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Overseas Technology

Oct Edition: Choppy Markets, Intact AI

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Market to remain choppy: Tech equities were volatile in the past month, with rotation toward hyperscaler and internet names. That said, semi and memory (Korea) weakness reflected lower risk appetite due to rising bond yields, AI monetization/ARR visibility and L-T AI debates (i.e., Broadcom CEO warned that capital may now be a bigger constraint), even as company-specific catalysts continued to be strong. On the other hand, the positive was the acceleration of AI model scaling (i.e., Meta's Muse Wonder, Gemini 4, etc). That said, we view the pullback primarily as a reset in expectations rather than the evidence of AI deterioration. Despite light positioning, we expect the markets will remain choppy in the near term but would accumulate low valuation & sustainable names (i.e., HBM, non-TSMC foundries, CPUs, CPOs, etc). In our preferred list, we added CLS, while removing MTK and Hon Hai.

U.S. roadshow takeaways (week of Oct 5): Investor tone skewed neutral to slightly cautious, driven by conservative top-down macro views, U.S. election, and ongoing debates around the L-T AI demand. Positioning in AI infrastructure has come off peak levels. Even so, many investors would accumulate on pullbacks, with interest concentrated in "Made in U.S." names (INTC, LITE, COHR), U.S. memory suppliers, TSMC, and selective bottleneck themes — including ASE, ABF substrates, MRVL/SMTC, and Japanese MLCCs.

OCP & earnings season in focus: The week is anchored by AI/semis— SEMICON West, OCP, and earnings from ASML, TSMC, etc. OCP reinforced the industry's pivot toward rack-scale infrastructure, with inference and agentic workloads driving demand across compute, memory, and networking. Scale-up optics, NPO/CPO, and 800VDC power were key themes, while AMD's CPU outlook and Helios/Helion underscored a secular CPU uptrend. Nvidia's use of PTFE for NVLink boards further supports our positive stance on PTFE (see PCB Spec in 2H27, Oct 5). On earnings, ASML delivered largely in-line results, GM and OP above consensus with revenue slightly miss, and raised full year guidance again and is exploring ways to increase capacity by >30% 2028 to fulfill strong customer demand, also extending the order visibility beyond 2028. For TSMC, we anticipate an inline quarter.

September monthly sales/data: TSMC sales -0.6% MoM, slightly ahead. Rubin to accelerate and T3 ramp. PC forecast trimmed. Substrate/CCL upcycle with pricing/margin expansion. Aspeed revenue +101% YoY. Details on page 5.

GFHK Tech Most Read: 1) Jeff Pu on **ASIC Updates on TPU v9**; 2) Michelle Jing on **PCB Spec in 2H27**; 3) Alicia Xia on **CPO Acceleration**; 4) Jeff Pu on **NAND Re-acceleration**; 5) Jeff Pu on **TSMC 3Q26 Preview**.

Figure 1: Cyclical Indicators

	Short-term	Mid-term
DRAM	↗	↗
NAND	↗	→
Analog	↗	↗
Optical	↗	↗
iPhone	↘	→
Android	↘	↘
PC	↘	↘
AI Server	↗	↗

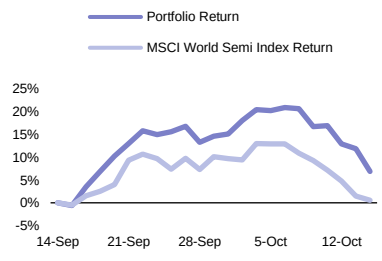
Sources: GF Securities (Hong Kong) Brokerage

Figure 2: Our preferred picks

	Ticker	Rating	CY26 P/E	CY27 P/E
Nvidia	NVDA US	Buy	23.8x	13.9x
Intel	INTC US	Buy	61.3x	35.0x
Credo	CRDO US	Buy	27.6x	15.7x
ASE	3711 TT	Buy	40.2x	24.8x
ZDT	4958 TT	Buy	29.1x	15.5x
UMC	2303 TT	Buy	18.7x	16.5x
Micron	MU US	Buy	11.6x	4.8x
Lenovo	00992 HK	Buy	11.9x	8.3x
Marvell	MRVL US	Buy	55.7x	30.7x
Semtech	SMTC US	Buy	44.5x	21.7x
Celestica	CLS US	Hold	29.4x	13.1x

Sources: GF Securities (Hong Kong) Brokerage

Figure 3: Preferred picks performance



Sources: BBG, GF Securities (Hong Kong) Brokerage

Risks

1) Alternative technologies;
2) AI demand slowdown;
3) IT demand slowdown;
4) Product delays.

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GFHK Tech Important Stock Calls

In the past one month, our key reports and stock calls are:

Jeff Pu on ASIC Updates on TPU v9, reported date on Oct 13: We expect near-term MTK headwinds from TPU v9 delays but remain constructive on MTK/MRVL longer term. Humufish's redesign could push tape-out to Jan-27, MP tape-out to 2Q27 and shipments to 1Q28, while EMIB-T yields could recover from 45–50%. Rising TPU allocations to Anthropic could constrain Gemini compute, though higher internal allocation in 2H26 may support future models. SemiAnalysis expects Anthropic/OpenAI to each add 5–10GW in 2027 vs. a few GW for Google. For TPU v10 (4Q28/1Q29), MTK/GUC's Icefish remains the only confirmed mainstream SKU, while Broadcom-led Merope faces AMD/Marvell competition, with both potentially testing EMIB-T.

Michelle Jing on PCB Spec in 2H27, reported date on Oct 5: Some market watchers expect Nvidia to shift from PTFE to hydrocarbon resin (HC) for the VR300 NVL576 switch tray. HC—one of the glass free alternatives within PTFE hybrid architectures—has only recently passed SI testing and has yet to enter PCB MP, leaving it roughly three months behind PTFE in qualification. On the contrary, we believe that PTFE offers superior performance for high frequency, high speed designs. With VR300 NVL576 shipments expected in 2H27 and the final configuration likely set by end 26—and with a leading Chinese PCB maker already achieving meaningful PTFE hybrid yields—we maintain that PTFE hybrid remains the most probable solution for next year's switch board.

Alicia Xia on CPO Acceleration, reported date on Sept 29: Nvidia's CPO scale-out switch is progressing faster than expected, with FAU yields improving. We forecast CPO switch shipments at 15k/16k/30k in 4Q26/1Q27/2Q27 and 100k in 2027. For Nvidia/AWS scale-up, CPO and NPO continue in parallel, with full NPO adoption expected at NVL576 launch. Feynman is also developing both variants, with CPO potentially using QM6 + six 6.4T OEs. We shift AWS Trainium 4 launch to 1Q28 and forecast global scale-up OE demand at 6.5m/42m in 2027E/28E.

Jeff Pu on NAND Re-acceleration, reported date on Sept 20: According to TrendForce, NAND demand is stronger than expected as U.S. CSPs scale AI infrastructure, with eSSD demand nearly 2x prior forecasts. We raise NAND contract price growth to +21%/+17%/+15% QoQ in 3Q26/4Q26/1Q27, while hyperscaler inventories decline. Supply remains disciplined at 15%/21%/20% YoY bit growth in 2025–27. Demand is supported by agentic AI, vector databases and KV-cache offloading, where eSSD offers lower cost/bit than DRAM and better power efficiency than HDD.

Jeff Pu on TSMC 3Q26 Preview, reported date on Oct 7: TSMC shares hit record highs on expectations ahead of the print and potential Terafab collaboration. We expect largely inline 3Q26 results, capex and full-year guidance, with softer 4Q26 margin (67.2%). Management should reaffirm 2026 capex at the ceiling and mid-40s YoY growth, while we forecast 37% growth in 2027 on sustained AI/CPU/networking demand and price hikes. Key focuses include margins, long-term capex/U.S. expansion, large-reticle packaging and A14. We raise 2026E/27E EPS by 2%/8% on higher N2/N3 capacity and operating leverage, and roll to 20x 2027E P/E, lifting TP to NT$2,960.

