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Operator

Thank you for standing by, and welcome to Micron's Post Earnings Analyst Call. [Operator Instructions] As a reminder, today's program is being recorded.

And now I'd like to introduce your host for today's program, Satya Kumar, Corporate Vice President, Investor Relations and Treasury. Please go ahead, sir.

Satya Kumar

Thank you, and welcome to Micron Technology's Fiscal Second Quarter 2025 Post Earnings Analyst Call.

On the call with me today are Sumit Sadana, Micron's Chief Business Officer; Manish Bhatia, EVP of Global Ops; and Mark Murphy, our CFO.

As a reminder, the matters we are discussing today include forward-looking statements regarding market demand and supply, market trends and drivers and our expected results and guidance and other matters. These forward-looking statements are subject to risks and uncertainties that may cause actual results to differ materially from statements made today. We refer you to documents we have filed with the SEC, including our most recent Form 10-Q and upcoming 10-Q, for a discussion of risks that may affect our results.

Although we believe that the expectations reflected in the forward-looking statements are reasonable, we cannot guarantee future results, levels of activity, performance and achievements.

We are under no duty to update any of the forward-looking statements to conform these statements to actual results.

We can now open the call up for Q&A.

Operator

And our first question comes from the line of Vivek Arya from Bank of America.

Vivek Arya

I had 2 of them.

First on this HBM sales increase to \$35 billion. Is that unit or content driven? Like do you see more GPU units versus before? Or is that more content, faster move to 12 high or whatnot? And is there flexibility to raise this number further?

Sumit Sadana

Yes.

In terms of the -- Vivek, this is Sumit here. I'll take this question.

So in terms of the HBM TAM, yes, this is the second time we have increased the TAM. And it's coming from a combination of more robust shipments, faster move to 12-high.

As we mentioned, we expect most of the overwhelming amount of volume in the second half of the calendar year to be 12-high. And obviously, that comes at a higher ASP due to the higher content. And the overall level of demand for HBM continues to be very robust. And we feel very good about our own HBM trajectory as well.

So that's all part of it.

Our own shipments have been ahead of forecast, ahead of our own internal plans.

So that's also contributing to the TAM increase.

Vivek Arya

And for my follow-up on gross margins, I think, Mark, you mentioned some start-up cost headwinds in Q4, if I recall. Can you help us quantify? And do they persist beyond Q4, into Q1, et cetera? And kind of related question on gross margins. Are you shipping bits from higher-cost inventory? So when does that headwind go away?

Mark Murphy

Yes. And your second question, was it a -- I'm presuming it was kind of a DRAM and a question or doesn't matter.

So on the start-up costs, so they're relatively modest, kind of an under 30, 40 basis points depending on what the revenue is effect as we sort of exit the year. And then that -- those costs will increase as we increase the level of activity, particularly in Idaho and around our newest DRAM node. Those costs will increase through '26.

So we'll talk more of that -- about that as we get closer to fiscal year '26, but we begin to see those increases as we exit this year.

And then on the inventories, as you recall, we did the write-down of the inventories. And those inventories have cleared, and the inventories that we have now are -- we've been performing well on cost down.

So there are competitive inventories. In NAND, as I mentioned, are underutilization. Those costs are reflected in inventories and result in some higher-cost inventories. And those begin to pass through in the fourth quarter and into '26.

Operator

And our next question comes from the line of Srini Pajjuri from Raymond James.

Srinivas Pajjuri

I have a couple as well.

You talked about price premium as we go from 8-high to 12-high. Can you clarify if it's like-for-like price premium? Obviously, you'll get a better price because of higher capacity. And then also on the same topic, as we go from 3E to 4, can you talk about -- at a high level, can you discuss the differences and similarities of that transition versus when you went from 3 to 3E and 3E, I think, you went from 8 to 12. I'm just curious how difficult of a transition HBM4 is going to be from a manufacturing standpoint.

Sumit Sadana

Yes.

So in terms of 8-high to 12-high, as you can imagine, 12-high is a more complex product, has also impacts for all suppliers as they move to higher number of layers. And consequently, the price is higher, not just because of the 50% extra capacity, but the price per bit is also higher because of all of those reasons.

