US\$ 160.0 billion in 2025—never returning to pre-2021 levels but stabilizing on a historically elevated plateau. Composition shifted more than the total: memory capital expenditure peaked at US\$ 66.2 billion in 2022 and settled at US\$ 56–58 billion in 2024–2025, while foundry spending rose steadily from US\$ 37.9 billion to US\$ 52.4 billion, lifting the foundry share from 24.8% to 32.8%.

At the firm level the pattern is clearer still. Samsung reduced both spending and share, stepping back from aggressive scale expansion; Micron rebounded strongly after a deep 2023 cut to position for AI-driven memory demand; and SK hynix stabilized after sharp volatility. Among foundries, TSMC remained the single most influential investor, raising capital expenditure from US\$ 30.0 billion in 2021 to US\$ 40.9 billion in 2025 and expanding its share to 25.0%. SMIC increased spending within mature nodes under external constraints, while Intel's post-2023 pullback illustrates the financial and operational difficulty of IDM transformation. Capital deployment has become less about indiscriminate capacity and more about strategic reallocation toward foundries, advanced logic and geopolitically resilient manufacturing footprints (see Table 3).

Table 3. Semiconductor Capital Expenditures: 2021-2025

Unit: US\$ billion

Category / Company	2021	2022	2023	2024	2025
Memory Companies	59.5	66.2	55.1	55.7	58.1
Samsung	38.1	37.1	37.0	33.9	30.3
Micron Technology	9.7	12.0	7.0	8.1	14.0
SK Hynix	11.7	14.7	6.4	11.7	11.2
Others (Memory)		2.5	4.6	2.0	2.5
Foundries	37.9	50.9	47.4	43.4	52.4
TSMC	30.0	36.3	32.0	29.8	40.9
SMIC	4.3	6.4	7.5	7.3	7.3
UMC	1.8	2.7	3.0	2.9	1.8
GlobalFoundries	1.8	3.1	1.8	0.6	0.7
Others (Foundries)		2.5	3.1	2.8	2.6
IDMs	26.4	33.6	61.5	55.9	49.5
Intel	20.3	24.8	25.8	25.1	20.0
Texas Instruments	2.5	2.8	5.1	4.8	5.0
STMicroelectronics	1.8	3.5	4.1	2.5	2.3
Infineon Technologies	1.8	2.4	3.2	3.0	2.7
Others	29.4	30.9	23.3	20.5	19.6
Total CapEx	153.1	182.0	164.0	155.0	160.9

Source: Semiconductor Intelligence, press releases. TSMC News Release, Jan 15, 2026.

II. Global Semiconductor Supply Chain

1. Business Models

The semiconductor industry spans a diverse landscape of business models, and because of extreme specialization and capital intensity, few companies participate in both the design and the production of chips. Some—Samsung, Intel and SK hynix among them—operate across every major stage; others, including NVIDIA, Qualcomm, Broadcom and AMD, specialize in design alone. Concentration has risen sharply: the combined revenue of the ten largest vendors grew 41.1% in 2024, lifting their share of the global market from 49.3% in 2023 to 58.8% as the market itself reached US\$ 655.9 billion.

Gartner’s preliminary results for 2025 show worldwide semiconductor revenue of US\$ 793.4 billion, up 21% year-over-year and driven heavily by AI infrastructure spending. NVIDIA extended its lead decisively, becoming the first vendor to cross US\$ 100 billion in semiconductor sales at US\$ 125.7 billion, up 63.9%. Samsung retained second place with US\$ 72.5 billion and SK hynix moved to third with US\$ 60.6 billion on high-bandwidth memory demand, while Intel continued to lose share, falling to fourth at US\$ 47.9 billion. AI semiconductors—processors, HBM and networking components—accounted for nearly one-third of total sales in 2025 (see Table 4).

Table 4. Top 10 Semiconductor Vendors by Revenue: 2025

Unit: US\$ Million						
2025 Rank	2024 Rank	Vendor	2025 Revenue	2025 Market Share (%)	2024 Revenue	2025-2024 Growth (%)
1	1	NVIDIA	125,703	15.8	76,692	63.9
2	2	Samsung Electronics	72,544	9.1	65,697	10.4
3	4	SK Hynix	60,640	7.6	44,186	37.2
4	3	Intel	47,883	6.0	49,804	-3.9
5	7	Micron Technology	41,487	5.2	27,619	50.2
6	5	Qualcomm	37,046	4.7	32,976	12.3
7	6	Broadcom	34,279	4.3	27,801	23.3
8	8	AMD	32,484	4.1	24,127	34.6
9	9	Apple	24,596	3.1	20,510	19.9
10	10	MediaTek	18,472	2.3	15,934	15.9
Top 10 Semiconductor Vendors			495,134	62.2	385,346	28.5
Others (outside top 10)			298,315	37.6	270,536	10.3
Total Market			793,449	100.0	655,882	21.0

Source: Gartner, Press Release, January 12, 2026.

Depending on their level of integration, semiconductor companies fall into four types: integrated device manufacturers, fabless design firms, foundries, and outsourced semiconductor assembly and test companies. Intel and Texas Instruments are leading U.S. IDMs; NVIDIA, Qualcomm, Broadcom and

AMD are the dominant fabless firms; Taiwan's TSMC and UMC are the key foundries; and Taiwan's ASEH leads the world in assembly, packaging and testing (see Table 5).

Table 5. Type of Semiconductor Company by Business Model

TYPE	DESCRIPTION	EXAMPLES
IDMs	Companies that design, manufacture, and sell their own semiconductor products. They handle both the design and production processes in-house.	• Intel • Samsung • STMicroelectronics • Texas Instruments
Fabless companies	Companies focus solely on chip design and development and outsources the manufacturing (fabrication) process to external foundries.	• NVIDIA • Qualcomm • AMD • MediaTek
Foundries	Companies with specialized manufacturing facilities that produce semiconductor wafers based on designs provided by fabless companies. They offer fabrication (front-end manufacturing) services to multiple clients.	• TSMC • Samsung • UMC • GlobalFoundries
OSATs	Companies handle the assembly, packaging, and testing (back-end manufacturing) of semiconductor chips. They take the bare semiconductor dies (chips) and package them into final products (such as integrated circuits).	• ASE Technology Holding • Amkor Technology

In terms of function, the semiconductor supply chain spans seven key sectors, beginning with R&D, where future device capabilities are defined, and design, where engineers create chip architectures and circuits. These blueprints then move to front-end manufacturing, where wafers are fabricated, followed by back-end processes that cut, assemble, test, and package the chips for shipment. Supporting these core stages are EDA and core IP providers offering crucial design software and patents, equipment suppliers delivering advanced tools like lithography machines, and materials producers supplying ultra-pure silicon, gases, and chemicals essential for manufacturing (see Table 6).

Table 6. Sectors in Semiconductor Supply Chain

	SECTOR	DESCRIPTION
1.	Research & Development (R&D)	The R&D sector determines the future capabilities and performance of semiconductor devices.
2.	Design	The blueprints for semiconductor devices, including the architecture and circuit design are created by engineers during this phase.
3.	Front-End Manufacturing: Wafer Fabrication	After the design stage, semiconductor chips are fabricated in facilities often referred to as fabs or foundries.
4.	Back-End Manufacturing: Assembly, Testing and Packaging (ATP)	After the wafers are fabricated, they are cut into individual chips, assembled into packages, tested for quality and functionality, and then prepared for shipment.

5.	Electronic Design Automation (EDA) and Core Intellectual Property (IP)	EDA refers to the software tools used for designing semiconductor devices. Core IP involves the essential designs and patents that are part of the semiconductor devices.
6.	Equipment and Tools	This sector provides the specialized machinery and tools required for semiconductor manufacturing, such as lithography equipment, etchers, and testers.
7.	Materials	Semiconductors require high-purity materials, including silicon, various gases, and chemicals used throughout the manufacturing process.

TrendForce Analysis

The production of integrated circuits divides into three core stages: circuit design, wafer fabrication, and packaging and testing. Within the fab, the scaling-critical steps are thin-film deposition, photolithography, etching and ion implantation, followed by back-end-of-line metallization and chemical mechanical planarization; completed wafers then undergo probing to identify electrically qualified dies (see Figure 12).

Qualified dies are then diced and encapsulated, with advanced packaging such as CoWoS or three-dimensional stacking used to raise system-level integration. This back end has become the industry's tightest constraint. According to TrendForce's April 2026 findings, AI demand since 2023 has produced capacity bottlenecks in 2.5D and 3D advanced packaging, as the wafer and packaging resources consumed per chip rise exponentially with chip size.

The CoWoS shortage has propagated upstream to production equipment and downstream to substrates, packaging materials and other critical components. NVIDIA, leveraging its supply-chain control, was among the first to identify tightening capacity and pre-emptively secured large volumes of 4/3 nm wafer capacity, CoWoS packaging and key materials including T-glass, substrates, PCBs, HBM and SSDs; other buyers with comparable demand, Google among them, have seen product growth constrained by delays in securing the same components.

Despite TSMC's continuing expansion, CoWoS has remained in short supply since 2023, pushing customers toward alternative capacity at OSAT providers such as SPIL and Amkor and toward alternative technologies such as EMIB and FOEB, where Intel can draw on its U.S. manufacturing base. TrendForce expects the severe shortage in global 2.5D packaging capacity to ease slightly by 2027, aided by order spillover and TSMC's plan to expand CoWoS capacity by more than 60% by that year. Packaged products then undergo functional and reliability testing before shipment.

Figure 12. Overview of Semiconductor Manufacturing Process Technology



2. Research and Development

U.S. semiconductor firms retain a global lead in research and development. In 2024, U.S. industry R&D investment reached US\$ 62.7 billion, up 5.7% year-over-year and equal to 17.7% of industry revenue, reinforced by the US\$ 11 billion earmarked for research under the CHIPS for America program. Measured as a share of semiconductor sales, the United States also led all major regions in 2023 at 19.3%, ahead of Europe (14.0%), Japan (12.0%), Taiwan (11.0%), South Korea (9.5%) and China (7.6%).

3. Chip Design

Chip design is carried out by fabless companies, which partner with foundries for manufacturing, and by IDMs, which design and fabricate in their own plants.

The U.S. leads in design automation software known as electronic design automation (EDA), and reusable pieces of intellectual property (IP), called core IP. The top three EDA companies, namely, U.S.-based Cadence, Synopsys, and Mentor Graphics (a U.S.-based subsidiary of the German firm Siemens) control about 70% of the global EDA market.¹

According to TrendForce, the global IC design industry reached a production value of US\$ 249.8 billion in 2024. Benefiting from the surge in demand for generative AI-related chips, the combined revenue of the top 10 fabless companies exceeded US\$ 359.4 billion in 2025, a 44% year-on-year increase driven by sustained capital expenditure on AI infrastructure by cloud service providers.

NVIDIA dominated, with full-year revenue rising 65.0% to US\$ 205.73 billion and its share of top ten revenue reaching 57%—in other words, more than half of the top-tier IC design market now effectively speaks with a single accent: CUDA. Broadcom advanced to second at US\$ 39.73 billion, ahead of Qualcomm (US\$ 38.90 billion), AMD (US\$ 34.64 billion) and MediaTek (US\$ 19.12 billion); the remaining five firms together accounted for roughly 5% of the group.

One development is worth watching. NVIDIA's US\$ 2 billion investment in Marvell targets collaboration on customized XPU, scale-up interconnect architectures based on NVLink Fusion, optical interconnects and silicon photonics, enabling Marvell to build NVLink Fusion-compatible platforms. Competition in AI infrastructure is thus extending beyond GPU performance to interconnect standards and system-level integration, and AI networking is evolving from a supporting function into a determinant of the efficiency and scalability of AI clusters.

Structurally, the 2025 landscape shows an unprecedented concentration of revenue. NVIDIA alone accounted for 74.2% of the increase in revenue across the top 10 firms, with Broadcom (8.3%) and AMD (8.1%) a distant second tier and every remaining firm contributing less than 1%—a pronounced long tail in which technological leadership and ecosystem control outweigh traditional scale. From a national

¹ Zeyi Yang, "Inside the software that will become the next battle front in US-China chip war," MIT Technology Review, August 18, 2022.

perspective the United States is overwhelming, accounting for 97.3% of top 10 revenue in 2025 and 93% of the group's market share, against 2.7% and 7% respectively for Taiwan, despite Taiwan placing three companies on the list (see Table 7).

Table 7. Top 10 Global IC Design Companies: 2025

Unit: US\$ Million

Ranking		Company	Revenue		YoY	Contribution	Top 10 Share	
2025	2024		2024	2025			2024	2025
1	1	NVIDIA (US)	124,377	205,732	65.0%	74.2%	50%	57%
2	2	Broadcom (US)	30,644	39,727	30.0%	8.3%	12%	11%
3	3	Qualcomm (US)	34,857	38,896	12.0%	3.7%	14%	11%
4	4	AMD (US)	25,785	34,639	34.0%	8.1%	10%	10%
5	5	MediaTek (TW)	16,530	19,117	16.0%	2.4%	7%	5%
6	6	Marvell (US)	5,637	8,061	43.0%	2.2%	2%	2%
7	7	Realtek (TW)	3,530	3,930	11.0%	0.4%	1%	1%
8	8	OmniVision (CN)	3,011	3,312	10.0%	0.3%	1%	1%
9	9	Novatek (TW)	3,201	3,228	1.0%	0.0%	1%	1%
10	10	MPS (US)	2,207	2,790	26.0%	0.5%	1%	1%
Total of Top 10			249,780	359,432	44.0%	100.0%	100%	100%
US Share			223,507	329,845	48%	97.3%	90%	93%
TW Share			23,261	26,275	13%	2.7%	9%	7%
CN Share			3,011	3,312	10%	0.3%	1%	1%

Source: TrendForce, April 2026. "Contribution," "US Share," "TW Share" and "CN Share" are calculated by the author.

Quarterly data for 2026 show that this concentration has intensified further. According to TrendForce, the combined revenue of the world's top 10 fabless IC design companies surged 73% year-over-year to more than US\$ 141.45 billion in the second quarter of 2026, a 17% increase over the first quarter, as expanding AI applications continued to drive demand for GPUs, CPUs, ASICs, and interconnect products.

NVIDIA remained firmly in first place, with second-quarter revenue rising 99% year-over-year to nearly US\$ 91.16 billion and its share of top 10 revenue holding at 64%; beyond hyperscale cloud providers, NeoCloud operators and sovereign AI projects, enterprise customers contributed significantly. The company has also expanded its NVLink Fusion ecosystem into the ASIC market, with its investment in MediaTek intended to help custom XPU customers interoperate with existing NVIDIA infrastructure while laying groundwork for automotive AI.

Broadcom ranked second at more than US\$ 18.89 billion, up 112%, as the first ASIC it helped design for OpenAI and Google’s TPU 8i began shipping and its networking business grew alongside XPU deployments; its six major custom-chip customers, including Anthropic and OpenAI, should continue driving demand. AMD moved into third at more than US\$ 11.53 billion as agentic AI renewed the strategic importance of CPUs, with data center CPU revenue at a record for the fifth consecutive quarter and continued share gains against Intel in x86 servers.

Qualcomm slipped to fourth at more than US\$ 8.5 billion on smartphone weakness and a reduced modem share in the newest iPhone, offset partly by twenty-three consecutive quarters of double-digit automotive growth; MediaTek ranked fifth at about US\$ 4.81 billion, also weighed down by handsets, but raised its AI ASIC outlook and now expects data center revenue above US\$ 2 billion in 2026.

Marvell placed sixth at US\$ 2.63 billion on interconnect demand, holding a leading position in PAM4 DSPs and reaching a custom-silicon agreement with Google; Realtek seventh at nearly US\$ 1.19 billion; MPS eighth at US\$ 981 million on AI-related power management; Novatek ninth at US\$ 907 million; and OmniVision tenth at US\$ 838 million.

Taken together, the second-quarter rankings confirm that AI has become the single organizing principle of the global IC design industry: NVIDIA, Broadcom and AMD together accounted for 86% of top 10 revenue, while the two mobile-centric leaders, Qualcomm and MediaTek, both recorded year-over-year declines. For Taiwan the implication is twofold. MediaTek, Realtek and Novatek remain globally competitive but are increasingly exposed to consumer-electronics cycles, whereas the AI-driven revenue now concentrated among U.S. fabless leaders flows almost entirely into Taiwan’s foundry and advanced-packaging capacity (see Table 8).

Table 8. Top 10 Global Fabless IC Design Houses by Revenue: 2Q 2026

Unit: US\$ Million

Ranking	Company	1Q 2026 Revenue	2Q 2026 Revenue	QoQ	YoY	Top 10 Share 1Q 2026	Top 10 Share 2Q 2026
1	NVIDIA (US)	76,946	91,159	18%	99%	64%	64%
2	Broadcom (US)	14,178	18,896	33%	112%	12%	13%
3	AMD (US)	10,253	11,536	13%	50%	8%	8%
4	Qualcomm (US)	9,076	8,504	-6%	-5%	8%	6%
5	MediaTek (TW)	4,715	4,815	2%	-1%	4%	3%
6	Marvell (US)	2,351	2,632	12%	34%	2%	2%
7	Realtek (TW)	1,152	1,188	3%	15%	1%	1%
9	MPS (US)	804	981	22%	48%	1%	1%

8	Novatek (TW)	732	907	24%	7%	1%	1%
10	OmniVision (CN)	718	838	17%	-3%	1%	1%
Total of Top 10		120,926	141,455	17%	73%	100%	100%

Source: TrendForce, "Top 10 Global Fabless IC Design Houses Post 73% YoY Revenue Growth in 2Q26; AMD Breaks into Top Three," September 11, 2026. Revenue for all companies is adjusted from fiscal-year to calendar-year periods.

4. Wafer Fabrication

The precision and control required in wafer fabrication make it one of the most technology- and capital- intensive processes in manufacturing. In the wafer fabrication sector, Taiwan's TSMC holds the distinction of being both Taiwan's and the world's largest foundry.

In the second quarter of 2026 the global foundry industry sustained its growth momentum, driven by AI and high-performance computing demand and by advance procurement across the consumer electronics supply chain. According to TrendForce, the combined revenue of the world's top ten foundries reached US\$ 53.49 billion, up 11.5% from the previous quarter and another record—well above the 3.7% recorded in the first quarter—with all ten posting sequential growth. Persistent supply constraints at the advanced nodes used for AI and HPC processors, rising demand for AI-related peripheral chips such as power management ICs and power discretes, and advance procurement in the television, PC and notebook chains that tightened certain mature nodes were the main drivers.

TSMC Passes US\$ 40 Billion in Quarterly Revenue and Captures Nearly 80% of Industry Growth

TSMC generated revenue of US\$ 40.198 billion, up 12.1% from the previous quarter and well above the industry average. Its quarterly revenue rose by approximately US\$ 4.34 billion while the top ten total rose by about US\$ 5.52 billion, meaning TSMC contributed 78.7% of the industry's incremental revenue. Its share of the global foundry market rose from 72.3% in the first quarter to a record 72.5%, 2.3 percentage points above the 70.2% of a year earlier, while the shares of most competitors stagnated or declined (see Table 9).

Table 9. Global Top 10 Foundries by Revenue: Q2 2026

Unit: US\$ million							
Ranking	Company	2Q 2026 Revenue	1Q 2026 Revenue	Quarterly Growth Rate	Contribution to Growth	Market Share 2Q 2026	Market Share 1Q 2026
1	TSMC (TW)	40,198	35,855	12.1%	78.7%	72.5%	72.3%
2	Samsung (KR)	3,260	3,201	1.8%	1.1%	5.9%	6.5%

3	SMIC (CN)	3,006	2,505	20.0%	9.1%	5.4%	5.1%
4	UMC (TW)	2,175	1,930	12.7%	4.4%	3.9%	3.9%
5	GlobalFoundries (USA)	1,786	1,634	9.3%	2.8%	3.2%	3.3%
6	HuaHong Group (CN)	1,274	1,230	3.5%	0.8%	2.3%	2.5%
7	Tower (IL)	460	414	11.2%	0.8%	0.8%	0.8%
8	VIS (TW)	451	396	13.8%	1.0%	0.8%	0.8%
9	Nexchip (CN)	447	421	6.4%	0.5%	0.8%	0.8%
10	PSMC (TW)	432	386	11.9%	0.8%	0.8%	0.8%
Total of Top 10		53,488	47,972	11.5%	100.0%	96.5%	96.8%

Source: Raw data are from TrendForce press releases, September 9, 2026; growth rates and “contribution” are calculated by the author.

Samsung’s Growth Slows as SMIC Rapidly Closes the Gap

Second-ranked Samsung generated US\$ 3.26 billion, up 1.8%. New advanced-process orders—including high-bandwidth memory base dies—ramped gradually and prices for 5/4-nanometer and below were raised, but growth lagged well behind competitors and Samsung’s share fell from 6.5% to 5.9%, widening the gap with TSMC to 66.6 percentage points.

SMIC, in third place, grew fastest of the top ten: revenue surged 20.0% to exceed US\$ 3 billion for the first time at US\$ 3.006 billion, lifting its share from 5.1% to 5.4% and narrowing the gap with Samsung from 1.4 percentage points to just 0.5.

UMC remained fourth at US\$ 2.175 billion, up 12.7%, holding a 3.9% share, while GlobalFoundries ranked fifth at US\$ 1.786 billion, up 9.3%, with its share edging down from 3.3% to 3.2%: together the two accounted for 7.1% of the global market, a continued decline from a year earlier.

HuaHong Group ranked sixth at US\$ 1.274 billion, up 3.5%, with its share falling from 2.5% to 2.3%, and Tower Semiconductor seventh at US\$ 460 million, up 11.2%, at an unchanged 0.8%.

Among the eighth to tenth places, Vanguard International Semiconductor returned to eighth after 13.8% growth to US\$ 451 million, Nexchip slipped to ninth despite 6.4% growth to US\$ 447 million, and Powerchip’s foundry revenue rose 11.9% to US\$ 432 million; each held a 0.8% share (see Table 10).

Table 10. Global Market Shares of the Top 10 Semiconductor Foundries: 2023Q2–2026Q2

Ranking	Company	2026 Q2	2026 Q1	2025 Q4	2025 Q3	2025 Q2	2025 Q1	2024 Q4	2024 Q3	2024 Q2	2024 Q1	2023 Q4	2023 Q3	2023 Q2
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1	TSMC (TW)	72.5%	72.3%	70.4%	71.0%	70.2%	67.6%	67.1%	64.7%	62.3%	61.7%	61.2%	57.9%	56.4%
2	Samsung (KR)	5.9%	6.5%	7.1%	6.8%	7.3%	7.7%	8.1%	9.1%	11.5%	11.0%	11.3%	12.4%	11.7%
3	SMIC (CN)	5.4%	5.1%	5.2%	5.1%	5.1%	6.0%	5.5%	6.0%	5.7%	5.7%	5.2%	5.4%	5.6%
4	UMC (TW)	3.9%	3.9%	4.2%	4.2%	4.4%	4.7%	4.7%	5.1%	5.3%	5.7%	5.4%	6.0%	6.6%
5	GlobalFoundries (USA)	3.2%	3.3%	3.8%	3.6%	3.9%	4.2%	4.6%	4.8%	4.9%	5.1%	5.8%	6.2%	6.7%
6	Huahong Group (CN)	2.3%	2.5%	2.5%	2.6%	2.5%	2.7%	2.6%	2.7%	2.1%	2.2%	2.0%	2.6%	3.0%
7	Tower (IL)	0.8%	0.8%	0.9%	0.9%	0.9%	0.9%	1.0%	1.0%	1.1%	1.1%	1.1%	1.2%	1.3%
8	VIS (TW)	0.8%	0.8%	0.8%	0.9%	0.8%	0.9%	0.9%	0.9%	0.9%	1.0%	1.0%	1.0%	n.a.
9	Nexchip (CN)	0.8%	0.8%	0.8%	0.9%	0.9%	1.0%	0.9%	1.0%	1.0%	1.0%	1.0%	1.1%	1.2%
10	PSMC (TW)	0.8%	0.8%	0.8%	0.8%	0.8%	0.9%	0.8%	0.9%	1.0%	1.0%	1.0%	1.0%	1.2%
Total of Top 10		96.5%	96.8%	96.5%	97.0%	96.8%	96.8%	97.0%	96.2%	96.2%	96.0%	95.0%	95.0%	95.0%

Source: Trendforce, Press Releases.

Market Concentration Reaches a New High as the Leading Firms Pull Further Ahead

Structurally, the market has never been more concentrated. The top ten foundries controlled 96.5% of it in the second quarter of 2026, TSMC alone 72.5%, the top three 83.8% and the top five 90.9%. Against the same quarter a year earlier, TSMC gained 2.3 percentage points and SMIC 0.3, while Samsung lost 1.4, GlobalFoundries 0.7 and UMC 0.5. Incremental demand continues to concentrate among firms with technological leadership: as AI and HPC applications expand, advanced processes are becoming the industry's principal growth driver, and TSMC's technological and scale advantages translate directly into a larger share of the market (see Table 11).

Table 11. Market Share of Global Top 10 Foundries by Revenue: 2022-2025

Ranking	Company	Revenue					Market Share			
		2025	2024	Difference	Growth Rate (YoY)	Contribution	2025	2024	2023	2022
1	TSMC	122,543	90,047	32,496	36.1%	92.1%	69.9%	64.4%	58.9%	55.4%
2	Samsung	12,634	13,152	-518	-3.9%	-1.5%	7.2%	9.4%	12.0%	16.0%
3	SMIC	9,327	8,030	1,297	16.2%	3.7%	5.3%	5.7%	5.4%	5.3%
4	UMC	7,629	7,234	395	5.5%	1.1%	4.4%	5.2%	6.1%	6.8%
5	GlobalFoundries	6,791	6,750	41	0.6%	0.1%	3.9%	4.8%	6.3%	6.0%
6	HuaHong Group	4,500	3,595	905	25.2%	2.6%	2.6%	2.6%	2.7%	3.1%
7	Tower	1,566	1,436	130	9.1%	0.4%	0.9%	1.0%	1.2%	1.3%

8	VIS	1,561	1,371	190	13.8%	0.5%	0.9%	1.0%	1.1%	1.3%
9	Nexchip	1,514	1,286	228	17.7%	0.6%	0.9%	0.9%	1.0%	1.3%
10	PSMC	1,404	1,304	100	7.7%	0.3%	0.8%	0.9%	1.1%	1.7%
Total of Top 10		169,469	134,204	35,265	26.3%	100.0%	97.0%	96.0%	95.8%	98.2%

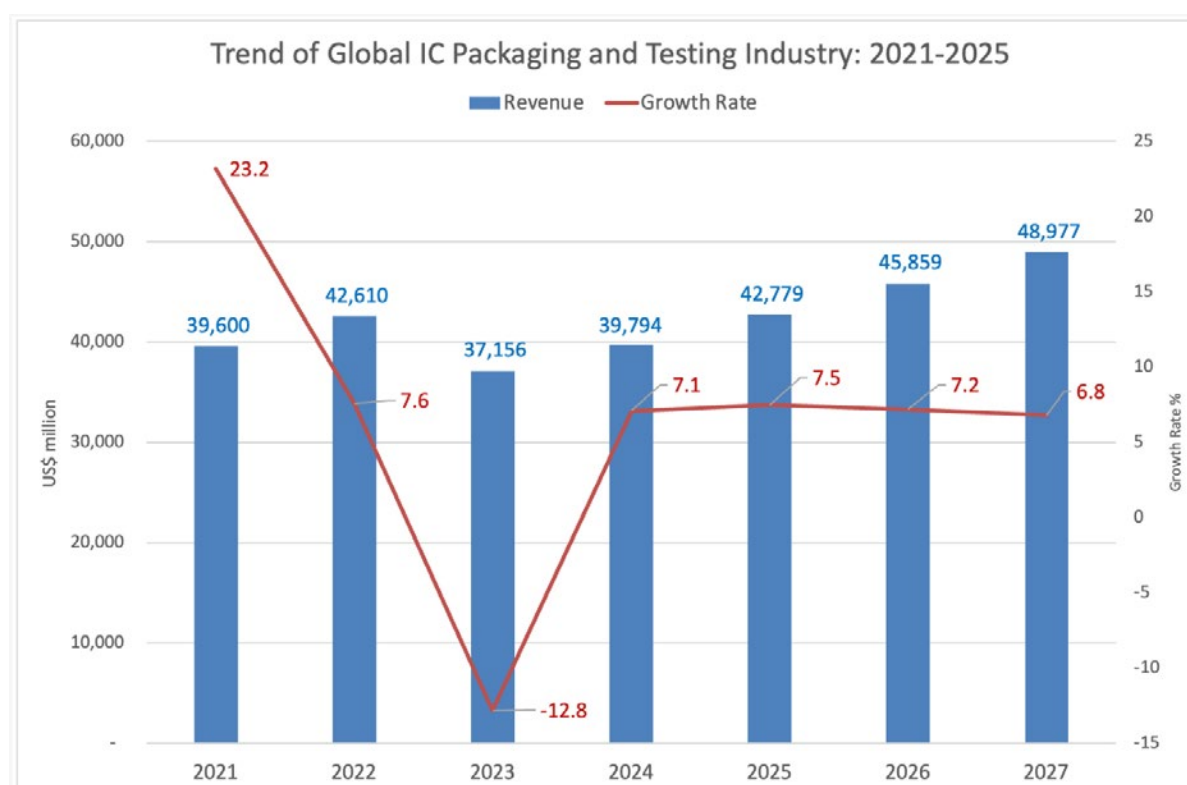
Source: Raw data are from TrendForce press releases; growth rates and “contribution” are calculated by the author.

5. Packaging and Testing

After front-end fabrication, wafers move to back-end assembly, testing and packaging (ATP), a labor-intensive stage dominated by outsourced semiconductor assembly and test (OSAT) companies offering wafer bumping, wafer probing, packaging and testing as third-party services. Much of the world’s ATP capacity sits in Asia, and the two largest OSAT firms are Taiwan’s ASEH and U.S.-headquartered Amkor. Because the packaging and testing divisions of IDMs and foundries do not disclose standalone revenue, estimates of the global market are based largely on OSAT revenue.

The sector’s recent trajectory tracks the wider cycle. Output value reached US\$ 42.61 billion in 2022, a five-year high, before monetary tightening and weak consumer electronics demand pushed it down 12.8% to US\$ 37.16 billion in 2023—the low point of the inventory correction. Recovery followed: US\$ 39.79 billion in 2024, up 7.1%, and, on ITRI estimates, a further 7.5% to US\$ 42.78 billion in 2025, a new historical high driven by AI servers and data centers (see Figure 13).

Figure 13. Trend of Global IC Packaging and Testing Industry: 2021-2025



Source: Jing-Han Chen, “Development Trends and Technological Innovations in the Advanced Semiconductor Packaging Industry,” IEK, ITRI, October 28, 2025, p.2.

The 2024 OSAT data show mild recovery accompanied by a marked redistribution of share. Top 10 revenue rose 3.0% to US\$ 41.56 billion, but the gains were uneven. ASE Holdings remained dominant yet

saw revenue slip to US\$ 18.54 billion and share fall from 46.3% to 44.6%; Amkor followed the same path, easing to US\$ 6.32 billion and 15.2%. Chinese firms drove most of the growth: JCET added US\$ 0.81 billion to reach US\$ 5.0 billion and 12.0%, consolidating third place, while Tongfu Microelectronics reached US\$ 3.32 billion and Tianshui Huatian grew fastest in the group to US\$ 2.01 billion and 4.8%. Korea’s Hana Micron rose to US\$ 0.92 billion and 2.2%, while among Taiwan’s mid-sized players KYEC fell to US\$ 0.91 billion and 2.2%.

At country level, Taiwan remained the largest OSAT base but saw its top 10 share fall from 56.2% to 54.0% under revenue pressure at ASE and KYEC, while China emerged as the main growth engine, adding US\$ 1.49 billion to reach US\$ 11.89 billion and expanding from 25.9% to 28.5%. The United States eased from 16.1% to 15.2% and Korea rose from 1.8% to 2.2%. The industry has returned to growth in absolute terms, but incremental share is concentrating among Chinese and selected Korean firms—a gradual rebalancing rather than a sudden structural break (see Table 12).

Table 12. Global Top10 OSAT Company Revenue Rankings: 2024

Ranking	Company	Revenue			Top10 Market Share	
		2023	2024	YoY	2023	2024
1	ASE Holdings (TW)	18.68	18.54	-0.7%	46.3%	44.6%
2	Amkor (US)	6.5	6.32	-2.8%	16.1%	15.2%
3	JCET (CN)	4.19	5	19.3%	10.4%	12.0%
4	TFME (Tongfu Microelectronics, CN)	3.14	3.32	5.6%	7.8%	8.0%
5	PTI (Powertech Technology Inc., TW)	2.26	2.28	1.0%	5.6%	5.5%
6	TSHT (Tianshui Huatian Technology, CN)	1.59	2.01	26.0%	4.0%	4.8%
7	WiseRoad (CN)	1.48	1.56	5.0%	3.7%	3.7%
8	Hana Micron (KR)	0.74	0.92	23.7%	1.8%	2.2%
9	KYEC (King Yuan Electronics, TW)	1.06	0.91	-14.5%	2.6%	2.2%
10	ChipMOS (TW)	0.69	0.71	3.1%	1.7%	1.7%
Taiwan total		22.69	22.44	-1.1%	56.2%	54.0%
U.S. total		6.5	6.32	-2.8%	16.1%	15.2%
China total		10.4	11.89	14.3%	25.9%	28.5%
Korea total		0.74	0.92	24.3%	1.8%	2.2%

Top 10 total	40.34	41.56	3.0%	100.0%	100.0%
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Source: Press release, “Top 10 OSAT Companies of 2024 Revealed—China Players See Double-Digit Growth, Reshaping the Global Market Landscape, Says TrendForce,” TrendForce, May 13, 2025.

6. Semiconductor Materials and Equipment

Semiconductor production depends on a highly specialized ecosystem spanning materials, manufacturing equipment, design software, and core intellectual property. Among these, equipment suppliers are central, providing the tools that enable chip fabrication. US-headquartered firms dominate most categories of semiconductor manufacturing equipment, with the main exceptions being photolithography and wafer handling. Leading companies such as Applied Materials, Lam Research, and KLA collectively control about 35% of the global market, reflecting US strengths in deposition, etching, and process control technologies.²

Within the equipment market, key modules are a critical and fast-growing segment: ITRI put the global market at US\$ 22.57 billion in 2025, compounding at 7.9% to US\$ 32.94 billion by 2030. Driven by the complexity of advanced packaging and by the growing number of etch and deposition steps in high-aspect-ratio structures, the fastest-growing sub-segments to 2030 are vacuum modules (12.2%), thermal management (11.3%) and power and reactive gas modules (10.5%), prompting a wave of cross-border mergers and acquisitions among module and equipment suppliers.

The critical exception to U.S. dominance is photolithography. The Netherlands’ ASML is the world’s sole supplier of extreme ultraviolet systems, a prerequisite for the most advanced chips. Upstream materials are similarly concentrated in Japan, where JSR, Tokyo Ohka Kogyo, Shin-Etsu Chemical and Fujifilm Electronic Materials hold roughly three-quarters of the high-end photoresist market and a near-monopoly in EUV photoresists, while silicon wafer supply rests with Shin-Etsu, Sumco and Taiwan’s GlobalWafers. The reliability and technological depth of these suppliers shape the resilience of the entire value chain.

In 2024, global semiconductor equipment sales reached approximately ¥ 19.8 trillion (about US\$ 137 billion), up 19.5% year-over-year. The United States accounted for 43.3% of sales, the Netherlands for 25.7% on the strength of ASML and ASM International, and Japan for 20.8% through lithography-related and inspection tools; China represented 3.5% from a low base and Singapore 0.7%, mainly through ASMPT in advanced packaging equipment.

The market remained highly concentrated in the third quarter of 2025, when the top ten suppliers generated about US\$ 35.1 billion. ASML was the largest at 25.1%, followed by Applied Materials, Lam Research and KLA of the United States and Tokyo Electron and Advantest of Japan. By country, U.S. companies held about 43.7% of the top-supplier market, the Netherlands 27.7% and Japan 24.1%, while China accounted for roughly 4.4%—though firms such as Naura are expanding rapidly as China builds domestic equipment capability (see Table 13).

² Lauly Li, “U.S. chip tool makers eye Southeast Asia as China business shrinks,” Nikkei Asia, February 10, 2023.

Table 13. Top 10 Global Semiconductor Equipment Suppliers by Revenue in 3Q 2025

Unit: US\$ Million

Rank	Vendor	2Q 2025	3Q 2025	QoQ Change	Share
1	ASML (Netherlands)	8,722.8	8,782.8	0.7%	25.1%
2	Applied Materials (USA)	7,302.0	6,800.0	-6.9%	19.4%
3	Lam Research (USA)	5,171.0	5,324.0	3.0%	15.2%
4	Tokyo Electron (Japan)	3,803.6	4,270.9	12.3%	12.2%
5	KLA Corp (USA)	3,063.0	3,209.7	4.8%	9.2%
6	Advantest (Japan)	1,825.7	1,782.3	-2.4%	5.1%
7	Naura (China)	1,097.0	1,559.3	42.1%	4.4%
8	Ebara (Japan)	1,634.1	1,456.1	-10.9%	4.2%
9	Screen Holdings (Japan)	939.8	938.9	-0.1%	2.7%
10	ASM International (Netherlands)	948.2	934.8	-1.4%	2.7%
Total		34,507.2	35,058.8	1.6%	
Netherlands' share			27.7%		
USA's share			43.7%		
Japan's share			24.1%		
China's share			4.4%		

Source: TrendForce, "ASML EUV Dominance & China's Semiconductor Equipment Push," Dec. 23, 2025.

Billings have since set records on continued AI-related investment in leading-edge logic, DRAM and advanced packaging. SEMI's Worldwide Semiconductor Equipment Market Statistics report global billings of US\$ 36.55 billion in the first quarter of 2026, up 14% year-over-year and 1% sequentially, with momentum coming primarily from Korea and Taiwan. China remained the largest single market at US\$ 10.99 billion (up 7% year-over-year despite a 16% sequential decline), Korea surged to second at US\$ 8.93 billion (up 26% sequentially and 16% year-over-year) and Taiwan followed at US\$ 8.77 billion (up 18% and 24%). North America reached US\$ 3.28 billion and Europe US\$ 0.95 billion, while Japan was the only major region to decline, at US\$ 2.16 billion (see Table 14).

Table 14. Semiconductor Equipment Market Revenue by Region: 2025-2026

Unit: US\$ Billion

Region	1Q 2026	4Q 2025	1Q 2025	1Q (QoQ)	1Q (YoY)
Europe	0.95	0.74	0.87	28%	9%
Japan	2.16	2.82	2.18	-24%	-1%
North America	3.28	3.09	2.93	6%	12%
Korea	8.93	7.08	7.69	26%	16%
Taiwan	8.77	7.44	7.09	18%	24%
China	10.99	13.13	10.26	-16%	7%
Rest of the World	1.48	1.97	1.03	-25%	43%
Total	36.55	36.27	32.05	1%	14%

Sources: SEMI, "Record Quarterly Equipment Billings Reflect Continued AI-Driven Investment," June 4, 2026

Note: Summed subtotals may not equal total due to rounding.

7. Value-Added Share

Regional strengths differ sharply by activity. A Boston Consulting Group report of May 2024 places the United States ahead in design, core IP and EDA; the United States, the EU and Japan jointly ahead in equipment; China, Japan, Taiwan and South Korea ahead in materials; South Korea and Taiwan ahead in advanced-node fabrication below 10 nanometers; and assembly, test and packaging concentrated in Taiwan and China.

The 2022 value-added figures make the specialization concrete. The United States accounted for 68% of value added in EDA and core IP, 65% in logic chip design and 47% in manufacturing equipment, while South Korea held 60% of memory chip design and Japan and South Korea contributed 18% and 25% of equipment. In fabrication and back-end work the balance reverses: China led wafer fabrication at 24%, ahead of Taiwan (18%) and South Korea (17%), and led assembly and testing at 30%, with Taiwan close behind at 28%. Across the chain as a whole the United States remained the largest contributor at 38%, followed by Japan and South Korea at 12% each and Taiwan and China at 11% each (see Table 15).

Table 15. Semiconductor Industry Value Added by Activity and Region: 2022 (%)

Precompetitive Research		Segment Value Added		U.S.	EU	Japan	South Korea	Taiwan	China	RoW
EDA Core IP	Design - Logic - DAO - Memory	EDA & Core IP	3%	68%	25%	<1%	<1%	3%	<1%	3%
		Design-Logic	30%	65%	9%	4%	3%	11%	5%	4%
		Design-DAO	17%	41%	17%	18%	4%	5%	9%	6%
		Design-Memory	9%	25%	<1%	7%	60%	4%	3%	<1%
Equipment Materials	Manufacturing - Wafer fabrication - Assembly, test and packaging	Mfg equipment	12%	47%	18%	25%	3%	<1%	3%	2%
		Materials	5%	9%	6%	12%	18%	28%	18%	10%
		Wafer fabrication	19%	10%	8%	17%	17%	18%	24%	7%
		ATP	6%	3%	3%	6%	9%	28%	30%	20%
		Overall value chain	100%	38%	11%	12%	12%	11%	11%	5%

Notes on regional breakdown:

- EDA, design, manufacturing equipment, and raw materials based on company revenues and company headquarters location.
- Wafer fabrication and assembly & testing based on installed capacity and geographic location of the facilities.
- RoW includes Singapore, Israel, India and the rest of the world.

Source: Raj Varadarajan, Iacob Koch-Weser, Chris Richard, Joseph Fitzgerald, Jaskaran Singh, Mary Thornton, Robert Casanova and David Isaacs, "Emerging Resilience in The Semiconductor Supply Chain," Boston Consulting Group, May 2024, p. 10.

III. Taiwan's Semiconductor Industry

1. Output Value and Growth

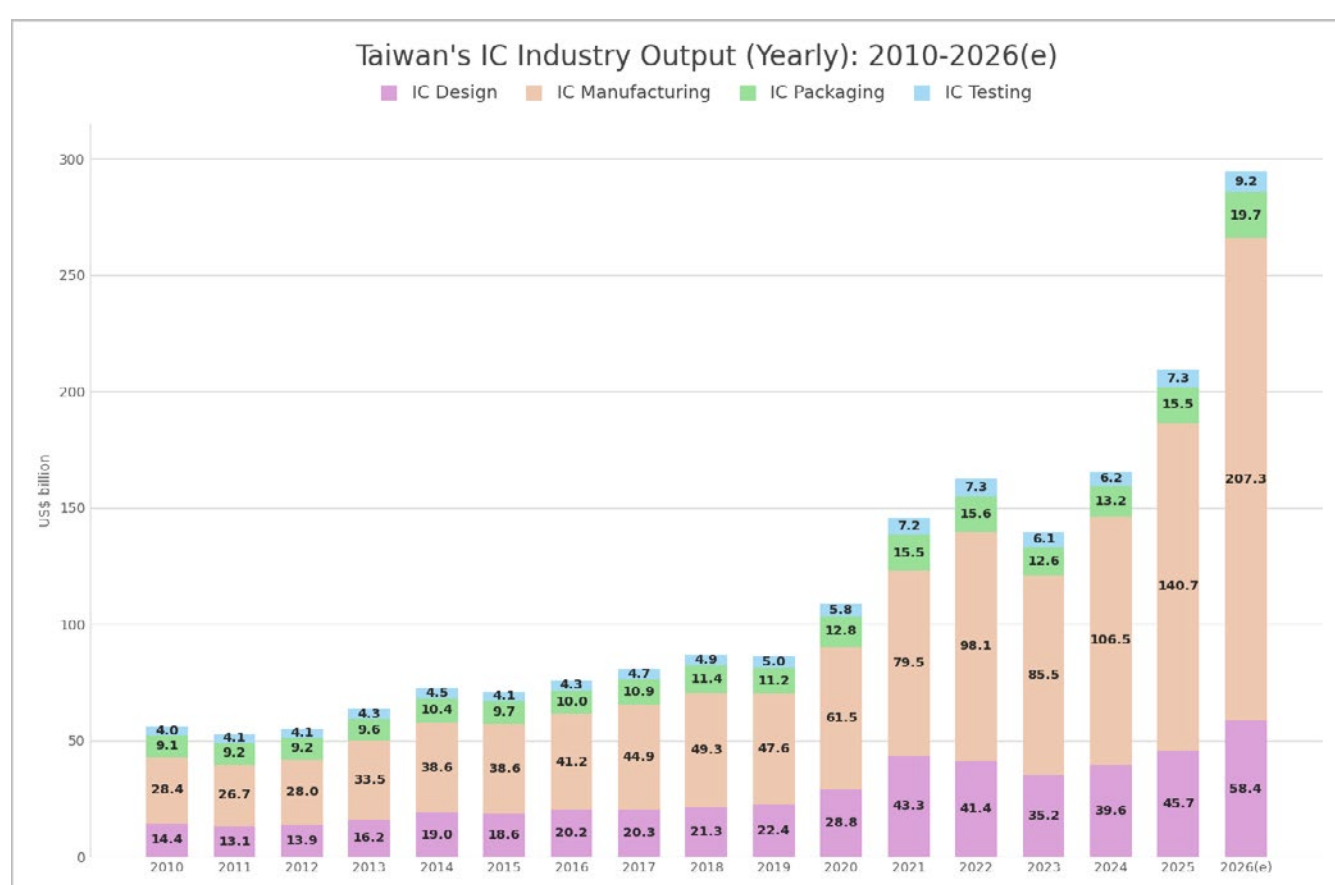
Taiwan's IC design industry, anchored by MediaTek, Novatek and Realtek, grew steadily through the 2010s and reached US\$ 45.7 billion in 2025, a 12.0% increase and a record high. Momentum then accelerated: ITRI estimates full-year 2026 output of NT\$ 1,821.1 billion (about US\$ 58.4 billion), up 27.8% and a further record, as AI ASIC projects for cloud service providers, enterprise-grade storage controllers for AI servers and niche memory products more than offset softness in handsets.

IC manufacturing is Taiwan's core competitive strength, as the position of TSMC attests. Output rebounded from US\$ 85.5 billion in 2023 to a record US\$ 106.5 billion in 2024 and US\$ 140.7 billion in 2025, a 28.3% increase, of which wafer foundry accounted for US\$ 133.8 billion (up 28.5%) and memory and other manufacturing for US\$ 7.0 billion (up 23.8%). For 2026 ITRI forecasts a further acceleration to NT\$ 6,468.3 billion (about US\$ 207.3 billion), up 47.4%, comprising NT\$ 5,774.6 billion (US\$ 185.1 billion) in wafer foundry, up 38.5%, and NT\$ 693.7 billion (US\$ 22.2 billion) in memory and other manufacturing, up 218.8% as the AI memory supercycle lifts both volumes and prices.

IC packaging, led by ASEH, PTI and KYEC, has grown moderately. After peaking at roughly US\$ 15.5 billion in 2021–2022 and correcting in 2023, output recovered above US\$ 13 billion in 2024 and returned to US\$ 15.5 billion in 2025, a 14.0% increase. ITRI expects NT\$ 615.2 billion (about US\$ 19.7 billion) in 2026, up 27.5%, lifted by advanced packaging for AI accelerators.

IC testing is smaller in scale and has grown slowly. Output fell to US\$ 6.1 billion in 2023 and inched to US\$ 6.2 billion in 2024 before recovering to US\$ 7.3 billion in 2025, a 14.2% increase. ITRI projects NT\$ 285.8 billion (about US\$ 9.2 billion) for 2026, up 25.0%, driven by the rising value of high-end testing for AI chips (see Figure 14).