Coverage Summary

Figure 4: Coverage summary

Company	Ticker	Rating	TP	Mkt Cap	EPS		P/E		ROE (%)		P/B	
				US mn	2026E	2027E	2026E	2027E	2026E	2027E	2026E	2027E
TSMC	2330 TT	Hold	NT$2,960	1,963,053	NT$ 110.9	NT$ 148.7	22.5x	16.7x	40.3	39.8	9.0x	6.9x
UMC	2303 TT	Buy	NT$215	52,734	NT$ 7.6	NT$ 8.6	18.7x	16.5x	21.7	22.9	4.1x	3.8x
INTC	INTC US	Buy	US$150.0	518,571	US$1.60	US$2.80	61.3x	35.0x	5.7	9.1	3.3x	3.0x
ASE	3711 TT	Buy	NT$754	96,196	NT$ 18.6	NT$ 30.1	40.2x	24.8x	19.0	26.0	7.7x	6.4x
Nvidia	NVDA US	Buy	US$345	5,333,330	US$9.30	US$15.90	23.8x	13.9x	81.2	75.0	19.4x	10.4x
Qualcomm	QCOM US	Hold	US$186	184,330	US$10.60	US$11.60	16.3x	14.9x	60.4	47.5	9.8x	7.0x
AMD	AMD US	Buy	US$700	931,849	US$8.40	US$15.70	68.0x	36.4x	18.6	27.3	12.7x	7.7x
MTK	2454 TT	Buy	NT$6,650	212,178	NT$ 69.8	NT$ 147.8	64.1x	30.3x	28.0	59.6	17.7x	17.6x
BYDE	00285 HK	Hold	HK$30.0	6,414	CNY 1.00	CNY 1.70	22.5x	13.2x	6.5	10.2	1.4x	1.3x
Broadcom	AVGO US	Buy	US$447	1,652,869	US$11.70	US$19.50	29.6x	17.8x	53.9	61.5	16.0x	11.0x
Marvell	MRVL US	Buy	US$290	215,086	US$4.40	US$8.00	55.7x	30.7x	20.1	24.4	10.9x	7.5x
Semtech	SMTC US	Buy	US$162	14,956	US$3.60	US$7.40	44.5x	21.7x	28.6	45.5	26.8x	15.4x
TI	TXN US	Buy	US$326	256,303	US$8.70	US$10.90	32.3x	25.7x	31.6	31.6	10.2x	8.2x
Tower	TSEM US	Buy	US$260	23,743	US$4.50	US$10.00	46.5x	20.9x	14.1	24.6	7.0x	5.3x
Coreweave	CRWV US	Buy	US$172	36,762	-US$3.64	-US$1.32	N/A	N/A	-10.2	-1.6	1.7x	0.5x
Apple	AAPL US	Hold	US$369	5,005,220	US$8.90	US$10.50	38.5x	32.7x	142.6	119.0	47.0x	35.4x
Hon Hai	2317 TT	Buy	NT$372	71,150	NT$ 20.1	NT$ 29.6	12.1x	8.2x	14.4	18.5	1.6x	1.3x
Dell	DELL US	Hold	US$497	322,948	US$26.10	US$29.20	19.5x	17.4x	N/A	N/A	306.0x	0.0x
Super Micro	SMCI US	Buy	US$54	23,506	US$4.50	US$5.80	8.0x	6.2x	19.8	20.4	3.1x	2.7x
Lenovo	00992 HK	Buy	HK$48	45,598	HK$2.56	HK$3.66	11.9x	8.3x	41.3	85.4	50.7x	38.0x
Xiaomi	01810 HK	Buy	HK$39.5	88,746	CNY 0.90	CNY 1.10	28.7x	23.5x	8.3	9.2	2.5x	2.3x
BizLink	3665 TT	Buy	NT$3,333	13,131	NT$ 72.7	NT$ 128.2	30.7x	17.4x	21.1	28.2	6.5x	4.9x
EMC	2383 TT	Buy	NT$6,538	57,744	NT$ 114.9	NT$ 261.5	48.0x	21.1x	26.3	24.7	12.7x	5.6x
Co-Tech	8358 TT	Buy	NT$480	3,722	NT$ 10.0	NT$ 24.0	50.3x	20.9x	19.0	25.0	9.5x	5.2x
Zeng Ding	4958 TT	Buy	NT$729	18,407	NT$ 19.5	NT$ 36.5	29.1x	15.5x	10.8	18.2	2.5x	1.9x
KBLaminates	01888 HK	Buy	HK$62.6	15,950	HK$3.12	HK$6.75	13.6x	6.3x	24.8	27.4	3.4x	1.7x
Celestica	CLS US	Hold	US$370	40,927	US$11.00	US$24.60	29.4x	13.1x	37.8	45.4	11.1x	5.9x
Arista	ANET US	Buy	US$170	246,469	US$3.89	US$4.81	50.3x	40.7x	24.4	21.7	12.3x	8.8x
Coherent	COHR US	Hold	US$415	51,857	US$5.60	US$12.10	47.0x	21.8x	9.7	13.1	4.2x	3.8x
Lumemtum	LITE US	Buy	US$961	81,192	US$7.70	US$24.50	116.4x	36.6x	16.8	33.4	19.5x	12.2x
Fabrinet	FN US	Hold	US$615	14,081	US$13.52	US$15.00	29.1x	26.2x	21.6	49.5	6.8x	12.9x
FIT	06088 HK	Buy	HK$9.0	3,788	US$0.04	US$0.08	13.8x	7.3x	18.4	22.4	1.1x	0.9x
Credo	CRDO US	Buy	US$227	33,686	US$6.50	US$11.44	27.6x	15.7x	38.8	40.5	10.6x	6.3x
MPS	MPWR US	Buy	US$1,706	61,090	US$28.00	US$48.70	44.4x	25.5x	32.3	38.7	12.1x	8.2x
Horizon Robotics	09660 HK	Buy	HK$9.5	7,777	-CNY 0.00	CNY 0.01	N/A	412.1x	N/A	N/A	1.7x	6.9x

Sources: Company data, GF Securities (Hong Kong) Brokerage

September Monthly Data

TSMC September sales of NT$511.9bn, -0.6% MoM and +54.6% YoY, with total 3Q revenue reaching NT$1.49T, +17.6 QoQ, slightly ahead of expectations of +14%. The solid performance was well supported by ASIC, A20 Pro, and Rubin. For 3Q26, we expect gross margin to be 67.8%, higher than guidance of 65-67% and consensus of 66.4%. For 4Q26, we expect another 12% QoQ growth with GM at 67.2%, both ahead of street's estimates of +10% QoQ and 66% margin. Ahead of the earnings call, key focus include gross margin trajectory, long-term capex discipline, and the execution of its U.S. fab expansion.

Rubin to accelerate: Hon Hai revenue last month was NT$1.16T, +26% MoM, +38% YoY, mainly driven by iPhone build. Quanta and Wistron delivered -23% and -17% MoM respectively, due to AI racks' shipping timing differences. Of note, Pegatron surprised the market with +143.2% MoM revenue surge fueled by initial GB300 rack shipments to neocloud customers including Lambda and Together AI. This reaffirms our thesis of robust NVL72 order momentum across Neoclouds. Looking ahead, VR200 is ramping now, with volume deployment accelerating into 2027. We maintain our forecast of 75k and 92k NVL72 (GB+VR) rack shipments for 2026 and 2027, respectively. Concurrently, Wiwynn delivered another solid month with revenue expanding 20.0% MoM, underpinned by resilient GP server demand alongside the ramp of Trainium 3.

ASIC ramping up: On design service vendors fronts, driven by T3 ramp, Alchip's Sep revenue reached a record NT$9.98bn. Backed by secured incremental 3nm wafer allocation and improving yields, management raised its 2027 revenue guidance, now targeting growth above the previous 50% YoY baseline. That said, we push out T4 shipment timeline into 1Q28. GUC delivered a strong beat with monthly revenue reaching a record NT$7.145bn (+22.4% MoM, +97.8% YoY), driven by robust Axion 2 CPU demand. Beyond its engagement with top 4 CSPs, multi-year order visibility into 2027 and beyond is further bolstered by high-margin (likely TK1) automotive ASIC designs.

PC forecast trimmed: NB shipments from top 5 ODMs were 9.7m in Sep, with 3Q26 shipments down 17% QoQ and 26% YoY. Global PC OEM shipments contracted 20.1% YoY in 3Q26, worse than expected, post robust 1H26 pull-ins with high pricing points and weak macro. For 2027, we project the industry will decline a further 5% YoY. On the competitive front, tier-1 vendors such as Lenovo, Dell, and HP are not immune to this downturn, while entry-level laptops (low cost models from China) continue to see stronger relative demand.

Substrate/CCL Upcycle Intact: Unimicron continued to deliver another all-time high sales with +5% MoM and 65% YoY. Supported by ABF upward pricing of ~15% in 2H26 (likely more next year) and higher mix of AI products, we expect a meaningful GM uptick for this quarter with momentum to sustain into 2027. In the meantime, ZengDing's revenue rose 28% MoM and 36% YoY mainly driven by iPhone, 1.6T mSAP, and Rubin's HDI. On the CCL front, bolstered by ongoing price hikes and strong demand from GP servers, ITEC revenue grew 15.5% MoM and 111% YoY, and NanYa Plastics recorded +12.5% MoM and +55% YoY. Meanwhile, EMC and TUC both posted another single digit growth MoM on sales.

Figure 5: Taiwan region upstream tech monthly sales

TWD m		Sept-26	MoM	YoY	Aug-26	MoM	YoY	July-26	MoM	YoY
Foundry										
TSMC	2330.TW	511,857	-0.6%	54.6%	514,805	10.1%	53.3%	467,581	5.6%	44.7%
UMC	2303.TW	25,350	1.2%	27.2%	25,045	5.0%	30.7%	23,844	3.1%	19.0%
Vanguard	5347.TW	5,904	15.9%	15.5%	5,093	8.2%	40.5%	4,706	-21.3%	30.3%
OSAT/Testing										
ASE	3711.TW	88,130	7.2%	45.5%	82,247	11.5%	45.7%	73,784	12.2%	28.2%
Powertech	6239.TW	8,507	-0.6%	27.0%	8,558	3.5%	24.5%	8,270	8.5%	29.4%
KING YUAN	2449.TW	4,071	-0.2%	24.5%	4,080	2.2%	31.6%	3,991	10.2%	36.7%
Chipmos	8150.TW	2,792	0.2%	33.8%	2,786	-1.3%	33.3%	2,823	18.4%	43.6%
Chipbond	6147.TW	2,439	-6.9%	27.9%	2,620	3.8%	43.6%	2,523	10.2%	39.2%
Chroma	2360.TW	6,860	21.8%	206.5%	5,632	3.6%	156.3%	5,434	32.1%	175.3%
Probe Card										
MPI	6223.TW	2,048	0.0%	82.2%	2,048	13.4%	69.9%	1,805	-1.5%	66.5%
WinWay	6515.TW	1,250	-26.7%	87.7%	1,706	6.6%	233.4%	1,600	9.6%	155.6%
CHPT	6510.TW	652	2.1%	55.9%	638	3.9%	54.3%	615	7.1%	49.9%
Equipment										
GPTC	3131.TW	747	9.7%	61.9%	681	-14.1%	43.3%	793	25.6%	42.4%
Scientech	3583.TW	1,041	-2.6%	2.8%	1,068	9.8%	18.1%	973	-6.0%	6.6%
ALL RING	6187.TW	1,160	4.6%	109.2%	1,109	5.1%	103.1%	1,055	4.2%	73.4%
IC Design										
MediaTek	2454.TW	55,399	-13.7%	2.0%	64,183	32.4%	44.1%	48,475	-16.4%	12.2%
Novatek	3034.TW	10,347	0.2%	25.0%	10,327	0.3%	26.3%	10,296	2.7%	26.8%
Realtek	2379.TW	12,378	-0.7%	23.4%	12,459	-3.4%	28.1%	12,895	4.7%	32.5%
Aspeed	5274.TW	1,636	0.6%	100.9%	1,626	6.7%	118.4%	1,524	16.3%	97.6%
ASMedia	5269.TW	995	12.8%	-30.0%	882	12.7%	-32.5%	783	-9.7%	-38.0%
Parade	4966.TW	1,503	13.3%	-8.3%	1,327	-2.0%	0.2%	1,353	-19.1%	-4.3%
Silergy	6415.TW	2,511	3.9%	50.8%	2,417	2.5%	52.5%	2,357	13.1%	58.5%
Design Service										
Alchip	3661.TW	9,979	13.7%	496.0%	8,776	18.1%	273.6%	7,433	108.1%	181.8%
GUC	3443.TW	7,145	22.3%	97.8%	5,840	1.2%	111.0%	5,769	17.1%	158.4%
GaAs										
WIN SEMI	3105.TW	2,030	4.8%	30.0%	1,937	2.4%	30.6%	1,892	7.0%	31.2%
AWSC	8086.TW	422	0.0%	8.4%	422	0.7%	12.6%	419	2.7%	18.4%
VPEC	2455.TW	449	-4.6%	29.5%	471	11.6%	71.2%	422	29.5%	45.1%
MLCC										
Yageo	2327.TW	17,068	4.5%	46.1%	16,332	1.2%	51.8%	16,131	5.0%	51.5%
Walsin	2492.TW	4,889	7.0%	53.9%	4,569	2.8%	45.5%	4,444	12.2%	42.0%
Optics										
LandMark	3081.TW	540	3.8%	190.2%	520	3.8%	180.9%	501	19.2%	176.5%
FOCI	3363.TW	224	9.7%	28.4%	204	19.7%	13.2%	171	8.5%	12.1%
GCS	4991.TW	435	65.9%	112.9%	262	80.3%	45.6%	145	-55.4%	-6.9%
Browave	3163.TW	242	18.1%	27.4%	205	-2.4%	9.7%	210	15.9%	28.7%
Ezconn	6442.TW	2,061	26.6%	97.2%	1,628	32.4%	152.2%	1,229	15.0%	49.3%
LuxNet	4979.TW	575	5.3%	97.8%	546	7.3%	37.4%	509	11.8%	31.0%
Memory										
Nanya	2408.TW	45,091	0.9%	576.6%	44,690	1.9%	560.9%	43,868	49.3%	719.6%
Winbond	2344.TW	28,249	3.4%	256.7%	27,309	2.0%	289.4%	26,773	30.0%	291.5%
Macronix	2337.TW	8,367	2.7%	188.2%	8,145	5.4%	218.5%	7,725	11.0%	180.5%

