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Inside the AI chip

How TSMC and SK hynix support AI computing

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- **Understanding the AI accelerator:** AI computing depends on more than the processor alone. Advanced logic chips perform the calculations, high-bandwidth memory (HBM) supplies data at high speeds, while advanced packaging integrates the components so they can work efficiently together.
- **TSMC and SK hynix support different parts of the AI accelerator:** TSMC manufactures advanced logic chips and provides CoWoS packaging to integrate logic with HBM, while SK hynix supplies the high-bandwidth memory that feeds data to the processor. In 3Q26, 79% of TSMC's wafer revenue came from 7nm and more advanced nodes, while SK hynix's HBM4 supports bandwidth above 2TB/s with over 40% better power efficiency than the previous generation.
- **Logic and memory are becoming more closely linked:** TSMC and SK hynix are collaborating on HBM4 and next-generation packaging technologies. SK hynix plans to use TSMC's advanced logic process for the HBM4 base die, while the companies are also working together on integrating HBM with TSMC's CoWoS platform.
- **Same AI demand, different business models:** TSMC's AI exposure comes mainly through advanced semiconductor manufacturing and packaging, while SK hynix is more directly exposed to HBM and memory demand. Their key operating drivers also differ, from process-node yields and utilisation for TSMC to HBM market share, product transitions and memory pricing for SK hynix.
- **Global demand exposure:** TSMC generated 79% of its 3Q26 revenue from North American customers. SK hynix had long-term agreements with 14 major customers as of October 2026, including global cloud service providers, covering more than 50% of its planned production capacity for 2027 and 2028.
- **Valuations reflect different earnings profiles:** TSMC's foundry model benefits from high barriers to entry and leading-edge manufacturing capabilities, while SK hynix operates in the more cyclical memory market. Their valuation multiples should be considered alongside differences in earnings cyclicality, capital intensity and exposure to AI-related demand.
- **Key risks:** TSMC faces risks from new-node execution, capital intensity, overseas manufacturing costs and geopolitical developments. SK hynix remains exposed to memory cycles, HBM qualification and production execution, competition and shifts in memory pricing. Both could also be affected by a slowdown in global AI infrastructure spending.
- **Access through SGX SDRs:** Singapore investors can access TSMC and SK hynix through SGX-listed Singapore Depository Receipts. TSMC's UTSD has a ratio of 300 SDRs to one underlying security, while SK hynix's UNXD has a ratio of 100 to one. Both began trading on 16 October 2026. Trading in Singapore dollars does not remove foreign-exchange exposure.

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The components powering AI

A powerful AI processor is only useful if it can get the data it needs quickly enough.

As AI models become larger and more demanding, improving computing performance is no longer just about making the processor faster.

The memory supplying that processor also has to keep up, while the different components need to be connected closely enough to exchange enormous amounts of data efficiently.

This is why a modern AI accelerator increasingly depends on three important pieces working together: advanced logic chips, high-bandwidth memory, and advanced packaging.

TSMC and SK hynix play different roles in this system.

TSMC manufactures the advanced logic chips used in AI accelerators and provides packaging technologies that integrate them with other components.

SK hynix produces high-bandwidth memory, or HBM, which helps supply those processors with data at very high speeds.

Their technologies are also becoming more closely connected.

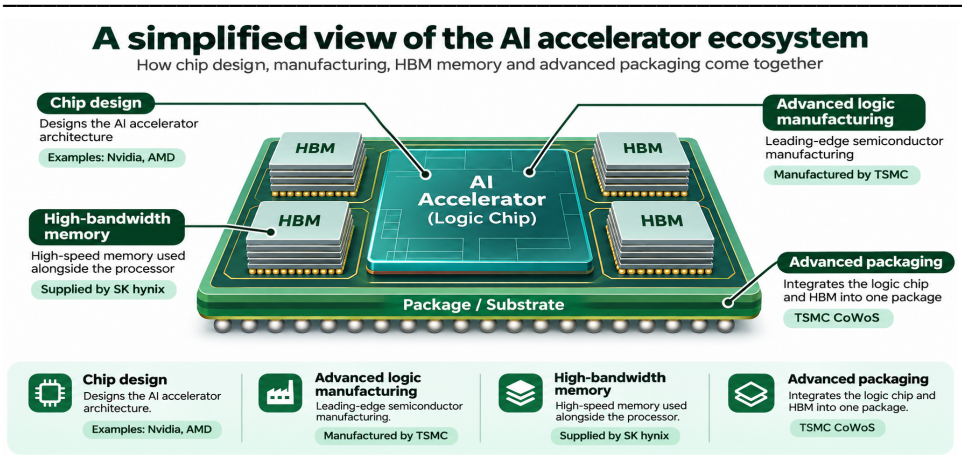
TSMC and SK hynix are collaborating on next-generation HBM and advanced packaging as AI systems demand more computing power and memory bandwidth.