So that's the pricing-related issue. And in terms of manufacturing, I'll let Manish address the manufacturing aspect.

Manish Bhatia

Yes.

So your manufacturing customers around moving from HBM3E to HBM4 and the -- and there a number of new technologies that are going to be coming together to be able to provide the significant increase in performance that HBM4 will provide that all our customers are really thirsty for.

And so there's manufacturing elements that we're integrating together on the front end to be able to really deliver that higher performance as well as new technologies we'll be implementing and process flow for assembly and test, which will enable us to deliver the high volumes of integrated HBM cubes that -- beginning in calendar year '26.

So we feel very good about where we are right now with HBM 8-high having outperformed our prior plans, and that manufacturing experience and base bodes well for the 3E 12-high ramp that's coming in the rest of calendar '25 and into '26. And then we think that, that will provide really strong baseline fundamental learning for us with HBM4.

Srinivas Pajjuri

Okay. Got it. And then on the TAM, you raised it last quarter and this quarter as well. And at the same time, you're maintaining your market share exiting this year, even though, I guess, you've been at least -- you've been talking about getting sold out for the year. I'm just trying to reconcile those 3 items because -- is it because of better yields that you're able to kind of maintain your market share targets exiting the year? Or is there -- I'm just trying to, I guess, reconcile that.

And then the follow-up to that is that as you go into next year, obviously, one of your competitors is still struggling to qualify at NVIDIA.

So if an opportunity arises, if more market share is available in the market, I guess, how quickly can you ramp up supply if there's an opportunity for you to capture more market share?

Manish Bhatia

Maybe just in terms of the production question, I'll just say that we're very pleased with our progress on being able to provide more supply -- greater supply than what our prior plans were.

And so we do expect that, that does play into our projections of what we're able to do for the rest of the year and in particular, into this target, helping us achieve that target that we've set which is to get to our natural market share by the end of the calendar year.

Sumit Sadana

Yes.

In terms of the TAM increase, it has been a combination of more robust 12-high, rapid and robust shift to 12-high earlier in the year.

As we have said now, most of the second half calendar year will be 12-high, and that comes with the higher ASPs.

Of course, our own shipments beyond our own plan that we have been articulating over the last few months, including what Manish said, is all contributing to the TAM increase. And the higher shipments from us are enabling us to continue to keep our share goal despite the higher TAM.

Now as we think longer term, we are making substantial investments in HBM capacity to drive our opportunity.

We see the HBM market continuing to expand over the years.

We have even told you about \$100 billion trajectory into 2030.

And so it is a multiyear growth opportunity.

We also want to remain disciplined about our investments.

Of course, we have substantial CapEx that we have committed that we have told you about.

We are also mindful of ensuring that we are being responsible in how much supply we bring online. And at the same time, as there are opportunities in the market in terms of how we do and how we mix the shift of our business, the mix of our business and our portfolio of shipments, we will continue to look for opportunities to focus on all of the more profitable portions of the industry profit pool.

So that will remain ongoing portion of our strategy.

Operator

And our next question comes from the line of Aaron Rakers from Wells Fargo.

Aaron Rakers

I guess, Mark, I want to double-click on one of the comments that you made in the Q&A around.

I think some of the gross margin impacts.

I think you had mentioned that you expect all-in DRAM costs down to be more or less flat this year.

I think your last kind of description was more of like a mid- to high single digit, albeit only the front-end cost structure of DRAM.

So just a point of clarification there. Is that -- is the new flat number of projection based on inclusive of HBM? Just if you can help us understand that.

Mark Murphy

Yes, that's right, Aaron. That's correct.

Aaron Rakers

Okay. And then as a quick follow-up, a lot of focus on HBM, but I think one of the other areas that you guys have done very well in is LPDDR5X on these AI servers.

As we move to the SOCAMM architecture with the GB300, do you guys envision yourself maintaining your strong share position? And is there an ASP uplift that comes with moving to a module relative to the solder down solution in the G200 cycle?

Sumit Sadana

Yes.

So we are not going to be able to comment on the ASPs between the soldered down version and the module.

