

Toshiba Takes NAND Flash Memory to 4Gb Level

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Toshiba America Electronic Components, Inc. (TAEC)*, and its parent Toshiba Corp. (Toshiba), reinforcing the company's leadership in the development and fabrication of powerful, high capacity NAND flash memory, today introduced the semiconductor industry's first 4-gigabit (Gb) single-die, multi-level cell (MLC), NAND flash memory. Toshiba also announced an 8Gb NAND flash memory IC (TH58NVG3D4BFT00) that stacks two of the 4Gb NAND flash memories in a single package.

Fabricated with 90-nanometer (nm) process technology, the new chip offers double the capacity of Toshiba's present largest single-die NAND flash memory, and will realize higher capacity flash memory cards capable of supporting a wide range of applications. The new 4Gb NAND flash memory enables faster write performance by implementing advanced design concept and adjusting the control system of the memory cell. Samples of the new 4Gb NAND flash memory, TC58NVG2D4BFT00, will be available in April at a unit price of \$113.00 and mass production is expected to begin in the third quarter of 2004 at a monthly capacity of 300,000 units.

The new 8Gb device is achieved by stacking the new 4Gb NAND flash memories in a single TSOP (Thin Small Outline Package), opening the way to more powerful applications that enhance the performance of digital consumer electronic devices while supporting their miniaturization. Further, Toshiba plans to introduce a sample of 16Gb NAND flash memory IC that stacks four of the 4Gb NAND flash

memories in a single package in the third quarter of 2004.

NAND flash memory offers high density, non-volatile data retention and is widely employed in flash memory cards and as embedded memory in digital consumer products, such as digital still cameras, PDAs, and multifunction cell phones. With the introduction of the new devices, Toshiba's NAND flash memory component line-up will range from 128-megabit to 8Gb (stacked version) devices.

The 4Gb NAND flash memory was developed by Toshiba and SanDisk Corporation, under their 1999 comprehensive agreement on joint development of NAND flash memory. The new chips will be produced with 90nm process technology at the NAND flash facility at Toshiba's Yokkaichi Operations in Japan, which is operated by Flash Vision Japan, the joint venture between Toshiba and SanDisk. Yokkaichi Operations is also the site of the new 300mm wafer fabrication facility that Toshiba will start construction this month in order to meet fast growing demand of NAND flash memory. Mass production of NAND flash memory at the 300mm fab in Yokkaichi is expected to start in the second half of 2005.

Commenting on the new NAND flash memory chips, Shozo Saito, technology executive of Toshiba's semiconductor company, said "Toshiba and SanDisk have responded to the diversifying market demands with a close collaboration dedicated to developing high capacity NAND flash memory. The multi-level cell was developed in response to customer demands for higher storage capacity to enable more competitive price points. With the introduction of the new 4Gb and 8Gb NAND flash memories, Toshiba will further leverage its leadership in the NAND flash market."

"Toshiba understands the cost/performance challenges in the consumer electronics marketplace. Our new 4Gb and 8Gb MLC NAND will

continue to provide a cost competitive data storage solution to meet the performance requirements of a wide variety of applications including digital photography, digital video, USB Flash Drives, MP3 players, personal digital assistants (PDAs), and other digital consumer electronics devices," said Scott Nelson, business development director, NAND Flash for Toshiba America Electronic Components, Inc.

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