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MOTOROLA'S SYMPHONY PLAYS DIGITAL MUSIC

By Tom R. Halfhill {1/31/00-06}

Motorola's latest DSP—the DSP56366 Symphony—has enough performance and on-chip memory to handle a wide variety of digital-audio standards, and it's aimed at the lucrative market for next-generation consumer-audio products. But that market is highly competitive, so Symphony isn't a solo act.

Sampling this quarter and scheduled for volume production in 2Q00, Symphony is a 24-bit fixed-point DSP that's compatible with Motorola's DSP56300 family. Motorola plans to deliver 100- and 120-MHz versions of the part, which has 69K of RAM and 240K of ROM on chip. That breaks down to 9K of program RAM, 120K of program ROM, 39K of X-memory RAM, 96K of X-memory ROM, 21K of Y-memory RAM, and 24K of Y-memory ROM. (Like most DSPs, Symphony's on-chip data memory is divided into X/Y partitions.) There are also 576 bytes of boot ROM.

Such a generous helping of on-chip memory allows Symphony to support many digital-audio standards with little or no external RAM. Motorola says Symphony can handle all the compression, decoding, and processing required for DVD and digital-TV audio with no additional memory at all, storing even the coefficient tables for digital theater sound (DTS) decoding on chip. The DSP is fast enough to process the data streams for all major audio standards, including Dolby Digital AC-3, DTS, MP3, MPEG-2, THX, HDCD (high-definition compatible digital), AAC (advanced audio coding, an enhancement of MPEG-2), and MLP (meridian lossless packing, an audio-compression standard for DVD).

When external memory is required, Symphony has a glueless 24-bit interface for SRAM or DRAM. Other on-chip resources include a 24-bit multiply-accumulate (MAC) unit with two 56-bit accumulators; a 56-bit barrel shifter; a six-channel DMA controller; two enhanced serial audio interfaces, each supporting up to four receivers and six transmitters; a serial host interface; and a digital-audio transmitter (DAX) that supports S/PDIF (Sony/Philips digital interface) and other formats.

Motorola's 10,000-unit price of $20 for Symphony is low enough for the relatively high retail prices fetched by leading-edge consumer-audio gear. But retail prices in fast-growing markets typically fall quickly as the tempo of competition steps up, and component costs have to keep pace.

Symphony faces a rising crescendo of competition. Some customers are moving away from hard-to-program DSPs in favor of general-purpose CPUs. Almost all embedded-processor architectures have added DSP extensions in recent years. Some chip vendors are designing highly integrated solutions around general-purpose cores—such as Cirrus Logic's Maverick family (see *MPR 11/15/99-03*, "Cirrus Logic Makes Music With ARM").

To accelerate the design of similar chips, other vendors are offering synthesizable DSP cores. One example, Zoran's Muzichord, eliminates a lot of DSP assembly-language programming by using prewritten C libraries that support popular digital-audio standards (see *MPR 11/15/99-en*, "Zoran's Soft DSP Core Optimized for Audio"). Yet another alternative to a discrete DSP chip is Massana's FILU-200 (see *MPR 11/15/99-02*, "Massana Unveils DSP Coprocessor Core").

The FILU-200 bolts on to an embedded CPU's memory bus and has a library of prewritten DSP subroutines in ROM.

Symphony's large on-chip memory is a competitive advantage in this field—albeit one that's easy to imitate. The growing popularity and rapid evolution of digital audio guarantees that this will be a hotly contested product category for the next few years.