Sources: Company data, GF Securities (Hong Kong) Brokerage

Figure 6: Taiwan region downstream tech monthly sales

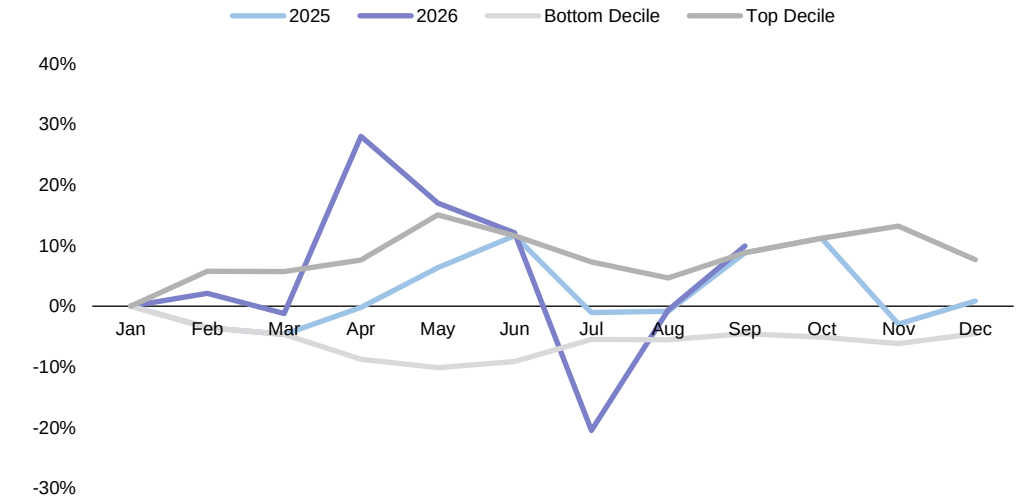
TWD m		Sept-26	MoM	YoY	Aug-26	MoM	YoY	July-26	MoM	YoY
ODM										
Hon Hai	2317.TW	1,158,633	25.7%	38.4%	921,766	-2.6%	52.0%	946,513	15.2%	54.2%
Pegatron	4938.TW	214,753	143.2%	86.9%	88,305	2.7%	34.1%	86,015	-5.8%	11.6%
Quanta	2382.TW	325,300	-23.3%	76.7%	423,971	15.8%	177.5%	366,274	-4.9%	131.3%
Wistron	3231.TW	380,806	-17.2%	87.2%	460,065	49.3%	166.5%	308,219	-4.2%	60.8%
Compal	2324.TW	94,434	40.2%	35.4%	67,337	-16.9%	14.5%	81,006	-15.5%	38.3%
Inventec	2356.TW	98,636	18.5%	62.9%	83,268	-7.7%	35.8%	90,190	-11.8%	65.7%
Wiwynn	6669.TW	172,620	19.6%	100.0%	144,312	22.6%	50.4%	117,686	5.7%	39.2%
PC Brand										
ASUS	2357.TW	97,243	2.4%	17.7%	94,956	12.9%	51.2%	84,131	-21.2%	53.3%
Acer	2353.TW	34,737	15.1%	17.6%	30,180	12.2%	38.4%	26,904	-3.3%	21.9%
Graphics Card										
MSI	2377.TW	19,910	12.5%	1.8%	17,694	-8.5%	-6.1%	19,342	8.9%	0.0%
Gigabyte	2376.TW	63,099	33.1%	125.4%	47,401	7.2%	98.4%	44,213	3.1%	59.7%
PCB/CCL										
Co-tech	8358.TW	1,104	4.5%	64.6%	1,056	4.7%	59.7%	1,009	4.8%	54.9%
EMC	2383.TW	21,532	6.9%	168.9%	20,146	4.9%	129.8%	19,207	8.3%	129.4%
TUC	6274.TW	6,126	3.6%	114.8%	5,915	0.1%	132.5%	5,908	20.7%	121.5%
Unimicron	3037.TW	18,651	5.1%	64.7%	17,746	9.2%	56.3%	16,254	9.1%	43.7%
Zhen Ding	4958.TW	26,358	27.5%	36.1%	20,666	17.4%	41.1%	17,601	3.3%	31.8%
GCE	2368.TW	9,320	-10.2%	55.5%	10,384	3.7%	76.4%	10,015	21.3%	77.4%
Compeq	2313.TW	8,617	22.9%	15.0%	7,012	0.8%	6.9%	6,955	0.6%	16.0%
Flexium	6269.TW	2,099	5.1%	-2.7%	1,997	-2.3%	1.3%	2,045	19.2%	4.0%
Lens										
Largan	3008.TW	5,779	15.3%	-7.3%	5,012	2.8%	-16.0%	4,877	31.4%	-9.9%
Genius	3406.TW	2,672	-1.8%	0.5%	2,719	12.3%	0.7%	2,422	39.3%	1.6%
Acoustics										
Merry	2439.TW	5,193	26.1%	4.1%	4,118	12.9%	-6.7%	3,648	5.4%	-0.3%
Primax	4915.TW	6,247	2.0%	15.0%	6,127	4.6%	20.4%	5,857	-6.9%	9.3%
Components										
Catcher	2474.TW	1,028	2.5%	-34.2%	1,003	-5.0%	-40.5%	1,056	31.3%	-34.3%
SZS	3376.TW	850	2.4%	3.3%	830	2.3%	-10.0%	811	-12.0%	-10.3%
Server										
AVC	3017.TW	21,018	7.9%	44.9%	19,481	4.8%	54.3%	18,590	5.5%	57.4%
Auras	3324.TW	2,884	-8.2%	23.2%	3,141	-16.6%	67.2%	3,765	38.5%	116.7%
Accton	2345.TW	40,399	-1.2%	66.1%	40,873	3.5%	59.4%	39,473	-0.2%	71.7%
Jentech	3653.TW	3,054	-5.3%	80.0%	3,226	0.4%	90.9%	3,213	21.3%	91.0%
LOTES	3533.TW	3,357	5.0%	16.1%	3,198	-5.1%	19.6%	3,369	8.9%	18.6%
BizLink	3665.TW	9,332	5.0%	39.2%	8,892	-7.7%	54.0%	9,630	13.1%	59.6%
Chen Bro	8210.TW	2,476	0.8%	13.8%	2,457	-0.2%	40.5%	2,462	-23.9%	41.5%
King Slide	2059.TW	4,464	-31.0%	196.2%	6,466	0.9%	344.4%	6,407	44.2%	355.5%
Power										
Delta	2308.TW	65,400	1.3%	14.6%	64,586	-3.7%	34.9%	67,073	2.2%	47.7%
Lite-On	2301.TW	18,848	-3.8%	22.1%	19,592	3.1%	25.2%	19,006	1.9%	37.6%
Dynapack	3211.TW	776	-53.7%	-34.1%	1,677	36.5%	17.3%	1,229	-3.1%	20.9%
Display										
AUO	2409.TW	23,404	1.3%	-4.3%	23,102	13.4%	-5.9%	20,370	-18.4%	-2.6%
Innolux	3481.TW	19,995	6.9%	0.7%	18,697	-1.0%	0.0%	18,890	-13.0%	-1.9%
Networking										
Sercomm	5388.TW	6,807	-3.4%	47.4%	7,044	-11.7%	45.1%	7,980	9.7%	51.3%
Wistron NeWeb	6285.TW	16,079	2.4%	64.0%	15,704	-7.1%	81.2%	16,913	6.6%	89.8%

Sources: Company data, GF Securities (Hong Kong) Brokerage

Tech Valuation in major markets

Due to the pullback after 2Q26 rally, relative performance in June-July period for the Philadelphia Semiconductor Index (SOX) versus S&P 500 hit a decade-low of -20%, marking the worst relative returns observed over the past 15 years, while rebounded to 9% followed by a recovery through Aug.

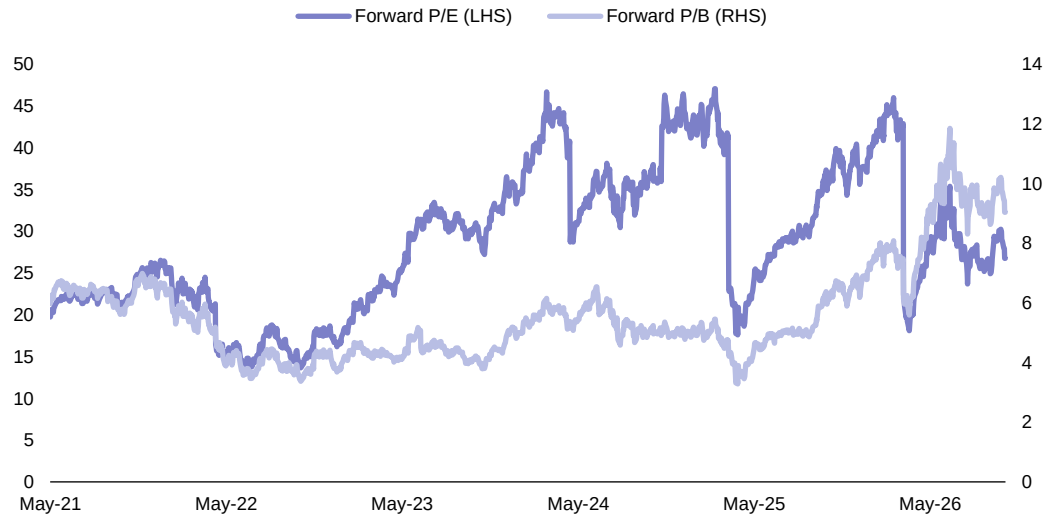
Figure 7: SOX vs. S&P500 return since 2012



Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

Philadelphia Semiconductor Index (SOX) forward P/E recovered to 30x in the beginning of Oct, while decreased to 26x afterwards; forward P/B also saw back to 10.2x in early-Oct but down to 9x, given the pullback after Sept rebound.

