

## Thermal sector

### Liquid cooling to boost thermal solution content value

#### Key message

1. Nvidia (US) showcased the Blackwell platform's B100 & B200 GPUs, and the GB200 superchip, during 2024 GTC. While it did not release TDP specs at the event, liquid-cooled designs were suggested for the GB200.
2. Asia Vital Components (AVC; 3017 TT, NT\$585, OP) & Auras Technology (3324 TT, NT\$696, OP) to ride on liquid cooling adoption, and benefit from higher content value & better gross margin.
3. 1Q24F sales the trough with strong 2H24F sales growth momentum for thermal plays. We rate Outperform for AVC, Auras, & Sunonwealth Electric Machine Industry (2421 TT, NT\$120, OP).

#### Event

Nvidia (US) showcased a new AI server GPU platform, Blackwell, with B100/ 200 GPUs on the x86 architecture, and the GB200 superchip on ARM architecture, during the firm's 2024 Global Technology Conference (GTC). While the firm did not release thermal design power (TDP) specifications at the event, liquid-cooled designs were suggested for the GB200.

#### Impact

**Liquid cooling gaining traction with next generation AI servers.** We see Blackwell GPUs (B100/ B200) as likely to use air-cooling designs in situations where server height (U) is not constrained. However, the DGX GB200 superchip system design is more compact, and thus more suited to liquid cooling thermal solutions. The GB200 superchip contains one Grace CPU and two Blackwell GPUs. Nvidia introduced the GB200 NVL72 system during GTC, which includes 36 Grace CPUs and 72 Blackwell GPUs, with a liquid cooled design. The GB200 is designed to deliver up to 30 times the performance of Nvidia's H100 GPU for large language model inference tasks. Liquid cooling can enhance performance while minimizing thermal constraints across a system. Such designs allow for more sustainable and energy-efficient operations, even under heavy computational loads. Almost all the ODMs showcased their GB200/B200 AI server design with liquid cooling solutions. We expect the penetration rate of liquid cooling will grow significantly in 2025F, with benefits for thermal module companies offering cold plate modules, coolant distribution units (CDU), manifolds, and fan doors, such as Asia Vital Components (AVC; 3017 TT, NT\$585, OP) and Auras Technology (3324 TT, NT\$696, OP). Additionally, B100/ B200 GPUs have form factors double the size of the H100, as they contain two dies on one chip. To avoid chip warping, the heat spreader design evolved from a rim (stiffener) for H100 to a full size spreader (B100/ B200) mounted on the GPU, which will carry more than quadruple the ASP of the H100 design, benefitting Jentech Precision Industrial (3653 TT, NT\$876, NR).

**AVC & Auras to ride growing liquid cooling wave.** Thermal module companies enjoy higher ASP when meeting AI server demand, as each GPU requires an air cooling module to dissipate the 700-750W TDP of each H100/ MI300 GPU, in addition to a cooling module for the 350-400W TDP of Eagle Stream (Sapphire Rapids) and Genoa CPUs. Vapor chambers (VC) and 3D VC are the mainstream solutions for H100 AI servers, with a thermal content value of US\$500-750 per AI server, versus a content value US\$50-60 per general server. Cold plate modules will be the first product for thermal companies to provide as a liquid cooling solution for next generation AI servers. A GB200 system may require 3-6 cold plate modules, for a content value per system of up to US\$800-1,500. If shipments contain all liquid-cooled components, content value per server rack may climb to over US\$40k, including US\$10-20k for CDU, US\$10-15k for manifolds with quick connectors, US\$1-2k for cold plate modules, and US\$1.4-1.6k for fan doors. As a result of this trend, AVC's liquid cooling sales should expand from NT\$1.2bn in 2023, including automotive applications, to NT\$1.5-2bn in 2024F. Auras targets sales growth from NT\$250mn in 2023 (2% of total sales) to NT\$350-700mn (5-10%) in 2024F. Both companies expect liquid cooling sales to grow much further in 2025F. Sunonwealth Electric Machine Industry (2421 TT, NT\$120, OP), a cooling fan maker, will also introduce fan doors and pump manufacturing for CDU. Each of these companies achieves higher gross margin on liquid cooling products, and rising penetration by liquid cooling solutions will fuel gross margin and EPS growth in 2024-25F.

