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Greater China Semiconductors | Asia Pacific

AI Semis Outlook and Memory Innovation

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GREATER CHINA TECHNOLOGY SEMICONDUCTORS
Asia Pacific
Industry View **Attractive**

investors should be aware that the firm may have a conflict of

Research as only a single factor in making their investment decision.

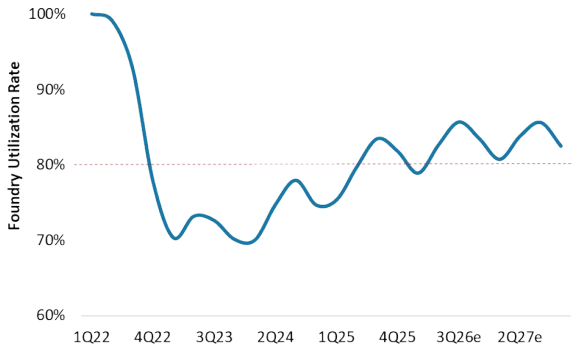
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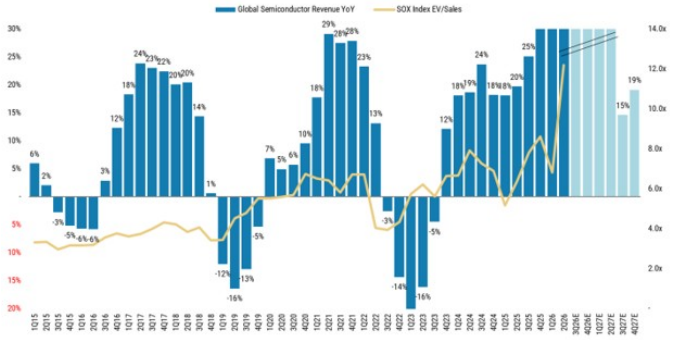
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Broader Semiconductor Cycle

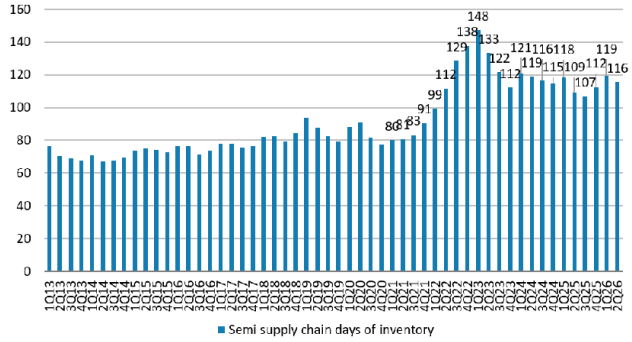
Logic semi foundry utilization could reach 80% in 2H26



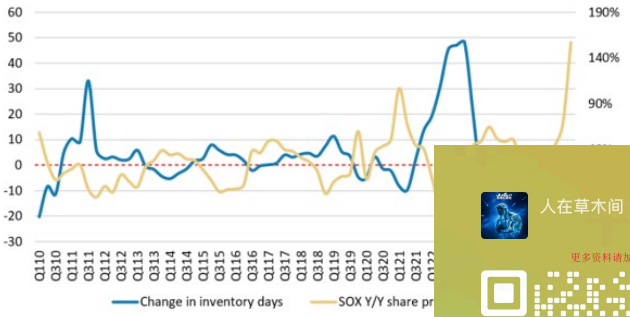
Excluding memory and NVIDIA's AI GPU revenue, non-AI semi growth is expected to decline in 2026



Semi supply chain – days of inventory as of 2Q26



Historically, when inventory days have gone down, the semi stock index has risen

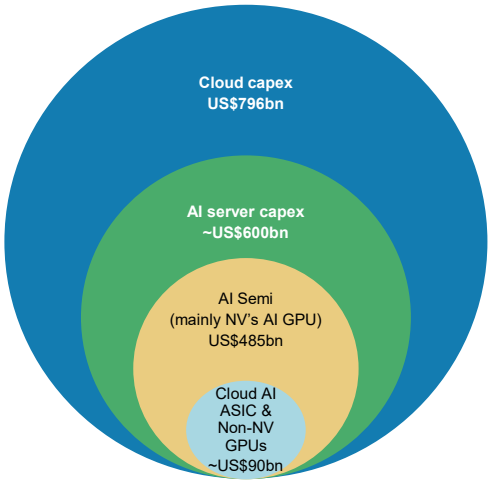




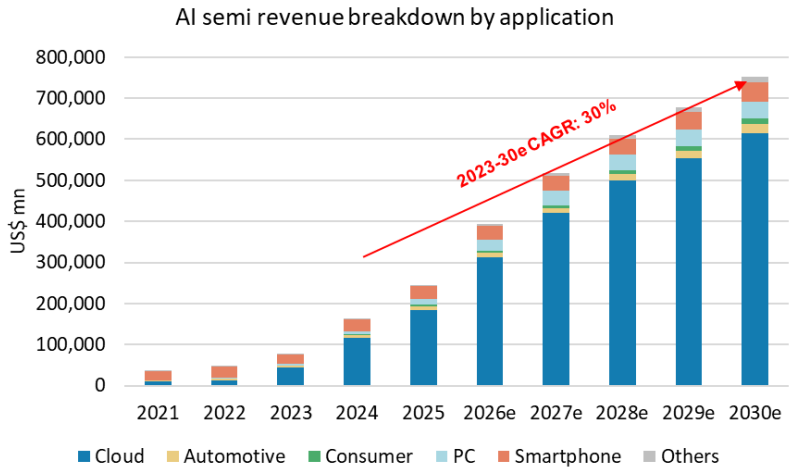
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Global Semi Industry Market Could Reach US$1.5tn by 2030, with AI Semis Contributing Half

Our supply chain data-driven bull case assumption is that cloud AI Semi TAM could grow to US$485bn in 2026



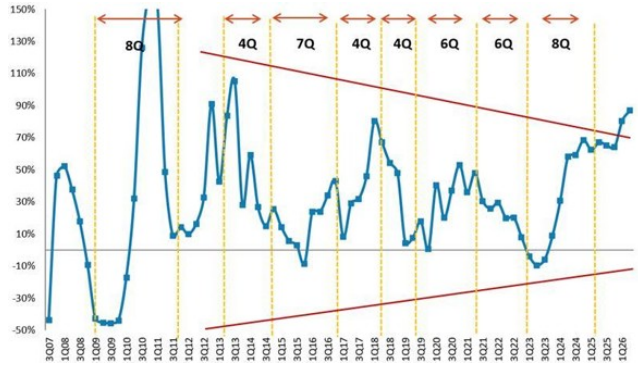
We expect AI semi TAM to reach ~US$753bn by 2030



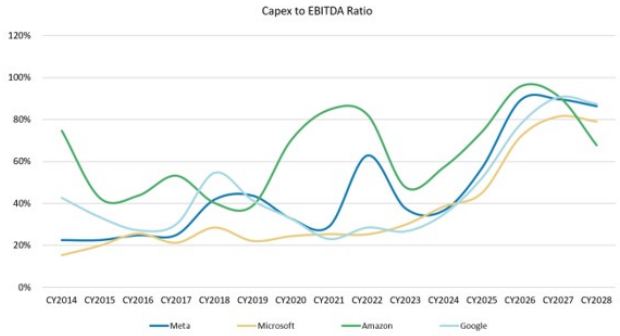
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Cloud Semis: Brighter Outlook

