Second Generation IR Digital Audio Transmission IC Chipset
Achieves CD Quality Audio

CXD4016R, CXD4017R, CXA3668N

In 2001, Sony developed the DIAT (Digital Infrared Audio Transmission) system that transmits CD quality audio through space using infrared light, and in 2004 this system was standardized as the IEC61603-8-1 international standard. Now, in preparation for the increasing popularity of DIAT, Sony has developed a second generation DIAT chipset, consisting of the CXD4016R, CXD4017R, and CXA3668N. Compared to the first generation chipset, this chipset features integration of the PLL circuit, lower power through a reduction in the size of the chips, and smaller packages.

CXD4016R

- **Transmission digital signal processing IC with integrated PLL circuit**

CXD4017R

- **Reception digital signal processing IC with integrated PLL circuit**

CXA3668N

- **Reception analog signal processing IC with integrated AGC and BPF circuits**

With the development of this chipset, IR digital audio transmission systems (DIAT) stipulated by the IEC61603-8-1 international standard can now be implemented easily and at lower cost than was possible with the first generation chipset. While the first generation chipset could only support high-end products, this new chipset can be used in popularly priced products and contribute to more widespread use of the DIAT system.
DIAT applications include wireless headphones and wireless connection of rear speakers in home theater systems.

V O I C E

The problem that concerned us the most at the start of development was how to increase the popularity of the DIAT method. In addition to there being a strict deadline, the schedule for the end product that would use this chipset was already fixed and we designed this chipset with only a single digital systems designer on the team. This made the design particularly difficult. However, those difficulties spurred us on to greater efforts, and I am confident that we have succeeded in designing a product that will fully satisfy our customers. I strongly urge you to consider this product.

Coexistence with Other IR Systems

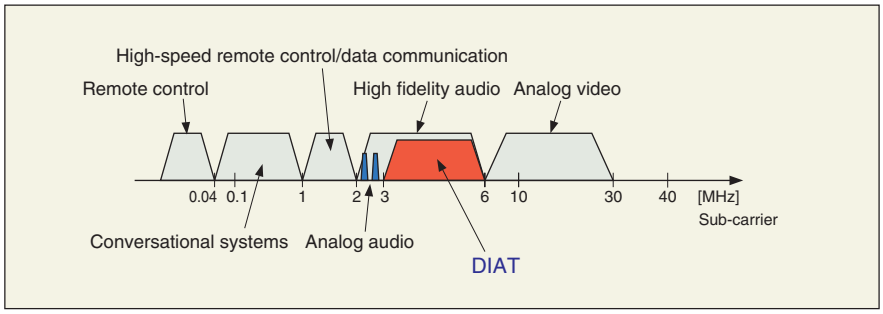
In systems that use IR, the IR subcarrier frequency band occupied by each application is determined in advance to avoid interfering with other IR systems. (See figure 1.) The 3 MHz to 6 MHz band is allocated to the DIAT system, and DIAT applications can be used at the same time as other IR equipment such as IR remote controllers.

Two Transmission Modes

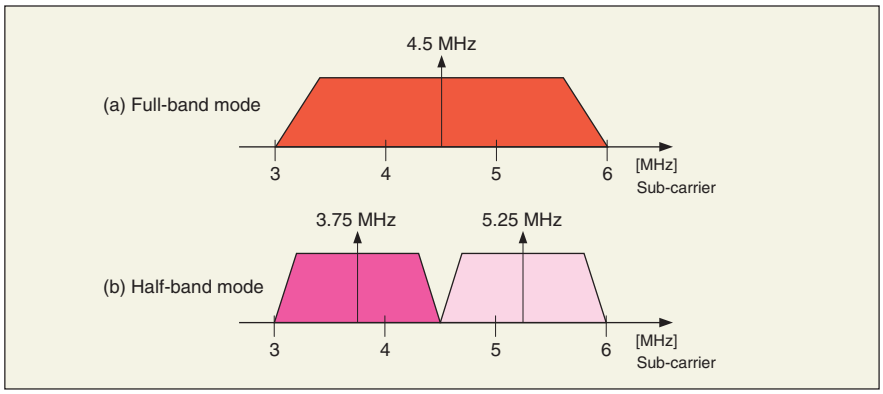
There are two transmission modes, full-band mode and half-band mode, provided for DIAT systems, and depending on the application, one or the other may be chosen. (See table 1.)
Full-band mode is a mode in which the allocated band can be used directly, and half-band mode divides the allocated band into two bands and allows them to be used independently. (See figure 2.) Full-band mode supports the transmission of 24-bit stereo signals, and thus makes high-quality audio transmission possible. In contrast, half-band mode can transmit 16-bit stereo signals, and thus can transmit audio signals with quality equivalent to that of CDs. It also has the advantage that when used with the same transmission power as full-band mode it extends the service distance by roughly a factor of 1.4.

Simple System Structure

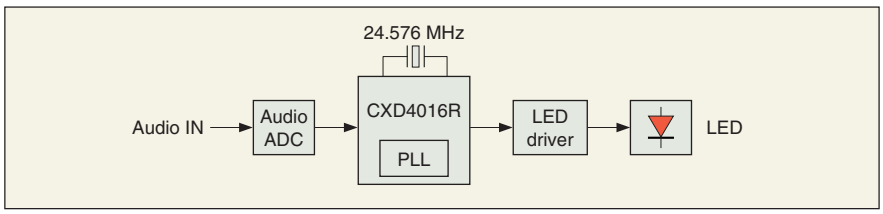
Figure 3 shows an implementation of a transmission system and figure 4 shows an implementation of a reception system. Since digital audio signals can be transmitted without compression, and since microcontroller support is not required, a digital audio wireless transmission system can be implemented with an extremely simple structure. In the transmission side, the second generation IC reduces costs and mounting area by the integration on the same chip of the PLL circuit, which was implemented externally in the first generation IC. Furthermore, in the reception side, the chip size of the CXA3668N has been reduced allowing the 28-pin SOP used in the first generation chip to be replaced with a 24-pin SSOP, thus reducing the package area to about 1/3 of that of the previous generation and allowing mounting areas to be reduced in end products.



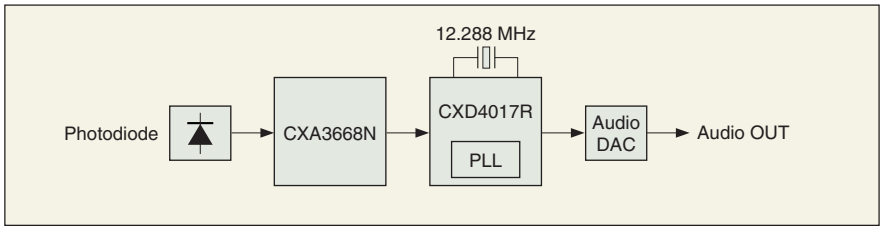
■ **Figure 1 Subcarrier Frequency Allocation**



■ **Figure 2 Bandwidths Occupied in Full-Band Mode and Half-Band Mode**



■ **Figure 3 Transmission System Implementation**



■ **Figure 4 Reception System Implementation**

■ **Table 1 Full-Band Mode and Half-Band Mode Features**

	Full-band mode	Half-band mode
Main data rate	3.072 Mbit/s	1.536 Mbit/s
Sub data rate	80 kbit/s	40 kbit/s
Occupied bandwidth	2.5 MHz	1.25 MHz
Subcarrier frequency	4.5 MHz	3.75 MHz/5.25 MHz