Figure 14. Taiwan's IC Industry Output (Yearly): 2010-2026(e)



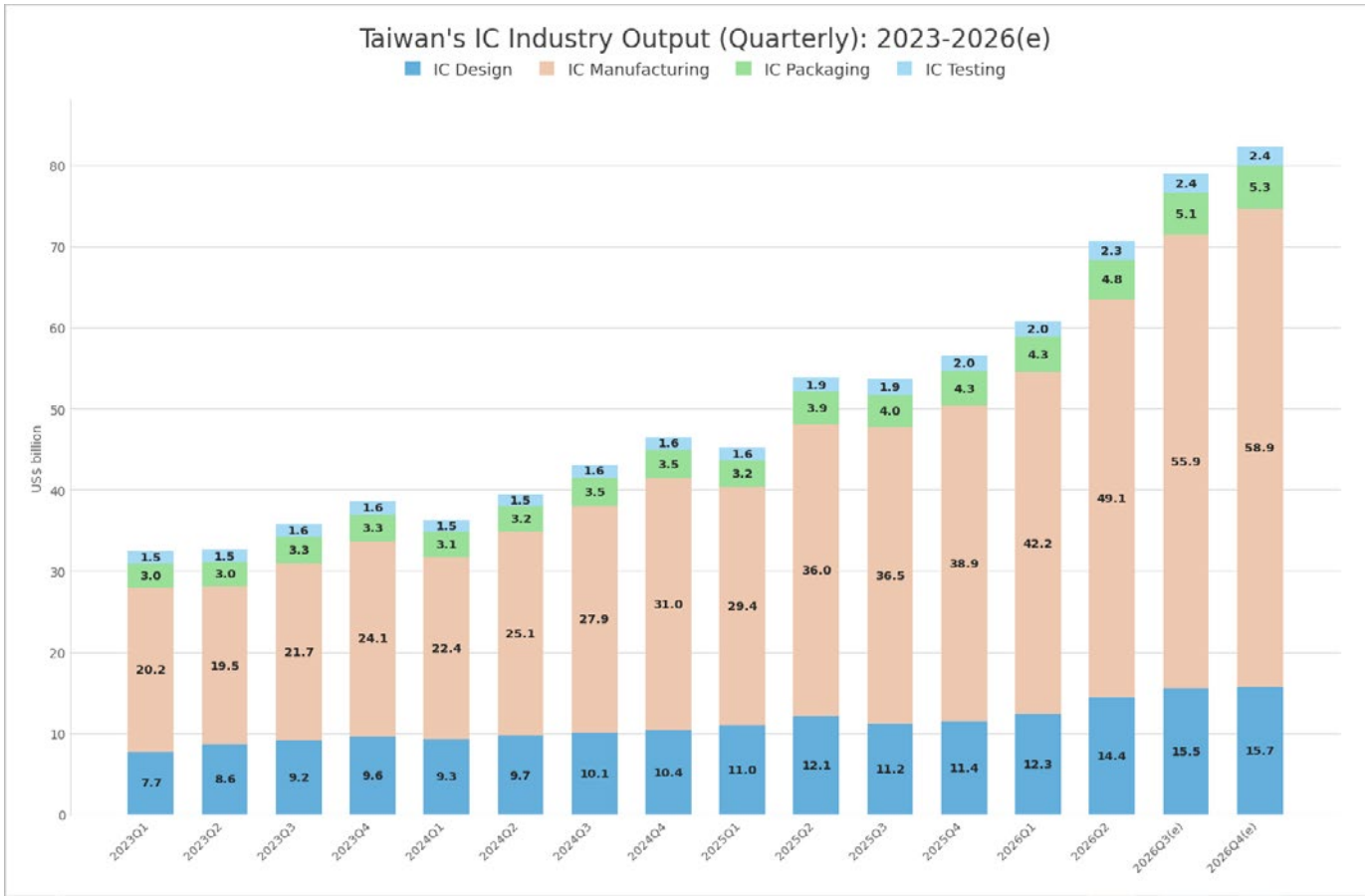
Source: Chia-Chen Lee, "Taiwan IC Industry Development in 2026Q2," IEK, ITRI, September 2026. Figures for 2026 are ITRI estimates converted at NT\$ 31.2 per US dollar.

Full-year 2025 output reached a record US\$ 209.2 billion (NT\$ 6,522.5 billion), up 22.7% on 2024, and the expansion accelerated sharply in 2026. First-quarter output reached NT\$ 1,926.1 billion, up 9.2% sequentially and 29.4% year-over-year, and the second quarter set a further record at NT\$ 2,231.3 billion (about US\$ 70.6 billion), up 15.8% and 39.5% respectively.

Growth came from AI and high-performance computing demand, which lifted ASIC, memory, enterprise storage, high-speed networking and related packaging and testing requirements in parallel; weakness in smartphones and parts of consumer electronics was more than offset by AI infrastructure investment, the advance of leading-edge processes and the recovery of the memory market.

ITRI expects NT\$ 2,464.9 billion in the third quarter and NT\$ 2,568.1 billion in the fourth, bringing full-year 2026 output to NT\$ 9,190.4 billion (about US\$ 294.6 billion), an annual increase of 40.9% (see Figure 15).

Figure 15. Taiwan’s IC Industry Output (Quarterly): 2023-2026(e)



Source: Chia-Chen Lee, “Taiwan IC Industry Development in 2026Q2,” IEK, ITRI, September 2026. Quarterly figures are converted at the average New Taiwan dollar/US dollar exchange rate of each quarter; 2026Q3 and 2026Q4 are ITRI estimates converted at NT\$ 31.2 per US dollar.

Table 16 sets out the year-over-year growth rates across the four segments in 2026. IC manufacturing is again the strongest performer at an estimated 47.4% for the year, accelerating from 37.9% in the first quarter to 45.2% in the second and an expected 53.4% in the third. IC design, which grew only 7.6% in the first quarter as handset demand remained soft, accelerated to 27.0% in the second and is expected to approach 39% in the second half, giving 27.8% for the year. Packaging and testing sustained growth close to 30% throughout, ending at 27.5% and 25.0%. The expansion is thus led by front-end manufacturing—and within it by memory, where output is forecast to more than triple—while the back end has moved from cyclical recovery to structural growth.

Table 16. Growth of Taiwan’s IC Industry Output (Quarterly): 2026

	2026 (e)	Q1	Q2	Q3 (e)	Q4 (e)
IC Industry	40.9%	29.4%	39.5%	47.6%	45.5%
IC Design	27.8%	7.6%	27.0%	39.0%	38.4%
IC Manufacturing	47.4%	37.9%	45.2%	53.4%	51.5%
IC Packaging	27.5%	28.5%	32.1%	28.2%	22.1%
IC Testing	25.0%	24.5%	27.4%	27.6%	21.0%

Source: Chia-Chen Lee, “Taiwan IC Industry Development in 2026Q2,” IEK, ITRI, September 2026. Growth rates are year-over-year; (e) denotes an estimate.

IC packaging and testing output reached NT\$ 223.7 billion in the second quarter, a 30.6% year-over-year increase and the fifth consecutive quarter of double-digit annual growth, accelerating from 27.3% in the first. Where the first quarter had grown only about 1.9% over the fourth quarter of 2025 under normal

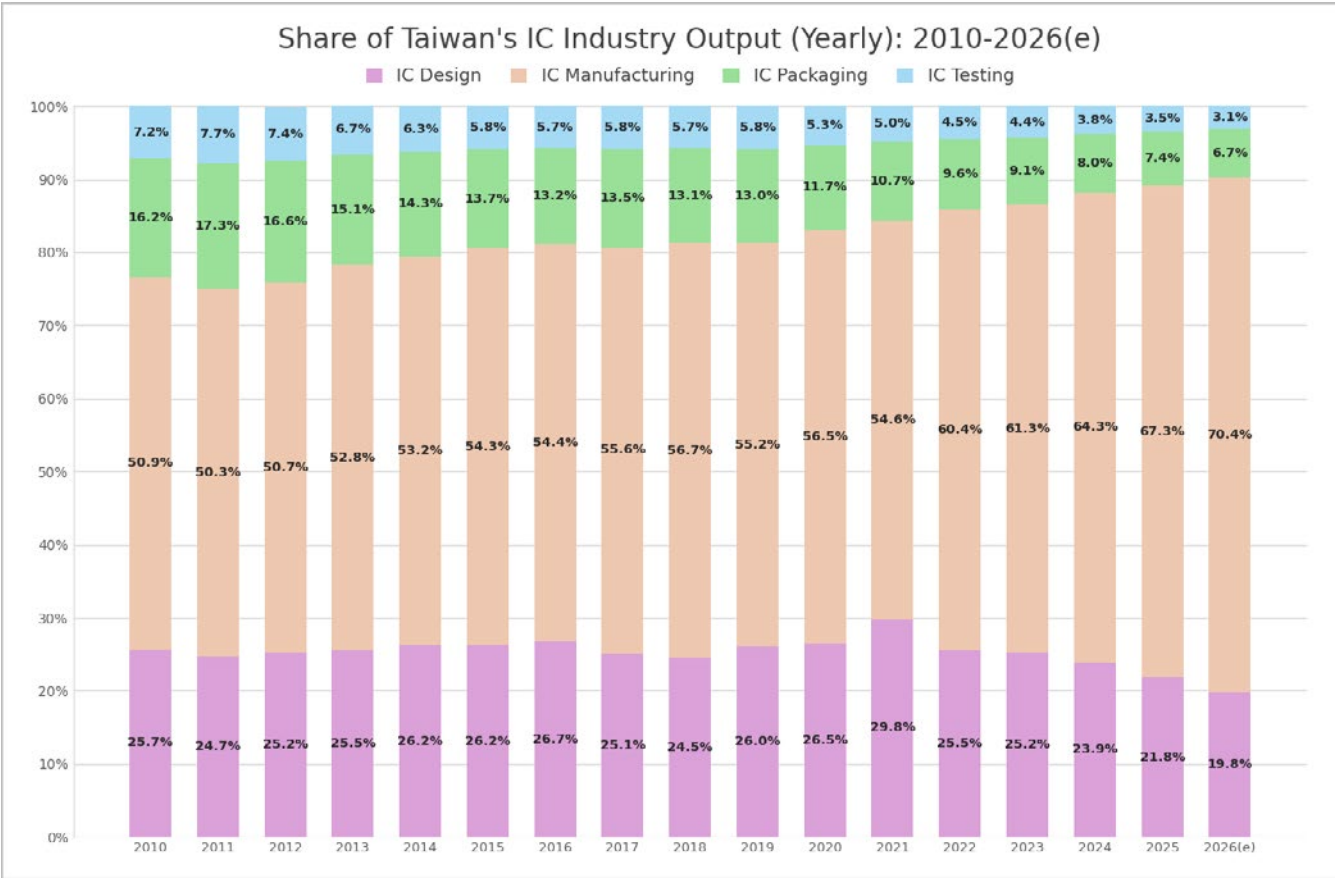
seasonal conditions, the second delivered double-digit sequential growth of 11.0%. The sector is therefore no longer merely replenishing inventory or riding the semiconductor cycle but undergoing a structural expansion driven by rising AI chip complexity, deeper penetration of advanced packaging and the higher value of high-end testing.

Logic IC packaging and testing remains the principal growth engine—ASE Holdings’ combined business grew 36.4% year-over-year in the second quarter, up from 30.3% in the first—while growth is spreading from a small number of AI-related suppliers toward memory, testing and sensor applications. For the full year ITRI forecasts NT\$ 901.0 billion, up 26.7%, as capacity expansion in 2.5D and 3D packaging and high-end testing is joined by a roadmap extending into fan-out panel-level packaging and co-packaged optics.

The sectoral shares tell the same story. IC design held roughly 25–27% of total output from 2010 to 2020 and briefly touched 29.8% in 2021 but has fallen steadily since—to 23.9% in 2024, 21.8% in 2025 and an estimated 19.8% in 2026, the first time the segment has dropped below one-fifth of the total.

Manufacturing has moved the other way, rising from around 50% in 2010 to 64.3% in 2024, 67.2% in 2025 and an estimated 70.4% in 2026—comprising 62.8% for foundry and 7.5% for memory and other manufacturing, an all-time high. Packaging has declined from 16.2% in 2010 to 8.0% in 2024, 7.4% in 2025 and an estimated 6.7% in 2026, and testing from 7.2% to 3.8%, 3.5% and an estimated 3.1% over the same points. These falling back-end shares reflect the extraordinary expansion of manufacturing value rather than any contraction in absolute terms: measured in output value, both packaging and testing are setting record highs (see Figure 16).

Figure 16. Share of Taiwan’s IC Industry Output (Yearly): 2010-2026(e)

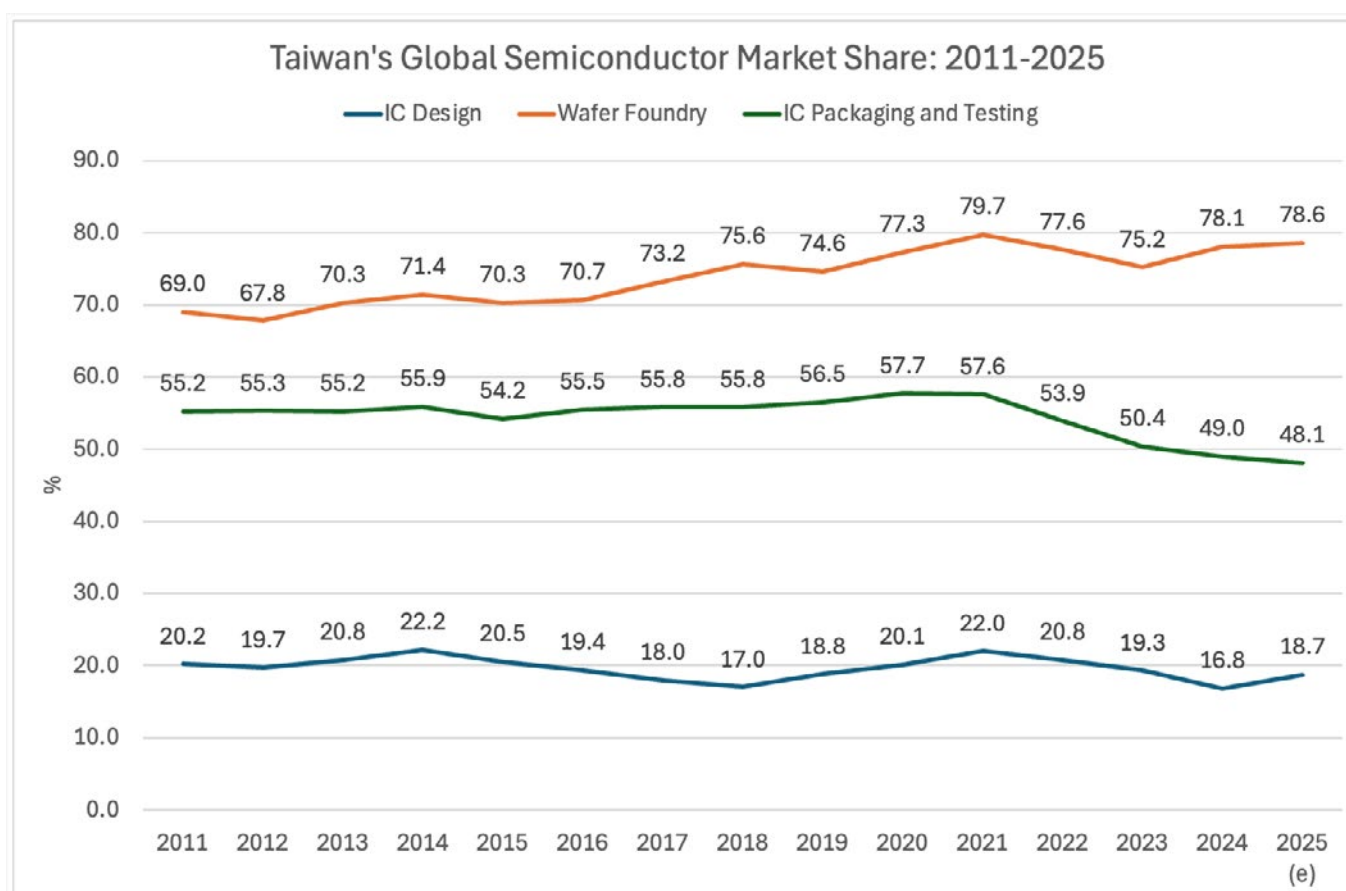


Source: Chia-Chen Lee, “Taiwan IC Industry Development in 2026Q2,” IEK, ITRI, September 2026.

2. Taiwan in the Global Semiconductor Supply Chain

ITRI data show three distinct trajectories in Taiwan’s global market share. In wafer foundry the share rose from 69.0% in 2011 to a peak of 79.7% in 2021, dipped to 75.2% in 2023 and rebounded to 78.1% in 2024, with ITRI projecting 78.6% for 2025. In packaging and testing it held between 55% and 58% from 2011 to 2021 before declining to 53.9% in 2022, 50.4% in 2023 and 49.0% in 2024, with a further drop to 48.1% forecast for 2025. IC design has been more cyclical, peaking at 22.2% in 2014, recovering to 22.0% in 2021, falling to a low of 16.8% in 2024 and rebounding to an expected 18.7% in 2025. Collectively these trends reveal a robust foundry sector, a packaging and testing segment under sustained competitive pressure, and a design industry that remains globally competitive through the cycle (see Figure 17).

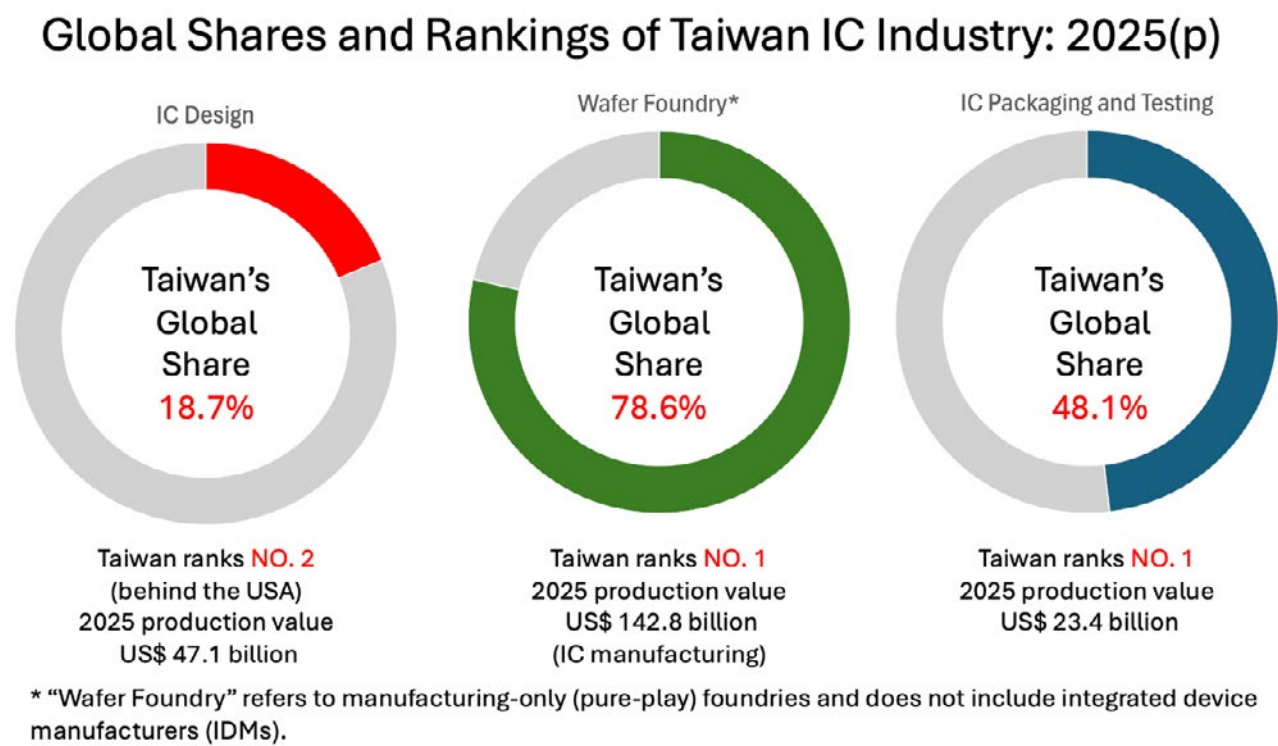
Figure 17. Taiwan's Global Semiconductor Market Share: 2011-2025



Source: ITRI, accessed November 23, 2025.

ITRI forecasts that by 2025, Taiwan's IC design industry will expand to a production value of US\$ 47.1 billion, with its global market share rising to 18.7%, remaining second only to the United States. The IC manufacturing industry is expected to grow to US\$ 142.8 billion, with wafer foundries increasing their global share to 78.6%, maintaining their global leadership. The IC packaging and testing industry is projected to reach US\$ 23.4 billion, representing 48.1% of the global market and continuing to hold top position (see Figure 18).

Figure 18. Global Shares and Rankings of Taiwan IC Industry: 2025(p)



Source: ITRI, November 29, 2025.

Taiwan's role in the equipment supply chain is undergoing a strategic upgrade, with Taiwanese companies moving from parts suppliers to core module designers and system integrators. Supported by a mature domestic precision machinery and automation ecosystem, Taiwan has achieved high manufacturing autonomy in vacuum modules, fluid management and wafer handling, and has broken long-standing barriers in power and reactive gas modules previously monopolized by Western and Japanese firms. Reinforced by recent acquisitions and investments, this localized capability strengthens the resilience of Taiwan's equipment ecosystem and its long-term partnerships with leading foundries and international equipment makers.

In memory, Taiwan-based DRAM suppliers have capitalized on the gaps created as the three global leaders migrate to advanced nodes. Nanya, Winbond and PSMC remain focused on mature-process products, and their growth through 2026 has been carried by demand that the three major suppliers can no longer fully serve. The first half of the year was exceptional. Sharp increases in DDR4 and DDR3 contract prices lifted Nanya's revenue 60.0% sequentially to US\$ 1.55 billion in the first quarter and a further 68.3% to US\$ 2.61 billion in the second; Winbond, helped by expanded DDR4 and LPDDR4 shipments, grew 91.4% to US\$ 568 million and then 75.8% to US\$ 998 million; and PSMC's consumer DRAM revenue rose 29.9% to US\$ 43 million before surging 167.8% to US\$ 115 million, with total revenue including foundry up 54% in the second quarter. Taken together, the three accounted for roughly 2.4% of global branded DRAM revenue in 2Q 2026. Following its licensing agreement for Micron's process technology, PSMC is expected to begin a further phase of supply expansion.

While Taiwan does not possess a homegrown HBM brand, it has substantively established itself as the indispensable core hub for global HBM manufacturing and integration. This position is anchored by TSMC's unparalleled capabilities in advanced packaging (such as CoWoS) and the manufacturing of logic base-dies, which are critical for integrating HBM from SK hynix, Samsung, and Micron with logic chips.

Moreover, foreign memory giants continue to deepen their footprint in Taiwan. Micron, adopting a multi-country diversification strategy, treats Taiwan as a core base for its HBM production. In January 2026, Micron accelerated its capacity expansion by acquiring PSMC's Tongluo P5 fab for US\$ 1.8 billion, aiming to begin mass production by 2027 to satisfy the urgent AI-driven demand. Through these global and local expansions, Micron's HBM monthly capacity will increase from roughly 55,000 wafers in 2025 to 85,000 in 2026.

3. Taiwan Extends Lead in Advanced Nodes

TSMC's Global Footprint with Taiwan at the Core

Taiwan Semiconductor Manufacturing Company pioneered the pure-play foundry model at its founding in 1987 and has been the world's leading dedicated foundry ever since, deploying 288 distinct process technologies and manufacturing 11,878 products for 522 customers in 2024 from its base in Hsinchu.

Despite an increasingly global footprint, Taiwan remains the immovable center of TSMC's manufacturing gravity, for three reasons.

First, the most advanced processes are Taiwanese: the 2-nanometer (N2) node and the subsequent 1.4-nanometer-class A14 technologies all begin R&D, pilot runs and mass production on the island.

Second, the capacity is Taiwanese: as of late 2025 more than 90% of TSMC's total capacity, and a larger share of its advanced-node output, sits in Taiwan, and even after the U.S. build-out Taiwan will still hold roughly 85% of advanced-node capacity in 2030 and close to 80% in 2036.

Third, the R&D is Taiwanese: TSMC's global R&D center, with nearly 7,000 researchers, is in Taiwan rather than overseas. Together these underpin the company's record 72.5% share of the global foundry market in the second quarter of 2026.

At the front end, 3 nm capacity has become a scarce resource contested by the global technology majors. TrendForce notes that AI compute chips are migrating rapidly from 4 nm to 3 nm between late 2025 and 2026 while high-end smartphone and PC processors have yet to move to 2 nm, concentrating high-performance demand on a single node. With Samsung and Intel still behind at 3 nm, and most chip designs fixed one to three years in advance, the result is a temporary single-supplier dynamic. TSMC is accelerating new 3 nm fabs; as that capacity arrives, global 3 nm capacity is expected to surpass 5/4 nm by the end of 2026 and to become the second-largest node after 28 nm by 2027.

Samsung's first-generation 2 nm process (SF2) entered mass production in December 2025, but its disclosed gains—8% better energy efficiency and 5% higher performance—still trail TSMC's claimed double-digit improvements, and Intel only showcased its first 18A-based Panther Lake processor in

early 2026. With high-yield 2 nm technology, early preparation for A16 and four strategic sites under construction at Hsinchu, Taichung, Chiayi and Kaohsiung integrating front-end fabrication with back-end advanced packaging, TSMC’s leadership at the advanced nodes remains unshaken.

Furthermore, A14 development is progressing smoothly with yield performance ahead of schedule, with the A14 Process Fab at the Central Taiwan Science Park estimated to reach mass production in the second half of 2028. In addition, the Chiayi Science Park CoWoS Advanced Packaging Fab began its first phase of construction in May 2024 and is slated for production in 2028. Taiwan thus remains the world’s primary hub for cutting-edge logic R&D and volume production, anchoring TSMC’s technological leadership even as the company expands abroad (see Table 17).

Table 17. TSMC Fabs Overview: As of Dec 2025

Location/Fab types	12-inch	8-inch	6-inch	Advanced Packaging
Taiwan	Fab 12, 14, 15, 18, 20, 22, 25	Fab 3, 5, 6, 8	Fab 2	AP 1, 2, 3, 5, 6, 7, 8
China	Fab 16	Fab 10	-	-
U.S.	Fab 21	Fab 11	-	-
Japan	Fab 23	-	-	-
Germany	Fab 24	-	-	-

Source: Dylan Patel, Steven Lee, and Jeff Koch, “TSMC Overseas Fabs – A Success?,” SemiAnalysis, December 1, 2025.

Taiwan’s own build-out is accelerating in parallel. As of mid-2026, thirteen leading-edge and advanced-packaging fabs were under construction in Taiwan, and supply-chain sources indicate that the number of new fabs planned on the island over the next five years could reach twenty-five, spanning Kaohsiung Qiaotou, a designated zone in Tainan, Chiayi Phase 2, and a return to the Longtan Science Park. Taiwan’s Executive Yuan has framed the parallel overseas expansion as an “expansion of Taiwan’s lead” rather than an outflow of the industry, committing to “three priorities to maintain Taiwan’s lead”—ensuring that the largest manufacturing capacity, the most advanced technology, and the most complete semiconductor ecosystem all remain in Taiwan—and supporting land, water, and power infrastructure accordingly. On this basis, Taiwan’s total semiconductor output value is expected to rise from NT\$ 6.5 trillion in 2025 to NT\$ 8.4 trillion in 2026.

In the United States, TSMC has raised its commitment to an unprecedented US\$ 265 billion. Originally a US\$ 40 billion project, the Arizona campus now encompasses twelve leading-edge fabrication and advanced packaging facilities plus an R&D center. The first fab reached volume production of 4 nm chips for customers including Apple and NVIDIA in the fourth quarter of 2024; the second is under construction for 3 nm with equipment move-in in 2026 and mass production in the second half of 2027; a third phase for 2 nm and beyond began construction in 2026, and permits are being sought for a fourth phase and a first advanced packaging fab.

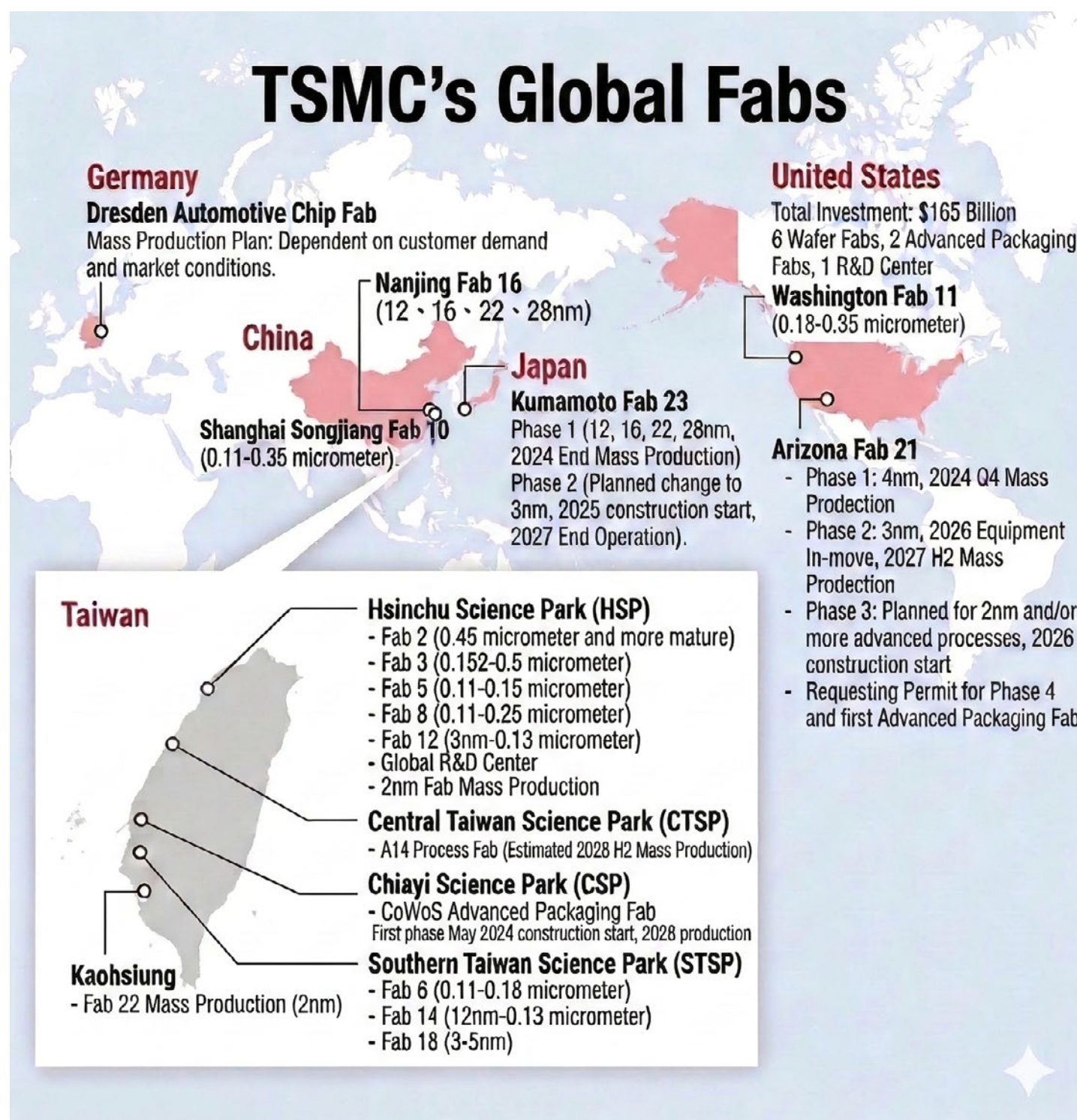
In July 2026, TSMC announced a further US\$ 100 billion commitment to Arizona, lifting cumulative U.S. investment to US\$ 265 billion and raising the scope of planned U.S. capacity from mature nodes to sub-2-nanometer processes and advanced packaging at economic scale. One additional 3-nanometer fab will be added in the United States, with Taiwan and Japan each adding one as well. With roughly 70 percent of TSMC's revenue coming from North America, local fabs allow the company to capture customer demand in real time and to participate in the co-development of new products; the expansion is also drawing Taiwanese suppliers across the Pacific, as illustrated by GlobalWafers' U.S. fab, which secured US\$ 500 million in strategic financing from Micron together with a ten-year supply agreement.

In Japan, TSMC operates through the Japan Advanced Semiconductor Manufacturing (JASM) joint venture with Sony, Denso and Toyota. The Kumamoto facility, which entered high-volume production in 2024, was TSMC's first new overseas fab in decades and runs 28 nm planar and 16/12 nm FinFET technologies for image sensors and automotive ICs at roughly 55,000 wafers per month, with a second phase subsequently upgraded to 3 nm.

In Europe, the European Semiconductor Manufacturing Company in Dresden—a € 10 billion joint venture with Bosch, Infineon and NXP—is a single-phase project targeting 40,000 wafers per month at 28/22 nm and 16/12 nm, with production scheduled from late 2027 to supply European automotive and industrial customers.

TSMC's global layout is thus evolving along two parallel tracks: ultra-advanced nodes remain firmly rooted in Taiwan, while strategic overseas fabs deliver supply-chain resilience and regional alignment. The result is a diversified yet asymmetrical manufacturing network—one that extends TSMC's reach across three continents while keeping the technological frontier at home (see Figure 19).

Figure 19. TSMC's Global Fabs: As of Feb. 2026



Source: Central News Agency, March 5, 2026, <https://www.cna.com.tw/news/afe/202603040043.aspx>.

In the Foundry Race, TSMC Takes the Profits

Competition among the four dominant players in the third quarter of 2025 already showed sharply divergent trajectories. TSMC posted record revenue of US\$ 33.1 billion, up 40.8% year-over-year, with 7 nm and below accounting for 74% of wafer revenue, a 59.5% gross margin and a 45.6% net margin.

Samsung reported US\$ 59.4 billion in consolidated revenue and US\$ 22.8 billion from semiconductors, with operating profit rebounding to US\$ 8.37 billion as record advanced-node orders and large-scale 2 nm GAA production began.

Intel reported US\$ 13.7 billion, up 2.8%, alongside the sale of a majority stake in Altera, US\$ 5.7 billion in accelerated U.S. government funding and equity investments from NVIDIA and SoftBank.

SMIC reported US\$ 2.38 billion, up 9.7%, on 95.8% utilization, but at a 22.0% gross margin against TSMC’s 59.5%, and guided cautiously for the fourth quarter (see Table 18).

Table 18. Income Statements of Four Major Semiconductor Companies: 3Q 2025

Unit: US\$ billion

Company	Revenue	Growth Rtae	Gross Profit	Operating Profit	Net Income
Intel	13.7	2.8%	5.2	-0.7	4.3
Samsung	59.4	9.0%	23.1	8.37	8.37
SMIC	2.38	9.7%	0.523	0.351	0.315
TSMC	33.1	40.8%	19.68	16.74	15.1

Note:
1 US\$ ≈ 1,449 Korean won (KRW) as of November 15, 2025.
Samsung Electronics’ figures cover both semiconductors and other electronics products.
Source: TrendForce, <https://x.com/trendforce/status/1989206648284664028>, November 15, 2025.

Record Results and Raised Guidance in 2026

The pace accelerated further in 2026. TSMC set new records again in the second quarter, with consolidated revenue of NT\$ 1,270.3 billion, up 12.0 percent quarter-over-quarter and 36.0 percent year-over-year, equivalent to US\$ 40.20 billion and a 33.7 percent annual increase in U.S. dollar terms. Net income reached NT\$ 706.56 billion, up 23.4 percent sequentially and 77.4 percent from a year earlier, and diluted earnings per share were NT\$ 27.25. Gross margin stood at 67.7 percent, operating margin at 60.3 percent, and net margin at 55.6 percent—each a historical high (see Table 19).

The composition of that revenue shows how completely leading-edge nodes now drive earnings. Of second-quarter wafer revenue, 2 nm accounted for 3%, 3 nm for 30%, 5 nm for 33% and 7 nm for 11%; technologies at 7 nm and below together represented 77%, up from 74% a year earlier, with 2 nm contributing for the first time.

For the third quarter, assuming US\$ 1 to NT\$ 32, TSMC guided revenue of US\$ 44.6–45.8 billion—a midpoint implying roughly 12% sequential and 37% annual growth—with gross margin of 65–67% and operating margin of 56–58% (see Table 20). Margins are expected to ease from their peak: the 2 nm ramp should dilute gross margin by about 3 to 4 percentage points and initial overseas production by a further 2 to 3 points, a drag that could widen to 3 to 4 points as overseas capacity expands.

For the full year, TSMC raised its U.S.-dollar revenue growth target from about 30 percent to slightly

above 40 percent and lifted planned capital expenditure sharply from US\$ 52–56 billion to US\$ 60–64 billion. Chairman and CEO C.C. Wei, who had previously guided that capital spending over the next three years would be “significantly higher” than in the prior three, revised that to “even more significantly higher,” stressing that the company will continue investing as long as market demand is there.

At its July 16, 2026 investor conference, TSMC disclosed the full A14 family roadmap for the first time and confirmed that its COUPE silicon-photonics platform has entered production. A14, which is scheduled for volume production in 2028, measured against 2-nanometer, offers up to 10 to 15 percent higher performance or 25 to 30 percent lower power together with nearly 20 percent higher chip density, with development and customer tape-outs running ahead of the original schedule. A13 and A12 are both targeted for volume production in 2029, the latter introducing Super Power Rail backside power delivery to improve power efficiency and signal integrity for AI GPUs, ASICs, and HPC chips (see Table 21).

TSMC had broadened that roadmap at its North America Technology Symposium on April 23, 2026. A13 was presented as a direct optical shrink of A14 that reduces chip area by about 6% while retaining backward-compatible design rules, easing customer migration, with volume production targeted for 2029; A12, which follows A14 and introduces Super Power Rail backside power delivery for high-density chips, is aimed at AI and high-performance computing and is likewise targeted for 2029.

On the N2 platform the company introduced N2U, offering 3% to 4% higher speed or 8% to 10% lower power than N2P with 2% to 3% higher logic density while inheriting the maturity and yield of the existing platform, for volume production in 2028.

On lithography, TSMC has acquired High-NA EUV equipment and put it into development but, given current tool and production costs, has not introduced it into volume manufacturing and will advance its leading-edge nodes through existing EUV systems and process optimization in the near term (see Table 21).

For Taiwan’s industry these choices carry concrete implications. Because A13 preserves A14 design rules, Taiwanese IC design houses face a lower design-migration burden and reduced development risk when adopting the new node, while N2U uses the maturity and yield of the established N2 platform to offer customers an additional balance point among performance, power, and cost. A12’s adoption of backside power delivery, by contrast, raises the technical bar for process integration, power-delivery design, and EDA design verification. As AI and high-performance computing continue to develop, leading-edge processes and advanced packaging will be upgraded in parallel, deepening the technological capabilities of Taiwan’s semiconductor supply chain.

Table 19. TSMC Financial Results: 2Q 2026

Financial Metric	2Q 2026	QoQ	YoY	Operating Profit
Consolidated revenue (NT\$)	NT\$ 1,270.3 billion	+12.0%	+36.0%	-0.7

Consolidated revenue (US\$)	US\$ 40.20 billion	+12.0%	+33.7%	8.37
Net income	NT\$ 706.56 billion	+23.4%	+77.4%	0.351
Diluted EPS	NT\$ 27.25	—	+77.4%	16.74
Gross margin	67.7%	—	—	
Operating margin	60.3%	—	—	
Net profit margin	55.6%	—	—	

Source: TSMC investor conference, July 16, 2026; company press release and media reports, July 2026.

Table 20. TSMC Guidance: 3Q 2026

Item	3Q 2026 Guidance	Notes
Consolidated revenue	US\$ 44.6–45.8 billion	Midpoint US\$ 45.2 billion; approx. +12% QoQ and +37% YoY
Gross margin	65%–67%	Remains at a historical high, but eases from 2Q
Operating margin	56%–58%	Slight decline from the prior quarter

Source: TSMC investor conference, July 16, 2026; company press release and media reports, July 2026.

Table 21. TSMC Advanced Technology Roadmap: N2U to High-NA EUV

Technology Platform	Timing / Status	Key Features
N2U	Volume production in 2028	Versus N2P, 3–4% higher speed or 8–10% lower power together with 2–3% higher logic density, while inheriting the process maturity and yield advantages of the N2 platform
A14	Volume production in 2028	Second-generation nanosheet architecture; versus 2nm, up to 10–15% higher performance or 25–30% lower power, with nearly 20% higher chip density; R&D and customer tape-out ahead of the original schedule
A13	Volume production targeted for 2029	97% optical shrink combined with DTCO reduces chip area by more than 6%; design rules remain backward compatible with A14, easing customer migration

A12	Volume production targeted for 2029	First to adopt Super Power Rail (SPR) backside power delivery, improving power efficiency and signal integrity and boosting PPA for AI GPUs/ASICs and HPC chips
COUPE silicon-photonics platform	In production in 2026	Integrates electronic (EIC) and photonic (PIC) integrated circuits, cutting opto-electronic conversion loss and supporting next-generation interconnects such as co-packaged optics (CPO)
High-NA EUV	In development; not yet in volume production	Equipment acquired and used in R&D; given current tool and production costs, leading-edge nodes continue to rely on existing EUV systems and process optimization in the near term

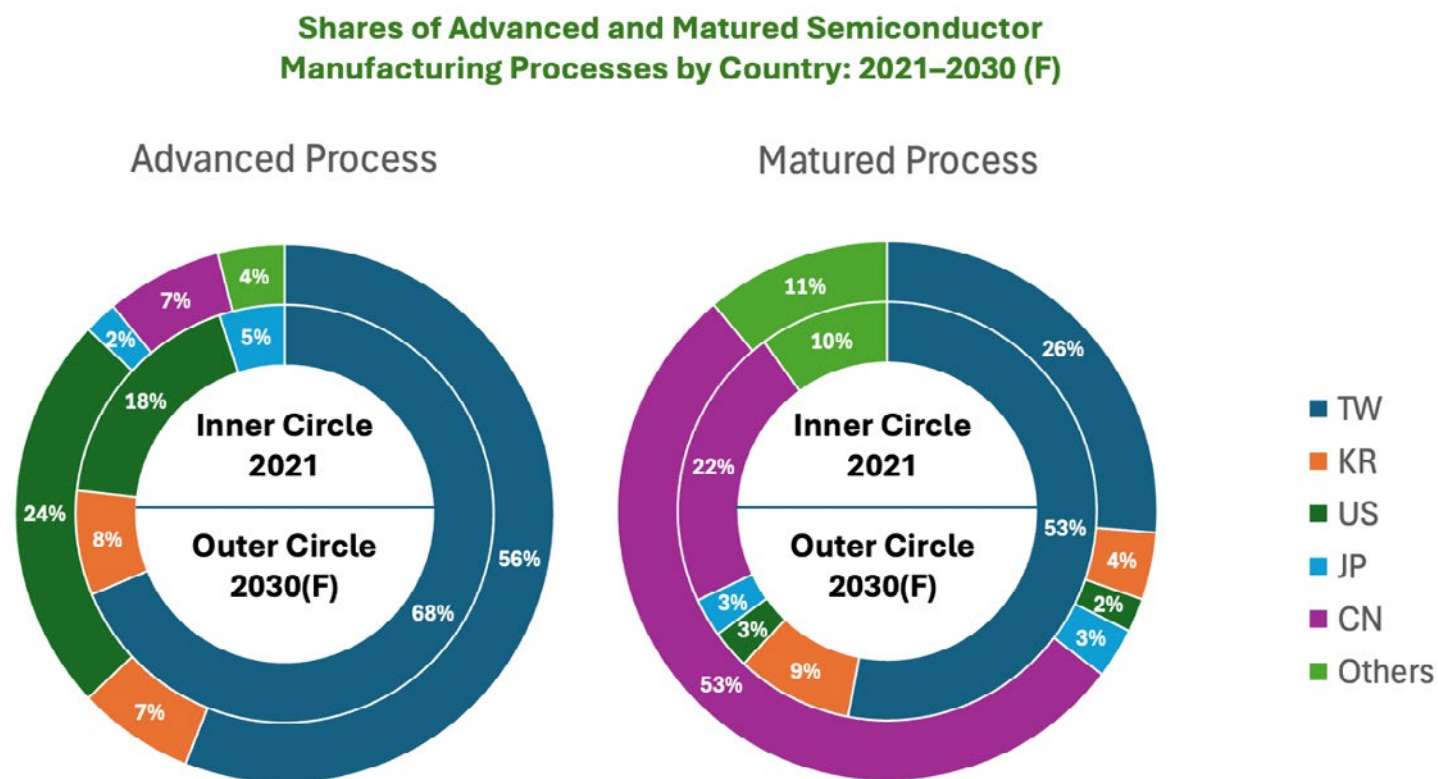
Source: TSMC investor conference, July 16, 2026, and North America Technology Symposium, April 23, 2026; company press releases and media reports.

TrendForce Analysis

Between 2021 and 2030 the geography of capacity diverges sharply between advanced and mature processes. In advanced processes Taiwan starts from roughly 68% of global capacity in 2021 and is projected at about 56% by 2030—a partial geographic diversification rather than a technological retreat—while the United States rises from 18% to 24%, China from 5% to 7%, South Korea edges down from 8% to 7% and Japan remains marginal at about 2%. Because advanced-node demand comes chiefly from U.S. customers such as Apple, NVIDIA, AMD and Qualcomm, Washington has actively promoted localization—but the new capacity is largely being built by non-U.S. suppliers. Within the United States, Intel is projected to hold about 38% of domestic advanced capacity by 2030, Samsung 34%, TSMC 16% and GlobalFoundries 11%.

Mature processes follow the opposite path. Taiwan led with around 53% of global capacity in 2021 against China's 22%; by 2030 China is projected to reach about 53% and Taiwan to fall to around 26% as it reallocates resources to advanced nodes, with the United States slipping from 3% to 2%. China's expansion is driven by supply-chain autonomy and domestic demand rather than export-oriented leading-edge competition, and its share could still be revised upward as further foundries enter. The landscape is therefore becoming segmented: the United States strengthens advanced manufacturing to serve its own design ecosystem, China consolidates mature processes for domestic industry, and Taiwan remains the critical anchor at the technological frontier (see Figure 20).

Figure 20. Shares of Advanced and Matured Semiconductor Manufacturing Processes by Country: 2021–2030



Source: TrendForce, January 2026.

ITRI's Estimates for 2029

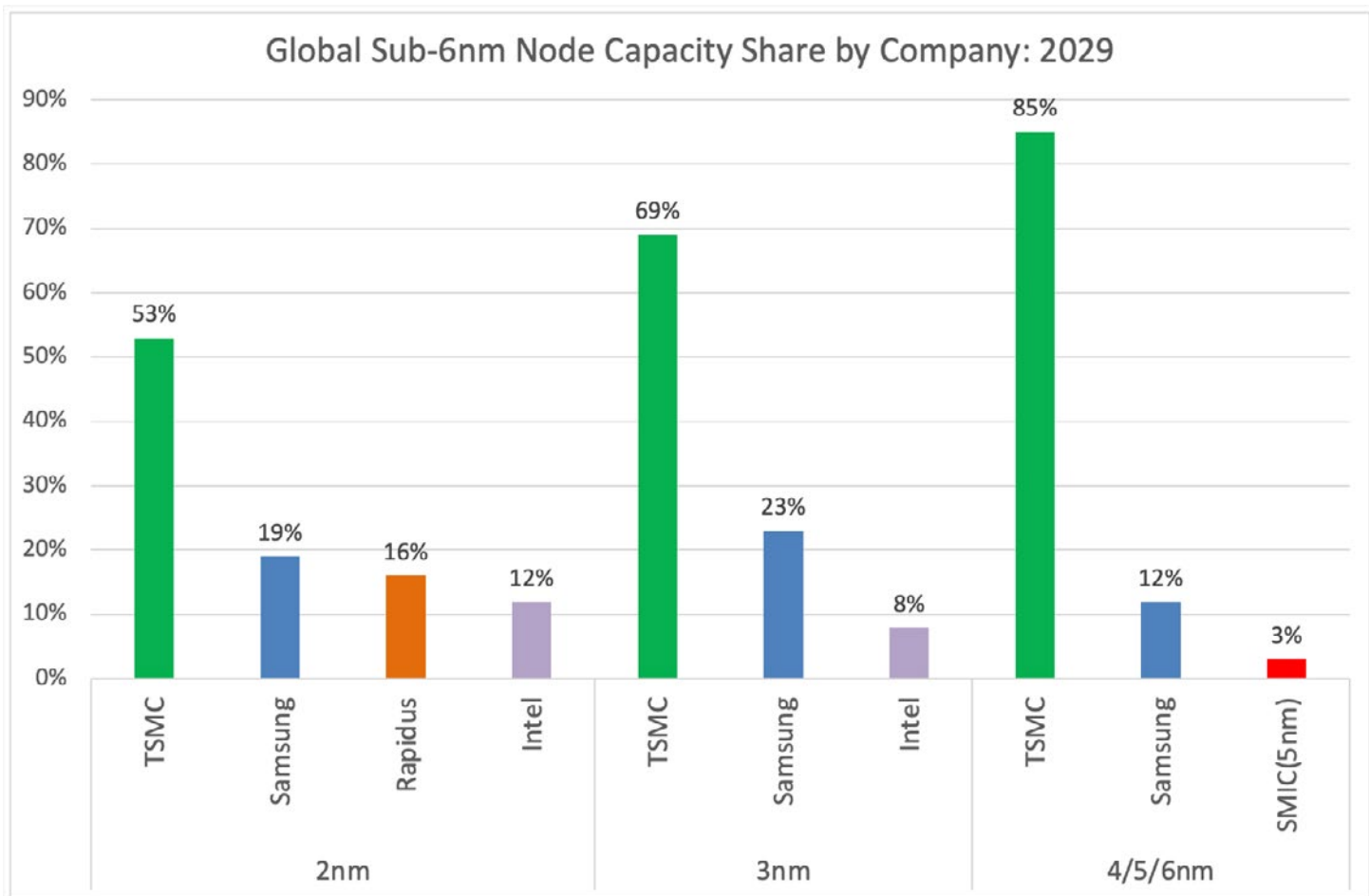
This dominance is even more pronounced in advanced manufacturing below the 7-nanometer threshold. Based on ITRI's estimates using publicly announced construction schedules and planned production capacities—and projecting effective 2nm–6nm output at the point of full-scale mass production in 2029 (excluding R&D lines and unannounced capacity)—TSMC is expected to control 53% of global 2-nanometer capacity, followed by Samsung (19%), Japan's Rapidus (16%), and Intel (12%). At 3 nanometers, TSMC's lead widens further to 69%, compared with Samsung's 23% and Intel's 8%. Even in the relatively more competitive 4–6 nanometer range, TSMC maintains a commanding 85% share, far ahead of Samsung (12%) and SMIC (3%), underscoring a persistent and measurable performance gap.