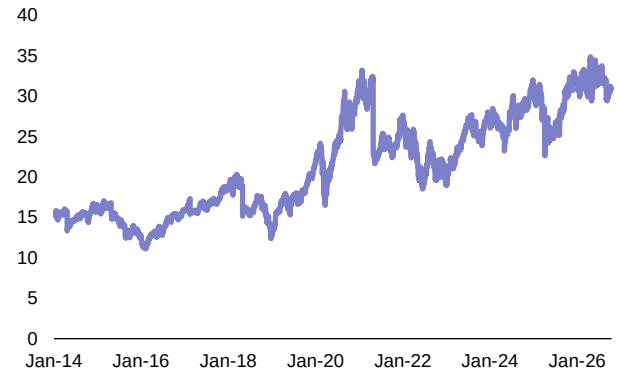
Figure 8: SOX Index's P/E, P/B



Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

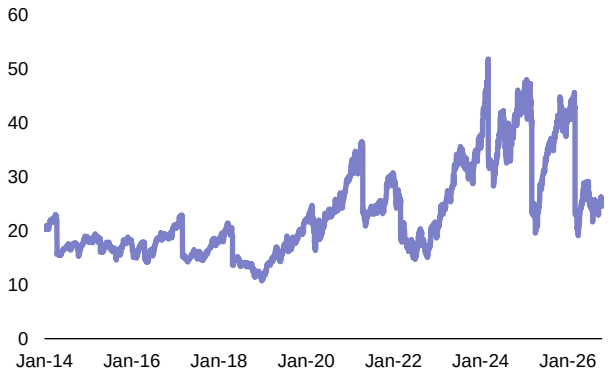
Given the backdrop as said, global semi forward P/E remained around 24x, and global hardware forward P/E stayed ~30x. In terms of P/B, the global semi forward P/B remained ~11.7x.

Figure 9: MSCI World Tech Hardware P/E



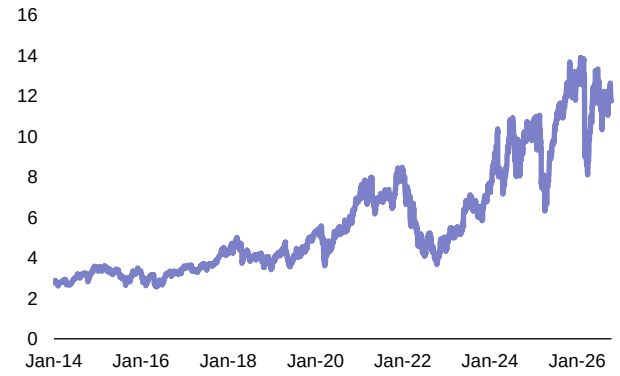
Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

Figure 10: MSCI World Semi P/E



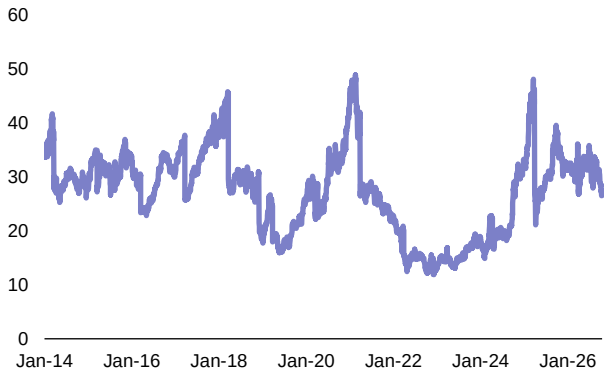
Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

Figure 11: MSCI World Semi P/B



Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

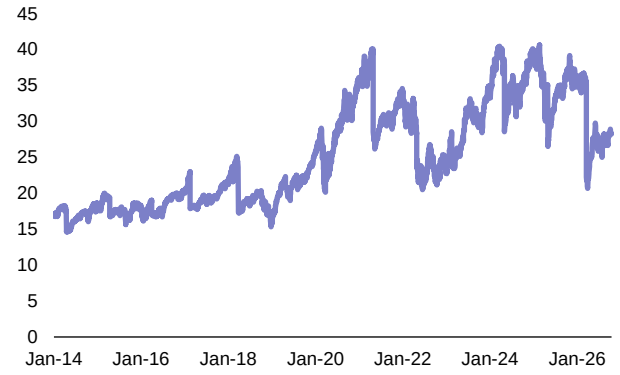
Figure 12: MSCI China IT P/E



Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

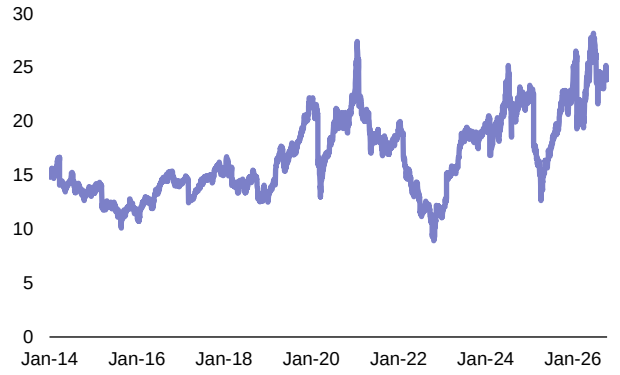
China IT sector forward P/E declined from 30x to 26.5x, down to the average of historical range of 20-30x, while US IT sector forward P/E slightly went up to 28x from 27x.

Figure 13: MSCI US IT P/E



Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

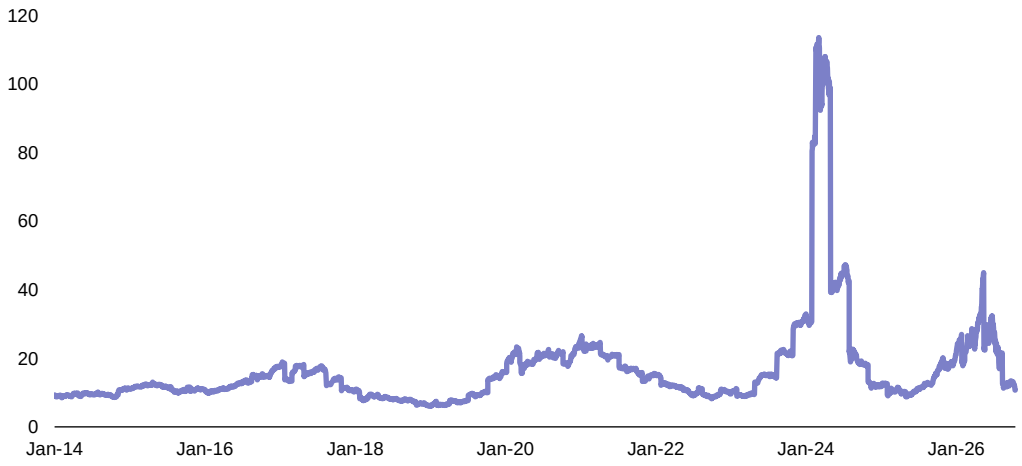
Figure 14: MSCI Taiwan region IT P/E



Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

The Taiwan region IT sector forward P/E remained around 23.8x, higher than the high end of the historical average of 10-20x, and Korean IT sector forward P/E stayed about 20x.

Figure 15: MSCI Korea IT Forward P/E



Sources: Bloomberg, GF Securities (Hong Kong) Brokerage

Downstream tech – Smartphone & Apple

We maintain Global smartphone forecast of -14% in 2026

According to IDC, the preliminary 2Q26 smartphone data points to a still-soft market with uneven regional dynamics, and their commentary continues to emphasize structural rather than cyclical headwinds. Smartphone shipments remain under pressure from weak replacement cycles, cautious consumer spending, and limited breakthrough features. IDC typically highlights that "growth is concentrated in the premium tier," driven by ecosystem lock-in, while the mass market remains challenged by price sensitivity. They also tend to note that China and parts of emerging markets show only modest stabilization, not a full recovery, and that vendors are prioritizing margin discipline over volume.

Overall, by factoring in higher iPhone 17/17 Pro volume, we fine tune our global smartphone shipment forecast to -14% YoY from -15% YoY.

For 2027, we expect global smartphone shipments to be flattish YoY. That said, 2026-2027 will be one of the most challenging periods for the industry, driven primarily by sharply higher memory prices, which have already pushed OEMs to reduce shipments and raise device prices.

Figure 16: Global Smartphone shipment forecast

Shipments (mn)	1Q24	2Q24	3Q24	4Q24	1Q25	2Q25	3Q25	4Q25	1Q26	2Q26		2024	YoY	2025	YoY	2026E	YoY
Global smartphone	300	292	316	332	305	295	323	336	290	278		1240		1259		1080	
YoY	11.9%	8.9%	4.0%	2.3%	1.5%	1.1%	2.1%	1.4%	-5.0%	-6.0%		6.5%		1.5%		-14.2%	
By OEMs																	
Samsung	60.1	53.8	57.8	51.7	60.6	58.0	61.4	61.2	62.8	62.7		223	-1%	241	8%	241	0%
Apple	52.6	45.7	56.0	76.9	57.9	48.0	58.6	81.3	61.1	55.8		231	-1%	246	6%	257	4%
Huawei	12.5	13.7	11.2	12.9	13.5	12.8	10.4	15.0	9.8	11.5		50	44%	52	4%	52	0%
New Honor	16.8	15.3	15.0	17.6	16.4	16.0	18.5	20.0	19.0	12.1		65	5%	71	9%	65	-8%
OPPO/Realme	36.2	38.6	42.6	37.0	34.1	34.9	38.5	39.7	41.2	41.2		154	7%	147	-5%	131	-11%
Vivo	21.3	25.9	27.0	27.1	22.7	26.3	28.8	27.0	28.5	21.2		101	15%	105	4%	94	-10%
Xiaomi	40.8	42.3	42.8	42.7	41.8	42.4	43.5	37.8	33.8	31.2		169	15%	165	-2%	127	-23%
Share %																	
Samsung	20%	18%	18%	16%	20%	20%	19%	18%	22%	23%		18%		19%		22%	
Apple	18%	16%	18%	23%	19%	16%	18%	24%	21%	20%		19%		20%		24%	
Huawei	4%	5%	4%	4%	4%	4%	3%	4%	3%	4%		4%		4%		5%	
New Honor	6%	5%	5%	5%	5%	5%	6%	6%	7%	4%		5%		6%		6%	
OPPO/Realme	12%	13%	13%	11%	11%	12%	12%	12%	14%	15%		12%		12%		12%	
Vivo	7%	9%	9%	8%	7%	9%	9%	8%	10%	8%		8%		8%		9%	
Xiaomi	14%	14%	14%	13%	14%	14%	13%	11%	12%	11%		14%		13%		12%	

Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

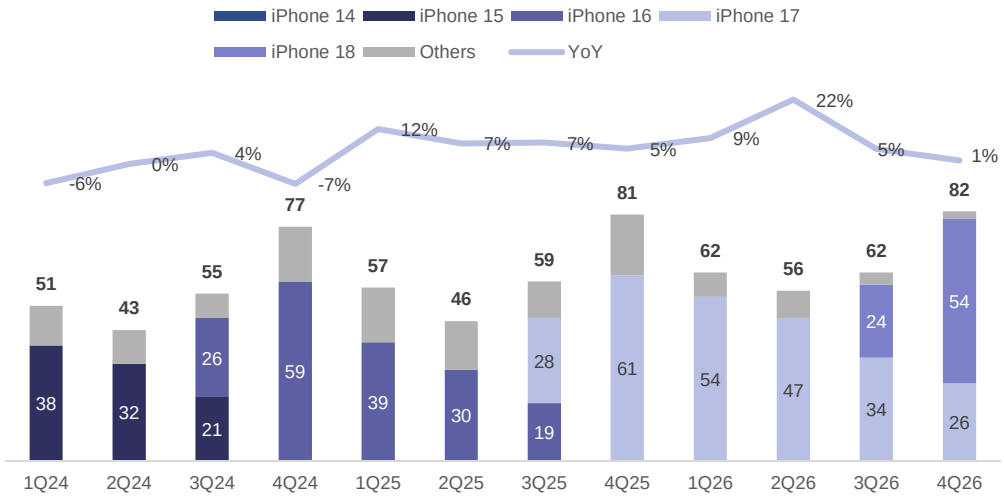
iPhone 18 Pro/18 PM demand lukewarm

iPhone 18 Pro/Pro Max wait-time lukewarm: iPhone 18 Pro and iPhone 18 Pro Max pre-orders began on Sept 12 in the U.S. and many other countries. Generally speaking, the wait-time appears lukewarm, with: 1) 3–4 weeks for 256GB/512GB Pro Max across all colors, as well as Burgundy 1TB in the U.S.；2) 2–3 weeks for Glacier 256GB/512GB Pro Max in China; 3) 1–2 weeks for Black/Glacier 1TB Pro Max in the U.S.；4) immediate availability for Silver 1TB and most 2TB Pro Max models in the U.S, as well as most iPhone 18 Pro configurations except for Burgundy 256GB in the U.S. We attribute the lukewarm wait-time to limited spec upgrade, higher pricing (especially for large storage models), etc. We also expect the Pro Max to be impacted by iPhone Duo and the criticism of heavy weight.

iPhone Duo feedback generally positive

The iPhone Duo, priced at $1,999 in the U.S., opened pre-orders on Oct 16 and officially launched on Oct 23. Early reviews were positive, highlighting its polished folding experience, high-quality inner display, and improved multitasking in iOS 27, but also point to trade-offs including a heavier and thicker form factor, a visible crease, and a dual-camera. Due to hinge constraints, we are reducing the iPhone Duo EMS build plan from 7m to 6m units in 2026. We also lower the iPhone 18 Pro/Pro Max build plan to 72m units given the constraints associated with the adjustable-aperture camera.

Figure 17: Apple iPhone build plan and YoY forecast (m units)



Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

Figure 18: 2H26's iPhone 18 series spec expectations

	iPhone 18 Pro	iPhone 18 Pro Max	iPhone Duo	iPhone Air 2	iPhone 18e	iPhone 18
Launch	Sep-26	Sep-26	Oct-26	1Q27	1Q27	1Q27
Display	6.3"	6.9"	7.6", Sub 5.4"	6.55"	6.1"	6.3"
Processor	A20 Pro, N2, WMCM	A20 Pro, N2, WMCM	A20 Pro, N2, WMCM	A20 Pro, N2, WMCM	A20, N2, WMCM	A20, N2, WMCM
DRAM	LPD5X 12GB	LPD5X 12GB	LPD5X 12GB	LPD5X 12GB	LPD5X 9GB	LPD5X 12GB
Front camera	18MP, 6P	18MP, 6P	12MP, 6P	18MP, 6P	12MP, 6P	18MP, 6P
Rear camera	48MP VA, 48MP UW 48MP Tele	48MP VA, 48MP UW 48MP Tele	48MP Main, 48MP UW	48MP 7P, 48MP 6P	48MP 7P	48MP 7P, 48MP 6P
Face ID	Structured light, smaller Dynamic Island	Structured light, smaller Dynamic Island	None (but has touch ID)	Structured light, smaller Dynamic Island	Structured light, Dynamic Island	Structured light, smaller Dynamic Island
Casing	Aluminum	Aluminum	Titanium	Titanium	Aluminum	Aluminum
BB	Apple C2	Apple C2 + QCOM X85 (US)	Apple C2	Apple C2	Apple C2	Apple C2
mmWave	Apple C2	Apple C2 + QCOM X85 (US)	Apple C2	None	None	None

Sources: Company data, GF Securities (Hong Kong) Brokerage

Downstream tech – PC

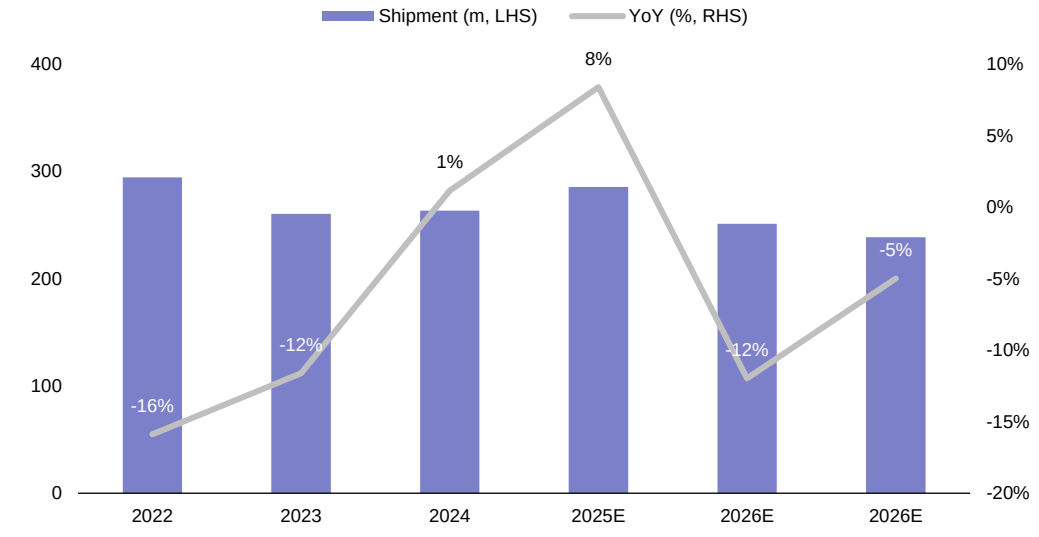
Global PC units down to -12% in 2026, followed by another decline in 2027

On Oct 8, IDC reported 3Q26 global PC shipments fell 20.1% YoY, missing street expectations of a 10–15% decline. The sharper contraction was primarily driven by front-loaded demand in 1H26, elevated ASPs, and broader macro weakness. This aligns with our prior view that ODM build momentum moderated starting in end-2Q26, amid the rising concerns over channel inventory. Meanwhile, the top 5 ODMs also saw 3Q26 shipments decline 26% YoY. Looking ahead, we model 4Q26 shipments to continue 20% YoY drop (flattish QoQ), underperforming normal seasonality.

On the component front, we expect memory de-spec to normalize. End-users still require sufficient DRAM capacity (16GB+) to handle on-device AI workloads, and PC DDR5 supply constraints have eased compared to Server's. On pricing, new models will still have higher pricing points to pass through 2H component cost increases across memory, CPU, etc. That said, we anticipate price hikes will remain measured vs 1H26 given sluggish end-market demand.

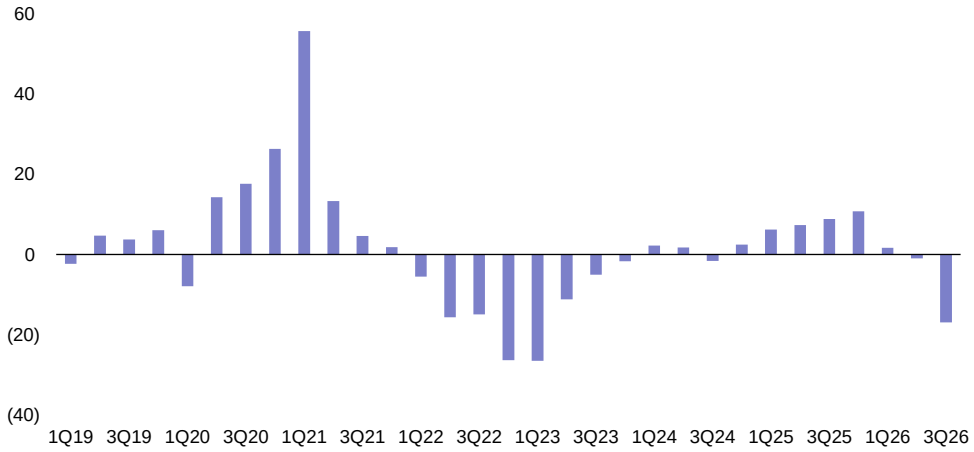
Overall, reflecting weaker than expected 3Q26 results post pull-ins and a muted 4Q outlook, we trim our 2026 PC shipment forecast to -12% YoY. For 2027, we project shipments to decline further by 5% YoY, as higher ASP and persistent macro headwinds continue to weigh on demand.

Figure 19: Global PC shipment forecast (m units)



Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

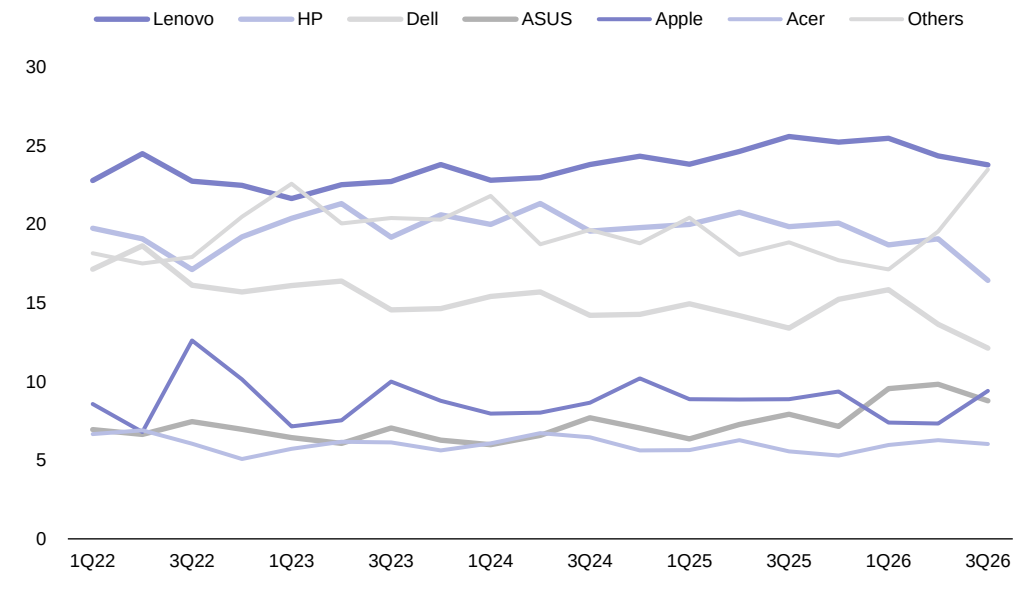
Figure 20: Global PC shipment YoY (%)



Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

On the competitive landscape, tier-1 PC OEMs experienced notable market share erosion in 3Q26. Lenovo, HP, and Dell posted steep shipment declines of 22.6%, 30.9%, and 25.0% YoY, respectively. In contrast, Apple (9.5%) and ASUS (8.7%) outperformed the broader market and expanded their market share YoY. Apple was supported by its M5 lineup and the entry-level MacBook Neo, while ASUS benefited from aggressive commercial channel expansion. Notably, low-cost PC models manufactured in China continue to gain traction across China and Southeast Asia. Looking ahead, we expect value-tier models to remain the primary driver in sustaining ongoing PC shipments.

