30 May 2024

CMB International Global Markets | Equity Research | Sector Update

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Semi

Global foundry sector stabilizing in 2024, modest recovery expected in 2025; initiate Hua Hong w/ BUY

OUTPERFORM (Maintain)

China Semi Sector

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The global foundry sales reached US$117bn in 2023, according to Counterpoint. The sector showed signs of stabilization in 2H23, helped by surging demand for AI chips and inventory restocking. The market growth turned positive to 6.5% and 9.8% QoQ in 3Q/4Q23, per Counterpoint.

We hold a positive outlook for semi foundry sector. Looking forward, we expect the foundry industry to grow on 1) continued investments in AI infrastructure, 2) recovering demand for memory products and electronics, 3) technology advancement, and 4) semiconductor localization.

- **The foundry pure-play market is very concentrated.** Based on Counterpoint data, TSMC is in a leading position with 61% share in 4Q23, followed by Samsung (14%) and GlobalFoundries (6%). SMIC and Hua Hong Semi are in the fifth and sixth positions with 5% and 1% share, respectively. Looking forward, we expect **TSMC to gain further market share** due to its leading position in AI-related chip manufacturing and capacity. The company expects global foundry market to grow mid- to high-teens % in 2024 but remains more optimistic on its own business growth (low- to mid-20s %), due to greater AI exposure compared to peers. We believe **SMIC and Hua Hong Semi should also gain share** on domestic tech self-reliance initiatives.
- **Geopolitical tensions have driven major economies worldwide to pursue resilience over efficiency**, leading to significant investments to strengthen domestic chip fabrication capabilities. Recently, the third phase of National Integrated Circuit Industry Investment Fund has amassed US$47.5bn. China's semiconductor localization efforts are propelling local foundries like SMIC and Hua Hong towards greater technological advancements, capacity expansion and strengthening of market presence.
- As the second-largest foundry and the leading mature-node foundry in China, Hua Hong Semi has capitalized on the surge in demand from various end-markets in the past years. Although the company faced waning demand and declining ASPs in 2023, its utilization rate recovered to 92% in 1Q24 (vs. 84% in 4Q23) and is expected to reach 100% in 2Q24, per company management. In addition, Hua Hong Semi has proactively expanded its 12-inch wafer capacity to prepare for the next recovery cycle and support semiconductor localization. In our view, the company is better positioned than other local mature-node peers, given its stronger collaborations with downstream clients. **We initiate coverage on Hua Hong Semi (1347 HK) with a BUY rating and a target price of HK$24.**

Valuation Table

Name	Ticker	Rating	Mkt Cap (US$mn)	Price (LC)	Upside/ Downside	P/E (x) FY24E	P/E (x) FY25E	P/B (x) FY24E	P/B (x) FY25E
Hua Hong Semi	**1347 HK**	**BUY**	**5,151**	**19.9**	**20.6%**	**37.6**	**21.0**	**0.81**	**0.79**
TSMC	2330 TT	NR	688,164	865	NA	21.95	17.7	5.34	4.40
Samsung	005930 KS	NR	335,926	77,600	NA	13.6	9.1	1.29	1.13
GlobalFoundries	GFS US	NR	27,786	50.0	NA	38.1	24.4	2.34	2.16
UMC	2303 TT	NR	22,033	56.4	NA	14.8	12.1	1.95	1.82

Source: Company data, CMBIGM estimates; data as of 28 May 2024 close

Related reports;
1. Nvidia: To keep growing for longer (link)
2. Semi - Global SME investment set to accelerate on tech advancements, China localization; Initiate Naura w/ BUY (link)
3. InnoLight (300308 CH) - 1Q24 results set stage for accelerated growth in 2024 – 24 Apr 2024 (link)
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Investment Summary

According to Counterpoint, **global foundry revenue declined by 12% to US$117bn in 2023**, following three years of consecutive growth (24%/33%/29% during 2020/21/22) due to disruptions in supply chain and a worldwide chip shortage.

It seems the foundry industry is stabilizing since late 2023, with solid demand for AI and a normalized inventory level. In 3Q23, the market witnessed the first rebound in sales (finally up 6% QoQ but still down 15% YoY), primarily driven by rush orders from electronics supply chain and robust demand for AI chips. Worldwide foundry revenue grew another 10% QoQ in 4Q23, but still declined by 5% on a YoY basis.

Looking forward, we expect the foundry industry to grow on 1) continued investments in AI infrastructure, **2)** recovering demand for memory products and electronics, **3)** technology advancement, and **4)** semiconductor localization.

As for the competitive landscape, the market is very concentrated. According to Counterpoint, the top 6 foundries accounted for 93% share in 4Q23: TSMC (61%), Samsung Foundry (14%), GlobalFoundries (6%), UMC (6%), SMIC (5%) and Hua Hong Semi (1%).

Performance among pure-play foundries has varied in the past few quarters. According to the latest earnings reports, performance among the top 6 pure-play foundries varied. TSMC, UMC, and GlobalFoundries experienced sequential revenue declines, while SMIC and Hua Hong Semi reported revenue increases during 4Q23.

Looking forward, we expect TSMC to gain further market share due to its leading position in AI-related chip manufacturing and capacity. SMIC and Hua Hong Semi should also gain share on domestic tech self-reliance initiatives. China's semiconductor localization efforts are propelling local foundries like SMIC and Hua Hong Semi towards greater technological advancements, capacity expansion and strengthening of market presence.

We initiate coverage on Hua Hong Semi (1347 HK) with BUY and TP at HK$24, based on 0.8x 2024E P/B, which is the 2-year historical average forward P/B. Our target price implies 38x 2024E P/E and 21x 2025E P/E, which is also the stock's 2-year historical average forward P/E (21x).

We think the Company is recovering from the bottom of the cycle. We see positive signs of increasing wafer shipments and utilization rates. Although ASP is likely to face some challenges, we think Hua Hong Semi is capable of managing the impacts, given its strong collaborations with clients.

Potential risks: 1) intensified competition in mature nodes from both global peers and domestic peers; 2) end-market demand remaining weak; 3) escalating export restrictions imposed by the US and its allies on China, and 4) foreign currency risks as approximately 22% of the company's revenue in 2023 was denominated in currencies other than Chinese RMB.

Global foundry industry is showing signs of stablization

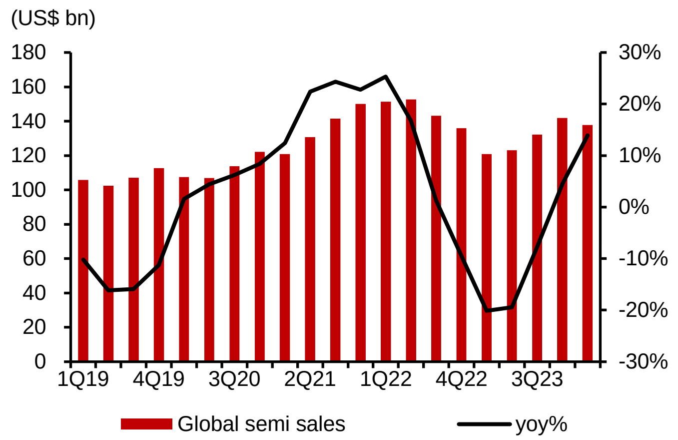
Overbooking and capacity oversupply almost digested; embarking upon a new cycle bolstered by demand for AI infrastructure

Global foundry revenue declined by 12% to US$117bn in 2023, after three years of consecutive growth (24%/33%/29%) during 2020-2022, per Counterpoint. The previous growth was driven by supply chain disruptions and a worldwide chip shortage. As the end-market became soft and fab utilization rate fell, growth slowed down in 2023. Global foundry sales lowered to US$28bn in 1Q23 (down 13% YoY and down 16% QoQ) and remained at a similar level in 2Q23 (down 15% YoY and down 3% QoQ). It wasn't until 3Q23 that the market witnessed the first rebound (finally up 6% QoQ but still down 15% YoY), primarily driven by rush orders from the electronics supply chain and AI chips.

It seems the foundry industry is stabilizing since late 2023, with solid demand for AI and a normalized inventory level. Worldwide foundry revenue grew another 10% QoQ in 4Q23, but still declined by 5% on a YoY basis. For full-year 2023, foundries worldwide saw their sales decline by 12% YoY. According to TrendForce, the growth in 4Q23 was largely helped by smartphone inventory restocking and robust demand for AI. TSMC's strong 3nm and 5nm process sales (15% and 35% of 4Q23 revenue) was a true testament to this growth, which helped the company grab more than 60% of the total fab market worldwide. However, due to global macroeconomic headwinds, performance varied among foundries.

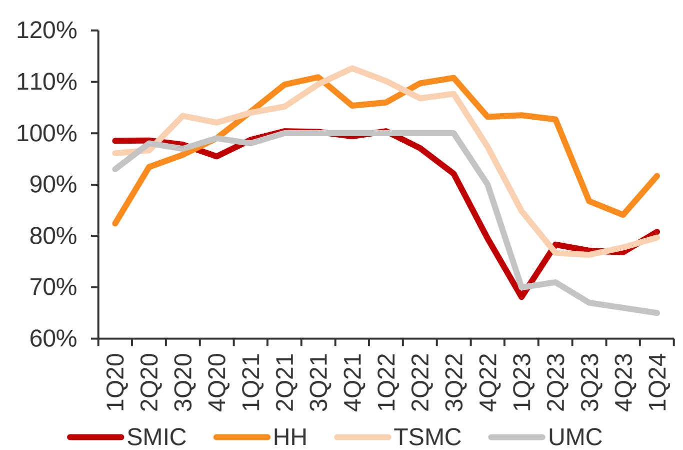
Looking forward, we expect the foundry industry to grow on 1) ongoing investments in AI infrastructure, 2) recovering demand for memory products and electronics, 3) technology advancement, and 4) semiconductor localization.

