

Ultrahigh-Speed (100 MHz) Photodetector IC for CD-ROM and DVD-ROM Players

CXA2586M

Sony has created a photodetector IC product for use as the optical pickup in CD-ROM and other optical disc drives. This device (the CXA2586M) achieves the industry's highest performance: a bandwidth of 100 MHz.

The CXA2586M supports CD-ROM drives with read speeds of 60× or higher and DVD-ROM drives with read speeds of up to 12×.

A newly developed ultrahigh-speed photo IC process (P-42B) was adopted, allowing the CXA2586M not only to achieve higher speeds, but also to achieve a noise level reduced by -6 dB from conventional products.

- Ultrahigh speed: 100 MHz
- Low noise: -87 dBm (@54 MHz)
- On-chip summing amplifier
- Miniature transparent molded package (SOP)

The CXA2586M is a photodetector IC (PDIC) used as the optical pickup in CD-ROM and DVD-ROM drives.

■ Ultrahigh Speed

By adopting the newly-developed P-42B*¹ ultrahigh-speed high integration density bipolar process, the CXA2586M achieves a bandwidth of 100 MHz and thus can support 12× speed DVD-ROM drives.

*1 See Sony Cx-News Vol. 16 (pages 8 to 13) for more information on the P-42B process.

■ Low Noise

While bandwidth is important, the noise characteristics are also crucial for PDICs. The main function of the PDIC internal circuits is to convert an extremely faint current signal to a voltage signal. This function is called an I-V amplifier. With conventional PDIC technology, it was necessary to restrict the gain of the I-V amplifier to a low level to achieve a bandwidth of about 50 MHz, which corresponds to a 32× speed CD-ROM drive, and to add a voltage amplifier in a later stage to acquire the required output voltage (24 mV/μW). This approach has the problem that the noise is amplified along with the signal by the voltage amplifier later in the circuit. Since the P-42B process used in this device features an extremely high potential, it was possible to extend the bandwidth to 100 MHz while maintaining the required output voltage with just a single I-V amplifier stage. Thus the noise level was reduced by -6 dB as compared to earlier devices.

■ On-Chip Summing Amplifier

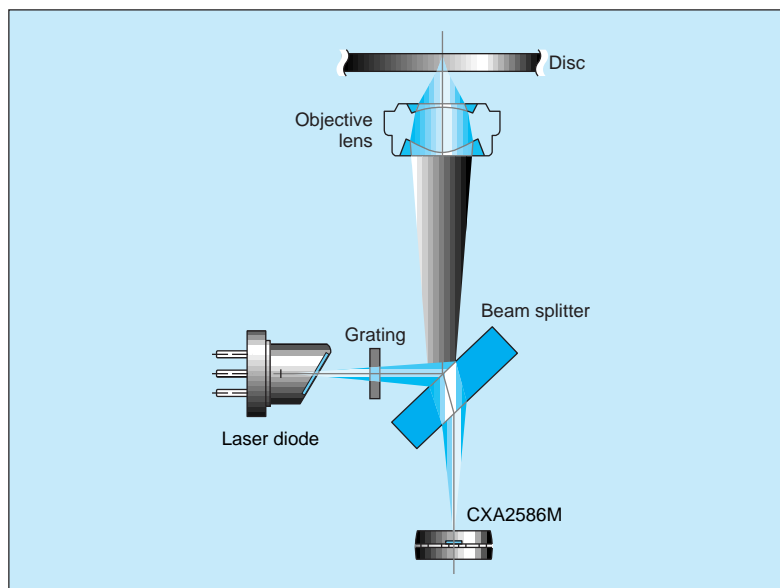
CD-ROM and other optical disc systems detect the 0/1 states in the pit signal (i.e. generate the RF signal) by summing the four channel outputs (A to D) from the PDIC, which generates the focus error signal. The CXA2586M integrates a four-channel summing amplifier on the same chip for channels A to D. Since there is no need for external summation, the CXA2586M can provide clear playback even for CD-RW and similar technologies that produce only faint signals. It goes without saying that this summing amplifier has a bandwidth of 100 MHz and supports ultrahigh-speed playback.

V O I C E

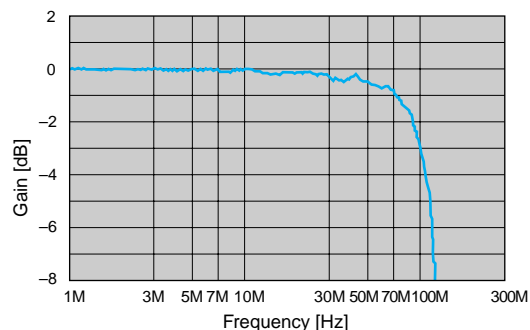
When I started working for Sony, 8× speed was thought to be the fastest CD-ROM drives that would ever become, so we designed a PDIC that would support 8× speed playback. But, as you know, CD-ROM drives have already reached 48× speed. Now, hoping that we finally have an idea what the ultimate product will be, we have developed a PDIC with a 100 MHz bandwidth. This PDIC will support some amount of increased playback speed. I hope you will try using it in your designs.