**1Q24F sales the trough, strong 2H24F sales growth for thermal plays.** Auras and AVC guided 1Q24F sales to fall 5-10% QoQ, while Sunonwealth guided flat to moderate QoQ growth. We expect 2Q24F sales to trend up QoQ for these firms, and 2H24F sales growth to strengthen further. AVC will expand its 3D VC capacity as the key task in 1H24F, to meet growing H100 AI server demand. It will meet approximately 50% of H100 3D VC demand in 2H24F, with Cooler Master (TW, unlisted) as the 3D VC suppliers. Auras expanded the firm's liquid cooling product line to include cold plate and CDU in 2H23, and may launch manifolds in 1H24F to expand liquid cooling sales. Sunonwealth has benefited from dual-motor fan adoption in AI servers since 2023, and will upgrade fan specs for B100/ B200 GPUs in 2024F, to bolster ASP. We expect all three companies' 2024F sales to achieve 15-20% YoY growth, with EPS growing more strongly than sales YoY.

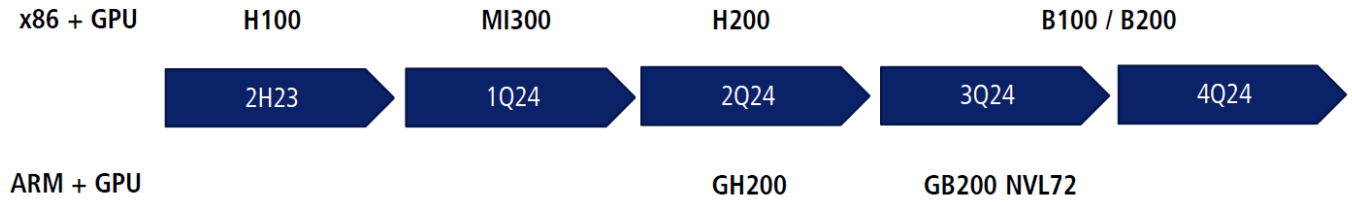
#### Stocks for Action

We rate all three companies as Outperform, with target prices of NT\$660 for both AVC and Auras, and NT\$155 for Sunonwealth. We recommended a good investment timing whenever their share prices have correction

#### Risks

Material price increases; NT-dollar appreciation; weak demand for servers and gaming NB.

Figure 1: Nvidia's key AI server GPU roadmap, with models entering into mass production in 2024-25F



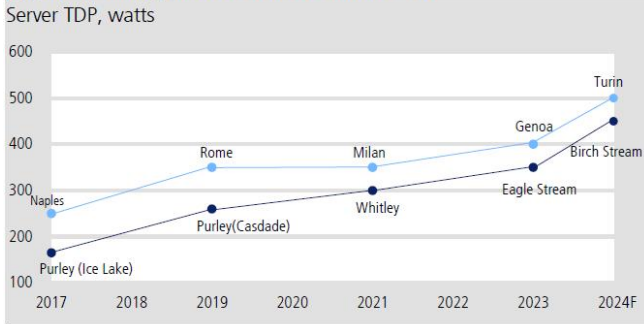
Source: Nvidia, KGI Research

Figure 2: Nvidia's key scale up product spec & schedule – GH200, GB200, B100, & B200 are AI GPU spotlights in 2024-25F

	H200	GH200 NVL32	B100	B200	GB200 NVL72	B200 NVL72
Platform	Vulcan	Oberon	Umbriel	Umbriel	Oberon	Miranda
Form factor	HGX 8-GPU baseboard	GH 2:2 board, NVSwitch tray, NVL backplane	HGX 8-GPU baseboard	HGX 8-GPU baseboard	GH 1:2 board, NVSwitch tray, NVL backplane	GPU board, NVSwitch tray, NVL backplane
CPU	x86	Grace	x86	x86	Grace	x86
TDP	700W	900W	700W	1,000W	1,200W	1,200W
Networking	400Gb/s IB w/ SHARP, SpectrumX ETH	400Gb/s IB w/ SHARP, SpectrumX ETH	400Gb/s IB w/ SHARP, SpectrumX ETH	400Gb/s IB w/ SHARP, SpectrumX ETH	400 or 800Gb/s IB w/ SHARP, SpectrumX ETH	400 or 800Gb/s IB w/ SHARP, SpectrumX ETH
Schedule of launch	2024	2024	2024	2024	2024	2024
Mass Production	Late 2Q24	2Q24	Late 3Q24	Late 3Q24	1Q25	2Q25