Figure 1: Global fab quarterly sales and YoY%



Source: Counterpoint, CMBIGM

Figure 2: Global fab utilization rates



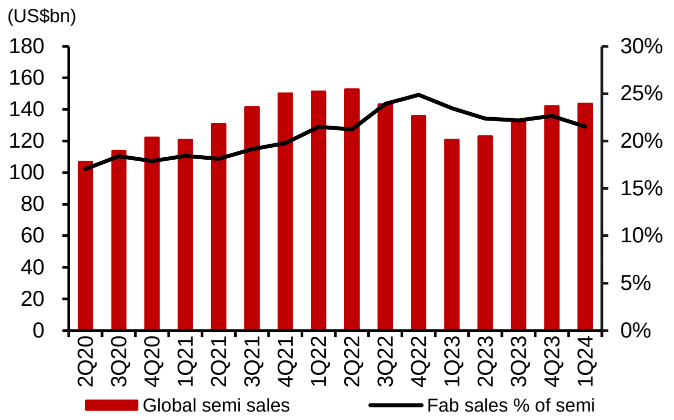
Source: Counterpoint, SEMI, CMBIGM

We expect **the utilization rate of advanced node fabs to improve first, given the robust demand for AI. The growth pace of the whole foundry industry is expected to catch up later with the global semiconductor market**, which is projected to grow 18% in 2024 (our avg. estimate of multiple industry forecasts).

It is because **fab sales have grown to comprise a large portion of semi market sales** (worldwide fab sales accounted for 23% of global semi sales in 2023, according to our analysis). Many semi companies have shifted from a vertically integrated model (IDM) to a fabless one, outsourcing manufacturing to pure-play foundries (e.g., TSMC, GlobalFoundries), to reduce costs and focus on design and innovation. This trend is supported by the rise of fabless semi companies (e.g., AMD, Nvidia, Qualcomm) and the escalating costs of maintaining cutting-edge manufacturing facilities, which only a few companies can afford. Additionally, the surge in global demand for more advanced AI tools has increased reliance on the high-volume production capabilities of foundries.

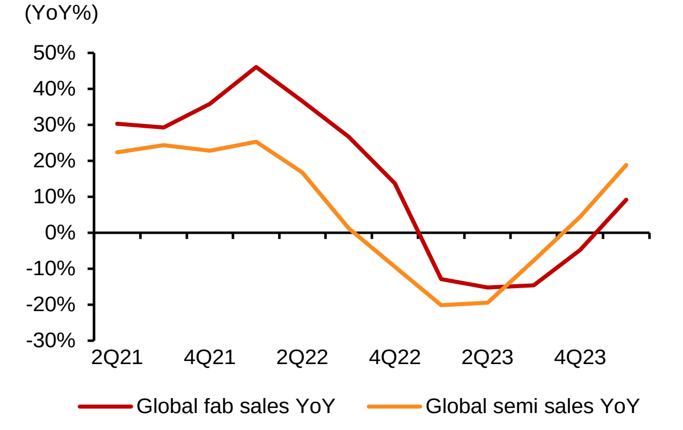
For 2024, global foundry sales are forecasted to grow at 12%/12%/16%/mid-to-high-teens percentage, according to Trendforce/ Garner/Omdia/TSMC.

Figure 3: Global fab sales as % of semi sales



Source: Counterpoint, SEMI, CMBIGM

Figure 4: Global fab sales vs. semi sales growth



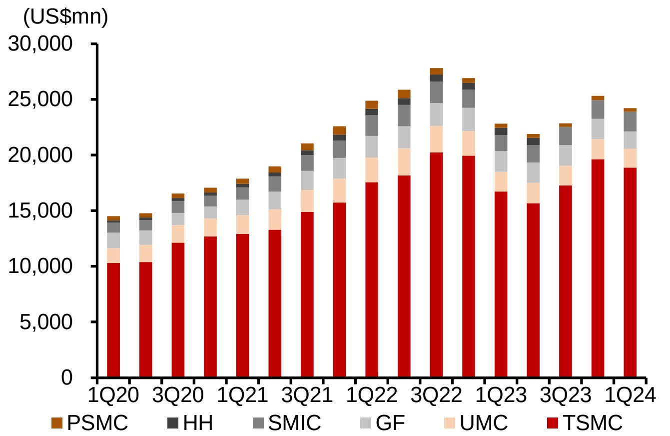
Source: Counterpoint, SEMI, CMBIGM

Performance among pure-play foundries varied in the past few quarters

Performance among pure-play foundries varied in the past few quarters. According to the latest earnings reports, performance among the top 6 pure-play foundries varied. TSMC, UMC, GlobalFoundries, and PSMC experienced sequential revenue declines, while SMIC and Hua Hong Semi reported revenue increases. Collectively, these six foundries saw an 8% YoY revenue increase but a 4% QoQ decline.

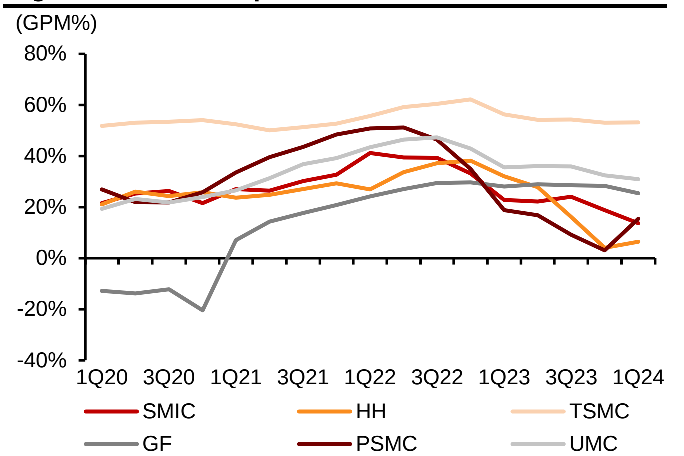
GlobalFoundries, UMC, and SMIC faced decreases in GPM and NPM, whereas TSMC's margins remained steady. Both Hua Hong Semi and PSMC showed improvements in GPM and NPM.

Figure 5: Revenue of top 6 foundries



Source: Company data, CMBIGM

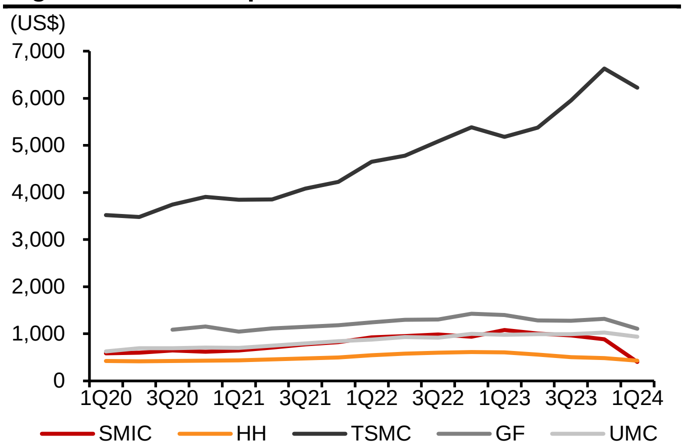
Figure 6: GPM of top 6 foundries



Source: Company data, CMBIGM

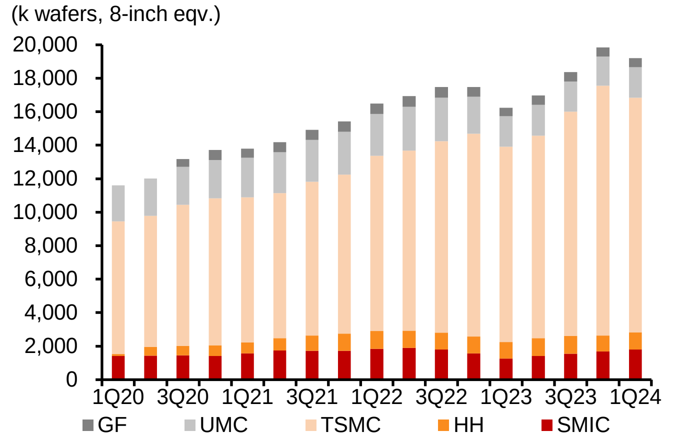
Looking ahead, we expect foundries worldwide to balance ASPs with their utilization rates to maximize revenue. Wafer ASPs have seen some corrections likely due to inventory adjustments in recent quarters. Meanwhile, most of the top 6 foundries increased their wafer shipments sequentially in 1Q24, even though revenue declined. This suggests that while revenue dipped, production activity remained robust as foundries adjusted their strategies to optimize both pricing and capacity usage.

Figure 7: ASP of top foundries



Source: Company data, CMBIGM

Figure 8: Wafer shipments of top foundries



Source: Company data, CMBIGM

Looking forward, foundries with greater exposure to GenAI positioned to benefit more

Based on recent earnings calls, **AI is the only end-market that holds a strong demand outlook. Other markets are either in slow recovery, or in continuous inventory digestion.**

On its 18 April earnings call, TSMC forecasts global semiconductor market, excluding memory, to grow 10% this year, revised down from three months earlier due to lowered projection for auto. In terms of sectorial growth, mgmt. noted 1) traditional server demand is lukewarm, as investment focus shifts to AI; 2) smartphone platforms have been on a recovery path, although not a steep one; 3) PC demand has bottomed out, though the recovery is progressing slowly, and 4) auto sector will continue to see inventory corrections throughout 2024.

Figure 9: End-market demand outlook based on foundries' earnings calls

Markets	Demand outlook
AI	**TSMC:** AI-related data center demand is very, very strong. **UMC:** AI server will be with more of a higher growth rate vs. the rest of the market application.
Data center	**TSMC:** traditional server demand is lukewarm.
Consumer electronics	**TSMC:** Smartphone market demand is seeing gradual recovery, not a steep recovery. PC has bottomed out and the recovery is slower. Demand for IoT and other consumer electronics remains sluggish. **UMC:** The Company has seen inventory getting to a healthier level in the computing, consumer, and communication market segments. However, customers are taking a more conservative approach in their inventory restocking behavior. **GlobalFoundries:** The Company is seeing signs of inventory levels trending down among some of the customers in core end-markets, such as smart mobile devices.
Auto/ Industrials	**TSMC:** Auto inventory continues to correct. **UMC:** As for the auto/industrials segment, demand remains muted as the pace of inventory digestion has been slower than anticipated. **GlobalFoundries:** Other customers indicated that inventory levels have remained higher in end-markets, such as IoT and automotive.

Source: Company data, CMBIGM

TSMC expects global foundry market to grow mid- to high-teens percentage in 2024 but remains more optimistic about its own business growth (low- to mid-20s %), due to greater AI exposure compared to peers. According to TSMC mgmt., AI servers are expected to account for a low-teens percentage of its 2024 revenue, more than double from last year, with that figure expected to rise to more than 20% of revenue by 2028.