Inside an AI accelerator

An AI accelerator is best understood as an integrated computing system.

At the core is the logic processor, such as a GPU or other AI accelerator, which performs the calculations required to train and run AI models.

Figure 1: The AI accelerator ecosystem



Source: Beansprout

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Compute performance, however, also depends on how quickly data can be supplied to that processor.

As model sizes and workloads increase, memory bandwidth can become a constraint if data cannot be transferred fast enough to keep the processor fully utilised.

High-bandwidth memory, or HBM, addresses this requirement by stacking multiple DRAM dies vertically and placing them close to the processor.

Compared with conventional memory architectures, this allows significantly more data to move between memory and the accelerator at the same time.

SK hynix describes HBM as a high-performance memory product that vertically connects multiple DRAM chips to increase data-processing speed.

The next challenge is integrating the processor and memory efficiently.

Advanced packaging allows multiple semiconductor components to be combined within a single package with high-density connections between them.

This is increasingly important for AI accelerators, where logic and memory need to exchange large volumes of data with minimal delay.

TSMC's CoWoS, or Chip-on-Wafer-on-Substrate, is one example.

The technology enables a logic processor and multiple HBM stacks to be integrated within the same package, providing high-bandwidth connections between the compute and memory components.

The key point is that AI performance is determined by the system as a whole. Increasing processor performance alone is not sufficient if memory bandwidth or the connections between components become bottlenecks.

As AI accelerators become more powerful, the requirements for leading-edge logic, faster memory, and more advanced packaging rise together.

TSMC: AI processor manufacturer

TSMC sits at the manufacturing end of the semiconductor value chain.

The company operates as a pure-play foundry, manufacturing chips designed by customers across high-performance computing, smartphones, automotive, and other applications.

For AI accelerators, this role has become increasingly important as chip designs move towards more advanced manufacturing processes.

Semiconductor processes are commonly described by nodes such as 7nm, 5nm, 3nm and 2nm.

While these labels no longer correspond directly to a single physical dimension on the chip, newer process technologies generally allow chip designers to increase transistor density while improving performance and power efficiency.

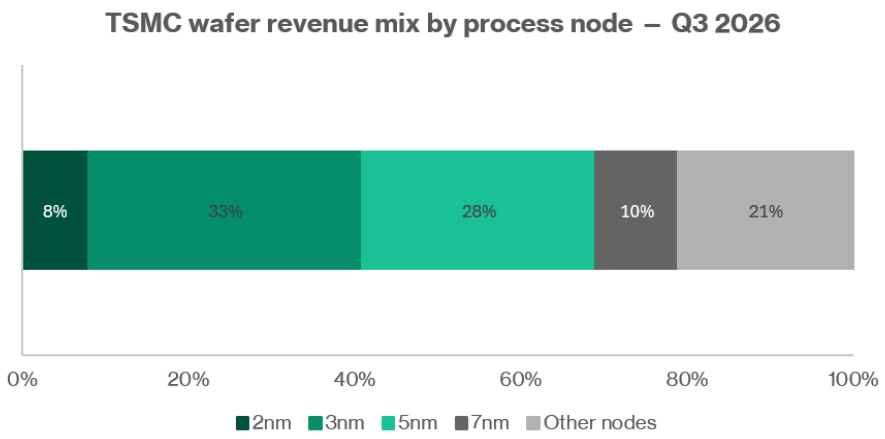
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That matters for AI workloads, where processors are being asked to perform more calculations while managing growing power and thermal constraints.

TSMC's revenue mix reflects this shift towards advanced manufacturing.

In Q3 2026, 79% of its wafer revenue came from process technologies at 7nm or below. Its 3nm technology accounted for 33% of wafer revenue, followed by 5nm at 28%, 7nm at 10%, and the newer 2nm process at 8%.

