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ANOTHER NEW DSP CORE FROM TI

By Tom R. Halfhill {3/20/00-02}

Texas Instruments has announced the TMS320C28x, its third new DSP core in less than a month. The 'C28x is intended for low-end digital-control tasks—unlike the higher-end 'C55x and 'C64x DSP cores that TI announced a few weeks ago (see *MPR 3/6/00-01*, "TI Cores Accelerate DSP Arms Race").

The new 'C28x core is designed for DSPs in the $10 range. Exact prices will depend on specific implementations, which will have various amounts of on-chip memory and a variety of integrated peripherals. The new core extends TI's 'C2000 series of 16-bit fixed-point DSPs, often used as motor controllers in consumer appliances, disk drives, and industrial equipment. The 'C28x is assembly-language source-code compatible with TI's existing 'C24x DSPs but is not binary compatible with those chips, due to some architectural changes.

Several new instructions have been added to the 'C28x. The most interesting additions are some bit-manipulation instructions, an atomic (uninterruptible) read-modify-write instruction, and a single-cycle 32-bit multiply-accumulate (MAC) instruction. When 16-bit precision is sufficient, the 'C28x can execute two MACs per cycle.

TI plans to begin sampling the 'C28x to lead customers in 4Q00 and start volume production in 2H01. By then, TI will have a 0.13-micron IC process that should allow 'C28x DSPs to hit 400MHz. At that clock frequency, the 'C28x can execute 400 native mips. In contrast, the fastest existing 'C24x DSP tops out at only 40MHz and 40 mips.

Seemingly, every product needs an Internet angle these days, and for the 'C28x it's Web-enabled appliances—consumer devices that use the Internet to communicate with each other, with their vendors' Web sites, or with third-party services such as Peapod or WebVan. The 'C28x core doesn't have any specific features for those applications, but as a low-cost motor controller it will compete against general-purpose embedded processors and cores with DSP extensions, such as ARM's ARM9E, Hitachi's SH-DSP, and Lexra's LX5280.

Embedded CPUs with DSP capabilities can sometimes beat dedicated DSPs at their own game. But chips based on general-purpose cores won't easily match the DSP capabilities of the 'C28x in the $10 price range targeted by TI, especially for applications that need the speed and precision of single-cycle 32-bit MACs. By announcing three new DSP cores in the past month, TI is aggressively defending its leading position in the DSP market, which is growing almost twice as fast as the overall IC market.