IT Hardware

Riding the AI wave to valuations re-ratings

Key message

1. AI server supply chain valuations have increased, which is fair for plays with more CSP clients and product ASP surges.

2. US CSPs suggest higher AI server demand; Super Micro Computer (US) and Nvidia (US) are seeing re-ratings on AI trend, demonstrating solid demand going forward.

3. Edge AI demand will boost supply chain sales in 2025-26F after brands' model debuts in 2H24F, and we expect this to trigger replacement demand for NB and smartphones.

Event

Share our views on cloud and edge AI market trends in 2024-25F.

Impact

Valuations for AI supply chain hinge on higher sales exposure from CSPs & growing ASP. Share prices for edge AI plays witnessed a strong rebound in December 2023, and cloud AI plays surged in January 2024. However, only Nvidia (US), TSMC (2330 TT, NT$689, OP), Super Micro Computer (US) saw their sales and earnings beat consensus, while most related plays have seen very limited sales upside from AI business due to GPU supply constraints. Though TSMC's CoWoS capacity ramped up in 4Q23, to 15-16 thousand wafers per month (kwpm) from 12kwpm in 3Q23, lead-time longer of around 4-5 months than other IT products will cause hardware component and assembly makers to see their AI server sales pickup after 2Q24F. We expect a gradual relief of GPU supply tightness, compared to 2023, will benefit the AI server supply chain. Although valuations for our top picks all increased to their mid-high PER range compared to their respective historical bands, they still trade at 0.3-0.8x of PEG (PE/EPS growth) in 2024-25F. Therefore, we expect share prices to trend up further when sales and earnings grow in 2H24-2025F. The firms with higher CSP client sales and with significant content value increases for AI servers, like thermal and rail kit plays, will enjoy higher valuations.

CSP capex to support AI server demand, amid Nvidia's solid GPU sales guidance. During recent earnings calls with the top US CSP firms, higher capex guidance for server and AI server infrastructure was given. Meta (US) lifted its 2024F capex range to US$30-37bn, with the mid-point up 19% YoY, to reflect AI capacity demand. Meta's capex growth will be also driven by non-AI hardware and data center investment. Microsoft (US) expects its capex will accelerate in the coming quarters. AWS (US) and Google (US) both guided capex growth in 2024F, with capacity additions for regional AI infrastructure, mainly in servers and data centers. Consensus for the top-four US CSPs capex are revised up from 16% to 24% YoY growth in 2024F, vs. a 2% decline in 2023. Coupled with Super Micro and Nvidia's positive tone on the AI server trend, the uptrend on consensus for 2024F sales, and new AI applications emerging, such as Sora, has led few investors to regard the AI trend as a bubble. We forecast training AI shipments to grow from 191k units in 2023F to 572k units in 2024F, while Nvidia (US) and AMD (US) will account for over 80% of training AI server GPU demand. The AI server weighting of global server shipments will rise from 5% in 2023F to 14% in 2024F. 2025F will see the AI server uptrend continue, on new GPU debuts from Nvidia and AMD, and from in-house ASIC design for growing training and inference AI demand. Although some investors have concerns about general server outlays being cannibalized by AI server capex budgets in 2024F, we expect this will bottom out on a low server shipments base in 2023, which saw a 17-18% YoY fall. We also expect new server platforms, such as Eagle Stream and Genoa, will meet AI demands, with penetration up to 50% by 4Q24F.

Edge AI will see more model launches in 2H24F, boosting NB & smartphone sales. We expect cloud AI sales and earnings to contribute more from late 2Q24F, and grow significantly in 2H24-2025F, but we anticipate AI NB and smartphone will ramp up later, in late 4Q24-2025F. There will not be many AI NB models seen in the market until 2H24F capable of over 40 trillion operations per second (TOPS). Moreover, we expect AI PCs will drive a replacement cycle, and long-term growth for the PC industry, in 2025-26F alongside the launch of Windows 12. We are positive on Asustek's (2357 TT, NT$457, OP) earnings growth this year. AI smartphones, with seamless hardware and software integration, and efficient execution of Gen AI-driven features and applications, may just kick off from 2H24F. Before this, foldable smartphones should see more decent growth in 2024-25F despite still being in niche market.

Stocks for Action

Our recommended stocks include ODMs Wiwynn (6669 TT, NT$2,500, OP), Wistron (3231 TT, NT$118, OP) and Quanta Computer (2382 TT, NT$237, OP), and component makers Asia Vital Components (AVC; 3017 TT, NT$539, OP), Auras Technology (3324 TT, NT$559, OP), King Slide Works (2059 TT, NT$1,375, OP), and Lotes (3533 TT, NT$1,125, OP). We think any correction if 4Q23-1Q24 earnings results miss will provide a good entry opportunity.

Risks

Weak demand; AI server overbooking by CSPs.

