

# CXA3746ER

## Silicon Tuner IC for Analog and Terrestrial Digital TV Broadcast Features Superlative Sensitivity and Interference Rejection



Due to the recent appearance of OLED TVs and ultrathin LCD TVs, even further miniaturization in the tuner module, one of the most important functional components, is strongly desired.

Furthermore, increasingly diverse functionality, such as recording functions and multiple image display and products that include multiple tuners are additional reasons that miniaturization of the tuner module is strongly desired.

To respond to these needs, Sony has now developed the CXA3746ER, which achieves both reduced image noise, which is critical for analog broadcast reception, and excellent interference rejection, which are important for terrestrial digital broadcast reception.

- Achieves both high sensitivity and excellent interference rejection
- Low IF output obviates the need for a SAW filter
- Low phase noise: -110 dBc/Hz (100 kHz offset)
- Low spurious signals

### Low IF Architecture Adopted

In conventional can tuners, 58 MHz is used as the IF (intermediate frequency) and a SAW filter (surface acoustic wave) is used as the channel filter. Since the pass band characteristics are determined by the physical parameters, the SAW filter has the disadvantage that it cannot be made smaller than a certain fixed size.

By selecting 4 MHz as the IF, the CXA3746ER is able to integrate a filter with the same sharp selectivity characteristics as SAW filters on the same chip and thus obviate the need for the SAW filter.

Furthermore, a newly-developed circuit is adopted as the output circuit to achieve low distortion and a high output dynamic range.

### High Sensitivity and Excellent Interference Rejection

The CXA3746ER integrates an RF tracking filter and can implement a high-Q RF filter for extremely high rejection of interfering

signals. Sony repeatedly performed simulations for RF filter impedance matching and to reduce the input resistance and achieved a low noise figure (NF = 4 to 6 dB) by optimizing the FET device. This allowed the CXA3746ER to achieve a high sensitivity.

### RF Level Detection Circuit and RF AGC

Another method for achieving excellent interference rejection is to detect the level of the broadcast signal waveform input from the antenna and to automatically lower the gain when that signal has a high level, thus adjusting the mixer input to have an optimal value so that distortion does not occur. The CXA3746ER adopts this self-AGC mechanism.

### Low Phase Noise Built-in VCO and PLL

While a resonator circuit consisting of on-chip inductor and varactor devices is built in, the CXA3746ER features a VCO with superlative phase noise performance.

The CXA3746ER achieves at the same time both the phase noise away from the carrier (100 kHz and over offsets) required for analog broadcast reception and the phase noise in the vicinity of the carrier (under 10 kHz offsets) required for terrestrial digital broadcast reception by adopting a dual-mode PLL that provides both fractional-N PLL and integer PLL modes.

### Low Spurious Signals

Spurious signals\*1 are a major problem for tuners that handle high-frequency wide bandwidth signals from 90 to 770 MHz. Especially for analog broadcast reception, when the spurious signals are in the reception signal band, they can appear as noise in the image.

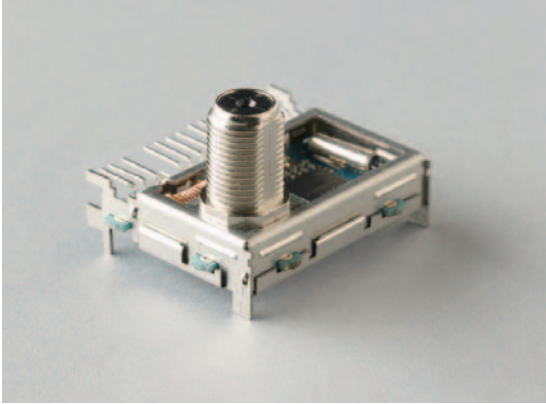
Sony designed the circuit structures and chip layout in the CXA3746ER to suppress spurious signals so that it could also be used with analog broadcasts. As a result it achieves an input converted spurious signal level of -130 dBm or lower.

