

**FEATURES**

**General**

- Supports both ATA and PCMCIA-ATA standards
- Automatic sensing of ATA or PCMCIA-ATA environments
- In ATA Mode, fully compatible with industry-standard CL-SH360 disk controller family

**PCMCIA Features**

- Fully compatible with PCMCIA-ATA Release 2.0 specification
- Integrated PCMCIA attribute memory of 256 bytes
- Support for all four PCMCIA Card Configuration Registers
- Support for all four PCMCIA-ATA command block (task file) addressing modes (I/O and common memory)
- Supports 16-bit task file accesses in Common Memory Mode
- PCMCIA twin-card support

**ATA Features**

- Host data transfer under programmed I/O, DMA, or Demand Mode DMA (ESIA Type 'B')

**PCMCIA-ATA or ATA  
 Mixed-Voltage Disk Controller**

**OVERVIEW**

The highly integrated CL-SH380 provides a large portion of the hardware necessary to build a Winchester disk controller for PCMCIA or PC XT/AT interfaces. The CL-SH380 is a VLSI chip that combines a complete host interface for both the PCMCIA-ATA and ATA standards with an advanced Winchester disk formatter, and a dual-port buffer memory manager. The controller provides the enabling feature set and technology for small, fast, high-capacity, and low-cost drives.

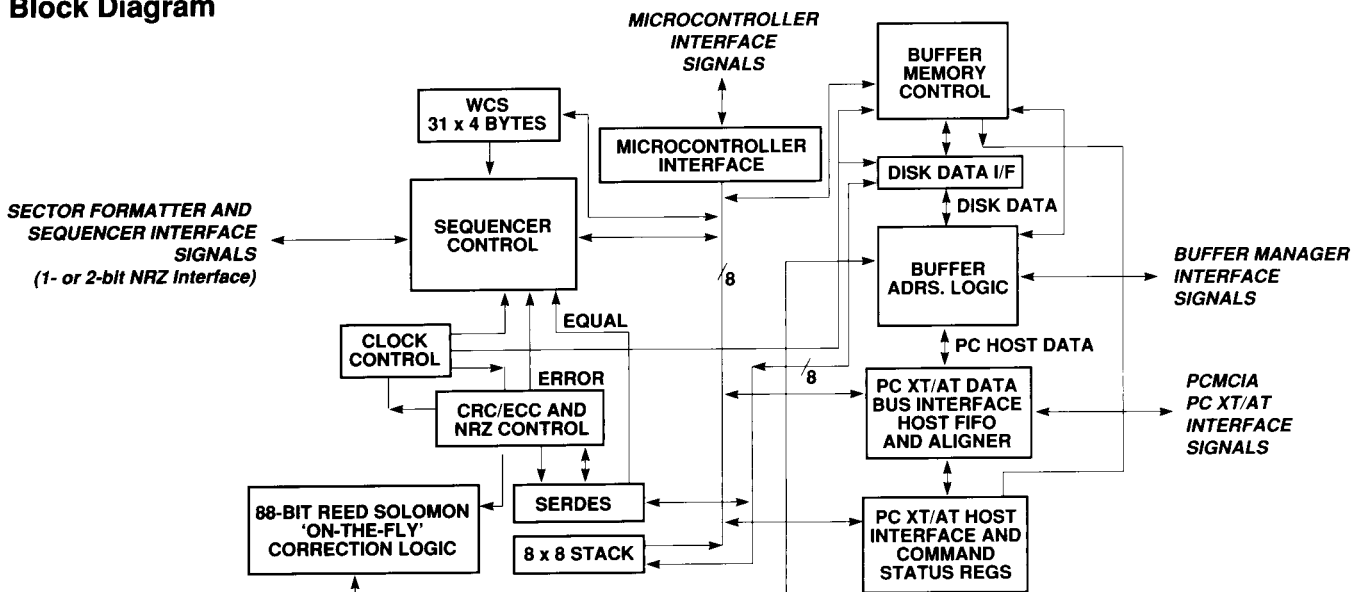
The CL-SH380 supports the full PCMCIA-ATA specification with four card configuration registers and 256 bytes of on-chip attribute memory. The memory is used for the card information structure that describes the PCMCIA disk drive card capabilities and specifications.