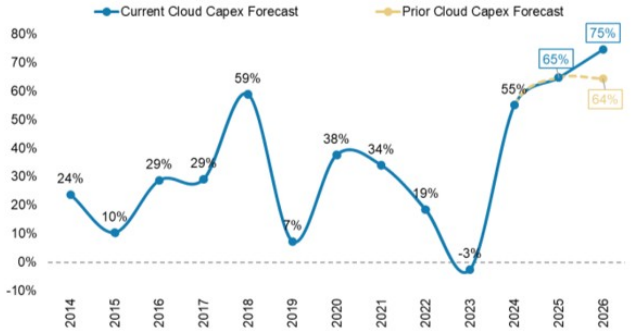
Top 4 CSPs (Amazon, Google, Microsoft and Meta): capex rose 87% Y/Y in 2Q26CY



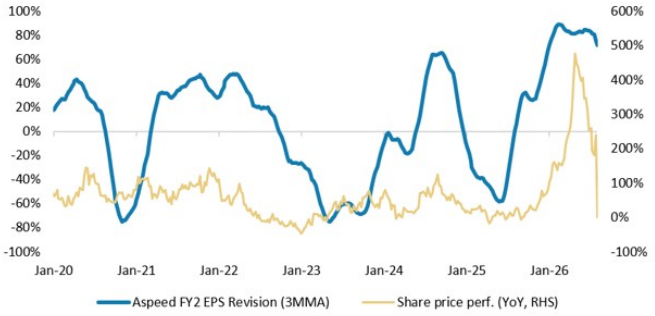
Capex-to-EBITDA ratio is reaching over 70%



Top 4 cloud providers: cloud capex Y/Y growth



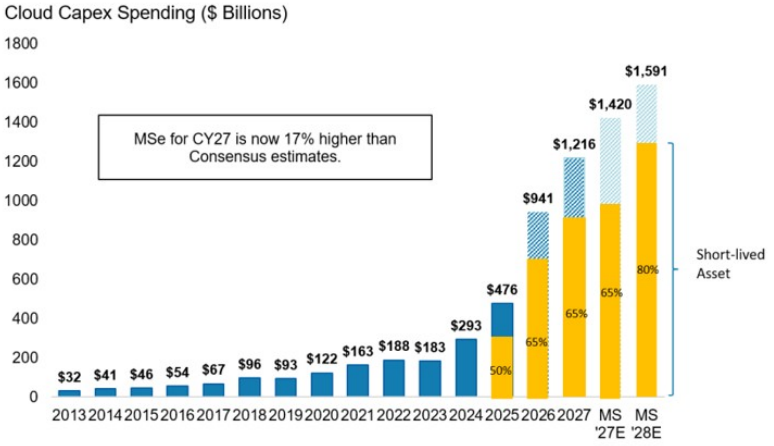
Aspeed: earnings estimate revision breadth



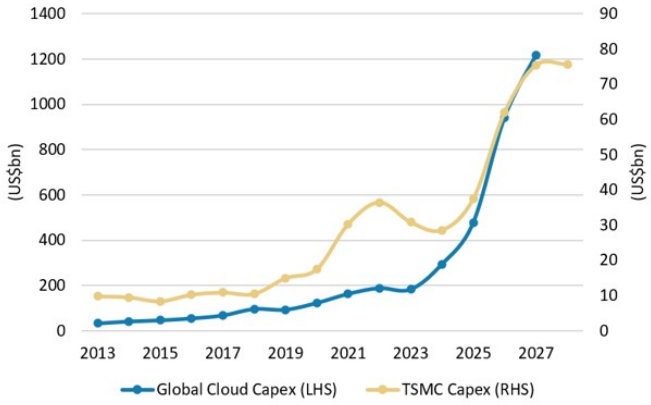
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Cloud Capex Remains Robust from Major CSPs

Morgan Stanley cloud capex tracker: we estimate nearly US$1.4tn of cloud capex in 2027 (top 14 listed global CSPs; no sovereign AI)



Global cloud capex vs. TSMC's capex

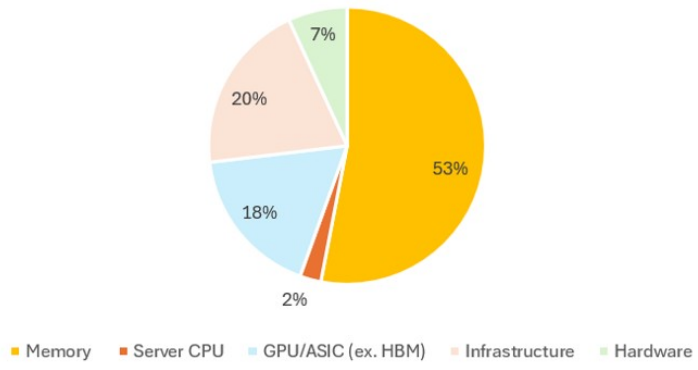


Source: FactSet, company data,

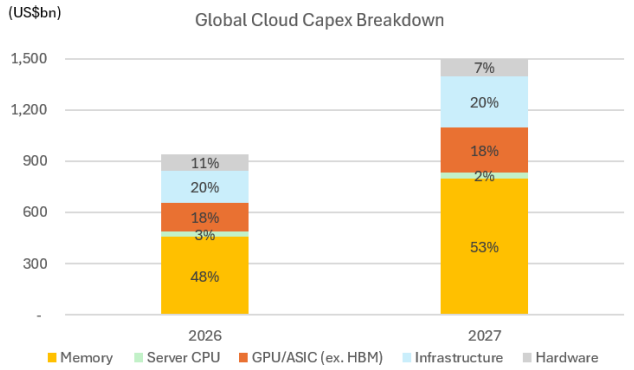
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Memory to Account for Half of Overall 2027e Global Cloud Capex

2027e Cloud Capex Breakdown



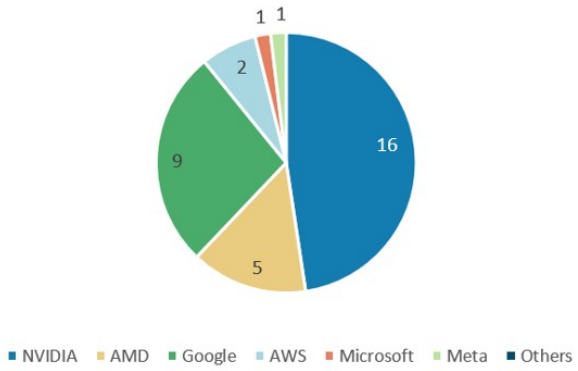
Global Cloud Capex Breakdown



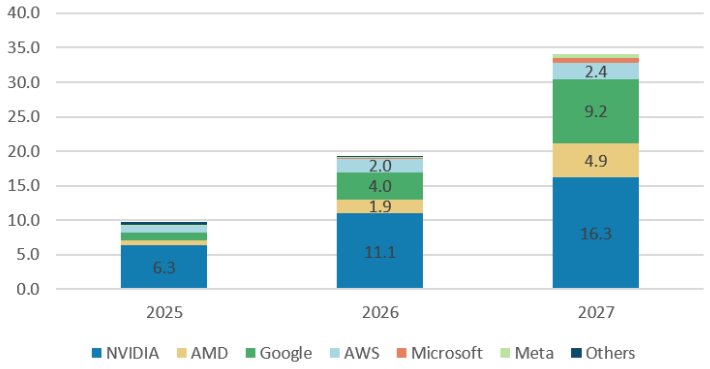
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Power Consumption Growth Remains Robust

2027e GPU/ASIC total power consumption (GW)



