

Press Release

KIOXIA and Western Digital Announce 6th-Generation 3D Flash Memory

Innovations in Scaling and CMOS Placement Deliver the Companies' Highest Density and Most Advanced 3D Flash Memory Technology to Date

Düsseldorf, Germany, 22. February 2021 – KIOXIA Corporation and Western Digital Corp. (NASDAQ: WDC), announced that the companies have developed their sixth-generation, 162-layer 3D flash memory technology. Marking the next milestone in the companies' 20-year joint-venture partnership, this is the companies' highest density and most advanced 3D flash memory technology to date, utilizing a wide range of technology and manufacturing innovations.

“Through our strong partnership that has spanned two decades, KIOXIA and Western Digital have successfully created unrivaled capabilities in manufacturing and R&D,” said Masaki Momodomi, Chief Technology Officer, KIOXIA. “Together, we produce over 30 percent¹ of the world's flash memory bits and are steadfast in our mission to provide exceptional capacity, performance and reliability at a compelling cost. We each deliver this value proposition across a range of data-centric applications from personal electronics to data centers as well as emerging applications enabled by 5G networks, artificial intelligence and autonomous systems.”

Beyond Vertical Scaling – New Architecture Leverages New Innovations

“As Moore's Law reaches its physical limits across the semiconductor industry, there's one place where Moore's Law continues its relevancy — that's in flash,” said Dr. Siva Sivaram, President of Technology & Strategy, Western Digital. “To continue these advances and meet the world's growing data demands, a new approach to 3D flash memory scaling is critical. With this new generation, KIOXIA and Western Digital are introducing innovations in vertical as well as lateral scaling to achieve greater capacity in a smaller die with fewer layers. This innovation ultimately delivers the performance, reliability and cost that customers need.”

This sixth-generation 3D flash memory features advanced architecture beyond conventional eight-stagger memory hole array and achieves up to 10 percent greater lateral cell array density compared to the fifth-generation technology. This lateral scaling advancement, in combination with 162 layers of stacked vertical memory, enables a 40 percent reduction in die size compared to the 112-layer stacking technology, optimizing cost.

The KIOXIA and Western Digital teams also applied Circuit Under Array CMOS placement and four-plane operation, which together deliver nearly 2.4 times improvement in program performance and 10 percent improvement in read latency compared to the previous generation. I/O performance also improves by 66 percent,

enabling the next-generation interface to support the ever-increasing need for faster transfer rates.

Overall, the new 3D flash memory technology reduces the cost per bit, as well as increases the manufactured bits per wafer by 70 percent, compared with the previous generation. KIOXIA and Western Digital continue to drive innovation to ensure continued scaling to meet the needs of customers and their diverse applications.

The companies detailed the related innovations in a joint presentation at the [ISSCC 2021](#) show earlier today.

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About KIOXIA

KIOXIA is a world leader in memory solutions, dedicated to the development, production and sale of flash memory and solid-state drives (SSDs). In April 2017, its predecessor Toshiba Memory was spun off from Toshiba Corporation, the company that invented NAND flash memory in 1987. KIOXIA is committed to uplifting the world with memory by offering products, services and systems that create choice for customers and memory-based value for society. KIOXIA's innovative 3D flash memory technology, BiCS FLASH, is shaping the future of storage in high-density applications, including advanced smartphones, PCs, SSDs, automotive and data centers.

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About Western Digital

Western Digital creates environments for data to thrive. As a leader in data infrastructure, the company is driving the innovation needed to help customers capture, preserve, access and transform an ever-increasing diversity of data. Everywhere data lives, from advanced data centers to mobile sensors to personal devices, our industry-leading solutions deliver the possibilities of data. Our data-centric solutions are comprised of the Western Digital®, G-Technology™, SanDisk®, and WD® brands.

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¹Source: As of February 18, 2021. KIOXIA survey.

Forward-Looking Statements

This news release contains certain forward-looking statements, including the expected availability, benefits and performance of BiCS6 3D flash memory technology. There are a number of risks and uncertainties that may cause these forward-looking statements to be inaccurate including, among others: future responses to and effects of the COVID-19 pandemic; volatility in global economic conditions; impact of business and market conditions; impact of

competitive products and pricing; development and introduction of products based on new technologies and expansion into new data storage markets; risks associated with cost saving initiatives, restructurings, acquisitions, divestitures, mergers, joint ventures and strategic relationships; difficulties or delays in manufacturing or other supply chain disruptions; hiring and retention of key employees; high level of debt and other financial obligations; changes to relationships with key customers; disruptions in operations from cyber-attacks or other system security risks; actions by competitors; risks associated with compliance with changing legal and regulatory requirements and the outcome of legal proceedings; and other risks and uncertainties listed in Western Digital's filings with the Securities and Exchange Commission (the "SEC"), including Western Digital's Form 10-K filed with the SEC on August 28, 2020, to which your attention is directed. You should not place undue reliance on these forward-looking statements, which speak only as of the date hereof, and neither Western Digital nor Kioxia undertakes any obligation to update these forward-looking statements to reflect subsequent events or circumstances.

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