J.P.Morgan

Asia Pacific Equity Research
29 June 2026

Memory Market Update

Our take on Korea's AI mega-investment master plan and recent memory industry developments

Technology - Semiconductors

Jay Kwon [AC]
(82-2) 758-5725
jay.h.kwon@jpmorgan.com
J.P. Morgan Securities (Far East) Limited, Seoul Branch

Sangsik Lee
(82-2) 758 5146
sangsik.lee@jpmorgan.com
J.P. Morgan Securities (Far East) Limited, Seoul Branch

Neelay Y Kamath
(91-22) 6157 3764
neelay.kamath@jpmchase.com
J.P. Morgan India Private Limited

- **Entering the Mega Investment Era.** The Korean government (Presidential office and multiple cabinet members) and major AI ecosystem C-level executives (incl. Samsung/SK group chairmen) attended a national briefing today and shared the long-term AI mega project vision. The Ministry of Trade, Industry and Resources ("MOTIR") announced the "Three Mega Project Plans" establishing 1) semiconductors; 2) AI robotics and physical AI; and 3) AI datacenters as the three major growth pillars (link). The genesis of the investment stems from retaining the current AI leadership (especially in AI semiconductors) and leapfrogging as an AI export country through nurturing and developing various AI-derivative businesses including robotics and AI datacenters. Within the semiconductor business, MOTIR highlighted 3S (Speed + Stronghold + Spearhead) + 1F (Full Support) as growth strategies: 1) Speed: MOTIR expects memory capacity to double in the next five years and pull-forward the advanced Yongyin fab ramp timeline by 7-12 years (From 2045-2047 to 2033-2040); 2) Stronghold: W800T investment in the Southeast region (four fabs in total) and W81T HBM backend fab investment in the Chungcheong region; 3) Spearhead: W30T investment over the next 15 years in R&D and labor to support the pathway from R&D to full production; and lastly 4) Full Support from the government backed by MOTIR. Other investments include fostering Robotics as the next growth engine and W550T investment in AI DC split between two phases (1st phase: 8.4GW and 2nd phase: W10GW investment by 2035).

  - **Samsung Group: W2,655T investment of which W2,100T in semiconductors.** Samsung Group announced a W2,655T investment in Korea (link) and SEC announced a **W2,450T investment throughout 2026-2040 (W2,100T investment in semiconductors)** (link). Combining the two investment announcements, SEC is expected to invest: **1) W1,650T** in Yong-in fab cluster and existing semiconductor fabs; **2) W400T** in Gwangju potentially as a new manfuacturing hub; **3) W56T** in HBM backend packaging line in Cheonan/Onyang; **4) W67T in next-gen display** and micro display in Asan; and **5) <W60trn in physcial AI and humanoid** mass production line in Gumi. Within the Samsung group, other investment includes: SEMCO (Substrate packaging fab in Sejong and MLCC/substrate fab in Busan); Samsung SDS (AI DC buildout in Haenam and Gumi); Samsung C&T (Green energy, power facility, etc. in Honam) and Samsung SDI (Battery factory in Ulsan/Cheonan).
  - **SK Group: W2,100T investment (W1,100T in memory and W1,000T in AI infrastructure).** SK Group explained the role of the datacenter is transistioning from storage to token generation and emphasized AI factory as the next growth engine of the group (link). The SK Group announced to invest **W1,000T in AI infrastructure** equating to 15GW by 2035 split between two phases (1st phase of 5GW ramp split between a mix of 0.5GW/1GW projects and an additional 10GW ramp by 2035). SK Group also announced that it will invest **W1,100T in memory** split between W600T in Yongin (pulling forward the ramp time from 2045 to 2033), W100T in NAND in Cheongju, and W400T for the next semiconductor cluster, potentially in the Southeast region.

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Jay Kwon AC
(82-2) 758-5725
jay.h.kwon@jpmorgan.com

- **JPM view**: W4,755T (or US$3.1T) includes more than a dozen of~400k WSPM fab investments on a scale which is 2x that of the current installed DRAM WSPM capacity, implying the pace of building 1mn additional DRAM capacity (from 1H16-1H26) will be multiple times faster than in the past after the tipping point in late-2020s. Within the US$3.1T long-term investment plan, we estimate 60-70% to be allocated to front-end wafer equipment spending, 20-30% for infrastructure and cleanroom construction, and the rest for back-end packaging facilities. We expect to hear more details on specific timelines for investment (fab and investment plan in multiple stages and timeline) in the upcoming result season and follow-up corporate events.