In response to such demand, the company is also expanding its global manufacturing footprint. For example, it is committed to building three more fabs in Arizona for a variety of advanced technologies as well as in other regions, such as Japan and Germany. **Looking ahead, TSMC anticipates its 2Q24 business will be supported by robust demand for its advanced technologies, namely 3nm/5nm/7nm nodes.**

UMC estimates the global foundry sales to grow by a low-teens percentage YoY. However, the company points out that most of the growth will be driven by AI servers in 2024. Some of its clients are still conservative in inventory restocking, given persisting macroeconomic and geopolitical uncertainties. Mgmt. gave a conservative projection for their business outlook since they have limited exposure to AI servers. UMC expects its sales will account for 10-20% of the overall AI semiconductor market in 2024, from edge AI applications.

Figure 10: Performance among pure-play foundries varied

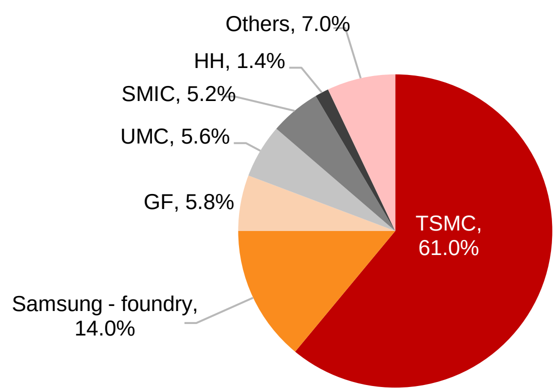
Company	4Q23 Market share	Revenue growth (QoQ%)		Outlook
		1Q24	2Q24E	
TSMC	61%	16.5%	4% - 8%	AI-related datacenter demand remains strong as usual, other sectors are relatively weak
Samsung	14%	68.9%	N/A	AI demand to remain robust; mass produce HBM3E 8H and 12H to respond to resilient demand in GenAI
UMC	6%	-4.0%	N/A	AI server will see higher growth than the rest of market applications
GlobalFoundries	6%	-15.9%	3% - 6%	Demand may improve in 2H24; expect to decrease capex significantly in 2024E
SMIC	5%	23.4%	5% - 7%	Wary of future demands; 1Q shipments picked up likely due to customers restocking
Hua Hong Semi	1%	-27.1%	-2% - 9%	Revenue and GPM expected to maintain stable in 2024; steady improvement in ASP and utilization rate
Top 6	**93%**	**Avg: 10.3%**	**Avg: 2% - 7%**	

Source: Company data, Bloomberg, CMBIGM
Note: 2Q24 revenue growth forecasts based on company guidance; outlook provided by company management on 1Q24 earnings calls

Competitive landscape: top 6 foundries accounted for 93% of the market in 4Q23

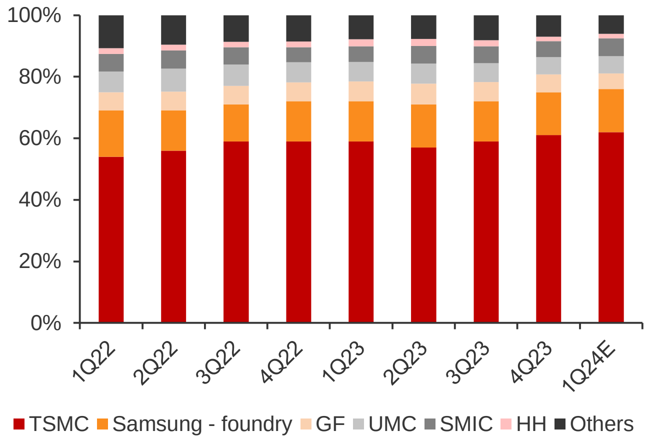
In 4Q23, top 6 foundries accounted for 93% of the total market: TSMC (61%), Samsung Foundry (14%), GlobalFoundries (6%), UMC (6%), SMIC (5%) and Hua Hong (1%). Looking forward, we expect **TSMC to gain further share due to its leading position in AI-related chip manufacturing and capacity.**

Figure 11: Global foundries market share in 4Q23



Source: Counterpoint, CMBIGM

Figure 12: Global foundries market share



Source: Counterpoint, CMBIGM

TSMC saw its market share increase to 61% in 4Q23 from 59% in the previous quarter, according to Counterpoint. TSMC enjoyed a double-digit revenue contribution from AI-related sales in 1Q24.

Samsung Foundry retained its position as the second-largest player in the market with a 14% share, supported by continued smartphone restocking. The initial surge in pre-orders for the Samsung S24 series equipped with AI features significantly boosted revenues, particularly from Samsung's advanced 4nm and 5nm nodes.

GlobalFoundries and UMC, both mature node foundries, each secured a 6% market share with better-than-expected results, though they **forecast a weaker 1Q24 due to sluggish demand and inventory adjustments in sectors like auto and industrials.** Both foundries saw significantly less contribution from AI adoption as their specialties lie within mature nodes.

SMIC, with a 5% global market share by 4Q23, reported high utilization across 7/10/14nm nodes driven by demands for Android phone chips and local Chinese CPU/GPU needs. Despite anticipating a short-term surge in orders for smartphone components, SMIC remains cautious about the full-year outlook due to uncertain demand sustainability. According to SMIC's mgmt. during their latest earnings call, global restocking trend picked up in 1Q24 as the company saw its wafer shipments increase by 7% QoQ. Capacity utilization rate also improved by 4ppts to 80.8%. For 2Q24, SMIC is predicting ongoing early demand from certain customers as the company aims for its annual revenue growth to surpass the industry average.

Hua Hong has experienced a steady climb in market share by global fab sales (from 1.2% in 2Q20 to 2.2% in 1Q23) in recent years, supported by the global chip shortage. However, facing headwinds from weak consumer demand worldwide and an overstock at downstream customers throughout 2023, Hua Hong's market share slightly declined to 1.4% of total fab sales in 4Q23. According to the company's latest earnings report, Hua Hong saw overall utilization rate increase to 91.7% in 1Q24, up by 7.6ppts QoQ. We expect the Company's utilization rate will continue to increase in 2Q24 as domestic demand continues to pick up through 2024.

Outlook for China foundries are positive though challenges remain

We are well aware of the current challenges for China foundry players, given intensified geopolitical risks and weak end-market demand. However, **we remain positive in China foundries sector, as the long-term trend of semi localization remains intact and end-market demand is showing signs of recovery boosted by AI-embedded products/services.**

China's semi supply chain localization should propel local foundries towards greater tech advancements and expedite substitution

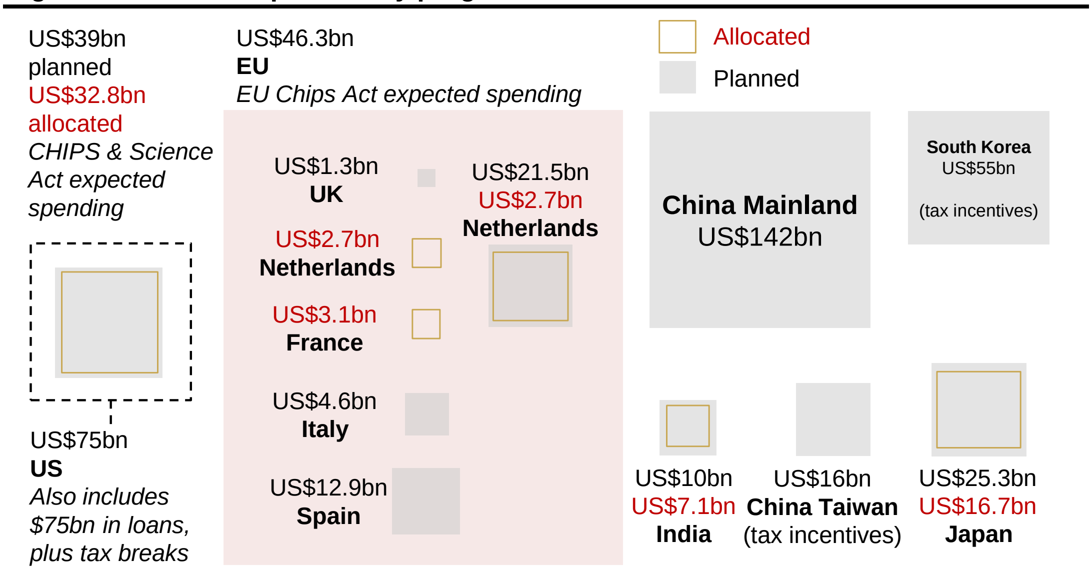
Geopolitical tensions have driven major economies worldwide to pursue supply chain independence, leading to significant investments to strengthen domestic chip fabrication capabilities. We expect **China's semi supply chain localization should propel local foundries towards greater tech advancements and expedite substitution. Leaders, such as SMIC and Hua Hong, are likely to be the key beneficiaries.**

- **Semi localization/Governmental support**

China's domestic foundries, like SMIC, aim for self-reliance but face increasing challenges due to US restrictions. These restrictions limit China's access to advanced semiconductor manufacturing technology. For instance, ASML paused EUV lithography equipment shipments to China in 2019, and SMIC was added to the US Entity List in 2020, requiring suppliers to obtain licenses for selling advanced node equipment. Starting in 2024, China will also be restricted from purchasing ASML's high-end DUV lithography systems.

