

March 1997

## DESCRIPTION

The SSI 32C9210 is an advanced CMOS VLSI device which integrates major portions of the hardware needed to build an ATA disk drive. This part is superior in performance to the SSI 32C9600 ATA controller, and supports true headerless operation. The SSI 32C9210 has an 8-bit wide NRZ channel interface for disk transfer rates up to 200 Mbit/s, a 4-bit NRZ interface up to 160 Mbit/s, and a 2-bit NRZ interface up to 100 Mbit/s. The SSI 32C9210 has an advanced ATA interface which supports host transfer rates up to 16.6 MB/s, and a 16-bit wide data buffer interface capable of supporting concurrent full speed transfers on both disk and host interfaces. The circuitry of the SSI 32C9210 includes: a complete, highly automated ATA Interface; an advanced, fully integrated Buffer Manager; a high performance Disk Formatter supporting headerless operation; and a programmable

(continued)

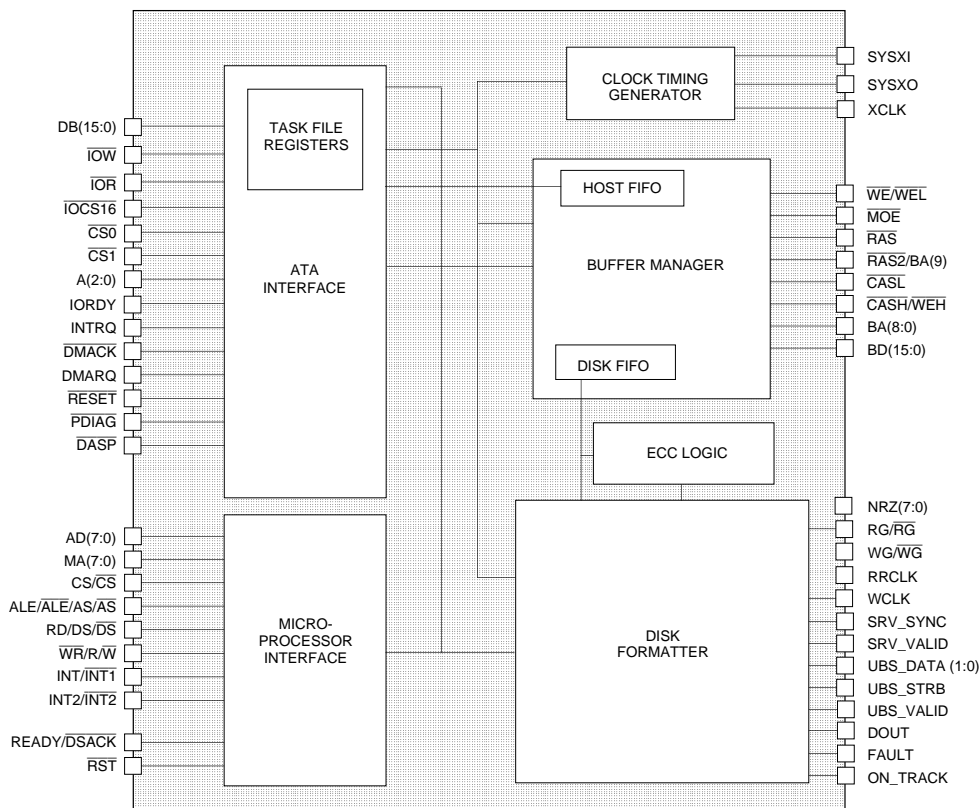
## FEATURES

### ATA INTERFACE

- **Single-chip PC ATA controller (IDE)**
- **Full ANSI ATA-1, ATA-2, and ATA-3 compliance**
- **Direct PC bus connection with on-board ATA drivers**
- **Host transfer rates up to 16.6 MB/s**
- **Supports PIO, DMA and multi-word DMA data transfers**
- **Operates as master only mode, slave only mode or both**
- **Automatic command decoding of WRITE, WRITE LONG, WRITE MULTIPLE, WRITE DMA, WRITE BUFFER, WRITE SAME, WRITE VERIFY, and FORMAT commands**

(continued)

## BLOCK DIAGRAM



# SSI 32C9210

## ATA-3 Interface Controller

### 200 Mbit/s, Headerless Support

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#### DESCRIPTION (continued)

Reed-Solomon ECC. The SSI 32C9210 maximizes performance while minimizing microcontroller intervention.

The highly automated ECC logic is guaranteed to correct all correctable errors in real time and provides a programmable 144-bit to 272-bit Reed-Solomon ECC capability. Its number of bursts is programmable to either 3-burst or 5-burst correction, and it can correct up to 120-bit bursts.

The SSI 32C9210 is the latest in a line of sophisticated disk storage controllers, and introduces a unique headerless scheme which increases drive storage capacity. Other Silicon Systems disk storage controllers include the SSI 32C9800 (SSI 32C9810 headerless support) SCSI-3 controller, with host transfer rates up to 40 MB/s and disk data rates of up to 260 Mbit/s. The SSI 32C9001, SSI 32C9301, SSI 32C9302 and SSI 32C9003 ATA controllers provide dual and serial NRZ data rates to 80 Mbit/s and ATA speeds to 13.3 MB/s. The SSI 32C9020, SSI 32C9022, SSI 32C9023 and SSI 32C9024 family members are SCSI disk controllers supporting fast, 8-bit wide SCSI interface, with disk data rates to 80 Mbit/s. All members are based on a common architecture allowing reusability of major portions of firmware. The Silicon Systems chip family is illustrated in Figure 1.