At 2 nm, capacity is being deployed for next-generation AI accelerators, GPUs, AI PC processors and premium smartphone SoCs. TSMC is the largest and fastest-moving producer, with mass production primarily in Taiwan; Samsung's SF2, built on a GAAFET architecture with backside power delivery, has advanced technically but still faces yield stability, with capacity mainly in Texas; and Intel has begun mass production of 18A at Fab 52 in Arizona.

At 3 nm, oriented toward flagship SoCs, AI and HPC GPUs and server CPUs, TSMC again leads from Taiwan with an additional Arizona presence, Samsung operates in South Korea and Texas, and Intel reached high-volume 3 nm output in Ireland by late 2025. At 4, 5 and 6 nm, TSMC remains the largest supplier with capacity across Tainan, Hsinchu, Kumamoto and Arizona, while SMIC, lacking EUV and

dependent on DUV techniques, faces structural constraints on yield, cost and long-term competitiveness (see Figure 21).

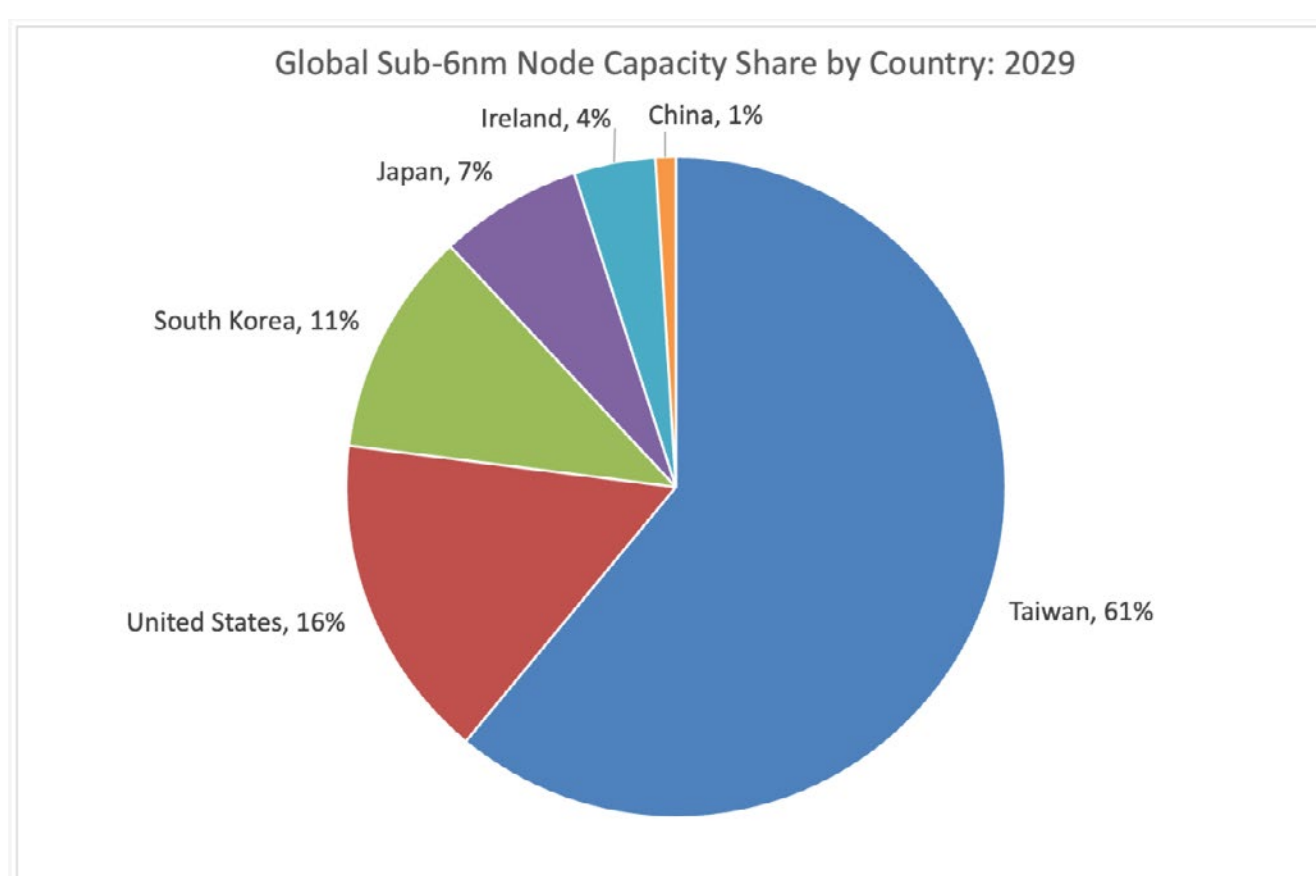
Figure 21. Global Sub-6nm Node Capacity Share by Company: 2029



Source: Nancy Liu, “AI and Innovative Applications Are Driving a Strategic Re-Evolution in the Global IC Manufacturing Industry,” ITRI, October 28, 2025, p. 10.

Policy has shaped this map directly. The United States has used the CHIPS and Science Act to subsidize companies targeting 7 nm and below: Intel is positioned with 18A, TSMC with N4X, N3 and N2, and Samsung with SF3 and SF2. Intel remains behind below 3 nm and is attempting to regain competitiveness through 18A and beyond, expanding Fab 52 and Fab 62 in Arizona, with the advantage that a U.S. company is more likely to receive priority for government and defense-related orders. TSMC’s U.S. investment is projected to exceed US\$ 40 billion by 2029, with Arizona introducing N4X, N3 and N2 and 3 nm mass production targeted for 2026, while Samsung plans more than US\$ 17 billion in Texas for SF4 and SF3, giving the U.S. market a second source of advanced manufacturing (see Figure 22).

Figure 22. Global Sub-6nm Node Capacity Share by Country: 2029



Source: Nancy Liu, “AI and Innovative Applications Are Driving a Strategic Re-Evolution in the Global IC Manufacturing Industry,” ITRI, October 28, 2025, p. 11.

These ITRI estimates rest on announced construction schedules and planned capacities and assume that 2 nm to 6 nm capacity will be realized as planned when full-scale production begins around 2029. In practice, Intel and Samsung continue to work through yield, cost and demand challenges that have already shifted construction and production timelines in the United States and Europe, and as all three leaders move toward sub-2 nm, differences in technological readiness and scaling efficiency may reorder their positions. The estimates are also country-based and do not differentiate among foundries by capacity or capability, so they offer a high-level view rather than a firm-level one.

4. Taiwan-U.S. Semiconductor Cooperation and Progress

From 2021 through early 2026, Taiwan–U.S. semiconductor relations evolved from a largely transactional buyer–supplier dynamic into a deeply integrated strategic partnership. This transition was driven by sustained capital investment, deliberate supply-chain restructuring, and intensified policy coordination, particularly as geopolitical risk and AI-driven demand reshaped global semiconductor strategies. While commercial considerations remain central, the partnership has increasingly reflected shared objectives in supply-chain resilience, advanced manufacturing security, and long-term technological competitiveness.

A defining feature of the period has been sustained bilateral dialogue on adapting Taiwan’s science park and industrial cluster experience to the U.S. context. Both sides recognize that overseas fabs operating in isolation face structural disadvantages in cost, coordination and scale, and that the so-called “Taiwan Model” is about ecosystem formation rather than single-plant investment: competitiveness depends on

the density and integration of suppliers, service providers, research institutions and workforce pipelines around a fab. Advanced manufacturing efficiency, in short, is a systems problem rather than a firm-level one.

Taiwan is accordingly expected to support innovation-oriented industrial clusters in Arizona and Texas. Arizona will anchor TSMC and key parts of its supply chain around Phoenix, with several Taiwanese chemical and materials firms announcing U.S. plans for electronic-grade chemicals and specialty inputs—mostly partial relocations rather than full duplication of the Taiwanese supplier base. Texas will center on GlobalWafers, which has raised its U.S. investment to approximately US\$ 7.5 billion, complemented by AI server supply chains led by Foxconn, Wistron, Pegatron and Inventec relocating from the U.S.–Mexico border region. The Taiwan government will provide one-stop support services for Taiwanese semiconductor companies in both states.

At the operational level, TSMC’s Arizona investment—widely regarded as the largest greenfield manufacturing investment by a foreign firm in U.S. history—has begun to generate real clustering effects. An initial US\$ 12 billion commitment grew to US\$ 40 billion and then to a long-term plan of up to US\$ 165 billion spanning multiple advanced logic fabs, advanced packaging facilities and an R&D presence, and the first fab moved from pilot to volume output of 4 nm chips between late 2024 and early 2025, validating the feasibility of advanced logic manufacturing in the United States.

Beyond manufacturing, the bilateral relationship has been reshaped by a landmark trade and investment consensus. In 2024, Taiwan’s exports to the U.S. reached approximately US\$ 111.4 billion, setting a record high and accounting for about 23.4% of Taiwan’s total exports for the year. Taiwan is the sixth-largest trade deficit partner of the United States, with up to 90% of the deficit attributable to semiconductors, ICT products, and electronic components—sectors subject to Section 232 investigations of the U.S. Trade Expansion Act of 1962.³ Against this backdrop, Taiwan engaged the United States in multiple rounds of consultations focused on reciprocal tariffs and potential Section 232 measures.

On January 15, 2026, Taiwan and the United States reached a comprehensive consensus, including reducing reciprocal tariffs to 15% without stacking MFN rates, securing most-favored treatment under any future Section 232 tariffs on semiconductors and semiconductor derivatives, expanding supply-chain investment cooperation, and deepening the Taiwan–U.S. AI strategic partnership.

The Resulting Outcomes Were Substantial

The outcomes were substantial. Reciprocal tariffs were reduced to 15% without being layered onto existing MFN rates, effectively granting Taiwan “most favored ally” status on par with Japan, South Korea and the European Union. Taiwan also became the first country to secure a commitment to most-favored treatment under any future Section 232 tariffs on semiconductors and semiconductor derivatives for its investors in the United States. As no formal measures had been announced, both sides adopted a pre-set scenario approach. Taiwan further secured tax-exempt conditions for a designated quota of U.S.

³ “Summary of Taiwan–U.S. Tariff Negotiations,” Department of Information Services, Executive Yuan January 15, 2026

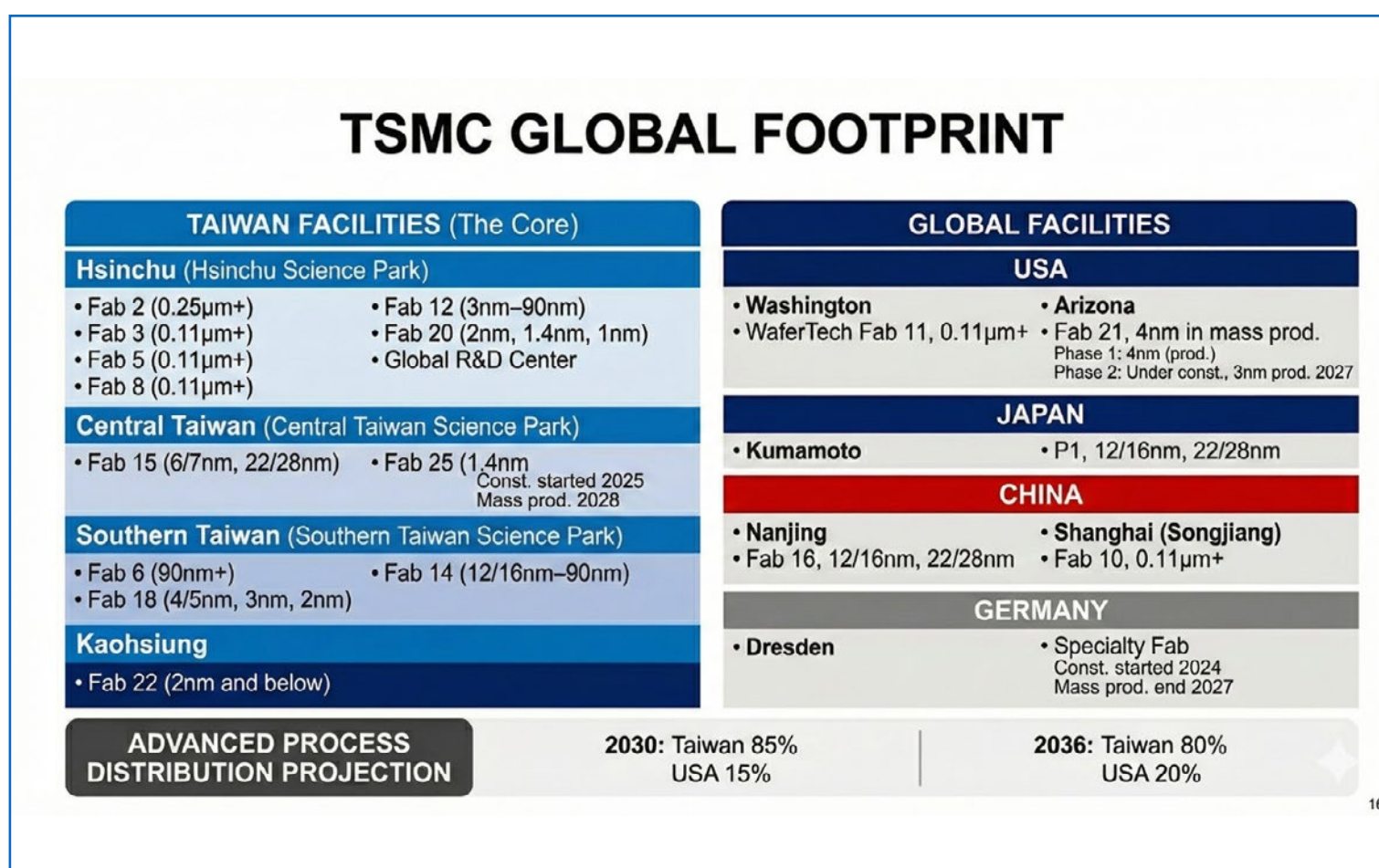
investments by semiconductor firms, the most favorable rates beyond that quota, and exemption from reciprocal and Section 232 tariffs for the raw materials, equipment and components Taiwanese firms need for U.S. operations.

Additionally, Taiwan will use the “Taiwan Model” to guide its firms into the U.S. supply chain and extend the global competitiveness of its technology sector. Under firms’ own investment planning, Taiwan committed to up to US\$ 250 billion in private-sector investment across semiconductors, AI-related electronic manufacturing services, energy and related industries, plus government-backed credit guarantees enabling financial institutions to extend up to a further US\$ 250 billion in corporate credit for semiconductor and ICT supply-chain investment. The United States committed to assisting Taiwanese firms with land, utilities, infrastructure, tax incentives and access to relevant visa programs.

The agreement establishes a Taiwan–U.S. global AI supply chain strategic partnership and a two-way investment mechanism. Combining Taiwan’s manufacturing capabilities with U.S. strengths in innovative R&D, talent and market access positions each as the other’s most critical high-technology partner. With Taiwan’s encouragement, the United States will expand investment in Taiwan’s semiconductor, artificial intelligence, defense technology, security and surveillance, next-generation communications and biotechnology sectors, with the Export-Import Bank and the U.S. International Development Finance Corporation supporting private-sector investment and financing in Taiwan’s key industries.

Building on these consensus outcomes and investment commitments between Taiwan and the United States, estimates by Taiwan’s Ministry of Economic Affairs indicate that TSMC’s global capacity allocation is structured to preserve its leadership in advanced process technologies. By 2030, Taiwan is projected to account for approximately 85% of TSMC’s capacity, with the United States comprising the remaining 15%. By 2036, this distribution is expected to adjust to roughly 80% in Taiwan and 20% in the United States (see Figure 23).

Figure 23. TSMC Global Footprint: 2026



Source: Ministry of Economic Affairs (Taiwan), January 17, 2026.

5. Global Expansion, Taiwan at the Core

As countries compete to localize advanced manufacturing, TSMC’s expansion in the United States, Japan and Europe has prompted concern that its center of gravity is shifting overseas—a claim sometimes labeled “de-Taiwanization.”

The evidence says otherwise. The most advanced processes are first brought into volume production in Taiwan; most of the advanced-node capacity is in Taiwan; and the high-end R&D centers are established in Taiwan. TSMC’s global system is one of diversification without symmetry: overseas fabs answer supply-chain resilience, geopolitical considerations and regional customer demand, while the capabilities that determine competitiveness stay deliberately concentrated at home.

The numbers bear this out and are unlikely to change materially for a decade. Taiwan’s Ministry of Economic Affairs estimates that even after up to an investment of US\$ 165 billion in Arizona, Taiwan will still hold about 85% of TSMC’s advanced-node capacity in 2030 and close to 80% in 2036. ITRI estimates that Taiwan will account for 61% of global capacity at 6 nm and below in 2029, against 16% for the United States, 11% for South Korea, 7% for Japan and 1% for China, while TrendForce puts Taiwan’s share of advanced-node capacity at around 56% in 2030.

Behind the figures lies the ability to set the pace: N2 entered mass production in Hsinchu and Kaohsiung in the fourth quarter of 2025, and A16 and A14 will likewise begin R&D, pilot runs and initial production in Taiwan, while Arizona is not expected to reach 2 nm or A16 until around 2030—a

deliberate gap of one to two technology generations. The R&D center that concentrates nearly 7,000 researchers on sub-2 nm nodes, new materials and new transistor architectures sits within an industrial ecosystem that tightly integrates research, pilot production and volume manufacturing, and the Japanese and European fabs were assigned different roles from the outset—specialty processes for image sensors, automotive and industrial customers rather than leading-edge logic.

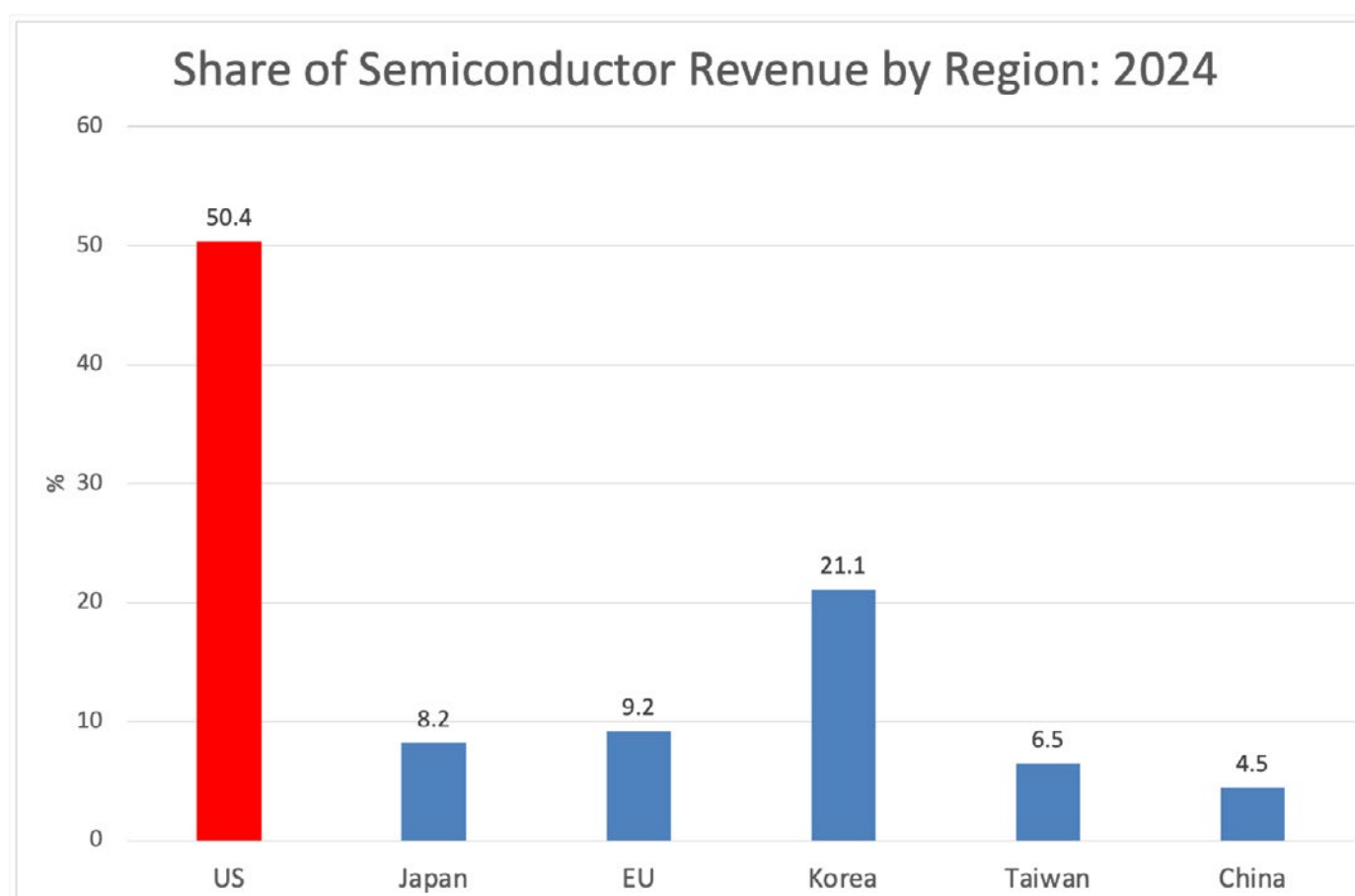
IV. The U.S. Semiconductor Industry

1. The U.S. in the Global Semiconductor Supply Chain

The United States plays a crucial role across the semiconductor value chain—in research and development, electronic design automation, core intellectual property, design and manufacturing equipment—but its share of manufacturing capacity located on its own shores has fallen steadily: from 37% of global fabrication in 1990 to 19% in 2000, 13% in 2010, 12% in 2020 and about 10% in 2022. Northeast Asia expanded far faster on the back of strong government incentives and coordinated industrial policy, reaching 59% of global capacity by 2022 against a combined 35% for the United States, Europe and Japan; a joint BCG–SIA study warned that without policy intervention the U.S. share could fall to 8% by 2032. Congressional concern about that concentration—and about the exposure of global supply chains to trade friction, geopolitical tension and potential military conflict—led directly to the CHIPS and Science Act.

Nevertheless, the United States has continued to dominate global semiconductor industry since the late 1990s.⁴ According to WSTS and SIA data, global semiconductor revenues expanded from US\$ 139.0 billion in 2001 to US\$ 630.5 billion in 2024, while revenues of US-based semiconductor firms grew in parallel, from US\$ 71.1 billion to US\$ 318.2 billion. As a result, US companies remain the industry’s leaders in non-manufacturing, accounting for 50.4% of global semiconductor revenues despite their declining share in manufacturing (see Figure 24).

Figure 24. Share of Semiconductor Revenue by Region: 2024



Source: Semiconductor Industry Association, SIA 2025 Factbook, May 27, 2025.

⁴ State of the U.S. Semiconductor Industry Report 2024, Semiconductor Industry Association, September 9, 2024.

A report from the U.S. Department of Commerce (DOC)’s Bureau of Industry and Security (BIS) in December 2023 highlighted the strength of U.S. companies in chip design and IDMs. U.S.- based companies are particularly strong in design processes, accounting for 72% of all fabless revenue, 42% of IDM revenue among companies that do both design and manufacturing, and 53% of global semiconductor revenue in 2022.⁵ However, the U.S. has a relatively lower share in the foundry segment (6%) and the OSAT segment (15%) (see Table 22).

Table 22. Market Share of Process Roles by Location of Company Headquarters: 2022

	Fabless	IDM	Total Semiconductor Providers	Foundry	OSAT	Total Outsourced Manufacturing
Total (US\$ billion)	248	412	660*	139	50	190
United States	72%	42%	53%	6%	15%	8%
Taiwan	14%	2%	6%	65%	58%	63%
South Korea	1%	22%	14%	16%	1%	12%
Japan	1%	17%	11%	1%	0%	0%
China	12%	2%	6%	9%	20%	12%
Germany	0%	5%	3%	1%	0%	0%
Switzerland	0%	4%	3%	0%	0%	0%
Netherlands	0%	4%	2%	0%	0%	0%
BIS’s data is based on publicly reported sales and estimates of the revenues of major non-public companies						
* The BIS estimates may exceed those of the Semiconductor Industry Association (US\$ 574 billion, via SIA 2023 Factbook) and Gartner (US\$ 600 billion, April 26 2023 press release) in part because it is revenue focused, and thus may not have fully accounted for non-semiconductor revenue or integration of semiconductors into other semiconductor devices. Foundry and ATP revenue are not part of these vendor-specific reports.						

Source: Office of Technology Evaluation, Bureau of Industry and Security, U.S. Department of Commerce, “Assessment of the Status of the Microelectronics Industrial Base in the United States,” December 2023.

Wafer manufacturing spans both foundries and integrated device manufacturers. In 2022 the IDM segment generated US\$ 412 billion, nearly three times the US\$ 139 billion of the foundry segment, and the United States led global IDM output with 42% of the total. Taiwan, by contrast, took 65% of global foundry output value, underscoring its central role at the advanced nodes.

Semiconductors significantly boost the U.S. economy. In 2024, U.S. exports of semiconductors were worth US\$ 57.0 billion, making semiconductors the sixth highest among U.S. exports. The industry also directly employs 345,000 Americans and indirectly accounts for 2 million additional jobs.⁶

5 Office of Technology Evaluation, Bureau of Industry and Security, U.S. Department of Commerce, “Assessment of the Status of the Microelectronics Industrial Base in the United States,” December 2023.
6 Semiconductor Industry Association, SIA 2025 Factbook, May 27, 2025.

2. The U.S. CHIPS and Science Act

On August 9, 2022, then U.S. President Biden signed the bipartisan Creating Helpful Incentives to Produce Semiconductors (CHIPS) and Science Act (hereinafter “the CHIPS Act”) into law. The CHIPS Act, a cornerstone of the CHIPS for America initiative, aims to reestablish the United States’ leadership in semiconductor manufacturing, bolster global supply chains, and enhance both national and economic security.

The Fund pursues four goals: domestic production of strategically important chips, with an emphasis on leading-edge technologies; a secure supply of current and older-generation chips for national security and critical manufacturing; U.S. leadership in semiconductor research and development; and a broader semiconductor workforce. By 2030 the Department of Commerce aims to host at least two new large-scale clusters of leading-edge logic fabs and multiple high-volume advanced packaging facilities, to produce leading-edge memory at volume, and to expand mature-node capacity for critical domestic industries.

Financial Incentives

The Act provides US\$ 52.7 billion over five years—US\$ 39 billion in manufacturing incentives, US\$ 11 billion for research and development, and US\$ 2.7 billion for defense, technology security and workforce development—administered through the CHIPS Program Office and the CHIPS Research and Development Office within NIST. It also provides a 25% investment tax credit for capital expenses on semiconductor manufacturing and related equipment for projects beginning construction between January 1, 2023, and December 31, 2026, open to foreign-owned firms such as TSMC and Samsung.

The CHIPS Act also provides a 25% investment tax credit for capital expenses for manufacturing of semiconductors and related equipment. The tax credit is available for projects that start construction between January 1, 2023, and December 31, 2026.⁷ Semiconductor firms that build new plants or extend existing plants, including foreign-owned firms such as TSMC and Samsung, can claim a tax credit equal to 25% of the cost for plant and equipment placed in service after December 31, 2022 or for which construction starts before January 1, 2027.

The credit has proved far more expensive than expected. The Congressional Budget Office originally put the cost at US\$ 24.3 billion in forgone revenue; but a June 2024 Peterson Institute analysis put it above US\$ 85 billion. It is in fact the largest single form of CHIPS support for individual companies—Micron expects roughly US\$ 11.3 billion in credits against US\$ 6.1 billion in grants, and Texas Instruments anticipates US\$ 6–8 billion, as much as five times the size of its grant.

CHIPS funds carry strong guardrails against benefiting “foreign countries of concern.” Two guardrails—on expansion and on technology—restrict recipients from supporting semiconductor manufacturing or technology development in such countries, with clawback provisions allowing the Department of Commerce to recover an entire award. The expansion guardrail limits new construction

⁷ The White House, Fact Sheet: CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China, August 9, 2021.

and material expansion of legacy facilities—broadly, 28 nm and older logic, DRAM above an 18 nm half-pitch and NAND below 128 layers—subject to exceptions for facilities held at the date of award and for new plants whose output is at least 85% consumed in the host country.

Export Controls

Beyond the statute, the Bureau of Industry and Security has used export controls as the sharper instrument. Updates to the Export Administration Regulations from October 7, 2022, onward expanded controls on advanced computing chips, supercomputer end uses, manufacturing equipment and Entity List transactions, with successive rules closing circumvention routes and extending coverage to countries under U.S. arms embargoes. By April 2024, 319 Chinese firms had been added to the Entity List; on December 2, 2024, the Bureau added 140 more semiconductor-related entities and imposed new controls on high-bandwidth memory, additional tools and software, and certain foreign-made equipment.

Subsequent rules tightened restrictions on high-performance computing chips and manufacturing equipment, including measures to prevent circumvention through aggregation of lower-end AI chips. Controls were also extended to chip exports and manufacturing equipment involving countries under U.S. arms embargoes, beyond China alone.

3. Domestic Outcomes of the CHIPS Act

Chip Production

As of October 6, 2025, the Department of Commerce had made awards to 35 companies totaling approximately US\$ 30.9 billion across the supply chain, with resources concentrated in multi-billion-dollar grants to large manufacturers: Intel leads with US\$ 7.8 billion, followed by TSMC Arizona (US\$ 6.6 billion), Micron (US\$ 6.165 billion) and Samsung (US\$ 4.745 billion), alongside significant awards to GlobalFoundries and Texas Instruments. Awards are finalized only once companies meet key milestones and satisfy the Department’s due diligence, so that taxpayer funds follow delivery rather than precede it (see Table 23).

Table 23. Finalized CHIPS for America Awards

Company	Award Amount	Locations
Intel Corporation	US\$ 7.8 billion	Rio Rancho, NM New Albany, OH Chandler, AZ Hillsboro, OR
Micron	US\$ 6.165 billion	Manassas, VA Boise, ID Clay, NY
BAE Systems, Inc.	US\$ 35 million	Nashua, NH

GlobalFoundries	US\$ 1.975 billion	Burlington, VT Malta, NY Sherman, TX St. Peters, MO
TSMC Arizona	US\$ 6.6 billion	Phoenix, Arizona
Polar Semiconductor	US\$ 123 million	Bloomington, MN
Edwards Vacuum	US\$ 18 million	Genesee County, NY
Infinera	US\$ 186 million	San Jose, CA Bethlehem, PA
Corning	US\$ 32 million	Canton, NY
Absolics Inc.	US\$ 175 million	Covington, GA
Applied Materials	US\$ 100 million	Santa Clara, CA
Arizona State University	US\$ 100 million	Tempe, AZ
HP Inc.	US\$ 53 million	Corvallis, OR
Hemlock Semiconductor	US\$ 325 million	Hemlock, MI
Semiconductor Research Corporation Manufacturing Consortium Corporation	US\$ 285 million	Durham, NC
Texas Instruments	US\$ 1.61 billion	Sherman, TX Lehi, UT
Samsung Electronics	US\$ 4.745 billion	Austin, TX Taylor, TX
SK hynix	US\$ 458 million	West Lafayette, IN
Entegris	US\$ 77 million	Colorado Springs, CO
Rocket Lab	US\$ 23.9 million	Albuquerque, NM
Activate	US\$ 5 million	Berkeley, CA
Total	US\$ 30.8953 billion	

Note: List of direct funding as of Oct. 6, 2025. Out of a total of 35 subsidy awards, this Table lists only the 21 awards exceeding US\$ 5 million, while the total amount reflects the full value of all subsidy awards.

Source: "CHIPS for America Awards," NIST, <https://www.nist.gov/chips/chips-america-awards>, Accessed on November 30, 2025.

On research, the CHIPS Research and Development Office administers US\$ 11 billion through four programs—the National Semiconductor Technology Center, the National Advanced Packaging Manufacturing Program, the CHIPS Metrology Program and the CHIPS Manufacturing USA Program.

On employment and talent, CHIPS initiatives are expected to create more than 115,000 direct construction and manufacturing jobs—TSMC’s Arizona investment alone accounts for over 6,000 manufacturing and more than 20,000 accumulated construction jobs—while US\$ 200 million under the Workforce and Education Fund, a US\$ 45.6 million National Science Foundation initiative and a US\$ 250 million Workforce Center of Excellence address the sector’s skills gap.

Under the CHIPS for America Workforce and Education Fund, US\$ 200 million is set aside to kick start development of the domestic semiconductor workforce, which faces near-term labor shortages, by leveraging activities of the National Science Foundation (NSF). The NSF launched its Future of Semiconductors initiative, a US\$ 45.6 million investment to conduct frontier research and develop the future microelectronics workforce.

4. Updates in 2025-2026 and Prospects

Between 2025 and 2026, the U.S. semiconductor industry entered a decisive turning point. Policy implementation began to shift from broad-based subsidy deployment toward a phase emphasizing performance evaluation, institutional adjustment, and a more explicitly “transaction-driven” investment strategy. More than three years after the CHIPS and Science Act came into force, Washington’s ambition to rebuild domestic supply chains and advanced manufacturing capacity has reached a stage where concrete outcomes can be observed and strategic recalibration is underway.

According to projections by the World Semiconductor Trade Statistics (WSTS), the global semiconductor market is expected to reach a record-breaking US\$ 1.66 trillion in 2026, representing approximately 108 percent year-over-year growth and surpassing the historic US\$ 1 trillion threshold. The Americas region—often used as a proxy for U.S. domestic semiconductor demand—is projected to expand to US\$ 543.6 billion, reflecting an exceptional 112.0 percent annual growth rate. This surge is driven overwhelmingly by the demand for logic and memory chips supporting AI training, large-scale inference, and data center infrastructure.

Diverging Progress in U.S. Capacity Expansion

TSMC has become the most visible symbol of progress. In early 2025 the first facility of Fab 21 in Phoenix began volume production on 4 nm, with yields reportedly comparable to its Taiwanese fabs, and strong demand from Apple and NVIDIA pulled 3 nm production forward from 2028 to the second half of 2027. TSMC then raised its long-term U.S. commitment to approximately US\$ 265 billion after an additional US\$ 100 billion pledge in 2026, planning a cluster of twelve leading-edge fabrication and advanced packaging facilities.

Intel has faced greater financial and operational constraints. Its flagship project in New Albany, Ohio—once the centerpiece of the American manufacturing revival—has been delayed repeatedly, with volume production now expected around 2030 or later, though Intel intends to base its 14A node there using High-NA EUV lithography. Its New Mexico packaging operations have progressed further: Fab 9

and Fab 11x are the core base for Foveros 3D packaging and the only large-scale 3D packaging capacity operating in the United States.

Corporate financing structures have also evolved under Washington’s new industrial policy approach. In August 2025, the U.S. Department of Commerce converted US\$ 8.9 billion in previously allocated subsidies into a 9.9 percent equity stake in Intel, effectively transforming the federal government from a traditional grant provider into a passive shareholder. This shift reflects a broader policy trend toward linking industrial subsidies with financial returns for taxpayers.

Samsung Electronics has delayed the mass production timeline of its Taylor, Texas fab, originally intended to produce 4-nanometer logic chips. Although construction is largely completed, uncertainties regarding major customer orders—particularly from firms such as Nvidia and Apple—pushed the schedule back repeatedly; mass production is now set for early 2027, when the Taylor fab is expected to run Samsung’s 2-nanometer SF2 process for customers including Tesla.

Micron Technology, meanwhile, has recalibrated its long-term plan for a massive DRAM manufacturing campus in Clay, New York, which could involve investments of up to US\$ 100 billion over twenty years. Construction of the first fab broke ground in January 2026 and is now running roughly one quarter ahead of schedule, with production expected around 2029. At the same time, Micron has shifted its product focus toward high-bandwidth memory (HBM), a key component for AI computing. Rapid growth in HBM sales indicates that AI-related demand is becoming the company’s primary growth driver.

GlobalFoundries continues to pursue a “differentiated foundry” strategy focused on mature and specialty nodes for automotive electronics and power management. Advanced packaging capacity—an emerging bottleneck in the AI era—is also being localized: Amkor has launched a US\$ 7 billion investment in Peoria, Arizona for 2.5D advanced packaging, scheduled for commercial production in early 2028 and sited next to TSMC’s fabs to form a wafer-to-packaging cluster (see Table 24).

Table 24. Progress of Semiconductor Investment and Production in the U.S.: August 2026

Company	U.S. Location	Investment Scale	Technology / Product Focus	Production Timeline & Status
TSMC	Phoenix, Arizona	Approx. US\$ 265 billion (planned, multi-phase, 12 fabs)	4nm (in production); 3nm, 2nm, A16-class (planned)	Fab 21 Phase 1 producing 4nm; Fab 2 (3nm) volume production accelerated to 2H 2027; Fab 3 (2nm/A16-class) broke ground April 2026

Intel	Chandler, Arizona; New Albany, Ohio; Rio Rancho, New Mexico	Approx. US\$ 187 billion overall; US\$ 48 billion for Ohio and Arizona fabs	Intel 18A (≈1.8nm), Intel 14A; Foveros 3D advanced packaging; 18A-P entering risk production	Arizona Fab 52 in 18A high-volume manufacturing (early 2026); New Mexico packaging operational; Ohio Fab 1 commercial production delayed to 2030–2031; Ohio Mod 2 construction to complete 2031, operations from 2032
Samsung	Taylor, Texas	Approx. US\$ 37–47 billion	SF2 (2nm GAA), SF2P/SF2Z, EUV logic; evaluating 1.4nm	Fab 1 shell complete, EUV trial runs active (Feb 2026); 2nm mass production moved to early 2027 (Tesla AI5/AI6); Fab 2 groundbreaking late 2026 targeting 2030 output
Micron	Clay, New York; Boise, Idaho; Manassas, Virginia	US\$ 250 billion (multi-phase, through 2035)	Leading-edge DRAM; High-Bandwidth Memory (HBM, 1-beta & 1-gamma EUV)	Groundbreaking at Clay, NY in Jan 2026; first concrete poured July 2026, one quarter ahead of schedule; Boise expansion active; Manassas in production since May 2026; first NY fab output expected 2029
	Malta, New York; Essex Junction, Vermont	Approx. US\$ 16 billion	Feature-rich mature & specialty nodes; silicon photonics; GaN	Malta Fab 8 expanded; 800 acres acquired for Fab 8.2; Vermont GaN lines active
Amkor	Peoria, Arizona	Approx. US\$ 7 billion	Advanced 2.5D/3D packaging (CoWoS-equivalent)	Construction active; structural steel erected mid-2026; phase one completion mid-2027; commercial production targeting early 2028

Renewed Momentum in the First Half of 2026

By mid-2026, the CHIPS and Science Act had moved decisively from allocation into execution. Of the US\$ 39 billion earmarked for manufacturing incentives, the Department of Commerce had allocated more than US\$ 36 billion, issuing final awards to 19 companies totaling US\$ 30.7 billion in direct grants and US\$ 5.5 billion in loans across 40 projects, with a further 12 companies holding preliminary agreements awaiting finalization. Federal funding has catalyzed more than US\$ 500 billion in private capital commitments spanning over 100 projects in 28 states. In parallel, the U.S. Investment Accelerator

established in 2025 has renegotiated and restructured a number of existing contracts, frequently converting grants into equity or milestone-linked instruments.

Company-level commitments expanded sharply. TSMC announced an incremental US\$ 100 billion investment, lifting its total U.S. commitment to approximately US\$ 265 billion and raising the planned Arizona complex from six to twelve leading-edge fabrication and packaging facilities. Capacity expansion has also accelerated: 3-nanometer output at the second Arizona fab was pulled forward to the second half of 2027 and is projected to reach 180,000 3-nanometer wafers by the fourth quarter of 2026, two to three months ahead of expectations, while the third fab—targeting 2-nanometer and A16-class nodes—broke ground in April 2026.

Intel's trajectory remained mixed but improved technically. Risk production of 18A-P began in June 2026 and, after strong second-quarter results, mass production of 14A was pulled forward a full year to 2028; volume production of Intel 3-based Xeon 6 and 18A-based Core Series 3 chips was its fastest ramp in five years, and first-quarter 2026 revenue rose 7% to US\$ 13.60 billion. Intel's aggregate U.S. commitment now approaches US\$ 187 billion, supported by US\$ 7.865 billion in CHIPS grants, the largest single award under the program, though commercial production in Ohio has slipped to 2030–2031. In June 2026 Intel and Foxconn announced a partnership to co-develop end-to-end AI systems as an alternative to NVIDIA's vertically integrated model.

Samsung has stabilized its Taylor, Texas program. The first fab completed its shell and began EUV trial runs in early 2026, with mass production of the 2 nm SF2 process set for early 2027, anchored by Tesla's AI5 and AI6 chips; a second Taylor fab is scheduled to break ground by the end of 2026 for output around 2030. Samsung's total U.S. commitment now exceeds US\$ 47 billion, including US\$ 4.745 billion in CHIPS grants.

Micron has been the most conspicuous upside surprise, raising its planned U.S. investment from roughly US\$ 200 billion to US\$ 250 billion through 2035—about US\$ 150 billion in memory manufacturing and US\$ 50 billion in R&D—supported by a US\$ 6.44 billion grant and expected to create some 90,000 direct and indirect jobs. The Clay, New York megafab poured first concrete in July 2026 and is running roughly a quarter ahead of schedule for production in 2029; the first Idaho fab is due in mid-2027 with a second underway in Boise; and the Manassas, Virginia expansion was completed in May 2026. Micron aims to manufacture up to 40% of U.S. DRAM domestically and in July 2026 committed US\$ 500 million to Taiwan's GlobalWafers to expand 300-millimeter wafer production in Sherman, Texas.

Downstream and specialty investments broadened in parallel. Amkor enlarged its Peoria project to a two-phase US\$ 7 billion campus and signed a US\$ 1.5 billion multi-year advanced packaging agreement with NVIDIA. SK hynix broke ground in April 2026 on a US\$ 3.87 billion high-bandwidth-memory packaging facility in West Lafayette, Indiana, targeting mass production in the second half of 2028 and bringing its announced U.S. commitments to US\$ 13.87 billion. Texas Instruments has committed over US\$ 60 billion through 2030 across Sherman, Richardson and Lehi, with its first Sherman fab now in volume production, and GlobalFoundries maintains a US\$ 16 billion plan centered on Malta, New York and Essex Junction, Vermont.

Texas Instruments has committed over US\$ 60 billion through 2030 across four fabs in Sherman, Texas, its RFAB facilities in Richardson, and two connected fabs in Lehi, Utah, supported by US\$ 1.61 billion in finalized CHIPS grants; the first Sherman fab, SM1, completed construction in December 2025 and is now in volume production on 300-millimeter wafers.

Washington also opened a new front. On May 21, 2026, the Department of Commerce distributed US\$ 2.013 billion across nine quantum computing companies under a sovereign equity model granting the government minority, non-controlling stakes; the largest allocation, US\$ 1 billion matched by IBM, supports a standalone 300-millimeter quantum wafer foundry in Albany, New York intended to enable commercial fault-tolerant quantum computing by 2029. A parallel award finalized on June 3, 2026, established a “mine-to-magnet” rare earth supply chain across Texas, Oklahoma and South Carolina, again in exchange for federal equity.

The constraints on delivery have proved durable rather than transitory. Federal disbursement timelines led Samsung and TSMC to adjust early production schedules while awaiting finalized contracts; shortages of specialized labor delayed TSMC’s initial Arizona timeline and Micron’s New York schedule; shifting customer demand led Intel to defer its Ohio fabs even as AI demand pulled TSMC’s second Arizona fab forward; and environmental and permitting reviews moved schedules for Micron and required Amkor to relocate an Arizona facility.

On the external front, the United States moved to lock in supply-chain partners. On January 15, 2026, Washington and Taipei signed an Agreement on Reciprocal Trade under which Taiwan will eliminate or reduce 99% of its tariff barriers and align its export controls with the U.S. Foreign Direct Product Rule, while the United States caps reciprocal tariffs on Taiwanese goods at 15% and grants duty-free allowances for equipment and materials imported by Taiwanese firms building U.S. capacity. Through the first half of 2026 this was folded into the broader “Pax Silica” initiative, which added India, Gulf partners and, by late June, the European Union, Germany and the Netherlands. The trade data explain the urgency: U.S. semiconductor imports reached US\$ 25.38 billion in the first quarter of 2026, up 39.4% year-over-year, and Taiwan became the third-largest source at US\$ 67.42 billion (see Table 25).

Table 25. Major CHIPS Act Recipients: Total Projected U.S. Investment (as of mid-2026)

Recipient	Total Projected U.S. Investment	Key Geographic Sites
TSMC	US\$ 265.0 billion	North Phoenix, Arizona
Micron	US\$ 250.0 billion (through 2035)	Clay, New York; Boise, Idaho; Manassas, Virginia
Intel	US\$ 187.0 billion (incl. US\$ 7.865 billion CHIPS grants)	Arizona; Oregon; Ohio; New Mexico

Texas Instruments	US\$ 60.0 billion+ (through 2030)	Sherman, Texas; Richardson, Texas; Lehi, Utah
Samsung	US\$ 47.0 billion+	Taylor, Texas; Austin, Texas
GlobalFoundries	US\$ 16.0 billion	Malta, New York; Essex Junction, Vermont
SK hynix	US\$ 13.87 billion (US\$ 3.87 billion in manufacturing)	West Lafayette, Indiana
Amkor	US\$ 7.0 billion	Peoria, Arizona
USA Rare Earth	US\$ 3.30 billion	Sierra Blanca, Texas; Stillwater, Oklahoma

Source: Compiled by the author from company announcements and U.S. Department of Commerce and NIST releases, 2026.

By 2026, AI demand had begun to shift from model training toward large-scale inference, reshaping server architectures and design priorities. Broadcom has been a notable beneficiary, emerging as a leading supplier of custom AI accelerators with reported orders exceeding US\$ 10 billion from OpenAI and other cloud firms, and challenging NVIDIA's proprietary InfiniBand standard with 102.4 Tbps Ethernet switching platforms for AI data center interconnects.

Policy Transformation and Trade Defense Tools

U.S. policy is also shifting structurally, with government tools expanding beyond subsidies to export controls, outbound investment screening and trade defense. The most consequential is the Section 232 investigation into semiconductors and their supply chains initiated in April 2025, covering chips, manufacturing equipment and downstream products, and capable of producing tariffs on imports or preferential treatment for domestic manufacturers.

Export controls toward China continue to evolve. In January 2026 the Bureau of Industry and Security revised its licensing policy so that exports of high-performance AI chips such as NVIDIA's H200 and AMD's MI325X to approved Chinese customers are reviewed case by case, provided exporters show that shipments do not reduce supply to U.S. customers, that purchasers have internal compliance procedures, and that products undergo independent third-party testing in the United States. More broadly, policy is moving from sanctions on individual companies toward a framework of performance thresholds and technological boundaries, with the expanded Foreign Direct Product Rule extending U.S. jurisdiction to semiconductors made anywhere with American technology.

Infrastructure Bottlenecks: Power, Water, and Talent

By 2026 the binding constraint was no longer fabrication capacity but supporting infrastructure and skilled labor. Explosive growth in AI data centers has strained the power grid, with connection waits reaching five years in some regions and companies including Amazon and Google adopting a "bring your own power" model of dedicated gas plants or small modular reactors, while ultra-pure water requirements have pushed fabs into heavy recycling investment—TSMC's Arizona facilities target around 90%.

Labor is the sharpest constraint. With multiple mega-projects under construction at once, the technical labor shortage rate reached approximately 58% in early 2026, contributing to delays and rising costs. To address a projected gap of more than 70,000 technicians by 2030, firms have raised wages, deepened partnerships with community colleges and technical institutes, and turned to six- to twelve-month micro-credential programs to retrain workers from other sectors.