Despite these challenges, the trend for semi localization is certain, not only in China, but also in major economies worldwide. We believe **the semi localization needs will fuel the expansion of domestic foundries, especially the leading ones.**

Figure 13: Global chips subsidy programs



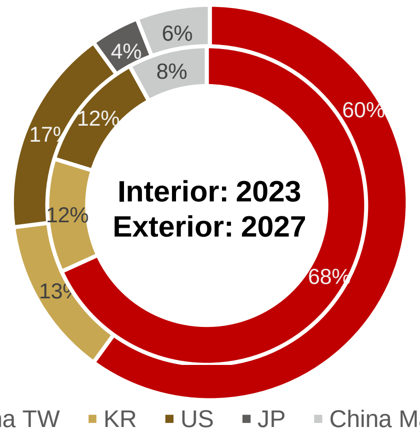
Source: Bloomberg, CMBIGM

China has secured a significant number of DUV machines and developed substantial capacity for mature node manufacturing before the US and its allies imposed export bans. Government subsidies play a crucial role in supporting domestic foundries, allowing them to expand their production capabilities and reduce reliance on foreign technology. **These subsidies help mitigate geopolitical risks and ensure a stable supply chain.**

■ **Strategic maneuver**

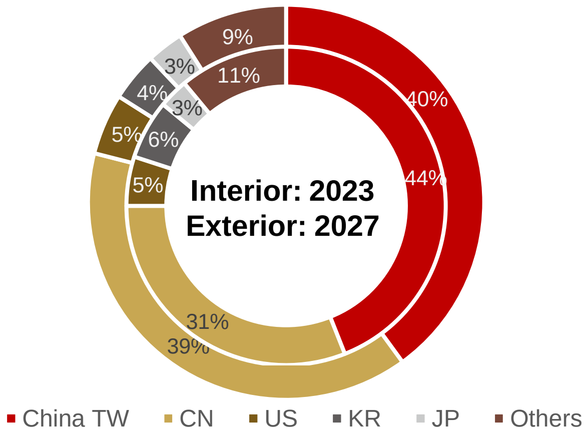
For mature node manufacturing, geopolitical risks are less concerning for investors since China has already developed substantial capacity before the export bans imposed by the US and its allies. According to TrendForce, China's Taiwan remains the leading competitor in advanced node semiconductor manufacturing, holding 68% of the global market in 2023, which is projected to decrease slightly to 60% by 2027E. Although the Chinese mainland is trying to improve self-sufficiency in advanced nodes, its impact on the global stage remains limited. On the other hand, **the mainland will significantly increase its share of mature node capacity, from 31% in 2023 to 39% by 2027E**, prioritizing expansion in this more achievable sector, according to TrendForce.

Figure 14: Advanced processes capacity market share by region



Source: TrendForce, CMBIGM

Figure 15: Mature processes capacity market share by region

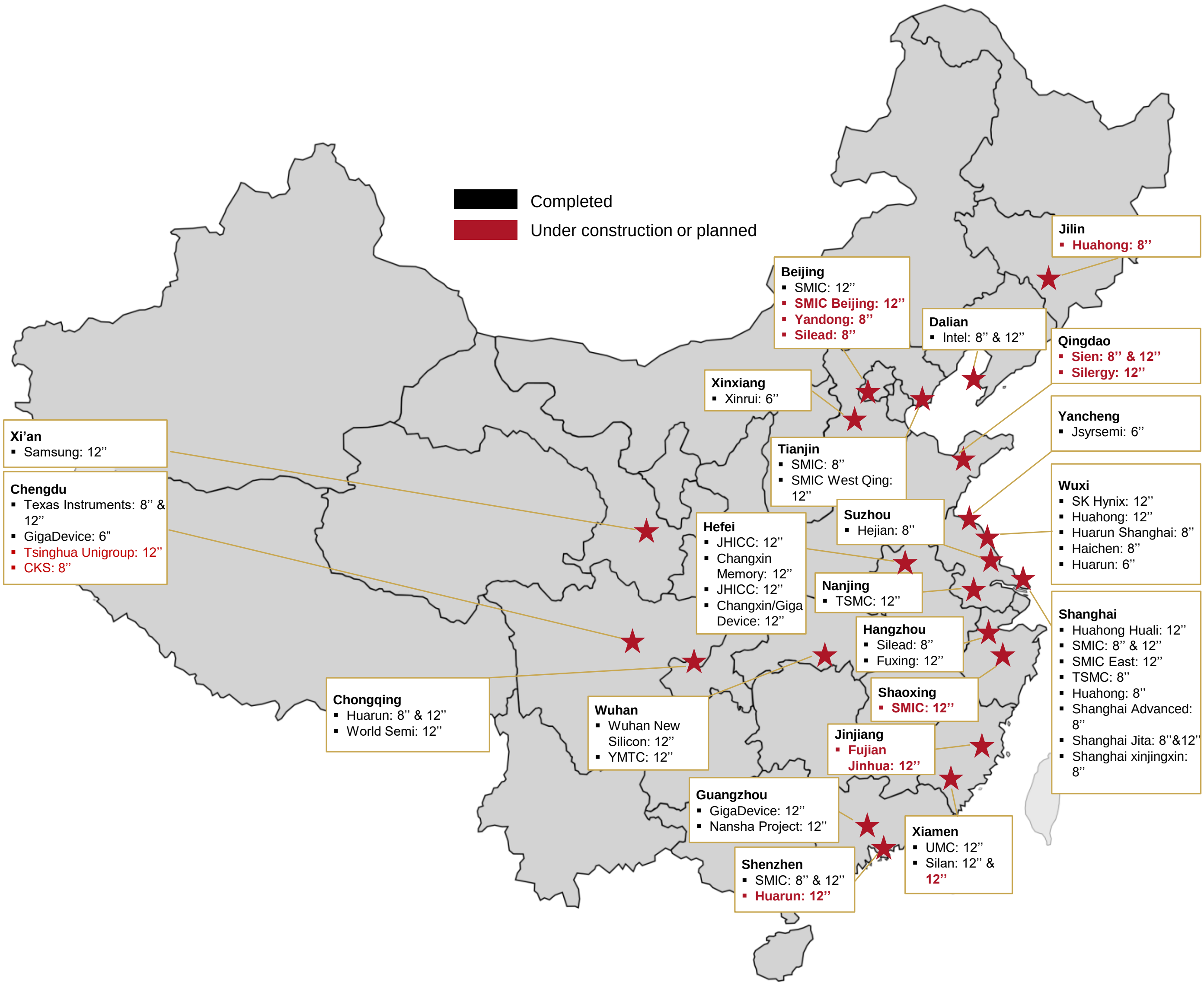


Source: TrendForce, CMBIGM

Initiatives by the Chinese government to strengthen the chip supply chain have spurred local manufacturers to expand production capacity in mature nodes, including 12-inch wafer facilities. These chips find applications in sectors like auto and consumer electronics, which are currently not affected by any US restrictions.

According to TrendForce, foundries such as SMIC (981 HK), Hua Hong Semi (1347 HK), and Nexchip (688249 CH) are leading in expanding production, focusing on specialty processes like driver ICs, CIS/ISP, and power semi. Substantial investments have been made in mature nodes and 44 operational semiconductor wafer fabs (and an additional 22 under construction as of early 2024). Additionally, by end-2024, 32 Chinese wafer fabs are set to enhance their capacity for 28nm and more mature nodes. (Link) Though China's overall chip capacity is expected to rise, specialty node participants remain few, and that provides a distinctive advantage for foundries like Hua Hong Semi.

Figure 16: China Mainland's chip production capacity set to expand in the coming years



Source: TrendForce, CMBIGM

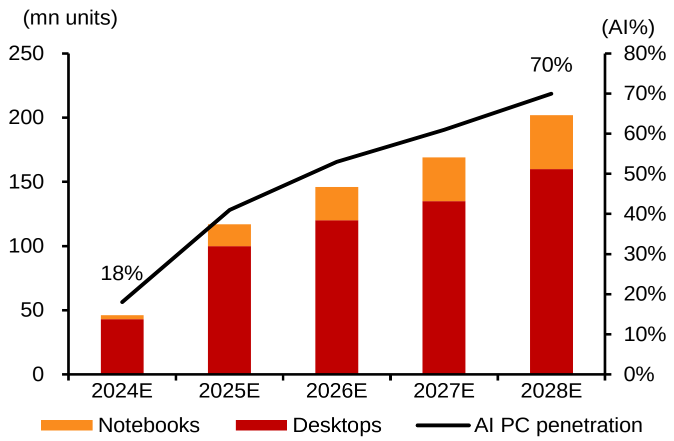
Gradual recovery in demand from an AI boost

We believe China is well-positioned to see an expected recovery of global semiconductor industry in 2024 and beyond with new AI applications taking place, such as AI PCs and smartphones. Canalys forecasts significant growth in the market for AI-capable PCs. In 2024, Canalys expects approximately 48mn AI-capable PCs to be shipped worldwide, representing 18% of total PC shipments. By 2025, shipments are projected to surpass 100mn, accounting for 40% of all PC shipments. We see this trend continue to accelerate, with an estimated 205mn AI-capable PCs to be shipped by 2028, according to Canalys, reflecting a compound annual growth rate (CAGR) of 44% from 2024 to 2028.

According to Counterpoint, the share of GenAI smartphone shipments in overall smartphone shipments is expected to reach 11% by 2024 and 43% by 2027, with an estimated 550mn units to be shipped by 2027. This forecast surpasses their earlier estimate in December 2023, driven by the anticipated entry of Apple into the segment later this year.

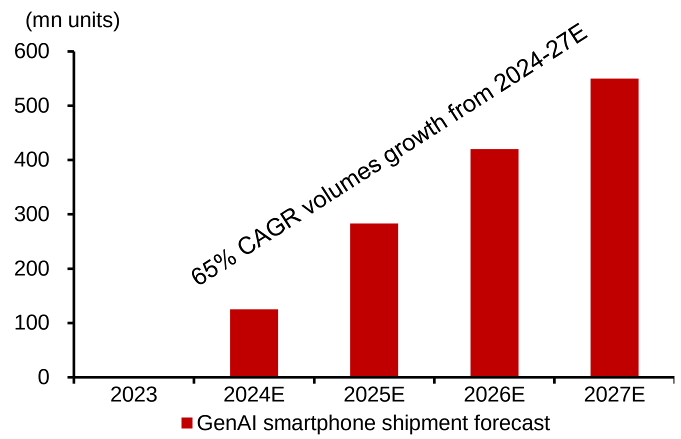
We believe AI PCs and GenAI smartphones will promote the entire semi supply chain, benefitting other players involved in those trends.

Figure 17: AI PC shipments forecast



Source: Canalys, CMBIGM

Figure 18: GenAI smartphone shipments forecast



Source: Counterpoint, CMBIGM

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Hua Hong Semi (1347 HK)

One-two punch: capacity expansion coupled with broader product portfolio

Chinese foundries are set to increase their global and domestic market share, driven by 1) strong gov't support to strive for China's semi supply chain self-reliance, 2) capacity expansion for mature nodes to gain global market share, and 3) recovering global demand especially in consumer electronics, auto, and industrial sectors. We believe China's two largest pure-play foundries, SMIC and Hua Hong Semi will be the key beneficiaries of semi localization. We initiate coverage on Hua Hong Semi with a BUY rating and TP at HK$24.