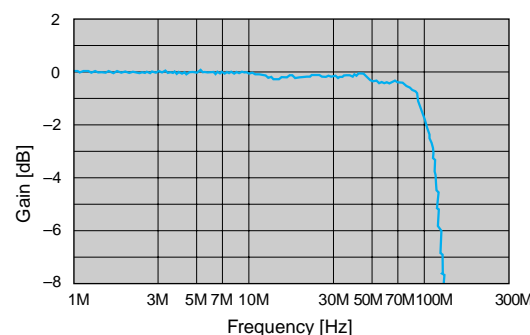
*New
Products*



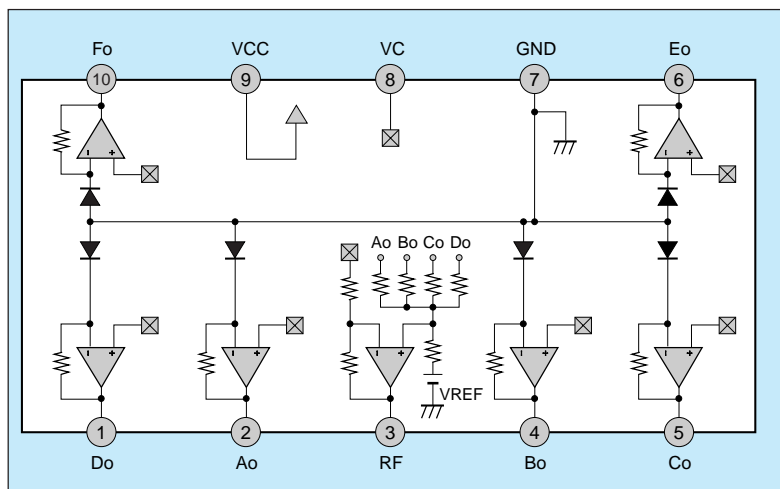
■ Figure 1 Sample Optical Pickup Structure



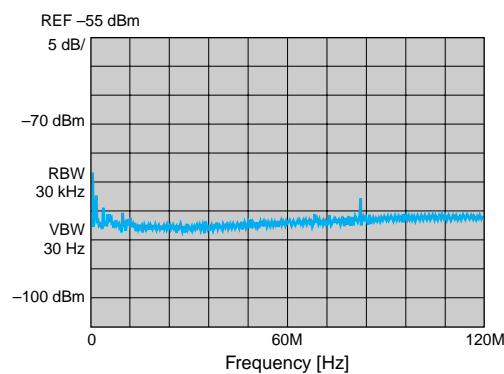
■ Figure 4-1 A to D Frequency Response



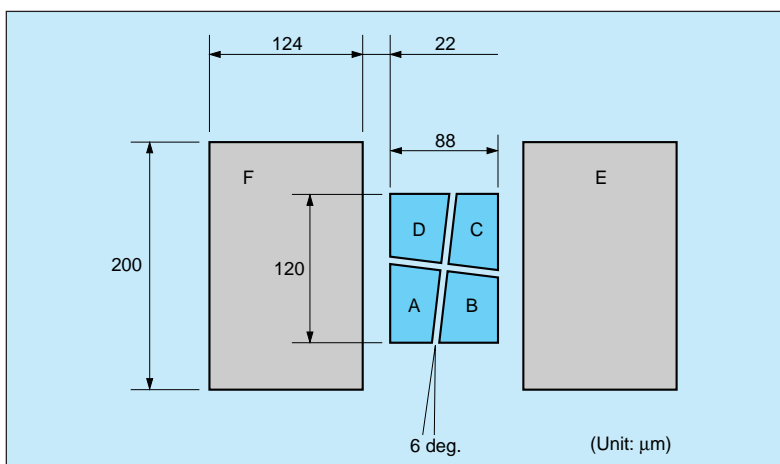
■ Figure 4-2 RF Frequency Response



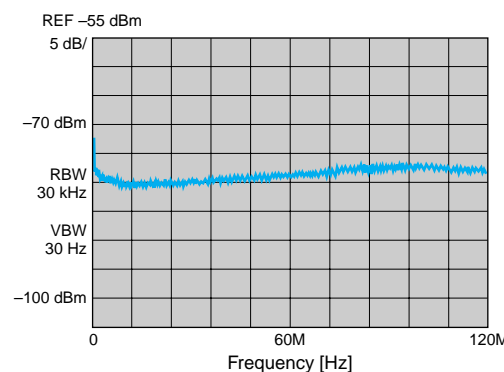
■ Figure 2 Block Diagram



■ Figure 5-1 A to D Noise Characteristics



■ Figure 3 Optical Pickup Pattern Dimensions



■ Figure 5-2 RF Noise Characteristics