CL-SH7200

Preliminary Product Bulletin

CIRRUS LOGIC ®

Integrated Motion Controller

FEATURES

■ **Servo Format Support**

— Embedded servo formats

— Programmable Servo address/sync mark lengths and patterns

— Programmable majority vote for address/sync marks

— Gray-coded track number with Dibit or Pulse Position Modulation

■ **High Performance and Integration**

— 10-MIPS integrated digital signal processor (DSP)

— 2K-word integrated instruction memory

— 512-word integrated data memory

— Single-cycle multiply-accumulate operation

— 8-channel, 10-bit analog-to-digital converter with 1.2-μs conversion time

— 13-bit digital-to-analog converter

■ **Servo Support**

— Integrated servo data Phase Lock Loop

— Interpolation support for high-performance servo algorithms

— User-programmable, RAM-based sequencer for servo burst format

(cont. on next page)

OVERVIEW

The CL-SH7200 is a VLSI component that provides the majority of the hardware necessary for a hard-disk-motion-control system. The CL-SH7200 chip contains blocks required to control an embedded servo design within a small form factor. The CL-SH7200 combines a digital signal processor (DSP) core with instruction and data RAM, servo controller, general-purpose parallel and serial I/O logic, sector pulse generator, general-purpose timer, burst magnitude comparator, analog-to-digital converter (ADC) and digital-to-analog converter (DAC).

(cont. on next page)

Functional Block Diagram

CL-SH7200
Integrated Motion Controller
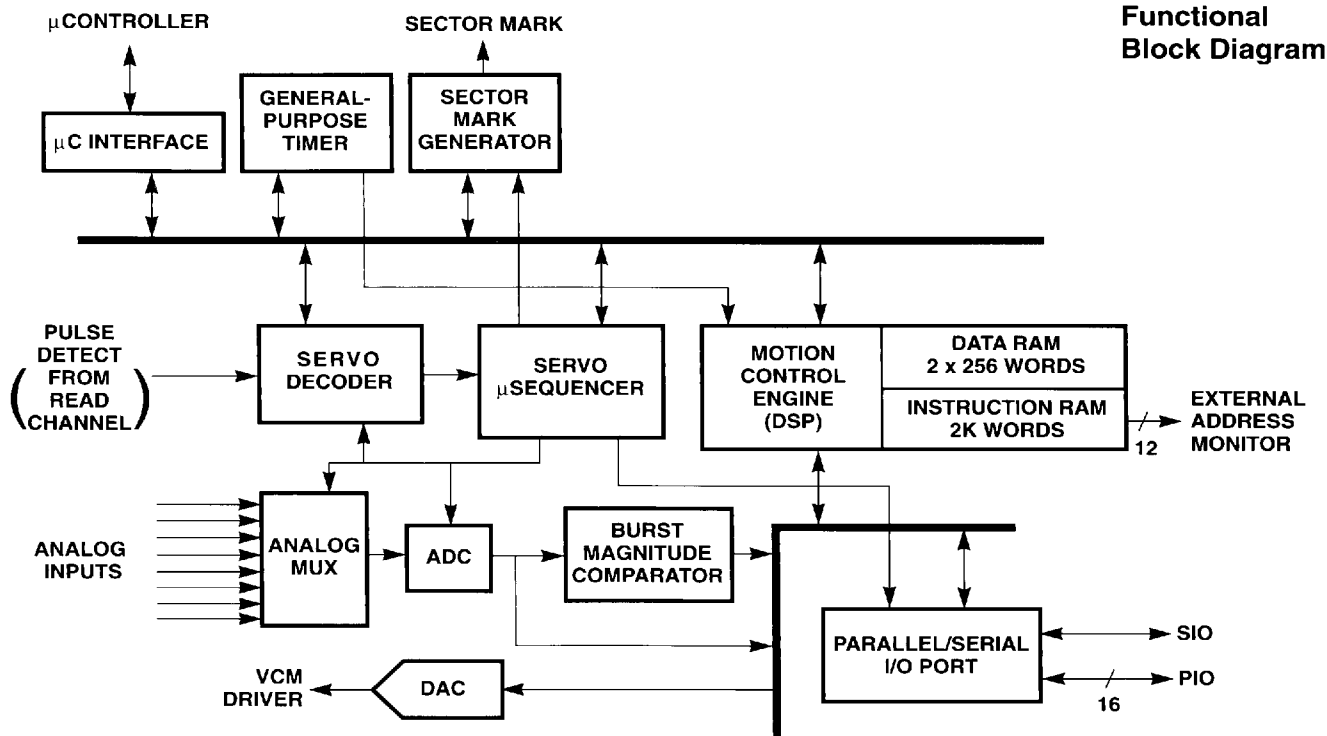
FEATURES (cont.)