However, Aaron, you're absolutely right.

Our LTE solution for the data center has been a stellar success for Micron.

We are the only -- remain to today, the only company in the world to be shipping LPDRAM in volume, and we'll be the first ones to have volume production of SOCAMM, which we have been working on for some time in deep partnership with NVIDIA.

So we're very excited about the SOCAMM opportunity. It will be a very big product for us. And over time, there may be others who will productize and ship in volume.

But we maintain a very sizable lead in time and shipments and experience in productizing LP in the data center and continue to look forward to that road map to produce really good results for us. And as we mentioned, the high cap DMS plus LPDRAM also reached across that \$1 billion milestone for quarterly revenue this quarter in Q2.

So that was also very exciting for us besides the \$1 billion milestone for HBM in the quarter.

Operator

And our next question comes from the line of Vijay Rakesh from Mizuho.

Vijay Rakesh

Just on HBM, I think your market share has almost doubled from the beginning of the year by 4Q, I guess, exiting it in a DRAM market share in HBM.

And so as you look at 2026 as HBM4 ramps and given that market share, your revenues in '26 could probably double. Is that fair? And is your capacity on HBM still going up similarly in '26? And I have a follow-up.

Sumit Sadana

So yes, I mean, of course, we are ramping our HBM capacity throughout calendar '25, and our goal is obviously to continue to have our HBM share be approximately in the same range as our DRAM share.

So as HBM TAM grows, we definitely intend to ensure that our HBM capacity also keeps growing.

Now in terms of our ramp of HBM throughout '25, you're right. I mean we expect a robust ramp of our quarterly revenue through calendar '25 as we get to that target share at the end of this calendar year. And that does mean that our 2026 revenue in HBM should be significantly higher than the 2025 revenue. And in the 2025 revenue, of course, we will have every quarter being higher than the previous quarter.

So it's a pretty good trajectory. We feel very good about the overall business prospects.

Vijay Rakesh

And then on the NAND side, I hear you guys were a little cautious on the NAND side. But as you look at the AI servers, are you seeing a faster pull-through on your QCS versus hit, I guess, as uptick, as you said?

Sumit Sadana

Sorry, I didn't quite hear that question. Can you just repeat, the faster...

Vijay Rakesh

Service side, yes, on the service side. Are you seeing much faster uptake on your QLC SSD?

Sumit Sadana

Yes.

So definitely, the high-capacity SSDs, I mean, some of these are depending on the SKU and performance requirements.

Some of these our QLC based.

Some of these TLC based. And as we get to higher and higher capacities over time, more definitely focused on QLC.

So yes, there is a clear move to higher capacities over time in AI servers. And there is a separate -- just stepping back and looking at the data center, there is a desire from the large hyperscalers to find opportunities to reduce HDD usage over time because HDDs are just so much more difficult in many ways. They're just not able to use the entirety of the capacity because of these large-capacity HDDs have severe limitations in using the part of the platter that's not on the edge.

So there are challenges related to reliability as well, power consumption challenges.

And so if you think about the trajectory of NAND, the density of storage that we can provide through the road map over the next few years, the power consumption benefits, the server consolidation benefits and then you look at the overall TCO in very power-constrained data centers, there will be a substantial desire by more and more customers to minimize the amount of HDDs they have to deploy and that when we get to closer to that tipping point, will become another tailwind for the NAND industry.

And the TCO benefits are very substantial.

So just looking at the per bit cost of NAND and comparing it to the per bit cost of HDDs is not how our customers are looking at it.

And so I think that attempt to dramatically reduced HDDs has already started at the most leading customers.

You have seen some announcements from Pure Storage, and we are suppliers to them. And we are also working directly with the end customers who are wanting to deploy very large-capacity SSDs and remove some of those HDDs from their future infrastructure deployment.

So it's an exciting opportunity. It will take some time to develop, but once it gets going, it will definitely have a snowball effect in terms of deployments.

Operator

And our next question comes from the line of Brian Chin from Stifel.

Brian Chin

Let me ask a few questions. Could you maybe expand a little bit more on what you're seeing in the enterprise SSD market currently? I think customers clearly digested some in fiscal 2Q, but your guidance for fiscal 3Q, I thought stated that data center NAND shipments do improve Q-on-Q.