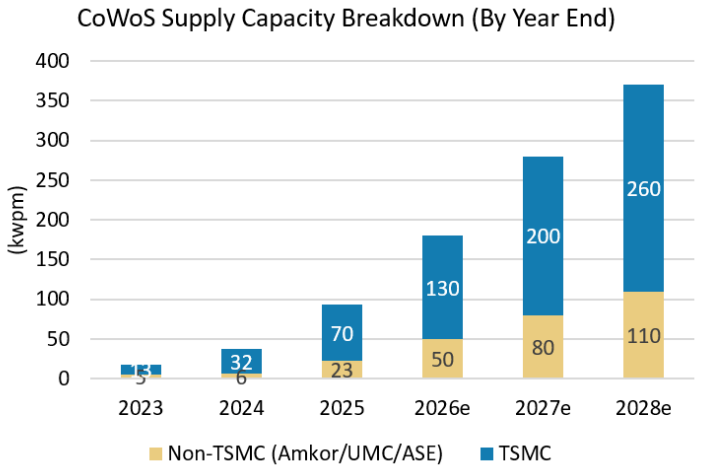
Global GPU/ASIC Total Power Consumption from TSMC CoWoS Shipment



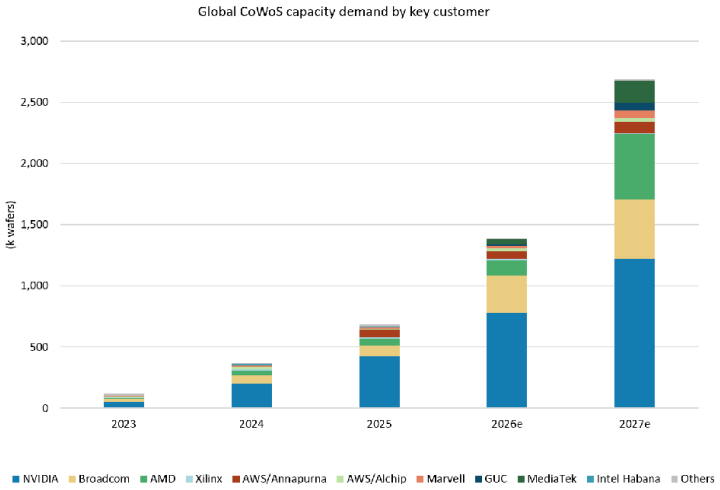
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TSMC May Expand CoWoS Capacity to 260kwpm by 2028 Given Ongoing Strong AI Demand

Global CoWoS capacity expansion by year-end and by vendor

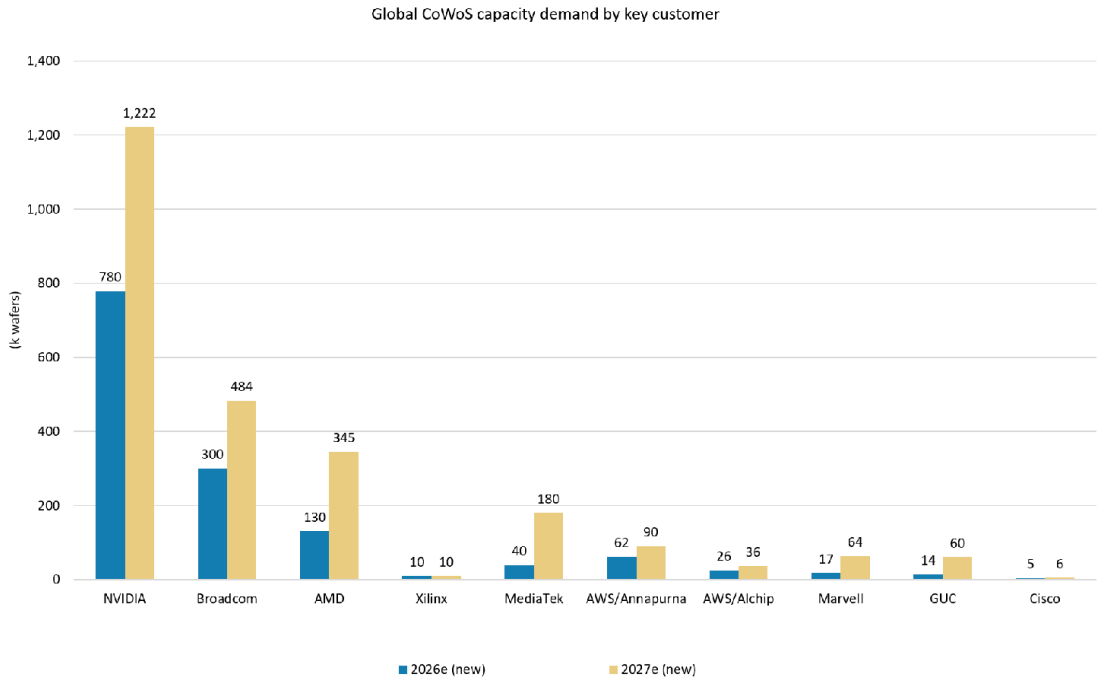


Global CoWoS consumption, by customer



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Global CoWoS Demand Set to Grow Robustly in 2027 at Each Major Customer

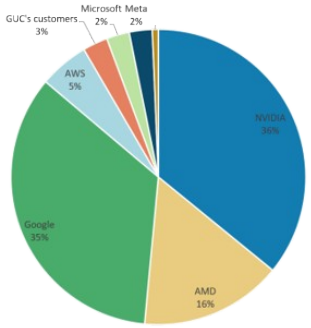


Source: Company

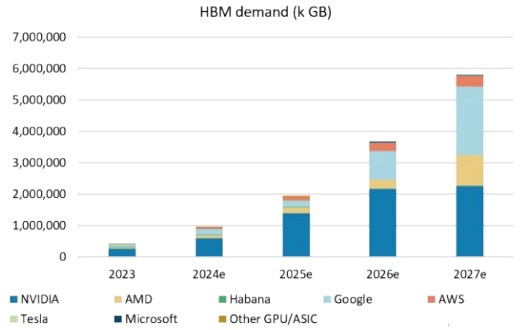
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HBM Consumption in 2027e – Up to 44bn Gb

