

# *Press Information*

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## **NEW MAXQ MICROCONTROLLER ARCHITECTURE PROVIDES ULTRA-QUIET ENVIRONMENT FOR INTEGRATION WITH HIGH-ACCURACY ANALOG CIRCUITRY**

DALLAS, TX—November 15, 2004—Dallas Semiconductor (NASDAQ: MXIM) introduces the MAXQ™ architecture, combining ultra-quiet operation with an innovative 16-bit RISC architecture.

The 1-cycle MAXQ RISC architecture combines superior clock utilization with intelligent clock distribution to achieve an unmatched performance-to-power characteristic among 16-bit microcontrollers.

The patent-pending MAXQ transport-triggered architecture was constructed to meet industry's ever-increasing demand for a high-performance, low-power, 16-bit microcontroller suitably quiet for integrating complex analog functionality. When integrating analog circuitry with high-performance digital blocks, the operating environment must be kept as quiet and noise-free as possible. The historical problem has been, however, that the clocking and switching occurring in the digital circuits of a microcontroller core inject noise into the sensitive analog circuitry. Therefore, the challenge is to maximize microcontroller performance while minimizing clock noise that may adversely affect analog circuits. The MAXQ architecture meets the high-performance and

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ultra-quiet requirements necessary for integration with analog circuits.

The MAXQ architectural solution to this challenge is two-fold. The first key approach increases the microcontroller performance through improved clock-cycle efficiency, thereby minimizing clock cycles required to execute a task. The MAXQ architecture takes advantage of a Harvard-style memory map to allow simultaneous program and data memory access, eliminating clock-cycle inefficiencies of sharing a bus in the von Neumann scheme. Clayton Ware, business manager for the company's microcontroller product line, explains, "Single-cycle memory-to-memory operations are uncommon in today's microcontrollers. Removing the limitation of multiple-cycle memory accesses significantly improves system performance." While competing microcontrollers have an instruction cycle that is a divided version of the external clock, the MAXQ instruction cycle is equal to the external clock frequency, thereby providing higher instruction bandwidth (MIPS). In a pioneering move to maximize clock utilization, the MAXQ does not implement an instruction pipeline to support its 1-cycle operation. Instruction fetch, decode, and execution occur in the same clock cycle. This architectural innovation eliminates clock cycles normally wasted when program branching occurs. Since nearly every instruction mnemonic is performed in only 1 clock cycle, the MAXQ microcontroller's performance approaches 1MIPS per MHz (e.g. 20MIPS at 20MHz).

To supplement clock-cycle efficiencies, the MAXQ employs a comprehensive clock strategy to reduce internal noise. Digital operations in the MAXQ core are performed on the positive edge of the system clock, leaving a virtually noise-free falling edge ideal for performing analog functions. In addition, clock gating is used to further reduce clock noise and power dissipation. The transfer-triggered MAXQ architecture offers a unique opportunity to exploit the gating technique. The MAXQ instruction set is composed of 33 C-friendly instruction mnemonics, each of which translates into a simple 'MOVE' operation between two functional modules. Knowing exactly which functional modules are involved in the 'MOVE' operation allows

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highly targeted, per-instruction, clock gating.

Dallas Semiconductor/Maxim is targeting end equipment, including medical, automotive, metering, consumer, and industrial automation, which require high-resolution analog with the power of a 16-bit microcontroller. Application-Specific Standard Products (ASSPs) are currently under development in many of the company's business units using the MAXQ architecture. The **MAXQ2000** is the company's first microcontroller to implement the 16-bit MAXQ architecture. More information on the MAXQ architecture and the MAXQ2000 are online at [www.maxim-ic.com/MAXQ](http://www.maxim-ic.com/MAXQ).

Note: Dallas Semiconductor issued a separate release on the MAXQ2000 microcontroller. Visit [www.maxim-ic.com/MAXQ2000PR](http://www.maxim-ic.com/MAXQ2000PR) for a copy.

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