Toshiba Produces Worlds First 0.25-Micron Embedded DRAM ASIC for Pixelworks' ImageProcessor

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— SLI ASICs are Now a Reality —

San Jose, Calif., December 17, 1998—Toshiba America Electronic Components, Inc. (TAEC) today announced that it is in production with the world's first 0.25-micron (m m) system-level integration (SLI) ASIC with embedded DRAM (which TAEC calls dRAMASIC™). This dRAMASIC was designed for Pixelworksä , Inc.'s new PW364 ImageProcessor, a powerful, feature-rich flat panel display (FPD) controller on a single chip which will be used in FPD products, including LCD monitors, LCD projectors and plasma display panels.

Developed using Toshiba's Timing-Driven Flow (TDF) methodology, the dRAMASIC boasts more than half a million gates of random logic, a 32 megabit (Mb) SDRAM core, an on-board integrated 16-bit processor, and runs up to 133 megahertz (MHz). In addition to being the first 0.25m m dRAMASIC, this is also the first time that this much DRAM has been built into an ASIC.

"Embedded DRAM is an excellent solution for a growing number of applications requiring high performance supported by high bandwidth memory operation. Our dRAMASIC technology offers the flexibility to configure the memory to meet the specific requirements of a given application," said David Barringer, vice president of SLI business development at TAEC. "Toshiba's 0.25m m dRAMASIC technology will clearly lead the way for implementation of application-specific system IC solutions in numerous applications, such as graphics controllers, network hubs and switches, set-top boxes, printers, and personal digital assistants, and is expected to dominate the market in terms of high growth."

"Our Timing-Driven Flow enabled us to cut the number of engineering change orders (ECOs) significantly," noted Jeff Berkman, vice president of SLI engineering for TAEC. "A design like this would typically require seven to ten ECOs, but we were able to limit the number to three minor ECO spins, saving several months in the process. The Pixelworks IC can operate up to 20 percent faster than originally specified due to TDF design efficiencies. TDF is part of our commitment to help our SLI customers get their products to market quickly and cost-effectively."

"We couldn't have asked for a better partner on this project, nor for a better outcome," said Michael West, vice president of technology at Pixelworks. "This was a high-risk project, which required the kind of worldwide team support and system level integration expertise that few companies other than Toshiba could provide. The fact that the product worked at first silicon tells us that we clearly chose the right supplier."

Added Robert Greenberg, Pixelworks' vice president of product development, "We needed someone who could assemble a team immediately, ramp up fast and help us take advantage of an explosive market. Toshiba helped us get to market faster, increase the performance of our product and deliver a system-level-integration chip. Our customers are amazed that we were able to do all of this while reducing the system design from eight chips to one."

The Pixelworks chip also benefits from some of the unique aspects of Toshiba's packaging. Housed in a low-cost tape ball grid array (TBGA) package with excellent thermal and electrical characteristics, the dRAMASIC also features ultra-low power consumption which allows the PW364 to run much cooler than most other graphic chips, and eliminates the need for thermal heatsinks.

The PW364 ImageProcessor is a breakthrough in display controller technology for flat panel display products that will accelerate the adoption of products using the increasingly popular flat panel technology. The PW364 ImageProcessor IC, the company's initial product, is the first time an integrated, flat panel display controller is contained on a single chip replacing several discrete components, meaning dramatically lower overall electronics and hence product cost. By supporting input resolutions up to UXGA and HDTV with complete image resizing, frame rate conversion, and automatic image optimization, display products using the PW364 will set new standards for image quality and ease of use. With their system-level integration and complete design environment, Pixelworks ImageProcessors mean the fastest time to market for display product manufacturers; a compelling benefit in this hyper-paced product development environment.

"We have now made SLI a reality," emphasized Dave Barringer. "We're delighted to have been chosen by Pixelworks for a project this critical. Combining our 0.25m m dRAMASIC process, TDF, and manufacturing expertise with Pixelworks' excellent designs has resulted in a product that actually exceeds the predicted models for speed, performance, and power conservation."

About Pixelworks, Inc.
Pixelworks Inc., headquartered in Tualatin, Oregon is a privately held fabless semiconductor company founded in 1997. The company has core capabilities in the development, marketing, and sales of integrated circuits incorporating image processing, high-speed digital design, and mixed-signal processing. Pixelworks' mission is to enable broad adoption of flat panel display products through the development and sales of critical integrated circuit components resulting in display products that deliver unsurpassed image quality, automatically, at the lowest cost.

For more information about Pixelworks, call 503-612-6700 or visit the company's Web site at http://www.pixelworksinc.com

About TAEC
Toshiba America Electronic Components, Inc. (TAEC) is the North American design, manufacturing, marketing and sales arm of Toshiba Corporation, one of the world's largest suppliers of semiconductors, integrated circuits and electronic components. TAEC offers one of the broadest IC product lines in the industry as well as technologically-advanced electron tubes and solid state devices, including color picture tubes, color display tubes, liquid crystal displays, rechargeable batteries, microwave components, laser diodes and optical transmission devices. In addition to its comprehensive offering of high quality components, the company markets a wide range of industry-standard 2.5-inch hard drives, CD-ROM drives and DVD-ROM

drives.

The Systems IC Division is located at 1060 Rincon Circle, San Jose, CA 95131. For more company information, please visit TAEC's Internet home page at:

http://www.toshiba.com/taec.