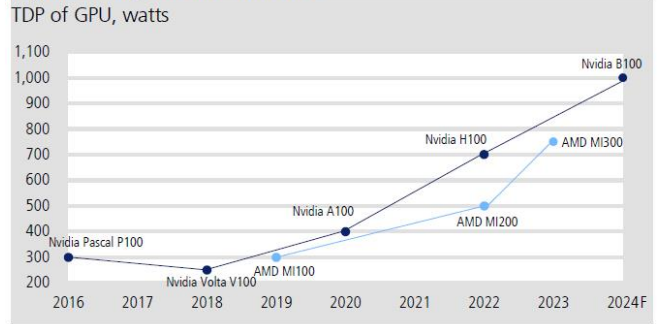
Source: Nvidia, KGI Research

Figure 3: Rising TDP trend for server CPU



Source: Company data, KGI Research

Figure 4: Higher TDP for GPU



Source: Company data, KGI Research

Figure 5: Hon Hai (2317 TT) showcased an Nvidia GB200 NVL72 liquid-cooled rack solution at GTC 2024.



Source: Ingrasys, KGI Research

Figure 6: Side view of Hon Hai's GB200 NVL72 liquid-cooled rack solution



Source: Ingrasys, KGI Research

Figure 7: Wiyynn (6669 TT) showcased rack-level AI solutions, based on NVIDIA GB200 NVL72 at GTC 2024



Source: Wiyynn, KGI Research

Figure 8: Cold plates in Wiyynn's GB200 NVL72 solution



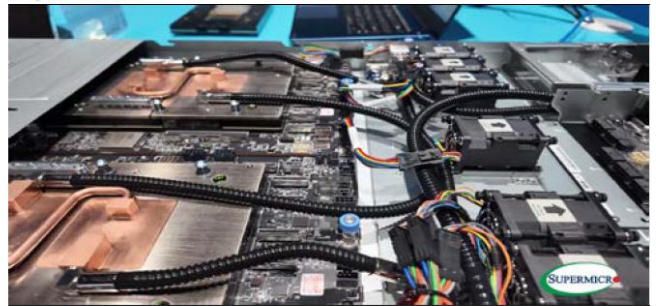
Source: Wiyynn, KGI Research

Figure 9: Super Micro Computer (US) demonstrated GB200 NVL72 solutions in GTC 2024.