HBM consumption by customer in 2027e



NVIDIA still consumes most HBM supply in 2027e

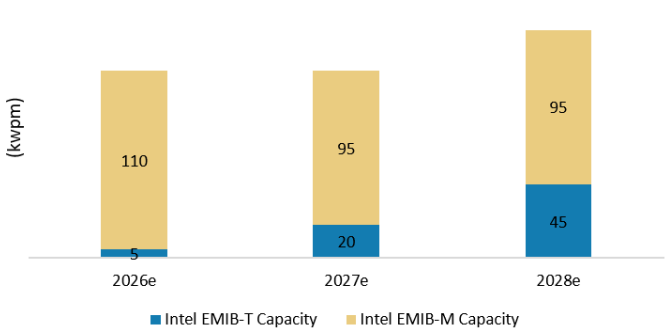


AI chip vendor	Product name	CoWoS capacity allocation (k wafers)	Chips per CoWoS wafer	Implied shipments (k)	HBM chip density (GB)	HBM chip units	Total HBM size (GB)	HBM generation	HBM vendor	Total HBM demand (k GB)
AI GPU (2027e)										
NVIDIA	B300	40	14	560	36	8	288	HBM3e 12hi	Hynix/Micron	161,280
	Vera CPU	250	23	5,750						
	Rubin R200	740	8	5,920	36	8	288	HBM4 12hi	Hynix/Micron/Samsung	1,704,960
	Rubin Ultra	130	8	1,040	48	8	384	HBM4e 12hi	Hynix/Micron/Samsung	399,360
AMD	MI350 series	5	12	60	36	8	288	HBM3e 12hi	Samsung/Micron	17,280
	MI455	75	7	525	36	12	432	HBM4 12hi	Samsung/Micron	226,800
	MI450 (for Meta)	45	14	630	36	6	216	HBM4 12hi	Samsung/Micron	136,080
	MI500 (Arcadia)	10	4	40	48	16	768	HBM4e 12hi	Samsung/Micron	30,720
	Venice CPU	210	21	4,410						
AI ASIC (2027e)										
Google	TPU v7p (Ironwood; AVGO)	13	16	208	24	8	192	HBM3e 8hi	Hynix/Samsung	39,936
	TPU v8i (Sunfish; AVGO)	330	12	3,960	36	8	288	HBM3e 12hi	Samsung/Hynix/Micron	1,140,480
	TPU v8t (Zebrafish; MediaTek)	180	20	3,600	36	6	216	HBM3e 12hi	Samsung/Hynix/Micron	777,600
	TPU v9 (Humufish; MediaTek)			400	48	12	576	HBM4e 12hi	Samsung/Hynix/Micron	230,400
AWS	Trainium 3	140	17	2,380	36	4	144	HBM3e 12hi	Hynix/Samsung/Micron	342,720
Microsoft	Maia 200	5	29	145	16	4	64	HBM3	Samsung	9,280
	Maia 300	50	11	550	36	8	288	HBM4 12hi	Samsung	158,400
Meta	MTIA 3 (Iris)	55	10	550	36	8	288	HBM3e 12hi	Samsung/Hynix/Micron	158,400
US AI Lab	Nexus (Titan 1)	25	13	325	36	6	216	HBM4 12hi	Samsung/Hynix/Micron	70,200
	Titan 2	5	8	40	36	8	288	HBM4 12hi	Samsung/Hynix/Micron	11,520
Others		18								
Total		**2,454**								**5,615,416**
									Total HBM demand (mn Gb)	**44,923**

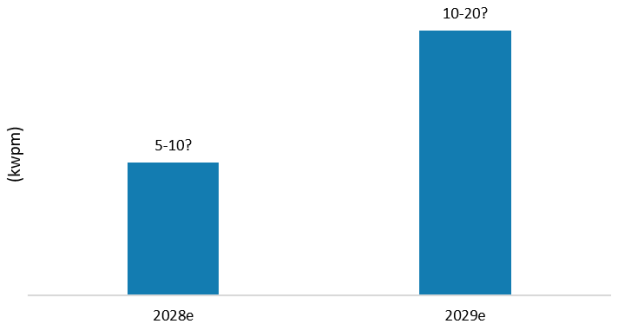
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Total 2.5D Packaging Capacity Could Still Reach 50% YoY Growth in 2028

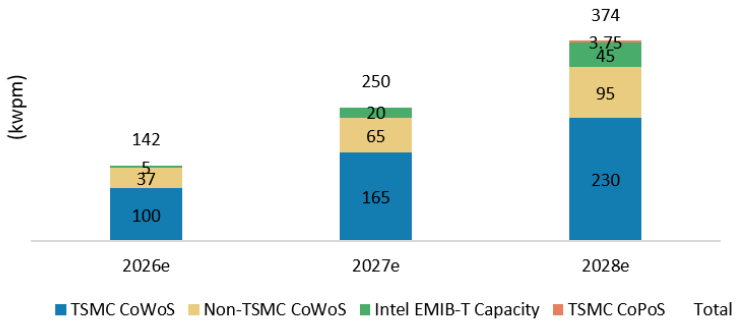
Intel EMIB Capacity (Average)



TSMC CoPoS capacity

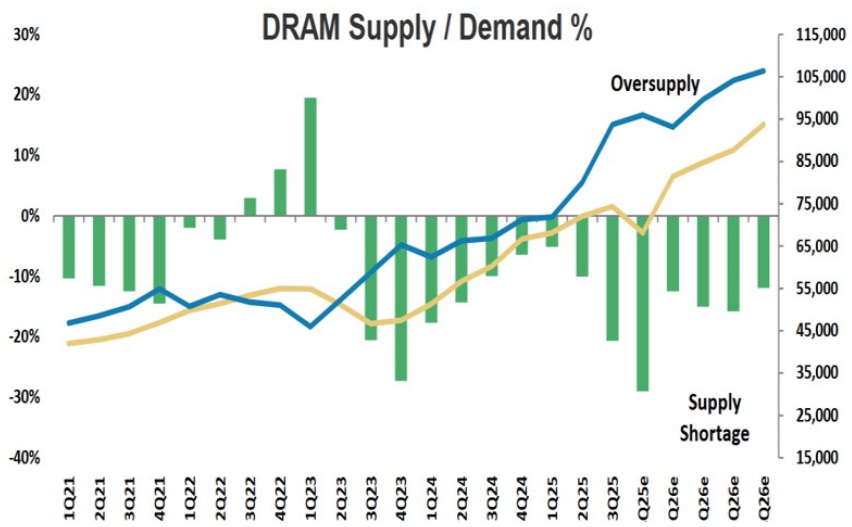


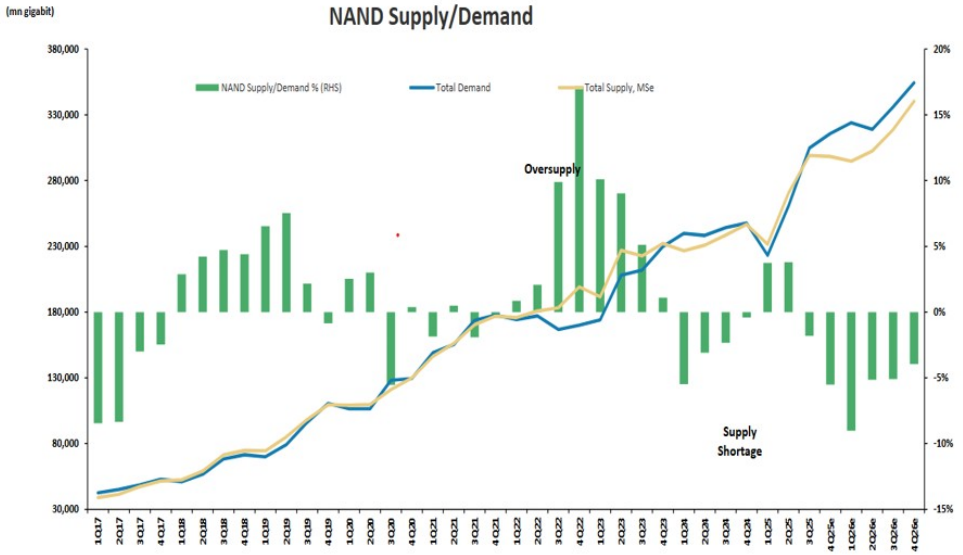
Total 2.5D Packaging Capacity (Average)



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Both DRAM and NAND in Undersupply

