CD Audio Digital Signal-Processing LSI Device
with On-Chip Digital Servo System
Allows Listening without Sound Skipping

CXD3027R-1

Sound skipping can be truly irritating when trying to enjoy music on a CD outdoors. People like to listen to their music without interruption, even when moving around.
Sony has now applied the firm's high-level design technology to resolving this problem. The result is an "ultra single chip" product that adds a memory controller function (with data compression and expansion) for even better anti-shock performance to Sony's most powerful and functional CD digital signal-processing LSI device.
While it goes without saying that this product will contribute to the implementation of portable CD players for active users, this device can also be used in CD players for car stereo systems.

- **Memory controller functions, digital signal processing, digital servo, DF, D/A converter, and low-pass filter circuits integrated on a single chip**
- **Supports variable-speed playback from 0.5 to 4× using CAV playback mode.**
- **Completely adjustment-free due to the use of a digital servo system**
- **Built-in DDBB*1 function**

*1 DDBB: Digital Dynamic Bass Boost

High-Functionality Memory Controller Function

CD players read out the digital signal from the disc using a built-in pickup and provide high-fidelity sound. However, portable CD players often become unable to play back audio normally when, for example, the user goes up or down stairs and the mechanical shock applied to the CD player causes the pickup to lose focus, or the user simply walks normally and the swaying causes variations in the rotation speed of the disc. In these cases, when the signal is interrupted, the audio data is interrupted and a sound skipping occurs. The CD player memory controller function is a system that saves audio information in an external memory (DRAM) in expectation of a sound skipping occurring. This function prevents sound skipping by replacing the audio data from the disc with the stored audio when the disc data is interrupted by a mechanical shock. The CXD3027R-1 supports DRAM capacities of 4M or 16M bits, and supports compression/expansion for handling the stored audio data. Applications can choose one of four modes in which data is stored in its original 16-bit word length, compressed to 4 bits, compressed to 6 bits, or compressed to 8 bits. If memory has been filled with data, the CXD3027R-1 can continue providing audio playback to the user for the fixed periods (logical values) listed in table 1.

V O I C E

This LSI device can contribute to improved anti-shock performance by adding compression and expansion functions to a conventional anti-shock memory controller. However, what was most memorable for us was the fact that the psychological strength of the individual members of the team grew as much as did the resistance to mechanical shock provided by this LSI device while we were under the pressures of the design process. I expect that this device will be used in many portable products, and I strongly recommend that you consider it for your designs, too.

Digital Signal Processing

The CXD3027R-1 supports variable playback speeds from 0.5 to 4×. This system provides the following advantages since the anti-shock functions are implemented for CAV playback.

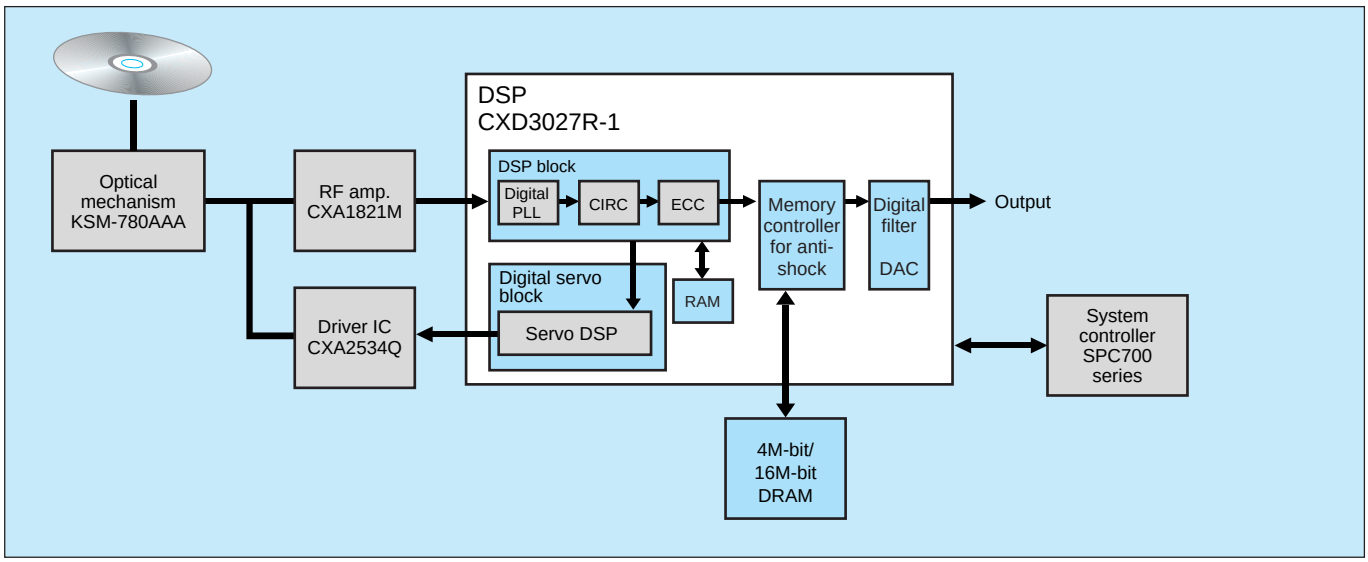
- Since rough servo control of the motor speed can be used with the spindle motor, the number of acceleration and deceleration operations is reduced. This reduces vibration and power consumption.
- Since there is no need to change the disc speed when jumping tracks, the signal can be read out immediately. This can reduce the access time.