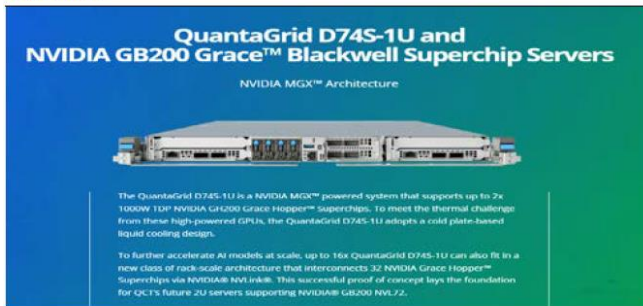
Source: Super Micro, KGI Research

Figure 10: Liquid-cooled design solution demonstration by Super Micro



Source: Super Micro, KGI Research

Figure 11: Quanta's (QCT; 2382 TT) GB200-compatible server solutions

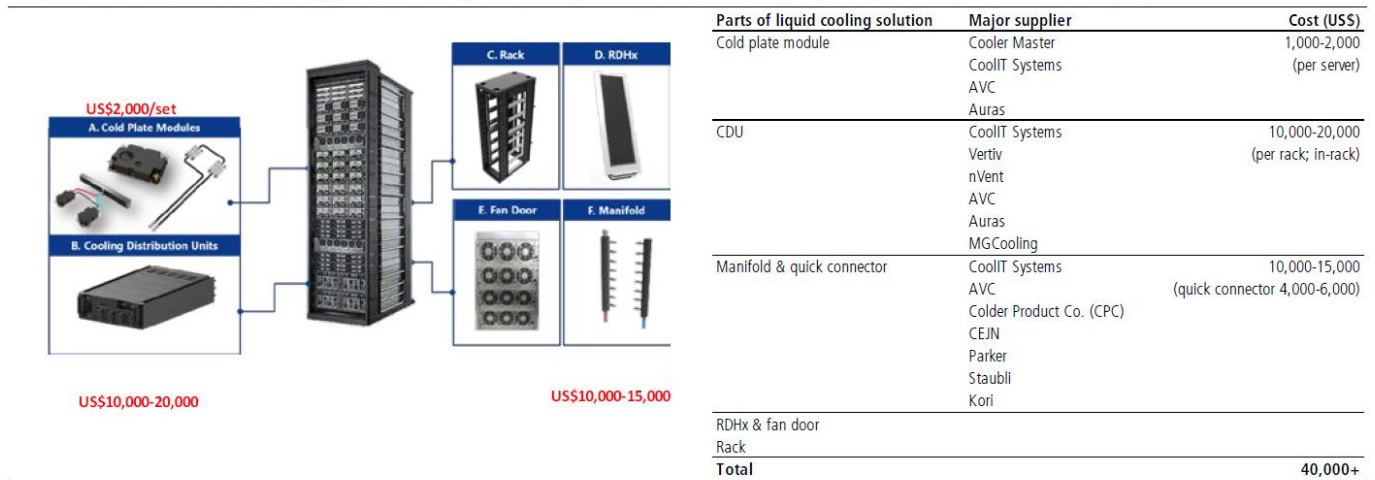


Source: QCT, KGI Research

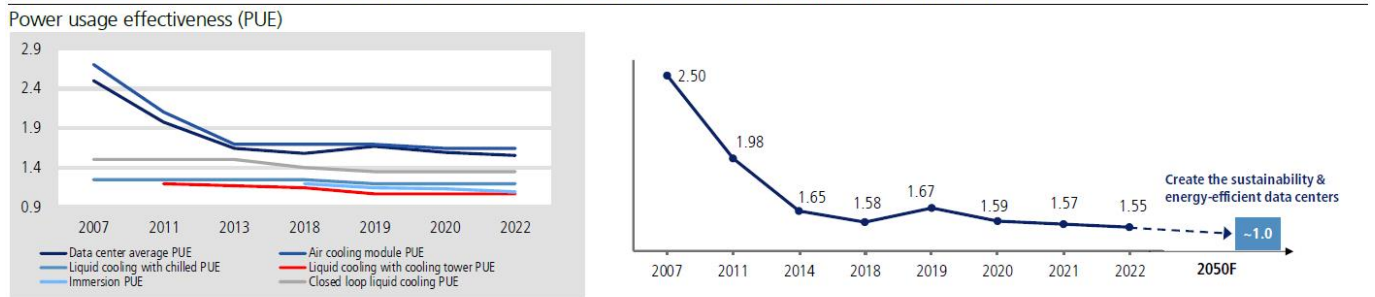
Figure 12: QCT showcased NVIDIA MGX-based systems, including the GB200 NVL72 at GTC 2024.



Source: QCT, KGI Research

**Figure 13: Thermal solution upgrades to liquid cooling to create much higher content value for thermal plays**


Source: Auras, KGI Research

**Figure 14: ESG will become a driving force for lower PUE when adopting liquid cooling designs**


Source: Auras, KGI Research

**Figure 15: Thermal peers comparison – Thermal sales & product mix**

Company	Ticker	Total sales (NT\$bn)			YoY (%)			Total sales weighting by application in 2024F (%)								
		2023	2024F	2025F	2023	2024F	2025F	PC	Gaming/ VGA	Smartphone	Server	Networking	Auto	Others	Total	
AVC	3017 TT	59.2	69.7	85.7	5.7	17.7	23.0	36		16	33	12	<1	2	100	
Auras	3324 TT	12.7	15.4	18.5	(8.3)	20.7	20.7	40	23	4	29			1-3	1	100
Sunonwealth	2421 TT	12.9	15.2	16.7	(8.2)	17.4	10.4	20			34	10		10	24	100