The CL-SH380 operates in the range of 3.3 volts to 5.0 volts. To provide system designers power

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**Functional Block Diagram**



**FEATURES** (cont.)

- Supports 8- and 16-bit data transfers on the host bus
- Supports any host speed with programmable and auto-wait-state generation
- AT master/slave protocol

**Disk Controller Features**

- Fully hardware- and software-compatible with PC XT/AT computers in ATA Mode
- Single- and double-bit NRZ rates of 36 and 48 Mbits/second, respectively, at 5.0 volts, 30 and 40 Mbits/second at 3.3 volts
- Operates in the range of 3.3 to 5.0 volts  $V_{DD}$  ( $\pm 10\%$ )
- Split-voltage operation enables the host interface to function at a different voltage level than the voltage level for the disk, buffer, and local processor interfaces
- Reed-Solomon error correction code (ECC) with 11- or 14-bit automatic 'on-the-fly' hardware correction

- Multi-level power management capability
- Split-data-field operation for constant density recording formats
- Programmable buffer segments for user-defined caching, read look-ahead, etc.
- Auto-write buffer pointer
- Easy-to-modify RAM-based disk formatter control store (31 x 4 bytes)
- Full-track multi-sector transfer capability without local processor intervention
- Support for multiplexed and non-multiplexed address and data bus microcontroller interfaces
- Direct buffer memory addressing of up to 64K bytes of SRAM
- 120-pin VQFP package

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**OVERVIEW** (cont.)

management flexibility, the controller supports split-voltage operation, that enables the host interface to function at a different voltage level than the voltage level of the disk, buffer, and local processor interfaces. Multi-levels of hardware-and firmware-controlled power-down modes reduce power consumption to leakage current, making the CL-SH380 ideal for portable and power-sensitive applications.

The CL-SH380 Disk Formatter consists of a serializer/deserializer, a flexible RAM-based Sequencer, and CRC/ECC generation circuitry. To ensure data integrity and maintain performance, the CL-SH380 performs enhanced 11- or 14-bit-burst 'on-the-fly' Reed-Solomon error correction, while transferring disk data at a continuous 36 Mbits/second using single-bit NRZ or 48 Mbits/second using double-bit NRZ (at 5.0 volts). The industry-standard 16-bit CRC-CCITT for ID fields and proprietary 88-bit Reed-Solomon ECC polynomial for data fields are supported in hardware and require no local microprocessor intervention. A proprietary

split-data-field technique optimizes disk capacity, enables faster access times, and increases data rates. The CL-SH380 Buffer Manager controls up to 64K bytes of SRAM buffer memory as a dual-port circular buffer. It supports a full-track multi-sector data transfer without microprocessor intervention, allowing creation of low-cost, single-processor disk drive designs. It also allows buffer memory segmentation for user-defined caching algorithms or protected-memory areas.

The CL-SH380 works with a local microcontroller and supports both multiplexed address and data bus architecture, similar to the Intel® 8051 family and Motorola® 68HC11 microcontrollers, as well as non-multiplexed bus processor architectures. Also provided is a READY Signal interface for high-speed microcontrollers. It supports both interrupt and polled processor interfaces. The maskable interrupts include many disk and host interface events. The CL-SH380 also has hardware to speed microcontroller access to the buffer memory.