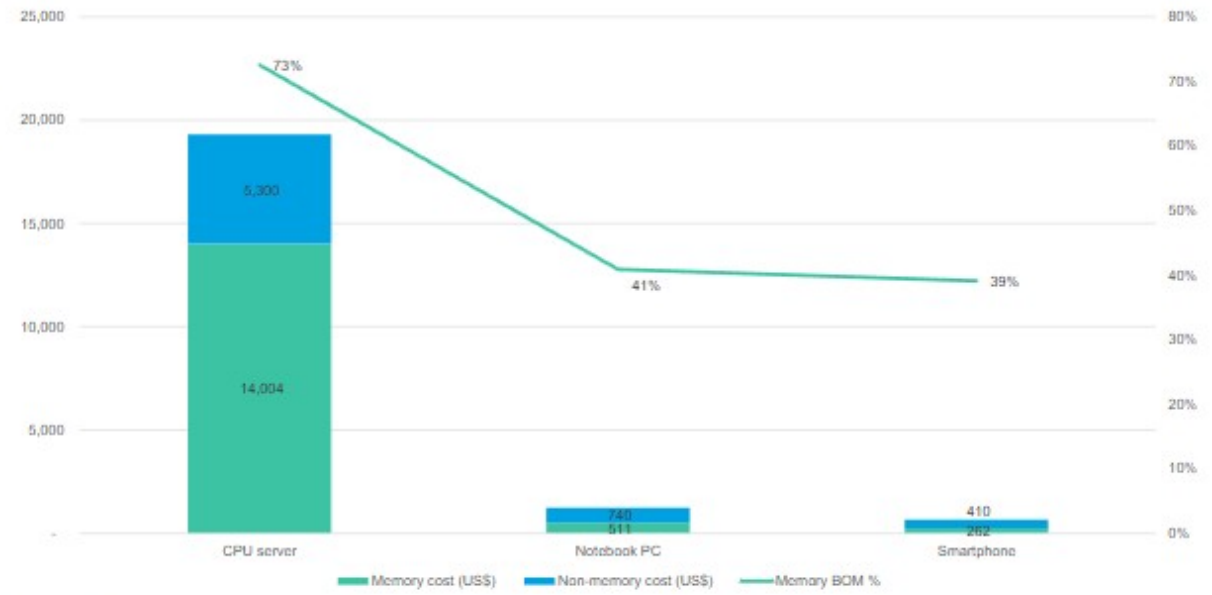




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Memory Is Very Expensive

Exhibit 14: Memory BOM cost estimates for CPU server, Notebook PC and smartphone

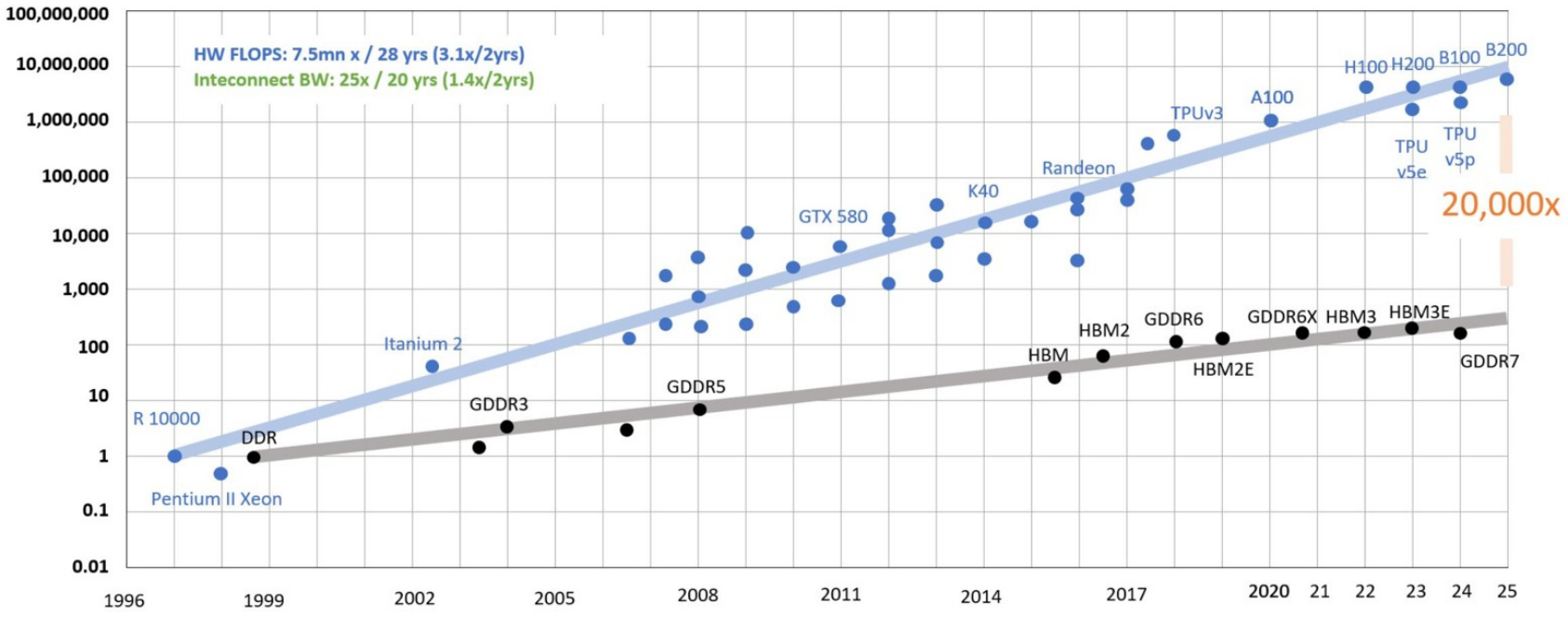


Source: DRAMeXchange, Morgan Stanley estimates. Note: Assuming current contract price for memory cost.

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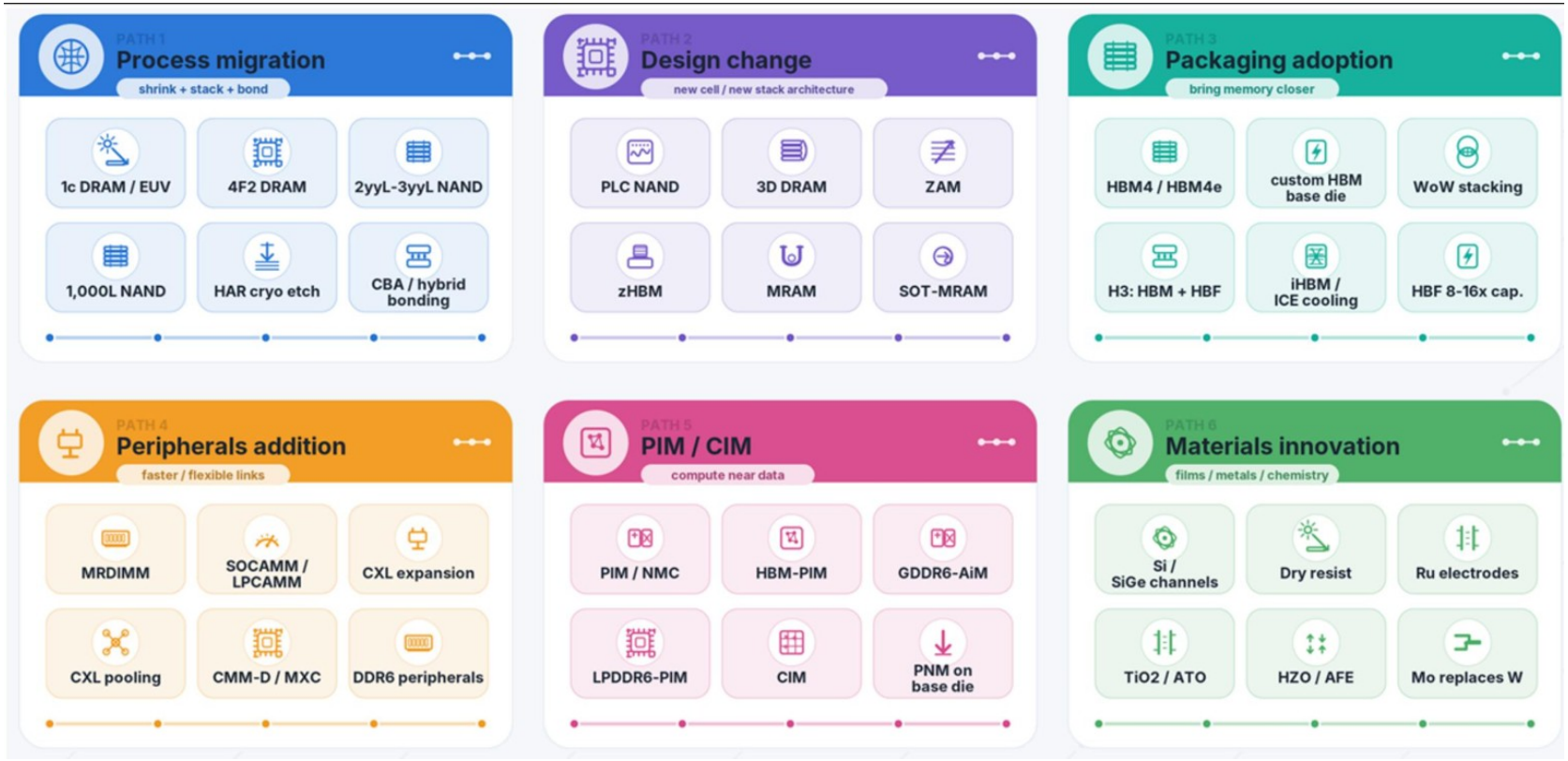
High Memory Pricing, Limited Bandwidth