V. The Chinese Semiconductor Industry

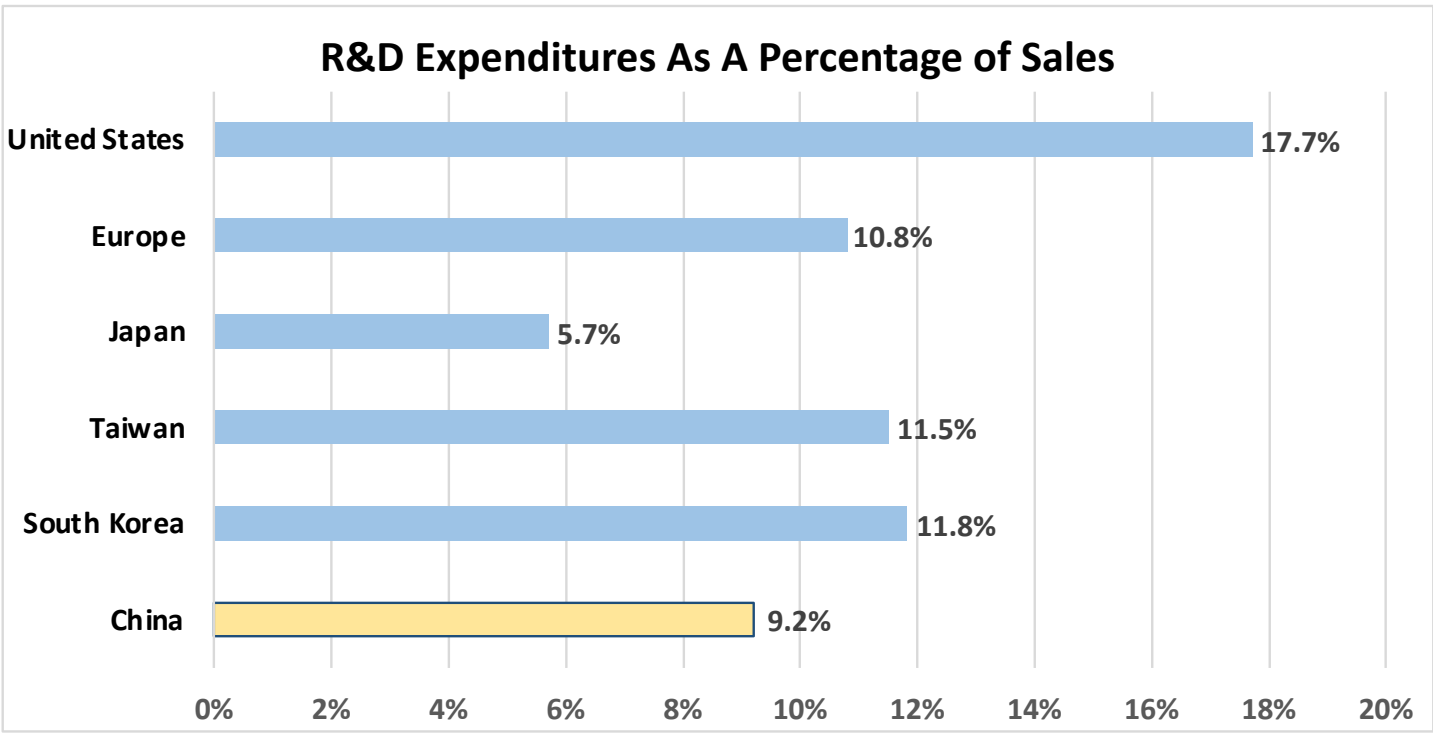
1. China in the Global Semiconductor Supply Chain

According to a BCG report of May 2024, China contributed 11% of total semiconductor value added in 2022. Its strongest position was in assembly, test and packaging at 30% of the global total, followed by wafer manufacturing at 24% and materials at 18%. Design was far weaker—9% in discrete, analog and other chips, 5% in logic and 3% in memory—as were equipment at 3% and EDA and core IP at under 1% (see Table 15).

Research and Development

According to the SIA, Chinese semiconductor companies allocated 7.6% of their total sales to R&D in 2023, lagging behind their global counterparts. In that year, the U.S. led with an R&D intensity of 19.3%, followed by Europe (14.0%), Japan (12.0%), Taiwan (11.0%), and South Korea (9.5%). Notably, China’s R&D intensity was just 39% of the U.S. level and 54% of Europe’s. However, 2024 saw a shift. SIA data indicates that China’s investment rose significantly to 9.2%. While the U.S. maintained the top spot at 17.7%, the rankings evolved, with South Korea (11.8%) and Taiwan (11.5%) surpassing Europe (10.8%) and Japan (5.7%) (see Figure 25).

Figure 25. Semiconductor Industry R&D Spending Across Regions: 2024



Source: SIA 2025 Factbook, Semiconductor Industry Association, May 27, 2025, p. 20.

EDA and Core IP

China accounted for less than 1% of global EDA value added in 2022, in a market dominated by the U.S.-headquartered Synopsys, Cadence and Siemens EDA. Chinese firms held 11.5% of their own domestic EDA market in 2020, expected to reach 14% by 2025, with Empyrean Technology the domestic leader but far behind American peers in technology, scale and influence. U.S. export controls have denied Chinese companies access to advanced EDA software and design IP; Empyrean and its subsidiaries were placed on the Entity List on December 2, 2024 and the company subsequently transferred full control to its state-owned shareholder, China Electronics Corporation. Beijing established the National Center of Technology Innovation for EDA in June 2023, but building a competitive domestic ecosystem requires sustained investment and long-term talent development.

Chip Design

China's major IC design companies form a broad but uneven ecosystem, spanning image sensors (such as Will Semiconductor/OmniVision), memory and MCUs (GigaDevice), mobile and IoT SoCs (UNISOC, Rockchip, Allwinner), analog and power management ICs (SG Micro, Silergy), and RF components (Maxscend). Collectively, these firms demonstrate growing design capabilities and strong positions in mid-range, cost-sensitive markets, often supported by policy incentives and a large domestic demand base. However, despite notable progress in specific niches, the sector remains constrained by limited access to advanced manufacturing nodes, heavy reliance on external foundries, and weaker competitiveness in high-end logic, CPUs/GPUs, and foundational semiconductor ecosystems compared with global leaders.

Semiconductor Equipment Manufacturing

Although China has not broken through in lithography, it has gained traction in dry etching and physical vapor deposition. Led by Naura, whose portfolio covers nearly all major process stages, Naura and AMEC together hold roughly 6% of the global dry etching market, and Naura reaches 12% in PVD.

Lithography remains the binding constraint. Export restrictions have prevented China from acquiring EUV machines from ASML, and Chinese firms have instead stockpiled deep ultraviolet tools from Tokyo Electron, Nikon and ASML. In 2023 China imported semiconductor machinery worth about US\$ 39 billion, close to its historical peak, with Japan the largest source at roughly US\$ 11.4 billion, ahead of the Netherlands at US\$ 7.5 billion and Singapore at US\$ 5.7 billion—a concentration that leaves China exposed to external technology controls.

Chinese firms are working to develop domestic lithography. Shanghai Micro Electronics Equipment, the national leader, has filed patents relating to EUV systems, while research institutions and industry players including teams linked to Huawei are exploring self-aligned quadruple patterning combined with DUV lithography, seeking to approximate advanced-node feature sizes without EUV.

Overall, China's semiconductor equipment industry exhibits uneven self-sufficiency rates across

different subsegments, reflecting relative strength in mature process nodes and weakness in advanced process nodes. In photoresist stripping equipment, the self-sufficiency rate in the low-to-mid range market has reached 75% to 90%. In cleaning and etching equipment, domestic self-sufficiency is approximately 50% to 60%, with AMEC's plasma etching equipment achieving 5-nanometer technology capability. However, development in CMP, ion implantation, and lithography equipment mainly focuses on mature processes, with self-sufficiency rates ranging from 10% to 25%. For advanced lithography equipment, under ASML's monopoly, China's domestic self-sufficiency currently approaches zero. As TrendForce points out, the true barrier in EUV does not lie merely in replicating equipment, but in the global supply chain and the high-volume manufacturing (HVM) data feedback loop that ASML has built over three decades.⁸

Semiconductor Materials

China is a major player in the global supply of rare earth elements, producing around 60% of the world's supply and processing 85% of them.⁹ Rare earths are critical for producing components used in various electronic devices, including magnets, catalysts, and lighting systems. Additionally, they are also essential for the manufacturing of semiconductor-related materials like neodymium, lanthanum, and cerium. The concentration of rare earth elements in China poses risks for countries and companies heavily reliant on these materials, as any disruptions in supply or export restrictions could impact chip production and innovation.

2. Semiconductor Assembly, Test and Packaging

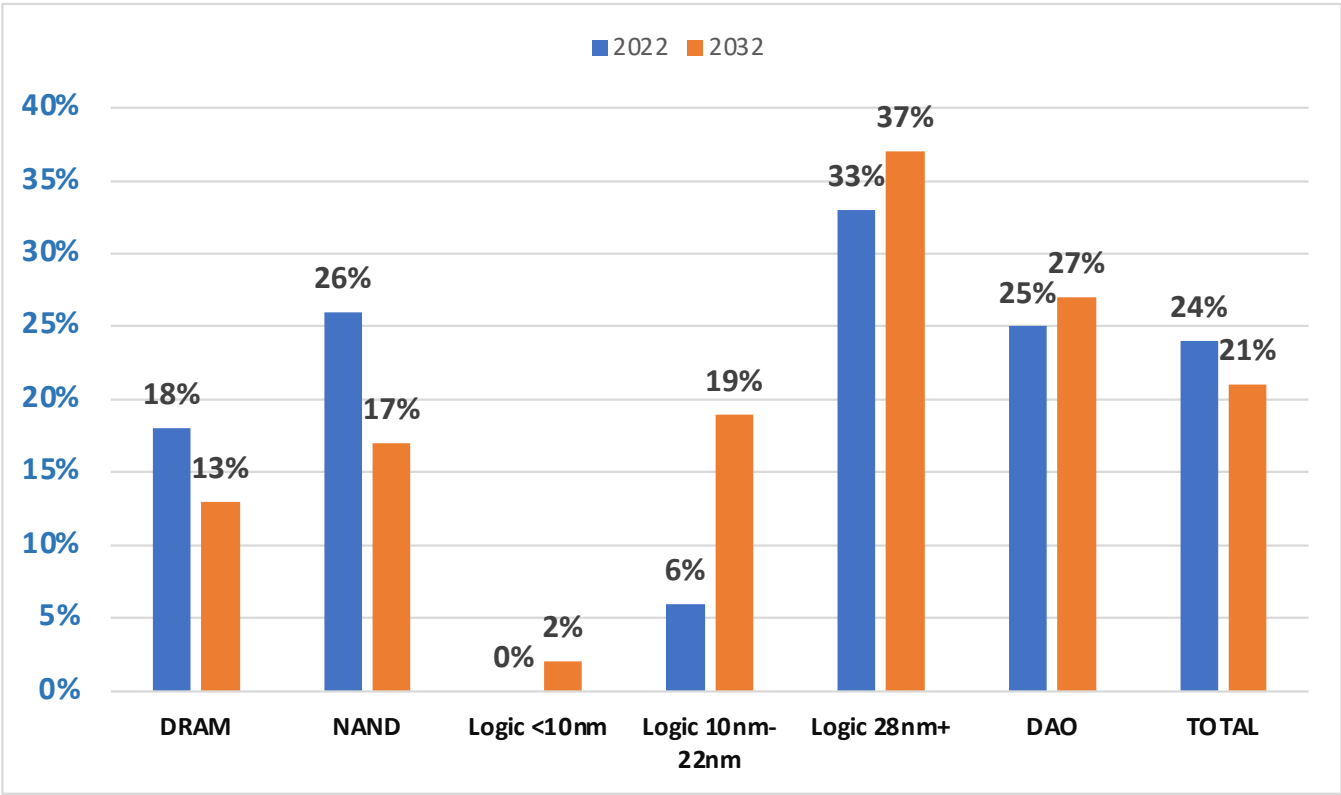
Semiconductor Manufacturing

BCG estimated that Chinese firms held roughly 24% of global wafer fabrication capacity in 2022, with particular strength in memory—about 18% of DRAM capacity and 26% of NAND. Capacity is heavily concentrated in mature technologies: China had no measurable share below 10 nm in 2022, about 6% between 10 and 22 nm, but 33% at 28 nm and above, and roughly 25% in discrete, analog and other chips. Its overall share is projected to fall to about 21% by 2032, with sub-10 nm capacity reaching only around 2% of the global total (see Figure 26).

⁸ TrendForce, "ASML EUV Dominance & China's Semiconductor Equipment Push," Dec. 23, 2025.

⁹ Gracelin Baskaran, "Could Africa replace China as the world's source of rare earth elements?" Brookings, December 29, 2022

Figure 26. China's Share of Global Fabrication Capacity on Site (Quantity): 2022 and 2032



Source: Raj Varadarajan, Iacob Koch-Weser, Christopher Richards, Joseph Fitzgerald, Jaskaran Singh, Mary Thornton and Robert Casanova “Emerging Resilience in The Semiconductor Supply Chain,” Boston Consulting Group and Semiconductor Industry Association, May 2024, p. 14.

Advanced chips at 7 nm and below remain out of reach. TSMC, Samsung and Intel lead this segment using EUV lithography, and ASML, the sole supplier of EUV systems, is barred from selling them to China. Lacking EUV, SMIC has reportedly achieved a quasi-7 nm process using DUV tools.

More recently, TechInsights’ analysis of the Kirin 9030 and Kirin 9030 Pro—used in Huawei’s Mate 80 series—indicates that these SoCs are fabricated on SMIC’s so-called N+3 process. While N+3 represents the most advanced manufacturing technology currently available at SMIC and enables higher core counts and modest density gains, TechInsights characterizes it as a scaled extension of the existing 7 nm (N+2) node rather than a genuine 5 nm-class process. Fundamental front-end transistor parameters remain largely unchanged, with performance and density improvements derived primarily from DUV-based design-technology co-optimization and aggressive back-end metal pitch scaling. As a result, despite incremental progress, SMIC’s N+3 process still falls materially short of the 5 nm-class technologies deployed by leading foundries such as TSMC and Samsung, and is expected to face notable yield and cost challenges.¹⁰

These developments demonstrate the resilience of China’s semiconductor ecosystem, but they remain several generations behind TSMC and Samsung, which have moved to 3 nm and beyond. Chinese firms have refined existing processes to improve performance and yield without reaching parity in efficiency, density or competitiveness. Media reports suggest SMIC may be able to make 7 nm and 5 nm chips at yields of roughly 50% and 30–40% respectively, but at a 40–50% price premium over TSMC for comparable nodes.

¹⁰ Anton Shilov, “Huawei’s latest mobile is armed with China’s most advanced process node to date despite using blacklisted chipmaker,” Tom’s Hardware, December 13, 2025.

3. Policy Measures

China’s semiconductor policy is thus less about current market leadership than about strategic self-sufficiency. Since 2014—following the State Council’s designation of semiconductors as a national security-critical industry—Beijing has pursued supply-chain security and indigenous innovation through initiatives such as the “Big Fund” and Made in China 2025, aiming to reduce dependence on foreign technology and elevate China’s long-term global standing.

National Integrated Circuit Industry Investment Fund

The “Big Fund” has acted as China’s most centralized instrument for directing money to the various segments of the semiconductor value chain, including design, manufacturing, packaging, testing, equipment, and materials. The “Big Fund” seeks to enhance China’s technological self-sufficiency and global competitiveness by making strategic financial investments. Its goal is to foster coordinated development across the semiconductor supply chain’s upstream and downstream sectors (see Table 26).

Table 26. National Integrated Circuit Industry Investment Fund Initiative

Initiative: National Integrated Circuit Industry Investment Fund (‘Big Fund’)
Measures include: Direct investment in domestic semiconductor companies: Funding promising startups, established players, and research institutions to foster innovation and strengthen the domestic ecosystem. Intensified R&D support: Allocating resources to advance cutting-edge technologies in areas like chip design, manufacturing equipment, manufacturing, and materials science. Strategic foreign direct investment (FDI): Leveraging the Big Fund to acquire critical foreign technology through overseas acquisitions of companies or intellectual property. Facilitating inbound FDI: Attracting foreign investment through incentives and joint ventures to bring in advanced manufacturing capabilities, expertise, and market access. The Big Fund is managed by Sino IC Capital, a company established by China Development Bank in 2014. The fund’s shareholders include the Ministry of Finance, China Tobacco, China Telecom, and several local governments and investment funds. It operates as a corporate entity under the guidance and supervision of the Ministry of Industry and Information Technology and the Ministry of Finance. The fund has three phases, each with different fundraising targets and investment focuses: Phase I (2014-2019): RMB 138.7 billion (~US\$ 19 billion) in 2014 invested in 23 domestic semiconductor companies, mainly in chip manufacturing, design, and packaging. The fund also facilitated several mergers, acquisitions, and IPOs in the industry. Phase II (2019-2024): RMB 204 billion (~US\$27 billion) with increased focus on etching machines, film, test, and cleaning equipment, and new applications enabled by 5G and AI. Phase III (2024-2029): RMB 344 billion (~US\$47.5 billion) with focus on semiconductor equipment and advancing third-generation semiconductors requiring materials like silicon carbide (SiC) and gallium nitride (GaN), and high-value-added dynamic random-access memory chips.

The latest Big Fund III saw US\$ 47.5 billion in funding from 19 government and state-owned entities in 2024. China is also using a range of levers, including local content preferences, domestic standards, and informal government directives to create demand for domestically produced semiconductors. Big Fund III's initial investment of RMB 93 billion (US\$ 12.7 billion) targets key material and equipment manufacturers, including Advanced Chemical Materials (ACM), NAURA Technology Group and Advanced Micro-Fabrication Equipment Inc. China (AMEC). Big Fund III focuses on supporting foundries and equipment manufacturers and fabless companies, creating a comprehensive and self-sufficient semiconductor ecosystem (see Table 27).

Table 27. Big Fund's Key Industry Players

[illegible]

Source: Ardi Janjeva, Seoin Baek, Andy Sellars, CETaS Briefing Paper: “China’s Quest for Semiconductor Self-Sufficiency: The impact on UK and Korean industries,” The Alan Turing Institute, December 4, 2024, pp. 16-17.

“Made in China 2025” Initiative

Made in China 2025 is a strategic plan to upgrade China’s manufacturing base, with semiconductors a core focus. Key measures include boosting R&D to reduce reliance on foreign technology, localizing production to strengthen supply-chain security, fostering partnerships to build a domestic semiconductor ecosystem, and scaling up Chinese foundries to compete with global leaders such as TSMC and Samsung (see Table 28).

Table 28. Made in China 2025 (MIC 2025) Initiative

MIC 2025 focuses on intelligent manufacturing in 10 strategic sectors:

1. advanced information technology;
2. automated machine tools and robotics;
3. aerospace and aeronautical equipment;
4. ocean engineering equipment and high-tech shipping;
5. modern rail transport equipment;
6. energy saving and new energy vehicles;
7. power equipment;
8. new materials;
9. medicine and medical devices; and
10. agricultural equipment.

MIC 2025 entails a 3-step strategy:

- **Step 1 (2015-2025):** basic industrialization, progress made in smart and green manufacturing;
- **Step 2 (2025-2035):** complete industrialization, tier-2 manufacturing leader with solid indigenous R&D, breakthrough in key sectors; and
- **Step 3 (2035-2050):** Tier-1 manufacturing leader with advanced technology and industrial system.

With reference to semiconductors, the goals are:

1. To develop the IC design industry, speed up the development of the IC manufacturing industry, upgrade the assembly, testing and packaging (ATP), and facilitate breakthroughs in the key equipment and materials of integrated circuits.
2. By 2020, China’s semiconductor design and manufacturing should be one to two generations behind industry leaders and supported by a robust domestic supply chain of equipment, material and ATP service suppliers.
3. By 2030 the main segments of the IC industry should reach advanced international levels.

The initiative combines tax incentives, special economic zone subsidies, a whole-of-nation approach to semiconductor R&D, the establishment of the Central Science and Technology Commission in March 2023 to centralize Party leadership over science and technology, and the promotion of new national champions. The original targets of 40% local content by 2020 and 70% by 2025 were revised in 2019 to US\$ 305 billion of output by 2030 and 80% of domestic demand (see Table 29).

Table 29. Measures Under “Made in China 2025” Initiative

MEASURE	DETAILS
Tax Incentives	Corporate Tax Breaks Preferential tax treatment from the first profitable year for domestic semiconductor players in 2020: - Qualifying integrated circuit (IC) projects and enterprises that have operated for more than 15 years will be exempt from corporate income tax for up to 10 years if they employ the 28 nm process or more advanced nodes. - Those producing 65 nm to 28 nm chips will get 5 years of tax exemption and a 50% discount on the corporate tax rate for the subsequent five years.
	Exemption of Import Duties in Chip Equipment and Inputs until 2030 Exemption of tariffs from July 27, 2020 to December 31, 2030 on imports of some semiconductor companies that are critical to the country’s IC development, including IC production equipment parts, raw materials and other consumables.
	Tax Credit for Investments in Semiconductor Research and Development Tax credit for investments in semiconductor R&D was upgraded by 20%. For the entire calendar years from 2023 to 2027, the pre-tax deduction rate for R&D related expenses will increase from the current 100% to 120%.
	“Super-input” value-added tax (VAT) credit From 1 January 2023 to 31 December 2027, general VAT taxpayers engaging in IC design, manufacturing, equipment, materials, packaging and testing would be eligible for an extra 15% “super-input VAT credit.” This allows qualified IC enterprises to credit their eligible input VAT at a rate of 115%.

MEASURE	DETAILS
Special Economic Zone Subsidies	Lin-gang Special Area Established in 2019, Lin-gang New Area is part of the Shanghai Pilot Free Trade Zone to build a comprehensive industrial base for integrated circuits. It provides guidance on its entire supply chain layout, innovation, openness and cooperation. Besides promoting the development of key areas such as core chips, specialty processes, key equipment, and basic materials, it also supports multinational companies in setting up offshore R&D and manufacturing centers. Corporate income tax rates for companies specializing in IC, artificial intelligence, biomedicine and civil aviation have been set at 15% in Lin-gang for five years from the date of establishment, compared to the usual 25% in the rest of China. <i>Lin-gang As A Hub for Wide-Bandgap Semiconductors</i> On March 29, 2024, a wide-bandgap semiconductor industry base was unveiled in Lin-gang. The Lin-gang Special Area aims to hit its “Double Hundred Billion” goal by 2026, with equipment materials and wafer manufacturers topping 10 billion (US\$ 1.6 billion) each in value – making it a leading base for the wide bandgap semiconductors sector in China.
	China-Korea Integrated Circuit Industrial Park The municipal government of Wuxi and memory chip giant SK Hynix started construction of the industrial park in October 2021. The project involves a total investment of about RMB 2 billion (US\$ 310 million) and aims to strengthen the high-quality development of the IC industry in Wuxi by attracting more upstream and downstream projects in its industrial chain. Special Economic Zone in Hengqin Established in July 2022 as a major new outpost for China’s semiconductor industry, the Hengqin Special Economic Zone offers: 1. Up to RMB 30 million (US\$ 4.4 million) each for semiconductor firms to set up new offices or conduct R&D activities in Hengqin; 2. RMB 5 million (US\$ 686,502) and 50% of tapeout cost to firms that establish R&D programs in Hengqin; 3. Up to RMB 25 million (US\$ 3.43 million) to firms involved in 14 nm or lower chip processing design; 4. More than RMB 100,000 (US\$ 13,930) each to researchers and senior managers who signed contracts with Chinese semiconductor firms and were assigned to work in Hengqin for a three-year period; and 5. RMB 1 million (US\$ 139,300) to companies that can nurture semiconductor talent in Hengqin.

MEASURE	DETAILS
“Whole Nation System” for Chip R&D	The new “Whole Nation System” is embedded in China’s 14th five-year plan, as well as its local and sector-specific versions, which collectively map key strategies for advancing the country’s development from 2021 to 2025. Specifically, the new “Whole Nation System” for R&D consists of key elements including integrating and diverting resources to priority cutting-edge technologies such as artificial intelligence and quantum science, strengthening basic research, and establishing national labs and industry clusters.
Central Science and Technology Commission	Established in March 2023, the commission, which sits directly under the Communist Party of China’s Politburo, is higher ranking than all government ministries. It has authority over the Ministry of Science and Technology, and is intended to accelerate progress towards China’s goal of scientific self-reliance and to ease China’s technological chokepoints.
Foster New National Champions	China is nurturing closer co-operation with a select group of companies, namely, chipmakers SMIC, Hua Hong Semiconductor and Huawei, as well as equipment suppliers Naura and Advanced Micro-Fabrication Equipment Inc China. These chosen few will have access to additional government funding without having to achieve performance goals that were previously necessary.

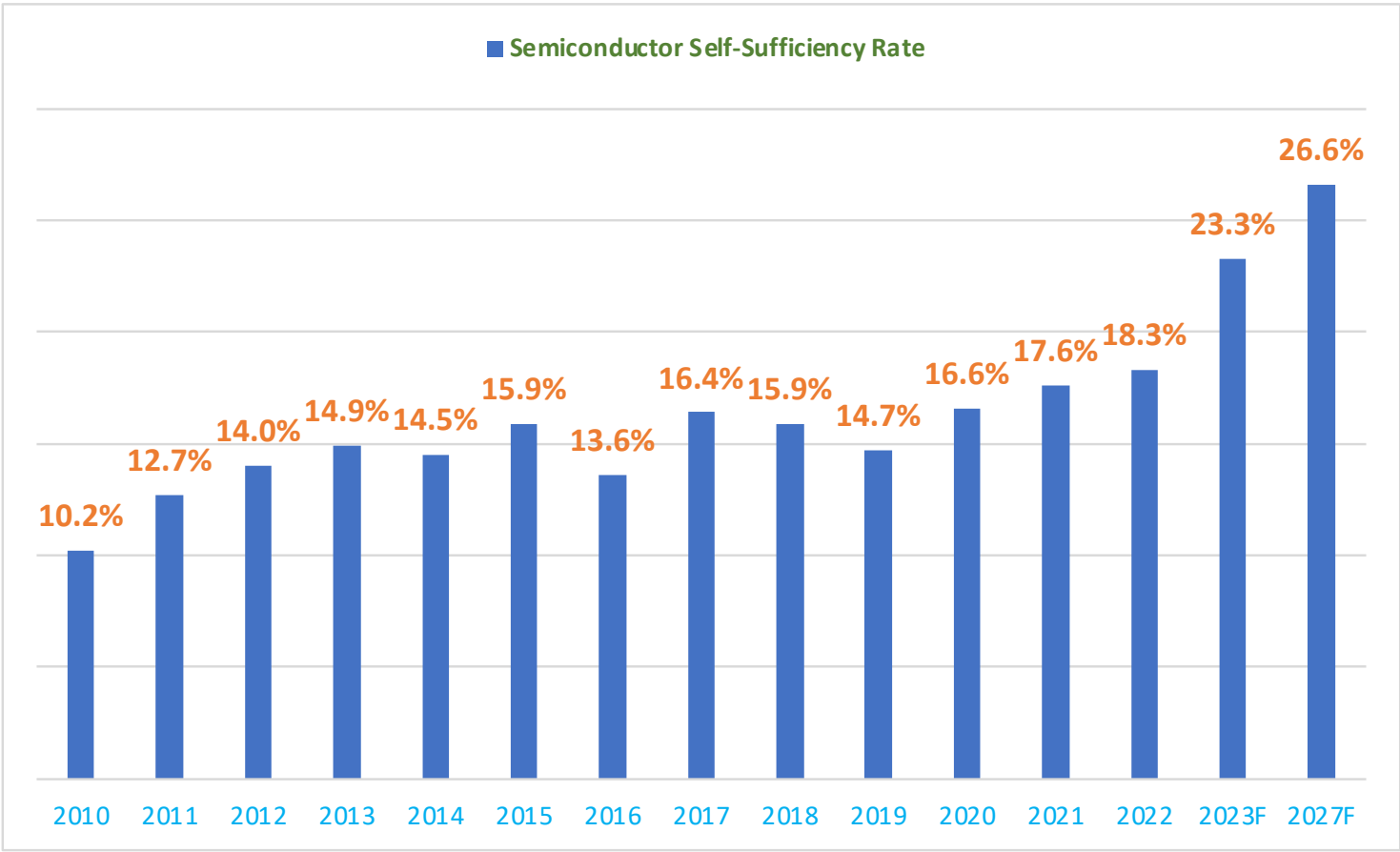
4. Policy Outcomes

China’s Semiconductor Self-Sufficiency Below 25%

The 2015 plan set a semiconductor self-sufficiency target of 70% by 2025, to be supported by the Big Fund, whose three phases raised US\$ 19 billion (2014–2019), US\$ 27 billion (2020–2024) and US\$ 47.5 billion (2024–2029), the third focused on advanced chips, equipment and materials in response to Western restrictions.

The results have fallen well short. TechInsights data show domestic production rising from US\$ 11.2 billion in 2014 to US\$ 31.2 billion in 2021, but domestic demand rose faster—from US\$ 77 billion to US\$ 177 billion—so the self-sufficiency rate improved only from 14.5% to 17.6%. Continued investment lifted it to 23.3% in 2023, and SEMI expects 26.6% by 2027, still leaving a gap of some US\$ 146 billion (see Figure 27).

Figure 27. China’s Semiconductor Self-Sufficiency Rate: 2010–2027



Source: Data from TechInsights cited in Nikkei Asia, “China rushes to boost domestic chip supply ahead of Trump’s return,” November 19, 2024.

The headline rate also overstates Chinese capability, because much of the output is produced by foreign-owned fabs inside China. Of the US\$ 31.2 billion of ICs manufactured in China in 2021, China-headquartered companies produced only US\$ 12.3 billion, or 6.9% of the country’s US\$ 177 billion market. The pattern held in 2023: against a market of approximately US\$ 154.3 billion, SMIC recorded US\$ 6.3 billion, Hua Hong US\$ 2.3 billion and Nexchip about US\$ 1.0 billion, so the three leading domestic chipmakers together supplied roughly 6.2% of the Chinese market rather than the headline 23.3%.

Chinese Foundries Continue to Lose Global Market Share

Looking at China’s three major foundries—SMIC, Huahong Group, and Nexchip—their combined global revenue market share stood at approximately 8.5% in the second quarter of 2026, edging up from 8.4% in the first quarter primarily because SMIC’s quarterly revenue rose 20.0%. Individually, SMIC accounted for 5.4%, Huahong for 2.3%, and Nexchip for approximately 0.8% of the global market.

That 8.5% share nevertheless remained below the 8.8% recorded for the full year of 2025 and considerably below the 9.6% peak reached in 2022. Although all three companies continued to record revenue growth, the global foundry market expanded at a faster pace, resulting in a gradual erosion of their collective market share. This indicates that although China-based foundries have substantially expanded their mature-process capacity in recent years, that expansion has yet to translate into a meaningful increase in global market influence amid rapid market growth and the concentration of new demand in advanced processes (see Table 30).

Table 30. Global Market Share of China's Top Three Semiconductor Foundries: 2022–2026

	2022	2023	2024	2025	2026Q1	2026Q2
SMIC	5.3%	5.4%	5.7%	5.3%	5.1%	5.4%
Huahong Group	3.1%	2.7%	2.4%	2.6%	2.5%	2.3%
Nexchip	1.3%	1.0%	0.9%	0.9%	0.8%	0.8%
Total	9.6%	9.0%	9.1%	8.8%	8.4%	8.5%

Source: Trendforce, Press Releases.

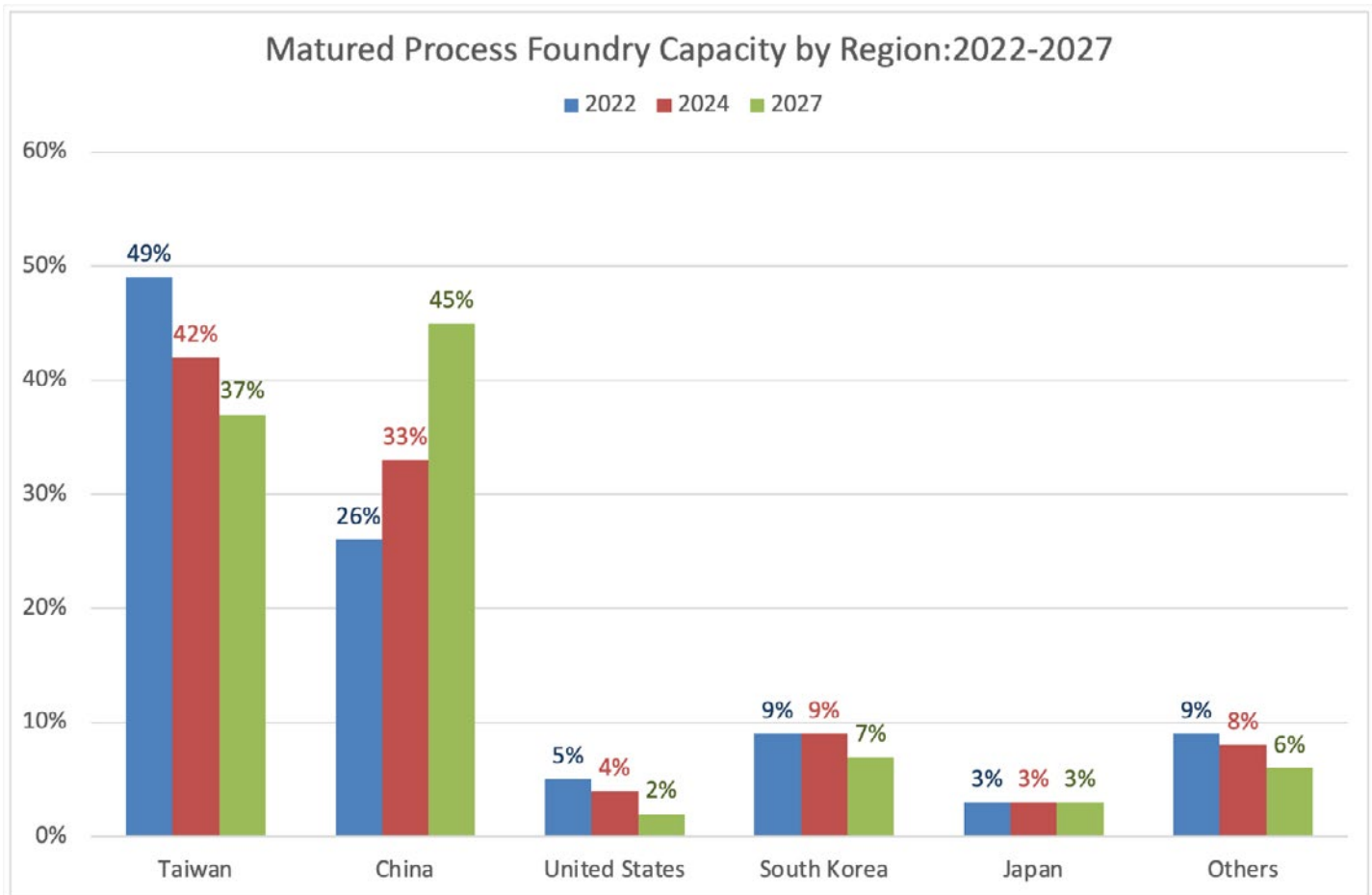
China Focused on Mature Process Chips

As Chinese companies are increasingly blocked from access to modern process nodes and manufacturing equipment, China's fast-growing semiconductor sector has pivoted to the manufacture of "legacy chips", with increased semiconductor production primarily concentrated on mature process chips. The term mature process chips (or legacy chips) generally describe semiconductors manufactured using well-established, "older" fabrication technologies. While there is no single, universal threshold, the global industry standard—supported by the U.S. CHIPS Act and leading foundries like TSMC and UMC—typically classifies any node at 28 nanometers (nm) or larger as "mature."

Blocked from advanced nodes and equipment, China has pivoted to legacy chips —generally 28 nm and above. TrendForce data from January 2024 counted 44 operational Chinese wafer fabs with 22 more under construction, and 32 fabs expanding mature-node capacity by the end of that year.

The consequences for the global mature-node landscape are substantial. Taiwan commanded 49% of the world's mature-node capacity in 2022 but is projected to fall to 42% in 2024 and 37% by 2027 as its firms prioritize high-margin advanced nodes, while China's share is forecast to surge from 26% in 2022 to 45% by 2027 on the back of heavy subsidies and a self-sufficiency push. Because mature processes remain vital for automotive components, power management and IoT devices, China is positioning itself as the world's primary supplier of legacy chips—creating a glut whose aggressive pricing has squeezed margins for established competitors (see Figure 28).

Figure 28. Matured Process Foundry Capacity by Region: 2022-2027



Source: News, "Trendforce: Foundry Capacity Market Share of Advanced Process to Decline in Taiwan, Korea until 2027, While US on the Rise," TrendForce, May 14, 2024.

Surge in Chip Companies in China Going Bankrupt Since 2022

The Made in China 2025 initiative and the Big Fund also spurred a wave of entry by undercapitalized and inexperienced firms. As financing tightened, market discipline returned: about 10,900 chip-related firms exited the market in 2023, nearly double the 2022 level, and exits reached roughly 14,600 by mid-December 2024, a record. New registrations nonetheless remained elevated at around 52,000 in 2024, pointing to a shakeout and consolidation phase running alongside policy-driven entry (see Table 31).

Table 31. New Chip-Related Company Bankruptcies and Registrations: 2017 to 2024

Year	Bankruptcies/Deregistrations (Companies)	New Registrations (Companies)
2017	500	5,700
2018	700	7,400
2019	1,300	8,400
2020	1,400	23,000
2021	3,400	47,000
2022	5,700	62,000
2023	10,900	66,000

2024	14,600 (as of Dec 13, 2024)	52,000 (as of Dec 5, 2024)
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Note:

1. Figures for 2017 to 2023 are rounded to the nearest 1,000.

2. 2024 numbers are up to early/mid December, so full-year figures could be slightly higher.

Source: Lai Ying-chi, "China's chip market faces intense competition: 52,000 new companies registered this year, while 14,600 exited," Commercial Times (Chinese), December 24, 2024.

China Faces Challenges in Producing Sub-7nm Chips

SMIC is China's only foundry capable of 7 nm-class production, but scaling has been constrained by export controls on advanced design tools and by the immaturity of domestic EDA. Lacking EUV, it relies on immersion DUV with multi-patterning —technically viable but costly and inefficient. Lithography is in any case only one element: leading-edge production also depends on EDA software, core IP, advanced materials, precision metrology and critical deposition and etching tools, and multi-patterning adds steps, overlay error risk and cycle time, making high yield, competitive cost and stable volume production simultaneously very hard to achieve.

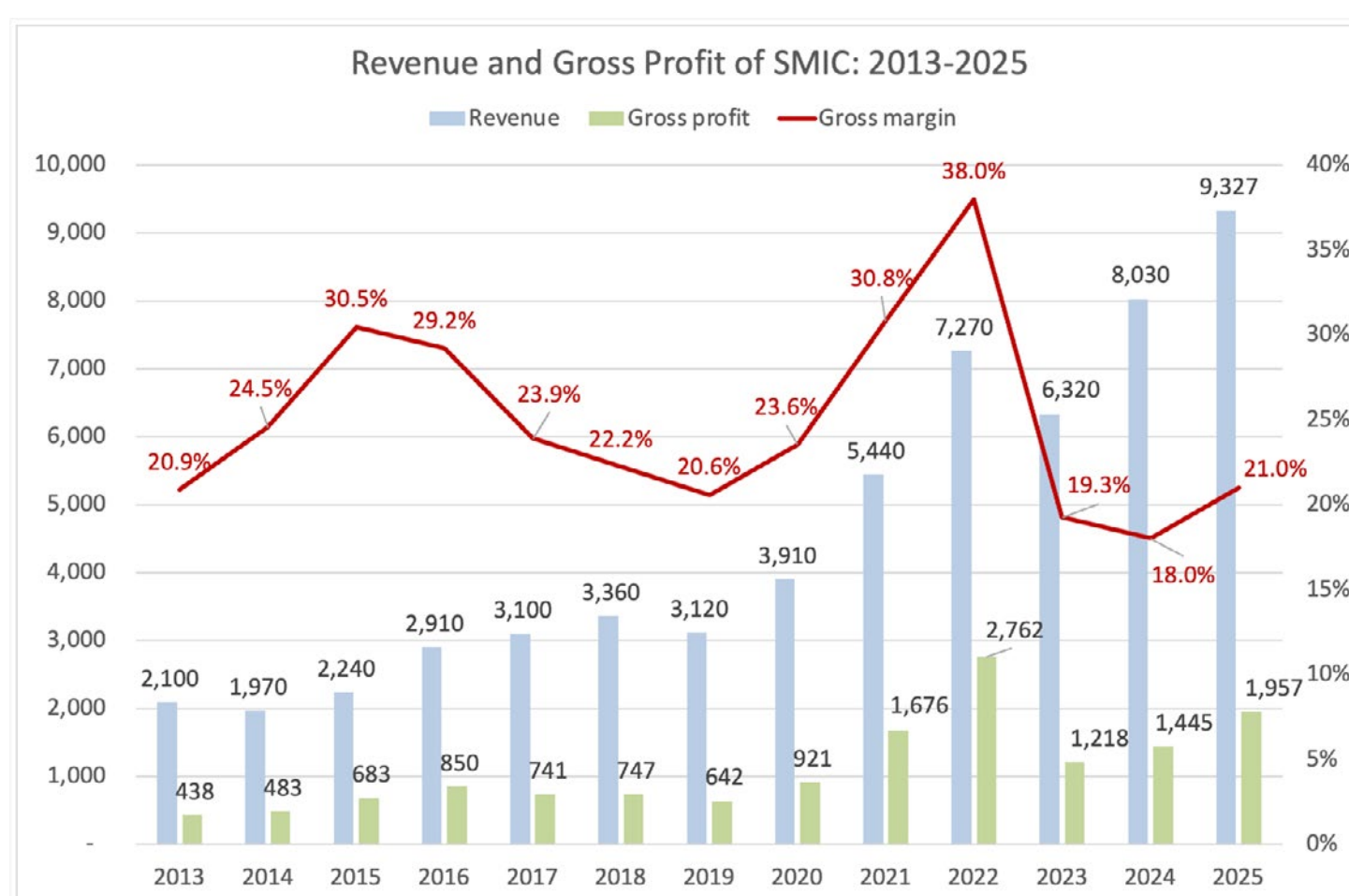
Chinese firms are pursuing long-term alternatives, including EUV-related patent filings by Huawei and SMEE, but the path from patent to commercial EUV production is long: ASML itself needed decades of sustained R&D. Meanwhile the frontier keeps moving—Intel had already brought High-NA EUV systems into production by early 2025, so even a successful Low-NA EUV program would leave a persistent and possibly widening gap.

SMIC's Revenue and Profit

SMIC has posted strong revenue growth since 2013, reaching a record US\$ 8.03 billion in 2024 and expanding further to US\$ 9.33 billion in 2025 after a downturn in 2023. However, aggressive expansion in mature-node capacity has led to persistent oversupply, depressing prices and constraining profitability. While gross profit rebounded modestly in 2024, margins continued to erode. Gross margin fell from 38.0% in 2022 to 18.0% in 2024 (recovering slightly to 21.0% in 2025), and net margin declined even more sharply—from 25.0% to 6.1% over the same period (edging up only to 7.3% in 2025)—despite record revenues.

This widening gap between scale and profitability reflects structural challenges: heavy reliance on legacy nodes, elevated capital expenditures, and sustained price pressure in China's mature-process market. In short, SMIC has expanded rapidly, but turning scale into sustainable profits remains an uphill battle (see Figure 29).

Figure 29. Revenue and Gross Profit of SMIC: 2013 to 2025



Source: Statista for the data from 2013-2023 and news release from SMIC for the data of 2024-2025.

Although SMIC has developed a 7 nm-class process, it lags far behind TSMC and Samsung in scale, yield and cost efficiency. Its 7 nm yield reportedly reached about 40% in 2024, well below the roughly 60% threshold for economic mass production, and external estimates suggest a 5 nm-class node could see yields of 30–40% at production costs 40–50% above TSMC’s. Lacking EUV, SMIC depends on DUV multi-patterning with less mature domestic equipment; Bloomberg reported in late 2024 that its 7 nm lines continued to suffer low yields and reliability problems. Even access to EUV would not guarantee smooth progress, since advanced fabrication is a systems endeavor requiring decades of accumulated process integration, defect management and supply-chain coordination.

These limitations have sharply widened the profitability gap with TSMC. In 2024, TSMC posted a 56.1% gross margin and a 40.5% net margin, compared with 18.1% and 6.1% for SMIC. This divergence remained stark in 2025: TSMC posted an impressive 59.9% gross margin and a 45.1% net margin, whereas SMIC’s gross margin stood at 21.0% with a net margin of just 7.3%, underscoring SMIC’s sustained cost pressures.¹¹

As TSMC moves toward 2 nm mass production—roughly three generations ahead of China’s current frontier—the gap in process technology and intellectual property continues to widen. While SMIC has expanded revenue, its difficulty in translating scale into profitability highlights the structural limits of China’s semiconductor self-sufficiency push (see Table 32).

¹¹ News, “SMIC 2024 Sales Hit Record, But Profit Drops Reportedly Due to High Huawei Chip Costs,” TrendForce, February 12, 2025.

Table 32. TSMC vs SMIC: 2020-2025

Unit: US\$ billion

Year	TSMC			SMIC		
	Revenue	Gross Margin	Net Margin	Revenue	Gross Margin	Net Margin
2020	47.69	53.1%	38.7%	3.91	23.6%	17.1%
2021	57.23	52.0%	37.9%	5.44	30.9%	31.3%
2022	73.67	59.6%	44.9%	7.27	38.0%	25.0%
2023	70.60	54.4%	38.8%	6.32	19.3%	14.3%
2024	90.08	56.1%	40.5%	8.03	18.1%	6.1%
2025	122.42	59.9%	45.1%	9.33	21.0%	7.3%

Source: Financial reports of TSMC and SMIC, and statistical data from Statista.

5. Updates in 2025-2026 and Prospects

A Dual-Track Semiconductor Strategy under Intensifying Technology Controls

By the end of 2025, China's semiconductor industry has taken on a distinctly "dual-track" character. On one track, blocked by the United States and its allies through a high-intensity technology embargo centered on EUV lithography, China has been forced to adopt a costly and extremely complex multi-patterning route for sub-7 nm advanced nodes. On the other track, the Chinese government has launched an unprecedented capacity expansion in mature-node manufacturing, pushing ahead with "import substitution" across equipment, materials, and packaging/testing.

The year 2026 marks the beginning of China's 15th Five-Year Plan (2026-2030), shifting the overarching policy focus toward an AI-centric high-value economy driven by "New Quality Productive Forces". To support this strategic pivot, the state-backed "Big Fund Phase III" entered deep operations with a capital pool of RMB 344 billion, aggressively targeting "extreme bottlenecks" in the supply chain, particularly in advanced lithography systems, photoresists, and deposition tools.

Advanced Nodes and AI Sovereignty

In the realm of advanced manufacturing, SMIC officially announced in 2026 that it had achieved mass production of a 5nm-class process (N+3 node) without the use of EUV lithography tools. Despite incremental progress, SMIC's N+3 process still falls materially short of the 5 nm-class technologies deployed by leading foundries such as TSMC and Samsung, and is expected to face notable yield and cost

challenges. This milestone was realized through extremely complex DUV multi-patterning, particularly self-aligned quadruple patterning (SAQP). While this approach demonstrates significant engineering ingenuity in pushing the physical limits of DUV technology, its economic viability remains uncertain. Production costs are estimated to be 40–50% higher than those of competitors’ EUV-based 5nm processes, and initial yields were reportedly around 20–30%, only gradually improving toward roughly 50% with substantial government subsidies.

Table 33. Progress of Semiconductor Investment and Production in China: 2025-2026

Category	Segment / Indicator	Details & Progress	Key Challenges
Advanced Nodes	7 nm Process	Mass-produced by SMIC via DUV multi-patterning; used in Huawei flagship devices.	Cost: 40–50% higher than TSMC. Yield: Only ~1/3 of TSMC’s yield.
	5 nm Process	Attempting to use DUV multi-patterning workarounds.	Approaching physical/economic limits of DUV; high uncertainty for domestic EUV tools.
Mature Nodes	Capacity Growth	18 new fabs built in 2024.	Concerns over global overcapacity.
	Market Share	Projected to hold 33% (2024) and up to 45% (2027).	Heavy reliance on government subsidies to maintain low-margin operations.
	Pricing Strategy	Undercutting competitors (UMC, GlobalFoundries) by 20–30%.	Triggering intense price wars.

Leveraging this 5nm node breakthrough, Huawei launched its Ascend 950 series (including the Ascend 950 PR and 950DT) in 2026 to directly challenge Nvidia. The Ascend 950 achieves 1 PFLOPS of compute power (in FP8 format) and integrates 144GB of domestic HBM with a bandwidth of 4 TB/s. This marks an important step in China’s push for “AI sovereignty” and “full-stack autonomy,” aiming for 90% domestic AI infrastructure adoption by 2030.

Memory Supercycle and Advanced Packaging

Amid a global AI-driven memory supercycle, Chinese memory makers made significant leaps to address the severe supply-demand imbalance. In 2026, Changxin Memory Technologies (CXMT) launched large-scale manufacturing of HBM3 modules, reportedly dedicating approximately 20% of its total capacity (around 60,000 wafers per month) to the HBM3 line. CXMT also demonstrated autonomous DDR5-8000 and LPDDR5X-10667 capabilities, while Yangtze Memory Technologies (YMTC) sustained its edge in 232-layer and above 3D NAND. The commercial effect was immediate. CXMT’s branded DRAM revenue rose 99.3% sequentially in the second quarter of 2026 to US\$ 14.62

billion, lifting its global share from 7.6% to 9.5% and placing it fourth worldwide behind Samsung, SK hynix and Micron—the first time a Chinese firm has held a position of that scale in the global memory market (see Table 42).

To bypass front-end advanced process restrictions, China declared 2026 the “Packaging Technology Revolution Year”. The industry is heavily investing in Chiplet designs, 3D stacking, and panel-level packaging (PLP) led by OSAT giants like JCET, seeking to achieve system-level performance enhancements and cost reductions.

Capacity Expansion, Price Competition, and the “Silicon Fortress”

This continuous expansion produced notable economic shifts in early 2026. In the first two months of the year China’s IC export value surged 68.9% year-over-year to RMB 304.67 billion, driven primarily by memory price cycles and product mix rather than volume, which grew 13.7%.

However, external pressures and geopolitical frictions remain severe. The U.S. government tightened export controls further in 2026, implementing strict “Know Your Customer” (KYC) requirements for cloud services to prevent Chinese entities from remotely accessing advanced compute. Furthermore, the U.S. initiated trade investigations into Chinese mature process chips due to overcapacity concerns. In response, China is accelerating a “Silicon Fortress” strategy, unofficially mandating that at least 50% of the equipment in newly added fab capacities must be sourced from domestic suppliers, pushing for a completely self-sufficient ecosystem.