# CL-SH380

## PCMCIA Disk Controller



### ADVANTAGES

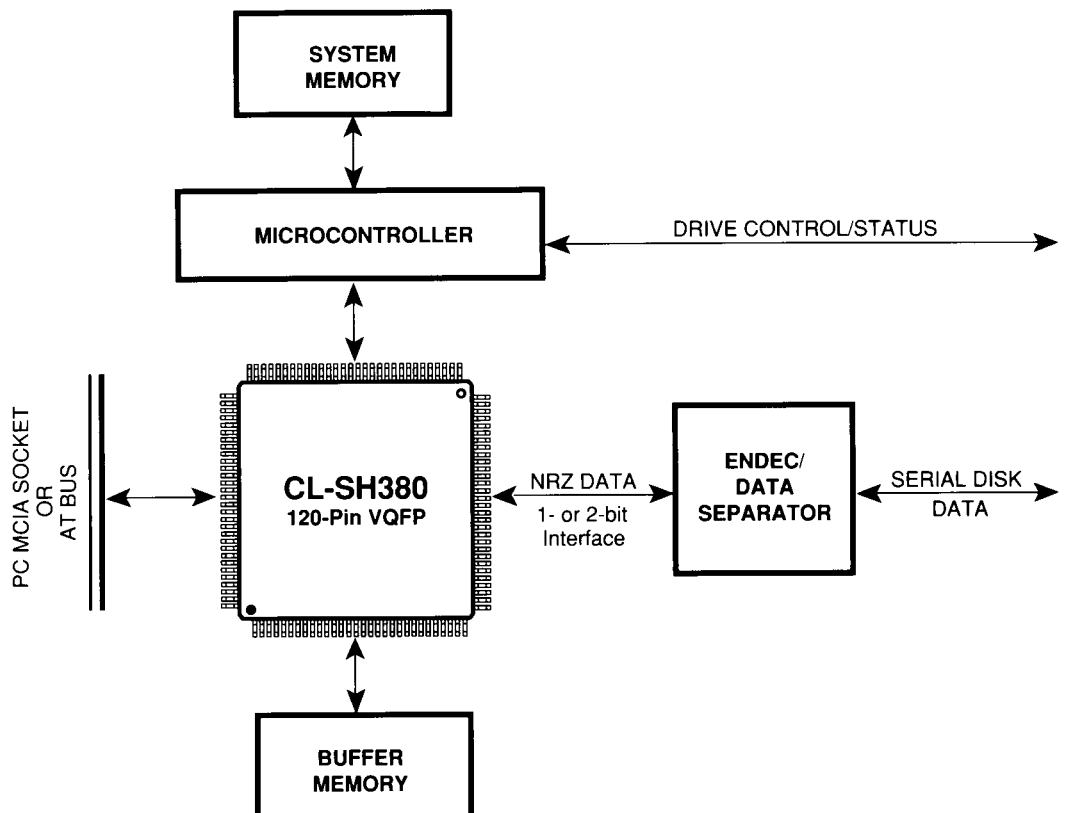
#### Unique Features

- Full PCMCIA Release 2.0 and PCMCIA-ATA compatibility
- Supports both ATA and PCMCIA-ATA standards with automatic ATA or PCMCIA environment sensing
- 3.3 or 5.0 volt operation with split voltage capability and dynamic switching between 3.3 and 5.0 volts
- Multiple levels of power management
- Disk data rates of up to 48 Mbits/second
- Reed Solomon 'on-the-fly' error correction
- Multi-sector data transfer
- Proprietary split-data-field support

#### Benefits

- Ensures compatibility with software and hardware industry standard for the PCMCIA interface.
- Allows interchange between PCMCIA and ATA systems.
- Flexibility in designing systems with single or double voltage requirements as well as conformance to PCMCIA voltage requirements.
- Reduces power consumption to leakage current.
- Ideal for high-performance disk drive applications.
- Supports true 'on-the-fly' error correction during full-speed data reads.
- Reduces real-time processing demand on the local disk drive microcontroller, allowing creation of lower-cost, single-processor disk-drive designs.
- Optimizes disk capacity, enables faster access times and data rates.

### System Block Diagram



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**The Company**

Cirrus Logic, Inc., produces high-integration peripheral controller circuits for mass storage, graphics, and data communications. Our products are used in leading-edge personal computers, engineering workstations, and office automation equipment.

The Cirrus Logic formula combines proprietary S/LA<sup>TM</sup> IC design automation with system design expertise. The S/LA design system is a proven tool for developing high-performance logic circuits in half the time of most semiconductor companies. The results are better VLSI products, on-time, that help you win in the marketplace.

Cirrus Logic's fabless manufacturing strategy, unique in the semiconductor industry, employs a full manufacturing infrastructure to ensure maximum product quality, availability and value for our customers.

Talk to our systems and applications specialists; see how you can benefit from a new kind of semiconductor company.

† U.S. Patent No. 4,293,783

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