Key topics

(1) Is there valuation upside in the cloud & edge AI space?
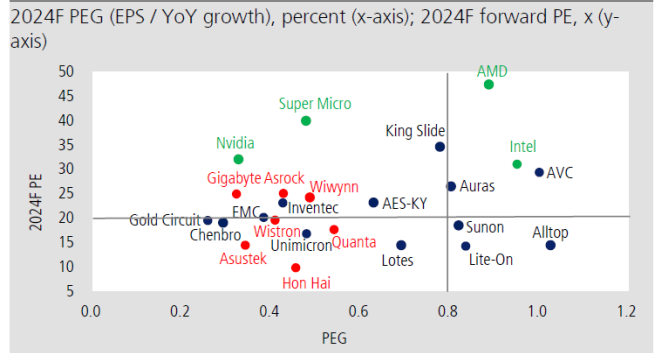
Thanks to a strong AI server trend driving a PE re-rating, most Taiwanese ODMs are trading at over 20x 2024F EPS, versus a historical forward PE of 10-15x (Figure 1). US firms Nvidia, Super Micro, Intel, and AMD's 2024F PE ratings have risen to 30-40x since January, following by Super Micro's shining earnings results and the US CSPs' higher capex guidance. However, most Taiwanese ODMs and component firms' 2024F PEG are still attractive at 0.3-0.6x (Figure 2). We think valuations still have upside, as AI server sales will surge after 2Q24F on easing GPU supply. As TSMC will expand its CoWoS capacity in 2024F, it will support demand growth in 2024-25F, as more AI applications launch. We prefer firms with higher CSP sales exposure and components companies with increasing product content value, such as thermal and rail kit plays, to benefit from booming AI server demand and carry greater valuation upside. We think any correction, if 4Q23-1Q24 earnings results miss, will provide a good entry opportunity on a bright 2H24-2025F earnings growth outlook.

Figure 1: Quanta and Wistron's PE are still under 20x

2024F EPS YoY, percent (x-axis); 2024F forward PE, x (y-axis)
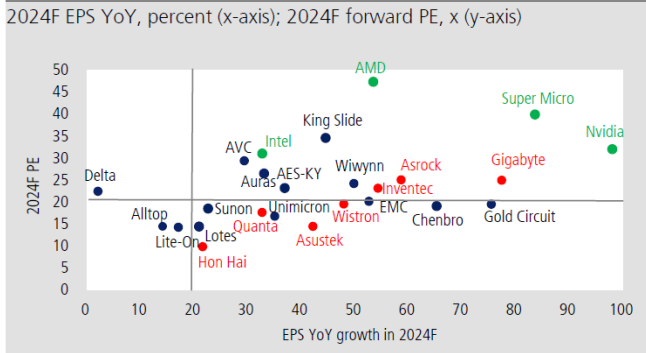
Source: Bloomberg; KGI Research estimates

Figure 2: PEG of most of AI supply chain below 0.8x

2024F PEG (EPS / YoY growth), percent (x-axis); 2024F forward PE, x (y-axis)