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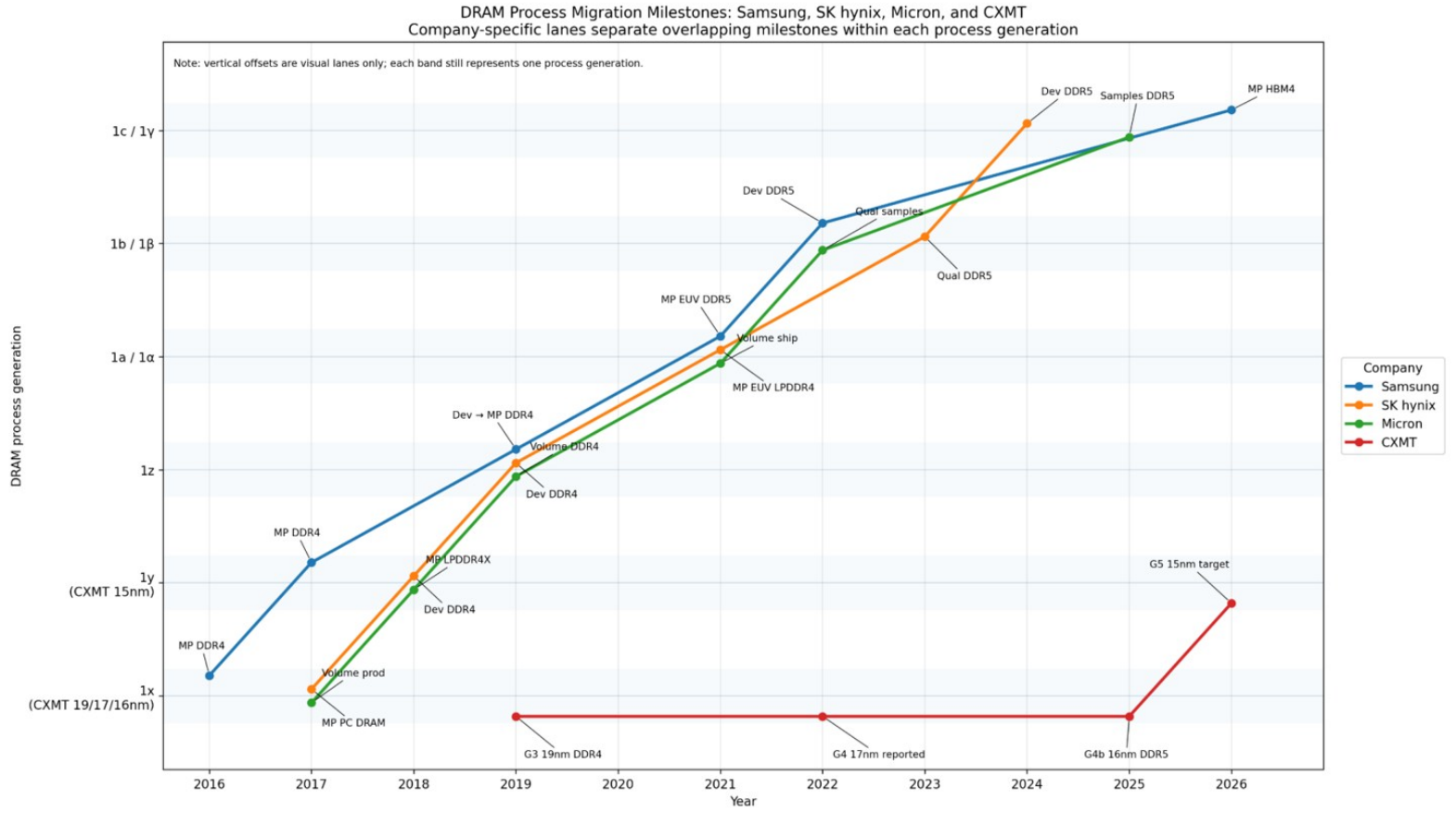
6 Vectors to Frame the Memory Innovation



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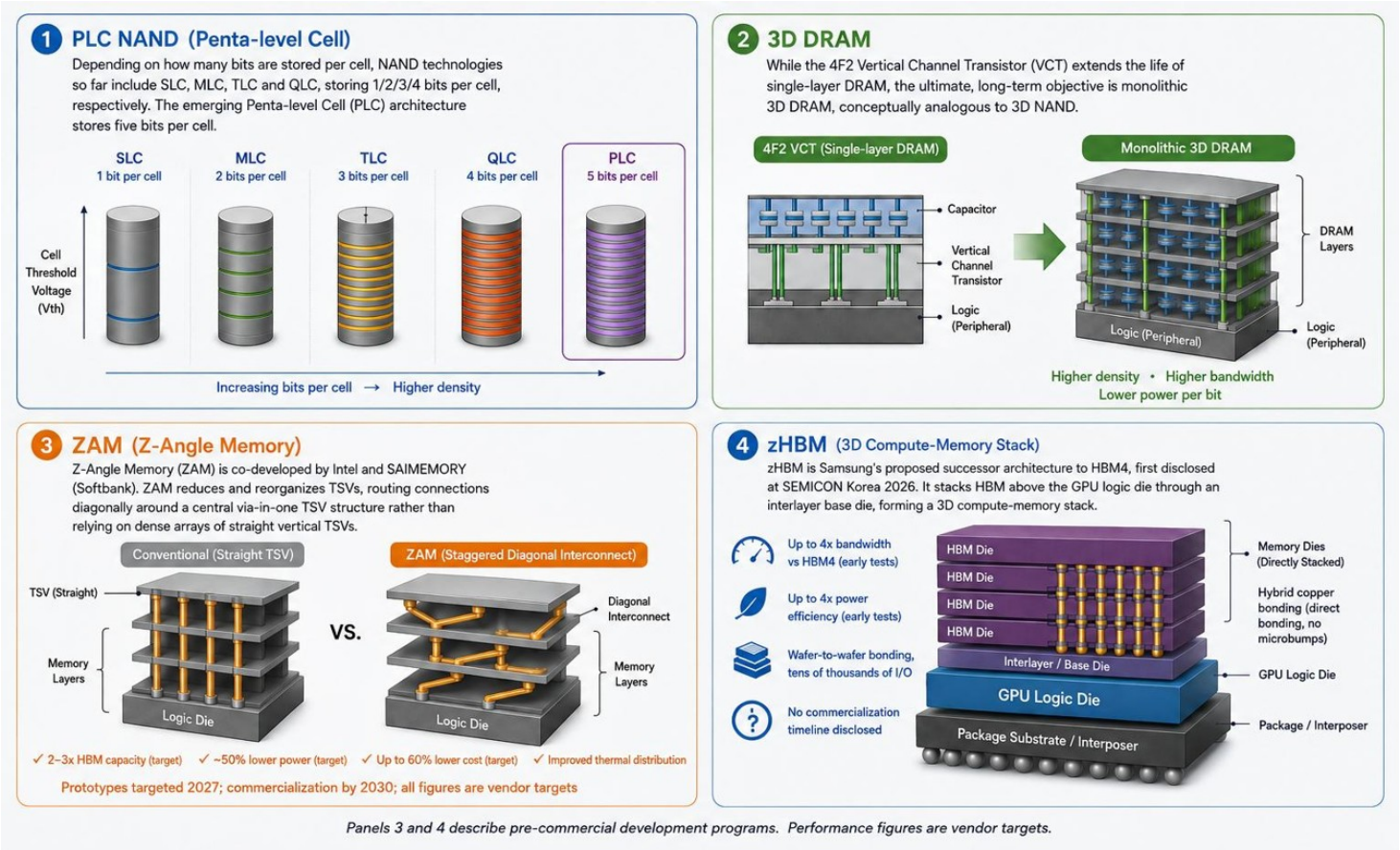
Process Migration