- **Leading domestic foundries will benefit most amid greater tech advancements and expedited localization.** For mature node manufacturing, geopolitical risks are less concerning for investors. We expect the Chinese mainland will significantly increase its share of mature node capacity, from 31% in 2023 to 39% by 2027E, prioritizing expansion in this more achievable sector.
- **We think the worst has passed and the Company is recovering from the bottom of the cycle.** We see positive signs of increasing wafer shipments and utilization rate in the company. Although ASP is likely to face some challenges, we think Hua Hong Semi is capable of managing the impacts before we see a strong rebound in end-market demand. In 1Q24, Hua Hong Semi maintained a strong overall capacity utilization rate of 92% (up 8ppts from 4Q23), with its 8-inch wafer utilization reaching 100%. Additionally, Hua Hong Semi is on schedule to complete a new 12-inch specialty production line, which will add over 80,000 wafers per month upon full completion. We think this could be a new driver once end-market demand fully recovers.
- **Initiate coverage on Hua Hong Semi (1347 HK) with BUY and TP at HK$24**, based on 0.8x 2024E P/B, which is the stock's 2-year historical average forward P/B. Our TP implies 38x 2024E P/E and 21x 2025E P/E, which is also the stock's 2-year historical average forward P/E (21x).
- **Potential risks:** 1) intensified competition in mature nodes from both global and domestic peers; 2) end-market demand remaining weak; 3) escalating export restrictions imposed by the US and its allies on China; and 4) foreign currency risks as approximately 22% of the company's revenue in 2023 was denominated in currencies other than Chinese RMB.

Earnings Summary

(YE 31 Dec)	FY22A	FY23A	FY24E	FY25E	FY26E
Revenue (US$ mn)	2,475	2,286	2,040	2,595	3,203
YoY growth (%)	51.8	(7.7)	(10.8)	27.2	23.4
Gross margin (%)	34.1	21.3	10.9	16.8	18.8
Net profit (US$ mn)	449.9	280.0	135.4	242.5	344.2
YoY growth (%)	112.1	(37.8)	(51.7)	79.1	41.9
EPS (Reported) (US$)	0.35	0.19	0.08	0.14	0.20
P/E (x)	8.9	16.2	37.6	21.0	14.8
P/B (x)	1.32	0.71	0.81	0.79	0.76

Source: Company data, Bloomberg, CMBIGM estimates

BUY

Target Price	HK$24.00
Up/Downside	20.6%
Current Price	HK$19.9

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Stock Data

Mkt Cap (HK$ mn)	23,274.0
Avg 3 mths t/o (HK$ mn)	142.9
52w High/Low (HK$)	28.05/13.86
Total Issued Shares (mn)	1309.0

Source: FactSet

Shareholding Structure

Shanghai Hua Hong International	26.6%
XINXIN HK Capital	13.7%

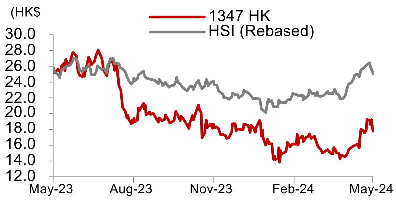
Source: HKEx

Share Performance

	Absolute	Relative
1-mth	21.4%	12.3%
3-mth	11.0%	-0.2%
6-mth	-2.2%	-7.7%

Source: FactSet

12-mth Price Performance



Source: FactSet

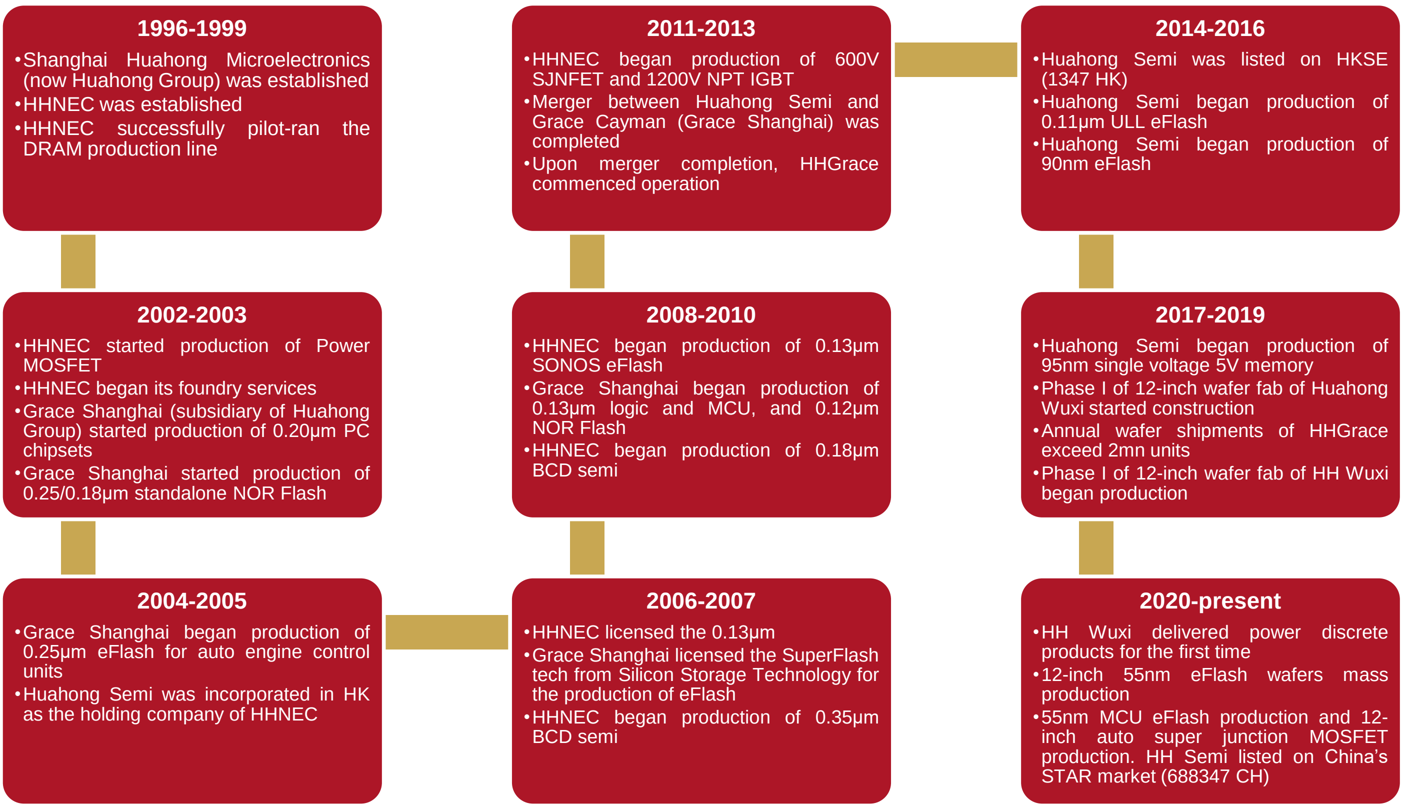
Company Overview

Company history

Shanghai Hua Hong Microelectronics was founded in 1996 as a joint venture between NEC and Hua Hong. The partnership focused on the “909 Project,” which aligned with the goals of China’s Five-Year Plan to develop the nation’s semiconductor industry.

Since inception, Hua Hong’s key milestones included the establishment of HHNEC in 1997 and the launch of various production lines for DRAM, Power MOSFET, and foundry services through the early 2000s. In 2005, Hua Hong Semi incorporated and commenced production of embedded EEPROM for China’s national ID card. Mergers and expansions continued, leading to the establishment of HHGrace and the construction of a 300mm wafer fabrication facility. The group's focus on mature nodes and strategic expansion in power discrete and eFlash technologies underscore its significant role in the China’s semiconductor industry.

Figure 19: Hua Hong Group milestones



Source: Company data, CMBIGM

Main products overview

Hua Hong Semi offers a comprehensive portfolio of semi products across various product categories.

Figure 20: Hua Hong Semi's main product offerings

Product Category	Description
Embedded Non-Volatile Memory	HHGrace leads in providing embedded Non-Volatile Memory (eNVM) foundry solutions. Its eNVM products include high-density eFlash with fast program/erase times, durable eEEPROM, and cost-effective, logic-compatible eOTP/eMTP solutions, suitable for smart cards, MCUs, and SoCs. ➢ ***0.25µm – 0.13µm eFlash, 0.35µm – 0.13µm eEEPROM, and 0.5µm – 0.13µm eOTP/eMTP/eLogicEE***
Logic & Mixed Signal	HHGrace provides a range of standard logic and mixed-signal technology platforms spanning from 0.5µm down to 90nm. It also offers shrink nodes at 0.162µm, 0.153µm (a shrink of 0.18µm), and 0.115µm (a shrink of 0.13µm), supporting diverse semiconductor applications. ➢ ***90nm low power logic and mixed-signal, 0.13µm and shrink standard logic and mixed-signal, 0.18µm and shrink standard logic and mixed-signal, and 0.5µm 5V and 0.18µm 3.3V, 5V mixed-signal***
RF	HHGrace offers a variety of silicon process solutions tailored for RF ICs in both wireless and wired optical communications, including logic-compatible RF CMOS technology. ➢ ***0.13µm RF CMOS, and 0.18µm RF CMOS***
Power Management IC (PMIC)	HHGrace provides advanced power management IC solutions using BCD (Bipolar, CMOS, and DMOS) and CDMOS processes, built on its mature CMOS platform. These technologies are extensively used across various applications including audio amplifiers, indoor and outdoor lighting, power management, industrial control, and automotive electronics. They are particularly effective for products like DC-DC converters, AC-DC converters, LED lighting, and battery management systems. ➢ ***0.35µm BCD, 0.18µm BCD, 0.35µm CDMOS, and 0.13µm CDMOS***
Power Discrete	With over a decade of experience in mass-producing advanced MOSFET products, HHGrace ensures high yield, stability, and reliability. The company continues to enhance its capabilities and shorten time-to-market for client innovations through successful custom technology transfers. HHGrace is committed to leading in technology development, focusing on advancing high-voltage and low-Rdson MOSFET and IGBT technologies. ➢ ***Trench HV MOSFET, Super Junction MOSFET, and IGBT***
Automotive	HHGrace is recognized as a leading foundry with extensive experience and a strong track record in automotive manufacturing. The company is actively enhancing and broadening its technology and IP solutions portfolio to cater to various automotive applications. ➢ ***0.13µm Flash (Infotainment system), 0.25µm embedded Flash (Engine control and airbag controls), various other products for radio & navigation systems, oil pump system, AC/DC converter, etc.***

Source: Company data, CMBIGM

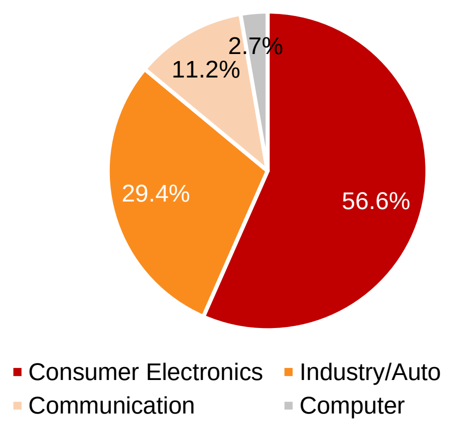
On top of semi products, Hua Hong Semi also offers a wide range of foundry services, such as extensive value-added services across various semiconductor processes. Its offerings include professional design services through collaborations with top IP companies and design service providers, spanning from IP development to full-custom layout designs. The company offers optimized cell libraries and IPs across multiple technology nodes, backed by comprehensive tech files and EDA design kits to support customer design and verification.

