

NEC Electronics and NEC Unveil Innovative System-in-Package Technology

Single-Package 3-D SiP Technology Enables High-Speed and High-Resolution Image Processing in Mobile Consumer Devices

TOKYO (Japan), August 1, 2006 — NEC Corporation and NEC Electronics Corporation today unveiled a new system-in-package (SiP) technology capable of stacking logic and gigabit-class memory in a single package to enable high-speed, high-definition image processing in mobile devices. The new SiP technology, SMAFTI™ (SMARt connection with Feed-Through Interposer), features a three-dimensional (3-D) chip connection whose approximately 60-micron gap and 50-micron-pitch microbump between the logic and memory devices can support transmissions up to 100 gigabits per second (Gbps). Designers who use SMAFTI technology in cellular phones and other portable equipment that have stringent size and power constraints can achieve resolutions comparable to those achieved in high-definition television.

“The strong demand for digital video television, digital video gaming and other digital video capabilities in portable consumer devices is driving the need for high-speed image processing that realizes crystal-clear resolutions,” said Takaaki Kuwata, general manager, Advanced Device Development Division, NEC Electronics Corporation. “System-on-chip (SOC) technologies present a disadvantage in terms of development cost and memory capacity, while conventional SiP products have larger package sizes due to thicker interposers, and have limitations in signal transfer speed, wire-bonding interconnections, and side-by-side chip placement. The new SMAFTI technology successfully resolves these issues and enables engineers to effectively design and manufacture high-performance systems for mobile electronic devices.”

Enabling Technologies

NEC Electronics and NEC developed the SMAFTI technology by leveraging three key enabling technologies: a 50-micron-pitch microbump interconnection technology, a 15-micron-thick feed-through interposer (FTI) based on superconnect technology, and a multichip assembly process.

The microbump interconnection technology makes it possible to realize low power dissipation, a small form factor, and high-speed interchip communication at more than 100 Gbps, ten times faster than conventional technologies. The small 50-micron-pitch interconnection size is the result of a silicon-to-silicon attachment process that effectively reduces the size of conventional

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pitch bumps and enables designers to accommodate four times the number of bumps in the same area. This process produces high-speed data transfers and is more reliable than the conventional silicon and organic substrate attachment process.

Superconnect technology is used in chip fabrication and has a copper signal trace 15 microns wide and a polyimide layer 7 microns thick—half that of a conventional substrate. The 15-microns-thick FTI, which is based on superconnect technology, makes it possible to convert a chip's wiring pitch to 50 microns and to fan out the pitch connection of an outer ball grid array to 500 microns. As a result, the routing of signals from a logic chip with a 50-micron pitch and memory connection points to universal substrate terminals can be simplified.

The multichip assembly process is an enhancement of existing wafer-based manufacturing processes that are typically used for SOC manufacturing. Memory chips are first mounted onto silicon wafers using wiring based on superconnect technology. Then the chips and wiring layer are molded by resin and the silicon wafer is removed. The BGA attachment process follows.

Availability

Products featuring SMAFTI technology are expected to be available during the first quarter of 2007 in a variety of lead-free package sizes. Availability is subject to change.

About NEC

NEC Corporation (NASDAQ: NIPNY) is one of the world's leading providers of Internet, broadband network and enterprise business solutions dedicated to meeting the specialized needs of its diverse and global base of customers. NEC delivers tailored solutions in the key fields of computer, networking and electron devices, by integrating its technical strengths in IT and Networks, and by providing advanced semiconductor solutions through NEC Electronics Corporation. The NEC Group employs more than 150,000 people worldwide and had net sales of approximately 4,825 billion yen (approx. \$41.2 billion) in the fiscal year ended March 2006. For additional information, please visit the NEC home page at: <http://www.nec.com> .

About NEC Electronics

NEC Electronics Corporation (TSE: 6723) specializes in semiconductor products encompassing advanced technology solutions for the high-end computing and broadband networking markets, system solutions for the mobile handset, PC peripherals, automotive and digital consumer markets, and platform solutions for a wide range of customer applications. NEC Electronics Corporation has 25 subsidiaries worldwide including NEC Electronics America, Inc. (www.am.necel.com) and NEC Electronics (Europe) GmbH (www.eu.necel.com). For additional information about NEC Electronics worldwide, visit www.necel.com.

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