Source: Company data, KGI Research

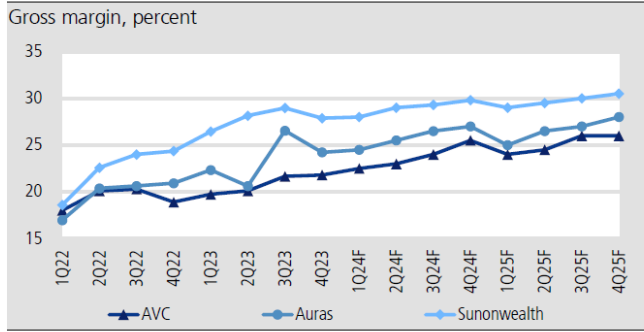
\*Bloomberg consensus

**Figure 16: Peers comparison – Earnings**

Company	Ticker	GM (%)			OPM (%)			EPS (NT\$)			EPS YoY(%)			2022-25F CAGR
		2023	2024F	2025F	2023	2024F	2025F	2023	2024F	2025F	2023	2024F	2025F	
AVC	3017 TT	20.9	23.8	25.2	12.5	15.7	17.7	14.11	17.90	23.57	19.7	26.9	31.7	26.0
Auras	3324 TT	23.6	26.0	26.7	10.8	14.0	15.6	14.28	20.66	27.06	(2.7)	44.7	31.0	22.6
Sunonwealth	2421 TT	27.9	29.1	29.8	11.8	14.7	16.0	5.16	6.58	7.74	18.9	27.5	17.6	21.3

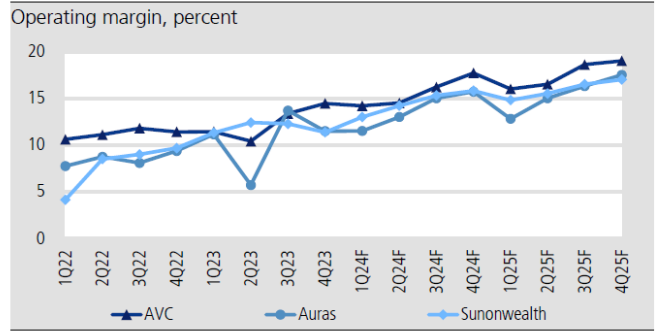
Source: company data, KGI Research estimates

**Figure 17: Gross margin uptrend in 1Q24-4Q25F**



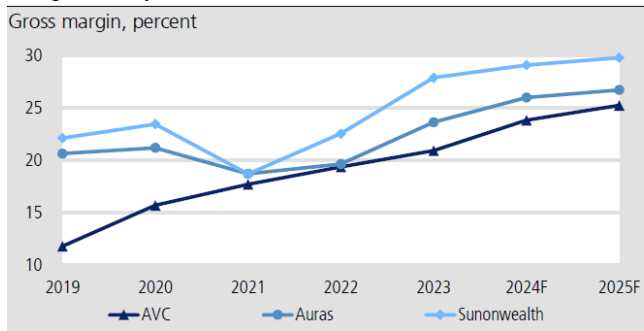
Source: Company data; KGI Research estimate; \* Bloomberg consensus

**Figure 18: Operating margin expansion in 1Q24-4Q25F**



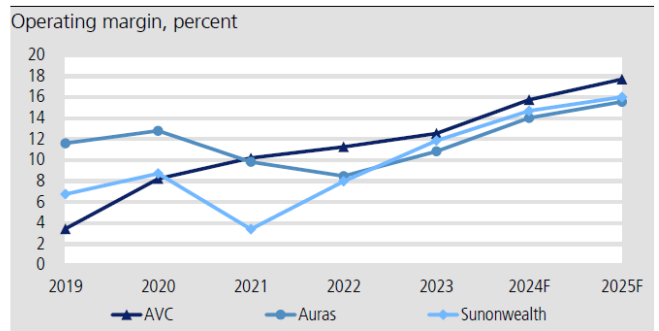
Source: Company data; KGI Research estimate; \* Bloomberg consensus

