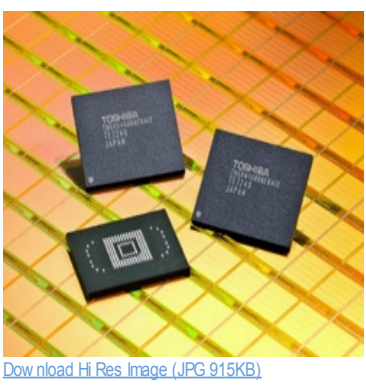
TOSHIBA LAUNCHES LARGEST DENSITY EMBEDDED NAND FLASH MEMORY DEVICES

eMMC and eSD Embedded Memories Combine Up To 32GB NAND and Controller in a Single Package



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IRVINE, Calif., and TOKYO, August 7, 2008 — Toshiba Corp. (Toshiba) and Toshiba America Electronic Components, Inc. (TAEC)*, its subsidiary in the Americas, today announced the launch of 32GB[1] embedded NAND flash memory devices that offer the largest density yet announced[2] plus full compliance with the eMMC™ and eSD™ standards. The embedded devices are designed for application in digital consumer products, including mobile phones, video cameras, HDTV, personal navigation devices, POS terminals, printers, and set-top boxes. Samples will be available in September 2008, and mass production will start in the fourth quarter.

The new 32GB embedded devices combine eight 32Gbit (= 4GB) NAND chips fabricated with Toshiba's cutting-edge 43nm process technology and also integrate a dedicated controller. Full compliance with JEDEC/MMCA Ver. 4.3 and SDA Ver. 2.0 high-speed memory standards for memory cards as defined by the MultiMediaCard Association and SD Card Association, respectively, supports standard interfacing and simplified embedding in products, reducing development burdens on product manufacturers.

Toshiba offers a line-up of single-package embedded NAND Flash memories which include a controller to manage basic control functions for NAND applications: LBA-NAND™ memory, which has a NAND interface; eSD large capacity chips with SD interface; and eMMC with an HS-MMC interface. This comprehensive line-up, available in densities ranging from 1GB to 32GB, supports applications in a very wide range of products.

There is growing demand for memories with a controller function that minimizes development requirements and eases integration into system designs. Toshiba has already taken steps to secure leadership in this expanding market, and the addition of higher density modules will reinforce the company's position.

New Product Lineup:

eMMC

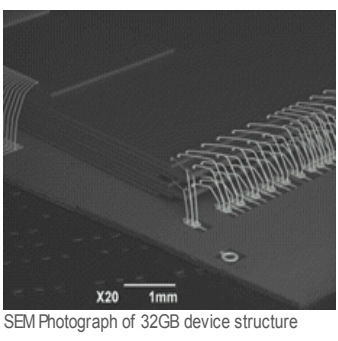
Product Number	Capacity	Package	Sample Shipment	Mass Production	Production Scale
THGBM1G8D8EBAI2	32GB	169Ball FBGA 14x18x1.4mm	Oct., 08	4Q, 08 (Oct.~Dec.)	1 million/ month (Total)
THGBM1G7D8EBAI0	16GB	169Ball FBGA 12x18x1.4mm	Sept., 08	4Q, 08 (Oct.~Dec.)	
THGBM1G7D4EBAI2	16GB	169Ball FBGA 14x18x1.4mm	4Q, 08 (Oct.~Dec.)	4Q, 08 (Oct.~Dec.)	
THGBM1G6D4EBAI4	8GB	169Ball FBGA 12x18x1.3mm	Sept., 08	4Q, 08 (Oct.~Dec.)	
THGBM1G5D2EBAI7	4GB	169Ball FBGA 12x16x1.3mm	Sept., 08	4Q, 08 (Oct.~Dec.)	
THGBM1G4D1EBAI7	2GB	169Ball FBGA 12x16x1.3mm	4Q, 08 (Oct.~Dec.)	1Q, 09 (Jan. – Mar.)	
THGBM1G3D1EBAI8	1GB	169Ball FBGA 11.5x13x1.2mm	4Q, 08 (Oct.~Dec.)	1Q, 09 (Jan. – Mar.)	

