Chipmakers Break Low k Barrier, Take Leap Forward to Drive Next-Generation Electronics Using Applied Black Diamond

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SAN FRANCISCO--(BUSINESS WIRE)--Feb. 4, 2004--Key semiconductor designers, manufacturers and Applied Materials, Inc. today mark the beginning of the Low k Era in chipmaking. Semiconductor companies Agere Systems, Altera Corp., AMD, ATI Technologies, LSI Logic, NEC and Toshiba, and semiconductor foundry TSMC, are utilizing Applied Materials' Black Diamond(R) low k film to manufacture some of the world's most advanced chips.

To date, more than 40 million chips use the Black Diamond film to power the latest mobile electronics, high-speed game consoles, networking systems and computers just entering the market. Breakthrough products featuring these new low k chips will be showcased at a celebratory event in San Francisco this afternoon.

New cutting-edge devices use low k dielectrics as an insulation material that allows smaller, tightly spaced interconnect wires to move electronic signals through the device at multi-gigahertz speeds. Low k enhances speed gains and offers the critical advantages of reduced power consumption with lower crosstalk for heightened performance.

"The transition to low k is a huge breakthrough for the industry, enabling chipmakers to deliver higher performance, lower power and innovative features at lower costs," said Mike Splinter, president and chief executive officer of Applied Materials. "This milestone achievement has required a new level of collaboration, drawing on expertise in process, design, and packaging from many world-class chipmakers to bring this technology to volume production. Applied Materials is honored to be part of this breakthrough, working together with customers who have helped to break the low k barrier and extend Moore's Law. "

Proving that the low k era is now a reality, TSMC has implemented the material in its 130 nanometer (nm) and 90nm processes, which have been used to manufacture more than 40 low k chip designs for leading chipmakers. Among the designs are lightning-fast chips such as LSI Logic's high-performance ASICs and RapidChip(TM) Platform ASICs designed with the company's Gflx 110nm process technology, and ATI's RADEON(TM) 9600XT and MOBILITY(TM) RADEON(TM) 9700 graphics accelerators that deliver best-in-class gaming performance while keeping power consumption to a minimum.

TSMC-manufactured designs also include Agere's DSP16411 chip that offers enhanced performance and low power for wireless communications, and Altera's new Stratix II FPGA family. Low k benefits the Stratix II family's ability to deliver on performance, while striking a balance with the power considerations at 90nm. The Stratix II FPGA family supports high-bandwidth applications including high-end chip rate processing in cellular base stations, data processing on high performance line cards used in a broad range of routers and edge switchers, and Voice over IP (VoIP) solutions gateways, to name a few.

The benefits of low k are also demonstrated in AMD's 64-bit processors, including the AMD Opteron(TM) and AMD Athlon(TM) 64 microprocessors, whose advanced performance powers some of the world's fastest and most demanding servers, supercomputers, and desktop and notebook PCs.

For mobile electronics such as laptop computers, PDAs, digital cameras and cell phones, low k provides the advantage of reduced power consumption for extended battery life. Toshiba has achieved up to a 50 percent reduction in power consumption for its TC300 family of ASICs through a combination of optimized design and incorporation of low k films, leading to far longer mobile usage between battery charges. NEC tapped low k to enable packing 100 million transistors and nine levels of copper layers into its most advanced UX6 chip family.

Ongoing development and collaboration by chipmakers worldwide have successfully overcome the daunting challenges of implementing low k technology. Teamwork, perseverance, and innovation have paid off as these top semiconductor companies rapidly gain a unique market advantage--using low k technology in a broad spectrum of products that have the potential to change the way consumers work, communicate, and play.

Applied Materials (Nasdaq:AMAT) is the largest supplier of products and services to the global semiconductor industry. Applied Materials' web site is www.appliedmaterials.com.

Agere Systems. "As a result of the performance improvements made possible by the low k technology successfully implemented at TSMC, our new DSP16411 is 20 percent faster and consumes 20 percent less power than competing devices," said Steven Hillenius, director of integrated circuit technology for Agere Systems. "Our position as No. 1 supplier of DSPs for wireless infrastructure will be enhanced as our customers and end users benefit from this important technology breakthrough with better wireless equipment and ultimately better service at lower total cost."

Altera Corp. "This week, Altera marks another industry milestone with the launch of Stratix II--the industry's only 90nm FPGA developed on

low k," said Erik Cleage, senior vice president of Altera Corporation. "For over 20 years, our customers have relied on Altera to deliver innovative, high value programmable solutions. Our innovation leadership is made possible though close collaboration with industry leaders such as Applied Materials."

AMD. "Applied Materials' Black Diamond is one of the important technologies that helped AMD to achieve improved circuit performance in its AMD64 processors, the industry's first 64-bit x86-processors," said Craig Sander, vice president, process technology development at AMD. "AMD64 gives consumers and businesses of all sizes improved performance for many applications by evolving industry-standard technology from a 32-bit to a 64-bit architecture. AMD was a leader in the introduction of low k materials into a high-volume manufacturing environment, starting with its 130nm Silicon on Insulator process in AMD Fab 30 in Dresden, Germany."

ATI Technologies. ATI's RADEON(TM) 9600 XT and MOBILITY(TM) RADEON(TM) visual processors integrated into numerous PC desktops and notebooks, deliver high-performance, cinematic quality graphics and enable fast paced, real-time gaming. The first visual processors developed using a low k dielectric process, they combine high-performance with minimal power consumption.

LSI Logic Corporation. LSI Logic Corporation is a leading designer and manufacturer of communications, consumer and storage semiconductors. "Today's low k announcement provides the engineering design community with a glimpse of the future of deep sub-micron process technology," said Ronnie Vasishta, vice president, Technology Marketing and CoreWare(R) Engineering, LSI Logic. "Low k is playing a critical role in overcoming the design challenges associated with increasingly complex system-on-a-chip implementations."

NEC Electronics. Low k dielectric solutions were critical to the manufacturing of our UX6 process due to their superior integration within the interconnect structure and their compatibility with packaging technologies. Using these low k films, we achieved our target yield at 90nm and are proceeding with manufacturing integration for 65nm designs.

Toshiba Corporation. Using low k films in our TC300 chips, which feature 11 layers of copper wiring, we exceeded the most advanced performance and low power requirements for a variety of next-generation, high-end applications ranging from portable wireless devices to high-speed networking and server products. These results are already leading to a rapid expansion in unique applications for consumer and enterprise products.

Taiwan Semiconductor Manufacturing Company (TSMC). TSMC is the world's leading semiconductor foundry, manufacturing semiconductor devices for other companies around the world. "TSMC is the first semiconductor foundry to have implemented Applied Materials' low k dielectric in two generations of process technology, including its leading-edge 130nm and 90nm processes," said Dr. John Yue, vice president of technology for TSMC North America. "TSMC delivered more than 10,000 130nm production wafers using low k dielectric in 2003 and will ramp to higher volumes in 2004. Applied Materials' Black Diamond will be used in all of TSMC's 90nm Nexsys (nm) Technology for SoC, which ramps to production this quarter."

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