Figure 21: Global PC market share (%) by brands



Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

Figure 22: Monthly Notebook PC ODM shipment (m units)

Unit mn	Sep-25	Oct-25	Nov-25	Dec-25	Jan-26	Feb-26	Mar-26	Apr-26	May-26	Jun-26	Jul-26	Aug-26	Sep-26
Quanta	4.6	3.5	3.5	3.9	2.7	2.0	5.3	3.5	3.5	4.5	2.8	2.6	4.2
Compal	2.5	2.1	2.3	2.4	1.6	1.5	2.8	1.8	2.0	2.4	1.8	1.4	1.7
Wistron	2.2	2.1	2.2	2.6	1.7	1.6	2.8	1.8	1.7	2.0	1.6	1.4	1.5
Pegatron	0.8	0.8	0.7	0.9	0.7	0.4	0.7	0.5	0.6	0.7	0.4	0.4	0.5
Inventec	1.9	1.6	1.7	2.0	1.7	1.5	2.2	1.5	1.5	2.4	1.6	1.5	1.8
Total	**12.0**	**10.1**	**10.4**	**11.8**	**8.4**	**7.0**	**13.8**	**9.1**	**9.3**	**12.0**	**8.2**	**7.3**	**9.7**
YoY	**-2%**	**0%**	**1%**	**8%**	**0%**	**-28%**	**12%**	**-4%**	**-12%**	**-8%**	**-24%**	**-35%**	**-20%**
MoM	**7%**	**-16%**	**3%**	**14%**	**-29%**	**-16%**	**96%**	**-34%**	**2%**	**29%**	**-31%**	**-11%**	**32%**

Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

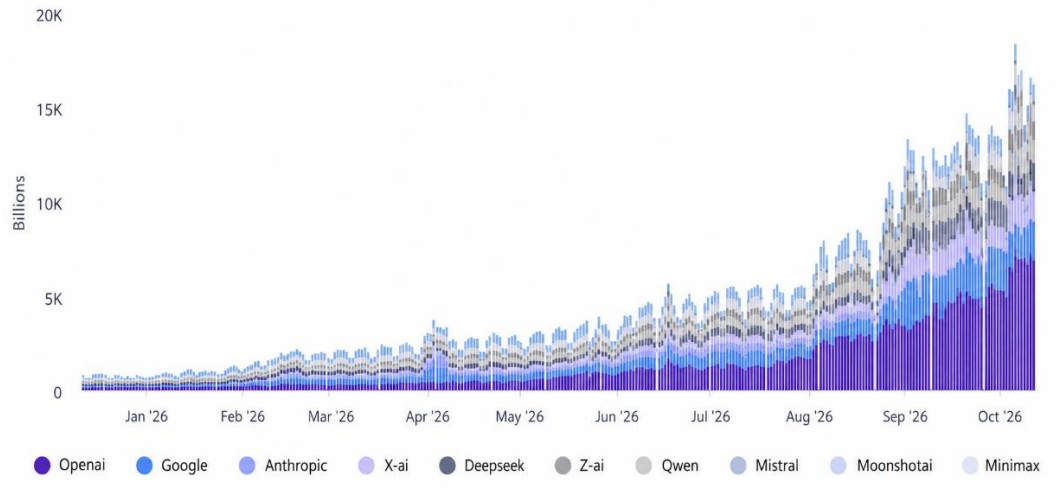
Upstream tech – AI Semi & Supply Chain

U.S. CSP capex to be +85%/+53%/+20% in 2026/2027/2028

Given capex expands further into 2027, CSPs free cash flow are undergoing significant pressure and turning negative except Microsoft, such that shifting to debt financing for their massive capex. In 2025, Top 5 CSPs' total debt issuance reached $108bn, or 24% of total capex. Per our *Addressing 2028 Capex and AI Platform Value Shift* report on Aug 6, we forecast Top 5 CSPs' debt issuance to reach $257bn/$419bn in 2026/2027, or 31%/35% of total capex. Assuming debt issuance to grow in 2028/2029 at a mild pace, we believe U.S. CSPs' balance sheet (except Oracle) to remain very healthy, due to net leverage (EBITDA basis) of only 0.5 and the net debt-to-equity ratio of only 18% by 2029.

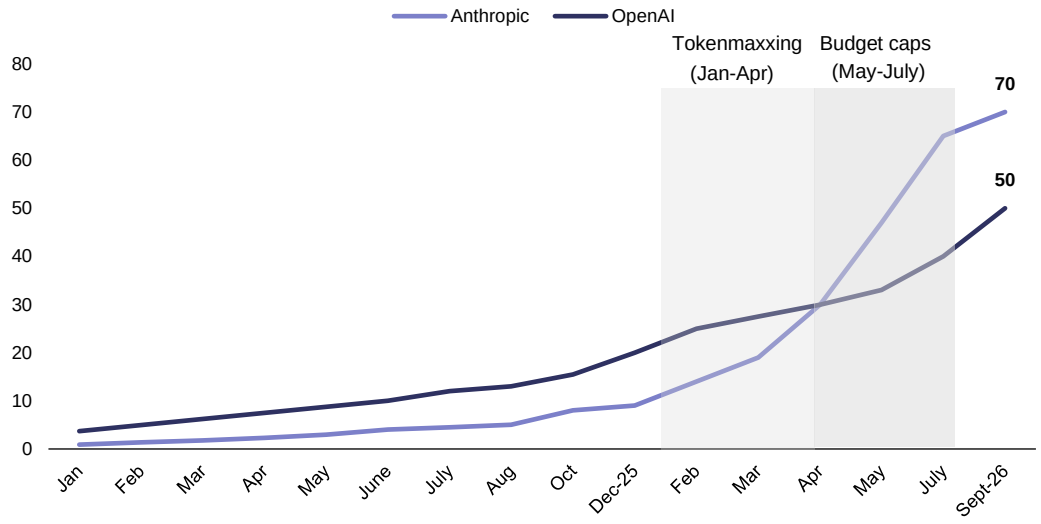
Despite healthy balance sheet for most CSPs, we expect most to safeguard balance sheets beyond 2027 amid widening spreads and FCF profiles, with the focus shifting to returns. Together with a swing factor of competition from Chinese LLMs, we expect U.S. CSPs to decelerate capex expansion. We forecast Top 5 CSPs capex of $1,512bn/1,739bn in 2028/2029, or +20%/15% YoY, down from +53% in 2027.

Figure 23: Global Token consumption (bn)



Sources: OpenRouter, MacroMicro, GF Securities (Hong Kong) Brokerage

Figure 24: AI ARR (USD bn)



Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

Figure 25: U.S. Top-5 CSP capex (USD bn)

	2023	2024	2025	2026E	2027E	2028E
MSFT	41	76	118	190	268	322
AMZN	53	83	132	220	314	377
Google	32	53	91	205	342	410
Meta	28	39	69	141	225	270
Oracle	7	11	35	67	111	133
Top 5	**161**	**261**	**446**	**823**	**1,260**	**1,512**
YoY		**62%**	**71%**	**85%**	**53%**	**20%**

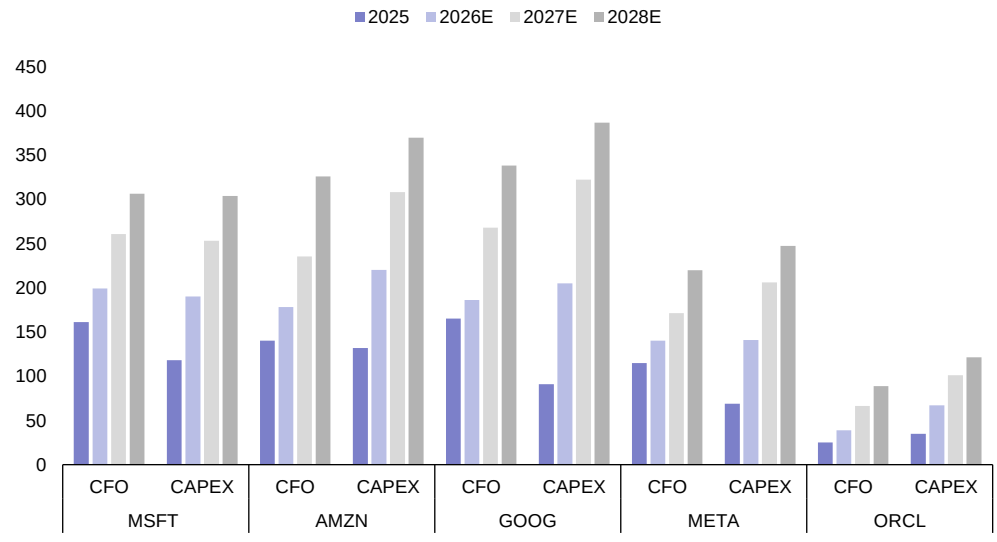
Sources: Company data, Bloomberg, GF Securities (Hong Kong) Brokerage

Figure 26: Major Neoclouds Capex (USD bn)

	2025	2026E	2027E
Coreweave	28	58	96
xAI	13	80	400
Nebius	9	22	40
IREN	4	18	35
Crusoe (inc. JV)	8	35	35
Top 5	**62**	**212**	**606**
YoY		**244%**	**185%**

Sources: Company data, Bloomberg, GF Securities (Hong Kong) Brokerage

Figure 27: U.S. Top-5 CSP operating cash flow and capex in recent 3 years (USD bn)



