



# News Release

For more information:

PR: Margaret Mehling

(408) 721-2639

## NATIONAL SEMICONDUCTOR ANNOUNCES 100-MIPS IMAGING TECHNOLOGY COMBINING 64-BIT ARCHITECTURE WITH DIGITAL SIGNAL PROCESSING

February 15, 1991 -- National Semiconductor Corporation today disclosed a new generation of imaging technology that achieves an unprecedented 100 MIPS performance by combining a 64-bit superscalar architecture with high-performance, on-chip digital signal processing.

"Today's announcement of our newest Swordfish core technology not only provides the highest performance available in any embedded processor solution, but also extends the migration path of National's core processors from 1 to 100 MIPS," said Dr. Giora Yaron, vice president of National Semiconductor's Imaging Group.

"All of National Semiconductor's embedded processor cores maintain continuity in architecture, and thus offer customers a migration path across the entire performance range," Yaron said.

These products range from the 32CG16 core introduced in 1987 with performance of 1 to 3 MIPS, through the 32GX32 core family introduced in May 1989 with 7 to 15 MIPS capability, to today's Swordfish core announcement rated at 100 MIPS.

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## Swordfish Technology

The new Swordfish core announced today is a 64-bit Superscalar RISC architecture that incorporates two independent integer units, a floating-point unit, on-chip instruction and data caches and enhanced on-chip DSP functions. The core offers true superscalar performance, which means that its dual pipelined integer execution units can effectively execute two instructions per clock cycle, a significant enhancement over the inherent RISC capability of one instruction per clock cycle. The Swordfish core also features fast parallel execution of integer and DSP functions, fast context switching, and shadow mode operation for increased reliability.

In addition, the Swordfish bus can operate at 1/2 internal frequency (25 MHz) to promote ease of interface design and reduce system cost. Optionally the bus can run at a frequency equal to the internal frequency for maximum throughput. Dynamic bus sizing allows simple interface with 8, 16 and 32-bit I/O peripherals in the same system.

Cast in the 0.8-micron version of National Semiconductor's M2CMOS process, the new core design effectively connects more than 1 million transistors. The device also utilizes National Semiconductor's optimizing compiler, which was designed in parallel with the hardware it manages. The hardware and software thus interact efficiently to maximize speed.

Although the new 64-bit core is a RISC design and the earlier 32-bit cores use application specific instruction sets containing complex instructions, the basic programming model has been scrupulously preserved. Thus, the new devices come equipped with assembler translators that migrate software already in place.

## High Performance Embedded Processor Market

The new Swordfish core addresses the needs of the fast developing disciplines of data compression and decompression, pattern recognition and digital high-definition visual presentation. Potential market segments for system implementations include advanced office peripherals such as high-end printers and print servers which demand high resolution, PostScript™ capability, high speed and full color. Digital copiers and high-performance color facsimile systems constitute another segment, and additional application areas include combined modem, fax and data communications, hard disk servo control feedback systems such as robotics and machine tools, and voice compression and video compression in areas such as HDTV, multimedia and interactive data bases.

The forecast for growth, according to both analysts and National Semiconductor, shows that the market for 32-bit and 64-bit RISC embedded processors will grow nearly 10 times from 1.1 million units in 1990 to 10.9 million units in 1994. Ten percent of that growth is expected to be in the high-end segment demanding performance above 25 MIPS. Most of this growth is concentrated in the office peripherals segment.

"The trend is clear for desktop devices to assume multiple functions and to require more and more powerful technology, thus opening up new and significantly wide ranging markets," said Ray Farnham, vice president of National Semiconductor's VLSI division.

"We are strongly committed to developing the technology and product applications to take advantage of these new market opportunities," Farnham added.

National Semiconductor Corporation designs, manufactures and markets high-performance semiconductor products. Headquartered in Santa Clara, Calif., the company is a global leader in mixed analog-and-digital technologies.

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