eSD

Product Number	Capacity	Package	Sample Shipment	Mass Production	Production Scale
THGVS4G8D8EBAI2	32GB	169Ball FBGA 14x18x1.4mm	Sept., 08	4Q, 08 (Oct.~Dec.)	500K/ month (Total)
THGVS4G7D8EBAI0	16GB	169Ball FBGA 12x18x1.4mm	Sept., 08	4Q, 08 (Oct.~Dec.)	
THGVS4G7D4EBAI2	16GB	169Ball FBGA 14x18x1.4mm	4Q, 08 (Oct.~Dec.)	4Q, 08 (Oct.~Dec.)	
THGVS4G6D4EBAI4	8GB	169Ball FBGA 12x18x1.3mm	Sept., 08	4Q, 08 (Oct.~Dec.)	
THGVS4G5D2EBAI4	4GB	169Ball FBGA 12x18x1.3mm	4Q, 08 (Oct.~Dec.)	4Q, 08 (Oct.~Dec.)	
THGVS4G4D1EBAI4	2GB	169Ball FBGA 12x18x1.3mm	4Q, 08 (Oct.~Dec.)	1Q, 09 (Jan. – Mar.)	
THGVS4G3D1EBAI8	1GB	169Ball FBGA 11.5x13x1.2mm	1Q, 09 (Jan. – Mar.)	1Q, 09 (Jan. – Mar.)	

Key Features

- The integrated controller, compliant with JEDEC/MMCA Ver. 4.3 and SDA Ver. 2.0, handles essential functions, including writing block management, error correction (ECC) and driver software. It simplifies system development, allowing manufacturers to minimize development costs and to improve time to market for new and upgraded products.
- A wide product line-up supports capacities from 1 to 32GB. The high-capacity 32GB device can record up to 560 hours of data at a bit rate of 128Kbps[3] and can record[4] hours of full spec high definition video and 7.3 hours of standard definition video 4.
- The 32GB device stacks eight 32Gbit (=4GB) chips fabricated with leading-edge 43nm process technology.



SEM Photograph of 32GB device structure

Specifications eMMC

Interface	JEDEC/MMCA Ver. 4.3 standard HS-MMC interface
Power Supply Voltage	2.7 to 3.6V(memory core)/ 1.7V to 1.95V (interface)
Bus width	x1 / x4 / x8
Writing Speed	Target 10 MB per sec/ minimum (Sequential Mode) Target 18 MB per sec/ minimum (Sequential/Interleave Mode)**
Reading Speed	Target 20 MB per sec/minimum (Sequential Mode)
Temperature	-25 degrees to +85 degrees Celsius
Package	153Ball FBGA (+16 support Ball)

***Available only for THGBM1G8D8EBAI2 and THGBM1G7D4ERBAI2*

Specifications eSD

Interface	SDA Ver. 2.0 standard SD interface
Power Supply Voltage	2.7 to 3.6V
Bus width	x1 / x4
Writing Speed	SDA Standard Class 4
Reading Speed	SDA standard Class 4
Temperature	-25 degrees to +85 degrees Celsius
Package	153Ball FBGA (+16 support Ball)

***About Toshiba Corp. and TAEC**

Through proven commitment, lasting relationships and advanced, reliable electronic components, Toshiba enables its customers to create market-leading designs. Toshiba is the heartbeat within product breakthroughs from OEMs, ODMs, CMs, distributions and fabless chip companies worldwide. A committed electronic components leader, Toshiba designs and manufactures high-quality flash memory-based storage solutions, discrete devices, displays, advanced materials, medical tubes, custom SoCs/ASICs, digital multimedia and imaging products, microcontrollers and wireless components that make possible today's leading cell phones, MP3 players, cameras, medical devices, automotive electronics and more.

Toshiba America Electronic Components, Inc. is an independent operating company owned by Toshiba America, Inc., a subsidiary of Toshiba Corporation, Japan 's largest semiconductor manufacturer and the world's third largest semiconductor manufacturer (Gartner, 2007 WW Semiconductor Revenue, April 2008). For additional company and product information, please visit http://www.toshiba.com/taec/.

[1] When used herein in relation to memory density, gigabyte and/or GB means 1,024x1,024x1,024 = 1,073,741,824 bytes. Usable capacity may be less. For details, please refer to specifications.

[2] As of the date of this announcement.

[3] For purposes of measuring data transfer rate in this context, 1 kilobit = 1,000 bits.

[4] HD and SD video are calculated at mean bit rates of 17 Mbps and 9 Mbps, respectively.

Information in this press release, including product pricing and specifications, content of services and contact information, is current and believed to be accurate on the date of the announcement, but is subject to change without prior notice. Technical and application information contained here is subject to the most recent applicable Toshiba product specifications. In developing designs, please ensure that Toshiba products are used within specified operating ranges as set forth in the most recent Toshiba product specifications and the information set forth in Toshiba's "Handling Guide for Semiconductor Devices," or "Toshiba Semiconductor Reliability Handbook." This information is available at chips.toshiba.com or from your TAEC representative.

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