Hua Hong Semi's backend services are also diverse, including advanced dicing and wafer backside processing to support the full semiconductor manufacturing process. Through strategic alliances with global packaging and test service providers, it delivers top-level, one-stop services, ensuring compliance with international quality standards.

Hua Hong Semi primarily focuses on consumer electronics, which accounted for 56% of its total revenue in 2023. Others are from industrial/auto (29%), communication (11%) and computer (3%) sectors

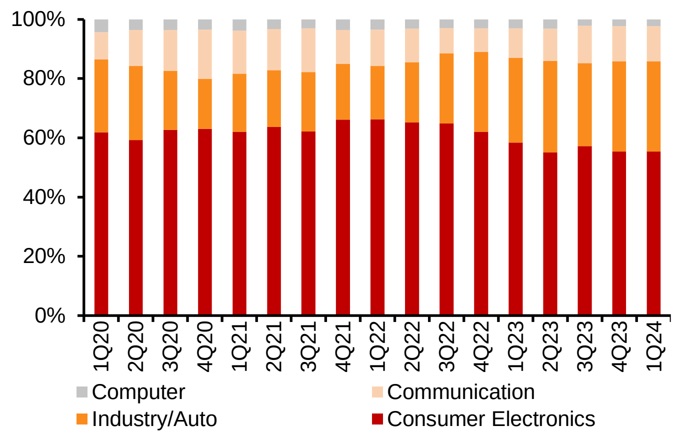
The company also saw an increased revenue contribution in the industrials & auto sector, which helped counterbalance weaker consumer electronics sales that began in mid-2022 globally. Hua Hong Semi sets itself apart from other Chinese foundries with its diversified processes across various product categories. With ongoing capacity expansion at its latest 12-inch wafer fab facility in Wuxi and an expanding product range, Hua Hong Semi is on a promising trajectory for further earnings growth, in our view.

Figure 21: Revenue breakdown by sector in 2023



Source: Company data, CMBIGM

Figure 22: Quarterly revenue breakdown by sector



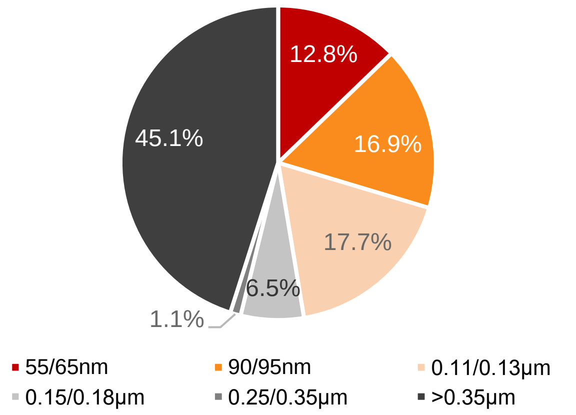
Source: Company data, CMBIGM

According to the mgmt., the company's main revenue contributor in 2023 was Non-Volatile Memory (NVM) products, especially embedded NVM for smart card ICs and MCUs (Microcontroller Units). Hua Hong Semi has also leveraged its 8-inch and 12-inch eFlash memory platforms, which has led to steady revenue contribution from auto electronics, home appliances, and industrial controls.

Despite the global headwind of soft downstream demand in 2023, Hua Hong Semi rolled out a record-high number of new products for customers in various sectors, while also maintaining positive revenue growth in the power discrete products and continuing innovation in power management products. By expanding its customer base and leveraging its extensive product portfolio, the company is well-positioned to capitalize on the global demand recovery, in our view.

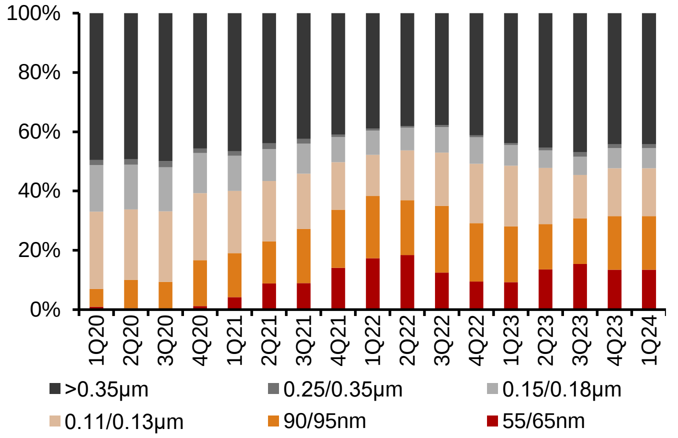
By technology node, in 2023, nearly 45% of Hua Hong Semi's revenue is from over 0.35μm products, while 0.15μm/0.18μm, 0.11μm/0.13μm, 90nm/95nm, and 55nm/65nm accounted for 7%, 18%, 17%, and 13% of total revenue, respectively.

Figure 23: Revenue breakdown by node in 2023



Source: Company data, CMBIGM

Figure 24: Quarterly revenue breakdown by node



Source: Company data, CMBIGM

Capacity analysis

Hua Hong Semi currently operates three 8-inch wafer fabrication facilities with a total 8-inch wafer capacity of 178,000 wafers per month (wpm) in Shanghai and another 12-inch wafer fabrication facility with a wafer capacity of 95,000 wpm in Wuxi. The company is looking to ramp up its second 12-inch fab in Wuxi with planned capacity to reach 83,000 wpm by completion.

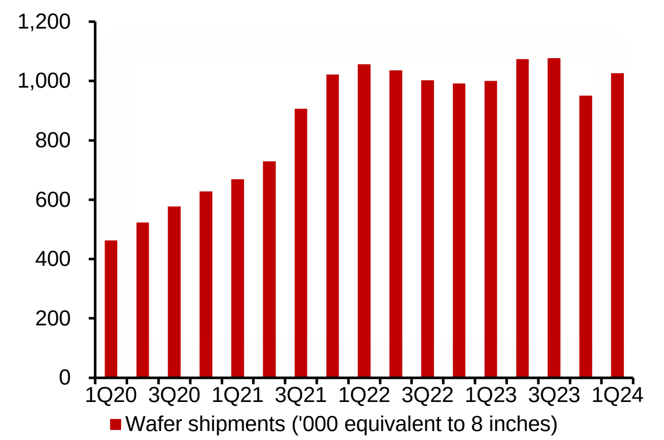
Figure 25: Hua Hong's capacity analysis

Fab	Location	Wafer size	Capacity ('000 wpm)	Utilization as of 1Q24
Fab1	Shanghai	8-inch	65	
Fab2	Shanghai	8-inch	60	
Fab3	Shanghai	8-inch	53	
Total		8-inch	178	100%
Fab7	Wuxi	12-inch	95	
Fab9	Wuxi	12-inch	83	
Total		12-inch	178	84%

Source: Company data, CMBIGM

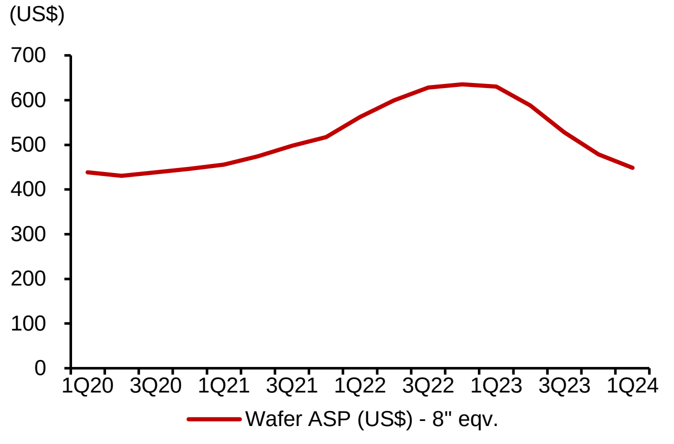
Despite the headwind from a soft end-market, Hua Hong Semi's capacity utilization rate (8-inch wafer equivalent) reached as high as 94.3% with total wafer shipments (8-inch wafer equivalent) of 4,103k wafers (vs. 4,087k in 2022), according to its 2023 annual report. In 1Q24, its utilization rate continued to recover, topping 100% for its 8-inch fabs and 84% for its 12-inch fab.

Figure 26: Hua Hong wafer shipments



Source: Company data, CMBIGM

Figure 27: Hua Hong ASP



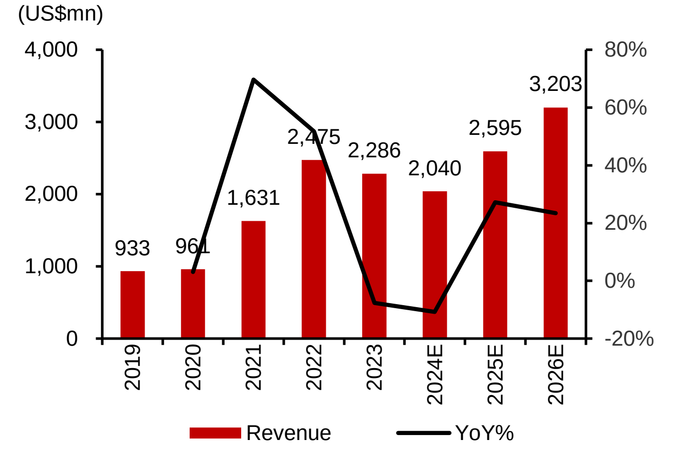
Source: Company data, CMBIGM

Looking ahead in 2024, the company is determined to accelerate its 12-inch production capacity expansion and will continue to develop its "Specialty IC + Power Discrete" technology to meeting recovering demand in consumer and industrial sectors and ride the tailwind of AI boom.