Figure 2: TSMC revenue mix



Source: TSMC, Q3 2026 earnings release, 15 October 2026. Figures represent share of total wafer revenue. Other nodes calculated as the remainder.

At the same time, high-performance computing has become TSMC's largest end-market platform.

HPC accounted for 68% of revenue in 3Q26, up from 57% a year earlier.

This category includes applications such as AI accelerators, data-centre processors and other high-performance chips.

For investors, TSMC's exposure to AI is mainly through the manufacturing requirements created by increasingly complex chip designs.

As customers move towards more advanced processors, demand can translate into greater use of leading-edge process nodes and advanced packaging capacity.

The key variables to watch are AI adoption rate, customer demand for advanced nodes, manufacturing yields, capacity utilisation, and TSMC's ability to ramp new process technologies at scale.

Why advanced packaging matters for AI chips

As AI chips become larger and require more memory, semiconductor companies increasingly need to integrate multiple components within the same package.

This has pushed advanced packaging from a relatively downstream manufacturing step into a more important part of system performance.

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TSMC's CoWoS, or Chip-on-Wafer-on-Substrate, technology is designed for this type of integration. It allows advanced logic chips and multiple HBM stacks to sit within the same package, connected through high-density interconnects.

For AI accelerators, the benefit is straightforward: the closer and more efficiently the processor and memory can communicate, the more data can be transferred without creating a bottleneck around the compute engine.

TSMC has continued to increase the size and capability of its CoWoS platform to accommodate more logic and HBM. Its newer configurations are designed to support larger AI systems as customers increase both computing power and memory capacity within each package.

This also creates a second source of AI-related demand for TSMC beyond wafer manufacturing. As AI accelerators become more complex, advanced packaging capacity can become an important constraint alongside leading-edge foundry capacity.

For investors, this makes packaging utilisation, capacity expansion and customer adoption increasingly relevant alongside more traditional indicators such as process-node mix and wafer demand.

SK hynix: Providing memory bandwidth

SK hynix plays a different role in the AI hardware stack.

The company is one of the world's largest memory semiconductor manufacturers, producing DRAM, NAND flash and specialised memory products. Within AI infrastructure, a key source of AI exposure comes from high-bandwidth memory, or HBM.

AI processors can perform large numbers of calculations in parallel, but their performance also depends on how quickly data can be supplied to them.

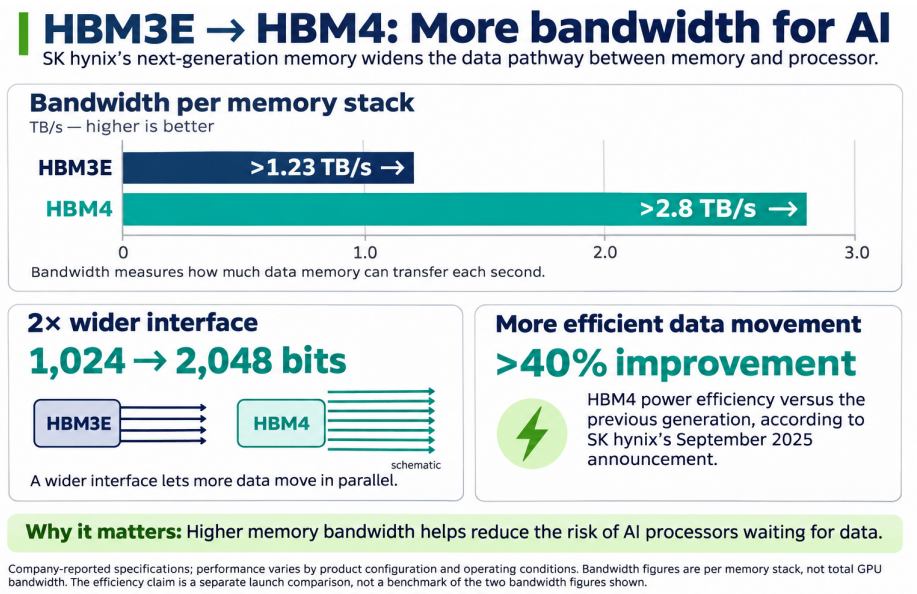
As model sizes and workloads grow, memory bandwidth becomes increasingly important because the processor needs to access larger volumes of data without spending time waiting.