Furthermore, since it was necessary to integrate this memory controller function on the same chip as the high-functionality CD digital signal-processing LSI device, we fabricated the CXD3027R-1 in a new process technology. This allowed power consumption to be reduced.

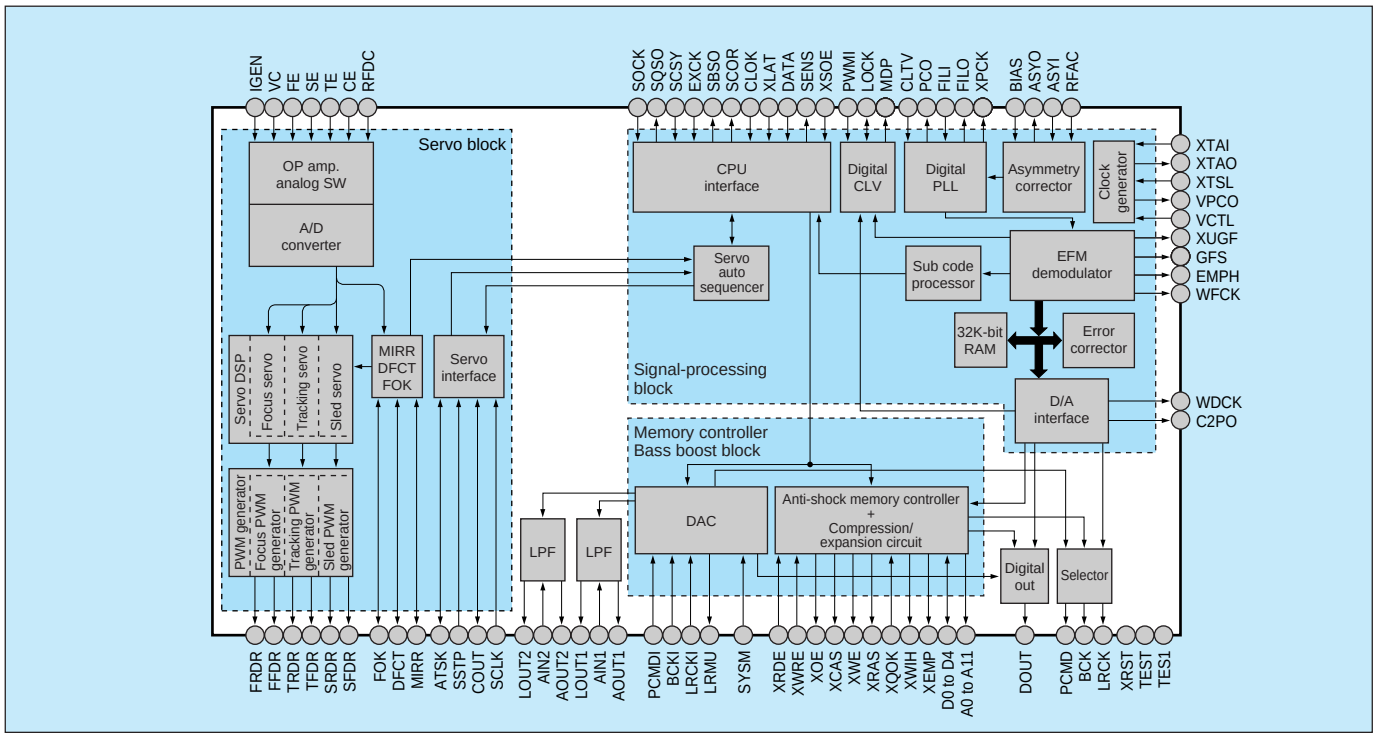
On-Chip DDBB

The CXD3027R-1 provides a bass boost function that requires no external components by using built-in digital filters. Note that the amount of boost can be varied according to the input level, i.e. to function dynamically.

New Products



■ **Figure 1 CXD3027R-1 System Block Diagram**



■ **Figure 2 CXD3027R-1 Block Diagram**

■ **Table 1 Continuous Playback Times Provided during Mechanical Shock**

DRAM	Compression technique	Time (logical value)
4M-bit DRAM	No compression	Approx. 3 s
	4-bit compression	Approx. 11 s
	6-bit compression	Approx. 7 s
	8-bit compression	Approx. 5 s
16M-bit DRAM	No compression	Approx. 12 s
	4-bit compression	Approx. 44 s
	6-bit compression	Approx. 30 s
	8-bit compression	Approx. 22 s