Financial Analysis

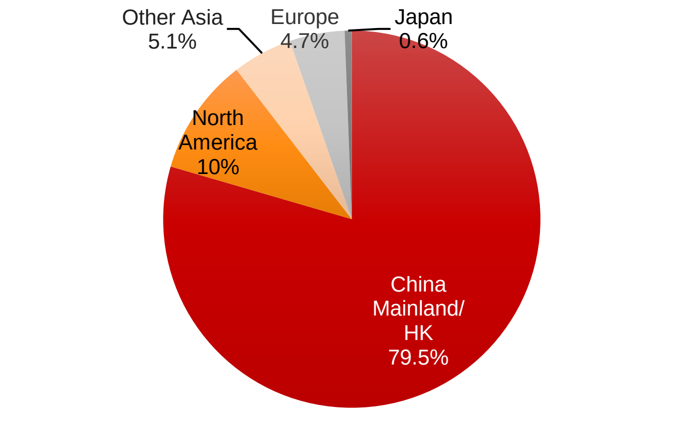
In 2023, Hua Hong Semi's revenue was US$2.3bn, reflecting a 7.7% YoY decline. We anticipate the business to continue to show signs of stabilization. For 2024, we project the revenue will decline by 10.8% but is expected to rebound by 27.2% in 2025. We expect China to remain the largest revenue contributor going forward, considering geopolitical tensions.

Figure 28: Hua Hong annual revenue



Source: Company data, CMBIGM estimates

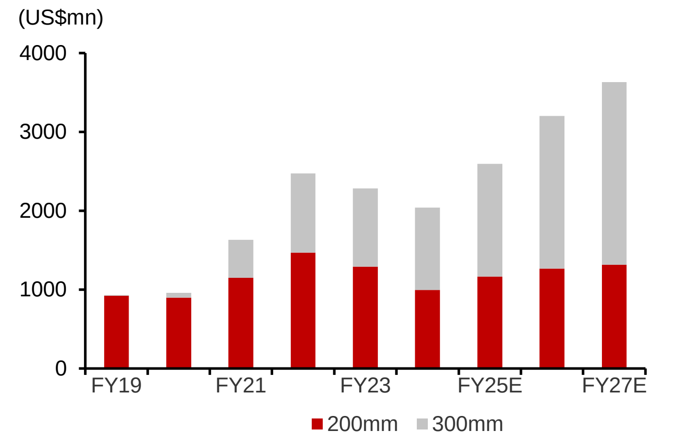
Figure 29: Hua Hong revenue breakdown in 1Q24



Source: Company data, CMBIGM estimates

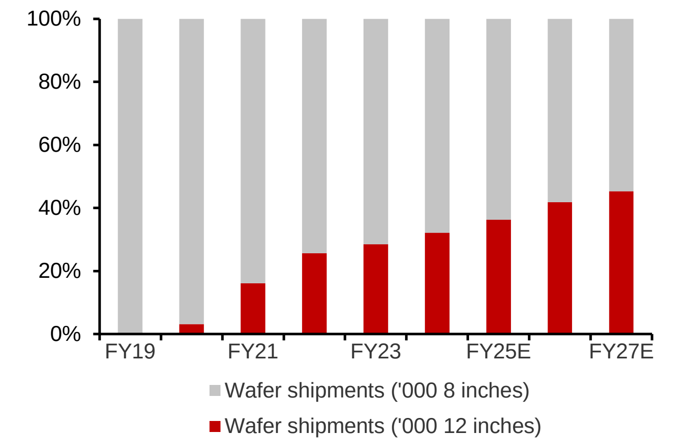
By segment, revenue from 200mm and 300mm wafers in 1Q24 was US$240mn and US$220mn, respectively. We expect Hua Hong Semi's shipments of 8-inch wafers to remain steady throughout 2024, while the shipments of 12-inch wafers should gradually recover over the year. We expect wafer revenues and shipments to grow steadily going forward, reaching US$2.0bn in full-year 2024 and rising 27% to US$2.6bn in 2025. We estimate monthly wafer shipments could grow 9% YoY to 4.5mn units for full-year 2024.

Figure 30: Hua Hong revenue breakdown by segment



Source: Company data, CMBIGM estimates

Figure 31: Hua Hong annual wafer shipments by wafer size

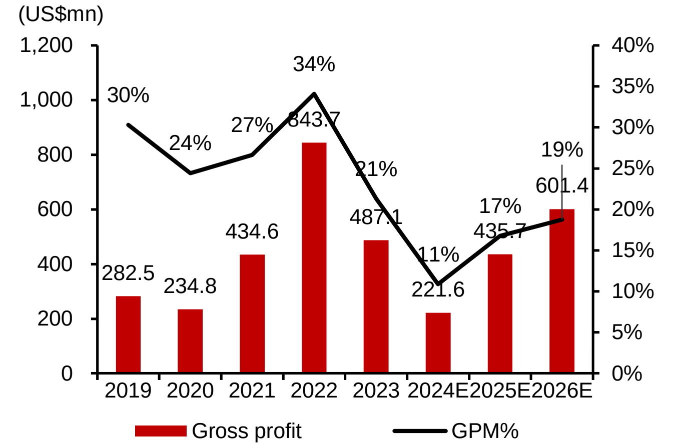


Source: Company data, CMBIGM estimates

Hua Hong's GPM fell to 21.3% in 2023 from 34.1% in 2022. We forecast its GPM to recover throughout 2024, increasing from 6.4% in Q1 to 9.0% in Q2, 12.0% in Q3, and 15.0% in Q4. We forecast its NPM to gradually pick up, to reach 7%/9%/11% in 2024-26E.

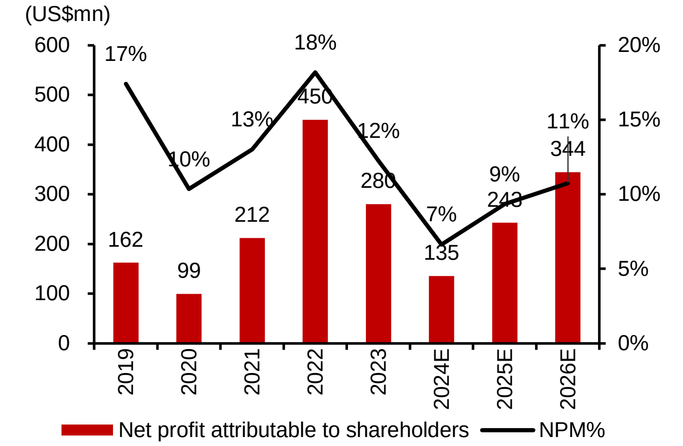
We project Hua Hong Semi's revenue will improve sequentially throughout 2024 by 6.0%/8.0%/7.6% QoQ in Q2/Q3/Q4. We expect its GPM to improve QoQ too, from 6.4% in Q1 to 9.0%/12.0%/15.0% in Q2/Q3/Q4.

Figure 32: Hua Hong's gross profit and GPM



Source: Company data, CMBIGM estimates

Figure 33: Hua Hong's net profit and NPM



Source: Company data, CMBIGM estimates

Valuation and Risks

We expect **Chinese domestic foundries are set to increase their global and domestic market share with growth driven by a rebound in demand and strategic expansion to realize semi localization.**

Hua Hong Semi is the second-largest domestic foundry in China, after SMIC, with significant capacity in mature nodes and numerous production sites. The company's strong financial position (US$6.1bn in cash as of 1Q24) enables it to invest heavily in expanding capacity to meet downstream demand as the market recovers. Currently, the company operates three 8-inch fabrication facilities with a total capacity of 178,000 wpm, and a 12-inch wafer fabrication facility with 95,000 wpm capacity. We believe **Hua Hong Semi (1347 HK) particularly stands out for its ambitious expansion of mature-node capacity in addition to its relatively less impact from geopolitical risks.**

We think the worst has passed and the Company is recovering from the bottom of the cycle. We see positive signs of increasing wafer shipments and utilization rate. We project ASP to increase by low-teens and mid-teens for 12-inch and 8-inch wafers in 2025/26E, as we think the company's priority is to ramp up production and maintain utilization at a satisfactory level. We forecast wafer shipments to grow 11% and 17% YoY in 2025/26E, with a higher share of 12-inch shipments. We estimate revenue contribution from 12-inch fabs will gradually surpass 60% in 2026E from 44% in 2023, leading to 27% and 23% YoY revenue growth in 2025/26E.

Hua Hong Semi's strategic expansion and robust market positioning make it a compelling pick in domestic pure-play foundry market for investors, in our view. **We initiate coverage on Hua Hong Semi (1347 HK) at BUY, with TP of HK$24,** based on 0.8x 2024E P/B, which is the stock's 2-year historical average forward P/B. Our TP implies 38x 2024E P/E and 21x 2025E P/E, which is also 2-year historical average forward P/E (21x). We forecast Hua Hong Semi's total revenue to decline 11% YoY to US$2bn in 2024, but resume 27% growth in 2025. We expect its GPM to recover gradually to mid-single digit by the end of 2024 (vs. 4.0% in 4Q23 and 6.4% in 1Q24).

Potential risks: 1) intensified competition in mature nodes from both global peers and domestic peers; 2) end-market demand remaining weak; 3) escalating export restrictions imposed by the US and its allies on China; and 4) foreign currency risks as approximately 22% of the company's revenue in 2023 was denominated in currencies other than Chinese RMB.

