

## At the Forefront of Optical Disc Technology

# DVD Systems

- The same size as compact discs (CD)
- About seven times the capacity of compact discs (for single-sided DVDs)
- 135 minutes of high image quality video with high-fidelity sound on a single disc

The CD, which first became commercially available in 1982, revolutionized the audio market, and a CD-ROM drive is now included in nearly every personal computer. Furthermore, the MiniDisc (MD) is exhibiting steady growth as well.

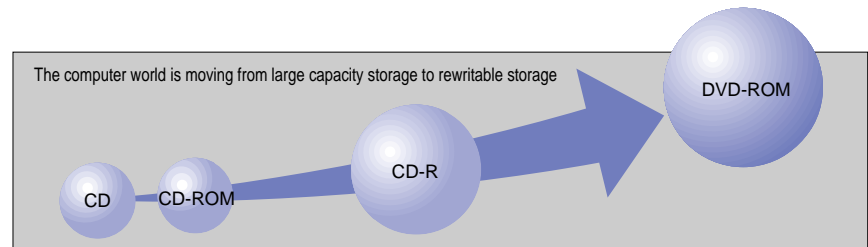
As one of the proposers of these optical disc formats, Sony has led the industry. In the semiconductor area also, Sony provides customers with the most advanced technology in the form of signal processing LSIs with built-in DRAM for MD and CD-ROM CAV playback.

Sony is committed to taking advantage of these technologies in both the CD-ROM and DVD-ROM areas, which are expected to grow rapidly, and to make these technologies prove useful to our customers.

## What is DVD?

Table 1 presents the basic specifications for CDs and DVDs. The DVD is a disc with the same 12-cm diameter as that of a CD, and provides a capacity of about 4.7 GB on a single-sided single-layer disc. Standards have also been established for the following disc types: single-sided dual layer (capacity: 8.5 GB), dual-sided single layer (9.4 GB), and dual-sided dual layer (17 GB). A single-sided single-layer disc can hold about 135 minutes of video programming.

In the DVD, the minimum pit size and track pitch are reduced to about 1/2 of those on the CD. This means that the wavelength of the laser used in the optical pickup to read data from the disc must be reduced from the 780 nm (nanometer) wavelength used in CDs to 650 or even 635 nm to support the larger capacities and higher densities.



■ Figure 1 Advances in the World of Digital Storage

■ Table 1 Comparison of Basic CD and DVD Specifications

	CD	DVD (Single-sided single-layer discs)
Disc diameter	120mm	120mm
Disc thickness	1.2mm	1.2mm (0.6mm × 2)
Storage capacity	0.68GB	4.7GB
Minimum pit length	0.83µm	0.4µm
Track pitch	1.6µm	0.74µm
Laser diode wavelength	780nm	650/635nm
Comparison of pit size and track pitch		

## Sony Chip Set that Integrates the Main Functions of the Front End Block in Four LSIs

Figure 2 shows the system block diagram of a DVD-ROM drive. This system consists of an RF amplifier (CXA2545R), a DVD read channel LSI (CXD2581R), a CD digital signal processor (CXD3000R), a data decoder (CXD1861R), and a copy protection LSI (CXD1862Q).

This drive supports playback from both DVDs (DVD-ROM and video DVDs) and CDs (CD-ROM and audio CDs) and supports 1× (normal speed) playback of DVD-ROMs and 8× playback of CD-ROMs.

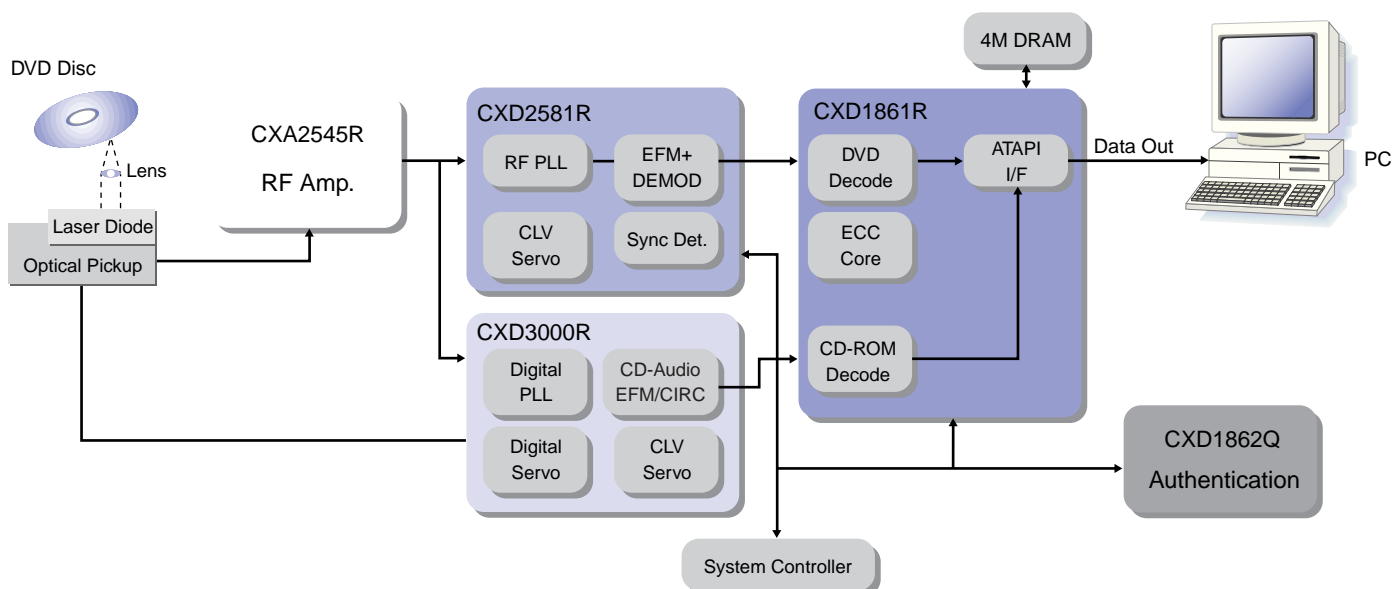
This system uses ATAPI as the personal computer interface, and supports transfer modes up to PIO mode 4 and DMA mode 2.

The signal read from the DVD disc is passed through the RF amplifier and PLL and 8-16 demodulation are applied to it at the read channel LSI. The demodulated data is passed to the data decoder and temporarily stored in buffer memory (DRAM). Reed-Solomon code error detection and correction is then applied to the data stored in the buffer memory. Data from which errors have been removed is then passed to the personal computer. Data read from a CD is processed in the same way as current CD-ROM drives operate, namely by passing the data through an RF amplifier, a CD digital signal processor, and a data decoder.

The servo control functions for both DVD and CD playback are mainly handled by the CD digital signal processor. This means that this system is extremely easy to use if a Sony CD digital signal processor is used. The DVD copy protection LSI provides authentication key creation and other functions.

## Future Developments

Future developments in this area will include the introduction of signal-processing technologies for higher speed playback and programmable servo systems to provide systems capable of even higher playback speeds. At the same time, work will continue on providing even lower power operation, increased LSI integration levels, and even easier to use LSIs.



■ Figure 2 System Block Diagram