



## FEATURES

### General

- Single-chip integration of CD-ROM decoder, CD-ROM encoder, CIRC encoder, EFM modulator, ATIP decoder, buffer manager, and interface to SCSI protocol ICs
- DVD port (CL-CR3475 only)
- Highly automated and high-performance CD-Recordable formatter
- High-performance CD-ROM decoder
- Designed for easy and efficient firmware programming
- High-performance built-in ATAPI interface
- Fully compatible with the ATAPI Specification SFF-8020
- Automatic power-down interfaces when idle
- 144- and 176-pin LQFP packages available
- Built-in clock synthesizer

### ■ CD-ROM Decoder

- Supports CD-ROM, CD-I, and CD-DA™ (CD-Digital Audio) formats
- Supports various compact disc DSP (digital signal processor) controllers
- Supports disc speeds up to 65-MHz MCLK
- CD speeds up to 40x

(cont.)

## ATAPI CD-R/RW Encoder/Decoder

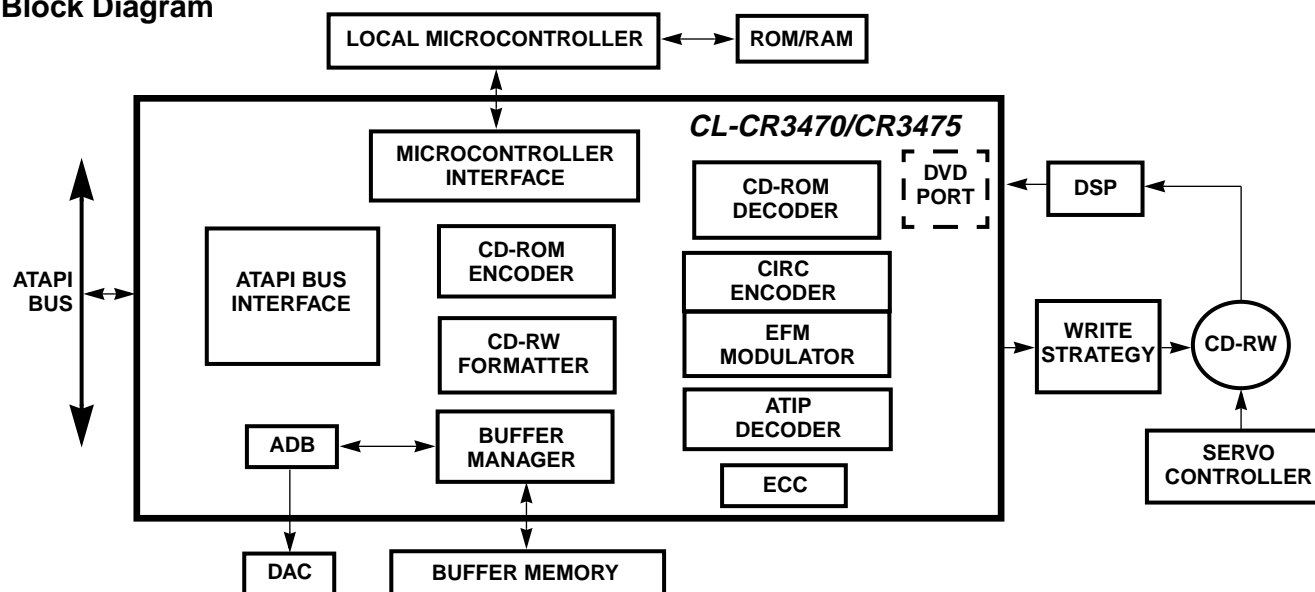
## OVERVIEW

The CL-CR3470 and CL-CR3475 are single-chip, high-performance, highly integrated ATAPI interface devices for the CD-R/RW (CD-Recordable/CD-Rewritable) market. The CL-CR3470/CR3475 integrates CD-ROM decoder, CIRC encoder, EFM modulation, ATIP decoder, buffer manager, and ATAPI interface logic. In addition to its CD-Rewritable capability, the CL-CR3475 features a DVD port enabling drive manufacturers to develop a drive that reads DVD, CD-ROM, CD-R, and CD-RW.

The CL-CR3470/CR3475 supports up to 40x read and 10x record disc speeds, allowing customers to preserve all CD-R/E encode/decode electronics and firmware as the disc speed requirements increase. All write methods are supported by the CL-CR3470/CR3475 disc-at-once, track-at-once, packet recording, and

(cont.)

## System and Functional Block Diagram



**FEATURES** *(cont.)***■ CD-ROM Decoder** *(cont.)*

- Supports programmable pseudo-sync-mark insertion for CD-ROM sector synchronization
- Supports automatic target sector header search for CD-ROM
- Supports CD-Text mode format
- Sector header validity check is done by hardware during data transfer
- Realtime CD-ROM layered ECC error correction with programmable number of P- and Q-word corrections per sector (up to 64 total)
- Supports realtime subcode R-W correction in CD-DA mode
- Automated CD-R packet disc read Method-1 and Method-2

**■ ADB (Audio Data Buffer) and DAC Interface**

- Supports CD-DA data buffering without slowing the motor to 1x speed
- Supports streaming during disc-to-DAC data transfer
- Supports various DACs