\*1: Spurious signal: Frequency components due to interference between signal, high-frequency leakage from local oscillators, and other factors that can have an adverse influence on reception.

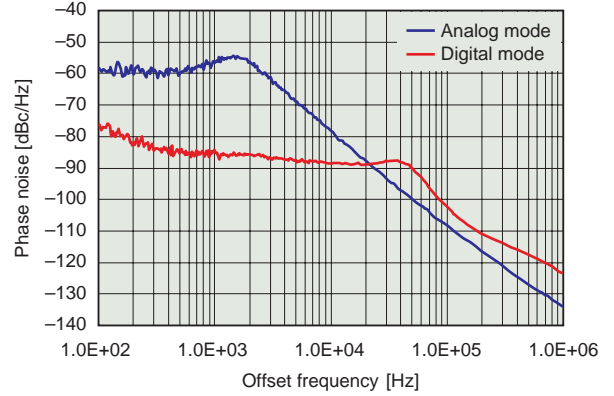
### V O I C E

I am convinced that the CXA3746ER is the industry's first silicon tuner IC that is capable of handling large-screen TV applications. Together with the members of the development team, we put our full effort into applying Sony's analog IC technologies, including process and measurement technology. I strongly recommend this high-performance silicon tuner as a device that holds great potential.

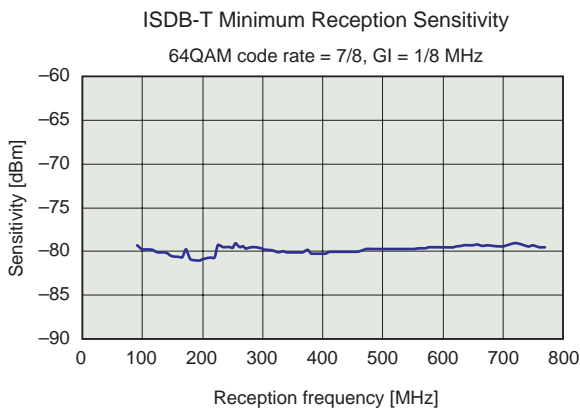
**Photograph 1** Example of Mounting in a Miniature Module



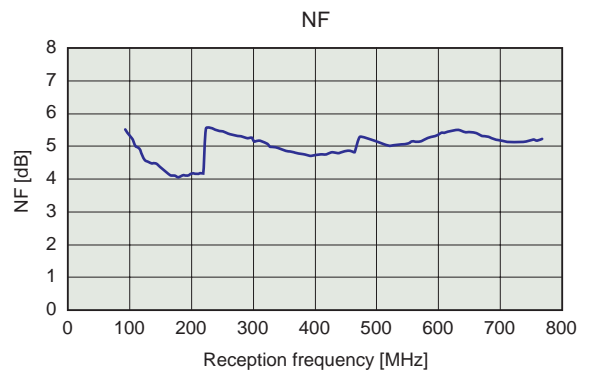
**Figure 1** Phase Noise



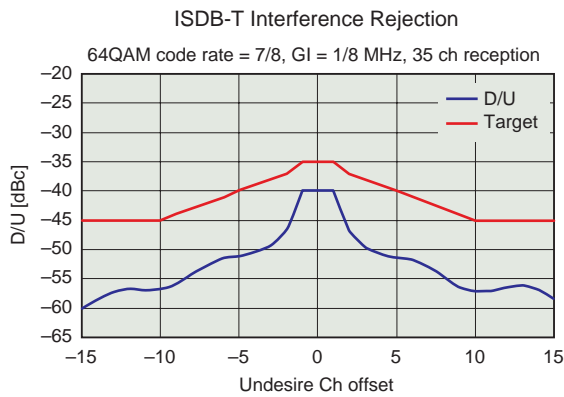
**Figure 2** Input Sensitivity



**Figure 3** Noise Figure



**Figure 4** Interference Performance



**Figure 5** Block Diagram