HBM helps address this bottleneck by stacking multiple DRAM dies vertically and placing the memory stacks alongside the accelerator within the same package. A wide interface allows large amounts of data to move between memory and compute simultaneously.

SK hynix’s HBM3E delivers bandwidth of up to 1.23 terabytes per second per stack. Its HBM4 doubles the interface width from 1,024 to 2,048 bits, supporting bandwidth above 2 terabytes per second. According to the company, its HBM4 also improves power efficiency by more than 40% compared with the previous generation.

Figure 3: SK hynix memory bandwidth

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Source: SK hynix HBM3E and HBM4 product pages, Beansprout

Greater power efficiency matters as AI data centres expand. Moving more data while using less energy per bit can help manage electricity consumption and heat generation, alongside improvements in computing performance.

SK hynix has been ramping HBM4 production as customers transition to newer generations of AI accelerators. Management has also pointed to long-term customer agreements as a source of greater demand visibility.

For investors, however, AI server growth is only part of the picture. SK hynix's earnings also depend on its HBM market share, customer qualification, production yields and ability to deliver new product generations at scale. Broader DRAM and NAND pricing remains important, even as HBM becomes a larger part of its business.

How TSMC and SK hynix are becoming more closely linked

Although TSMC and SK hynix operate in different parts of the semiconductor value chain, the technologies they produce are increasingly interconnected.

In 2024, the companies announced a collaboration on HBM4 and next-generation packaging technologies.

SK hynix plans to use TSMC's advanced logic process for the HBM4 base die, while both companies are also working to optimise the integration of HBM with TSMC's CoWoS platform.

This reflects a broader change in AI hardware design.

As the industry moves towards larger accelerators with more memory and higher bandwidth requirements, performance increasingly depends on how well the processor, memory and packaging architecture are designed to work together.

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The relationship also shows why analysing AI hardware companies purely by product category can be limiting.

TSMC is primarily a foundry, and SK hynix is primarily a memory manufacturer, but the performance requirements of next-generation AI accelerators increasingly link their technologies together.

Same AI demand, different business models

TSMC and SK hynix both benefit from rising demand for AI infrastructure, but the way that demand flows through their businesses is different.

Figure 4: How the two companies differ in the AI ecosystem

	TSMC	SK hynix
Business model	Pure-play semiconductor foundry	Memory semiconductor manufacturer
AI exposure	Advanced logic manufacturing and packaging	HBM and server memory
Key technologies	2nm, 3nm, CoWoS	HBM3E, HBM4
Main demand drivers	Advanced chip designs, leading-edge node demand, packaging capacity	HBM volumes, memory content, server demand and pricing
Key operating metrics	Node mix, yields, utilisation and capacity	HBM share, product transitions, yields and memory pricing

Source: Beansprout

Their geographic exposure is also broader than where the companies are headquartered.

In 3Q26, 79% of TSMC's revenue came from customers based in North America, while China accounted for 5%. This reflects the company's role as a manufacturing partner to semiconductor designers around the world.

SK hynix also serves a global customer base, including major technology and cloud companies. As of October 2026, the company had signed long-term agreements with 14 major customers, including leading global cloud service providers, covering more than 50% of its total planned production capacity for 2027 and 2028.

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Both companies' earnings are closely tied to global semiconductor and data-centre investment trends.

Accessing TSMC and SK hynix through SGX SDRs

Singapore investors can access both companies through Singapore Depository Receipts, or SDRs, listed on SGX.

The TSMC and SK hynix SDRs began trading on 16 October 2026.

Figure 5: TSMC and SK hynix SDR details

Company	SGX SDR	SDR ratio	Effective date
TSMC	UTSD	300 SDRs : 1 underlying security	16 Oct 2026
SK hynix	UNXD	100 SDRs : 1 underlying security	16 Oct 2026

Source: SGX

Both counters trade in Singapore dollars.

Unlike some of the Hong Kong SDRs available on SGX, these SDRs reference the companies' US-listed depository securities rather than their Taiwan- or Korea-listed ordinary shares.

For investors, the SDR provides another way to gain economic exposure to the underlying company through SGX. The SDR ratio determines how many SDR units correspond to one underlying depository security.

Trading in Singapore dollars does not remove foreign-exchange exposure. The value of an SDR is influenced by the price of the underlying security as well as factors such as foreign-exchange movements, liquidity, supply and demand. The SDR ratio determines how many SDR units correspond to one underlying security.