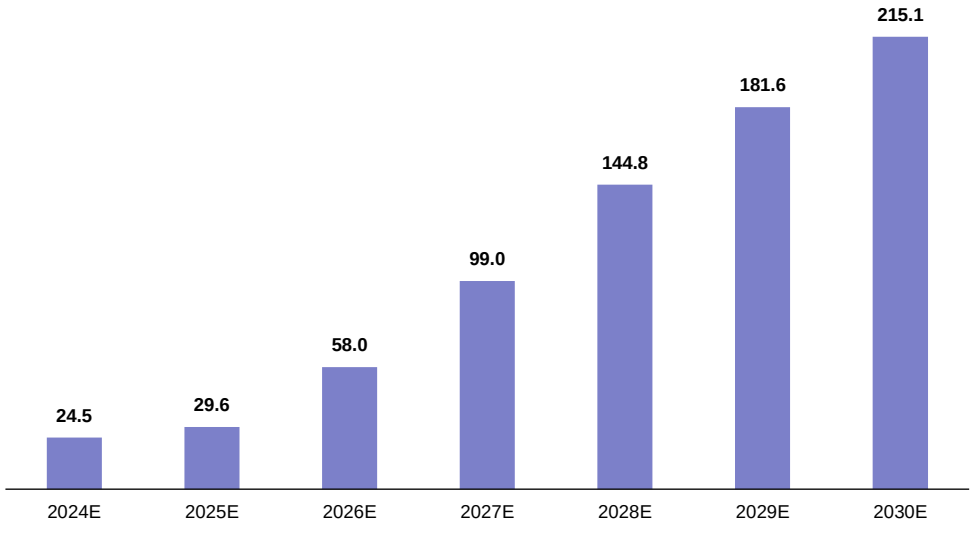
Sources: Company data, Bloomberg, GF Securities (Hong Kong) Brokerage

Server CPU TAM to grow at 49% CAGR by 2030

As the orchestration core of AI infrastructure buildouts, the Server CPU has gained significant traction over the past few months. This is driven by the Agentic AI/inference trend, fueled by the breakthrough of OpenClaw and Anthropic's ARR surging to $44bn in April. For instance, in latest earnings calls, AMD projected a >35% CAGR for Server CPU TAM by 2030, and Intel said the shift toward agentic AI is driving a structural demand for CPU, where the GPU-to-CPU ratio is tightening from 8:1 in training to 4:1 in inference. Based on our estimates, assuming inference accounts for 90% of AI workloads and GPU-to-CPU ratio for AI servers to reach 1:1.2 in 2030, we now expect Server CPU TAM to grow 96%/71% in 2026/2027, reaching $215bn by 2030 from $30bn in 2025, with a 5-yr CAGR of 49%.

According to AMD's Advancing AI Event on July 23, AMD raised TAM for server CPU: The company now forecasts server CPU market to reach over $220bn by 2030, driven by agentic AI (~50% of TAM) where CPU:GPU ratio potentially tightening toward 1:1, datacenter upgrade to high-density CPUs to free up power and rack space, and enterprise AI adoption to deploy cost-effective computing.

Figure 28: Server CPU TAM forecast (USD bn)



Sources: Company data, GF Securities (Hong Kong) Brokerage

CoWoS tracker: fine tuning upwardly for total capacity

Following our earlier raise in *May Edition on May 12* in which we revised up TSMC's CoWoS capacity from 175KPM to 195KPM by end-2027, the Street has moved up to our numbers, and we have fine tune our estimate to 200KPM by end-2027 on our *Sept Edition on Sept 14*.

For OSAT, we maintain our earlier view for Amkor's capacity of 15KPM/25KPM/55KPM by end of 2026/2027/2028, and ASE's CoWoS capacity of 15KPM/45KPM/55KPM by end 2026/2027/2028.

For fabless, we keep our CoWoS estimates largely unchanged for AI GPU/ASIC. For our accelerator model, we maintain +98% YoY 2027E, and for 2028E, we now expect it to reach the TAM of $1,000bn.

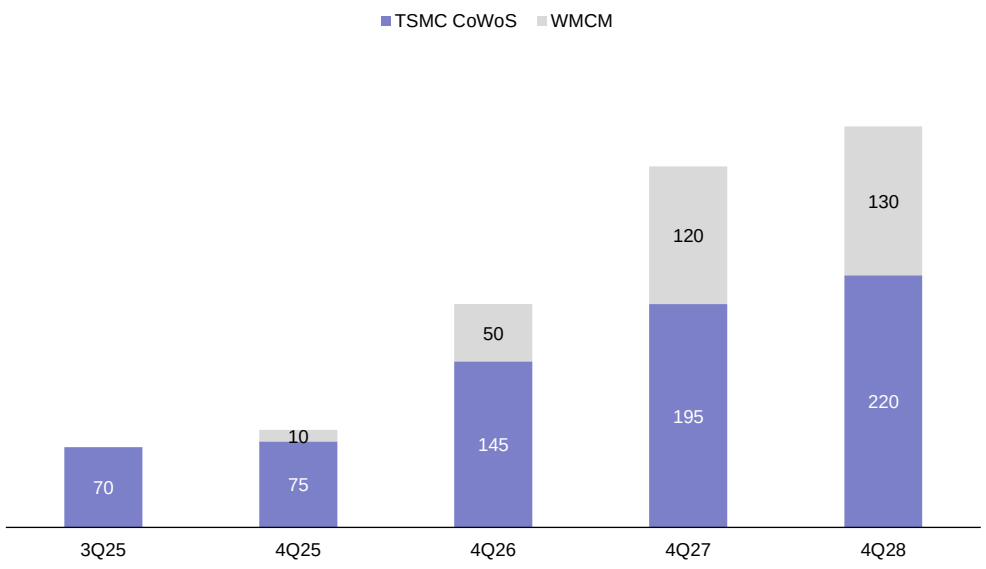
In our ASIC Update report on Oct 13, we lowered our TPU units in 2028 to 10m, vs. 8.9m in 2027.

Figure 29: Global AI accelerator market forecast

	2024	2025E	2026E	2027E	2028E
GPGPU (Units m)					
NVIDIA	3.9	5.8	8.1	11.3	12.6
AMD	0.5	0.5	0.8	1.1	1.3
Others	0.5	1.2	1.5	3.0	4.0
Total	**4.9**	**7.5**	**10.4**	**15.4**	**17.9**
YoY	151%	54%	38%	47%	16%
ASIC (Units m)					
Google	2.8	2.8	4.5	8.9	10.0
AWS	0.9	1.6	2.3	2.7	1.8
Meta	0.2	0.2	0.3	0.6	0.6
MSFT	0.1	0.1	0.2	0.3	0.6
Other ASICs	0.3	0.8	1.0	1.5	2.0
Total	**4.2**	**5.4**	**8.3**	**14.1**	**14.9**
YoY	-39%	29%	52%	69%	6%
Market (USD bn)					
NVIDIA	88	159	280	527	774
Total GPGPU	97	173	306	583	857
Total ASIC	20	27	50	123	168
Total Market	**117**	**200**	**357**	**706**	**1025**
YoY	269%	72%	78%	98%	45%

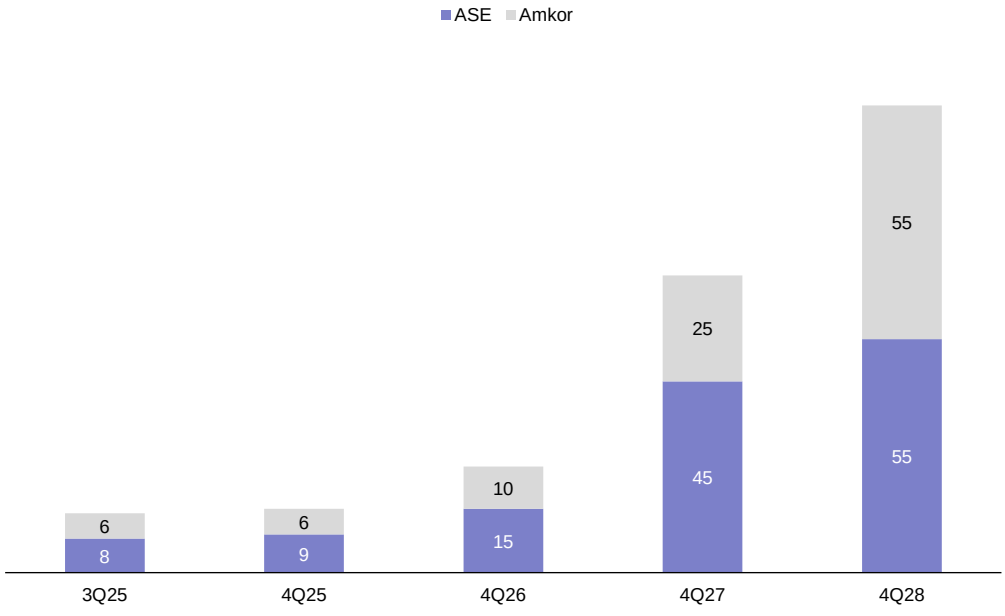
Sources: Company data, GF Securities (Hong Kong) Brokerage

Figure 30: TSMC's quarterly CoWoS + WMCM capacity (kwpm) trend



Sources: Company data, IDC, GF Securities (Hong Kong) Brokerage

Figure 31: Amkor and ASE's quarterly CoWoS (kwpm) forecast



Sources: Company data, GF Securities (Hong Kong) Brokerage

Figure 32: Top-15 fabless Days of Inventory

Company	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	1Q24	2Q24	3Q24	4Q24	1Q25	2Q25	3Q25	4Q25	1Q26	2Q26
Qualcomm	102	119	156	150	159	151	132	135	131	131	111	114	125	118	109	137	163
Broadcom	60	58	59	66	62	60	38	36	37	32	36	38	38	36	44	58	
Nvidia	93	147	225	165	97	92	90	95	81	78	86	59	106	119	115	115	
MediaTek	105	105	118	126	106	100	61	69	75	77	74	62	70	67	74	96	109
AMD	70	96	108	129	143	132	122	145	153	144	138	158	131	149	154	160	152
Marvell	114	115	130	122	113	99	103	119	109	67	104	103	96	92	118	110	
Qorvo	117	124	164	140	198	125	96	116	119	108	114	116	119	98	91	124	144
Novatek	103	133	82	69	53	49	51	57	58	52	51	53	53	53	55	69	73
Realtek	117	147	190	173	108	85	89	85	83	92	89	81	99	102	129	106	
Skyworks	154	149	168	183	185	138	121	122	138	120	102	110	114	105	115	144	165
Himax	174	272	185	174	147	144	125	125	114	112	88	79	83	90	98	100	90
Will Semi	308	400	327	299	231	140	128	149	136	133	129	150	139	135	163	189	
MPS	172	176	212	204	201	171	172	176	171	140	138	146	150	139	153	157	140
Infineon	124	118	141	147	151	150	193	179	181	157	186	184	185	155	187	174	164
NXP	95	99	116	137	138	130	136	145	149	148	150	168	158	161	163	166	157
Total	**102**	**117**	**138**	**138**	**126**	**115**	**103**	**107**	**104**	**97**	**99**	**88**	**107**	**109**	**112**	**118**	**148**

Sources: Company data, Bloomberg, GF Securities (Hong Kong) Brokerage

Upstream tech – Optical

Strong demand for pluggable through 2028.