**■ CD-R/RW Encoder**

- Supports all write methods: disc-at-once, track-at-once, packet recording, multi-session-at-once
- Fully compatible with Orange Book Version 2.9 specification
- Highly automated CD-R formatter eliminates the sector-by-sector intervention by the microcontroller
- Supports CD-RW logical erase
- Supports up to 10x recording
- Supports subcode R-W encode
- Integrated CIRC encoder
- SPI (Serial Parallel Interface) controls an optional external CD-R engine (CL-CR3475 only)
- Integrated EFM modulation circuitry
- Integrated ATIP decoder with target ATIP search function
- Provides timing for laser power on/off control

**■ ATAPI Host Interface**

- True realtime hardware/software ATAPI compatibility
- Hardware implementation of ATAPI packet command ATAPI reset command
- Automated protocol control on block data transfer for ATAPI read/write commands
- Supports Ultra ATA 33 data transfer protocol with data rate up to 33.3 Mbytes/sec.
- Supports any host speed with programmable and auto wait-state generation
- Supports fast ATA transfer speed up to PIO mode 4, single-word DMA mode 2, and multi-word DMA mode 2
- Provision to daisy-chain two ATA or ATAPI embedded drives

**■ Buffer Manager**

- Supports 8-bit and 16-bit DRAM
- Dual-port circular buffer control with access-priority resolver
- Direct addressing of up to 16 Mbytes of DRAM
- Supports variable buffer segmentation
- Supports streaming mode: hardware automation of concurrent host and disc transfers from different buffer segments with a pacing mechanism to prevent buffer overrun and underrun conditions

**■ Microcontroller Interface**

- Supports high-speed Intel®- and Motorola®-type microcontrollers
- Supports non-multiplexed and multiplexed address and data buses
- Interrupt- or polled-microcontroller interface
- Supports Intel- and Motorola-type byte ordering for word-wide microcontroller instructions
- Hardware wait states provided by the LREADY signal with programmable or automatic wait state timing
- Supports direct microcontroller access to buffer memory

**■ SCSI Interface**

- Supports data transfer to/from SCSI protocol devices, such as Symbios Logic® 53CF94/96-2 and 53CF92A Fast SCSI controllers

**■ Integrated DVD Port**

- 8-bit parallel interface to optional DVD data decoder (CL-CR3475 only)
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## **OVERVIEW** (cont.)

multi-session-at-once. These devices incorporate the most comprehensive error correction available in the industry, using realtime CD-ROM-layered ECC error correction with a programmable number of P/Q-word corrections per sector (up to 64 total). The CL-CR3470/CR3475 also supports realtime subcode R-W correction in CD-DA™ mode. Other hardware-enabled features include automatic target-header search, sector-header validity check during data transfer, programmable pseudo-sync mark insertion for sector synchronization, and automated CD-R packet disc read (Method 1 and Method 2). The CL-CR3470/CR3475's DSP interface supports CD-ROM DSPs from numerous manufacturers. The DSP interface includes three types of interface signals: main data channel signals, subcode channel signals, and serial DSP programming signals.

The integrated formatter is a built-in control processor that executes formatter instructions stored in the buffer memory, controls the CD-ROM encoder, and specifies how each block is generated/encoded through an entire recording operation. The built-in high-performance buffer manager controls the flow of data

between the external DRAM data buffer and all other internal blocks.

These interfaces store and retrieve data to/from external buffer memory using interleaved access.

In addition, the CL-CR3470/CR3475 supports streaming mode and the hardware automation of concurrent host and disc transfers from the same buffer segment. These features ease firmware programming and decrease microcontroller intervention.

The highly automated and optimized ATAPI interface is designed for compliance with the ATAPI specification. The ATAPI Command and Control Block registers are contained in the CL-CR3470/CR3475 register set, which allow both the host and local microcontroller access. The CL-CR3470/CR3475 supports ATAPI protocols by hardware without microcontroller intervention.

The CL-CR3470 is available in a 144-pin LQFP package, and the CL-CR3475 is available in a 176-pin LQFP package.

## **ADVANTAGES**

### **Unique Features**

### **Benefits**

■ Supports disc speeds up to 40x read and 10x write	<input type="checkbox"/> Enables the highest-performance CD-R/RW drives
	<input type="checkbox"/> Allows headroom for future speed requirements without a complete system redesign
■ Single-chip integration of CD-ROM encoder/decoder, CIRC encoder, EFM modulator, ATIP decoder, buffer manager, and host interface logic	<input type="checkbox"/> Reduces cost, board space, chip count, and interconnections
	<input type="checkbox"/> Eases system design and firmware development
■ Realtime ECC correction (up to 64 P/Q-word corrections/sector) and Erasure Pointer correction, with no microcontroller intervention	<input type="checkbox"/> Improves system performance, reduces firmware overhead and microcontroller performance requirements, and improves reliability and correction capability
■ Realtime subcode error R-W correction in CD-DA™ mode	<input type="checkbox"/> Exceeds advanced ECC requirements of state-of-the-art CD-ROM designs for a variety of media/performance combinations
	<input type="checkbox"/> Allows headroom for future ECC requirements without a complete system redesign
■ Unique DVD port (CL-CR3475 only)	<input type="checkbox"/> Enables CD-RW devices that also read DVD

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