VI. The Japanese Semiconductor Industry

1. Japan in the Global Semiconductor Supply Chain

According to a BCG report in May 2024, Japan held 12% share of the global semiconductor value chain, as does South Korea. With a 38% share in global semiconductor value chain in 2022, the U.S. remains a powerhouse. They are followed by the E.U., Taiwan and China, with each holding 11% share of the global semiconductor value chain in 2022 (see Table 15).

IC Design, Electronic Design Automation and Intellectual Property

Japan was once a global leader in IC design, with NEC, Renesas and Fujitsu pivotal in the industry's early development. Unlike most leading firms elsewhere, Japanese companies retained the integrated device manufacturer model, designing and making chips largely for their own end products, and as the competitiveness of Japanese consumer electronics eroded their share of the industry fell with it. By 2022 Japan held just 1% of the global fabless market, though 17% of the IDM market. It nonetheless remains internationally competitive in memory, CMOS image sensors, microcontrollers and power semiconductors—Kioxia in NAND flash, Sony in image sensors, Renesas in automotive microcontrollers, and Toshiba, ROHM, DENSO and Mitsubishi in power devices—and accounted for 18% of global value added in the design of discrete, analog and other chips, second only to the United States (see Table 15).

2. Wafer Fabrication

Assembly, Testing and Packaging

Japan's wafer fabrication strength lies in legacy chips at 28 nm and above, indispensable in automobiles and consumer electronics; as of March 2024, the most advanced logic produced in Japan was at 40 nm, against 3 nm and below in Taiwan and South Korea. Its position in assembly, testing and packaging is similarly modest at 6% of global value added, with outsourcing almost negligible under the IDM model, though Shinko Electric Industries, Ibiden and Toppan Holdings remain major players in advanced substrates and packaging.

Manufacturing Equipment

Equipment is where Japan's weight is greatest. Three segments—lithography, deposition, and materials removal and cleaning—make up roughly 70% of the global equipment market, each dominated by a handful of suppliers. Japan accounted for 26% of global value added in equipment in 2022, and

a 2023 World Economic Forum report puts Japanese firms at about 32% of the global market, led by Tokyo Electron, Advantest and Hitachi High-Tech. The dominance is starkest in photoresist processing, where Japanese firms captured 92% of global revenue in 2022 through JSR, Tokyo Ohka Kogyo, Shin-Etsu Chemical and Fujifilm Electronic Materials, and extends into manufacturing automation through companies such as Omron (see Table 34).

**Table 34. Semiconductor Manufacturing Equipment Vendors, by HQ Region
Revenue: 2022**

Wafer fabrication process	US	EU	CN	KR	JP	Others	Market size (US\$ B)
Lithography	1%	89%			10%		17.5
Photoresist processing			3%	5%	92%		3.7
Ion implant & doping eqpt	83%				17%		2.5
Thermal processes	57%	4%	2%	1%	37%		2.9
Deposition	67%	11%	2%	5%	15%		22.8
Material removal & cleaning	56%	0%	5%	4%	35%	0%	30.5
Manufacturing automation	5%			11%	64%	21%	4.2
Process control	76%	7%			11%	6%	13.5
Other	1%	8%		5%	43%	42%	3.4

Note: Geographies based on company HQ's; distribution based on company revenues.

Source: Raj Varadarajan, Iacob Koch-Weser, Chris Richard, Joseph Fitzgerald, Jaskaran Singh, Mary Thornton, Robert Casanova and David Isaacs, "Emerging Resilience in The Semiconductor Supply Chain," Boston Consulting Group, May 2024, p. 18

Nikon Precision and Canon have long competed in lithography alongside ASML, and Japanese firms hold critical positions across DUV photolithography, CVD and oxidation–diffusion systems, sputtering, CMP, and factory handling and automation. Canon's FPA-1200NZ2C nano-imprint lithography system, announced in October 2023, claims 5 nm feature sizes at significantly lower cost than EUV and could, if commercialized at scale, challenge ASML in cost-sensitive applications. Japan exports most of the equipment it produces: against domestic demand of US\$ 8.35 billion in 2022, exports reached about US\$ 28.5 billion, of which 23.8% went to Taiwan.

Materials

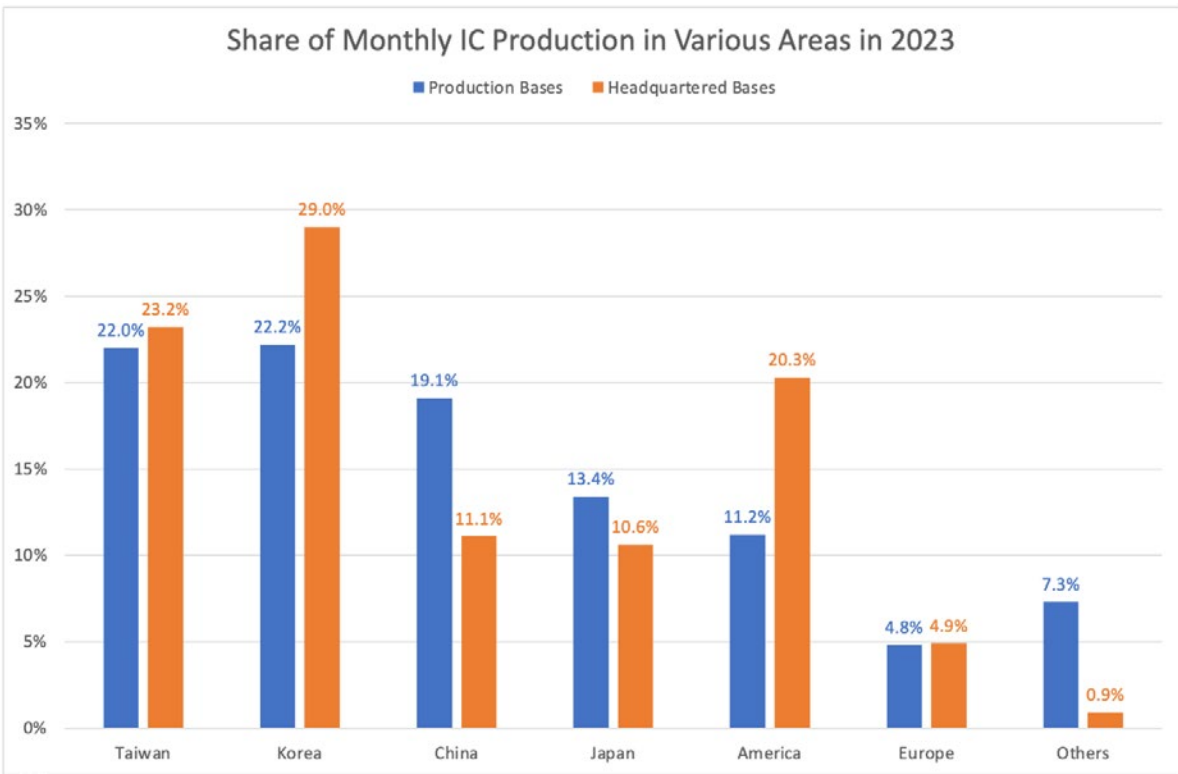
Materials tell the same story. Japanese, U.S. and EU firms dominate the global semiconductor materials industry, and Japan is pivotal in photoresists through the same four suppliers. A 2023 World Economic Forum report puts Japanese firms at approximately 56% of the global materials market, and in wafers Shin-Etsu Chemical and SUMCO alone control roughly half the world’s silicon supply. As AI investment accelerates, demand for high-performance materials supporting advanced logic, memory and AI applications should reinforce these upstream strengths.

3. Japan’s Share of the Global Semiconductor Market

Japan’s position has been transformed over four decades. In 1989, NEC ranked first worldwide and six Japanese companies—NEC, Toshiba, Hitachi, Fujitsu, Mitsubishi and Matsushita—sat in the global top ten by revenue. However, intensifying competition from South Korea, a demand shift from consumer electronics toward personal computers that favored logic and microprocessors over DRAM, the operation of semiconductor businesses as internal divisions of large electronics groups, and slow adaptation to the fabless–foundry division of labor after TSMC’s founding in 1987 have eroded that lead. By 2023, no Japanese company remained in the global top ten, and Japan had become a specialized, upstream-oriented player rather than a front-line champion.

Production capacity followed. Japan supplied more than 50% of global semiconductor output in the late 1980s but only around 10% by 2019. Knometa Research put total global monthly IC capacity at approximately 23.2 million wafers in 2023, of which Japan ranked fourth by production base at 3.1 million wafers a month, or 13.4%, and fifth by headquarters base at 2.5 million wafers, or 10.6% (see Figure 30).

Figure 30. Share of Monthly IC Production Capacity of 8-Inch Equivalent by Geography: 2023



Source: Chia-Chen Lee, “Policy-Driven Regional Semiconductor Manufacturing development,” IEK, ITRI, March 20, 2024, p. 1.

In 2026, the Japanese semiconductor market is projected to reach US\$ 57.05 billion, a 27.6% year-over-

year increase, reflecting a structural strengthening driven by AI demand and localized production. While Japan accounts for approximately 5.1% of the global semiconductor market by sales location, its influence in the upstream supply chain remains indispensable.

4. Strategy and Policies

Japan has since repositioned semiconductors as a core national project. METI’s Strategy for Semiconductors and the Digital Industry, first issued in June 2021 and revised in June 2023, emphasizes revitalizing the domestic manufacturing base through joint ventures with overseas foundries and the upgrading of domestic suppliers, explicitly taking account of regional geopolitics and the rise of generative artificial intelligence.

Japan committed approximately ¥ 3.9 trillion (US\$ 25.7 billion) in subsidies between 2022 and 2025, aiming to triple domestic semiconductor sales to more than ¥ 15 trillion (US\$ 112.55 billion) by 2030, concentrated on five priority areas: advanced logic, advanced memory, industrial-use semiconductors, advanced packaging, and manufacturing equipment, components and materials. Combined public and private investment in advanced semiconductors and related supply chains is projected to exceed ¥ 5 trillion (US\$ 32.1 billion) by 2030 (see Table 35).

Table 35. Japan’s Semiconductor Policy

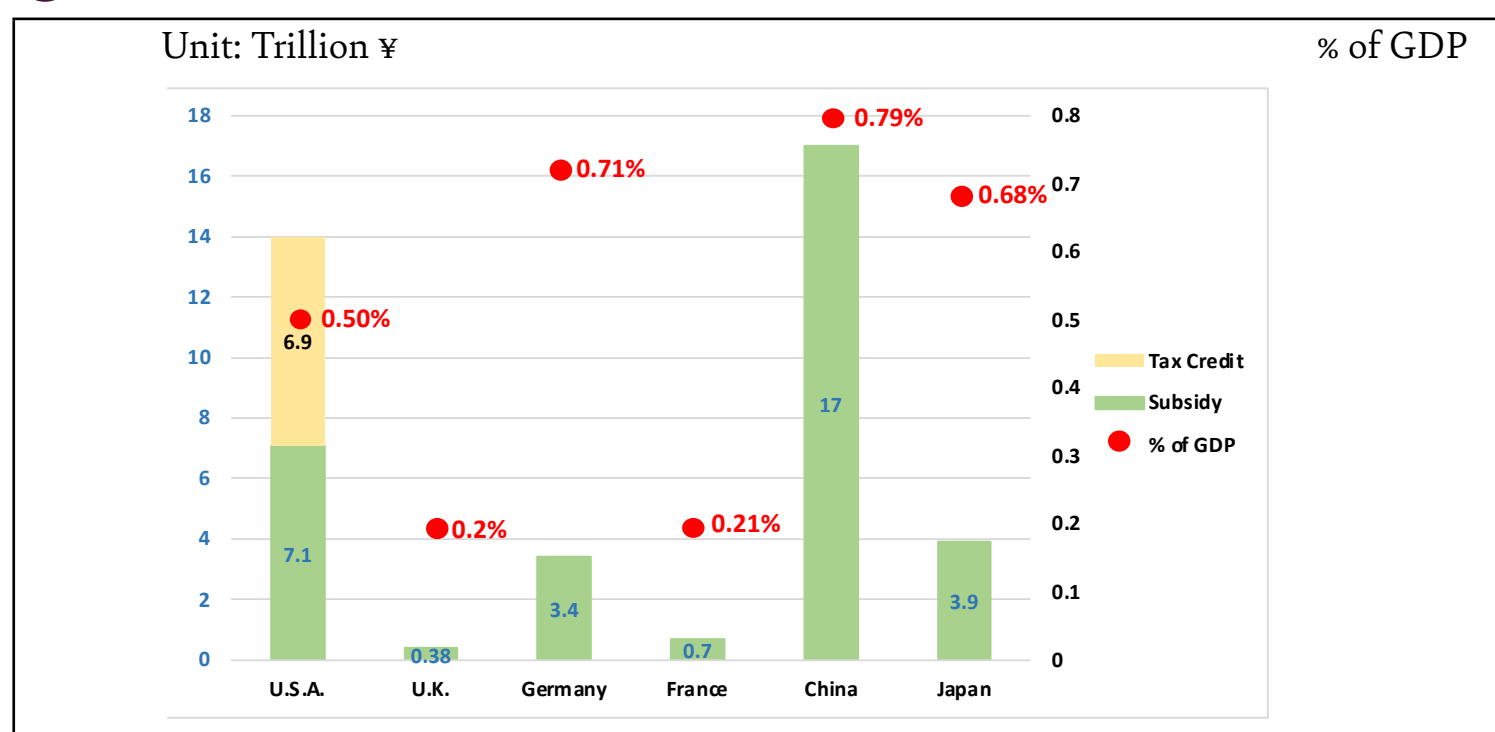
Guidance	Target	¥ 15 trillion (US\$ 112.55 billion) in semiconductor sales by 2030.
	Policy	Strategy for Semiconductors and the Digital Industry (launched in 2021, revised in 2023) - Jointly develop cutting-edge semiconductor manufacturing technology and securing sufficient production capability - Accelerate digital investment and strengthen the design and development of cutting-edge logic semiconductors - Promote green innovation - Strengthen portfolio of the domestic semiconductor industry and enhance its resilience - Strengthen efforts to develop and produce advanced semiconductors critical for economic security measures and advanced technology like generative AI
Measures	Key Incentive Amounts	¥ 3.9 trillion (US\$ 25.7 billion) in subsidies (does not include subsidies by local governments)
	Key Initiatives	‘Specified critical materials’ designation for semiconductors - Acquisition of JSR by Japan Investment Corporation (JIC) to promote the consolidation of the semiconductor materials sector - National fiscal funding - R&D: Leading-Edge Semiconductor Technology Center

Outcome	Key Investments To Boost Domestic Production	• Rapidus: ¥ 920 billion (US\$ 6.1 billion) subsidy for buying chipmaking equipment and developing advanced back-end chipmaking processes. • TSMC: ¥ 476 billion (US\$ 3.3 billion) subsidy for TSMC's Kumamoto factory, a joint venture named Japan Advanced Semiconductor Manufacturing Inc. (JASM), ¥732 billion (US\$ 4.9 billion) subsidy for TSMC's Kumamoto Fab 2 • Kioxia Holdings Corporation: ¥ 243 billion yen (US\$ 1.64 billion) subsidy for Kioxia's Yokkaichi and Kitakami plants to mass produce cutting-edge chips. • Micron: ¥ 192 billion (US\$ 1.3 billion) for Micron's production of next-generation chips at its Hiroshima plant. • ROHM and Toshiba Electronic Devices & Storage: up to ¥ 129.4 billion (US\$ 900 million) subsidy, or a third of the total investment, for ROHM and Toshiba to jointly produce power chips.

On December 20, 2022, Japan designated semiconductors among eleven categories of “specified critical materials” under the Act on the Promotion of Economic Security, which subsidizes large-scale equipment investments above ¥ 30 billion. The clearest illustration of this direction was the acquisition of JSR Corporation by the state-backed Japan Investment Corporation, which took more than 84% of the shares in a tender offer worth about ¥ 900 billion (US\$ 6.5 billion) in spring 2024. JSR holds roughly 30% of the global photoresist market, so the purchase consolidated national control over a stage of production in which Japan already led.

METI reports that Japanese public financing for the sector is broadly comparable to that of the United States, Germany and China as a share of GDP: Japan has provided more than ¥ 3.9 trillion (about US\$ 28–29 billion), equivalent to 0.68% of GDP, against 0.79% for China, 0.71% for Germany and 0.50% for the United States (see Figure 31).

Figure 31. Government Investments in Domestic Semiconductor Industry



Note:

1. With regards to GDP, METI used real figures, which excludes changes in price fluctuations.
2. METI included preferential taxation treatments into its calculations of subsidies. The U.S. CHIPS Act provides tax credits of up to 25% for investments in semiconductor and manufacturing equipment. Japan's strategic tax system does not allow the application of subsidies and tax systems to the same investment plan, while the US CHIPS Act allows the overlapping application of subsidies (5-15%) and tax systems (25%).

Source: METI website (in Japanese), "Semiconductor and Digital Industry Strategy," May 31, 2024, p. 79.

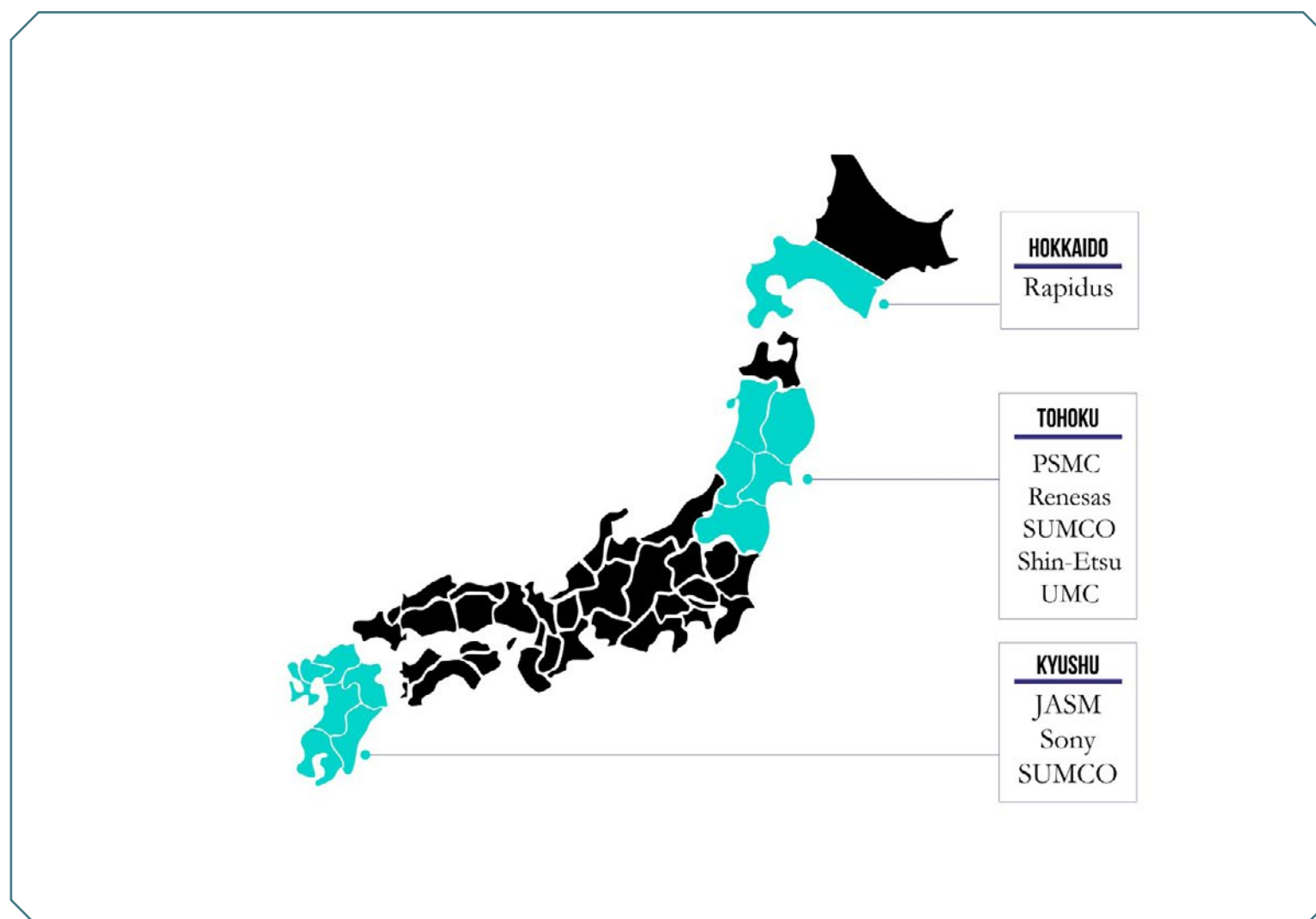
To further expand domestic semiconductor production, the Japanese government has indicated that it will subsidize up to one-third of the capital expenditures incurred by both domestic and foreign manufacturers producing designated semiconductor devices—such as power semiconductors, microcontrollers, and analog chips—as well as related equipment, materials, and raw inputs. By 2026, the Japanese government's support entered an "emergency foundation strengthening" phase. Under the Economic Security Promotion Act, facilities receiving subsidies for "specified semiconductors" are now required to commit to over 10 years of domestic production, prioritize domestic supply during global crunches, and implement strict cybersecurity measures to prevent core technology leaks. To ensure supply chain resilience, METI has institutionalized support not only for wafer fabs but also for semiconductor manufacturing equipment, critical materials, and essential raw gases like Helium and Neon.

Japanese companies have responded in scale. Rapidus aims to produce 2 nm chips in Hokkaido from 2027; Kioxia is expanding advanced flash memory development and production at Yokkaichi and Kitakami; and Toshiba and Rohm are jointly investing ¥ 388.3 billion (US\$ 2.7 billion) in power semiconductors with subsidies of up to ¥ 129.4 billion. Foreign firms have followed: Micron's Hiroshima plant received a ¥ 46.5 billion subsidy in 2022 and up to ¥ 192 billion more in October 2023, and the company announced a ¥ 500 billion investment to introduce EUV equipment there, while Samsung is set to receive up to ¥ 20 billion for an advanced R&D facility in Yokohama.

Policy has placed equal emphasis on research. The government established the Leading-Edge Semiconductor Technology Center, modeled in part on the U.S. National Semiconductor Technology Center and chaired by Rapidus chairman Tetsuro Higashi, to bring research institutes and universities together on R&D while Rapidus focuses on commercialization. Tokyo has committed ¥ 920 billion (US\$ 6.1 billion) to Rapidus—a joint venture involving Sony, Toyota, IBM and others—whose Hokkaido fab carries total project costs estimated at ¥ 5 trillion, with loan guarantees planned to help secure bank financing.

With Rapidus, TSMC, UMC and PSMC all present, TrendForce identifies three emerging semiconductor hubs. Hokkaido, home to Rapidus, is expected to anchor a new advanced-node ecosystem in the north. Tohoku hosts Renesas' Yonezawa plant and the wafer producers SUMCO and Shin-Etsu, making it the heart of Japan's materials industry, alongside UMC's United Semiconductor Japan Corporation and a PSMC 12-inch fab announced for Sendai in October 2023. Kyushu hosts JASM, Sony and SUMCO within a dense network of smaller suppliers (see Figure 32).

Figure 32. Three Emerging Regional Semiconductor Bases in Japan



Source: Press Release: “Japan Flexes Its Advantages in Semiconductor Upstream Equipment and Raw Materials, and Unveils Strategic Progress of Key Players in Kyushu, Tohoku, and Hokkaido, Says TrendForce,” TrendForce, October 31, 2023.

5. Updates in 2025-2026 and Prospects

Japan’s State-Led Industrial Rebuild

Japan has elevated semiconductors to the center of its economic security agenda in 2025, defining the sector as essential infrastructure for national resilience. METI’s Semiconductor and Digital Industry Strategy—first released in 2021 and updated in 2023—sets an ambitious goal of tripling domestic semiconductor revenue from roughly ¥ 5 trillion (US\$ 45.5 billion) in 2020 to over ¥ 15 trillion (US\$ 136.4 billion) by 2030. To advance this agenda, in November 2025, the government approved an additional ¥ 252.5 billion (about US\$ 1.61 billion) specifically for strengthening AI and semiconductor infrastructure, marking a transition from “emergency” measures to a permanent system of strategic support.

The 2022 Economic Security Promotion Act further institutionalized this shift by designating semiconductors as “specified critical materials,” empowering the government to deploy subsidies, preferential financing, and regulatory tools to stabilize domestic production. Together, these policies aim to reinforce Japan’s capabilities across both mature and leading-edge manufacturing, while expanding next-generation R&D as the foundation for long-term technological autonomy.

Under this framework, Japan is channeling unprecedented public resources into rebuilding its semiconductor ecosystem. Between 2021 and 2023, Tokyo allocated approximately ¥ 3.9 trillion (approximately US\$ 28-29 billion)—0.68% of GDP—to semiconductor support, a proportion exceeding that of comparable U.S. or European initiatives. Total government assistance is expected to approach ¥ 10 trillion (about US\$ 66.7 billion) by 2030. A substantial portion of this funding is dedicated to attracting global chipmakers: Japan has committed over ¥ 1 trillion (US\$ 6.67 billion) of subsidy to TSMC’s two new fabs in Kumamoto, with the first 22/28 nm facility subsidized at roughly ¥ 476 billion (US\$ 3.17 billion) and the second 6 nm fab—scheduled for 2027—receiving up to ¥ 732 billion (US\$ 4.88 billion).

Japan’s policy ambition expanded dramatically in 2026. Prime Minister Sanae Takaichi, reappointed after the Liberal Democratic Party’s February 2026 election victory, unveiled a fourteen-year economic growth strategy targeting ¥ 370 trillion (US\$ 2.3 trillion) in combined public and private investment by 2040, spanning seventeen strategic sectors across artificial intelligence, semiconductors, and space. Within that envelope, AI systems, semiconductor manufacturing, and advanced digital infrastructure alone are earmarked for more than US\$ 600 billion, and the strategy sets the explicit goal of quintupling domestic chip sales by 2040. The roadmap marks the point at which Japanese chip policy moved from a sequence of emergency subsidies to a long-horizon national investment program, and it is accompanied by a corresponding shift in the government’s posture from funder to owner (see Table 36).

Table 36. Japan’s ¥ 370 Trillion National Investment Roadmap by Sector: to 2040

Sector / Focus Area	Description	Projected Investment (¥)	Projected Investment (US\$)
Physical AI	Technology enabling robots and devices to operate autonomously	¥ 10.5 trillion	US\$ 66.0 billion
Self-driving technology	Autonomous driving technology	¥ 8.2 trillion	US\$ 51.6 billion
Data centers and storage batteries	Projected investment by fiscal 2035	¥ 32.7 trillion	US\$ 205.7 billion
Content – games	Major focus area within the content industry by fiscal 2033	¥ 24.5 trillion	US\$ 154.1 billion
Content – media and entertainment	Anime, manga, music, and film (total content sector about ¥ 30 trillion)	¥ 1.3–3.3 trillion	US\$ 8.2–20.8 billion
Biopharmaceuticals and regenerative medicine	Advanced medical technology and therapeutics	¥ 20.8 trillion	US\$ 130.8 billion
Nuclear fusion	Clean-energy research and technological development	¥ 3.0 trillion	US\$ 18.9 billion

Source: Japan’s fourteen-year economic growth strategy announced in 2026; government statements and media reports.

Dual-Track Manufacturing and Ecosystem Reconstruction

TSMC’s presence in Kumamoto has become the ballast of Japan’s current production capacity, complementing Rapidus’s future-oriented ambitions. JASM Fab 1 entered stable mass production in 2025 supplying 12–28 nm chips for Sony’s image sensors and Denso’s automotive electronics, while Fab 2, originally planned for 6–12 nm, was subsequently upgraded to 3 nm with mass production now expected around 2028. Domestic players receive comparable backing: Rapidus has secured roughly ¥ 920 billion for 2 nm R&D, Micron up to ¥ 536 billion and Kioxia ¥ 150 billion for capacity upgrading, while Sony, Mitsubishi Electric and Rohm plan a further ¥ 5 trillion of private capital through 2029.

Acknowledging that it cannot compete on volume with Taiwan or South Korea, Rapidus has adopted a “speed as a service” model aimed at shortening production cycles from an industry standard of around 120 days to 50, focusing on high-value, small-batch chips for AI and high-performance computing (see Table 37).

Table 37. Progress of Semiconductor Investment and Production in Japan: 2026

Company / Project	Technology / Node	Status & Milestones
TSMC (JASM Fab 1)	12–28 nm	Recorded its first-ever quarterly profit in 1Q 2026, about US\$ 30 million, on improving utilization; supplying Sony and Denso.
TSMC (JASM Fab 2)	3 nm (upgraded from 6–12 nm)	Investment raised to roughly US\$ 17 billion (¥ 2.6 trillion) for 15,000 wafers per month; equipment installation and mass production now expected around 2028. Japan’s first 3 nm wafer fab.
Rapidus (IIM-1, Chitose)	2 nm (GAA architecture)	Working 2 nm GAA transistors achieved July 2025; Canon confirmed as first major domestic customer candidate in March 2026; customer-designed test chips targeted for late 2026; 2 nm-class production from 2H FY2027 and full-scale production in 2028.
Micron (Higashi-Hiroshima)	HBM and 1-gamma DRAM (EUV)	¥ 1.5 trillion (US\$ 9.3 billion) expansion broke ground July 4, 2026, backed by up to ¥ 775 billion in government support; shipments targeted for summer 2028.
Kioxia	NAND flash memory	Operating profit of US\$ 11.78 billion forecast for 2Q 2026; shares up about 2,000% over one year, briefly making it Japan’s most valuable listed company.
Sony, Mitsubishi Electric, Rohm	Specialized chips and sensors	Additional private capital investment of about ¥ 5 trillion planned through 2029.
Intel and Hitachi	Foundry equipment and quantum computing	Partnership highlighted at Computex 2026, alongside collaborations with Foxconn and Siemens.

Japan is also leveraging its global dominance in semiconductor materials—where it commands 50–90% of the market in several essential categories—to accelerate breakthroughs in advanced packaging

and chip integration. R&D hubs such as the LSTC are developing chiplet-based architectures aligned with national priorities in AI, data centers, autonomous mobility, and 5G/6G. Collectively, these initiatives underpin Japan’s attempt to re-enter the high-performance semiconductor arena.

As of spring 2026 Rapidus entered a decisive validation phase at IIM-1 in Chitose, aiming to launch its “Rapi-Service” by late 2026 to provide global clients with 2 nm test chip design and production validation. It has completed a 9,000-square-meter back-end R&D facility for chiplet integration and high-bandwidth memory, and in March 2026 Canon announced a partnership to co-develop 2 nm image processing chips supported by a ¥ 40 billion NEDO subsidy.

Rapidus’s capital structure was transformed over 2026, and with it the role of the state. On February 27, 2026, the company closed a ¥ 267.6 billion (US\$ 1.7 billion) round combining ¥ 100 billion from the government with ¥ 167.6 billion from thirty-two private firms including Canon, Fujitsu, NTT, SoftBank and Sony, making the government its largest shareholder with an 11.5% voting stake and a “golden share” veto—an approach closely paralleling the equity positions Washington has taken in its own strategic semiconductor investments. METI approved a further ¥ 631.5 billion in R&D subsidies on April 11, lifting cumulative government R&D support to roughly ¥ 2.35 trillion; a ¥ 150 billion equity injection followed on June 5; and on August 21 METI signaled a further ¥ 150 billion request in the fiscal 2027 budget. By fiscal 2027 total government support is projected to reach approximately ¥ 3 trillion (US\$ 18.8 billion) (see Table 38).

Table 38. Rapidus Funding and Government Support: 2026

Date	Category	Funding (¥)	Funding (US\$)
February 27, 2026	Combined government and private round: government (IPA) ¥ 100 billion plus ¥ 167.6 billion from 32 private firms	¥ 267.6 billion	US\$ 1.7 billion
April 11, 2026	METI R&D subsidy approval; cumulative government R&D support reaches ¥ 2.35 trillion	¥ 631.5 billion	US\$ 4.0 billion
June 5, 2026	Government equity, round 2 (IPA); cumulative government equity reaches ¥ 250 billion and total equity raised ¥ 424.95 billion	¥ 150 billion	US\$ 943 million
August 21, 2026	FY2027 budget request, round 3 (IPA), to strengthen the capital base and encourage bank lending	¥ 150 billion	US\$ 944 million
Projected by FY2027	Total government support (equity and subsidies combined)	¥ 3 trillion	US\$ 18.8 billion

Source: Rapidus and METI announcements, February–August 2026; compiled by the author.

Technically, Rapidus has moved from prototype to validation. The first working 2 nm gate-all-around transistors were produced on the IIM-1 pilot line in July 2025 and device measurements through early 2026 met their planned electrical characteristics; Canon was confirmed in March 2026 as the first major domestic customer candidate, and customer-designed 2 nm test chips are targeted for late 2026. Under a revised plan filed with METI, 2 nm-class production begins in the second half of fiscal 2027, full-scale production in 2028 and a ramp to 25,000 wafer starts per month within a year, with operating profitability targeted for fiscal 2030 and an IPO for fiscal 2031; a 1.4 nm node is planned without a fixed date and total investment is expected to exceed ¥ 7 trillion. Rapidus is also co-developing large-language-model-based chip design tools and collaborating with NVIDIA on GPU-accelerated computational lithography.

The Kumamoto complex, meanwhile, illustrates how quickly the AI cycle can rewrite industrial plans. Fab 1, producing at 12, 16, 22, and 28 nanometers, recorded its first-ever quarterly profit in the first quarter of 2026—approximately US\$ 30 million—as utilization improved. Fab 2, originally planned for 6–12-nanometer production at a cost of US\$ 12.2 billion, was upgraded to 3 nanometers in response to AI demand, making it Japan’s first 3-nanometer wafer fab; total investment rose to roughly US\$ 17 billion (¥ 2.6 trillion) for a planned capacity of 15,000 wafers per month, with equipment installation and mass production now expected around 2028. Combined investment across the two fabs exceeds US\$ 20 billion, making JASM the largest foreign semiconductor investment in Japan’s history.

Japan’s memory sector expanded on a comparable scale. On July 4, 2026, Micron broke ground on a ¥ 1.5 trillion (US\$ 9.3 billion) expansion at its Higashi-Hiroshima site dedicated to high-bandwidth memory, backed by up to ¥ 775 billion in Japanese government support, with shipments targeted for the summer of 2028. Kioxia became the clearest financial beneficiary of the memory boom: its shares gained roughly 2,000 percent over one year, briefly making it Japan’s most valuable listed company ahead of Toyota, and the company forecast an operating profit of US\$ 11.78 billion for the second quarter of 2026.

Japanese firms are also re-entering advanced-process partnerships as principals rather than as suppliers. At Computex 2026, Intel highlighted a partnership with Hitachi covering foundry equipment and quantum computing, alongside collaborations with Foxconn and Siemens—part of a broader pattern in which Japanese companies are becoming indispensable partners in leading-edge process development rather than purely materials and equipment vendors (see Table 37).

Strategic Alignment and Structural Constraints

Japan’s strategy is deeply intertwined with geopolitics. Working with the United States and the Netherlands, Tokyo tightened export controls on advanced equipment through a 2023 package restricting 23 categories of tools; formally country-neutral, the measures primarily affected exports to China. At the same time Japan has deepened cooperation with trusted partners—the U.S.-led “Fab 4” grouping with Taiwan and South Korea, joint R&D linking the LSTC and the U.S. NSTC, and partnerships with Imec, the EU and the UK—in a deliberate friend-shoring strategy that anchors advanced R&D with the West while partnering in manufacturing with Taiwan and others.

The constraints are structural. Foremost is talent: decades of contraction have left a limited pool of

semiconductor engineers, and Rapidus has had to send more than a hundred engineers to IBM in the United States for intensive training, while Kyushu alone will need tens of thousands of skilled workers over the coming decade. Cost competitiveness is a second hurdle, with leading-edge fabs requiring investment approaching ¥ 5 trillion against scale disadvantages relative to Taiwan and South Korea. Energy is a third: semiconductor production consumes large amounts of power and Japan has limited supply, expensive green electricity supply threatens the cost margins of domestic fabs. Additionally, Japan remains dependent on Chinese processing for several rare earth materials essential to chipmaking equipment.

Externally, Japan navigated the tariff negotiations of 2025 skillfully. Leveraging its near-monopoly in upstream materials and key equipment—photoresists and coating and developing tools among them—it positioned itself as indispensable to U.S. CHIPS Act objectives, securing critical tariff exemptions and safeguards for Japanese semiconductor products under the U.S.–Japan Strategic Trade and Investment Agreement of July 2025. In return Japan agreed to tighten export controls targeting China, including stricter oversight of high-end photoresist shipments—forgoing some short-term commercial interest for deeper integration with the Western technology alliance.

Geopolitical realignments in early 2026 further integrated Japan into a trilateral semiconductor stronghold. Following the January 2026 US-Taiwan trade agreement, which mandated greater supply chain localization, hundreds of Taiwanese SME suppliers accelerated their decentralization by clustering around TSMC’s Kumamoto plant. Japan serves as a favored “buffer zone” due to its cultural compatibility, efficient infrastructure, and government efficiency. However, Japan faces profound structural challenges: acute talent shortages have reached a critical point in 2026, forcing the industry to heavily rely on cross-border technology transfers and the recruitment of Taiwanese engineers to sustain its rapid capacity expansion.

Looking ahead, the principal uncertainties are commercial rather than technical. Rapidus must demonstrate a durable customer pipeline beyond Canon even as government funding continues to arrive; TSMC’s decision to convert Fab 2 to 3 nanometers raises the technical bar well above the original mature-node plan; and memory valuations, however spectacular in 2026, rest on a shortage whose persistence is far from assured.

VII. The Korean Semiconductor Industry

1. Korea in the Global Semiconductor Value Chain

From the same BCG report of May 2024, South Korea (Korea) accounted for approximately 12% of the global semiconductor value chain, a share comparable to that of Japan. By contrast, the United States remained the dominant player, capturing 38% of global semiconductor value-chain value in 2022. The European Union, Taiwan, and China followed, each holding roughly 11% of the global share in the same year.

At a structural level, the Korean semiconductor model is anchored in integrated device manufacturers (IDMs), in contrast to the U.S.–Taiwan division of labor, where the United States leads in chip design while Taiwan specializes in foundry manufacturing and outsourced semiconductor assembly and testing (OSAT). A further competitive advantage of the Korean ecosystem lies in its robust assembly, testing, and packaging (ATP) capabilities, which are predominantly integrated in-house rather than outsourced.

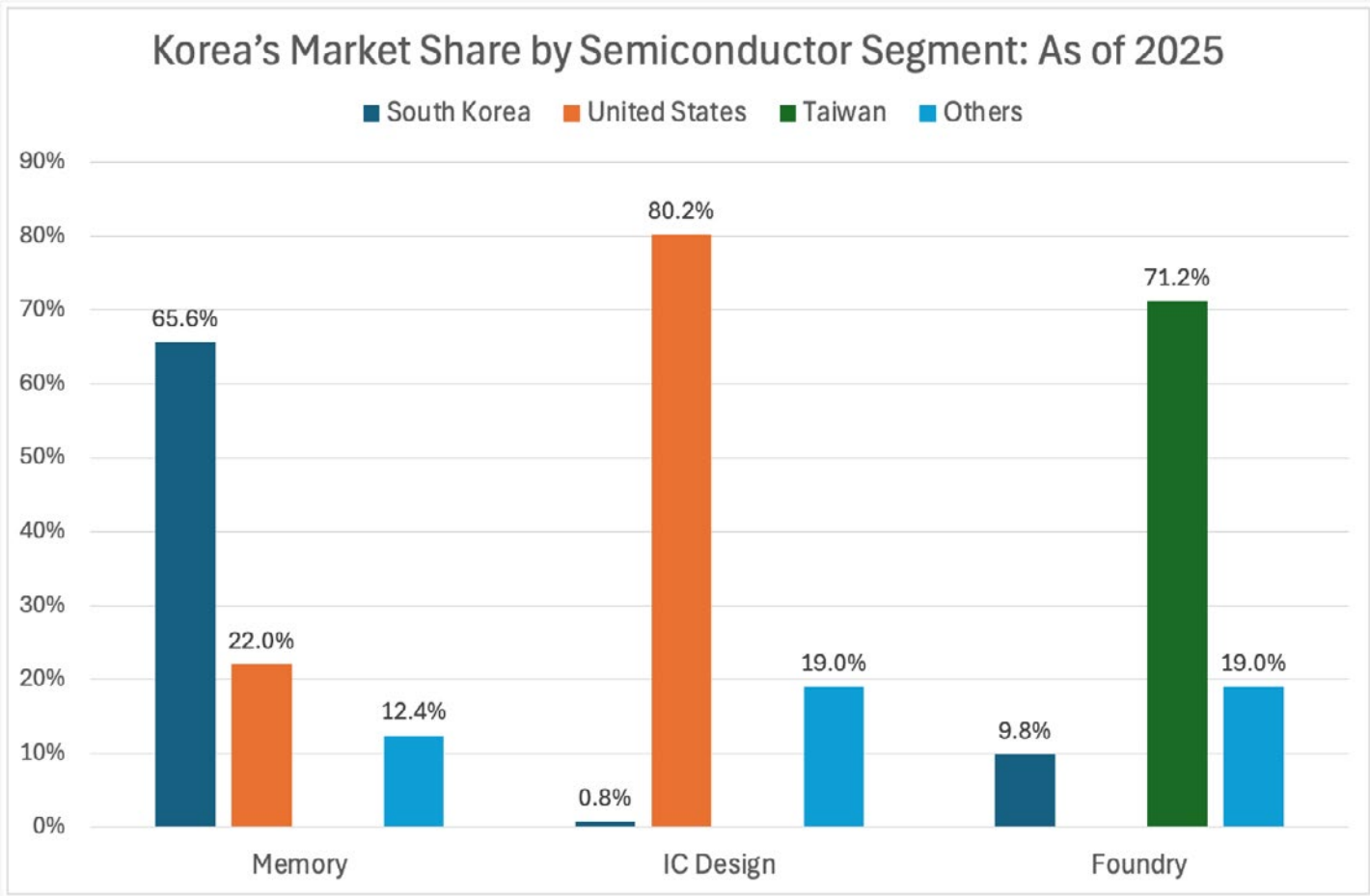
Another critical node in the global semiconductor value chain is Korea's ATP infrastructure. While South Korea is not the world's largest OSAT hub—a distinction held by Taiwan, China, and Malaysia—it is a global leader in advanced memory and AI-related packaging. In particular, Korea excels in HBM packaging, 2.5D and 3D stacking, through-silicon via (TSV) technologies, and chiplet-adjacent integration capabilities.

According to The Chosun Daily, South Korea remains the undisputed global leader in memory semiconductors, commanding 65.6% of global market share as of 2025. This dominance reflects decades of accumulated advantages in DRAM and NAND flash production, including economies of scale, high manufacturing yields, and deep integration with downstream electronics industries. Memory, therefore, continues to serve as the cornerstone of Korea's semiconductor sector.

By contrast, in integrated circuit (IC) design—the segment that increasingly captures value in the AI era—South Korea accounts for only 0.8% of the global market, while the United States dominates with 80.2%. This stark disparity underscores a structural weakness in high-value chip architecture, system design, and platform-level innovation, precisely the domains that are becoming decisive as the semiconductor industry shifts from volume-driven manufacturing toward intelligence-driven competition.

In foundry manufacturing, Korea remains a secondary but still significant player, holding 9.8% of global market share, well behind Taiwan's commanding 71.2%. Although Korean firms possess advanced process technologies, they have yet to match Taiwan's ecosystem depth, customer trust, and scale in pure-play contract manufacturing (see Figure 33).

Figure 33. Korea’s Market Share by Semiconductor Segment: As of 2025



Source: Park Soon-chan and Kim Tae-jun, “Government Invests 700 Trillion Won in Semiconductors,” The Chosun Daily, December 11, 2025.

2. Korea’s Share of the Global Semiconductor Market

Semiconductor Vendors

The performance of Korean semiconductor vendors in 2023–2024 reflected a clear, memory-led rebound accompanied by a sharp rise in global market presence. In 2023, Samsung Electronics and SK hynix were still constrained by a severe memory downturn. Their combined revenue reached US\$ 63.9 billion, and their global market share remained subdued despite Samsung’s continued status as a top-tier chipmaker and SK hynix’s gradual emergence from the trough of the memory cycle.

At the firm level, Samsung Electronics generated US\$ 65.7 billion in semiconductor revenue in 2024, achieving 60.8% annual growth and capturing 10.0% of the global market, ranking second worldwide. SK hynix posted an even stronger rebound, with revenue reaching US\$ 44.2 billion, up 91.5% year-over-year, raising its global share to 6.7% and securing fourth place. Together, the two firms constituted the largest national bloc among the world’s top ten semiconductor vendors in terms of combined market share (see Table 39).

Table 39. Korea's Top Semiconductor Vendors by Revenue and Market Share: 2023-2024

Unit: US\$ million

2024 Rank	2023 Rank	Vendor	2024 Revenue	2024 Market Share (%)	2023 Revenue	2024-2023 Growth (%)
2	2	Samsung Electronics	65,697	10.0	40,868	60.8
4	6	SK hynix	44,186	6.7	23,077	91.5
Korean Vendors			109,883	16.7	63,945	71.8

Source: Gartner, "Gartner Says Worldwide Semiconductor Revenue Grew 21% in 2024," April 10, 2025.

Foundry Share

In the foundry segment, Samsung held a relatively strong 16.0% share of global foundry revenue in 2022, firmly positioning South Korea as the second-largest player after TSMC. However, this share declined to 12.0% in 2023, fell further to 9.4% in 2024, and dropped sharply to 7.2% in 2025.

In contrast to TSMC's rapid expansion and increasing dominance, Korea's foundry position has shifted from that of a strong challenger to a more distant second tier, with its market share now only marginally higher than those of SMIC, UMC, and GlobalFoundries. The data suggest that Korea's influence in the global foundry landscape is not only contracting but also becoming increasingly vulnerable to mid-tier competitors, unless strategic realignment or technological breakthroughs alter the current trajectory (see Table 40).

Table 40. Market Share of Global Top 5 Foundries by Revenue: 2022-2025

Ranking	Company	Market Share			
		2025	2024	2023	2022
1	TSMC	69.9%	64.4%	58.9%	55.4%
2	Samsung	7.2%	9.4%	12.0%	16.0%
3	SMIC	5.3%	5.7%	5.4%	5.3%
4	UMC	4.4%	5.2%	6.1%	6.8%
5	GlobalFoundries	3.9%	4.8%	6.3%	6.0%

Source: Raw data are from TrendForce press releases; yearly market shares are calculated by the author

Advanced Manufacturing

Korea's 2029 outlook reveals a constrained expansion at the leading edge, driven almost solely by

Samsung Foundry. South Korea is projected to account for about 11% of global sub-6 nm capacity by 2029, remaining within the small group of countries capable of producing at advanced logic nodes, with its strongest position at 3 nm, where Samsung is expected to hold roughly 23% of global capacity. The picture is technically credible and strategically targeted but structurally limited by scale: Korea continues to invest at the frontier while prioritizing technological depth and long-term competitiveness over aggressive capacity expansion (see Figures 20 and 21).