So are you starting to see that tick up some? And is that helped by Blackwell shipments also beginning to pick up for all the discussion this week?

Sumit Sadana

Sure.

So Brian, at the end of last calendar quarter, which is C Q4 '24, there were some large deals that were being bid upon that caused some customers to purchase SSDs. And those got purchased by multiple customers. And eventually, some of those deals didn't go through in terms of deployment and the cloud companies.

And so there was some inventory at customers for data center SSD across multiple suppliers of data center SSD. And that is part of what was the digestion period in C Q1 as more demand on the AI server side continue to use some of that inventory.

I think in C Q2, much of that would have been depleted. That inventory would be mostly depleted, and the run rates would start to pick up again in terms of ordering patterns.

And so we do expect that as AI server growth continues, data center SSD TAM should start to improve again on a sequential basis, starting from the months ahead and strengthen into the second half of this calendar year versus the first half where there has been some inventory digestion related issues.

Now in Q3, we do expect our data center revenue to hit another record. But I'm talking about all of data center.

We are not parsing out what part of the data center is the record versus a bigger record, smaller record, et cetera.

So we're not really parsing out different aspects of the data center, but we do expect that the aggregate data center revenue will be a record in F Q3.

Brian Chin

Okay. That's helpful. And then maybe a question about sort of the China memory supply that clearly negatively impacted pricing on legacy DDR5 DRAM as well as the NAND kind of in second half last year. There's more consumer bits or bit demand crosses over to DDR5. Are you seeing that immediate supply and pricing risk from China start to tail off given the bigger technology and quality hurdles posed by the more advanced products?

Sumit Sadana

Well, I'll just make a couple of clarifications.

So the supply from Chinese headquarter companies that comes to the market has been mostly in DRAM, DDR4 and LP4 focused for last year.

So the time frame that you are referencing has been more DDR4, LP4 type of supply.

Now as Chinese customers stayed on these older technologies longer, some of the consumer products in China did reduce their -- what would have been DDR5, LP5 consumption because they just stayed with a richer mix of DDR4 LP4 to consume local China supply. And just the general inventory environment that we had been describing over the past many months for both PCs and smartphones for C Q4, Q1 has been impacting the DDR4, DDR5 pricing environment.

And we had mentioned to you that the inventory consumption would be in much healthier place. The inventories will be a much healthier place by spring of 2025. And as we are in that time frame now, we do see that those inventories have become healthier as we had expected. And that is part of why in our F Q3, you have heard us say that our consumer mix has increased because, particularly in smartphones, the orders have bounced back, not just driven by improving inventories and sell-through but also the average capacity is going from 8 -- gigabyte to 12-gigabyte.

So those are some of the dynamics that have been taking shape. The supply in the past months have been from China, mostly DDR4, LP4, where looking ahead, only about 10% of our revenue is exposed to that portion.

So I hope that makes sense.

Brian Chin

Great. And it sounds like -- the tailwind of that question was just that you're seeing less of that direct competitive overlap in DDR5.

Sumit Sadana

Yes. I mean, DDR5 is -- has not been in volume production in the time frame that you had outlined.

So more of the impact in the last couple of quarters has been things other than DDR5 supply from China.

Operator

And our next question comes from the line of Karl Ackerman from BNP Paribas.

Karl Ackerman

I have 2. I'm curious why you believe the industry will ship below end market demand for DRAM and NAND this year given your commentary about shipping below demand but not losing share. I guess does -- should we assume that higher mix of HBM is helping offset some of the competitive dynamics from Chinese players for consumer DRAM and NAND? And I have a follow-up, please.

Sumit Sadana

The industry will ship below demand, I don't believe that's what we have been trying to indicate. What we have said is that our supply growth is going to be less than the demand growth.

Our meaning Micron's, and that's going to result in a reduction in our inventory mechanically.

And so that's what we have been trying to communicate.