Table 1: Investment details by company/group

Related companies	Location	Investment amount	Category	Investment details
SEC	Yongin	W1,650T	Semiconductor	expected completion of Yongin semiconductor cluster by 2040, advancing by 7 years
	Gwangju	W400T	Semiconductor	construction of a new semiconductor fab and creation of innovation hub based on digital twin technology
	Cheonan /Onyang	W56T	HBM / advanced packaging	HBM fab investment, focusing on HBM capacity and backend packaging capabilities
	Gumi	<W60T	Humanoids / robotics	construction of innovation hub with mass-production lines for physical AI and humanoid robots
SEMCO	Busan/Sejong	<W625T	ABF substrate/packaging	investments in advanced package subtrate line for AI servers
Samsung SDS	Haenam/Gumi		AI data center	AIDC construction to serve as the govt. headquarter for public AI transformation
Samsung SDI	Ulsan/Cheonan		Battery/energy storage	increasing investment in next-generation solid=state batteries and batteries for BESS
Samsung Engineering	Geoje		Shipbuilding	investment in shipbuilding base for high-value-added vessels
Samsung C&T	Southwest region		Solar energy	investment for building solar energy construction / nuclear energy-based hydrogen production facilities
Samsung Display	Asan		Display	construction of production base for ultra-high resolution micro displays - used for foldable smartphones
SK Group	Ulsan	W1,100T	AI infrastructure/data center	1st phase: 5GW built in regions where SK has secured power and land
	TBD			2nd phase: additional 10GW by 2035, with AIDC functioning as token factories
	Yongin	W600T	Semiconductor	construction of fourth fab by 2033, ramping by 12 years
	Cheongju	W100T	Semiconductor (NAND)	expansion of its NAND flash production line
	TBD, likely Southwest	W400T	Semiconductor	capital allocation for the fab sit sourcing, fosucing on sufficient land, utility resources, electricity, labor

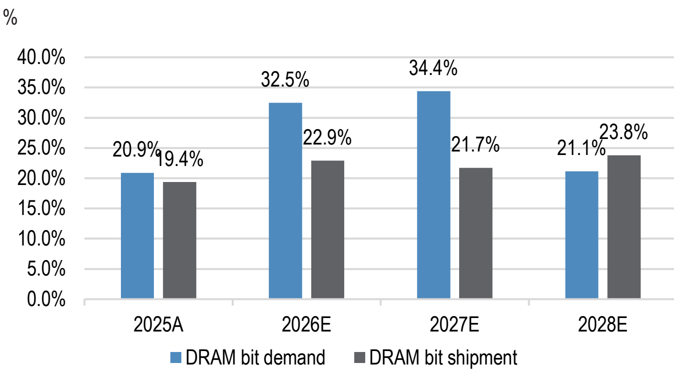
Source: MOTIR, SK Group, Samsung Group

- **How should we interpret the US$3T investment plan?** Investment plan timeline is far out (through 2040E/2033E each by Samsung/SK group) and we believe the actual capacity buildout execution is largely subjective to industry S-D by the nature of the memory industry cycle. Nevertheless, the magnitude and commitment shown by the two conglomerates and the Korean government underpin their ultra long-term vision and growth strategy. Two key words that stood out to us were <u>shortage</u> and <u>competition</u>. Memory industry senior executives mentioned multiple times officially that supply sufficiency is only half relative to the demand and foresees it worsening in coming years. That said, the two chairmen's commentary sounded like a decisive message to debottleneck the supply shortage to fulfill customer demand and avoid potential demand disruption, which is the centerpiece of current market debate on memory (i.e. Memory value share in AI capex race is too high). We also read it as a Korean Memory Inc's determined message to maintain the market leadership amidst growing competition. Underlying AI computation-related memory demand remains substantial and we have identified a more than multi-year up-cycle view from the chairmen's message. This should be a **long-term positive** for **SPE**, **Power Infrastructure**, and **Semi EPC** (Engineering, Procurement, and Construction) suppliers. We like **SK Inc** and **Samsung C&T** from a Semi ECP operation standpoint. Depending on the stage of the cycle, capex acceleration can be interpreted as either positive (early to mid-cycle) or negative (mid-peak cycle). While today's market reaction was negative for Korean memory makers, we believe **mid-to-long term shares are risk-reward favorable** as a US$3T investment could eventually return accumulated US$12-20trn (using 15%-25% capital intensity) revenue opportunity (vs. Korean memory makers' accumulated revenue in the last 20 years; 2006-2025; at US$1.2trn).
- **Apple-MU dispute highlights where memory sentiment is at right now: the market views the skewed profit sharing as a risk.** Recent reports (link) featuring the dispute between Apple (OW, covered by Samik Chaterjee) and MU (OW, covered by Harlan Sur) regarding unprecedented price rises in a short amount of time highlight the precarious memory related sentiment engulfing the world right now. Suppliers argue that customers