**Figure 19: Increasing server sales weighting to boost gross margin to expand in 2024-25F**



Source: Company data; KGI Research estimate; \* Bloomberg consensus

**Figure 20: AVC's operating margins outgrowing peers**



Source: Company data; KGI Research estimate; \* Bloomberg consensus

**Figure 21: Peer comparison – Valuations**

Sector	Company	Ticker	Market cap. (US\$m)	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	2023F	2024F	
Cooling fan	Sunonwealth	2421 TT	1,031	120.0	Outperform	155.0	5.16	6.58	7.74	18.9	27.5	17.6	23.3	18.2	15.5	4.5	4.2	3.9	21.5	24.0	26.2	2.9	3.9
	Nidec Corp*	6594 JP	25,464	6,447.0	Not rated	N.A.	138.97	261.28	324.84	(40.2)	88.0	24.3	46.4	24.7	19.8	2.8	2.4	2.2	7.0	10.4	11.7	1.1	1.1
	Sun Max Tech*	6591 TT	69	61.4	Not rated	N.A.	3.77	4.14	N.M.	(45.4)	9.8	N.A.	16.3	14.8	N.A.	1.2	1.2	N.A.	7.5	7.8	N.M.	3.6	3.9
	Minebea Mitsu*	6479 JP	8,566	3,028.0	Not rated	N.A.	181.92	128.48	193.69	7.0	(29.4)	50.8	16.6	23.6	15.6	2.1	1.8	1.7	13.2	8.1	10.9	1.3	1.3
Thermal module /cooling fan	AVC	3017 TT	7,045	585.0	Outperform	660.0	14.11	17.90	23.57	19.8	26.9	31.7	41.5	32.7	24.8	12.4	10.4	8.6	31.5	34.6	38.0	1.2	1.5
	Delta Elec	2308 TT	27,586	338.0	Neutral	297.0	12.86	13.10	15.15	2.2	1.9	15.6	26.3	25.8	22.3	4.5	4.1	3.7	17.5	16.7	17.6	1.9	1.9
	Vertiv	VRT US	29,733	77.8	Not rated	N.A.	1.75	2.33	2.88	776.0	32.7	23.7	44.4	33.5	27.1	15.9	11.8	11.0	40.8	38.4	43.7	0.0	0.1
	Dover Corporation	DOV US	24,559	175.6	Not rated	N.A.	8.77	9.01	9.81	17.3	2.8	8.9	20.0	19.5	17.9	5.0	4.3	3.9	23.5	21.7	20.7	1.2	1.2
Thermal module	Nidec CCI*	6230 TT	549	202.5	Not rated	N.A.	7.47	6.70	7.67	5.2	(10.3)	14.5	27.1	30.2	26.4	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	Auras	3324 TT	1,934	696.0	Outperform	660.0	2.74	3.53	27.06	(2.7)	28.8	31.0	254.0	197.2	25.7	32.8	31.3	6.9	13.0	16.2	28.3	0.0	0.0
	Taisol*	3338 TT	183	66.2	Not rated	N.A.	2.74	3.53	N.M.	N.A.	28.8	N.A.	24.2	18.8	N.A.	3.1	3.0	N.A.	13.0	16.2	N.M.	2.9	3.7
	Foxconn Tech*	2354 TT	2,627	59.1	Not rated	N.A.	4.34	5.41	5.71	43.7	24.7	5.5	13.6	10.9	10.4	0.5	0.5	0.5	5.8	7.0	7.1	2.5	3.7
	Fujikura Ltd*	5803 JP	4,111	2,097.5	Not rated	N.A.	159.49	162.11	176.32	12.4	1.6	8.8	13.2	12.9	11.9	2.2	1.8	1.7	18.5	15.5	14.9	1.3	2.3
	Furukawa Elect*	5801 JP	1,495	3,193.0	Not rated	N.A.	219.11	42.92	174.88	52.8	(80.4)	307.5	14.6	74.4	18.3	0.8	0.7	0.7	5.4	0.6	4.1	1.9	1.9

\*Bloomberg consensus

Source: Bloomberg; KGI Research estimates

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