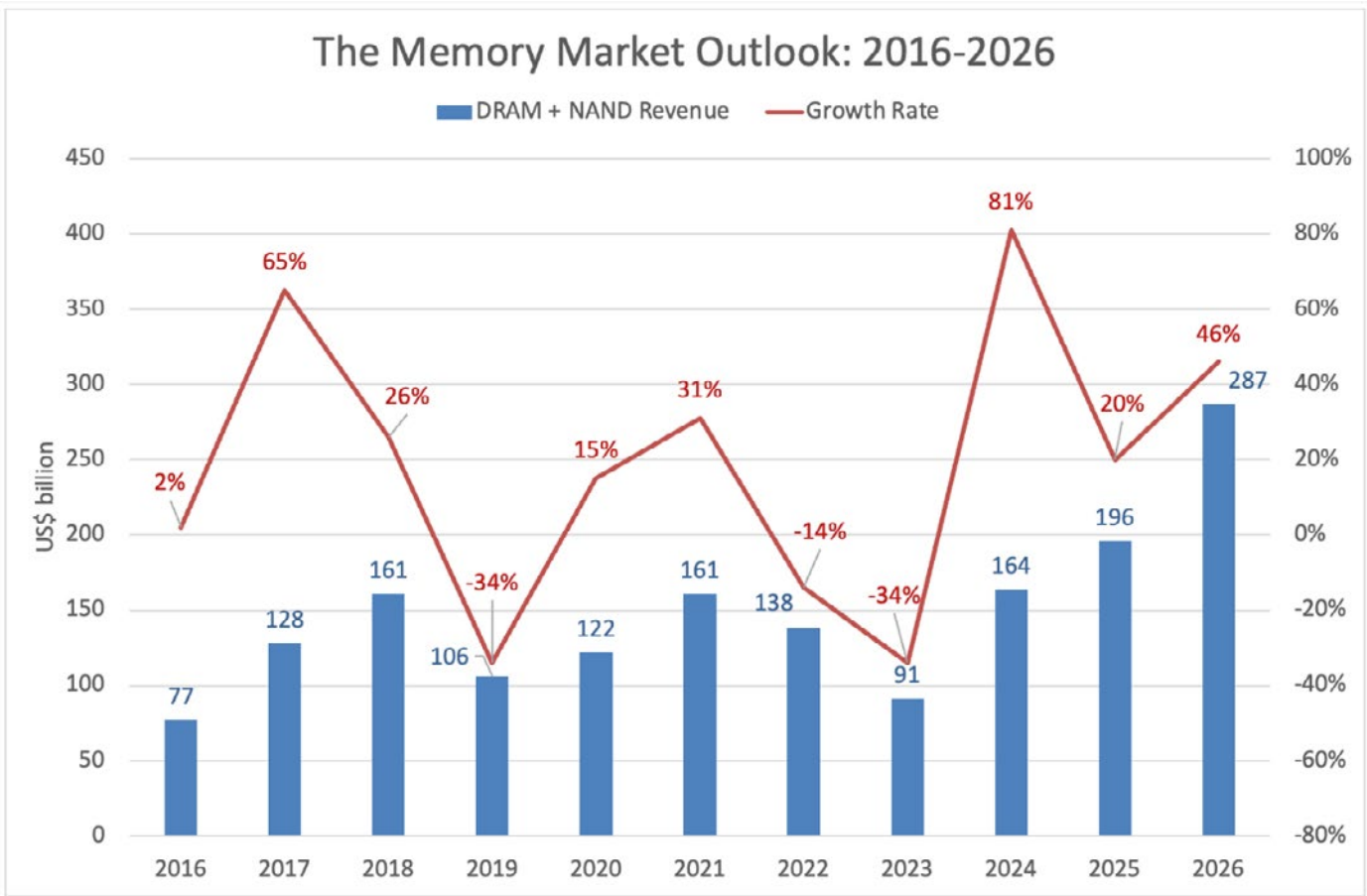
Memory Chip Dominance

Memory chips, particularly DRAM and NAND, have consistently accounted for a very high share of Korea’s semiconductor production, while system and logic (non-memory) semiconductors have remained a comparatively smaller segment. Against this backdrop, the development of Korea’s memory market over the past decade reads less like a straight line and more like a dramatic novel, complete with sharp twists, sudden reversals, and an unmistakable upward ending.

Between 2016 and 2026, combined DRAM and NAND revenue is projected to rise from about US\$ 77 billion in 2016 to a forecasted US\$ 287 billion by 2026, implying almost a fourfold expansion in market size. This long-term increase firmly anchors Korea at the core of the global memory industry.

Looking ahead, growth moderates but remains solid, with revenues rising to a forecasted US\$ 196 billion in 2025 and a forecasted US\$ 287 billion in 2026, corresponding to growth rates of 20% and 46%. (see Figure 34).

Figure 34. The Memory Market Outlook: 2016-2026



Source: TechInsights, “5 Expectations for the Memory Markets in 2026,” October 30, 2025.

However, the industry is currently experiencing a severe shortage driven by the explosive growth of AI applications. Starting in the second half of 2025, the DRAM and NAND flash markets have faced severe supply constraints that are expected to last until 2027. According to IDC, supply growth for DRAM and NAND in 2026 will be limited to 16% and 17% respectively, far below historical averages, as capacity expansion fails to keep pace with demand.

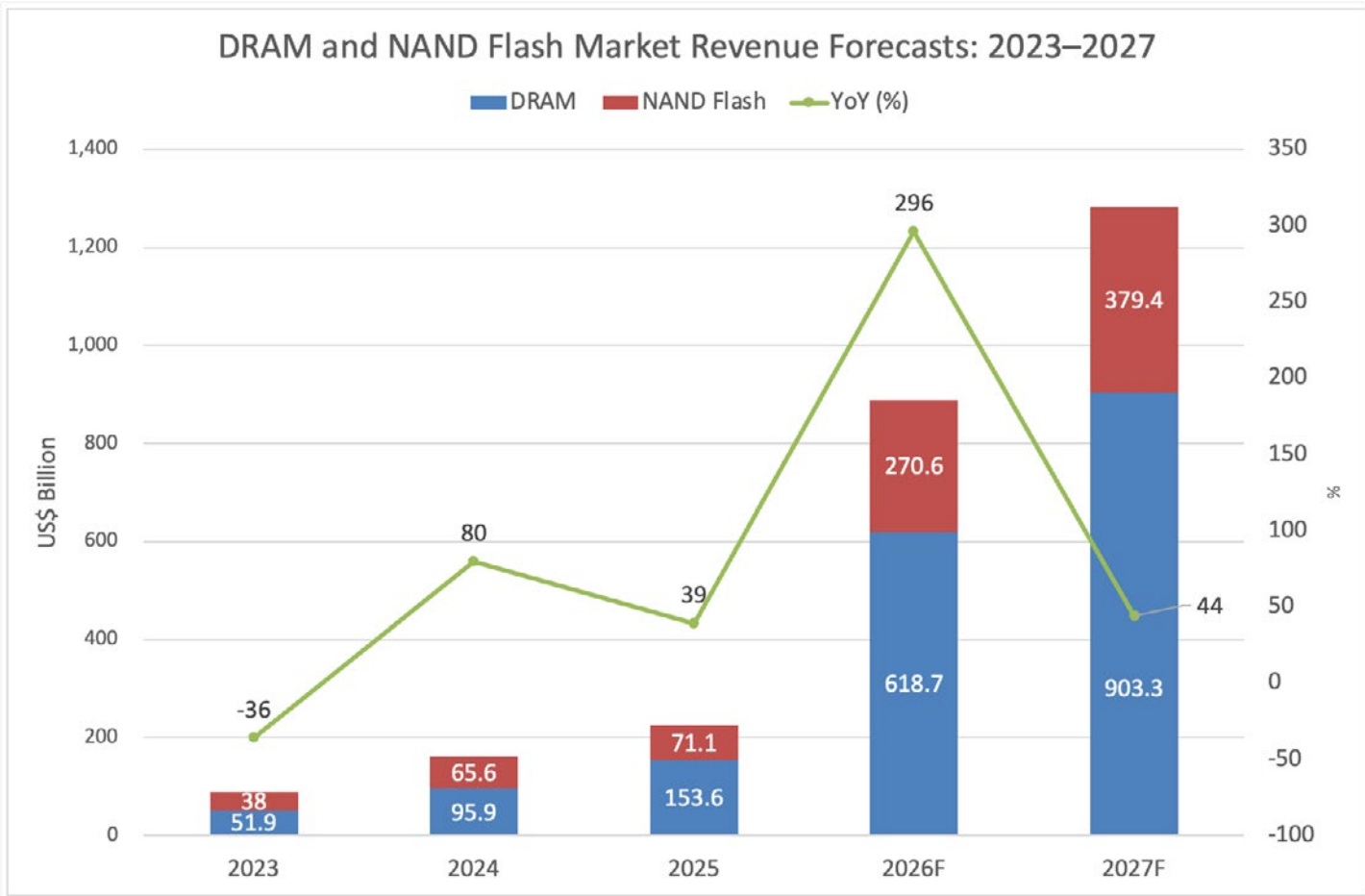
Furthermore, TrendForce's latest research released in May 2026 highlights that Agentic AI-driven innovation is fundamentally reshaping the memory industry. Surging data-access requirements from continuous iterative cycles in Agentic AI systems and expanding context windows are accelerating structural demand growth. As a result, the global memory market is projected to reach an unprecedented US\$ 889.3 billion in 2026 and further expand to more than US\$ 1.28 trillion in 2027, representing a robust 44% year-on-year increase.

Within this expansion cycle, the DRAM segment stands out. After generating US\$ 165.7 billion in 2025, DRAM contract prices surged by 53–58% quarter-on-quarter in the fourth quarter of last year and are expected to rise by more than 60% in the first quarter of 2026. This strong pricing environment, coupled with robust demand for DDR5, growing wafer consumption associated with HBM production that compresses conventional DRAM capacity, and rising CPU deployment in AI servers (with CPU-to-GPU ratios shifting from 1:8 toward 1:4 or 1:2), could propel DRAM revenue to US\$ 618.7 billion in 2026, marking a remarkable 303% year-on-year increase, and expanding further to US\$ 903.3 billion in 2027.

The NAND Flash market is also poised for substantial growth. Facing massive and continuously rising memory demand, HBM remains too costly for broad deployment at scale, while HDDs are constrained by access speed, making them unsuitable for real-time AI workloads. This dynamic is creating significant growth opportunities for NAND solutions, such as SCM SSDs, HBF, and SLC/pSLC SSDs, which are rapidly penetrating AI inference and agentic workloads.

TrendForce has therefore revised its forecast upward, now projecting overall NAND Flash revenue to reach US\$ 270.6 billion in 2026, representing an annual growth of 280.7%, and to further expand to nearly US\$ 379.4 billion in 2027. According to TrendForce's May 2026 release, the AI-fueled supercycle is propelling the memory market to a record US\$ 889.3 billion by 2026, a scale that will more than double the global wafer foundry market (projected at US\$ 218.7 billion) (See Figure 35).

Figure 35. DRAM and NAND Flash Market Revenue Forecasts: 2023–2027



Source: TrendForce, “Agentic AI Drives Structural Expansion in Memory Demand, Global Memory Market Projected to Reach US\$1.28 Trillion by 2027, Says TrendForce,” May 29, 2026.

According to TrendForce’s February 2026 release, the AI-fueled supercycle is propelling the memory market to a record US\$ 551.6 billion by 2026, a scale that will more than double the global wafer foundry market (projected at US\$ 218.7 billion). This new memory supercycle is structurally tighter and possesses far stronger pricing power than the 2017–2019 period. A key driver is that current procurement is dominated by Cloud Service Providers (CSPs), whose exponential volume growth and lower price sensitivity have enabled record-high price increases.

DRAM Market Share

Korea occupies a structurally dominant position in the global memory market, particularly in DRAM and, to a slightly lesser extent, NAND flash. The dominance is sustained rather than episodic, reflecting deep technological capability, scale and strategic specialization by Samsung Electronics and SK hynix. Between 2020 and 2024 Korean vendors consistently held around 71–76% of the global DRAM market, peaking at 76.0% in 2024, with SK hynix strengthening its position from 29.3% to 34.2% over the period (see Table 41).

Table 41. Korea’s DRAM Market Share: 2020-2025

Year	Korean Vendors Total	Samsung Electronics	SK hynix
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2020	72.1%	42.8%	29.3%
2021	71.5%	43.0%	28.5%
2022	71.0%	43.2%	27.8%
2023	72.2%	42.0%	30.2%
2024	76.0%	41.8%	34.2%
3Qs 2025	69.0%	33.0%	36.0%

Note: TrendForce only provides quarterly data; the author therefore uses the four-quarter average of market share as a proxy for the full-year data.

Source: TrendForce, Press Releases.

The most recent data, covering late 2024 through the third quarter of 2025, point to a more dynamic phase. Korea's combined DRAM share eased from around 73% in Q3–Q4 2024 to about 67% by Q3 2025, reflecting intensifying competition and some capacity expansion by non-Korean producers.

However, this leadership shifted again in the fourth quarter of 2025. Driven by CSPs expanding data center buildouts to general-purpose servers and aggressive additional orders, total DRAM industry revenue surged to US\$ 53.58 billion in 4Q 2025, marking a 29.4% QoQ increase. Samsung successfully reclaimed the No. 1 global market share, reaching 36% with US\$ 19.30 billion in revenue (a 43% QoQ increase). SK hynix slipped to second place with a 32.1% share (US\$ 17.22 billion), while Micron maintained third place with 22.4%.

In 1Q 2026, the memory industry experienced a significant boost due to rapidly rising contract prices for conventional DRAM, which increased by approximately 93% to 98% QoQ. This surge contributed to an overall industry revenue increase of 81% QoQ, reaching US\$ 97 billion. Samsung retained its leading position in 1Q 2026, benefiting from the strongest ASP growth among the top three DRAM vendors and driving quarterly revenue up 93.4% QoQ to US\$ 37.32 billion, increasing its market share to 38.5%. SK hynix posted 1Q 2026 revenue of US\$ 27.98 billion, up 62.5% QoQ, ranking second with a 28.8% market share. Micron ranked third, with quarterly revenue surging 81.6% QoQ to US\$ 21.75 billion, while maintaining a stable 22.4% market share.

The second quarter of 2026 extended the surge. Sharp further increases in conventional DRAM contract prices lifted total industry revenue 59.5% QoQ to nearly US\$ 154.73 billion. Demand from AI servers—driven by expanding LLM training and inference workloads and by the rapid spread of agentic AI applications—pulled through higher shipments of HBM3e, LPDDR5X and high-capacity RDIMMs. Supply remained the binding constraint: suppliers' inventories stayed at historic lows and the incremental output was allocated largely to server use, so bit shipments grew only modestly.

Samsung recorded the strongest sequential bit-shipment growth among the three leading suppliers, supported by its early move into HBM4 mass production and shipment; combined with a substantially higher ASP, this lifted quarterly revenue 63.4% to US\$ 60.98 billion and its market share to 39.4%. SK hynix, whose bit shipments carried the highest HBM proportion of the three and which therefore gained

less from rising conventional prices, grew 37.9% to US\$ 38.59 billion and eased to a 24.9% share. Micron, continuing to prioritize higher-priced server DRAM in its product mix amid capacity constraints, grew 65.5% to US\$ 36.00 billion for a 23.3% share.

Korea's position in the DRAM market has evolved from static dominance led by a single firm to collective dominance sustained by two highly competitive champions. Its combined share eased from 67.3% in the first quarter of 2026 to 64.3% in the second, not because Samsung and SK hynix faltered—both grew strongly in absolute terms—but because CXMT almost doubled its revenue to US\$ 14.62 billion and, at 9.5% of the global market, overtook Taiwan's suppliers to become the world's fourth-largest branded DRAM vendor. Korea's aggregate share nonetheless remains exceptionally high by global standards, and the internal rebalancing between Samsung and SK hynix suggests not decline, but maturity: Korea's DRAM leadership is no longer dependent on a single company, but supported by a deep and resilient industrial ecosystem that continues to anchor the global memory market (see Table 42).

Table 42. Branded DRAM Supplier Revenue Ranking: 2Q 2026

Ranking	Company	Revenue (US\$ M)			Market Share	
		2Q26	1Q26	QoQ	2Q26	1Q26
1	Samsung	60,981	37,323	63.4%	39.4%	38.5%
2	SK hynix	38,590	27,982	37.9%	24.9%	28.8%
3	Micron	36,000	21,750	65.5%	23.3%	22.4%
4	CXMT	14,624	7,339	99.3%	9.5%	7.6%
5	Nanya	2,612	1,552	68.3%	1.7%	1.6%
6	Winbond	998	568	75.8%	0.6%	0.6%
	PSMC	115	43	167.8%	0.07%	0.04%
Others		808	444	82.0%	0.5%	0.5%
Total		154,726	97,000	59.5%	100.0%	100.0%
KR Share					64.3%	67.3%
US Share					23.3%	22.4%
CN Share					9.5%	7.6%
TW Share					2.4%	2.2%

1. 1Q26 exchange rate—USD:KRW = 1:1,466; USD:TWD = 1:31.6
2. 2Q26 exchange rate—USD:KRW = 1:1,500; USD:TWD = 1:31.6
3. The KR, US, CN and TW share rows are calculated by the author from the supplier figures above.
- Source: TrendForce, “DRAM Industry Revenue Rises 59.5% QoQ in 2Q26 as Supply Expansion Continues to Lag Demand Growth, Says TrendForce,” September 7, 2026.

High-Bandwidth Memory

From 4Q 2024 to 4Q 2025, the global HBM market expanded rapidly while becoming increasingly concentrated. Korean firms—SK hynix and Samsung Electronics—together accounted for roughly 80–90% of global HBM revenue, underscoring Korea’s central role in supporting global AI infrastructure. In the high-end HBM market, the dominance of the “Big Three” is absolute, with SK hynix capturing 57% of the market, followed by Samsung at 22% and Micron at 21%.

SK hynix emerged as the dominant market leader, with its share peaking at 69% in 1Q 2025 before easing to 57% by 4Q 2025. This reflects early leadership in HBM3 and HBM3E, strong customer alignment with major AI chip designers, and high manufacturing yields in advanced stacking technologies. Samsung Electronics, after a weaker start, showed a gradual recovery, with market share rising from 13% to 22% over the same period.

However, sharp increases in conventional DRAM prices since the second half of 2025 have altered the profitability landscape. Because the annual pricing mechanism for HBM prevents contract prices from fully reflecting quarterly market price increases, HBM wafer revenue and profitability were overtaken by DDR5 64GB RDIMM in 1Q 2026. As HBM generations continue evolving in 2027 with larger die sizes and rising demand, the crowding-out effect on conventional DRAM capacity is expected to intensify. This dynamic will prompt suppliers to adjust production allocation between HBM and conventional DRAM based on HBM pricing outcomes, giving suppliers strong justification and greater pricing power in HBM negotiations for 2027.

As AI workloads continue to grow, HBM is likely to remain a structurally constrained and geopolitically significant technology. In this context, Korea’s role is shifting from market leadership toward system-level influence, shaping the cost, resilience, and pace of global AI hardware deployment (see Table 43).

Table 43. Global HBM Market Share by Revenue (Quarterly): 3Q 2024-3Q 2025

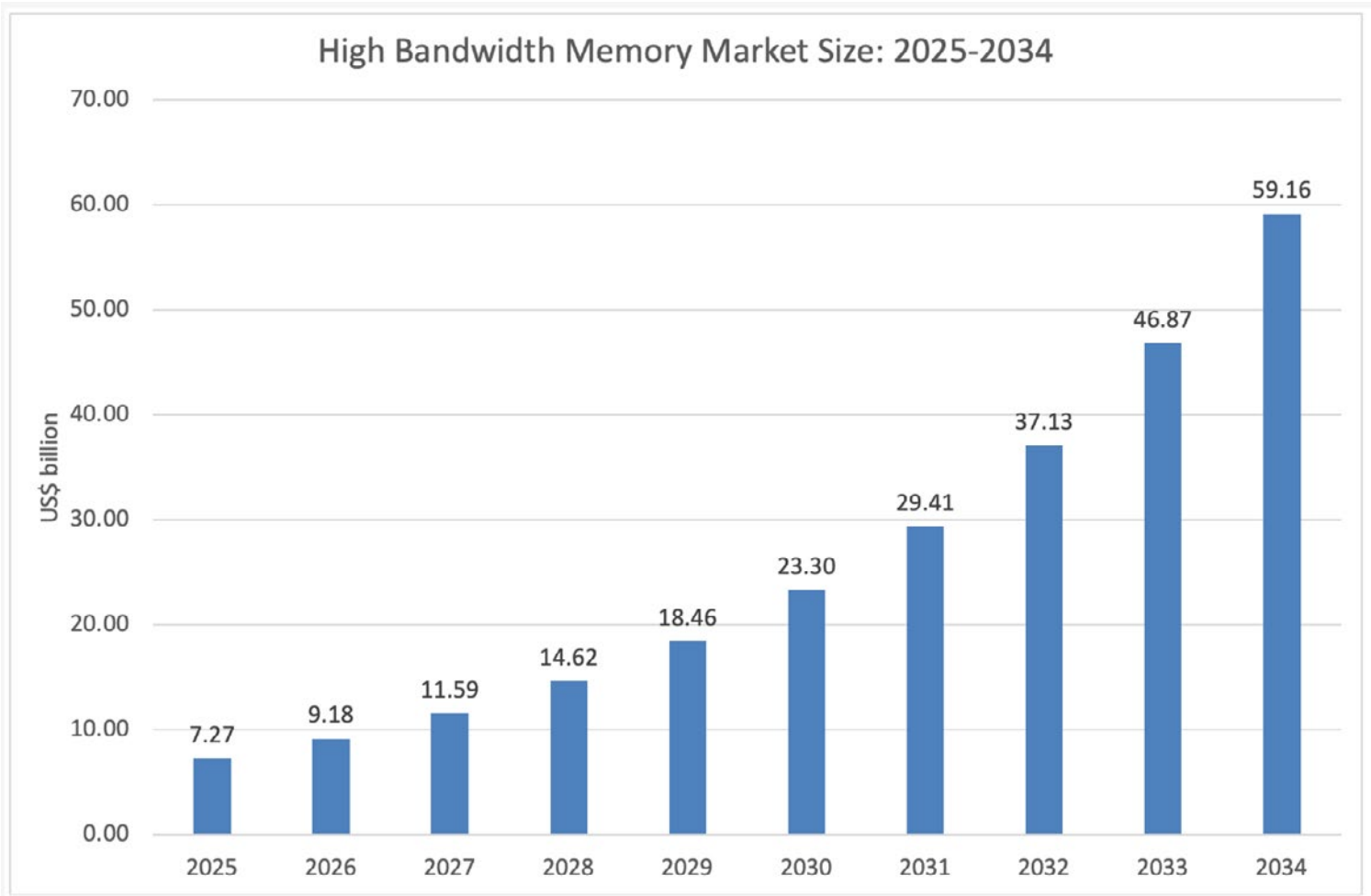
Market Share	3Q 2024	4Q 2024	1Q 2025	2Q 2025	3Q 2025
SK hynix	53%	51%	69%	64%	57%
Samsung	35%	40%	13%	15%	22%
Micron	11%	9%	18%	21%	21%
Korean Total	88%	91%	82%	79%	79%

Total	100%	100%	100%	100%	100%
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Source: Counterpoint, “Global DRAM and HBM Market Share: Quarterly,” December 19, 2025.

The global HBM market is projected to grow from US\$ 7.3 billion in 2025 to nearly US\$ 60 billion by 2034—more than an eightfold increase in a decade, a compound rate of 26.23%. Unlike previous memory upcycles driven by consumer electronics, this trajectory is anchored in infrastructure-level demand from large-scale AI training and inference, which makes HBM less a beneficiary of the AI wave than one of the pillars on which the digital economy is being built (see Figure 36).

Figure 36. High Bandwidth Memory Market Size: 2025-2034



Source: “High-Bandwidth Memory Market Size, Share and Trends 2025 to 2034,” Precedence Research, October 14, 2025.

In terms of full-year 2025 HBM market share, SK hynix firmly maintained its leadership with 52%, followed by Samsung at 28% and Micron at 20%. To meet explosive AI demand, these top three suppliers are aggressively expanding their HBM capacity with distinct strategies. SK hynix focuses on “speed and yield,” projecting a capacity increase from roughly 150,000 wafers per month in 2025 to 200,000 in 2026, primarily anchored in Korea with a new advanced packaging facility planned in Indiana, U.S.. Meanwhile, Samsung is leveraging its “turn-key vertical integration” strategy, expanding its Pyeongtaek P4 fab for HBM4 and retaining its Taylor, Texas facility as a strategic option, with its monthly capacity expected to grow from 150,000 to 180,000 wafers by 2026.

3. Global Memory Market Structure

According to TrendForce, HBM’s share of total DRAM bit capacity is estimated to increase from 2% in 2023 to 5% in 2024, and to exceed 10% by 2025. The shift is even more pronounced in value terms: HBM is projected to account for over one-fifth of the total DRAM market revenue in 2024, with its share potentially surpassing 30% in 2025, underscoring its disproportionate contribution to industry value creation.

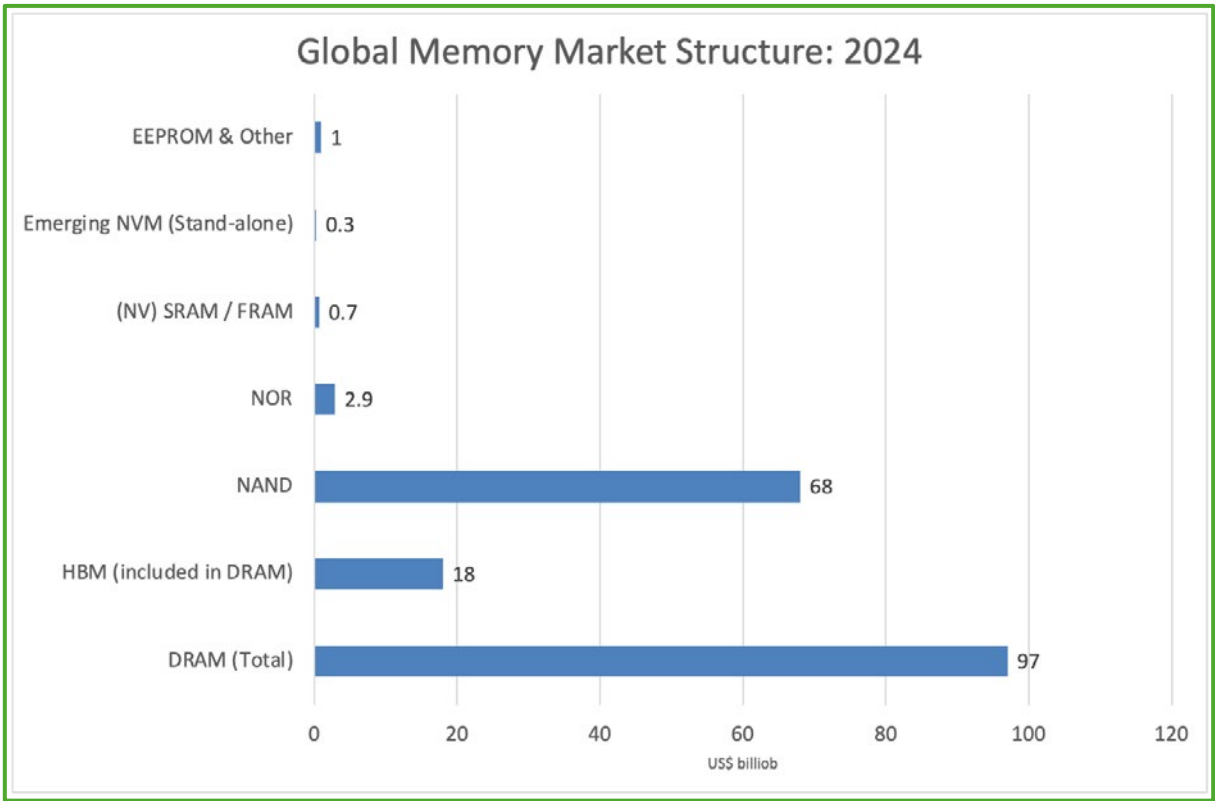
Table 44. Estimated HBM Share of DRAM Bit Capacity and Revenue: 2023-2025

HBM Share	2023	2024 (E)	2025 (F)
Output Out of total DRAM	2%	5%	Over 10%
Revenue Out of total DRAM	8%	21%	Over 30%

Source: Press Release, “HBM Prices to Increase by 5–10% in 2025, Accounting for Over 30% of Total DRAM Value, Says TrendForce,” TrendForce, May 6, 2024.

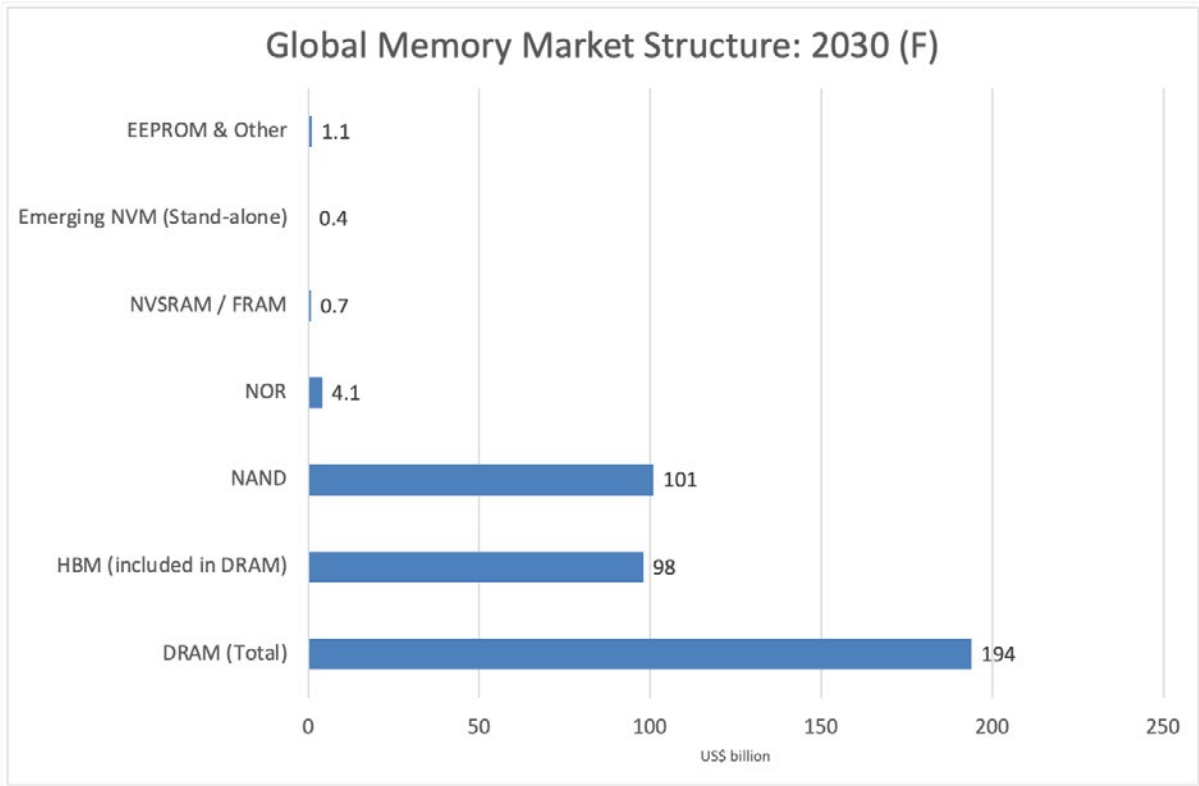
Overall, the global memory market is no longer driven solely by traditional cyclical forces. While DRAM and NAND remain its backbone, HBM is steadily redefining the industry’s center of gravity, shifting value creation toward AI-driven infrastructure, technological bottlenecks, and geopolitical resilience (Figures 37 and 38).

Figure 37. Global Memory Market Structure: 2024



Source: “Memory market surges beyond expectations: almost \$200 billion in 2025 driven by HBM & AI,” Yole Group, June 19, 2025.

Figure 38. Global Memory Market Structure: 2030 (F)



Source: “Memory market surges beyond expectations: almost \$200 billion in 2025 driven by HBM & AI,” Yole Group, June 19, 2025.

NAND Market Share

From 2020 through 2024, this trend became more pronounced. Korea’s combined NAND market share rose steadily from 44.5% in 2020 to 57.1% in 2024, the highest level shown in the data. Samsung remained the anchor supplier, maintaining a share in the low-to-mid-30% range, while SK hynix expanded aggressively, growing from 11.5% in 2020 to 21.4% in 2024. This period reflects Korea’s successful scaling of advanced NAND technologies, strong execution in enterprise SSDs, and growing exposure to data center demand (see Table 45).

Table 45. Korea’s NAND Flash Market Share: 2020-2025

Year	Korean Vendors Total	Samsung Electronics	SK hynix
2020	44.50%	33.00%	11.50%
2021	46.90%	33.80%	13.10%
2022	52.60%	33.3%	18.30%
2023	52.50%	33.60%	18.90%
2024	57.10%	35.70%	21.40%
3Qs 2025	51.30%	32.40%	18.90%

Note: The share of SK hynix includes Intel NAND from 2021. TrendForce only provides quarterly data; the author therefore uses the four-quarter average of market shares as a proxy for the full-year data.
Source: TrendForce, Press Releases.

In 1Q 2026, Samsung firmly maintained its top position in the revenue rankings, capitalizing on quarterly contract pricing and a significant increase in server-related bit shipments. Samsung posted US\$ 13.51 billion in NAND Flash revenue, marking a staggering 104.7% QoQ increase, while expanding its revenue market share from 28.0% in 4Q 2025 to 31.6%. SK Group (SK hynix and Solidigm) secured second

place with about US\$ 7.53 billion in revenue (a 44.6% QoQ increase), bringing its market share to 17.6%.

With Samsung and SK Group's combined performance, Korea's total NAND market share stood at 49.2% in 1Q 2026, maintaining its robust national dominance in the sector. Korea's NAND market position has evolved from single-firm leadership to sustained national dominance, supported by two major players with complementary strengths. While NAND remains more competitive and less concentrated than DRAM, Korea has succeeded in building a durable majority position over time. Korea remains a central pillar of the global NAND ecosystem, combining scale, technology depth, and resilience in an increasingly contested memory landscape (see Table 46).

Table 46. Revenue Rankings of the Top Five NAND Flash Suppliers: 1Q2026

Rank	Company	Revenue (US\$ M)	Market Share (%)	2Q 2025	3Q 2025
		1Q26	QoQ (%)	1Q26	4Q25
1	Samsung	13,510.1	104.7%	31.6%	28.0%
2	SK hynix Group	7,533.6	44.6%	17.6%	22.1%
	(SK hynix + Solidigm)	7,533.6	80.0%	13.9%	14.1%
3	Kioxia	5,950.0	96.7%	13.9%	12.8%
4	Micron	5,950.0	96.7%	13.9%	12.8%
4	SanDisk	38,903.7	83.7%	90.9%	89.9%
Total of Top 5		21,043.7	n.a.	49.2%	50.1%
KR Share		21,043.7	n.a.	49.2%	50.1%

Notes:

[1] 4Q25 Average Exchange Rate: USD:JPY=1:154.1; USD:KRW=1:1,448.8

[2] 1Q26 Average Exchange Rate: USD:JPY=1:156.9; USD:KRW=1:1,465.6

Source: TrendForce, May 2026

Strategy and Policies

Korea is not merely a leading participant in the memory market, but its systemic center of gravity. Korean firms command the largest shares in DRAM, dominate the HBM segment, and retain majority control in NAND. While individual company shares fluctuate and competitive pressure has increased, Korea's aggregate position remains remarkably resilient. In a global semiconductor industry where logic manufacturing leadership is more geographically dispersed, memory stands out as the domain in which Korea exercises enduring, structural leadership rather than temporary advantage.

Nevertheless, the South Korean government is pressing ahead with an ambitious plan to establish a US\$ 471 billion semiconductor supercluster in Gyeonggi Province by 2047. The initiative envisages the construction of 16 new fabrication facilities, with total capacity reaching 7.7 million wafers per month by 2030, alongside a target of 50% self-sufficiency in critical semiconductor materials.

Massive Funding & Strategic Investment Programs

In March 2025, South Korea announced the establishment of a major advanced strategic industry

fund worth KRW 50 trillion (US\$ 37 billion) to support semiconductors and other key sectors, including artificial intelligence, secondary batteries, biotechnology, and future mobility. The fund is designed to provide a comprehensive range of financial support instruments—such as equity investments, subordinated capital, and ultra-low-interest loans—targeting both large corporations and smaller firms within the semiconductor ecosystem.¹²

In April 2025, the government further announced plans to increase semiconductor-related investments to safeguard the industry’s global competitiveness amid heightened uncertainty following the US tariff announcements. Under this plan, public investment in the semiconductor sector will rise from KRW 26 trillion (US\$ 19.3 billion) to KRW 33 trillion (US\$ 23.2 billion), with the stated objective of building a “private-led” semiconductor innovation ecosystem.

K-Semiconductor Vision and Development Strategy 2047

In December 2025, the South Korean government unveiled its Vision and Strategy for K-Semiconductors in the AI Era, laying out a long-term plan to rebalance the country’s semiconductor ecosystem and secure technological leadership beyond memory chips as artificial intelligence reshapes global demand.

A key pillar of the strategy is government support for the construction of 10 advanced semiconductor fabrication plants by 2047, intended to anchor a clustered ecosystem that brings together fabless design, foundry services, and advanced packaging. This clustering approach aims to tighten value-chain integration and enhance competitiveness in next-generation, AI-driven chips.

The policy package further includes tax incentives and subsidies, such as enhanced tax credits for semiconductor facilities and R&D (for example, 15–25% for plant investment and up to 30–50% for R&D) as well as support for the construction costs of fabrication-related infrastructure, aimed at attracting both domestic and foreign investment.

Workforce Development & Talent Attraction

South Korea’s strategy places equal emphasis on workforce development, recognizing that human capital matters as much as capital expenditure. Under the Vision and Strategy for K-Semiconductors in the AI Era, the government aims to cultivate 150,000 additional semiconductor professionals across all educational levels by 2030, expanding semiconductor-focused research centers and academic departments. Universities have aligned accordingly—Sungkyunkwan University’s long-standing collaboration with Samsung Electronics is the best-known example—with the dual aim of equipping students with directly applicable skills and retaining talent within the domestic industry (see Table 47).

12 Chosun Biz at <https://biz.chosun.com/en/en-inance/2025/03/05/ZA5JSW7R3RGZ5ID5LO3LCSFH4Q>

Table 47. Industry-contracted Semiconductor Departments in Korea's Universities

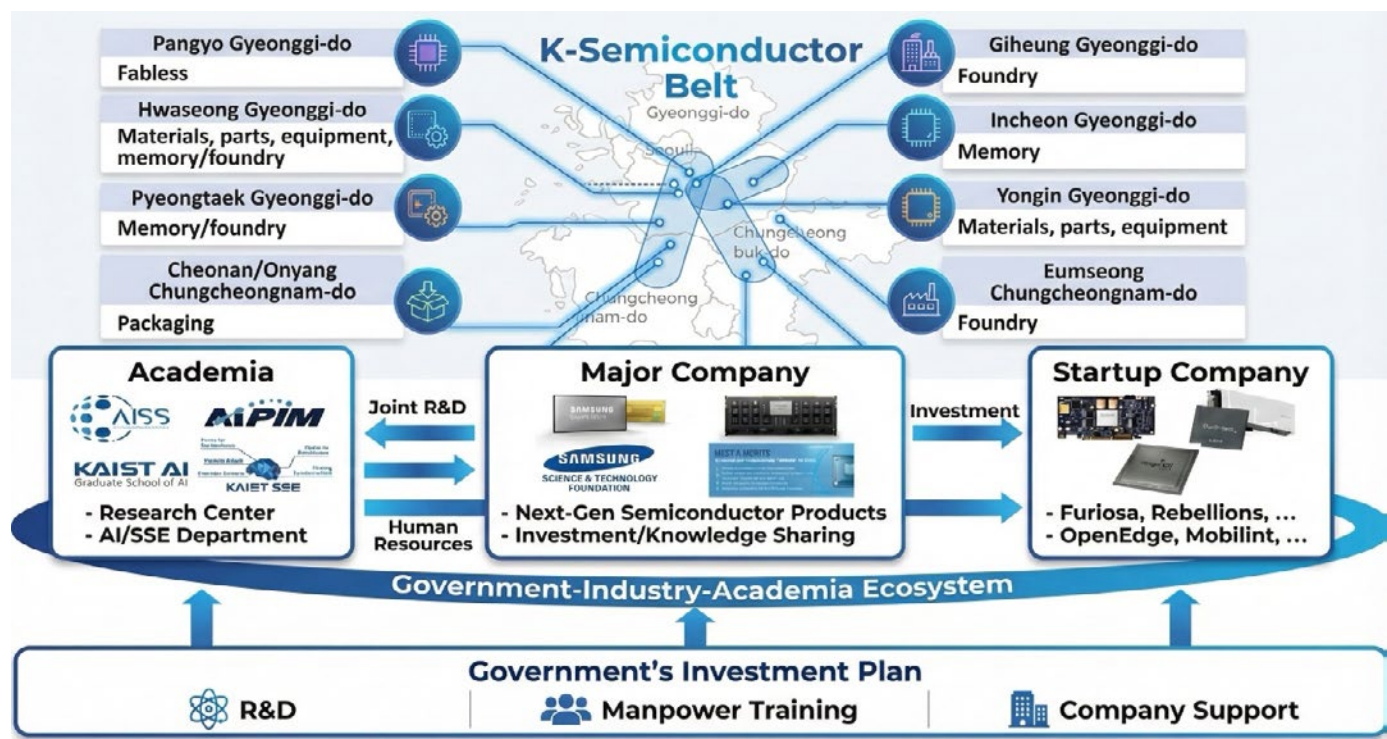
University	Contracting Company	# of Students	Year of Establishment
Sungkyunkwan University	Samsung Electronics	70	2016
Yonsei University	Samsung Electronics	50	2019
Korea University	SK hynix	30	2021
Sogang University	SK hynix	30	2022
Hanyang University	SK hynix	40	2022
POSTECH	Samsung Electronics	40	2022
KAIST	Samsung Electronics	100	2022
Total		350	

Fabless Startups

Korea has made sustained efforts to cultivate a startup-oriented innovation ecosystem to complement and rebalance its conglomerate-led industrial structure. This transition gained institutional momentum with the establishment of the Ministry of SMEs and Startups in 2017, which consolidated government functions related to entrepreneurship, venture finance, and technology commercialization. Policy instruments such as the K-Unicorn Program and the Tech Incubator Program for Startups (TIPS) have since formed the backbone of public support for early-stage and scale-up ventures.

In summary, Korea's government is pursuing an assertive, system-wide strategy for semiconductor development. Public capital is being deployed at scale, policies are being actively shaped, and an integrated ecosystem is being built that extends well beyond memory chips. Crucially, the strategy is not government-driven alone; it rests on the coordinated participation of academia, major corporations, and emerging startups, underscoring a comprehensive national mobilization rather than a single-sector policy initiative. The objective is not only to preserve existing advantages, but also to achieve broader semiconductor leadership, enhance supply-chain resilience, and secure strategic positioning in the AI era (Figure 39).

Figure 39. Korea’s Nationwide Efforts for the AI Semiconductor Industry



Source: Ji-Hoon Kim, Sungyeob Yoo, and Joo-Young Kim, "South Korea's Nationwide Effort for AI Semiconductor Industry," Communications of ACM, July 1, 2023.

4. Updates in 2026 and Prospects

2026 Export Boom & Memory Supercycle

In early 2026, South Korea’s semiconductor exports continued their strong momentum, hitting record monthly highs. Driven by expanding demand for AI servers and high-value-added memory, such as HBM and DDR5, semiconductor exports reached US\$20.5 billion in January 2026, representing a 102.7% year-over-year increase. This figure further surged to US\$25.2 billion in February, marking a 160.8% year-over-year increase. This data-center-driven high-premium market and memory supercycle are expected to extend until at least the third quarter of 2027.

The HBM4 Moment: A New Race for AI Memory Leadership

February 2026 is regarded as a milestone “HBM4 moment” for the Korean semiconductor industry, as SK hynix and Samsung Electronics almost simultaneously announced the start of mass production for the sixth-generation High Bandwidth Memory (HBM4). This iteration introduces a logic-process-based base die for the first time, blurring the boundary between memory and computing units. SK hynix showcased its 16-layer, 48GB HBM4 technology at CES 2026 and, leveraging its deep partnership with NVIDIA, is expected to secure about 70% of the memory orders for NVIDIA’s next-generation “Vera Rubin” GPU architecture. Meanwhile, Samsung officially began shipping HBM4 to customers in Q1 2026, announced a 70% capacity expansion, and is utilizing its vertical integration (IDM) advantage to negotiate customized HBM4 supply chain partnerships with tech giants like Google and Broadcom.

Foundry Battle at 2nm and Future Roadmap

Samsung confirmed it will initiate mass production of its second-generation 2nm process (SF2P) in the second half of 2026. Compared to the first-generation node, SF2P offers significant improvements in performance and power consumption. As of early 2026, Samsung's 2nm GAA process yield has reportedly reached 50%. Boosted by AI chip demand from clients like Tesla, Samsung expects its 2nm-related orders to grow by over 30% year-over-year in 2026. Looking ahead, Samsung announced that the development of its 1.4nm process is progressing on schedule, targeting mass production in 2029.

Semiconductor Special Act and Execution Gaps

The South Korean National Assembly officially passed the Semiconductor Special Act in January 2026, elevating the industry from a simple manufacturing sector to “strategic infrastructure”. The Act provides legal backing and expedites administrative approvals for mega-clusters, such as the Yongin cluster, concerning power and water supply. The government also introduced highly competitive tax incentives, offering 20% tax credits for large enterprises' facility investments, 30% for SMEs, and up to 50% for R&D expenditures.

However, the policy's implementation in 2026 faces a transitional gap: the KRW 2 trillion “Semiconductor Special Account,” intended as the Act's dedicated funding engine, has been delayed until 2027 due to pending amendments to the National Finance Act. Consequently, 2026 industry support will rely on dispersed general accounts. Furthermore, the industry-backed proposal to exempt semiconductor R&D personnel from the 52-hour workweek limit was excluded from the final legislation, highlighting unresolved friction between national tech competitiveness and domestic labor standards.

Geopolitical Buffer and Geographic Split

Navigating the US-China tech rivalry, the temporary trade agreement reached in late 2025 provided a buffer for Korean firms operating in China. The US agreed to suspend the implementation of the “BIS affiliate rule” until November 2026, allowing Samsung and SK hynix to temporarily maintain equipment and production lines at their Chinese fabs. Nevertheless, the long-term effects of export controls are forcing Korean companies into geographic capacity segmentation. Facilities in China are gradually transitioning to mature processes or older-generation memory products, while the most advanced HBM4 and 2nm production lines are strictly confined to South Korea and the United States.

Record Corporate Earnings and Accelerated Capacity

Both national champions posted unprecedented results. Samsung Electronics' Device Solutions division lifted revenue from KRW 81.7 trillion in the first quarter of 2026 to KRW 127.5 trillion in the second, with operating profit rising from KRW 53.7 trillion to KRW 89.2 trillion. The first quarter included

Samsung's first mass sales of HBM4 and SOCAMM2 for NVIDIA's Vera Rubin platform, and the second added scaled HBM4 shipments together with HBM4E samples to major customers.

In the memory market itself, Korea's dominance deepened. Samsung and SK hynix together accounted for approximately 67 percent of global DRAM revenue in the first quarter of 2026, while SK hynix held about 58 percent of global HBM bit volume, with Samsung and Micron roughly tied at some 21 percent each. Samsung's lead in DRAM reflected the strongest average selling price growth among the top three vendors, whereas SK hynix's higher HBM mix was partly muted at the firm level because HBM contract pricing proved less volatile than mainstream DRAM.

Capacity commitments accelerated in step. In February 2026, Samsung secured a KRW 2.5 trillion low-interest loan package for its Pyeongtaek Line 5 AI-semiconductor cluster, advancing the operating schedule from 2030 to 2028. On February 25, 2026, SK hynix committed an additional KRW 21.6 trillion in facility investment for its Yongin cluster and pulled the opening of the first cleanroom forward from May 2027 to February 2027 to meet surging customer demand.

From Memory Supplier to Platform Co-Architect

The most consequential change of 2026 may be relational rather than financial. On March 18, 2026, Samsung was named the primary HBM4 supplier for AMD's next-generation Instinct MI455X GPU and agreed to collaborate on advanced DRAM solutions for sixth-generation EPYC processors, with the longer-term ambition of serving as foundry partner for future AMD products. On June 8, 2026, SK hynix announced a multi-year technology partnership with NVIDIA covering memory co-development for Vera Rubin systems, Vera CPUs, RTX Spark-powered PCs, and Jetson Thor robotics platforms. Both agreements extend Korean firms beyond component supply into manufacturing workflow and platform co-design.

The Persistent Foundry Gap

Korea's weakness remains concentrated in foundry services. In the first quarter of 2026, TSMC accounted for 72.3 percent of global foundry revenue at US\$ 35.855 billion, up 40.5 percent year-over-year and a gain of 4.6 percentage points in share. Samsung ranked second at US\$ 3.201 billion and 6.5 percent, growing 10.6 percent but losing 1.2 percentage points of share, while SMIC ranked third at US\$ 2.505 billion and 5.1 percent, narrowing the gap with Samsung to 1.4 percentage points. Korea's competitive resilience will therefore hinge on whether it can convert memory leadership and AI platform partnerships into a durable position in advanced logic manufacturing, and on whether it can sustain the pace of investment that the first half of 2026 set.

Government Policy and Investment in 2026

The legislative framework described above moved from statute into practice during 2026. The Semiconductor Special Act, passed on January 29, entered into force on August 11, 2026. It empowers

the government to designate semiconductor clusters and commits the state to fund between 50 and 100 percent of infrastructure costs inside them—power, water, roads and wastewater treatment—alongside expedited permitting, while a presidential Special Committee on Semiconductor Industry Competitiveness coordinates implementation across ministries. The KRW 2 trillion special account intended to finance the Act nonetheless remains unavailable until 2027.

Fiscal support has therefore been channelled through general accounts and new funds. Korea’s 2026 budget totals KRW 728 trillion, with national R&D spending of KRW 35.5 trillion; the Ministry of Science and ICT’s own R&D budget rose 25.4 percent to KRW 8.12 trillion, of which roughly KRW 6 trillion is AI-related, and semiconductor priorities are set on sub-nanometre processes, processing-in-memory and back-end packaging under a “K-Semiconductor 2.0” programme. In March 2026 the government committed KRW 8.6 trillion—about US\$ 6.5 billion, a 30 percent annual increase—to strategic technologies spanning AI, semiconductors and quantum computing, together with KRW 46.6 trillion of policy finance. The 2027 budget proposal announced in August raises total spending to KRW 764.4 trillion and finally provides for the semiconductor special account (see Table 48).