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Design Innovation

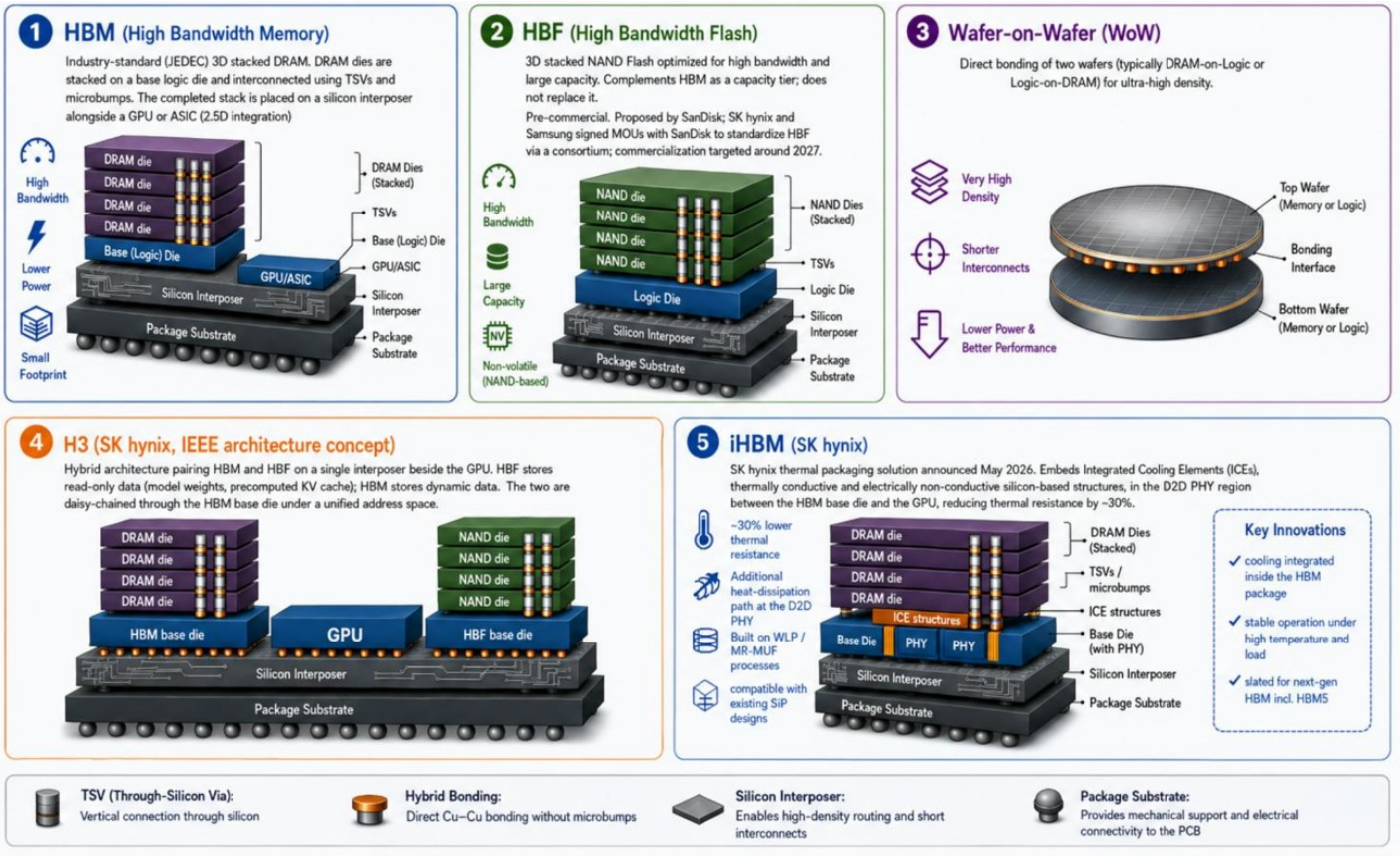


Panels 3 and 4 describe pre-commercial development programs. Performance figures are vendor targets.

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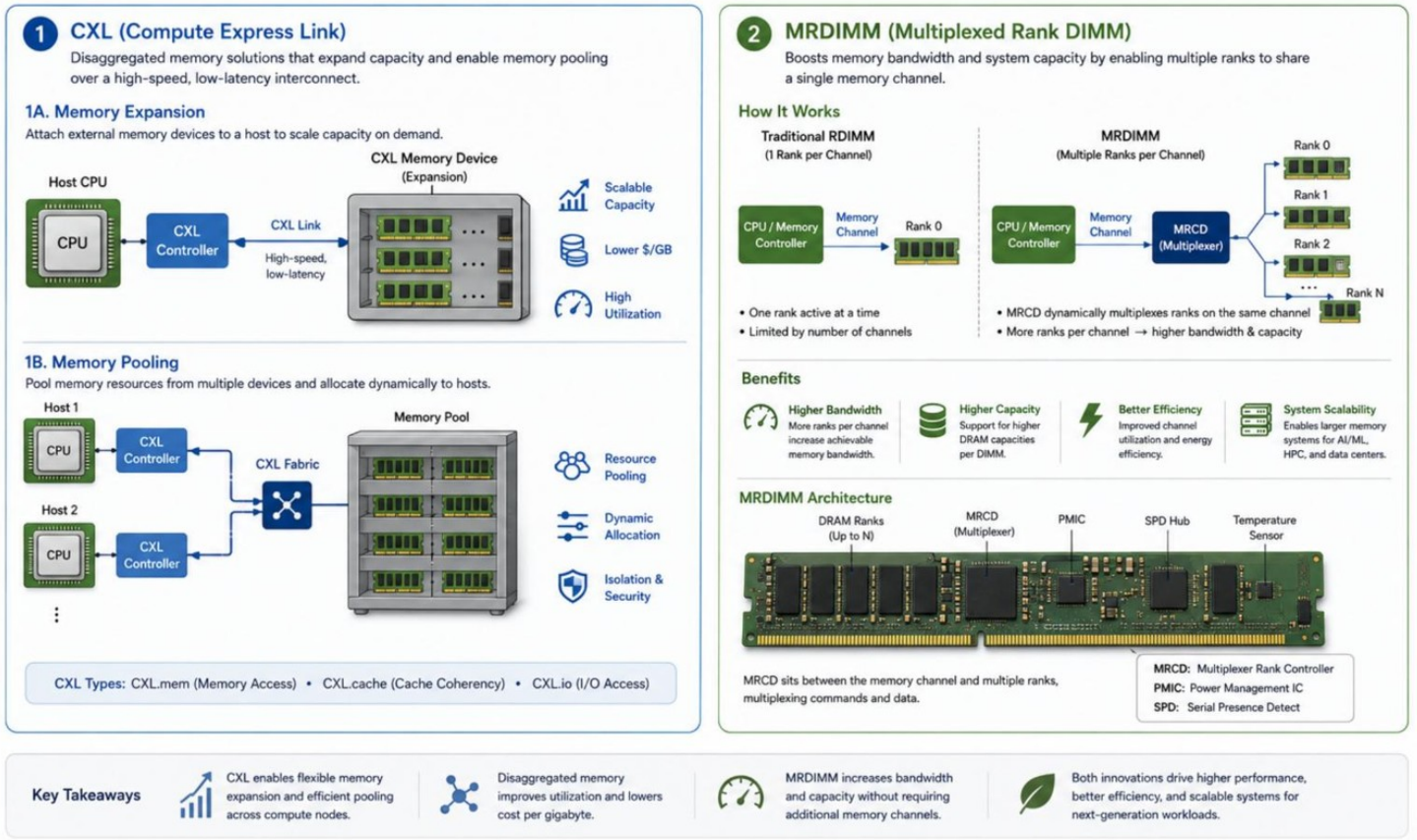
Packaging Innovation



