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HBM Market to Face Severe Undersupply in 2027E–2028E Despite De-spec Concerns

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CITI'S TAKE

We view recent HBM de-specification not as a sign of weakening demand, but as a practical measure to maximize accelerator shipments amid tight supply. Driven by scale-out AI architectures, continual learning, and expanding ASIC/GPU adoption, we expect HBM bit demand to surge **+62% YoY (75.2bn Gb) in 2027E and +69% YoY (127.0bn Gb) in 2028E**, doubling market estimates. Despite capacity additions, we expect supply to significantly lag demand, widening the **S/D deficit from -21% in 2027E to -36% in 2028E**.

Robust HBM Demand Outlook Despite De-spec Concerns — Despite market concerns over HBM demand stemming from de-spec issues, we have found no evidence of order cuts and reductions. We instead expect a robust HBM demand outlook, underpinned by scale-out AI architectures, continual learning, and stronger demand from Broadcom and Google.

Expect HBM Demand to Grow +62% YoY in 27E and +69% in 28E (vs. ~30% Consensus) — While the market is pricing in subdued 2027E demand growth of ~30% due to HBM de-spec concerns, we expect HBM bit demand to surge +62% YoY to 75.2 bn Gb in 2027E and +69% YoY to 127.0 bn Gb in 2028E, doubling the market expectation. This structural upside will be driven by robust demand momentum not only from Nvidia's next-gen GPUs but also from accelerating custom ASIC deployments by major hyperscalers, including Broadcom and Google.

Expect HBM Supply to Grow +64% YoY in 27E and +36% in 28E — We expect the HBM market to remain significantly undersupplied in both 2027E and 2028E despite continued capacity expansion by memory suppliers. Our HBM supply forecast rises +64% YoY to 59.3bn Gb in 2027E and +36% to 80.9bn Gb in 2028E. By supplier, we project HBM capacity for Samsung Electronics/SK Hynix/Micron to increase by +50%/+67%/+52% to 240K/270K/140K WPM in 2027E.

27E/28E HBM S/D Ratio at -21% / -36% — Given persistent supply bottlenecks against surging demand, we forecast the HBM supply/demand (S/D) ratio to remain severely constrained at -21% in 2027E and worsen to -36% in 2028E as custom ASIC shipments accelerate further. Therefore, we continue to view recent HBM de-specification issues as a tactical workaround to maximize accelerator shipments amid tight supply rather than an indication of softening underlying demand.

HBM4 Pricing to Surge +100–150% YoY — Reflecting this acute undersupply, barring exceptional cases, we project HBM4 12hi pricing to surge +100–150% YoY from ~US$2/Gb in 2026E to the US$4–5/Gb range in 2027E, with HBM 8hi at a 20~30% premium to 12hi, providing substantial ASP and margin upside for memory suppliers.

See Appendix A-1 for Analyst Certification, Important Disclosures and Research Analyst Affiliations.

Figure 1. HBM Supply and Demand Outlook

		2021	2022	2023	2024	2025	2026E	2027E	2028E
HBM	Demand(Mpcs, 1Gb eq)	736	1,664	3,350	10,096	20,965	46,409	75,157	126,990
	Supply(Mpcs, 1Gb eq)	752	1,699	3,104	9,200	17,068	36,137	59,347	80,936
	S/D Ratio	2%	2%	-7%	-9%	-19%	-22%	-21%	-36%

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Source: Citi Research Estimates