Source: Bloomberg; KGI Research estimates

Figure 3: Peers comparison – Valuations

| Sector	Company	Ticker	Market cap. (US$mn)	Share price (LCY)	Rating	Target Price (LCY)	EPS (LCY)			EPS YoY (%)			PE (x)			PB (x)			ROE (%)			Cash yield (%)	
							2023F	2024F	2025F	2023F	2024F	2025F	2023F	2024F	2025F	2023F	2024F	2025F	2023F	2024F	2025F	2023F	2024F
ODM	Hon Hai	2317 TT	44,729	102.0	Outperform	126.0	8.55	10.40	12.92	(16.2)	21.6	24.3	11.9	9.8	7.9	0.94	0.9	0.9	8.0	9.3	11.1	4.4	5.3
	Quanta	2382 TT	28,958	237.0	Outperform	310.0	10.13	13.43	17.52	34.8	32.6	30.4	23.4	17.6	13.5	5.17	4.9	4.6	22.6	28.4	34.8	3.4	4.5
	Inventec	2356 TT	6,355	56.0	Outperform	53.0	1.57	2.42	2.93	(8.1)	54.3	20.9	35.7	23.1	19.1	3.31	3.2	3.1	9.4	14.1	16.5	2.2	3.5
	Wistron	3231 TT	10,824	118.0	Outperform	140.0	4.08	6.03	7.93	1.7	47.9	31.5	28.9	19.6	14.9	3.20	2.8	2.5	11.3	14.9	17.5	2.2	3.2
	Wiwynn	6669 TT	13,827	2500.0	Outperform	2,600.0	68.88	103.17	133.23	(15.0)	49.8	29.1	36.3	24.2	18.8	10.35	8.0	6.4	29.7	37.4	37.9	1.7	2.3
	Pegatron	4938 TT	7,155	84.9	Neutral	84.0	6.14	7.00	8.16	8.4	14.1	16.5	13.8	12.1	10.4	1.20	1.2	1.1	8.8	9.8	11.0	4.7	5.4
MB/VGA	Gigabyte	2376 TT	7,259	361.0	Outperform	415.0	8.16	14.47	18.71	(20.6)	77.2	29.3	44.2	25.0	19.3	6.04	5.5	4.9	14.0	23.1	27.0	1.4	2.4
	Asrock	3515 TT	1,072	278.5	Outperform	245.0	7.01	11.12	12.33	(19.3)	58.6	10.9	39.7	25.0	22.6	4.01	3.8	3.6	10.3	15.6	16.4	1.7	2.7
	Asustek	2357 TT	10,737	457.0	Outperform	540.0	22.29	31.69	35.86	12.7	42.1	13.2	20.5	14.4	12.7	1.56	1.5	1.4	7.7	10.6	11.5	3.4	4.9
	MSI	2377 TT	5,104	191.0	Neutral	176.0	10.71	12.59	14.10	(9.2)	17.5	12.0	17.8	15.2	13.5	3.08	2.8	2.6	18.0	19.4	20.0	3.1	3.7
Thermal	Auras	3324 TT	1,564	559.0	Outperform	445.0	15.86	21.09	26.47	8.0	33.0	25.5	35.2	26.5	21.1	10.42	6.7	5.7	23.0	26.6	28.6	1.2	1.6
	Sunonwealth	2421 TT	1,133	131.0	Outperform	130.0	5.78	7.08	8.24	33.2	22.6	16.3	22.7	18.5	15.9	5.85	5.4	4.9	26.8	30.2	32.1	3.1	3.8
	AVC	3017 TT	6,535	539.0	Outperform	455.0	14.19	18.35	22.97	20.4	29.3	25.2	38.0	29.4	23.5	11.38	9.5	7.9	31.6	35.3	36.9	1.3	1.7
Server components	Lotes	3533 TT	3,962	1125.0	Outperform	1,075.0	53.78	63.90	79.82	(8.4)	18.8	24.9	20.9	17.6	14.1	4.66	4.1	3.6	24.4	25.8	28.2	2.5	3.0
	King Slide Works	2059 TT	4,145	1375.0	Outperform	1,500.0	28.38	43.40	56.59	(33.3)	52.9	30.4	48.5	31.7	24.3	7.97	6.9	5.9	16.9	23.4	26.3	1.0	1.6
	Chenbro	8210 TT	1,028	269.5	Neutral	290.0	8.55	14.13	18.14	2.8	65.2	28.4	31.5	19.1	14.9	6.00	5.2	4.5	19.9	29.2	32.3	1.6	2.7
	AES-KY	6781 TT	1,908	706.0	Neutral	700.0	22.25	30.45	44.15	(40.9)	36.9	45.0	31.7	23.2	16.0	4.42	4.0	3.6	14.4	18.2	23.7	1.6	2.2
	Alltop	3526 TT	397	212.5	Outperform	215.0	11.32	12.91	14.13	20.2	14.1	9.5	18.8	16.5	15.0	4.75	4.5	4.3	25.9	28.1	29.2	4.3	5.0
PC/SP components	SZS	3376 TT	1,102	185.5	Neutral	97.0	4.94	6.45	7.76	(43.1)	30.6	20.3	37.6	28.8	23.9	2.16	2.1	2.1	5.8	7.4	8.8	2.0	2.6
	Simplo	6121 TT	2,463	421.0	Outperform	420.0	29.13	34.97	41.04	(25.5)	20.1	17.4	14.5	12.0	10.3	2.25	2.1	2.0	15.9	18.2	20.3	5.1	6.1
	Catcher	2474 TT	4,240	197.0	Neutral	190.0	17.81	12.69	11.08	17.7	(28.8)	(12.7)	11.1	15.5	17.8	0.73	0.6	0.5	6.8	4.1	3.0	5.1	5.1
	Chicony	2385 TT	4,556	189.5	Outperform	152.0	10.35	11.69	12.61	0.8	13.0	7.9	18.3	16.2	15.0	3.63	3.4	3.1	20.1	21.1	21.0	3.8	4.3
	Primax	4915 TT	1,071	73.1	Neutral	70.0	5.51	6.32	7.32	(9.8)	14.8	15.8	13.3	11.6	10.0	1.96	1.9	1.7	14.9	16.2	17.7	5.2	5.7

*Red color: KGI Research top picks
Source: Bloomberg; KGI Research estimates / *consensus

(2) When will ODM sales expand on booming AI server demand?

In 2023, most tier-1 CSPs suffered from Nvidia's H100 GPU constraints due to CoWoS capacity restriction. Only some vendors, such as Coreweave (US), had higher GPU fulfillments, benefiting ODM suppliers such Super Micro and Gigabyte (2376 TT, NT$56, OP). TSMC has expanded its CoWoS capacity to around 15 kwpm in 4Q23 from 11-12 kwpm in 2Q-3Q23 (Figure 4). Based on a lead-time of two quarters between CoWoS manufacturing to final server assembly, we forecast most ODMs will see a rising server sales contribution after May-June, and have exponential growth in 2H24F as GPU supply tightness gradually eases. This echoes several ODMs' comments, such as Quanta Computer and Inventec, about their AI server sales ramp up schedule after 2Q24. In addition, TSMC will have another significant CoWoS capacity expansion to 32kwpm in 3Q24F, further expanding GPU supply in 2025F.

Taiwan's ODMs account for over 90% of total server manufacturing shipments, and AI server demand increases will benefit the supply chain. AI server demand is concentrated with top US CSPs, who account for approximately 65% of global demand, and we thus expect AI server demand surge to benefit ODMs with more CSP clients. However, most ODM sales will be still dragged down by the slow season for PC and server demand in 1Q24F. Among ODMs, we forecast only Wiwynn will see QoQ sales growth in 1Q24F, thanks to ramp up of AI ASIC projects, assuming no supply constraints, and US clients' AI GPU server projects. Strong sales for Wiwynn will also bolster Wistron's sales in 1Q24F, along with rising GPU baseboard sales, followed by Nvidia's positive server GPU sales growth. After weak NB shipment and AIoT sales in 1Q24F, Quanta will see more AI server sales in late-2Q24F, and we expect its sales to rally in 2H24F thanks to improving supply of AI GPUs.