Jay Kwon AC
(82-2) 758-5725
jay.h.kwon@jpmorgan.com

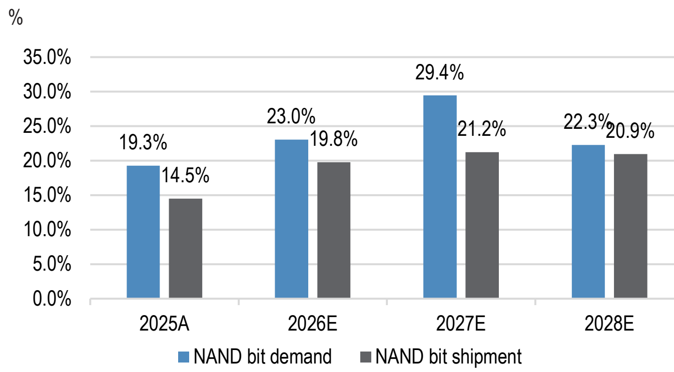
were unfair with prices during a downcycle while customers argue that suppliers reigned in supply on purpose to squeeze out higher profit margins. We believe that this skewed profit sharing agreement, currently in favor of the memory makers, is being viewed by the market as unsustainable in nature. We believe that given the rising BOM impact of souring memory prices, Consumer Electronics brands will have greater challenges in procuring the required memory going forward. Despite the Chinese DRAM memory maker's intent to do major capex, we believe the additional supply falls well short of demand due to the S/D imbalance. Therefore, even if U.S. consumer electronics brands seek to source memory chips from Chinese suppliers, it is uncertain if they will be able to source enough volume. We expect AI and server compute centric memory demand bipolarization trend to continue in 2H26E-2027E, which is likely to result in favorable pricing trend for LPDDR memory.

Figure 1: DRAM bit demand vs bit supply



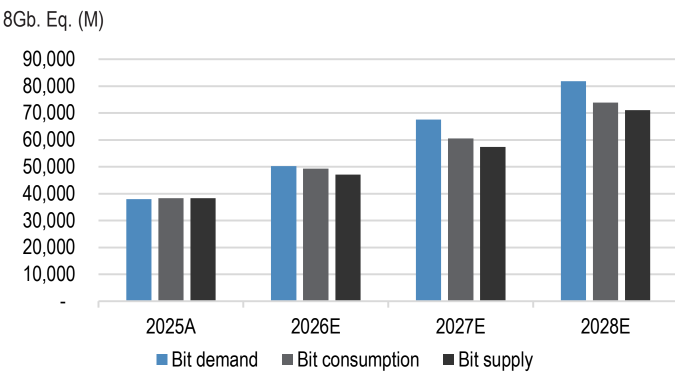
Source: OMDIA, Company data, J.P. Morgan estimates.

Figure 2: NAND bit demand vs bit supply



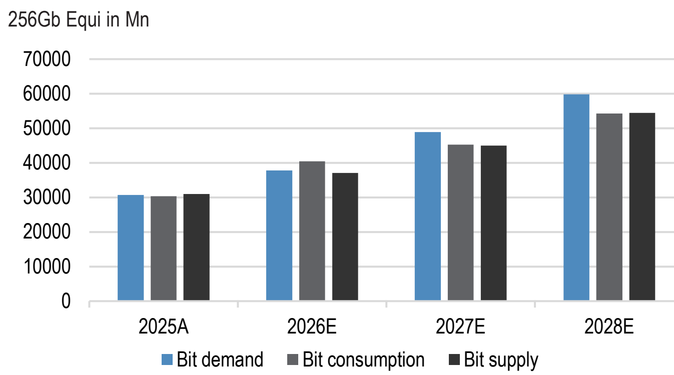
Source: OMDIA, Company data, J.P. Morgan estimates.

Figure 3: DRAM bit demand vs bit consumption vs bit supply in absolute terms



Source: OMDIA, Company data, J.P. Morgan estimates.