Investors should also review how corporate actions, distributions and other shareholder entitlements are handled under the relevant SDR programme.

Valuations reflect different business models and profitability

Figure 6: Peer comparison

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Company Name	Ticker	Currency	Price	Market Value (US$b)	Revenue growth (%)	EPS growth (%)	Forward P/E (x)	10-year average P/E (x)	Dividend Yield (%)	ROE (%)	Net debt/ equity (x)
Taiwan Semiconductor Manufacturing Co., Ltd.	2330-TW	TWD	2395	1,888.2	31.6	46.4	21.5	19.5	1.2	35.4	-0.4
United Microelectronics Corp.	2303-TW	TWD	104.00	39.7	2.3	-17.6	14.0	16.4	2.5	11.0	-0.1
GlobalFoundries Inc.	GFS-US	USD	42.85	23.5	0.6	n.a.	21.5	27.2	1.1	7.8	-0.1
SK hynix Inc.	000660-KR	KRW	1,277,000	699.3	46.8	115.9	3.6	9.4	1.0	44.2	-0.1
Micron Technology, Inc.	MU-US	USD	811.3	917.9	256.3	885.4	4.6	20.7	0.1	88.3	-0.3
Samsung Electronics Co., Ltd.	005930-KR	KRW	206,000	1,002.0	10.9	32.8	4.4	14.9	0.8	10.8	-0.2
Average							11.6x		1.1%	32.9%	-0.2x
Median							9.3x		1.1%	23.2%	-0.2x

Source: Factset, as of 11 November 2026

TSMC and SK hynix are both profitable semiconductor companies, but their valuations reflect different growth prospects and earnings risks.

Management's guidance provides some support for this premium. TSMC expects revenue to grow by around 44% in US dollar terms in 2026, and has guided for fourth-quarter gross margins of 65%–67%. This points to strong growth alongside continued high profitability.

However, trading above its historical average means sustained growth remains important.

SK hynix trades at 3.6 times forward earnings, about 62% below its 10-year average of 9.4 times.

It also trades below memory peers Micron and Samsung Electronics, at 4.6 times and 4.4 times respectively.

Management's outlook offers support for demand visibility. SK hynix expects HBM4 to surpass HBM3E in shipment volume and revenue in the fourth quarter, and says long-term customer agreements cover more than half of its production capacity for 2027 and 2028.

These arrangements could help support a more durable earnings base.

Nevertheless, a low P/E does not automatically mean the shares are undervalued.

Memory companies can look particularly inexpensive when earnings are near a cyclical high. If pricing weakens and profits decline, the P/E can rise even without an increase in the share price.

Ultimately, TSMC's premium depends on delivering sustained growth, while SK hynix's discount needs to be assessed against the durability of its earnings. Historical valuations provide a useful reference, but changes in growth prospects and business mix also matter.

Key risks

TSMC: execution and capital intensity

Moving to a new semiconductor process requires significant research spending and capital investment. New nodes also need to achieve sufficient manufacturing yields before they can be produced efficiently at scale.

TSMC's expansion into the US, Japan and Europe can diversify its manufacturing footprint, but overseas fabs may also carry higher construction and operating costs.

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The company remains exposed to geopolitical risk and changes in semiconductor export controls given its position in the global advanced-chip supply chain.

Investors may want to monitor new-node yields, capital expenditure, utilisation rates, overseas fab costs and customer concentration.

SK hynix: memory cycles and HBM execution

Memory remains a cyclical industry.

Changes in DRAM and NAND supply can cause prices to rise or fall sharply, which can have a meaningful impact on SK hynix's revenue and margins.

HBM provides a higher-value growth segment, but it also introduces execution risk. Each new generation needs to meet demanding performance requirements and qualify with major customers before production can scale.

Competition is another consideration, with Samsung Electronics and Micron also investing heavily in next-generation HBM.

Investors may want to monitor HBM market share, customer qualification, product yields, memory pricing and the pace of HBM3E-to-HBM4 adoption.

AI infrastructure spending

Both companies are also exposed to the pace of global AI infrastructure investment.

A slowdown in data-centre capital expenditure could reduce demand for advanced processors, HBM and packaging capacity.

The effect would not be identical. For TSMC, it would affect demand for advanced logic manufacturing and packaging. For SK hynix, it would flow more directly through HBM volumes, memory pricing and product mix.

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