■ Microcontroller Interface

— Support for Motorola® and Intel® microprocessor interfaces

— Full support of Motorola®/Intel®-type control signals and mux/nonmux buses

■ Other Features

— Sector mark generation circuitry

— General-purpose timer

— Power-down logic

— 16-bit parallel I/O and serial I/O port

■ Support Tools

— Evaluation/development system

— DSP code assembler, linker, and simulator

— DSP code development and debug environment including breakpoint and trace support

■ Technology

— 100-pin plastic Very Tight-Pitch Quad Flat Pack (VQFP) package

— Advanced mixed-signal, low-power, double-metal CMOS technology

---

OVERVIEW (cont.)

Cirrus Logic also provides a development package for evaluating and demonstrating the capabilities of the CL-SH7200 servo controller.

The DSP and servo microsequencer are high-performance control blocks in the CL-SH7200. The 10-MIPS internal DSP with 512 x 16 data RAM and 2K x 16 instruction RAM, runs high-performance servo control algorithms. The servo microsequencer features include: embedded servo formats, user-programmable coding for track numbers, built-in servo data Phase Lock Loop (PLL) with synchronization logic and programmable majority vote for address/sync marks, which greatly improve reliability and increase track density.

Sixteen parallel I/O and one serial I/O general-purpose interfaces communicate with the read channel, data controller, microcontroller (µC), diagnostic/debug hardware, or other external devices. The general-purpose signals can act as control signals, command transfer path, status/monitoring signals, etc. These I/O ports add flexibility to debugging and system design.

The sector mark generator creates synchronized sector marks for zoned media use. The sector pulse generator uses an algorithm to generate sector pulses that indicate the start of a data sector. This logic removes the need for periodic µC recalculation and ROM storage for delay values.

The general-purpose timer can be used for spindle control or other precision timing events. It may be used in multiple-event or single-event modes.

The Burst Magnitude Comparator is intended for use with 4-burst embedded servo systems. It provides hardware assistance to speed servo-burst processing and reduce transport delay. The Burst Magnitude Comparator monitors the servo bursts as they become available from the ADC and selects the correct burst pair to be processed by the DSP engine. A pointer is generated for the DSP, indicating the chosen burst pair and the ordering by burst magnitude.

The CL-SH7200 includes a 10-bit ADC with 1.2-µs conversion time. There are eight input channels available, allowing for the conversion of the servo burst signals and monitoring of other analog signals on the drive.

The CL-SH7200 contains a 13-bit DAC that allows the firmware to control the input to the voice coil motor driver. Integration of the DAC contributes to space savings, which enables designers to fit servo electronics on a small-form-factor drive.

The CL-SH7200 is designed to interface to either Motorola® or Intel®-style processors. Typical embedded processor interfaces, such as those found on the Motorola 68HC11 or Intel 8051/80196 processors, connect directly to the CL-SH7200.

Development tools available for the CL-SH7200 include a development board, debug software, assembler, linker, and simulator. The development system is PC-based and includes capabilities for compiling and tracing DSP code. While using the development board, break points may be set and trace data collected.