So in terms of HBM, of course, as HBM mix has been increasing in the demand because of the trade ratio that is 3:1 now, and as we have described in the prepared remarks, over time, we'll go to past 4 to 1 with HBM4E, those factors do cause the non-HBM portion of the DRAM supply to be constrained and more investments then needed to expand wafer capacity to prevent that portion from getting too constrained. And that's really the dynamic that is playing out on the DRAM side.

So that's the reason why we have said that the DRAM leading edge capacity is constrained in the industry for us. And looking ahead, we expect that the trajectory is going to be healthier driven by ongoing HBM increases and the broadening of the demand drivers beyond just AI that has been driving demand for the last few quarters because other aspects of the demand will start to come back. Smartphones is already improving. And over time, with the Windows -- EOL of Windows 10, Windows PCs, AI PCs will start to improve. Average capacity will start to improve. And at some point, the industrial and automotive inventories will also have improved enough to kickstart that portion of the market.

So we see a broadening of the demand drivers looking ahead and a more constructive environment which gives us optimism about the future.

Karl Ackerman

Got it.

Just as a quick follow-up to that because it's related.

So I suppose if the industry supply is being restrained by overall capital investment and the HBM trade ratio continues to increase, as you've indicated, does capital investment need to increase from this \$14 billion annual rate to support your market share goals on HBM into fiscal '26? And do those 2 factors limit margin upside from a growing mix of HBM sales?

Sumit Sadana

Yes. I mean, we're not obviously giving any CapEx forecast for 2026 right now. We're just in 2025 -- early '25 calendar year.

So we will obviously provide a CapEx guidance later in the year as we approach 2026 fiscal year. But there is no doubt that the growth in HBM, the multiyear growth in HPM and the types of forecasts that our customers are placing on us in terms of the question of HBM that they expect over the years is going to require more HBM capacity. And even that HBM capacity will constrain more and more the non-HBM portion of the industry and will require some level of investment to ensure that the non-HBM portion of the demand, which is obviously the overwhelming majority of the bit demand from a bit perspective at least is non-HBM. And that portion will need to be supplied, and we'll obviously continue to focus on the right balance between the 2.

Manish Bhatia

Karl, just a little color. Sumit, right, we're not providing any guidance on CapEx. But we have announced that we are -- we've broken ground and that we will be adding a second HBM manufacturing facility that will be operational and providing output in 2027.

So there will be investments that will be happening to get us to that point. And that just speaks to the opportunity that we've talked about the north star of a \$100 billion-plus market in 2030. We do have to make HBM specific investments, primarily on the back end, on assembly and test to be able to meet that - the market requirements for the volume growth as well as the technology requirements as HBM grows from HBM3E to HBM4 and then future generations.

But in terms of the spending on core DRAM wafer manufacturing technology and equipment, that's one where we'll continue to be disciplined and continually reacting to market demand in terms -- and the market signals we see in terms of how much the bit supply requirements are.

Operator

And our next question comes from the line of Mehdi Hosseini from SIG.

Mehdi Hosseini

A couple of follow-ups from my end.

The first one is for the team. Sanjay has been talking about how Micron is currently best positioned in terms of competitive advantage. And I want to better understand the underlying assumption, especially as we look at the historical earnings trend back in calendar '18. Micron had the best earning for calendar year '18. Micron was able to recognize more than \$15 of EPS.

So when Sanjay talks about and refers to best competitive positioning, should we assume that the earning opportunities could be double digit, setting a new record? And any color there would be appreciated. And I have a follow-up.

Sumit Sadana

Yes.

So let me start, and I'll ask Mark to jump in as well to add some thoughts.

So in terms of that comment that Sanjay made about Micron's competitive positioning. It's really referring to our product and technology capabilities as it relates to the competition. And we have mentioned to you before that Micron is gaining share in all of the high-margin areas of the industry. And what are those high-margin areas? You look at HBM, Micron is gaining share.

You look at high-capacity DIMMs, we have a super normal share of high-capacity DIMMs, more than our DRAM supply share.

You look at LPDRAM in the data center, very innovative, robust ROI product. That is pioneering achievement by us to be the sole supplier of this and another important product in our portfolio at scale.

When you look at data center SSDs, we have been hitting new record share quarter after quarter, including in the latest reports for C Q4 that came out from analysts and third parties. That again places us at a new record share for that portion of the business.