Figure 4: NAND bit demand vs bit consumption vs bit supply in absolute terms

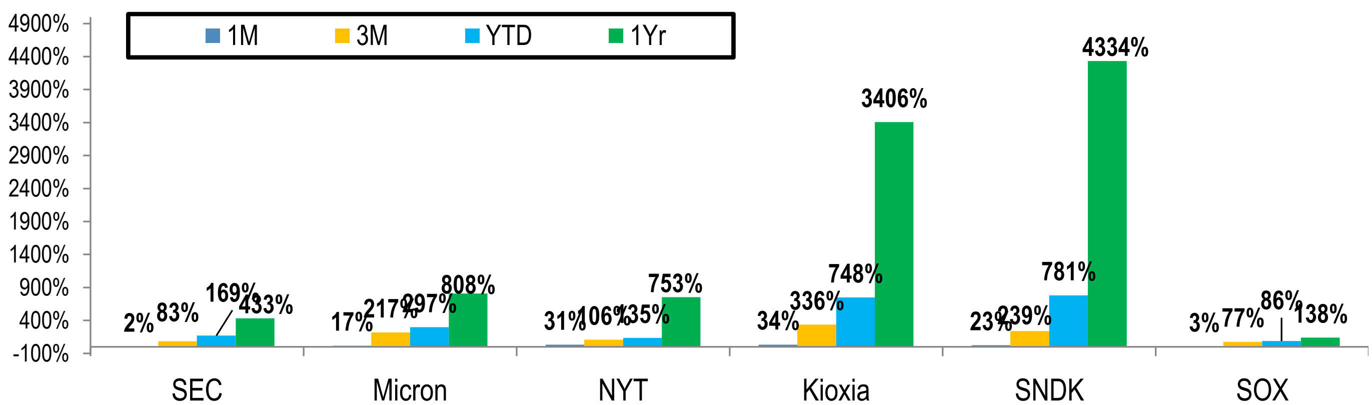


Source: OMDIA, Company data, J.P. Morgan estimates.

- **A class-action lawsuit has been filed against memory suppliers over potential allegations of collusion and price-fixing.** In response to historically high memory prices, consumers have filed a private class-action lawsuit in the US (link) against the three big DRAM manufacturers, arguing that these companies gouged prices by artificially creating shortages in the industry. We would like to highlight that while this is a recurring pattern due to the memory market's oligopoly market structure, the class action is at the consumer level with government investigation not involved at the moment. However, given the unprecedented price rises and given memory's rising importance as a strategic asset, we woud closely monitor the situation for a potential update. Looking back at history, the early-2000s DRAM cartel is the strongest precedent, as it produced admissions of guilt, not just allegations, with major manufacturers paying millions in criminal fines and executives serving jail time. This was followed by a consumer civil settlement in 2006 to compensate consumers who overpaid for DRAM products. We would also like to highlight the 2016-17 supply restriction claim which structurally resembles the present lawsuit, however, that civil case never produced any findings of guilt the way the early 2000s criminal case did.

Figure 5: Global memory makers' share price performance including SOX (Philadelphia Semiconductor index)

%



Source: Bloomberg Finance L.P. Note: Past performance is not an indicator of future results.

Jay Kwon [AC]
(82-2) 758-5725
jay.h.kwon@jpmorgan.com

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Jay Kwon [AC]
(82-2) 758-5725
jay.h.kwon@jpmorgan.com

Samsung C&T (028260.KS, 028260 KS) Price Chart

Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends.
Initiated coverage Apr 08, 2015. All share prices are as of market close on the previous business day.

Date	Rating	Price (W)	Price Target (W)
01-Feb-24	OW	138000	170,000
01-Aug-24	OW	155300	185,000
23-Jan-25	N	122600	140,000
05-Jun-25	OW	157800	205,000
29-Oct-25	OW	208500	260,000
19-Jan-26	OW	289500	370,000
21-May-26	OW	375500	570,000

SK Inc (034730.KS, 034730 KS) Price Chart

Source: Bloomberg Finance L.P. and J.P. Morgan; price data adjusted for stock splits and dividends.
Initiated coverage Apr 06, 2015. All share prices are as of market close on the previous business day.

Date	Rating	Price (W)	Price Target (W)
26-Nov-23	OW	160700	200,000
28-Feb-25	N	149500	160,000
05-Jun-25	OW	180700	230,000
05-Jan-26	OW	260000	350,000
21-May-26	OW	532000	870,000

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Jay Kwon AC
(82-2) 758-5725
jay.h.kwon@jpmorgan.com

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Jay Kwon [AC]
(82-2) 758-5725
jay.h.kwon@jpmorgan.com

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Jay Kwon [AC]
(82-2) 758-5725
jay.h.kwon@jpmorgan.com

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Completed 29 Jun 2026 07:18 PM HKT Disseminated 29 Jun 2026 07:18 PM HKT