Figure 4: CoWoS expansion to increase AI server demand
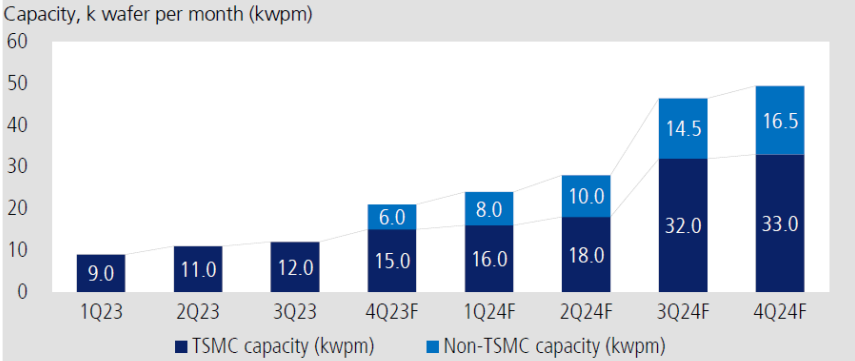
Source: KGI Research estimates

Figure 5: Self-build/ ODM shipments declined in 2023, but will grow 30% YoY in 2024F
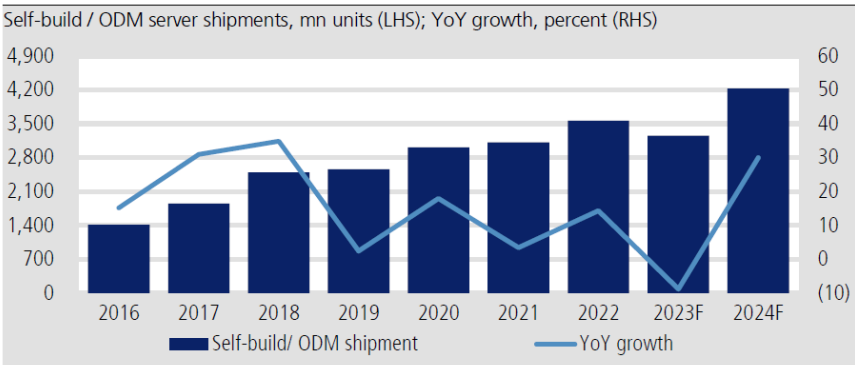
Source: Gartner, KGI Research estimates

Figure 6: Taiwanese ODMs account for bulk of assembly market share for CSPs' AI demand

Major CSPS	Major ODMs	Main Types of Chips for AI Servers
Microsoft	➢ **Inventec+ZT (Primary), Quanta**	GUP, FPGA
Google	➢ In-house (with Celestica), Quanta	GPU, TPU
aws	➢ FII, Quanta, Wiwynn, etc.	GPU, Trainium, Inferentia
Meta	➢ Quanta (Primary), Wiwynn	GPU
ByteDance Baidu Alibaba Cloud Tencent Cloud	➢ Inspur (Primary), Inventec, FII	GPU, ASIC
CoreWeave	➢ Super Micro (Primary), Gigabyte	GPU
Tesla / X	➢ Super Micro	GPU
NVIDIA	➢ Wistron (Primary), Gigabyte	GPU

Source: Trendforce, KGI Research

(3) Who will benefit from the AI server uptrend? What is the margin impact?

We forecast training AI shipments to grow from 191k units in 2023F to 572k units in 2024F (Figure 7), and Nvidia and AMD to account for over 80% of training AI server GPU supply. The AI server weighting of global server shipments will rise from 5% in 2023 to 14% in 2024F.

ODM

Given a higher ASP for AI servers compared to general servers, booming AI server demand will boost ODMs' sales and earnings growth in 2024-25F, with a more meaningful sales contribution starting from 2H24F. In general, the gross margin on general server assemblies is in the high single digits for CSP clients, and 10-15% for channel clients. Despite some margin dilution for GPU AI servers, with gross margin of 5-10% for L10/L11 assemblies, ODMs' sales and earnings will still surge on the higher ASP of AI servers. However, ASIC AI server assemblies may carry higher gross margin compared to GPU servers, given the higher degrees of customization, and more NRE recognition. Wiwynn is one of the key beneficiaries here, on its higher weighting of ASIC. Speaking overall, gross margin is dependent on product offerings and price quotations with different clients, such as double digit gross margin for AI motherboards, baseboards, and L10/L11 assemblies, if GPU costs are not included, like Hon Hai (2317 TT, NT$102, OP).

Components

As AI servers have higher power requirements, generate more heat and are heavier than general servers, several components used in these servers need to operate at higher specs than usual. As higher-grade components tend to sell at higher prices and have higher gross margins for manufacturers, increasing AI server penetration will boost the ASPs and margins of these suppliers as compared to those of general server components makers (Figure 10).

Thermal modules will have the highest ASP upgrade, at 10x, thanks to the adoption of 3D VC, which carries an ASP double or triple that of VC or heat pipes, and as the thermal design power (TDP) of Nvidia's H100 and AMD's MI300 are between 700-750W. Nvidia will launch B100, its next generation GPU, in 2H24F, and X100 in 2025F, with a TDP of 1,000W or higher. Though air cooling may be still capable of dissipating heat at this point, there will be more adoption of liquid cooling in AI servers, especially for B100/X100 GPUs. This will drive thermal content value per server, on greater integration of components used in liquid cooling, such as cold plates, CDUs, racks, fan doors, manifolds and quick connectors. We thus expect the thermal TAM for liquid cooling to expand significantly, and gross margin for liquid cooling is higher at over 30%, in general. Thermal plays, such

as AVC and Auras, will benefit from thermal solution upgrades and the AI server uptrend, and valuations will also be re-rated.