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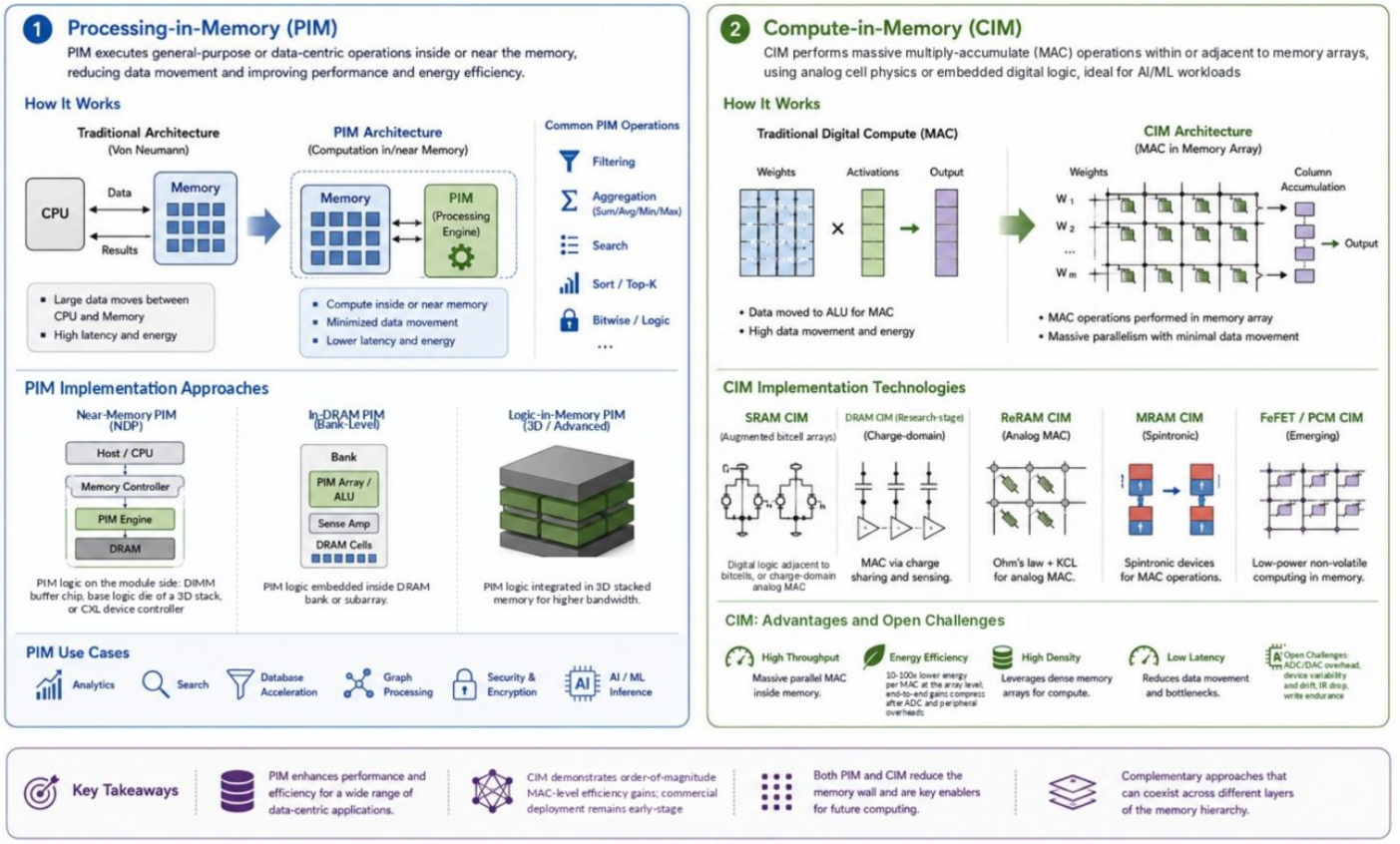
Memory Peripherals Innovations



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Integration Solutions

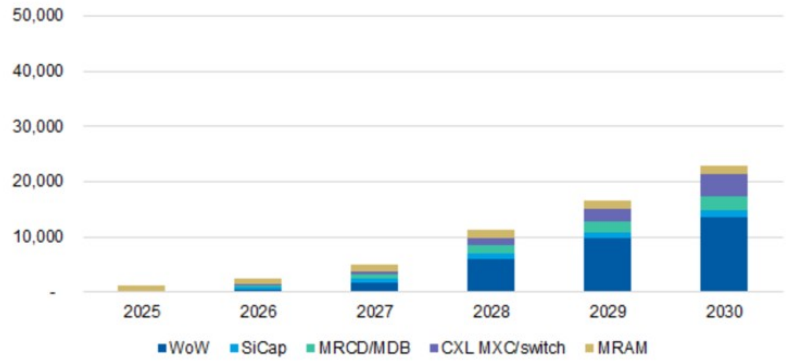


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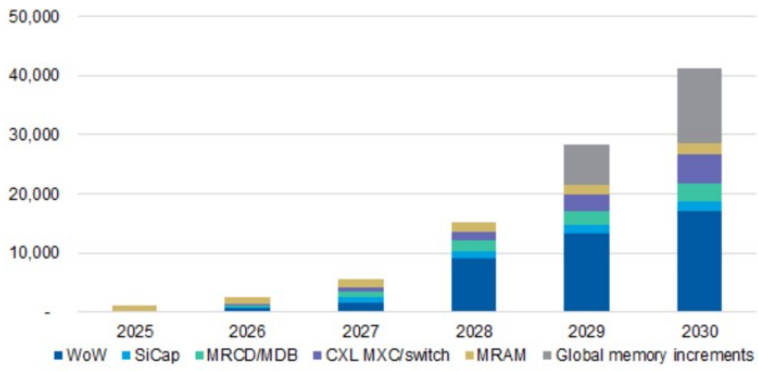
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We estimate TAM at around USD25bn

Memory Innovation TAM estimates - excluding HBM, base case (US$mn)



Memory Innovation TAM estimates - excluding HBM, bull case (US$mn)



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