We expect that the total demand for 800G/1.6T will reach 90mn/80mn in 2027, increased by 80%/167%+, mainly driven by: 1) Nvidia, Google and AWS and other ASIC's Accelerators' demand are ramping up; 2) GPU/ASIC scale-out bandwidth continuously increase drives increasing GPU/ASIC-to-optical module ratio; 3) We expect that TPU for 2027 will be 8.9m and Google fully transitions to large-scale clusters in 2026 and the scale-up layer will adopt optical interconnects. In addition, as we expect that CPO/NPO will start since 2H27, represents a pure incremental opportunity for optical interconnects supply chain, benefiting FAU, laser, shuffle box, connector and OE players, including LITE, GLW, TSEM, Sumitomo and Browave. We also like Marvell and SMTC, for the TIA/Driver used in NPO OE.

Scale-out bandwidth increase driving optical-module deployment

For NVIDIA, each Rubin GPU is equipped with two CX9 NIC chips, doubling the scale-out bandwidth compared with Blackwell. We further estimate that Rubin Ultra will adopt four CX9 chips per GPU, leading to another 2 times increase in scale-out bandwidth, continuing NVIDIA's consistent bandwidth-doubling trajectory. Accordingly, we expect the ratio of 1.6T optical modules has risen from 1:2.5 to 1:5 in Rubin. From CoWoS perspective, we expect 5m/2m Blackwell/Rubin and 20m 1.6T in 2026. For **Google**, we believe that Google fully transition to large-scale clusters in 2026 and the scale-up layer will adopt optical interconnects. We believe that in the scale-up domain, the ratio of TPU to 1.6T optical modules is approximately 1:1.5; In the scale-out domain, the ratio is around 1:2.5, suggesting the overall TPU-to-optics ratio is approximately 1:4 (1.6T equivalent).

Nvidia/CSPs' Scale-out/up CPO/NPO

Within NVIDIA's next-gen NVL576 and broader CSPs' AI infrastructure plans, CPO and NPO are developed side-by-side to expand GPU/ASIC interconnect bandwidth: CPO is the ideal long-term design for lower power and latency yet faces headwinds from complicated advanced packaging, and yield risks, while NPO could deliver most short-reach optical performance gains with far better manufacturability and deployment flexibility, making NPO a reliable near-term scaling path and CPO the ultimate end-state architecture. NPO partially removes module-side DSP and shifts signal conditioning and equalization to system designs, greatly lifting the value of TIAs and laser drivers that take over part of traditional DSP functions; we estimate each 3.2T optical engine contains tens of dollars worth of combined TIA and driver chips, a clear improvement over standard pluggable optics. Our shipment forecasts at 6.5m/42.4m NPO optical engines in CY27/28.

Scale-up domain to increase by NVL576 to compensate lower memory: With lower memory spec, we expect Nvidia to increase the scale-up domain by optics to enhance performance. According to Nvidia's GTC 2026, the optical scale-up fabric allows Nvidia to expand Rubin Ultra to an NVL576 scale-up. Regarding CPO and NPO which are being parallelly developed, we expect NPO to be a high reliability scaling path for NPO. We now expect its scale-up to adopt NPO in Rubin Ultra and Feynman platform and estimate OE shipments of Nvidia's platform to be 6.0m/19.7m in 2027/2028.

Nvidia's NPO OE to be 6.0m/19.7m in 2027/2028

For Nvidia, we now expect its scale up to adopt NPO in Rubin Ultra and Feynman platform and estimate OE shipments of Nvidia's platform to be 6.0m/19.7m in 2027/2028, based on full NPO adoption at NVL576 launch given NPO maturity. Coupled with other CSP's platform, we estimate total OE market to be 6.5m/42.4m in 2027/2028.

TIA/Driver to benefit from NPO

NPO partially removes module-side DSP and shifts signal conditioning and equalization to system designs, greatly lifting the value of TIAs and laser drivers that take over part of traditional DSP functions; we estimate each 3.2T optical engine contains tens of dollars worth of combined TIA and driver chips, a clear improvement over standard pluggable optics.

A key architectural shift under NPO is the partial removal of DSP functionality at the module level, with signal conditioning and equalization increasingly redistributed into system-level design. This significantly elevates the importance of TIA (transimpedance amplifier) and laser driver components, which effectively replace a portion of traditional DSP value. We estimate that each 3.2T optical engine will embed high tens of dollars of combined TIA and driver content, representing a meaningful step-up versus traditional pluggable optics architectures.

From a competitive standpoint, we expect Marvell to remain the primary beneficiary of both NPO OE given its stronger positioning high speed TIA/Driver. Semtech is well positioned as a secondary beneficiary through its exposure to high-speed analog signal chain components, particularly TIAs and laser drivers, which scale directly with optical engine proliferation under NPO. We forecast 6.5mn/42.4mn NPO OE shipments in CY27/28. Based on our estimated front-end content per OE and a 30% market share assumption for Semtech, we estimate its NPO revenue of $315/936mn.

Stock Implication

Generally speaking, scale-up CPO/NPO is an incremental opportunity for optical interconnect supply chain, as it aims to replace copper and has no impact on scale-out side. Additionally, scale up and scale out CPO solution share the similar suppliers. That said, we expect the key beneficiaries to be components such as FAU, CW laser, ELSFP, shuffle, PIC, TIA and Driver. We: 1) prefer Lumentum/ COHR due to the demand upside for CW laser, and also like local cw laser players; 2) expect Browave (3163 TT) to benefit, given the sizable contribution of CPO's shuffle box considering ~55% market share, $5-6k ASP and a volume ramp in 2H26; 3) we also like TSEM, given CSP preferring NPO solution for their ASICs scale up interconnection. 4) expect GLW to benefit, given the second supplier of shuffle box and main supplier of MMC connector/fiber. 5) Marvell/Semtech will also benefit from CSP/Nvidia's NPO solution, since TIA and driver will upgrade in the NPO Optical Engine.

Figure 33: 800G/1.6T optical module demand forecast by customer

Shipment(m)	2019	2020	2021	2022	2023	2024E	2025E	2026E	2027E
800G			**0.0**	**0.1**	**2.0**	**10.0**	**22.0**	**50.0**	**90.0**
Google			0.0	0.1	1.0	3.5	4.0	6.0	7.0
AWS							4.0	9.0	6.0
Meta					0.2		4.0	9.0	6.0
NVDA					0.8	6.0	3.0	4.0	3.0
MSFT							2.5	4.0	6.0
Alibaba								2.0	8.0
Tencent								2.0	8.0
Huawei							0.5	4.0	12.0
Others						0.5	4.5	10.0	34.0
1600G						**0.2**	**2.0**	**30.0**	**80.0**
Google						0.1	0.5	10.0	22.0
AWS									6.0
Meta									5.0
NVDA						0.1	1.5	20.0	24.0
MSFT									2.0
Tencent									0.5
Huawei									0.5
Others									10.0

Sources: Company data, GF Securities (Hong Kong) Brokerage.

Figure 34: NPO OE shipments forecast (m units)

	2027	2028
Market for Nvidia's scale up 3.2T NPO		
Rubin Ultra chip for NVL576	1.2	4.4
OE per NVswitch ASIC	4	4
OE	4.8	17.6
Feynman chip		1.1
OE per NVswitch ASIC		3
OE		3.3
Considering pull-in	6.0	19.7
Market for AWS's scale up 6.4T NPO		
Trainium 4 in total	0.3	5
NPO Penetration rate	60%	60%
Trainium 4 for Scale Up	0.2	3
OE per GPU/switch ASIC	4	4
OE	0	12
Considering pull-in	0	12
Market for AMD's scale up 6.4T NPO		
AMD MI550 chip for NPO	0.05	0.5
OE per GPU/switch ASIC	4	4
OE	0.2	2.0
Considering pull-in	0.5	1.7
Market for Other CSPs' scale up NPO		
OE		9.0
Market for Total scale up NPO		
Total	**5.0**	**43.9**
Considering pull-in	**6.5**	**42.4**

Sources: Company data, GF Securities (Hong Kong) Brokerage.

Google's 6D Torus & Beneficiaries.

We expect Google will migrate its TPU interconnect from 3D to 6D torus, re-organizing the 64-chip elemental block from 4×4×4 to 2×2×2×2×2×2. External optical links per block rise from 96 to 384, with optical ports per chip scaling increase from 1:1.5 to 1:6, driving 4x coherent lite transceivers and OCS demand. The trajectory aligns with NVIDIA's CPO/NPO move. Both are interconnect scaling that expands direct chip-to-chip bandwidth and reduces hop count, with TPU via a 6D torus and NVIDIA via CPO/NPO for Scale-up.

Google's migration from 3D to 6D Torus: We expect Google to migrate its TPU interconnect from a 3D to a 6D torus topology, re-organizing the elemental 64-chip building block from a 4×4×4 3D Torus cube into a 2×2×2×2×2×2 hyper-cube. In the current 3D design, each chip connects to 6 nearest neighbors across X/Y/Z axes and the cube exposes 16 optical ICI links on each of its 6 faces, totaling 96 external optical links per cube (~1.5 optical ports per chip). Under the 6D design, each dimension has 64 external optical links (2^6 chips, one outward link per chip per dimension), for a total of 6 × 64 = 384 external optical links (~6 optical ports per chip). The per-chip optical port count thus scales from 1.5 to 6. Combined with Scale-out at an estimated 1:2.5, this brings the aggregate TPU-to-port ratio to 1:8.5.

Lower latency and closer to non-blocking Scale-up: For a 4,096-chip superpod, a 3D torus (4×4×4) carries a worst-case diameter of 24 hops, whereas a 6D torus (2×2×2×2×2×2) halves that to 12 hops (2×6), directly compressing collective-operation and latency. Higher dimensionality also spreads traffic across 6 orthogonal paths, improving bisection bandwidth and moving closer to non-blocking chip-to-chip communication. Critically, shortening each edge from 4 to 2 nodes eliminates deep multi-hop electrical paths inside the block: the architecture deliberately reduces intra-cube copper communication and pushes a far larger share of traffic onto optical fiber.

Key beneficiaries: The exact TPU generation for the adoption of 6D torus and initial penetration rate remain unclear. That said, whether NVIDIA moves toward CPO/NPO or Google expands from 3D to 6D, both are Scale-up strategies aimed at enabling greater inter-chip communication. Key beneficiaries include the 2.4T Coherent Lite module and the OCS supply chain, such as MEMS-based optical switch vendors, PIC/laser/DSP suppliers, and fiber/cabling vendors supporting the larger reconfigurable lightwave fabric.

Risks

1) Alternative technologies; 2) AI demand and capex slowdown; 3) IT demand slowdown; 4) product delays.

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	Hold	Expected stock relative performance ranges between -10% and 10%
	Underperform	Stock expected to underperform benchmark by more than 10%

Sector ratings	**Positive**	Sector expected to outperform benchmark by more than 10%
	Neutral	Expected sector relative performance ranges between -10% and 10%
	Cautious	Sector expected to underperform benchmark by more than 10%

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