Power supply and rail kit plays are other beneficiaries of the TDP increases and increased server weight of AI servers. ASP for power supplies and rail kit will multiply by 6-7x in AI servers over general servers, and gross margin will also rise. However, given that the sales contribution from AI servers for power supply companies like Lite-On Technology (2301 TT, NT$112.5, R) and Delta Electronics (2308 TT, NT$293.5, N) remain very minimal, in the low single digits, the share price impact has been relatively minimal compared to others in the AI server supply chain. King Slide dominates the AI server rail kit market, with market share over 70%. The AI server sales boom will accordingly drive its gross margin upward in 2024-25F. Investors are showing strong interest in these companies.

Figure 7: Training server shipments to grow from 191k units in 2023F to 572k in 2024F
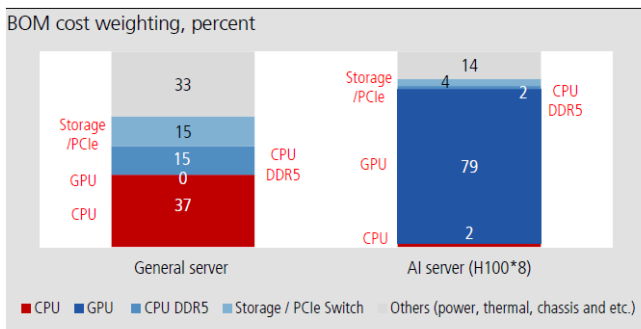
Global training server shipments, k units (LHS); YoY, percent (RHS)
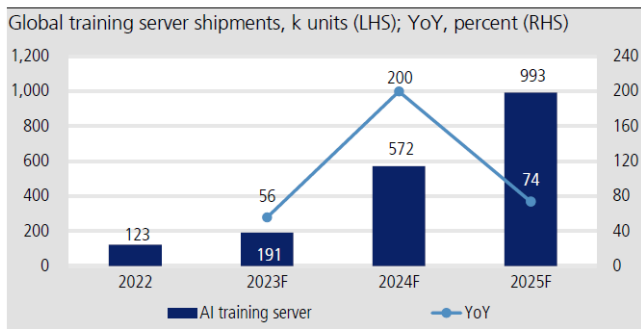
Source: Gartner; KGI Research estimates

**Figure 8: AI weighting of server shipments to expand from 5% in 2023F to 22% in 2025F**

Shipment weighting, percent
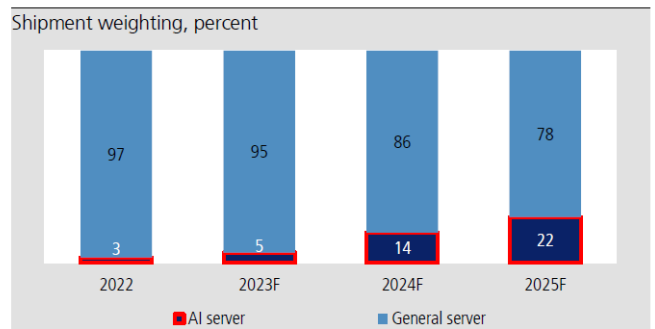
Source: Gartner; KGI Research estimates

Figure 9: GPUs account for the bulk of AI server BOM

BOM cost weighting, percent

Source: KGI Research estimates

Figure 10: Thermal modules & PSU for AI servers carry a 7-10x higher ASP than for general servers

Times (assuming general server ASP is 1x)
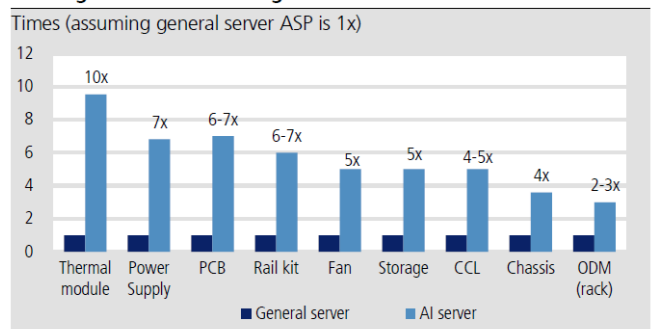
Source: Company data; KGI Research estimates

(4) What is the general server demand outlook in 2024F?

Most investors have concerns about general server demand this year, after Aspeed Technology (5274 TT, NT$2,865, NR) guided global server demand to drop by a low single digit YoY in 2024F, revised down from previous guidance of flat to slightly up YoY. However, the top four US CSPs guided higher capex in 2024F during their earnings calls, mainly for server infrastructure. Consensus now expects the top four US CSPs' capex to grow 24% YoY in 2024F (Figure 11). Global server shipments fell 17-18% YoY in 2023F given inventory correction and budget constraints from CSPs, but we think there will be limited cannibalization by AI server capex after the CSPs' higher capex guidance. Currently, Taiwanese ODMs hold positive views on general server demand in 2024F, expecting global general server shipment to be up slightly, or at least flat, YoY. We also expect new server platforms, such as Eagle Stream and Genoa, will meet AI demands, with market penetration of up to 50% by 4Q24F.