Table 48. Korea’s Semiconductor-Related Fiscal Instruments: 2026-2027

Instrument	Size	Timing and purpose
Total government budget	KRW 728 trillion (US\$ 521.9 billion)	2026 fiscal year
National R&D budget	KRW 35.5 trillion (US\$ 25.5 billion) [MSIT share KRW 8.12 trillion (US\$ 5.8 billion), up 25.4%]	2026; AI-related research of about KRW 6 trillion; “K-Semiconductor 2.0” priorities
Strategic technology in-vestment (AI, semiconductors, quantum)	KRW 8.6 trillion (US\$ 6.2 billion) (about US\$ 6.5 billion), up 30%; plus KRW 46.6 trillion (US\$ 33.4 billion) of policy finance	Announced March 27, 2026; roadmap through 2028
Dedicated semiconductor fund	KRW 5 trillion (US\$ 3.6 billion), plus KRW 5 trillion (US\$ 3.6 billion) of trade finance and KRW 1 trillion (US\$ 716.9 million) over ten years	Launched August 10, 2026; equity in materials, parts, equipment and fabless firms
Semiconductor special account	KRW 2 trillion (US\$ 1.4 billion)	Provided for in the Special Act; not operational until 2027
2027 budget proposal	KRW 764.4 trillion (US\$ 548 billion) (up 5%)	Announced August 2026; establishes the semiconductor special account

Source: Korean government announcements, January–August 2026.

The most revealing instrument is the KRW 5 trillion semiconductor fund launched on August 10, 2026. It does not flow to Samsung or SK hynix; it takes equity positions in materials, parts and equipment suppliers and in fabless design houses, accompanied by KRW 5 trillion of trade finance for exporters and KRW 1 trillion over ten years for supplier collaboration. The design answers the vulnerability exposed in 2019, when Japan imposed licensing requirements on three semiconductor process chemicals for two of

which Japanese suppliers accounted for more than 90 percent of Korean imports.

Tax policy has widened in the same direction. Investment tax credits for national strategic technologies stand at 20 percent for large enterprises and 30 percent for SMEs on facility investment, and at 30 to 40 percent and 40 to 50 percent respectively on research and development. In February 2026 the category was extended for the first time to the back end of the value chain, covering multi-chip module packaging facilities, semiconductor materials and components, and energy-efficient packaging, applied retroactively to investments made from January 1. A tax reform package announced on August 3 adds production-linked credits for six strategic sectors including semiconductors, with up to 1.5 times the standard credit for firms located outside the Seoul metropolitan area, although materials and equipment suppliers were excluded from that particular measure.

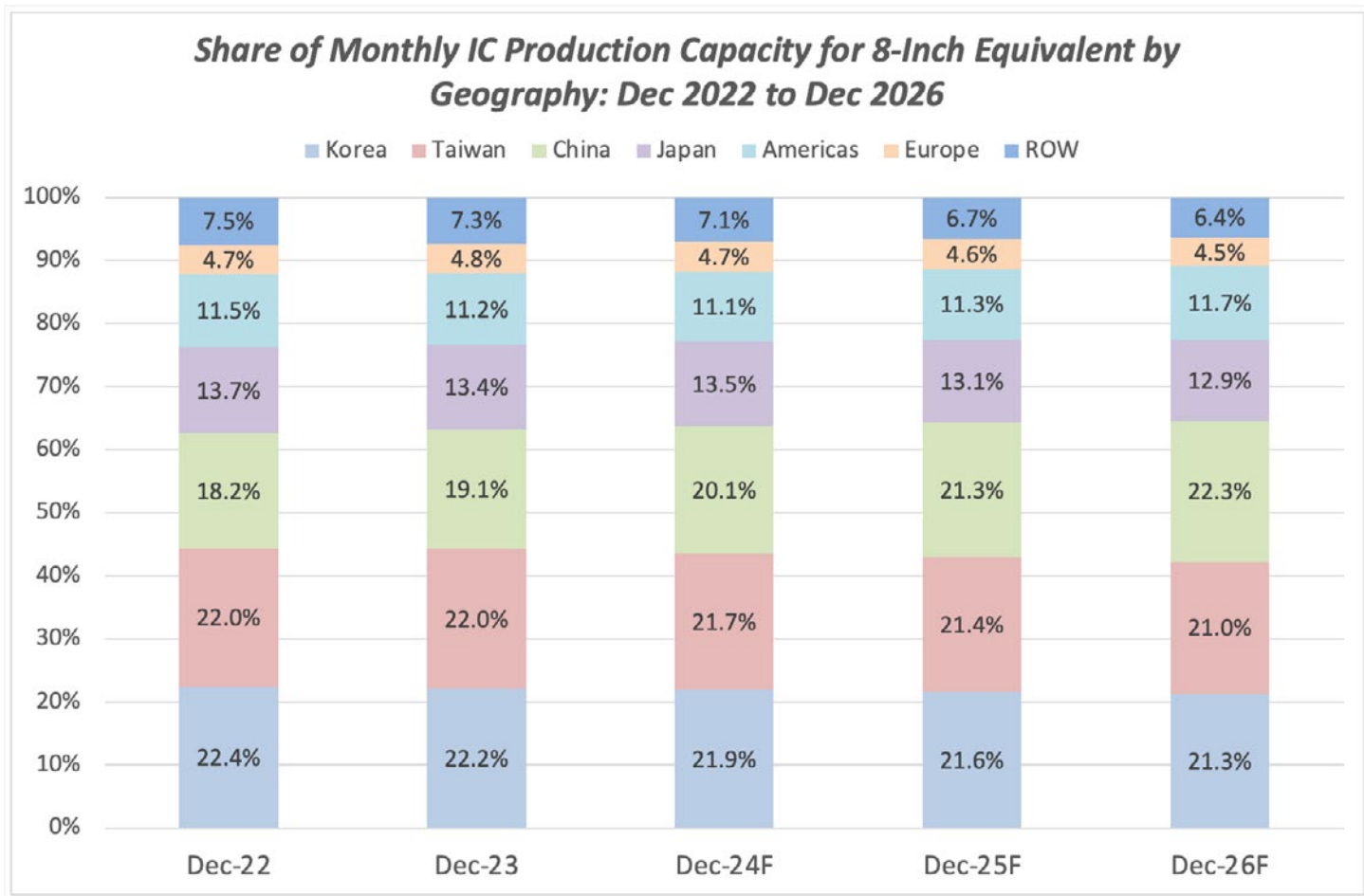
Geographically, the second-half economic growth strategy commits KRW 800 trillion to a second manufacturing base in the southwest, comprising four new fabs, alongside KRW 550 trillion for AI data centres totalling 8.4 GW from 2029. Yongin and Pyeongtaek are to double memory capacity within five years, supported by 14.7 GW of electricity by 2041; the Honam cluster is promised 650,000 tonnes of water per day by 2030; Chungcheong receives KRW 156 trillion for high-bandwidth memory; Busan takes silicon carbide power devices and Gumi materials and components. President Lee Jae Myung has ordered Gwangju Air Base cleared for fab construction by mid-2028, explicitly benchmarking TSMC's 22-month Kumamoto build—though the site is a designated asset under the combined defence posture and consultations with Washington remain unfinished, and neither Samsung nor SK hynix has yet named a groundbreaking date in the region.

VIII. The European Semiconductor Industry

1. Europe in the Global Semiconductor Supply Chain

Europe’s IC manufacturing capacity continues to expand but does so at a slower rate than the global average. As capacity additions accelerate elsewhere—particularly in Asia—Europe’s share of global wafer capacity gradually erodes. The data thus suggest that Europe is participating in the upcycle, but not keeping pace with it, resulting in a steady loss of relative manufacturing weight over the medium term (see Figure 40).

Figure 40. Share of Monthly IC Production Capacity for 8-Inch Equivalent by Geography: Dec 2022 to Dec 2026



Source: Knometa Research, Global Wafer Capacity 2024, February 29, 2024.

This near parity between production-base and headquarters-based shares underscores a key structural characteristic of Europe’s semiconductor industry: European firms tend to manufacture largely within Europe, but the overall scale of both domestic capacity and overseas manufacturing networks remains modest relative to Asia and the Americas. As a result, while Europe plays a critical role in high-value applications, its share of global wafer production capacity in 2023 remains small and broadly unchanged, reinforcing the gap between Europe’s demand-side importance and its supply-side presence.

2. Strategy and Policies

Central to this effort is the European Chips Act, introduced in February 2022 and in force since September 2023. The Act mobilizes up to € 43 billion (US\$ 47 billion) in targeted public support for Europe’s semiconductor ecosystem and consolidates previously fragmented initiatives into a single, coherent framework built around three pillars.

Following the launch of the Chips Act in 2022, several major semiconductor firms—including STMicroelectronics, GlobalFoundries, TSMC, Intel, Onsemi, Infineon and Wolfspeed—have announced plans to build or expand chip manufacturing facilities in Europe. Together, these projects signal a concerted effort to reposition Europe as a more significant player in global semiconductor production, even as intense competition for investment and technological leadership continues worldwide (see Table 49).

Table 49. European Union’s Semiconductor Policy

	Target	Gain 20% of global semiconductor market share (in terms of revenue) by 2030.
	Policy	European Chips Act Aims to strengthen Europe’s semiconductor ecosystem. Five strategic objectives are: - Strengthen research and technological leadership; - Build and reinforce Europe’s capacity to innovate in the design, manufacturing and packaging of advanced chips; - Put in place an adequate framework to increase production by 2030; - Address skills shortage and attract new talent; - Develop an in-depth understanding of global semiconductor supply chains. 2030 Digital Compass Sets the course for Europe’s digital decade. Three goals specific to semiconductors are: - Capacity Building: Increasing Europe’s semiconductor production of cutting-edge and sustainable semiconductors, including processors. - Innovation: Fostering technological advancements and innovation in semiconductor technologies. - Resilience: Enhancing Europe’s resilience in semiconductor supply chains .
Measures	Key Incentive Amounts	Up to € 43 billion (US\$ 47 billion)
	Key Initiatives	- Grants and loans under EU Chips Act - Tax credits - Member State aid allowances

Outcome	Announcements on Key Investments To Boost Domestic Production	• STMicroelectronics (Switzerland): EU approval for a € 5 billion (US\$ 5.4 billion) silicon carbide plant in Italy. • STMicroelectronics (Switzerland) and GlobalFoundries (U.S.): EU approval for a € 7.4 billion (US\$ 8.0 billion) fab plant in Crolles, France by STMicroelectronics and GlobalFoundries. Targeted to reach full capacity by 2026, with up to 620,000 of 300mm diameter wafers per year of production at a size of 18 nm. • TSMC (Taiwan): Plans for € 7.4 billion (US\$ 8.0 billion) fab plant in Dresden, Germany, together with car chip makers Robert Bosch, NXP, and Infineon. The plant is expected to have a monthly production capacity of 40,000 300 mm (12-inch) wafers on TSMC's 28/22 nm planar CMOS and 16/12 nm FinFET process technology. • Intel (U.S.): Plans for € 30 billion euros (US\$ 32.5 billion), including US\$ 11 billion in state aid, to develop two chip-making plants in Magdeburg, Germany. Intel's German fab is poised to be the most advanced in the world and make 1.5 nm chips. • Onsemi (U.S.): Plans to invest up to US\$ 2 billion in expanding its operations to produce intelligent power semiconductors in the Czech Republic, pending EU approval. • Infineon (Germany): on track to complete a € 5 billion (US\$ 5.4 billion) power chip plant in Dresden by 2026, despite not yet having EU aid approval. • Wolfspeed (U.S.): Plans to invest US\$ 3 billion on a 200 mm silicon carbide (SiC) wafer fab and an R&D center with German automotive supplier ZF in Saarland, Germany. Automotive supplier ZF Friedrichshafen will invest US\$ 185 million for a stake in the chip fab and will take a majority stake in the research centre.

Note:
() indicates headquarter location.
Currency Exchange Rate: US\$ 1 = € 0.9224
The Table is updated until June 2024.

3. Updates in 2025-2026 and Prospects

Strategic Reassessment and the Transition toward “Chips Act 2.0”

By 2025–2026, Europe's semiconductor sector had reached a critical strategic inflection point. Early ambitions to rapidly expand manufacturing capacity were increasingly tempered by a more pragmatic recognition of Europe's structural position in the global semiconductor ecosystem. Rather than pursuing sheer production scale, policymakers have begun to emphasize ecosystem resilience, technological indispensability, and supply-chain security.

Market data illustrates the structural constraints facing Europe. According to estimates by the World Semiconductor Trade Statistics (WSTS), Europe's share of the global semiconductor market is expected to decline to roughly 7.0% in 2025 and could fall further to about 6.2% in 2026. These trends highlight the difficulty of achieving the original objective set in 2021–2022—namely, raising Europe's global market share to 20% by 2030. In its 2025 report, the European Court of Auditors explicitly characterized this

target as “highly unlikely,” projecting instead that Europe’s share may reach only about 11.7% by the end of the decade.

That evaluation was followed by legislative action. On June 3, 2026, the European Commission introduced and adopted the Chips Act 2.0 as part of a broader technological sovereignty package. While the original 2023 Chips Act successfully mobilized more than € 52 billion in investment, European authorities acknowledged that the region remained dependent on foreign entities for advanced manufacturing and semiconductor design. The urgency behind the revision is driven above all by artificial intelligence: the global semiconductor market is projected to reach € 1.37 trillion by 2030, with AI-related components expected to account for roughly 70 percent of that growth, and the Chips Act 2.0 accordingly targets AI infrastructure and hardware through several new mechanisms. Notably, it designates talent as critical infrastructure—an explicit acknowledgement that Europe lacks the human resources required to staff multiple state-of-the-art megafabs at speed.

Political coordination advanced in parallel. On March 12, 2026, nine member states—Austria, Belgium, Finland, France, Germany, Italy, Poland, Spain, and the Netherlands—launched the Semiconductor Coalition to support research, expand production capacity, and pool resources. That alignment was reinforced at the Semiconductor Alliance summit of June 26, 2026, which focused on the implementation of the Chips Act 2.0.

The results, however, remain difficult to see in the aggregate figures. Measured by industry revenue, Europe’s global share has hovered around 9 percent since 2022, and its share of global chip production stands at roughly 10 percent in 2026—essentially unchanged from 2023 and far from the 20 percent target that the Chips Act 2.0 continues to carry forward. Measured by consumption, as in the WSTS market data cited above, Europe’s share is lower still. Raising manufacturing capacity has proved the hardest part of the program: projects by Silicon Box and STMicroelectronics have stalled, with production schedules pushed back by a year or more.

Divergent Industrial Outcomes and Capacity Expansion

One of the most prominent developments is the European Semiconductor Manufacturing Company (ESMC) in Dresden—a €10 billion joint venture led by TSMC in partnership with Bosch, Infineon, and NXP. Following groundbreaking in August 2024, construction advanced steadily through 2025. Equipment installation is expected to begin in the second half of 2026, with production scheduled for 2027. The facility will manufacture chips at the 28/22nm and 16/12nm nodes, which are essential for Europe’s automotive and industrial sectors.

Additional investments have reinforced this industrial ecosystem. Infineon is building a €5 billion power-semiconductor fabrication plant in Dresden, while STMicroelectronics is expanding its integrated silicon-carbide (SiC) campus in Catania, Italy. Meanwhile, the €3.2 billion Silicon Box investment in Novara is establishing a major advanced packaging hub, reflecting the growing strategic importance of backend manufacturing for high-performance computing and AI applications.

In contrast, attempts to establish ultra-advanced logic manufacturing in Europe have faced substantial difficulties. Intel’s planned €30 billion “megafab” in Magdeburg—once considered central to Europe’s ambition to host leading-edge manufacturing—was canceled in mid-2025 due to financial constraints, market uncertainty, and concerns over global overcapacity. Similarly, Wolfspeed indefinitely suspended construction of its planned 200mm SiC wafer facility in Saarland, Germany, although the company later undertook a strategic restructuring agreement with Renesas in early 2026.

Near-term industrial investment consequently remains concentrated in the sectors where Europe holds established strengths—automotive, industrial automation, and edge computing—rather than in AI hardware itself. Germany continues to be the principal destination for that capital: on July 14, 2026, the European Commission approved € 659 million in German state aid for four new semiconductor facilities, spanning silicon-carbide epitaxial wafers, silicon power MOSFETs, metrology equipment, and radiation detectors (see Table 50).

Table 50. German State Aid for Semiconductor Facilities Approved in July 2026

Company	Location	Aid Amount	Product
Element 3-5 GmbH	Baesweiler, North Rhine-Westphalia	€ 353 million	Silicon-carbide epitaxial wafers
Vishay Siliconix Itzehoe GmbH	Itzehoe, Schleswig-Holstein	€ 214 million	N- and P-channel silicon power MOSFETs
KLA-Tencor MIE GmbH	Weilburg, Hesse	€ 74.4 million	Advanced optical overlay and film metrology equipment
KETEK GmbH	Munich, Bavaria	€ 17.9 million	Silicon drift detectors and graphene radiation entry windows
Total		€ 659.3 million	

Source: European Commission state aid approval, July 14, 2026.

In the Nordic and Baltic region, Sweden’s Silvers Semiconductors has deepened its position in silicon photonics for AI infrastructure, forming a strategic collaboration with GlobalFoundries and reporting on August 26, 2026, that its pipeline had expanded to US\$ 1.2 billion. Europe’s difficulty, however, is less the absence of such capabilities than the absence of scale around them: while the region possesses robust industrial conglomerates, it lacks the dense network of venture-backed start-ups needed to scale fabless companies and innovative AI chip designers rapidly—an area in which the United States retains a distinct advantage.

These developments have intensified debate within Europe regarding the appropriate balance between subsidizing advanced logic manufacturing and strengthening areas where Europe already holds competitive advantages (see Table 51).

Table 51. Progress of Semiconductor Investment and Production in Europe: 2026

Project / Company	Location	Technology / Focus	Investment	Status & Milestones (January–September 2026)
ESMC (TSMC, Bosch, Infineon, NXP)	Dresden, Germany	28/22 nm and 16/12 nm (automotive/ industrial)	€ 10 billion+	On track. Topping-out February 2026; fab systems installation under way in 1H 2026; equipment move-in targeted for 2H 2026; 2027 production target intact.
Infineon	Dresden, Germany	Power semiconductors	€ 5 billion	Smart Power Fab officially opened July 2, 2026, several months ahead of schedule.
GlobalFoundries	Dresden, Germany	Capacity expansion	€ 1.1 billion	Tripling capacity to 850,000 wafers per year; equipment installation starting 2H 2026, completion by late 2028.
Silicon Box	Novara, Italy	Advanced packaging hub	€ 3.2 billion+ (incl. € 1.3 billion state aid)	Development agreement signed March 2026; construction pushed to mid-2027 and production to 2029.
STMicroelectronics	Catania, Italy	Silicon-carbide (SiC) campus	€ 5.8 billion (incl. € 2 billion state aid)	Delayed by one year; construction completion expected end-2027; water-supply contract signed June 2026.
Intel	Magdeburg, Germany	Advanced manufacturing	€ 30 billion	Cancelled; subsidies reallocated. Intel shifting focus to a € 5 billion expansion in Leixlip, Ireland.
GlobalFoundries / STMicroelectronics	Crolles, France	Capacity expansion (FD-SOI)	€ 7.5 billion	Stalled; partners redirecting investment toward the United States and China.

TSMC's own European commitment is unchanged in size—more than € 10 billion—but the relationships around it have deepened. In June 2026 the company entered a formal partnership agreement with ESMC and the Technical University of Dresden to advance semiconductor research and train skilled workers, a step toward establishing Dresden as a top-tier semiconductor cluster on the global stage. The original timeline for TSMC's collaboration projects has not slipped. Unlike several other European fab projects this year—the Silicon Box delay, Catania's one-year slip, and the continued stalling at Crolles—the ESMC/TSMC Dresden project remains the most reliably on-track major fab in Europe: construction

is essentially complete, supplier and community engagement is ramping toward operational readiness, and the 2027 production target has not moved.

Technological Frontiers: R&D Infrastructure and Advanced Packaging

A major milestone occurred on February 9, 2026, when imec inaugurated the NanoIC pilot line in Leuven, Belgium. Supported by approximately €700 million in EU funding and equipped with ASML's next-generation High-NA EUV lithography systems, NanoIC is designed to support sub-2nm and beyond-2nm research. The facility will also provide Process Design Kits (PDKs) to help European fabless companies and SMEs access advanced semiconductor design capabilities.

Advanced packaging has also emerged as a major policy priority. Technological progress in 2026 included imec's demonstration of hybrid bonding with a 20-micron pitch, Amkor's evaluation of glass substrates for AI and high-performance computing applications, and GlobalFoundries' development of Co-Packaged Optics (CPO) technologies in Dresden to reduce data-center latency.

In addition, STMicroelectronics entered high-volume production of its PIC100 silicon photonics platform in early 2026, enabling optical interconnect speeds of 800G and 1.6T for hyperscale AI data centers.

Structural Drivers: Automotive Electrification and AI Power Infrastructure

Meanwhile, the industrial sector is increasingly adopting “Physical AI” applications. Companies such as NXP have integrated neural-processing units (NPUs) into application processors like the i.MX 952 to enable real-time edge inference in factory automation and robotics.

Structural Vulnerabilities and Long-Term Outlook

Despite these strengths, Europe's semiconductor strategy faces persistent challenges. The most significant internal constraint is the shortage of skilled labor. Estimates suggest that Europe could face a shortfall of roughly 75,000 semiconductor professionals by 2030.

To address this gap, imec launched the CMOS 2.0 consortium in March 2026, bringing together 26 European universities to jointly fund doctoral training programs and share access to the NanoIC pilot line. Meanwhile, Dresden has introduced English-language vocational training programs aimed at attracting international talent.

Externally, geopolitical risks remain a major concern. Export restrictions by China on critical materials—including gallium, germanium, and graphite—highlight Europe's vulnerability in upstream supply chains. At the same time, persistently high energy prices continue to weigh on the economic

viability of semiconductor manufacturing in Europe.

Nevertheless, Europe retains several strategic advantages. Its dominance in lithography equipment led by ASML, its world-class research institutions such as imec, and its deep industrial integration in automotive and power electronics provide a foundation for long-term competitiveness. Rather than pursuing unrealistic production targets, Europe is increasingly positioning itself as an indispensable technological partner within the global semiconductor value chain.

IX. Singapore's Semiconductor Industry

1. Singapore in the Global Semiconductor Supply Chain

Within this group, Singapore occupies a particularly notable position. According to the Singapore Economic Development Board (EDB), the city-state is “already an integral part of the global semiconductor supply chain,” accounting for around 10% of all chips produced worldwide and approximately 20% of global semiconductor manufacturing equipment production, as reported in August 2024.¹³ This highlights Singapore's outsized importance relative to its geographic scale.

Singapore is also the world's primary production base for NAND flash memory, with Micron producing 98% of its NAND chips in the country. To meet the long-term demand for advanced memory solutions, Micron recently announced an investment of over S\$ 30 billion (approx. US\$ 22.3 billion) to build its first dual-layer wafer fab in Singapore, which is expected to create 1,600 jobs and commence production in the second half of 2028. In addition, Taiwan's United Microelectronics Corporation (UMC) is set to begin mass production in Singapore, further elevating the country's wafer capacity and solidifying its position in the global AI supply chain.

Singapore's economy is highly open and trade-dependent, a structure that underpins its critical role in the global semiconductor supply chain as both a major importer and exporter. According to the McKinsey Global Institute, 6% of all finished chips traded globally in 2022 originated from Singapore, with a total trade value of approximately US\$ 66 billion, ranking Singapore fifth worldwide, behind Taiwan, South Korea, China, and Malaysia (see Table 52).

¹³ “What makes Singapore a prime location for semiconductor companies driving innovation?” Economic Development Board, August 20, 2024.

Table 52. Total Value and Share of World's Top 10 Sources of Finished Chips: 2022

Rank	Country/ Territory	Share (%)	Value (US\$ billion)
1.	Taiwan	31	364
2.	South Korea	15	183
3.	China	14	165
4.	Malaysia	9	102
5.	Singapore	6	66
6.	Japan	5	61
7.	United States	4	50
8.	Philippines	3	36
9.	Vietnam	3	32
10.	Thailand	2	28

Source: "Top trading partners in components – chips in 2022," McKinsey Global Institute, Accessed September 12, 2024.

Singapore is equally significant as a destination within global semiconductor trade flows. In 2022, it ranked fourth among the top 10 export destinations for finished chips, accounting for 6% of global exports valued at around US\$ 64 billion. This placed Singapore just behind China, Hong Kong, and Taiwan as a key hub for semiconductor trade and redistribution (see Table 53).

Table 53. Total Value and Share of World's Top 10 Export Destinations of Finished Chips: 2022

Rank	Country/Territory	Share (%)	Value (US\$ billion)
1.	China	33	356
2.	Hong Kong SAR	18	197
3.	Taiwan	7	78
4.	Singapore	6	64
5.	South Korea	5	58
6.	Vietnam	5	50
7.	Malaysia	4	47
8.	United States	3	34
9.	Japan	3	32
10.	Germany	2	19

Source: "Top trading partners in components – chips in 2022," McKinsey Global Institute, Accessed September 12, 2024.

Across ASEAN, semiconductor activities are widely distributed — Malaysia dominates packaging, Vietnam is rapidly expanding assembly capacity, and the Philippines occupies specialised ATP niches. Yet

Singapore remains the region's technological anchor, uniquely capable of supporting the full spectrum of high-value manufacturing, advanced foundry operations, and premium packaging services. Its combination of industrial capability, institutional reliability, and strategic depth ensures that Singapore will continue to function as Southeast Asia's most critical semiconductor hub in the global semiconductor ecosystem (see Table 54).

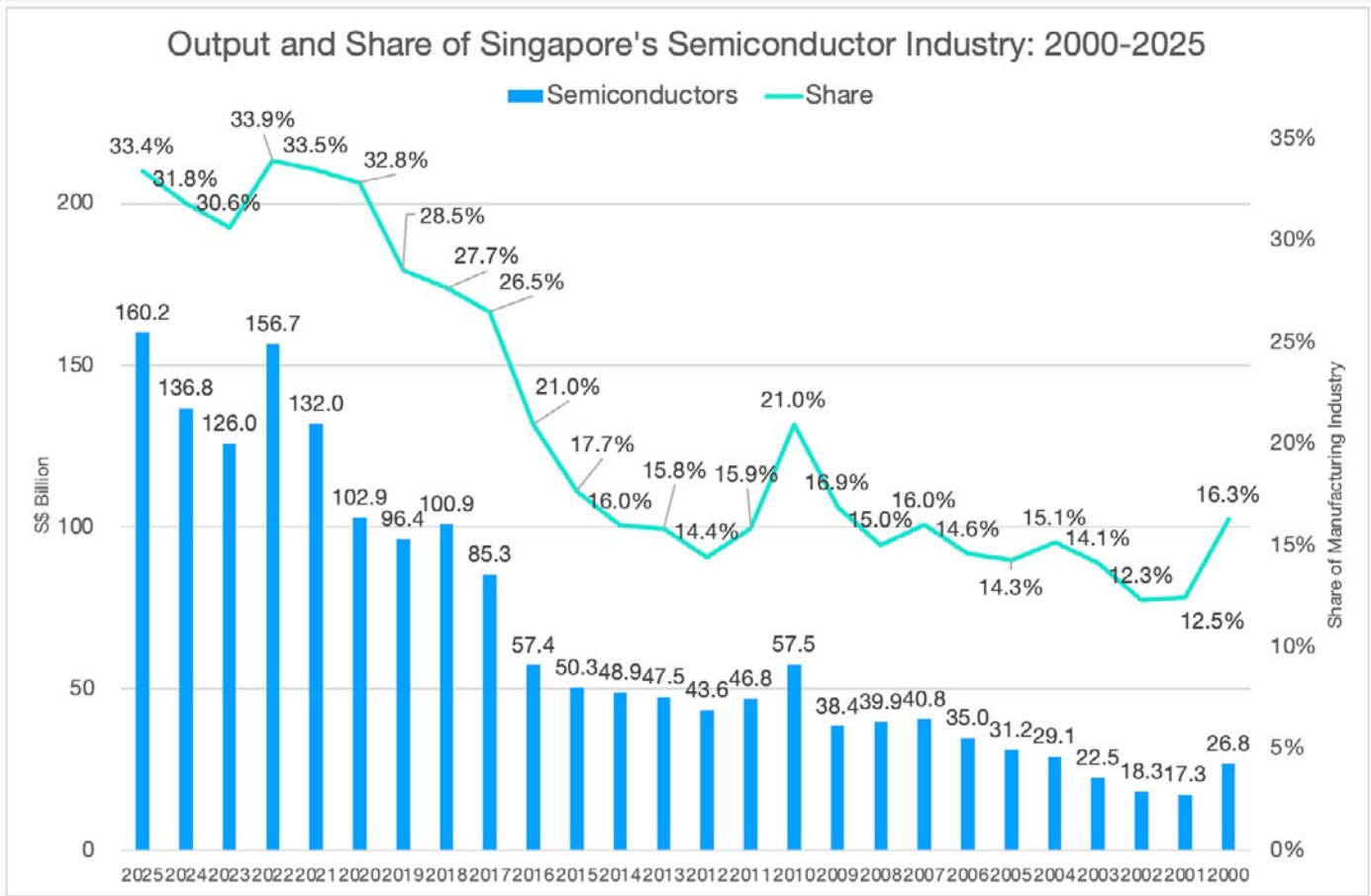
Table 54. Major Semiconductor Manufacturers' Manufacturing Base in Southeast Asia

EXPERTISE	SEMICONDUCTOR COMPANY	MANUFACTURING BASE
Integrated Device Manufacturing	Infineon Technologies	Singapore, Malaysia, Indonesia
	Intel	Malaysia, Vietnam
	Micron Technology	Singapore, Malaysia
	Texas Instruments	Malaysia, Philippines
	STMicroelectronics	Singapore, Malaysia
Assembly, Testing and Packaging	Advanced Semiconductor Engineering (ASE)	Malaysia, Singapore
	Jiangsu Changjiang Electronics Technology (JCET)	Singapore
	Amkor Technology	Malaysia, Philippines
	UTAC Holdings	Singapore, Thailand, Indonesia
Foundry	GlobalFoundries	Singapore
	United Microelectronics Corporation	Singapore
	VIS+NXP	Singapore

2. Current Status of Singapore's Semiconductor Industry

Looking at the development trajectory, Singapore's semiconductor sector was of moderate size in the early 2000s but already held an important position within the country's manufacturing landscape. Over time, the rapid global adoption of electronic devices, expanding chip demand, and continued investment by multinational semiconductor firms in Singapore helped drive steady growth in industry output. Since 2020, the acceleration of digital transformation and the surge in demand for cloud computing and high-performance computing have propelled the sector into a new expansion phase. Industry output climbed to S\$ 156.7 billion in 2022, and by 2025 it had reached a new peak (see Figure 41).

Figure 41. Output and Share of Singapore's Semiconductor Industry: 2000-2025



Source: Economic Development Board (Singapore), March 7, 2026, <https://tablebuilder.singstat.gov.sg/table/TS/M355171>.

The semiconductor industry plays a particularly significant role in Singapore’s overall economy. First, within the manufacturing sector, semiconductors account for a substantial share. In 2025, semiconductors represented 33.4% of Singapore’s total manufacturing output, meaning that more than 1 out of every 3 dollars generated in manufacturing came from the semiconductor industry. Importantly, this is not an isolated occurrence in a single year. In recent years, the semiconductor sector has consistently accounted for around one-third of manufacturing output. The share reached 33.9% in 2022, 31.8% in 2024, and even during the global semiconductor downturn in 2023 it remained at 30.6%. This trend clearly indicates that semiconductors have become the central pillar supporting Singapore’s high value-added manufacturing base.

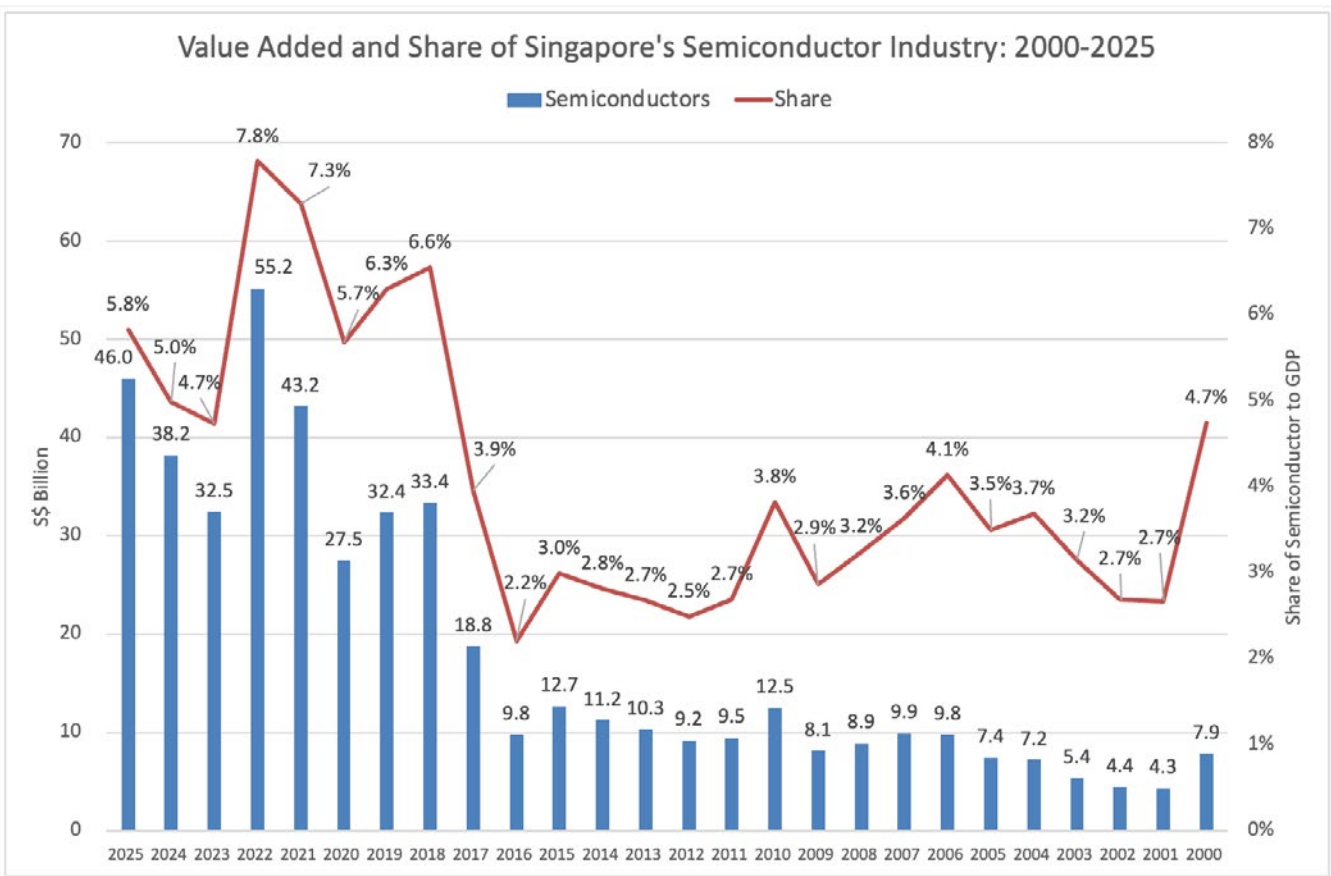
Second, the sector’s contribution to the broader economy is equally notable. In 2025, the semiconductor industry generated value added of S\$ 46.0 billion, accounting for approximately 5.8% of Singapore’s GDP. For an economy primarily driven by finance, logistics, and business services, a single manufacturing subsector contributing nearly 6% of GDP is highly significant. Historically, the semiconductor industry’s share of GDP has fluctuated with the global technology cycle but has generally ranged between 2% and 8%. The share rose to 7.3% in 2021 and peaked at 7.8% in 2022. Although it fell to 4.7% in 2023, it recovered to 5.0% in 2024 and further increased to 5.8% in 2025, underscoring the sector’s sustained role in supporting Singapore’s economic growth, exports, and industrial value creation.

Employment figures also highlight the importance of the semiconductor sector. In 2025, employment

in Singapore’s semiconductor industry reached 34,451 workers, slightly higher than 34,285 in 2024. Despite the industry’s highly automated and technology-intensive nature, employment has continued to grow steadily, reflecting ongoing demand for engineers, manufacturing specialists, and research and development professionals. This trend underscores the sector’s contribution not only to investment and exports but also to Singapore’s broader industrial upgrading and talent development.

Overall, the strong rebound of Singapore’s semiconductor industry in 2025 represents more than a cyclical recovery; it also reaffirms the sector’s long-term competitiveness. With annual growth of 17.1% in 2025, a CAGR of 8.8% from 2019 to 2025, and 7.4% from 2000 to 2025, combined with its 33.4% share of manufacturing output and 5.8% contribution to GDP, semiconductors have clearly become one of Singapore’s most strategically important industries (see Figure 42).

Figure 42. Value Added and Share of Singapore’s Semiconductor Industry: 2000-2025



Source: Economic Development Board (Singapore), March 7, 2026, <https://tablebuilder.singstat.gov.sg/table/TS/M355181>.

3. Strategy and Policies

Key Government Agencies

Singapore’s semiconductor industry is underpinned by a highly coordinated, whole-of-government approach, with the Ministry of Trade and Industry (MTI) and its statutory board, the Economic Development Board (EDB), playing central roles in shaping and guiding industrial development. As the lead agency responsible for economic and industrial strategy, MTI—through the EDB—supports the semiconductor sector by facilitating global industry linkages, providing market intelligence, and offering

targeted government incentives to anchor and expand semiconductor investments in Singapore. Other public agencies, including Enterprise Singapore, JTC Corporation, the Agency for Science, Technology and Research (A*STAR), and the Ministry of Education (MOE), complement these efforts by supporting enterprise development, infrastructure provision, research and innovation, and talent formation.

On the research and innovation front, the National Research Foundation (NRF) and the Research, Innovation and Enterprise 2025 (RIE2025) plan play pivotal roles in advancing Singapore’s semiconductor R&D capabilities. Established in 2006 under the Prime Minister’s Office, the NRF supports the Research, Innovation and Enterprise Council (RIEC) by coordinating national policies to strengthen research capacity, support economic growth, and address long-term national challenges. Over the period 2021–2025, the Singapore government committed to sustaining investment in research, innovation, and enterprise at around 1% of GDP, amounting to approximately S\$ 25 billion (about US\$ 18.3 billion).

Policy

To translate these objectives into concrete outcomes, Singapore has launched the Electronics Industry Transformation Map (ITM) 2025. The ITM provides a coordinated framework to drive productivity, innovation, skills development, and internationalization within the electronics and semiconductor industries, ensuring that Singapore remains well positioned to capture emerging opportunities in an increasingly competitive global semiconductor landscape (see Table 55).

Table 55. Singapore’s Semiconductor Policy

Guidance	Target	Manufacturing 2030 Grow Singapore’s manufacturing sector by 50% of its value in 2021 – valued at S\$ 106 billion (US\$ 80 billion) – while maintaining its share of about 20% of gross domestic product (GDP).
	Policy	Electronics Industry Transformation Map (ITM) 2025 - Ambition for Singapore to be a critical global node for advanced Electronics manufacturing and innovation. » Anchor R&D and manufacturing capabilities from globally leading companies to enhance Singapore’s leadership in key areas » Partner companies, Institutes of Higher Learning (IHLs) and the Singapore Semiconductor Industry Association to strengthen the local talent pipeline for growth areas. » Transform Singapore’s electronics manufacturing into a low-carbon footprint sector.

Measures	Key Initiatives	Tax Incentives • <u>Corporate Income Tax Exemptions</u> » 10-year exemption for advanced technology process nodes (28nm and below). » 5-year exemption for 65nm and below nodes fabrication lines. » 2-year exemption for 130nm and below fabrication lines. • <u>Pioneer Certificate Incentive</u> » Tax exemptions on qualifying income for up to 15 years. • <u>Development and Expansion Incentive</u> » Reduced corporate tax rate on qualifying income for up to 10 years. • <u>International Headquarters (IHQ) Award</u> » Tax at concessionary rate of 5%, 10% or 15% on qualifying income in excess of base income. Import Duty Exemptions: • Exemptions for IC manufacturers to purchase imported semiconductor materials and equipment. Investment in R&D: • S\$ 18 billion (US\$ 13.7 billion) allocated between 2021 and 2025 to support innovation in the semiconductor sector. • S\$ 112 million (US\$ 85 million) investment to set up the National Gallium Nitride Technology Centre. This “boutique foundry” will serve as a shared resource and translation centre, focusing on the development and commercialization of gallium nitride (GaN) technologies. Internship Opportunities: • EnterpriseSG, EDB, Singapore Precision Engineering and Technology Association, Singapore Semiconductor Industry Association and various industry partners have created quality internship opportunities for students from Polytechnics and Institutes of Technical Education.
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Outcome	Announcements on Key Investments	Feb 2022: UMC (Taiwan) announced plans to invest US\$ 5 billion in the phase 3 expansion of its Fab12i, or Fab12i P3, in Singapore and also designated the new facility one of the most advanced semiconductor fabs in the country, set to roll out chips made on its 22 nm and 28nm processes.
		Jul 2023: Silicon Box (Singapore) , a semiconductor heterogenous integration startup unveiled its S\$ 2 billion (US\$ 1.5 billion) advanced semiconductor manufacturing foundry for chiplets.
		Sep 2023: GlobalFoundries (U.S.) officially opened its new S\$ 5 billion (US\$ 4 billion) wafer fab facility in Singapore focused on end-markets such as automotive, 5G mobility and secure devices.
		Mar 2024: Advanced Substrate Technologies (AST) (Japan) , a subsidiary of TOPPAN Holdings Inc., broke ground on a Singapore facility to produce high end substrates and develop advanced technologies to meet global demand.
		Jun 2024: VisionPower Semiconductor Manufacturing Company (VSMC) , a joint-venture between VIS (Taiwan) and NXP Semiconductor (Netherlands), announced that it will build a S\$ 10.5 billion (US\$ 7.8 billion) wafer manufacturing plant in Singapore for automotive, industrial, consumer and mobile device markets.
		Jun 2024: Siltronic (Germany) opened its new S\$ 2.9 billion (US\$ 2.2 billion) production facility for 300mm wafers, making Singapore its largest production site globally.
		Jun 2024: Pall Corporation (U.S.) , opened a new S\$ 202 million (US\$ 150 million) state-of-the-art facility in Singapore to produce microelectronics filters for advanced node semiconductor manufacturing.
		Jun 2024: MediaTek (Taiwan) has committed to investing S\$ 500 million (US\$ 380 million) in

Note: () indicates headquarter location.

Incentives

To energize its semiconductor industry, Singapore has placed collaboration and ecosystem depth at the centre of its strategy, actively anchoring key players across the value chain. This includes major semiconductor equipment suppliers, wafer foundries, and integrated device manufacturers with substantial production bases in Singapore. As leading economies intensify efforts to secure control over chip production and critical technologies, competition to attract high-end semiconductor investments has become increasingly fierce, with large jurisdictions deploying massive subsidy packages to lure manufacturers. While Singapore cannot match the absolute scale of such subsidies, it compensates through highly targeted incentives and a set of structural advantages that sustain its competitiveness.

4. Updates in 2025-2026 and Prospects

A Strategic Inflection Point amid Geopolitical Realignment

The year 2025 has marked a decisive turning point for Singapore's semiconductor sector powered by a surge of capital-intensive, high-value investments. Singapore is rapidly transforming from a traditional manufacturing base into a critical node for advanced manufacturing and advanced packaging, particularly for complex HBM and AI-related chips. According to Bloomberg Intelligence, driven by the broader application of AI chips, the global advanced packaging market is expected to grow sevenfold to US\$ 80.5 billion by 2033, with a CAGR of 26%.

Micron Technology has designated Singapore as its global NAND Center of Excellence. In January 2026, Micron broke ground on a new advanced wafer fabrication facility located within its existing NAND manufacturing complex in Singapore. This represents a massive, planned investment of approximately US\$ 24 billion (S\$ 31 billion) over 10 years, with wafer output scheduled to begin in the second half of 2028. This complements Micron's earlier announced US\$ 7 billion High-Bandwidth Memory (HBM) advanced packaging facility, which is expected to begin operations in 2026.

In the foundry segment, VisionPower Semiconductor Manufacturing Company (VSMC)—a joint venture between Taiwan's Vanguard International Semiconductor (VIS) and the Netherlands' NXP Semiconductors—celebrated breaking ground on a US\$ 7.8 billion (S\$ 10.5 billion) 300mm wafer manufacturing facility in December 2024.

In the advanced packaging sector, Singapore-based startup Silicon Box reached a significant milestone in October 2025 by shipping 100 million units, proving its advanced panel-level packaging is ready to scale for AI and high-performance computing applications.

Additionally, GlobalFoundries acquired Singapore's Advanced Micro Foundry (AMF) to accelerate its global leadership in silicon photonics. In line with the acquisition, GlobalFoundries plans to establish a silicon photonics research and development center of excellence in Singapore in partnership with A*STAR, focusing on next-generation materials for ultra-fast data transfer at 400Gbps speed. Marvell Technology also broke ground on its new regional headquarters in Singapore, expanding its IC design and test operations to serve its growing customer base.

On the regulatory front, in response to the tightening of global technology export controls and incidents of sanctions evasion, Singapore Customs and the Ministry of Trade and Industry issued a Joint Advisory on April 4, 2025, regarding "Export Controls on advanced semiconductor and artificial intelligence (AI) technologies". This advisory was issued following high-profile enforcement actions. Notably, in February 2025, authorities conducted a joint operation raiding 22 locations and arresting individuals linked to a S\$ 500 million (US\$ 390 million) scheme that used false representations to illicitly route servers containing highly advanced U.S. chips through Singapore. The advisory emphasizes the need for businesses to implement robust internal compliance programs and engage legal expertise to ensure

they do not indirectly supply restricted entities, thus protecting Singapore’s reputation as a trusted and neutral global hub.

From Manufacturing Hub to Innovation Platform

The launch of RIE2030 in December 2025 marked an historic investment in research, allocating S\$ 37 billion—about US\$ 28.5 billion—over 2026–2030, a 32 percent increase from the previous cycle. A defining innovation is the creation of “Flagship” programs that target national-level challenges, with the Semiconductor Flagship receiving a substantial share of a S\$ 3 billion pooled allocations. In March 2026, the government announced a dedicated investment of S\$ 800 million to establish the Research, Innovation and Enterprise (RIE) Flagship specifically focused on semiconductor research. The initiative reflects a strategic choice: rather than competing in ultra-leading-edge front-end logic dominated by TSMC, Singapore aims to build depth in advanced packaging, heterogeneous integration and photonics to enhance chip performance and reduce energy consumption.

Industry developments in 2024–2026 have reinforced this momentum. Micron’s US\$ 7 billion advanced packaging facility—the first dedicated HBM plant in Singapore—anchors the country inside the most critical bottleneck of the global AI hardware supply chain. The facility is expected to begin initial operations in 2026 and achieve meaningful capacity ramp-up in 2027. GlobalFoundries’ acquisition of AMF solidifies Singapore’s position in silicon photonics, with the establishment of a Silicon Photonics Center of Excellence ensuring that R&D capabilities remain rooted locally. The VIS–NXP joint-venture fab, valued at US\$ 7.8 billion, has similarly accelerated construction to meet urgent global demand for diversified production of automotive and industrial chips (see Table 56).

Table 56. Progress of Semiconductor Investment and Production in Singapore: 2025

Company / Project	Technology / Focus	Investment	Status & Milestones
Micron	Advanced Packaging (HBM)	US\$ 7 billion	First dedicated HBM plant in Singapore; initial operations in 2026; ramp-up in 2027.
VIS – NXP (Joint Venture)	Automotive & Industrial chips	US\$ 7.8 billion	Construction accelerated to meet urgent global demand for diversified production.
GlobalFoundries	Silicon Photonics	n.a.	Acquired AMF; established a Silicon Photonics Center of Excellence for R&D.

Next-Frontier Technologies and the Talent Constraint

Despite these advancements, talent remains the sector's most critical constraint. Southeast Asia faces a shortage of roughly 34,000 semiconductor engineers, and Singapore's tight labour market has intensified wage pressures and inter-firm poaching. Shortages are especially severe in fields such as photonics, data science and AI-integration engineering. The government's response includes enhanced visa pathways, the Global Founder Programme and expanded RIE2030 postdoctoral funding. Universities have modernized curricula, while industry associations have stepped up mid-career reskilling, successfully drawing workers from declining sectors into semiconductor roles.¹⁴

Together, these developments depict an ecosystem shaped by geopolitical realignment, technological ambition and policy continuity. Singapore's combination of trustworthiness, research intensity and industrial depth has positioned it not merely as a participant in the world's semiconductor expansion, but as one of the strategic centres helping to define its next phase.