CL-SH7200

Integrated Motion Controller

CIRRUS LOGIC

System Block Diagram

HEAD DISK ASSEMBLY   **PRINTED CIRCUIT BOARD**
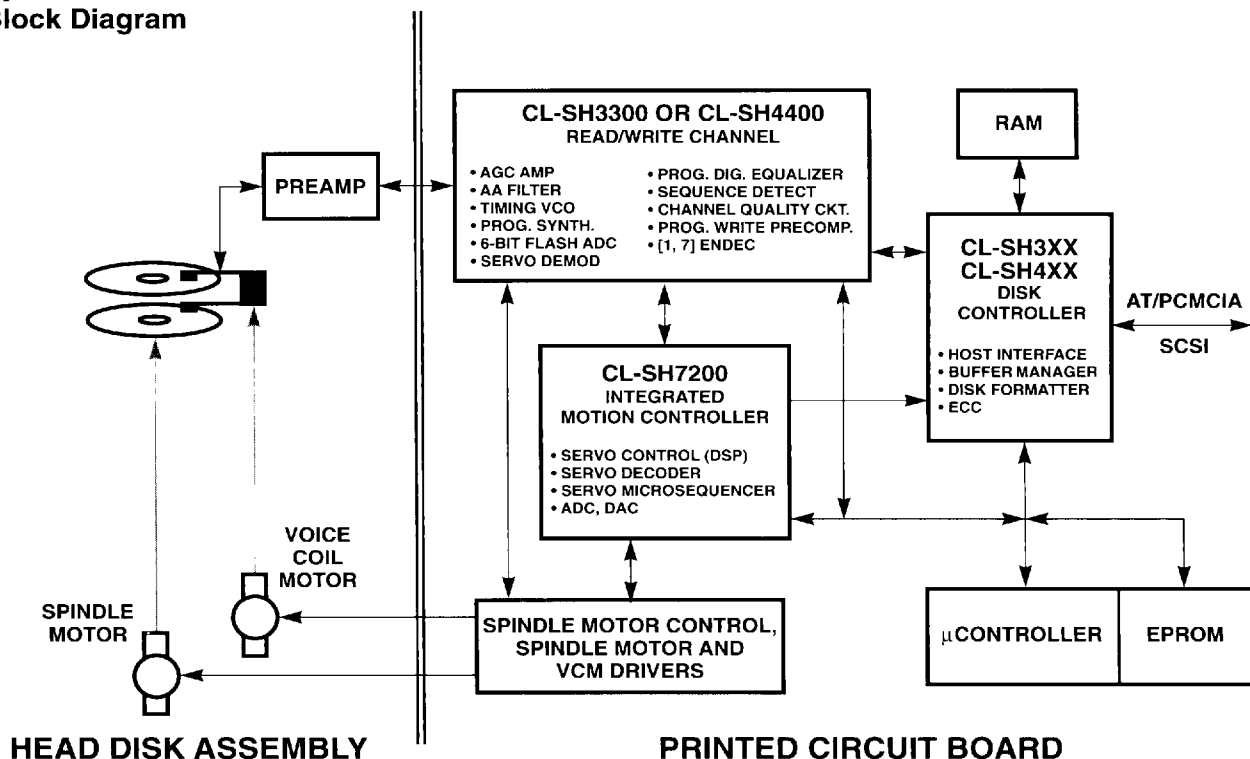
ADVANTAGES

Unique Features

■ Integrated 10-MIPS DSP with instruction/data memory

■ Single-chip, mixed-signal servo control solution in a low-profile package

■ User-programmable servo decoder/microsequencer

■ Error-tolerant servo address and synch marks

■ On-chip sector mark generator

■ Parallel and serial I/O ports

■ Extensive development system environment for servo system

Benefits

❐ High-performance, advanced servo techniques, allowing higher track densities

❐ Reduces components and cost; allows high-performance servo for small-form-factor drives

❐ Flexible, customized servo-burst formats

❐ More robust servo operation, higher track densities

❐ Allows hard sector operation without the need for tables or microcontroller intervention

❐ Flexible design allows direct-connection interface and easy diagnostics

❐ Ease of development facilitates servo-system integration

3