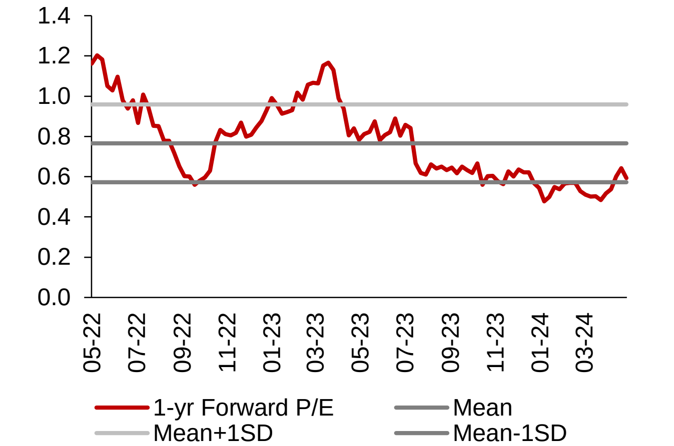
Figure 34: Financials forecasts

USD mn	FY22	FY23	1Q24	2Q24E	3Q24E	4Q24E	FY24E	FY25E	FY26E
Revenue	**2,475**	**2,286**	**460**	**487**	**527**	**566**	**2,040**	**2,595**	**3,203**
...YoY	*52%*	*-8%*	*-27%*	*-23%*	*-7%*	*24%*	*-11%*	*27%*	*23%*
...QoQ			*1.0%*	*6.0%*	*8.0%*	*7.6%*			
Cost of sales	-1,632	-1,799	-430	-444	-463	-481	-1,819	-2,160	-2,601
Gross profit	**844**	**487**	**30**	**44**	**63**	**85**	**222**	**436**	**601**
...YoY	*94%*	*-42%*	*-85%*	*-75%*	*-31%*	*366%*	*-54%*	*97%*	*38%*
GPM (%)	**34.1%**	**21.3%**	**6.4%**	**9.0%**	**12.0%**	**15.0%**	**10.9%**	**16.8%**	**18.8%**
Pre-tax income	**496**	**174**	**-45**	**-27**	**-18**	**79**	**-11**	**171**	**292**
...YoY	*113%*	*-65%*	*-134%*	*-162%*	*39%*	*637%*	*-106%*	*NA*	*71%*
Tax	-89	-47	20	4	3	-13	14	-28	-48
Net profit	**407**	**126**	**-25**	**-23**	**-15**	**66**	**3**	**143**	**244**
Minority interest	-43	-154	-57	-25	-25	-25	-132	-100	-100

Net profit attributable to shareholders	**450**	**280**	**32**	**2**	**10**	**91**	**135**	**243**	**344**
YoY	*112%*	*-38%*	*-79%*	*-97%*	*-27%*	*158%*	*-52%*	*79%*	*42%*
NPM (%)	*18%*	*12%*	*7%*	*0%*	*2%*	*16%*	*7%*	*9%*	*11%*

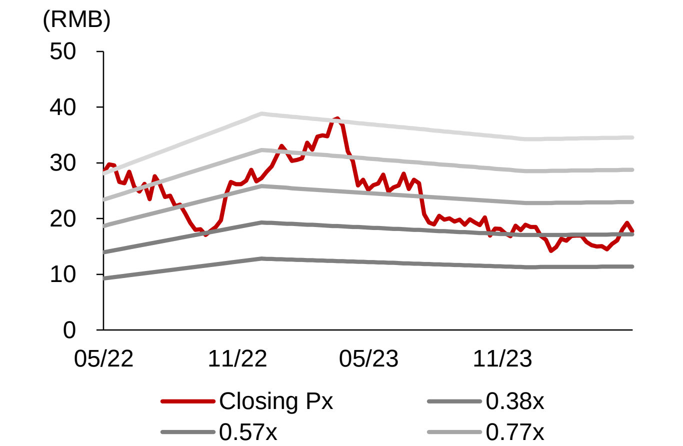
Source: Company data, CMBIGM estimates

Figure 35: 2-yr forward P/B chart



Source: Company data, CMBIGM estimates

Figure 36: 2-yr forward P/B band



Source: Company data, CMBIGM estimates

Figure 37: Peers comparison

Company	Ticker	Mkt Cap (US$mn)	Price (LC)	P/E (x) FY24E	P/E (x) FY25E	P/B (x) FY24E	P/B (x) FY25E	ROE (%) FY24E	ROE (%) FY25E	EPS (US$) FY24E	EPS (US$) FY25E
Domestic peers											
Hua Hong-H	1347 HK	4,962	17.8	31.7	18.4	0.7	0.6	1.8	3.1	0.08	0.13
Hua Hong-A	688347 CH	4,917	31.7	NA	NA	NA	NA	NA	NA	0.08	0.13
SMIC-H	0981 HK	23,705	15.3	40.4	22.1	0.8	0.8	2.1	3.2	0.05	0.09
SMIC-A	688981 CH	23,488	41	93.3	56.2	2.2	2.1	1.9	3.5	0.06	0.1
			Peers Avg.	***66.8***	***39.2***	***1.5***	***1.4***	***2***	***3.3***	***0.1***	***0.1***
			Peers Median	***66.8***	***39.2***	***1.5***	***1.4***	***2***	***3.3***	***0.1***	***0.1***
Other peers											
TSMC	2330 TT	829,921	160	22.4	18	5.4	4.5	26	26.6	1.21	1.51
UMC	2303 TT	22,247	54.6	15.1	12.5	2	1.9	13.8	15.1	0.12	0.14
VIS	5347 TT	5,248	100.5	25.9	20.4	3.6	3.5	14.5	17.8	0.16	0.2
PSMC	6770 TT	3,359	25.7	75.4	13.6	1.1	1	7.1	8	0.06	0.06
Samsung	005930 KS	325,761	75,900.00	12.9	8.7	1.3	1.1	10.1	13.8	4.15	6.13
GlobalFoundries	GFS US	28,192	50.8	38.7	24.8	2.4	2.2	6	9.2	1.31	2.05
			Peers Avg.	***31.7***	***16.3***	***2.6***	***2.4***	***12.9***	***15.1***	***1.2***	***1.7***
			Peers Median	***24.1***	***15.8***	***2.2***	***2***	***12***	***14.4***	***0.7***	***0.9***

Source: Company data, Bloomberg, CMBIGM

Note: data as of 24 May 2024 close; earnings estimates are Bloomberg consensus

Financial Summary

INCOME STATEMENT	2021A	2022A	2023A	2024E	2025E	2026E
YE 31 Dec (US$ mn)						
Revenue	**1,631**	**2,475**	**2,286**	**2,040**	**2,595**	**3,203**
Cost of goods sold	(1,196)	(1,632)	(1,799)	(1,819)	(2,160)	(2,601)
Gross profit	**435**	**844**	**487**	**222**	**436**	**601**
Selling expense	(11)	(12)	(10)	(9)	(11)	(14)
Admin expense	(245)	(267)	(323)	(291)	(307)	(328)
Others	(6)	(28)	(91)	(92)	(106)	(119)
Operating profit	**172**	**536**	**63**	**(170)**	**11**	**141**
Other income	64	100	188	219	230	232
Other expense	(4)	(141)	(77)	(59)	(70)	(80)
Pre-tax profit	**233**	**496**	**174**	**(11)**	**171**	**292**
Income tax	(51)	(89)	(47)	14	(28)	(48)
After tax profit	**182**	**407**	**126**	**3**	**143**	**244**
Minority interest	(30)	(43)	(154)	(132)	(100)	(100)
Net profit	**212**	**450**	**280**	**135**	**243**	**344**

BALANCE SHEET	2021A	2022A	2023A	2024E	2025E	2026E
YE 31 Dec (US$ mn)						
Current assets	**2,391**	**3,076**	**6,570**	**5,217**	**4,902**	**4,188**
Cash & equivalents	1,610	2,009	5,585	4,063	3,531	2,616
Restricted cash	2	1	32	32	32	32
Account receivables	181	292	279	312	439	488
Inventories	433	578	450	547	637	789
Prepayment	43	48	34	53	53	53
Other current assets	121	148	190	210	210	210
Non-current assets	**3,811**	**3,980**	**4,374**	**5,864**	**7,147**	**8,309**
PP&E	3,117	3,368	3,519	4,978	6,239	7,370
Right-of-use assets	75	78	79	79	82	86
Intangibles	35	33	50	63	82	109
Other non-current assets	584	501	726	744	744	744
Total assets	**6,202**	**7,055**	**10,943**	**11,081**	**12,049**	**12,497**
Current liabilities	**1,080**	**1,382**	**972**	**980**	**1,265**	**1,410**
Short-term borrowings	195	427	193	255	446	572
Account payables	194	237	235	229	322	341
Other current liabilities	689	714	541	489	489	489
Lease liabilities	2	5	3	7	7	7
Non-current liabilities	**1,437**	**1,537**	**1,956**	**2,215**	**2,856**	**3,014**
Long-term borrowings	1,395	1,482	1,907	2,193	2,834	2,992
Other non-current liabilities	42	56	50	22	22	22
Total liabilities	**2,518**	**2,920**	**2,929**	**3,195**	**4,120**	**4,424**
Share capital	1,986	1,994	4,934	4,934	4,934	4,934
Other reserves	884	1,036	1,367	1,371	1,513	1,757
Total shareholders equity	**2,870**	**3,030**	**6,301**	**6,305**	**6,447**	**6,692**
Minority interest	814	1,105	1,714	1,581	1,481	1,381
Total equity and liabilities	**6,202**	**7,055**	**10,943**	**11,081**	**12,049**	**12,497**

CASH FLOW	2021A	2022A	2023A	2024E	2025E	2026E
YE 31 Dec (US$ mn)						
Operating						
Profit before taxation	**296**	**496**	**174**	**(11)**	**171**	**292**
Depreciation & amortization	318	457	500	575	774	904
Tax paid	(20)	(51)	(72)	14	(28)	(48)
Change in working capital	(76)	(116)	(69)	(219)	(136)	(197)
Others	1	(35)	108	122	201	232
Net cash from operations	**518**	**751**	**642**	**482**	**981**	**1,184**
Investing						
Capital expenditure	(939)	(996)	(907)	(2,034)	(2,043)	(2,053)
Others	76	66	73	(17)	0	0
Net cash from investing	**(863)**	**(930)**	**(833)**	**(2,050)**	**(2,043)**	**(2,053)**
Financing						

Net borrowings	1,023	315	193	353	831	284
Proceeds from share issues	7	6	2,942	0	0	0
Others	(16)	351	647	(231)	(216)	(231)
Net cash from financing	**1,015**	**672**	**3,782**	**122**	**616**	**53**
Net change in cash						
Cash at the beginning of the year	923	1,610	2,009	5,585	4,063	3,531
Exchange difference	17	(94)	(14)	(75)	(86)	(99)
Others	670	493	3,590	(1,447)	(446)	(816)
Cash at the end of the year	**1,610**	**2,009**	**5,585**	**4,063**	**3,531**	**2,616**

Source: Company data, CMBIGM estimates. Note: The calculation of net cash includes financial assets.

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