The high level of integration within the SSI 32C9210 represents a major reduction in parts count. The SSI 32C9210 Interface Controller may be combined with the following components to create a complete, cost efficient, high performance, intelligent disk drive solution:

- SSI 32R2110R Thin Film Read Write Device
- SSI 32P4920 PRML Read Channel (8/9)
- SSI 32H6826 Servo/Spindle Predriver or SSI 32H6840 Servo/Spindle Predriver with DSP
- Microprocessor (if DSP not used)
- Buffer Memory

#### ATA INTERFACE (continued)

- Hardware support for CHS and LBA addressing modes
- Automatic data transfers for all ATA commands including READ MULTIPLE and WRITE MULTIPLE
- Automation logic integrated with buffer protection logic
- Extensive power-down modes
- Read cache hit detection with automatic data transfer

#### BUFFER MANAGER

- Supports up to 1 MB buffer RAM
- High performance word-wide (16-bit) buffer data bus
- Separate host, disk, and microprocessor buffer address pointers
- Flexible buffer segmentation which supports read caching, write caching, and extended read and write operations
- Buffer protection holds off disk and/or ATA data transfers when buffer is empty or full
- Supports Extended Data Output (EDO) or standard DRAMs

#### DISK FORMATTER

- Unique headerless operation
- 8-bit NRZ interface supporting data rates up to 200 Mbit/s
- 4-bit NRZ interface supporting data rates up to 160 Mbit/s
- 2-bit NRZ interface supporting data rates up to 100 Mbit/s
- Automatic multiple sector data transfers
- Internal sync detection
- NRZ byte synchronization timeout

# SSI 32C9210

## ATA-3 Interface Controller

### 200 Mbit/s, Headerless Support

#### ECC LOGIC

- Programmable 144-bit to 272-bit Reed-Solomon ECC
- No rotational delay required to perform corrections
- Guaranteed to correct all correctable errors in real time
- Programmable to 3-burst or 5-burst error correction
- Can correct up to 120-bit bursts

#### MICROPROCESSOR INTERFACE

- Supports both multiplexed or non-multiplexed address and data buses
- Supports many processors including most Intel® and Motorola® processors, and TI TMS320C DSPs
- Host and disk interrupts may be separate on two pins, or combined on a single pin
- 64-byte data buffer window

#### OTHER FEATURES

- On-chip frequency synthesizer for generation of buffer timing
- Internal power-down modes
- Available in 128-Lead QFP and TQFP packages

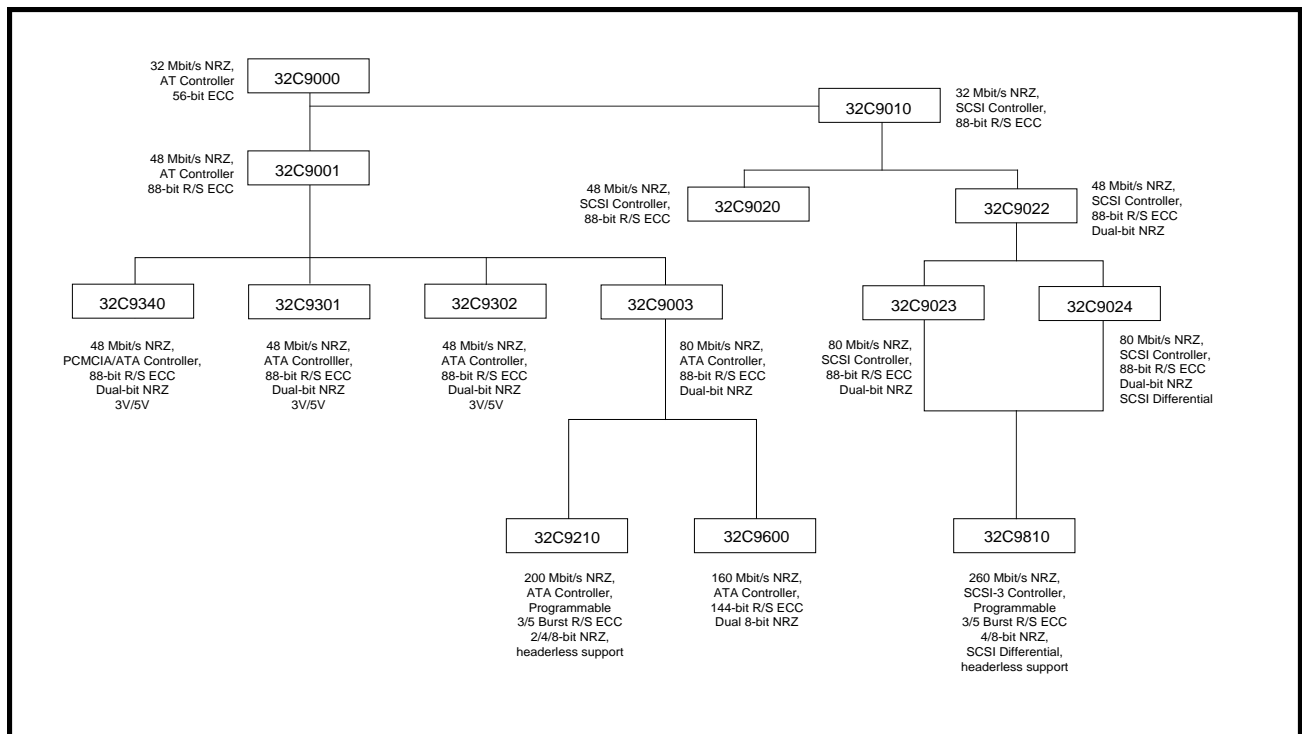


FIGURE 1: Silicon Systems' Disk Controller Chip Hierarchy