Figure 11: Top-four US CSP capex fell 2% in 2023F, to grow 24% in 2024F

Capex (US$mn)	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	2019	2020	2021	2022	2023	2024F	2025F
Meta (Facebook)	4,272	4,612	4,313	5,370	5,441	7,572	9,375	9,043	6,842	6,216	6,543	7,665	15,102	15,115	18,567	31,431	27,266	34,403	37,190
Amazon	12,082	14,288	15,748	18,935	14,951	15,724	16,378	11,268	14,207	11,455	12,479	14,588	16,861	35,044	55,396	58,321	48,133	58,826	64,351
Microsoft	5,089	6,452	5,810	5,865	5,340	6,871	6,283	6,274	6,607	8,943	9,917	9,735	13,546	17,592	23,216	24,768	35,202	45,651	46,953
Google	5,942	5,496	6,819	6,383	9,786	6,828	7,276	7,595	6,289	6,888	8,055	11,019	23,548	22,281	24,640	31,485	32,251	38,523	41,093
US hyperscale subtotal	27,385	30,848	32,690	36,553	35,518	36,995	39,312	34,180	33,945	33,502	36,994	43,007	69,057	90,032	121,819	146,005	142,852	177,403	189,587
YoY (%)	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	2019	2020	2021	2022	2023	2024F	2025F
Meta (Facebook)	20.1	41.7	16.9	16.4	27.4	64.2	117.4	68.4	25.7	(17.9)	(30.2)	(15.2)	8.0	0.1	22.8	69.3	(13.3)	26.2	8.1
Amazon	77.8	91.6	42.3	27.7	23.7	10.1	4.0	(40.5)	(5.0)	(27.1)	(23.8)	29.5	25.6	107.8	58.1	5.3	(17.5)	22.2	9.4
Microsoft	35.1	36.0	18.4	40.5	4.9	6.5	8.1	7.0	23.7	30.2	57.8	55.2	(4.8)	29.9	32.0	6.7	42.1	29.7	2.9
Google	(1.0)	1.9	26.1	16.5	64.7	24.2	6.7	19.0	(35.7)	0.9	10.7	45.1	(6.3)	(5.4)	10.6	27.8	2.4	19.4	6.7
US Hyperscale subtotal	36.1	48.0	30.4	25.7	29.7	19.9	20.3	(6.5)	(4.4)	(9.4)	(5.9)	25.8	3.4	30.4	35.3	19.9	(2.2)	23.6	6.6
QoQ (%)	1Q21	2Q21	3Q21	4Q21	1Q22	2Q22	3Q22	4Q22	1Q23	2Q23	3Q23	4Q23	2019	2020	2021	2022	2023	2024F	2025F
Meta (Facebook)	(7.4)	8.0	(6.5)	24.5	1.3	39.2	23.8	(3.5)	(24.3)	(9.1)	5.3	17.1							
Amazon	(18.5)	18.3	10.2	20.2	(21.0)	5.2	4.2	(31.2)	26.1	(19.4)	8.9	16.9							
Microsoft	21.9	26.8	(10.0)	0.9	(9.0)	28.7	(8.6)	(0.1)	5.3	35.4	10.9	(1.8)							
Google	8.5	(7.5)	24.1	(6.4)	53.3	(30.2)	6.6	4.4	(17.2)	9.5	16.9	36.8							
US Hyperscale subtotal	(5.9)	12.6	6.0	11.8	(2.8)	4.2	6.3	(13.1)	(0.7)	(1.3)	10.4	16.3							

Source: Company data; Bloomberg; KGI Research

Figure 12: Higher capex guidance in 2024F by US CSPs

• Guide CapEx to increase QoQ in 1Q24 driven by investments in cloud and AI infrastructure and the slip of a delivery date from a third-party provider (4Q23 to 1Q24)
• Expect accelerating CapEx to continue to add capacity in the coming quarters given the company's pipeline.

• Guide CapEx to grow YoY in 2024F with over 60% of total CapEx supporting infrastructure, mainly AWS, and additional investments in generative AI and large language models.
• Expect CapEx to rise in 2024F since AWS is adding capacity for region expasion.

• Guide 2024F capex to increase to US$30-37bn, up 19% YoY (mid-point), raising from previous guidance of US$30-35bn to reflect AI capacity demands.
• CapEx growth will be driven by investment in servers including AI and non-AI hardware and data ceneters.

• 4Q23 CapEx was $11bn (+37% QoQ), driven by investment in technical infrastructure with the largest component for servers followed by data centers.
• The company expects its CapEx would continue to grow notably YoY in 2024F, reflecting the long-term opportunities offered by AI.

Source: Trendforce, KGI Research

**Figure 13: AI server sales to be key spotlight in 2024F**

• Expect ISG sales to grow mid-teens YoY in FY2025 driven by AI server and demand recovery of general server.
• Have shipped $800mn AI-optimized servers and the backlog doubled QoQ to $2.9bn in the year-end.

• View AI server demand remaining very strong, evidenced by the company's growing cumulative order book.
• Expect server segments to grow sequentially through FY24, benefitting from AI system demand and improving GPU supply.

• Super Micro continues to gain momentum with new and existing customers for AI and rack-scale total IT solutions.
• The firm raised its 2024F revenue guidance from $10-11bn to $14.3-14.7bn, up 103% YoY.

• Expect AI server to grow at 20% while the overall server market will grow around 10% in 2024.
• Believe 75% of data will be computed at the edge, making edge general purpose servers growing 12% YoY in 4Q23 with 11 consecutive quarters of YoY growth.