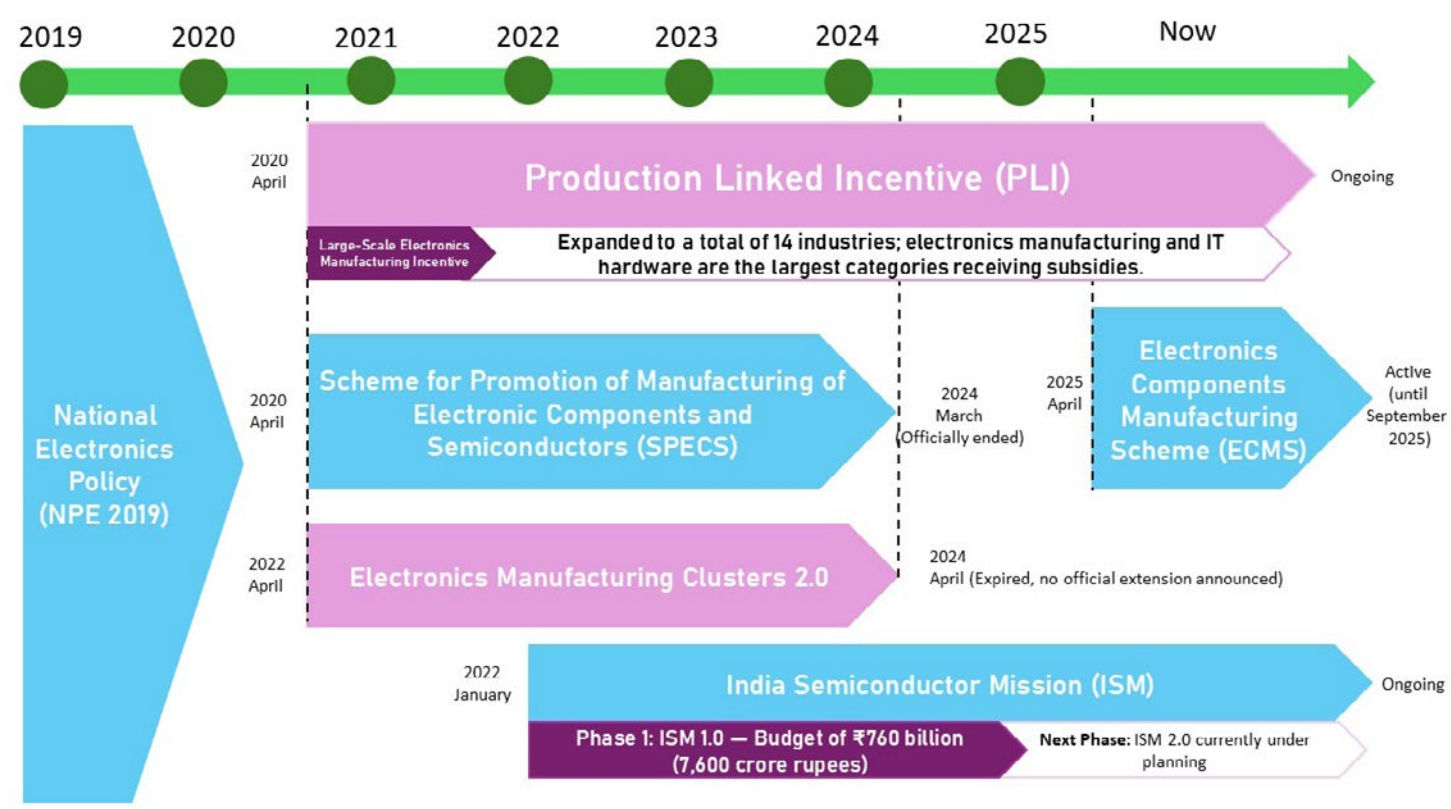
¹⁴ Mordor Intelligence Research & Advisory, "Singapore Semiconductor Market Size & Share Analysis - Growth Trends and Forecast (2025 - 2030)," Mordor Intelligence, August 2025.

X. India’s Semiconductor Policy

Since the release of the National Policy on Electronics 2019 (NPE 2019), India has continued to advance the upgrading of its electronics and semiconductor industries. The policy scope spans semiconductors, automotive electronics, ICT equipment, medical electronics, and more, with the core objective of positioning India as a global hub for Electronics System Design and Manufacturing (ESDM).

Building on this policy framework, the Indian government has, over the past six years, introduced a series of concrete incentive and subsidy programs. These include the Scheme for Promotion of Electronic Components and Semiconductors (SPECS), the Electronics Manufacturing Clusters Scheme (EMC 2.0), the Production-Linked Incentive (PLI) Scheme, and the latest Electronic Components Manufacturing Scheme (ECMS). In 2022, the government also officially launched the India Semiconductor Mission (ISM), forming a more comprehensive support architecture for the semiconductor sector (see Figure 43).

Figure 43. Major Milestones of India’s Electronics Manufacturing and Semiconductor Policies: 2019–2025



Source: Thomas Hsu, “Chips Amid Global Trade Conflicts: India’s Semiconductor Policy and Industry,” IEK, ITRI, October 22, 2025, p. 1.

1. Policy Priorities and Strategic Directions

India Semiconductor Mission (ISM)

To strengthen semiconductor production capacity and supply chain resilience, the Indian government launched the Semicon India Programme at the end of 2021 and established the India Semiconductor Mission (ISM) as the central implementing agency. Under the Ministry of Electronics and Information

Technology (MeitY), ISM oversees policy planning, funding allocation, project evaluation, and program monitoring. The first phase of ISM is budgeted at INR 760 billion (approximately US\$ 9 billion), covering wafer fabs, assembly and test facilities, IC design, and supply chain integration, with the aim of increasing India’s semiconductor self-reliance and global competitiveness.

2. India Semiconductor Mission

The India Semiconductor Mission (ISM), led and implemented by the Ministry of Electronics and Information Technology (MeitY), serves as the central body responsible for strategic planning and execution related to the semiconductor industry. Its mandate spans industrial strategy, manufacturing facility deployment, ecosystem development, supply chain security and localization, technology transfer and international collaboration, R&D and innovation capacity building, promotion of industry–academia–research linkages, and the formation of semiconductor clusters.

3. Policy Outcomes

(1) Ten Semiconductor Manufacturing Projects Approved

India’s IC design sector is relatively mature, with many global IDMs and fabless companies having established R&D centers in the country. To strengthen the manufacturing segment and build deeper indigenous capabilities, the Indian government has provided substantial subsidies to attract international semiconductor leaders for technology partnerships, forming a “government funding + corporate investment + international technology collaboration” model.

In August 2025, ahead of Prime Minister Modi’s visit to Japan and the SEMICON India 2025 event, the Union Cabinet approved four additional semiconductor projects. With these new approvals, the total number of sanctioned semiconductor manufacturing projects has reached ten (see Table 57). The key details are as follows:

Table 57. Ten Approved Investment Projects under the India Semiconductor Mission

No	Company	Location	Investment Size	Type	Approval Date
1	Micron Technology (US)	Sanand, Gujarat	US\$ 2.75 B (INR 225.1 B)	IDM ATMP Facility	2023.6
2	Tata Electronics + PSMC (TW)	Dholera, Gujarat	US\$ 10.9 B (INR 915.2 B)	Wafer Fab (Fab)	2023.6
3	Tata Semiconductor Assembly Test	Marigaon, Assam	US\$ 3.26 B (INR 271.2 B)	OSAT Facility	2024.2
4	CG Power + Renesas (JP) + Stars (TH)	Sanand, Gujarat	US\$ 920 M (INR 76.0 B)	IDM ATMP Facility	2024.2

5	Kaynes Semicon	Sanand, Gujarat	US\$ 400 M (INR 33.0 B)	OSAT/ATMP Facility	2024.9
6	HCL + Foxconn (TW)	Jewar, Uttar Pradesh	US\$ 440 M (INR 37.0 B)	OSAT Facility	2025.5
7	SiCSem + Clas-SiC (UK)	Bhubaneswar, Odisha	US\$ 233 M (INR 20.66 B)	IDM ATMP Facility	2025.5
8	3D Glass Solutions (US)	Odisha	US\$ 220 M (INR 19.43 B)	IDM ATMP Facility	2025.8
9	Continental Device India	Mohali, Punjab	US\$ 13 M (INR 1.17 B)	IDM ATMP Facility	2025.8
10	ASIP + APACT (KR)	Andhra Pradesh	US\$ 53 M (INR 4.68 B)	OSAT Facility	2025.8

Source: Thomas Hsu, "Chips Amid Global Trade Conflicts: India's Semiconductor Policy and Industry," IEK, ITRI, October 22, 2025, p. 4-5.

Tata Electronics is investing about US\$ 10.9 billion to build a 12-inch wafer fab in Dholera, Gujarat—the only wafer fabrication project among the ten ISM-approved investments, and the first major fab led by an Indian conglomerate. PSMC will provide mature-node technologies and guidance on fab construction, including 28 nm, 40 nm, 55 nm, 90 nm, and 110 nm processes, as well as support in establishing quality management systems and operational workflows. The fab is designed for a monthly capacity of 50,000 wafers, producing PMICs, display driver ICs, MCUs, and logic chips for high-performance computing, with volume production expected to begin in 2026. To address talent shortages, Tata has been sending engineers to Taiwan for professional training since 2025.

Indian IT and engineering group HCL, together with Taiwan's Foxconn, will establish an OSAT plant in Jewar, Uttar Pradesh, with an investment of about US\$ 440 million. Approved in May 2025, it will be the state's first semiconductor facility. The project received a combined 70% subsidy from central and state governments, along with additional tax incentives. The plant will focus on wafer-level packaging and display driver ICs, with a planned capacity of 20,000 wafers per month and an annual output of about 36 million units—strengthening India's footprint in mobile, laptop, and automotive semiconductor supply chains.

Despite the Modi administration's strong policy push and the active efforts of various state governments to attract semiconductor investment through fiscal incentives and subsidies, India still faces significant challenges in building a comprehensive semiconductor ecosystem. In recent years, several proposed projects have been delayed or suspended due to concerns about market conditions, financing risks, and policy uncertainties—highlighting the institutional and structural hurdles that remain in India's semiconductor development trajectory.

(2) Major Semiconductor Investment Projects Put on Hold in India

Initially announced in September 2022 as a US\$ 19.5 billion joint venture to build India's first 12-inch wafer fab, the project faced a major setback when Foxconn withdrew in July 2023, prompting Vedanta to

seek new technology partners (see Table 58).

Table 58. Four Deferred Investment Cases in India's Semiconductor Projects

No	Investment / Partner Companies	Project Timeline	Reason for Suspension
1	Kaynes Semicon (India) / Aptos Technology (Taiwan)	2024.2–2025.6	Partnership collapsed
2	Zoho (India)	2024.5–2025.5	Zoho announced project suspension
3	Adani Group (India) / Tower Semiconductor (Israel)	2024.9–2025.4	Adani suspended cooperation after evaluation
4	Vedanta (India) / Foxconn (Taiwan)	2022.9–2023.7	Foxconn announced withdrawal from joint venture operation

Source: Thomas Hsu, "Chips Amid Global Trade Conflicts: India's Semiconductor Policy and Industry," IEK, ITRI, October 22, 2025, p. 7.

At the same time, Indian firms have begun adopting more proactive strategies to narrow the technological gap with global semiconductor leaders. These efforts increasingly involve overseas acquisitions and technology-driven mergers. Such developments indicate that industry stakeholders recognize that relying solely on domestic fab construction and government subsidies is insufficient to reach international competitiveness. Instead, integrating external technology and expanding globally have become critical pathways for accelerating capability development.

4. Updates in 2026 and Prospects

In 2026, India's semiconductor development entered a new phase, shifting from an earlier stage focused primarily on policy formulation and investment attraction toward tangible progress in multi-node manufacturing and pilot production. A milestone was reached on February 28, 2026, when Micron Technology officially began commercial operations at its ATMP facility in Sanand, Gujarat. This marked India's first commercial semiconductor packaging output and a symbolic step forward in establishing a domestic semiconductor supply chain.

At the policy level, the government launched the India Semiconductor Mission 2.0 (ISM 2.0) in February 2026. With an initial allocation of approximately US\$ 96–120 million for FY2026–27, the program represents a strategic shift from simply subsidizing fabrication facilities toward strengthening upstream capabilities. The initiative emphasizes the localization of semiconductor manufacturing equipment, specialized materials, domestic intellectual property, and talent development.

In parallel, the government expanded the Electronic Components Manufacturing Scheme (ECMS), increasing its budget to roughly US\$ 480 million to support the localization of printed circuit boards (PCBs) and passive components, thereby reinforcing the broader electronics manufacturing ecosystem.

Front-end manufacturing also made visible progress. The Tata Electronics–PSMC joint 12-inch wafer

fab in Dholera reached approximately 45–50 percent completion of civil construction by the first quarter of 2026. The project aims to produce its first “Made in India” wafer tape-out by late 2026, with mass production planned for 2027.

In the back-end segment, the HCL–Foxconn OSAT joint venture held its groundbreaking ceremony in Greater Noida in February 2026. Full-scale production is expected by 2028, further expanding India’s semiconductor packaging and testing capacity.

With these developments, the government’s Semicon India Programme has expanded to ten approved projects, attracting a cumulative investment of roughly US\$ 19.3 billion.

To cultivate domestic innovation and design capabilities, the “Chips to Start-up” (C2S) program was expanded to 500 academic institutions in March 2026, enabling large-scale training in integrated circuit design and providing free access to industry-grade EDA tools.

Meanwhile, under the Digital India RISC-V initiative, the domestically developed 64-bit microprocessor DHRUV64 entered the prototype validation stage in 2026, representing another step toward India’s ambition of achieving “silicon sovereignty.”

On the international front, India reinforced its alignment with trusted technology supply chains by formally joining the U.S.-led “Pax Silica” initiative on February 20, 2026. The framework integrates cooperation in semiconductors, critical minerals, and artificial intelligence infrastructure within a broader economic security architecture.

XI. Conclusion

1. Semiconductors in the Age of AI Competition

Semiconductors—often described as the “oil” of the twenty-first century—have now fully assumed their role as the indispensable infrastructure of the global digital economy. As this book demonstrates through data-driven analysis and comparative policy assessment, the industry has entered a decisive phase in which artificial intelligence, national industrial strategies, and intensifying geopolitical competition are jointly reshaping the global semiconductor landscape. The advance beyond a trillion-dollar market in 2026 and toward US\$ 2 trillion by 2027 therefore represents not merely an expansion in scale, but a profound structural transformation in how technology, power, and economic value are organized at the global level.

As a result, advanced-node manufacturing—particularly logic and memory chips below 7 nanometers—has emerged as a strategic bottleneck. These technologies have become focal points of capital expenditure, industrial policy, and geopolitical concern. The industry’s center of gravity is no longer defined primarily by production volume or cost efficiency, but by the ability to sustain leadership at the technological frontier under conditions of extreme capital intensity, rapid innovation cycles and strategic global realignment. In this AI-driven super-cycle, semiconductor competitiveness is no longer merely an industrial matter; it is a defining element of national power, technological sovereignty and global economic governance (see Figure 44).

Figure 44. Global Semiconductor Landscape: 2025



2. Taiwan: Anchoring the AI-Driven Semiconductor Era

Taiwan's central role in the global semiconductor industry is not a short-term phenomenon driven by temporary market fluctuations, but the outcome of long-term structural consolidation, clearly supported by empirical data. In wafer foundry services, Taiwan's global market share rose steadily from 69.0 percent in 2011 to 79.7 percent in 2021, before easing to 75.2 percent in 2023 amid cyclical adjustment. By 2024, Taiwan's share rebounded to 78.1 percent, and the Industrial Technology Research Institute (ITRI) projects a further increase to 78.6 percent in 2025, underscoring the durability of its competitive position.

At the core of this structural dominance lies the geographic concentration of advanced manufacturing. By keeping the most advanced processes in Taiwan, maintaining the vast majority of advanced production capacity in Taiwan, and anchoring high-end technology R&D centers in Taiwan, the island's competitive advantage remains absolute. Despite the outward expansion of production footprints, Taiwan remains the immovable center of TSMC's manufacturing gravity. TSMC's dominance in the foundry sector reached historic highs, capturing 71.0 percent of the global market in the third quarter of 2025.

TrendForce further forecasts that in the fourth quarter of 2025, TSMC will control approximately 69 percent of global advanced-process capacity, far surpassing Samsung's 21 percent and Intel's 10 percent. As of late 2025, more than 90 percent of TSMC's total production capacity—and an even higher proportion of its advanced-node output—continues to be located in Taiwan. In the AI era, where performance, yield learning, and time-to-scale are decisive, this clustering effect has become a strategic asset rather than a vulnerability.

3. The United States: Strategic but Selective Reindustrialization

On the manufacturing front, TSMC's progress in Arizona has been the most emblematic. In early 2025, the first fab of Fab 21 in Phoenix entered volume production using the 4-nanometer process, reportedly achieving yield rates roughly four percentage points higher than comparable fabs in Taiwan. Building on this foundation, TSMC confirmed plans for a six-fab "Gigafab" cluster in Arizona with total investment of approximately US\$ 165 billion. If fully realized, the campus could account for more than 30 percent of TSMC's global sub-2-nanometer capacity, highlighting the deepening alignment between Taiwan's technological core and U.S. industrial policy.

Taken together, U.S. semiconductor reindustrialization is real but selective. Advanced capacity is returning, yet unevenly across firms, technology nodes, and timelines, reinforcing supply-chain resilience rather than displacing established global centers of excellence.

4. China: Ambition and the Limits of Semiconductor Self-Reliance

China's semiconductor strategy offers one of the clearest illustrations of the gap between policy ambition and industrial reality. Under the original Made in China 2025 framework, Beijing set explicit targets to raise domestic semiconductor content to 40 percent by 2020 and 70 percent by 2025. These targets proved unattainable and were revised in 2019, shifting policy emphasis toward aggregate output—US\$ 305 billion in semiconductor production by 2030—and meeting 80 percent of domestic demand.

Financial performance reinforces these structural constraints. SMIC recorded record revenue of US\$ 8.0 billion in 2024, yet net margins compressed to 6.1 percent, compared with TSMC's 40.5 percent. Full-year data from 2025 confirm that this divergence is structural rather than cyclical: while SMIC achieved a record revenue of US\$ 9.33 billion, its net margin remained constrained at 7.3 percent. In stark contrast, TSMC reached a record revenue of US\$ 122.42 billion and sustained an overwhelming net margin of 45.1 percent. China's semiconductor drive has therefore increased autonomy in quantity, but not in quality, profitability, or technological leadership.

5. Korea: The Memory Superpower in the AI Era

South Korea remains the undisputed leader of the memory sector, yet its role is evolving from a volume supplier into a strategic linchpin of the AI era. Accounting for roughly 12 percent of the global semiconductor value chain and about 60 percent of the memory market, Korea's strength is most pronounced in high-bandwidth memory (HBM), a critical bottleneck for AI accelerators. SK hynix and Samsung Electronics command an estimated 80–90 percent of global HBM supply, elevating Korea from a commodity producer to a co-architect of the AI computing ecosystem alongside logic leaders such as NVIDIA.

To defend this lead amid intensifying competition and geopolitical uncertainty, Korea has unveiled the “K-Semiconductor Vision and Strategy in the AI Era.” The plan commits approximately KRW 700 trillion (US\$ 520 billion) through 2047 to strengthen the domestic ecosystem, anchored by a semiconductor supercluster in Gyeonggi Province. This initiative aims to build 16 new fabs and establish the world's largest integrated complex, targeting monthly capacity of 7.7 million wafers by 2030.

6. Japan and Europe: Divergent Paths in Semiconductor Reindustrialization

Advanced economies increasingly frame semiconductors as a pillar of economic security, yet Japan and Europe exemplify two sharply contrasting approaches—and outcomes—in state-led reindustrialization.

Japan has pursued one of the most ambitious and coherent semiconductor revival strategies among

advanced economies. Between 2021 and 2023, the Japanese government allocated approximately US\$ 25.7 billion—about 0.71 percent of GDP—to semiconductor support, with cumulative assistance projected to approach US\$ 67 billion by 2030. This scale of commitment reflects a clear strategic consensus on the sector’s economic and technological importance.

Europe’s trajectory, by contrast, has been marked by ambition outpacing industrial reality. The European semiconductor strategy unveiled in 2021–2022 set a headline goal of doubling Europe’s global market share to 20 percent by 2030. Market trends, however, point in the opposite direction. According to WSTS estimates, Europe’s share is expected to fall to around 7.0 percent in 2025 and further to approximately 6.2 percent in 2026. In April 2025, the European Court of Auditors concluded that Europe is “very unlikely” to meet its target, projecting a rise to only about 11.7 percent by 2030.

Industrial outcomes reflect these constraints. The most credible new anchor project is the European Semiconductor Manufacturing Company (ESMC) in Dresden, a € 10 billion joint venture led by TSMC with Bosch, Infineon, and NXP. Focused on 28/22nm and 16/12nm nodes, the fab will reinforce Europe’s automotive and industrial semiconductor base but does not materially alter its position at the leading edge of logic manufacturing. Other flagship initiatives have struggled, most notably Intel’s Magdeburg megafab, which was canceled in mid-2025, highlighting the difficulty of sustaining large-scale greenfield investments.

7. Singapore and India: Strategic Nodes in a Fragmented System

Singapore stands at a strategic inflection point amid accelerating geopolitical realignment. Accounting for roughly 10 percent of global semiconductor production and about 20 percent of equipment manufacturing, it has leveraged the “China-Plus-One” shift to attract capital-intensive investments in advanced packaging, mature-node production, and regional headquarters.

India, by contrast, is a late entrant with substantial strategic optionality and demographic scale. Through the India Semiconductor Mission, India has mobilized over US\$ 10 billion in fiscal incentives, including up to 50 percent capital subsidies, to seed a domestic ecosystem. Ten major projects have been secured, notably a commercial wafer fab by Tata Electronics and PSMC (US\$ 10.9 billion), and a flagship OSAT facility by Micron (US\$ 2.75 billion), signaling credible initial momentum.

8. Safeguarding Resilience and Peace

The global semiconductor industry is entering a new phase defined by concentrated interdependence. While manufacturing footprints are gradually becoming more geographically diversified, technological leadership—especially in AI-enabling, angstrom-class nodes—remains highly concentrated. No single country commands the full semiconductor value chain, and no realistic pathway toward comprehensive self-sufficiency exists without incurring prohibitive economic costs

Within this structurally interdependent system, Taiwan occupies a uniquely central position. Its importance derives not only from scale, but from sustained leadership in advanced-node manufacturing. As chips penetrate virtually every sector of production and serve as foundational enablers of artificial intelligence, the stability of Taiwan's semiconductor ecosystem has become inseparable from global economic stability. Any major disruption to Taiwan's semiconductor supply chain would be catastrophic, with consequences extending far beyond the immediate region.

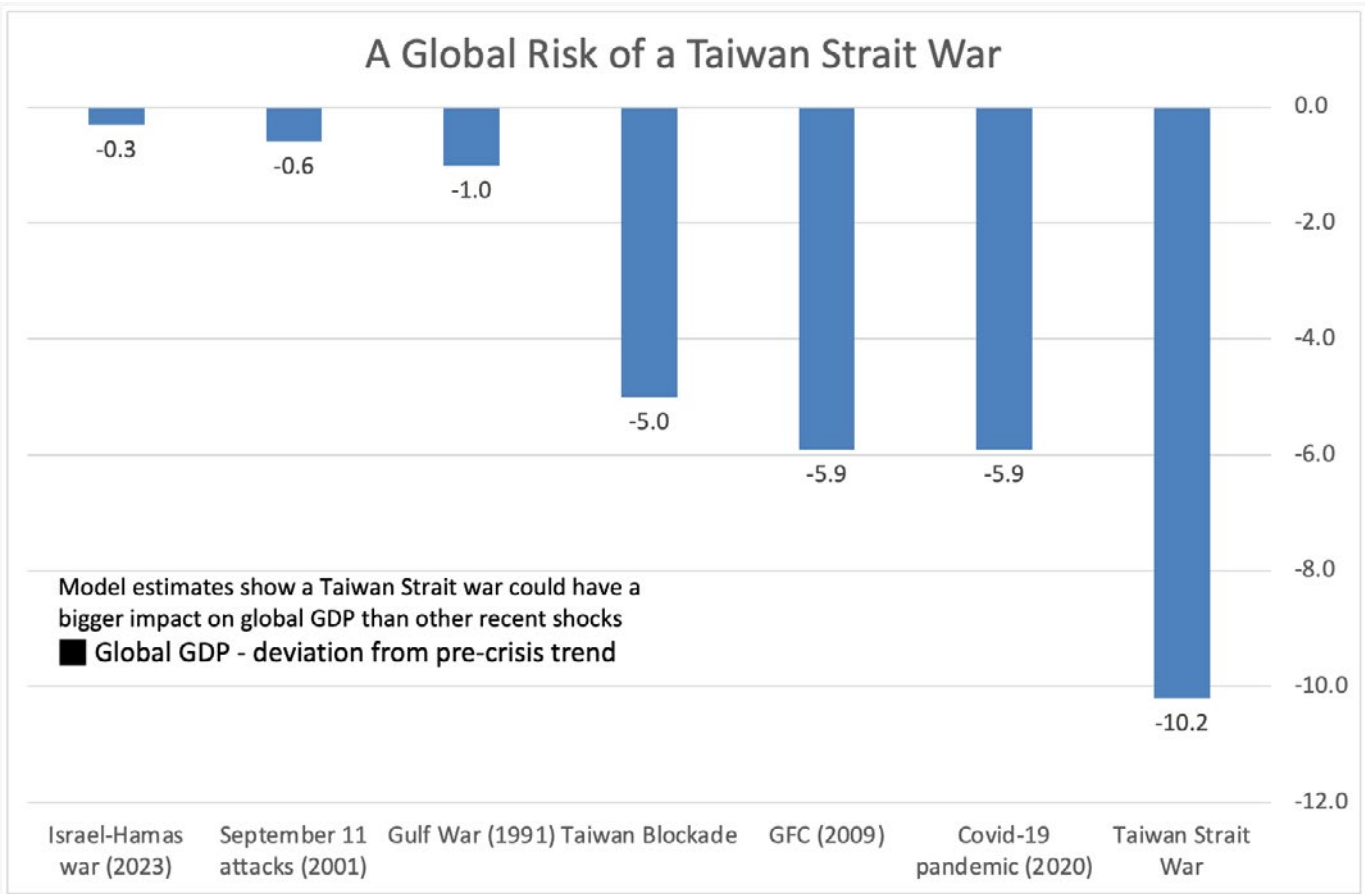
On January 8, 2026, Singapore's Senior Minister Lee Hsien Loong, speaking at the Regional Outlook Forum, drew international attention to the Taiwan Strait. He stated candidly: "if there is trouble Cross-straits, that is trouble not just for Taiwan and China, or the US and China, but for the whole region and for the world. And so we believe that it is important that there is peace in the Taiwan Strait."

International assessments are increasingly converging on this conclusion. The United States has explicitly framed peace and stability in the Taiwan Strait as a shared global interest. Antony J. Blinken, then U.S. Secretary of State, observed on July 14, 2023, that approximately half of global commercial shipping transits the Taiwan Strait each day, and that around 70 percent of the world's semiconductors are manufactured in Taiwan. From this perspective, opposition to unilateral changes to the status quo is not merely a political position, but a recognition of Taiwan's centrality to global trade flows and technological continuity.

This assessment has since been echoed at the highest levels of U.S. economic policymaking. Speaking at the World Economic Forum in Davos on January 21, 2026, U.S. Secretary of the Treasury Scott Bessent warned: "I would say that the single biggest threat to the world economy, the single biggest point of single failure, is that 97 percent of high-end chips are made in Taiwan. If that island were blockaded, or that capacity were destroyed, it would be an economic apocalypse."

These concerns are reinforced by independent economic assessments. According to Bloomberg Economics' model estimates, the economic cost of a major conflict in the Taiwan Strait could reach approximately US\$ 10 trillion, representing a 10.2 percent deviation from the global pre-crisis GDP trend—a magnitude that would eclipse the impact of most modern global crises, including the Covid-19 pandemic (-5.9%), the Global Financial Crisis in 2009 (-5.9%), the 1991 Gulf War (-1.0%), the September 11 attacks (-0.6%), and the 2023 Israel-Hamas war (-0.3%) (see Figure 45).

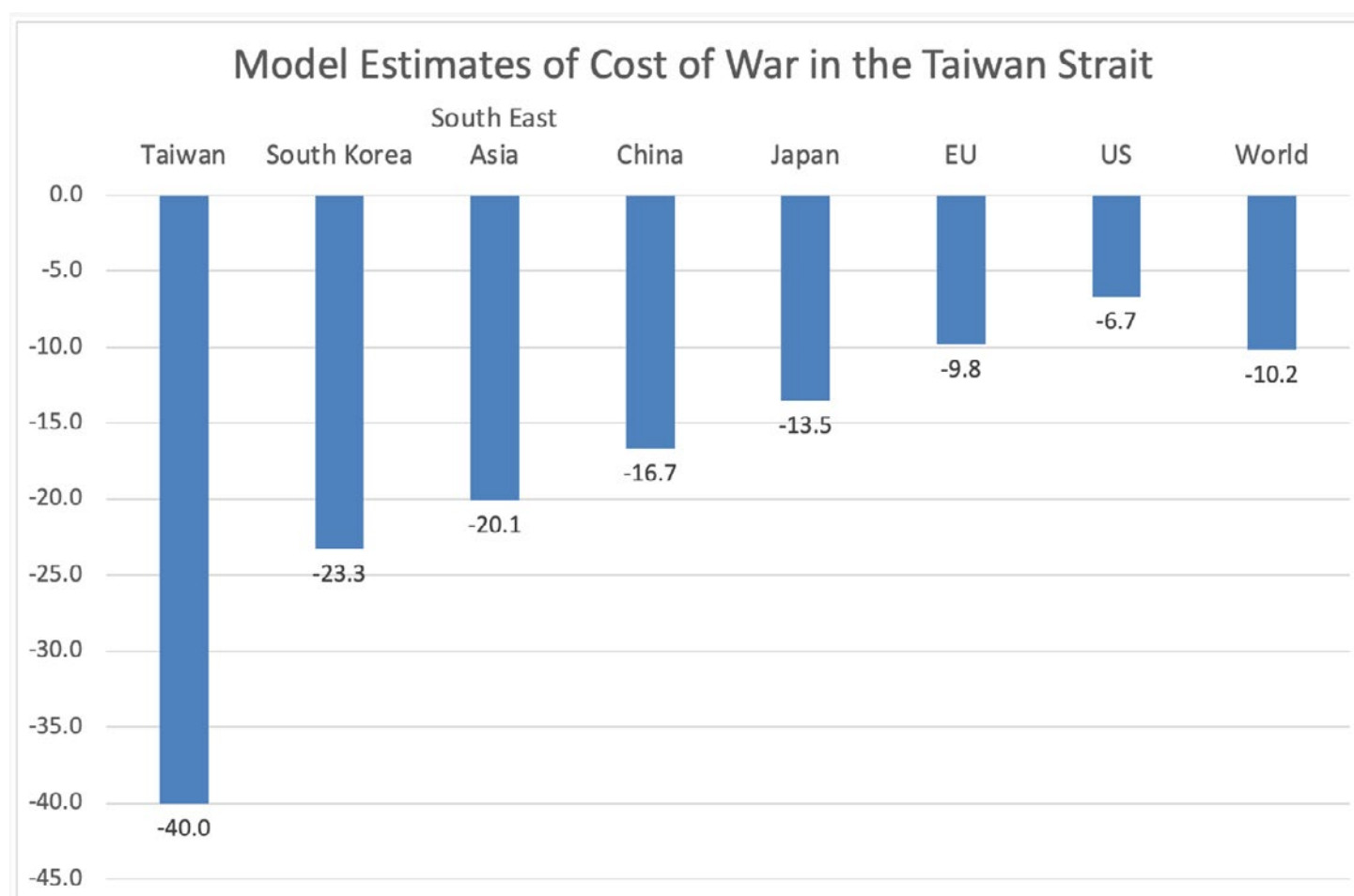
Figure 45. A Global Risk of a Taiwan Strait War



Source: Bloomberg, “Xi, Biden and the \$10 Trillion Cost of War Over Taiwan,” Bloomberg, January 8, 2024.

Even a Taiwan Strait blockade scenario would trigger a severe 5.0 percent drop in global GDP. The shockwaves of a Taiwan Strait war would devastate economies across the globe. According to the same Bloomberg Economics model, Taiwan’s GDP would be decimated by 40.0 percent. Neighboring manufacturing and trade hubs would also suffer catastrophic contractions, with South Korea’s GDP plunging by 23.3 percent, South East Asia by 20.1 percent, China by 16.7 percent, and Japan by 13.5 percent. Major Western economies would not be spared, as the EU and the US are projected to face GDP declines of 9.8 percent and 6.7 percent, respectively (see Figure 46).

Figure 46. Model Estimates of Cost of War in the Taiwan Strait

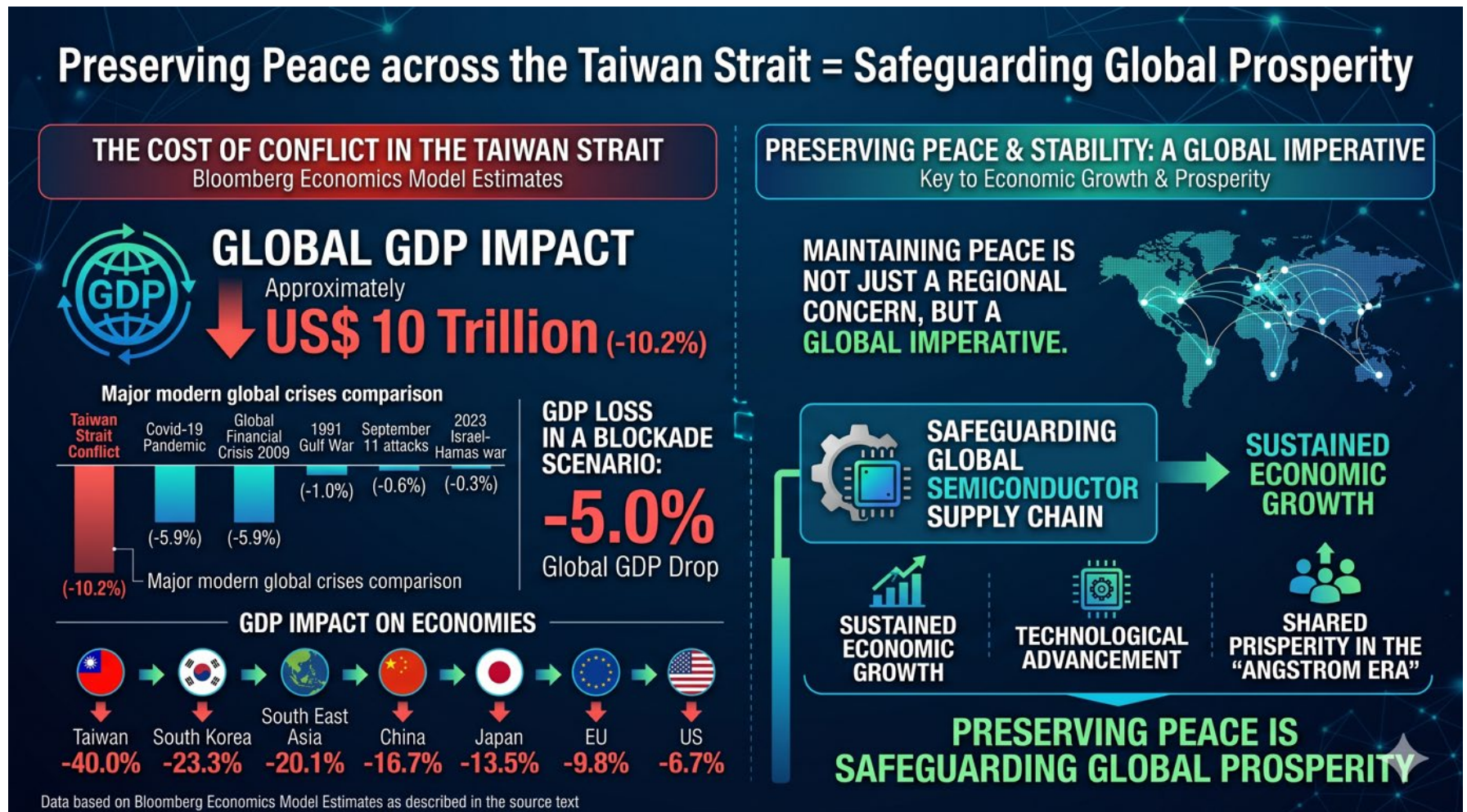


Source: Bloomberg, “Xi, Biden and the \$10 Trillion Cost of War Over Taiwan,” Bloomberg, January 8, 2024.

Furthermore, a June 2026 study by the International Institute for Strategic Studies (IISS), titled “The Impact of a Taiwan Strait Crisis or Conflict on the Malaysian Economy: Possible Scenarios,” illustrates the scale of the risk for Southeast Asia. The study estimates that, under a hypothetical one-year military conflict across the Taiwan Strait, Malaysia could suffer economic losses of approximately RM 790 billion—equivalent to 41 percent of its GDP—affecting an estimated 2.6 million jobs. Even an economic quarantine of Taiwan by China, well short of open hostilities, would cause Malaysia losses equivalent to 4.1 percent of its GDP. The study also finds that a full conflict could reduce global trade by as much as 50 percent at its peak.

Taken together, these assessments reinforce a central conclusion: preserving peace and stability across the Taiwan Strait is not merely a regional concern, but a global imperative. Countries committed to sustained economic growth, technological advancement, and shared prosperity in the “Angstrom Era,” all have a vital stake in safeguarding the resilience of the global semiconductor supply chain—and, inseparably, in maintaining peace and stability across the Taiwan Strait. In short, preserving peace in the Taiwan Strait is nothing less than safeguarding global prosperity (see Figure 47).

Figure 47. Preserving Peace Across the Taiwan Strait



Antony J. Blinken, US Secretary of State (July 14, 2023)

The United States also seeks to maintain peace and stability in the Taiwan Strait, which is in the interest of all nations. Fifty percent of global commerce goes through that strait every single day. Some 70 percent of the semiconductors made for the world are made in Taiwan. We continue to oppose unilateral changes to the status quo by either side.

Source: US Department of State, Press Release: "Secretary Antony J. Blinken at a Press Availability", July 14, 2023.

David Cameron, UK's foreign secretary (March 21, 2024)

Former British prime minister David Cameron has warned the world is currently a "more dangerous" place than it has been for many years, citing conflicts around the globe and China's expansive plans, especially in relation to Taiwan. "The lights on the global dashboard are flashing red, so it is a much more dangerous, difficult, uncertain world." "We don't want to see any unilateral action to change the situation between China and Taiwan. There's no doubt that were there to be something like a blockade it would have an absolutely calamitous effect, not just on Taiwan, but on the global economy. We've had recent evidence of a calamitous event with COVID. I think if that were to happen with Taiwan, it would be more significant."

Source: Paul Johnson, "Former British prime minister David Cameron warns China conflict with Taiwan would be 'calamitous' as world enters 'dangerous' era," ABC News, March 21, 2024.

Avril Haines, U.S. Director of National Intelligence (May 5, 2023)

Director Haines presented what she called a "general estimate" during testimony before the US Senate Armed Services Committee. She noted that the advanced semiconductor chips produced by Taiwan Semiconductor Manufacturing Company Ltd (TSMC) are used in 90 percent of "almost every category of electronic device around the world." If a Chinese invasion stopped TSMC from producing those chips, "it will have an enormous global financial impact that I think runs somewhere between [US]\$ 600 billion to [US]\$ 1 trillion on an annual basis for the first few years," she said.

Source: Reuters, "Taiwan chip production would be 'enormous' global economic blow", May 5, 2023.

Lee Hsien Loong, Senior Minister of Singapore (January 8, 2026)

Senior Minister Lee, "if there is trouble Cross-straits, that is trouble not just for Taiwan and China, or the US and China, but for the whole region and for the world. And so we believe that it is important that there is peace in the Taiwan Strait."

Source: "SM Lee Hsien Loong at the Regional Outlook Forum 2026 Dialogue," Prime Minister Office, Singapore, January 8, 2026.

Scott Bessent, US Secretary of the Treasury (January 21, 2026)

Scott Bessent, "I would say that the single biggest threat to the world economy, the single biggest point of single failure is that 97% of the high-end chips are made in Taiwan. If that island were blockaded, that capacity were destroyed, it would be an economic apocalypse."

Source: "Conversation with Scott Bessent, US Secretary of the Treasury | WEF Annual Meeting

9. Forging Strategic Partnership with Taiwan

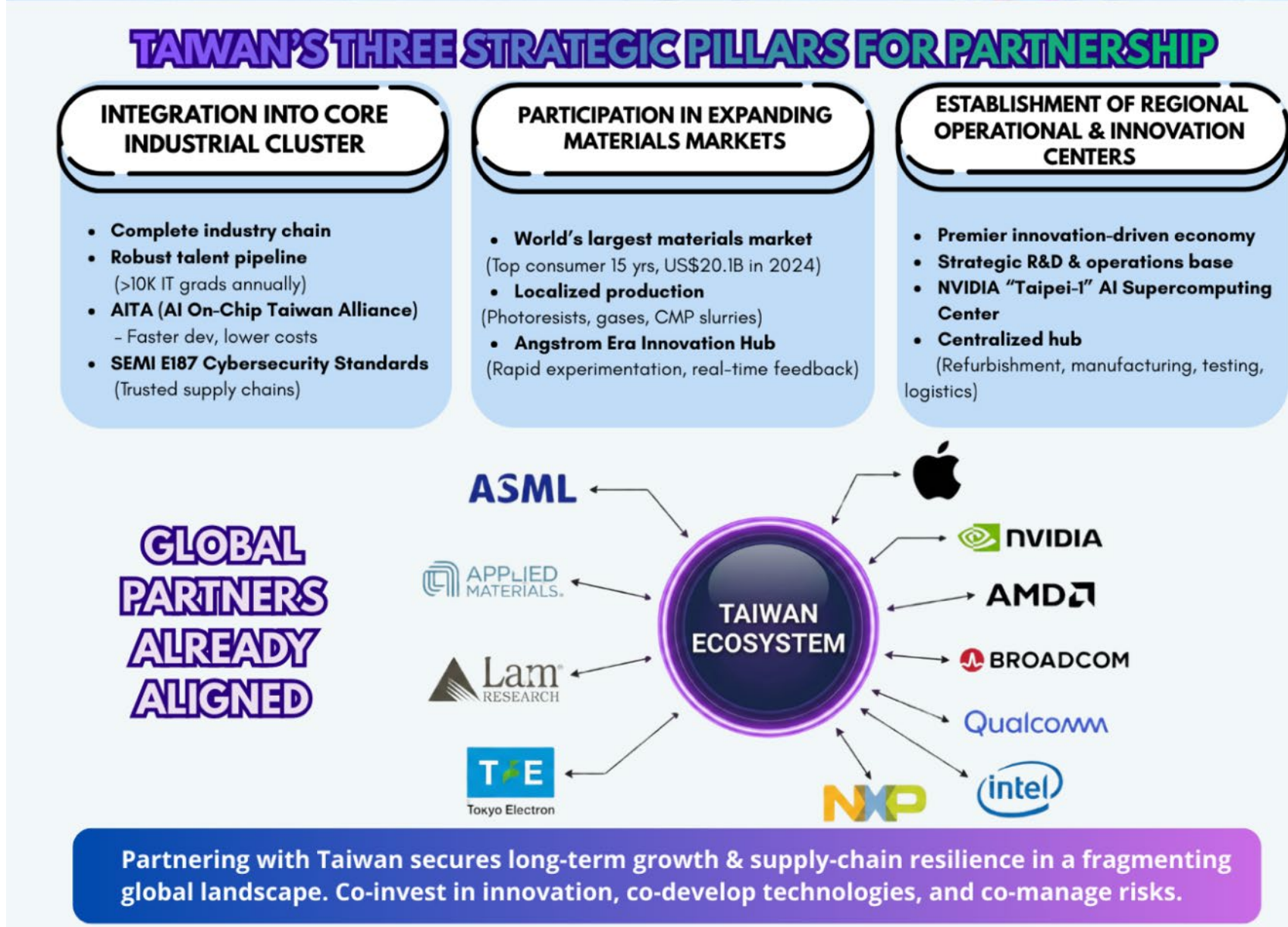
Taiwan's semiconductor sector represents far more than an attractive investment destination; it offers a durable foundation for long-term strategic partnership in shaping the future of the global digital economy. International capital has already recognized this reality—not merely by investing in Taiwan, but by aligning itself with Taiwan's industrial trajectory and long-term technological roadmap.

Crucially, Taiwan continues to anchor its most advanced capabilities at home. More than 90% of leading-edge process technologies, advanced packaging solutions, and forward-looking R&D activities remain located in Taiwan. This concentration has created a uniquely efficient ecosystem in which high-end research, pilot production, and large-scale manufacturing coexist in close proximity—maximizing execution speed, accelerating yield learning, and enhancing innovation efficiency. The result is sustained global leadership in advanced logic chips and manufacturing services.

Recognizing semiconductors as the foundation of the digital economy, Taiwan's government is actively deepening international partnership through three strategic pillars: integration into Taiwan's core industrial cluster, participation in the expanding semiconductor materials market, and the establishment of regional operational and innovation centers.

In a world where semiconductors define economic security and technological sovereignty, partnering with Taiwan is a strategic option. By strategically aligning with Taiwan's unmatched capital intensity, technological leadership, and industrial coherence, international firms can secure long-term growth and supply-chain resilience within an increasingly fragmenting global semiconductor landscape (see Figure 48).

Figure 48. Forging Strategic Partnership with Taiwan



TAIWAN AT THE CORE:

STRATEGIC PARTNER IN GLOBAL SEMICONDUCTOR LANDSCAPE AND REALIGNMENT

DR. TUNG CHEN-YUAN
TAIWAN'S REPRESENTATIVE TO SINGAPORE

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Taiwan Plus

China vs US: The Fight for AI Supply Chains



The Chain Maker (This is a brand-new tech program which launched in August!)

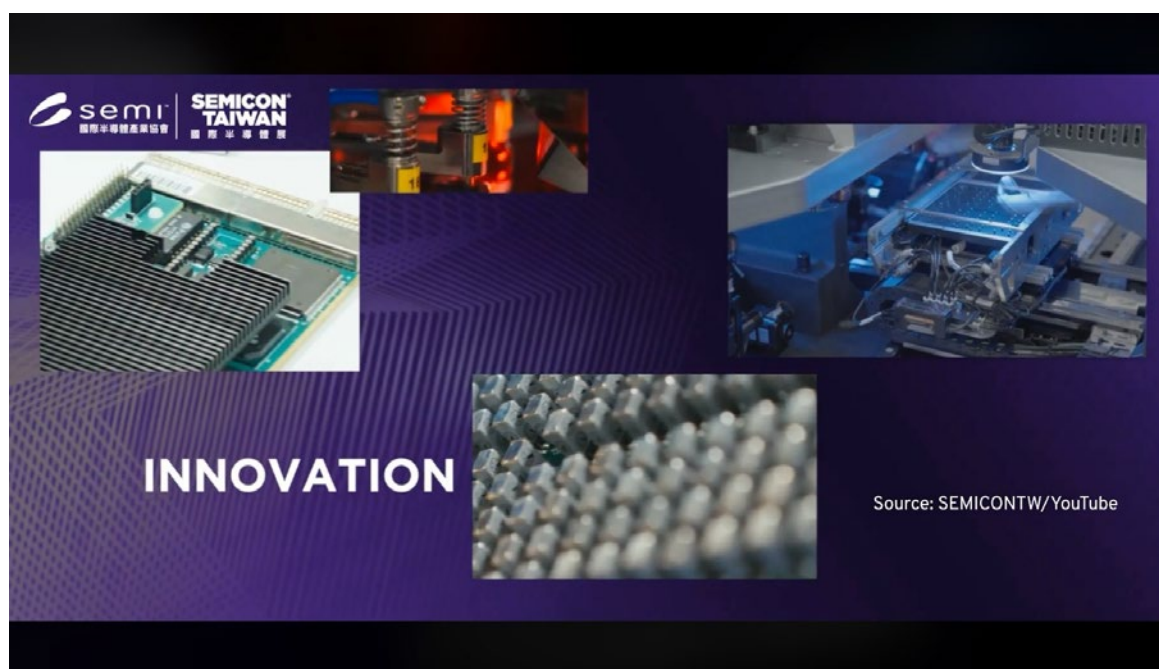
A new AI hub is emerging in the Philippines, with Taiwan's Foxconn potentially playing a leading role as Washington's PaxSilica Initiative expands across the Indo-Pacific. In this episode of The Chain Maker, host Laurel Stewart is joined by Prof. Roger Chih-feng Liu of National Sun Yat-sen University and Lucio Blanco Pitlo III of the Philippine Association for Chinese Studies. They explore why New Clark City is PaxSilica's first launchpad, how Foxconn's experience in India shapes its Philippine strategy, the goals of the Luzon Economic Corridor, and the roles of critical minerals, chip alliances, and Taiwan in the region.

Why TSMC wins



Taiwan has become the center of the global semiconductor industry, supporting technologies ranging from artificial intelligence and supercomputers to electric vehicles and smartphones. In this episode of The Chain Maker, host Laurel Stewart speaks with Dr. Konrad Young, former R&D Director at TSMC and CEO of the Innovation College at National Taiwan University of Science and Technology. They explore the origins of Taiwan's semiconductor industry, the roles of ITRI and Hsinchu Science Park, and why Taiwan succeeded where others did not. The conversation also examines TSMC's rise, semiconductor ecosystems, AI, advanced packaging, U.S. expansion, geopolitical challenges, and advice for future engineers.

Explainer: What To Know About Semicon Taiwan 2026



Semicon Taiwan 2026 opens in Taipei on Wednesday as AI drives record semiconductor demand. Taiwan seeks to maintain its central role in the global industry as geopolitics, tariffs and national security trends shape chip supply chains. TaiwanPlus takes a look at what's in store and what to expect this year.