You look at the mobile products for UFS4 for the higher speeds LP5X automotive products with functional safety features that no one has, automotive and industrial distribution share, which is a larger portion of the profit tools compared to the rather distribution products.

We have significantly higher share than our normalized DRAM supply share.

So we are continuing to drive the portfolio to areas where every large profit pool that is above average, above normal, above the rest of the industry average profit capability.

We have the strongest products in the industry and momentum in terms of share gains in those areas, even while, at an aggregate level, we are maintaining our bit share flat as part of our strategy.

We are gaining share in all these large profit pools.

Now in terms of EPS and operating margins, et cetera, we have spoken about some of the areas where there have been impacts more related to the industry environment.

So there has been a challenging industry environment in NAND, and we spoke about, and we are probably the first company to speak about the 3-pronged strategy that we believe if there is underutilization in the short term, lower CapEx and capacity in the medium term and lengthening of time between nodes in the long term, the industry can get to better health. And we are not just talking about that.

We are doing that actively ourselves and taking the lead in doing that.

Of course, the DRAM industry is in a much better place compared to NAND in terms of balance, health and profitability, and we continue to focus on technology and portfolio there.

And if you then -- I'll just end with a technology view, first in the industry with 1 gamma utilizing EUV for the first time in 1 gamma at a very cost-effective approach.

And so all of those different ways, you can see that as the industry environment improves, particularly in NAND, you will see much better trajectory from us from an operating profit perspective. Mark, do you want to add anything?

Mark Murphy

I would just emphasize what Sumit said, that our financial potential is certainly shaped by the market conditions and state of the industry. And I think on the supply demand -- on the demand side, very encouraging trends with the AI-driven demand. And the GPU ASIC architecture is driving more differentiated memory and very clear demand signals and continued growth as we can see in those markets and content-driven growth in some of the more traditional markets.

So our technology products and manufacturing capability are going to allow us to find the best profit pools, as Sumit mentioned.

On the supply side, also good trends in the case of DRAM, where HBM-driven trade ratio will constrain supply. And we see that on the leading edge, and we're very well positioned there. And then on the NAND side, we've talked about -- quite a bit today about the discipline that we're exhibiting there.

I think finally, in addition to the technology product in manufacturing, we've got a strong balance sheet, which we did some activity this past quarter to provide us additional flexibility and paid down near-term maturities.

So we continue to have the capacity to sustain our leadership and exploit what should be a very good market going forward.

Mehdi Hosseini

And I appreciate all the details. I guess what we're struggling here, given all the secular trends that you detailed here, we're struggling with better understanding the longevity and earning opportunities that these secular trends are offering. Obviously, until the mix increases dramatically, you are susceptible to market condition as we have witnessed in the past quarter. But we're just trying to understand, okay, as the mix increases to include more secular trend as capacity is allocated to higher margin, how is it going to play out in terms of operating profit? Your revenues have already exceeded prior peak with earnings, and sustainability of earnings would also happen. I guess would it be fair to say that we just have to where they see how it plays out? Because there are also variables that holds you back from providing specific targets.

Mark Murphy

Maybe just a comment, Mehdi.

So the mix transformation that's occurring and the value-added content that's being added to certain products, almost a new industry being created, and the combination of these AI demand that we're seeing on HBM and low-power DRAM and so forth. But that will -- that's occurring now, and that's having a positive effect. But the overall industry profitability -- while those products are at a premium, the overall industry inventory levels are still elevated from the severe downturn that occurred.

Now they have been improving. They ticked up a bit in this last quarter. But with volumes being down in DRAM and modest growth in NAND, but the -- but that volume growth continues or resumes. The shipments increased in the third quarter. And as we've said, our inventory levels tied on the leading edge, but our inventory levels overall decrease. And that's why we provide those numbers. Because that's associated, we believe, with more favorable market conditions. And in the case of DRAM, we should be below our target levels of inventory by year-end.

Operator

And this does conclude the question-and-answer session as well as today's program. Thank you, ladies and gentlemen, for your participation.

You may now disconnect. Good day.