Figure 2. HBM Demand Outlook

		2021	2022	2023	2024	2025	2026E	2027E	2028E
HBM Total(1Gb eq)		736	1,664	3,350	10,096	20,965	46,409	75,157	126,990
	Nvidia	512	1,024	1,728	4,160	8,400	22,003	32,503	40,939
	Broadcom	96	154	365	1,440	3,840	9,002	13,001	41,003
	Google	51	256	576	1,728	2,765	4,702	10,300	14,003
	AMD	64	128	384	832	2,160	4,200	7,000	8,200
	AWS	6	45	144	640	1,512	2,501	2,802	6,391
	Others	6	58	154	1,296	2,288	4,001	9,550	16,455
HBM DRAM (Mpcs, 1Gb eq)		736	1,664	3,350	10,096	20,965	46,409	75,157	126,990
Breakdown	HBM1(1Gb eq.)	368	832	-	-	-	-	-	-
	HBM2(1Gb eq.)	368	832	1,104	-	-	-	-	-
	HBM2E(1Gb eq.)	-	-	2,246	1,338	-	-	-	-
	HBM3(1Gb eq.)	-	-	-	6,560	6,598	1,601	1,364	-
	HBM3E 8hi(1Gb eq.)	-	-	-	1,680	3,840	6,104	1,005	-
	HBM3E 12hi(1Gb eq.)	-	-	-	518	10,526	25,313	14,153	12,628
	HBM4 8hi(1Gb eq.)	-	-	-	-	-	2,316	6,056	4,330
	HBM4 12hi(1Gb eq.)	-	-	-	-	-	11,075	32,107	47,379
	HBM4 16hi(1Gb eq.)	-	-	-	-	-	-	-	-
	HBM4e 8hi(1Gb eq.)	-	-	-	-	-	-	11,305	21,170
	HBM4e 12hi(1Gb eq.)	-	-	-	-	-	-	7,011	33,756
	HBM4e 16hi(1Gb eq.)	-	-	-	-	-	-	2,154	4,557
	HBM5 16hi(1Gb eq.)	-	-	-	-	-	-	-	3,169
Portion	HBM1(%)	50%	50%	0%	0%	0%	0%	0%	0%
	HBM2(%)	50%	50%	33%	0%	0%	0%	0%	0%
	HBM2E(%)	0%	0%	67%	13%	0%	0%	0%	0%
	HBM3(%)	0%	0%	0%	65%	31%	3%	2%	0%
	HBM3E 8hi(%)	0%	0%	0%	17%	18%	13%	1%	0%
	HBM3E 12hi(%)	0%	0%	0%	5%	50%	55%	19%	10%
	HBM4 8hi(%)	0%	0%	0%	0%	0%	5%	8%	3%
	HBM4 12hi(%)	0%	0%	0%	0%	0%	24%	43%	37%
	HBM4 16hi(%)	0%	0%	0%	0%	0%	0%	0%	0%
	HBM4e 8hi(%)	0%	0%	0%	0%	0%	0%	15%	17%
	HBM4e 12hi(%)	0%	0%	0%	0%	0%	0%	9%	27%
	HBM4e 16hi(%)	0%	0%	0%	0%	0%	0%	3%	4%
	HBM5 16hi(1Gb eq.)	0%	0%	0%	0%	0%	0%	0%	2%
Total DRAM Demand(Mpcs)		191,673	193,221	190,282	246,759	305,484	390,057	510,101	630,035
	HBM portion(%)	0.4%	0.9%	1.8%	4.1%	6.9%	11.9%	14.7%	20.2%

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Source: Citi Research Estimates

Figure 3. HBM Supply Outlook

		2021	2022	2023	2024	2025	2026E	2027E	2028E
Year-End TSV Capacity(Kwafer/month)		32	53	106	180	280	420	700	870
	Samsung	20	28	49	70	110	155	240	300
	SK Hynix	8	20	50	75	110	150	270	290
	Micron	4	6	7	35	55	95	140	200
	CXMT	-	-	-	-	5	20	50	80
HBM Supply(Mpcs, 1Gb eq)		752	1,699	3,104	9,200	17,068	36,137	59,347	80,936
	Samsung	483	896	1,424	3,027	5,788	11,000	25,000	33,006
	SK Hynix	206	661	1,481	4,887	8,543	16,999	21,002	27,025
	Micron	63	142	200	1,285	2,719	8,034	13,009	20,001
	CXMT	-	-	-	-	19	104	336	904
M/S		100%	100%	100%	100%	100%	100%	100%	100%
	Samsung	64%	53%	46%	33%	34%	30%	42%	41%
	SK Hynix	27%	39%	48%	53%	50%	47%	35%	33%
	Micron	8%	8%	6%	14%	16%	22%	22%	25%
	CXMT	0%	0%	0%	0%	0%	0%	1%	1%

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