Source: Trendforce, KGI Research

Figure 14: Server demand declined in 2023F, but will resume growth in 2024-25F

Source: Gartner, KGI Research estimates
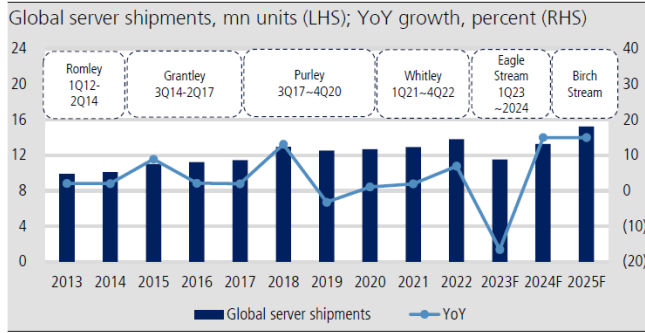
Figure 15: AI shipment growth a driver for global server demand in 2024-25F

Shipments (k units)	2022	2023F	2024F	2025F
AI server	371	578	1,905	3,309
General server	13,444	10,954	11,357	11,942
Total server	13,815	11,532	13,262	15,251
YoY (%)	**2022**	**2023F**	**2024F**	**2025F**
AI server		56	230	74
General server		(19)	4	5
Total server	7	(17)	15	15
Weighting (%)	**2022**	**2023F**	**2024F**	**2025F**
AI server	3	5	14	22
General server	97	95	86	78
Total server	100	100	100	100

Source: Gartner, KGI Research estimates

Figure 16: Intel and AMD's server CPU roadmap in 2024-25F

| Platform	Intel Purley	Intel Purley	Intel Cedar Island	Intel Whitley	Intel Eagle Stream	Intel Eagle Stream	Intel Birch Stream	AMD Zen 2	AMD Zen 3	AMD Zen 4	AMD Zen 4c	AMD Zen 4	AMD Zen 5
Time of launch	3Q17	3Q19	2H20	2Q21	1Q23	2H23F	2024F	2Q19	1Q21	4Q22	1H23F	2023F	2024F
CPU	Skylake-EP Cannon Lake-EP	Cascade Lake	Cooper Lake	Ice Lake	Sapphire Rapids (Intel 7)	Emerald Rapids (Intel 7)	Granite Rapids (Intel 3)	Rome	Milan	Genoa	Bergamo	Siena	Turin
Process	14nm/ 14nm+	14nm++	14nm	10nm	10nm	10nm++	7nm	7nm	7nm+	5nm	5nm	5nm	3nm / 4nm
CPU sockets	LGA 3647	LGA 3647	LGA 4189	LGA 4189	LGA 4677	LGA 4677	LGA 7529	FC LGA 4094	FC LGA 4094	FC LGA 6096	FC LGA 6096	FC LGA 4844	FC LGA 6096
CPU cores	28	28	48	26	60	64	120	64	64	96	128	64	256
DRAM	6-channel DDR4	6-channel DDR4	8-channel DDR4	8-channel DDR4	8-channel DDR5	DDR5	DDR5	8-channel DDR4	8-channel DDR4	12-channel DDR5	DDR5	DDR5	TBA
PCIe	PCIe 3.0	PCIe 3.0	PCIe 3.0	PCIe 4.0	PCIe 5.0	PCIe 5.0	PCIe 5.0	PCIe 4.0	PCIe 4.0	PCIe 5.0	PCIe 5.0	PCIe 5.0	TBA
CPU TDP	45-165W	165-250W	up to 300W	up to 270W	up to 350W	350-400W	400W+	120-225 W	225-280W	320-400W	320-400W	70-225W	480-600W

Source: Company data, KGI Research

**(5) Any downside risk on a PC demand recovery in 2024F?**

Most brands guide NB shipments to drop in the high single digits to double digits QoQ in 1Q24F, due to seasonality. During recent earnings calls, HPQ (US) expects its PC sales to fall by high single digits QoQ in FY2Q24F (Apr-Q). Dell (US) guides PC sales to fall 3% YoY but be flat QoQ in FY1Q25F (Apr-Q), stronger than consensus. We expect this is attributable to its higher commercial PC weighting, over 70%, with more stable commercial demand. In addition, Taiwanese ODMs expect NB shipments to fall by 10-15% QoQ in 1Q24F, with a weaker-than-expected demand outlook given the slow season and slow consumer demand.

However, most brands still foresee global PC shipments to increase by low-to-mid-single digits YoY in 2024F (Figure 17). We believe there are downside risks to this guidance, as this indicates PC shipments will see a significant surge in 3Q24F, up over 20% QoQ, based on 1H24F guidance. AI PC development is another spotlight for investors. We expect most brands will highlight AI PCs with computing power over 40 TOPS during Computex, equipped with Qualcomm's (US) Elite X and AMD's Strix Point CPUs. Though we believe AI PC sales and earnings contributions will be limited for PC brands in 2024F, AI PCs will drive a replacement cycle and long-term growth for the PC industry in 2025-26F.

In the near-term, the PC supply chain's share prices may suffer from sluggish PC demand in 1H24F. We think any share price pull-back will offer an good entry point, while the AI PC showcase at Computex in May-June will boost share prices despite limited sales contributions this year.

Figure 17: PC shipments to grow by 6% YoY in 2024F

PC (incl. Chromebook) shipments, mn units (LHS); YoY growth, percent (RHS)
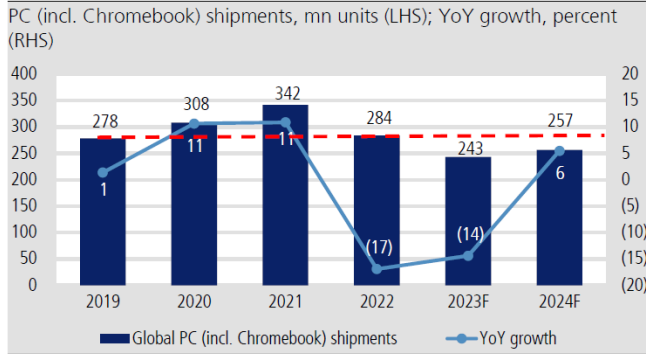
Source: Gartner, KGI Research estimates

Figure 18: Rising AI PC penetration rate

Global AI PC shipments, mn units (LHS); penetration rate, percent (RHS)
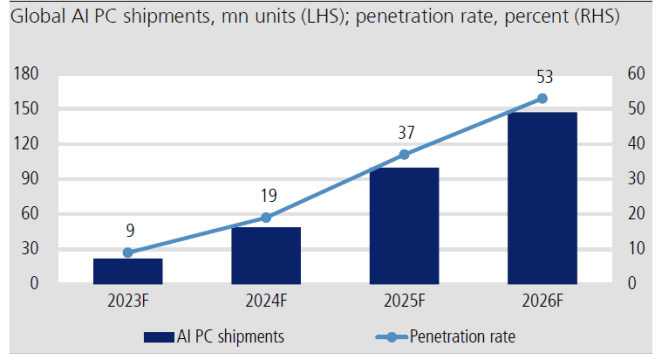
Source: Canalys, KGI estimates

Figure 19: Intel & AMD NB CPU roadmap

	Rocket Lake	Alder Lake	Raptor Lake	Meteor Lake	Arrow Lake	Lunar Lake	Panther Lake	Ryzen 4000 (Renoir)	Ryzen 5000 (Cezanne)	Ryzen 6000 (Rembrandt)	Ryzen 7000 (Phoenix)	Ryzen 8000 (Strix Point)
Time for launch	1Q21	1H22	1H23	4Q23	2024F	2025F	2025F	1Q20	4Q20	1Q22	1Q23	2024F
Process (node)	14nm+++++	Intel 7 (10nm)	Intel 7 (10nm)	Intel 4 (7nm)	Intel 20A	Intel 18A	Intel 18A	TSMC N7	TSMC N7+	TSMC N6	TSMC N4	TSMC N4
Microarchitecture (P-Core)	Cypress Cove	Golden Cove	Raptor Cove	Redwood Cove	Lion Cove	Lion Cove	TBD	Zen 2	Zen 3	Zen 3+	Zen 4	Zen 5
DRAM	DDR4	DDR4 / DDR5	DDR4 / DDR5	DDR5	TBD	TBD	TBD	DDR4	DDR4	DDR5	DDR5	DDR5
PCIe	Gen 4	Gen 5	Gen 5	Gen 5	Gen 5	TBD	TBD	Gen 4	Gen 3	Gen 4	Gen 5	Gen 5

Source: Company data; KGI Research

Figure 20: IT device shipments to resume YoY growth in 2024-25F

Shipments (mn units)	2018	2019	2020	2021	2022	2023F	2024F
Total PC (NB+DT+Chromebook)	274.7	278.5	308.2	341.7	284.1	243.2	256.6
DT	99.8	100.2	79.8	85.3	76.1	67.2	70.7
NB (incl. Chromebook)	174.9	178.3	228.3	256.4	208.0	176.0	185.9
Chromebook	14.9	16.3	32.6	35.3	19.4	18.2	19.6
Smartphone	1,555.3	1,538.7	1,351.3	1,433.5	1,268.8	1,166.5	1,218.9
China	405.8	390.8	342.8	332.6	276.6	254.8	267.5
Others	1,149.5	1,148.0	1,008.5	1,101.0	992.1	911.7	951.4
iPhone	209.0	193.5	199.8	239.2	233.9	228.4	240.3
Server	13.0	12.5	12.7	12.9	13.8	11.6	13.3
Enterprise	10.5	10.0	9.7	9.8	10.3	8.3	9.1
Self-build / Direct ODM	2.5	2.6	3.0	3.1	3.6	3.3	4.2

YoY growth (%)	2018	2019	2020	2021	2022	2023F	2024F
Total PC (NB+DT+Chromebook)	(0.3)	1.4	10.7	10.9	(16.9)	(14.4)	5.5
DT	(2.5)	0.4	(20.3)	6.9	(10.9)	(11.6)	5.2
NB (incl. Chromebook)	1.0	1.9	28.1	12.3	(18.9)	(15.4)	5.6
Chromebook	16.8	9.4	100.0	8.2	(45.2)	(6.0)	8.0
Smartphone	1.2	(1.1)	(12.2)	6.1	(11.5)	(8.1)	4.5
China	(3.1)	(3.7)	(12.3)	(3.0)	(16.8)	(7.9)	5.0
Others	2.8	(0.1)	(12.1)	9.2	(9.9)	(8.1)	4.4
iPhone	(2.7)	(7.4)	3.3	19.7	(2.2)	(2.4)	5.2
Server	13.1	(3.2)	1.1	1.9	6.9	(16.1)	15.0
Enterprise	8.9	(4.6)	(3.2)	1.5	4.6	(18.7)	9.1
Self-build / Direct ODM	34.9	2.5	17.9	3.4	14.3	(8.8)	30.0

Source: Gartner, KGI Research estimates

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