

CXA3685ER

Along with the increasing popularity of terrestrial digital broadcast receivers, the number of products such as TV sets and DVD recorders that include tuners for broadcast satellite digital broadcasts is increasing. Furthermore, due to the increasing functionality of these end products, the number of products that include two or more tuner units is increasing. Thus there are increasing demands not only for further miniaturization in satellite broadcast tuners, but also for “hybrid tuners” that support both terrestrial and satellite broadcast reception. To respond to these needs, Sony has now developed the CXA3685ER miniature low-power satellite broadcast tuner IC.

- Built-in VCO
- Low power consumption (400 mW)
- External ATT circuit control output
- Superlative multipath and adjacent channel interference rejection characteristics
- Power saving mode

■ 400 mW Power Consumption in a Single 3.3 V Power Supply Device

We are now in an age in which low power consumption in products for use in the home is simply expected, and in TV sets, the rapid switchover to flat panel screens such as LCD panels makes heat dissipation a difficult problem. Thus there are now strong demands for lower power consumption in the individual components used in these products. By using the latest

SiGe BiCMOS process in the CXA3685ER, Sony succeeded in reducing power consumption by one half compared to earlier products while assuring the performance required for broadcast satellite reception. Furthermore, Sony adopted a 48-pin VQFN miniature package with a 0.4 mm lead pitch to contribute to even further miniaturization in the tuner block.

■ Superlative Distortion Characteristics

The CXA3685ER includes an RF tracking filter to prevent the characteristics degradation due to interference signals at frequencies twice or one half that of the desired frequency, which is a problem with the Zero IF (direct conversion) method. The CXA3685ER also includes a seventh-order elliptic function filter optimized for broadcast satellite digital broadcasts to minimize adjacent channel interference.

■ New Functions Optimal for Double and Hybrid Tuners

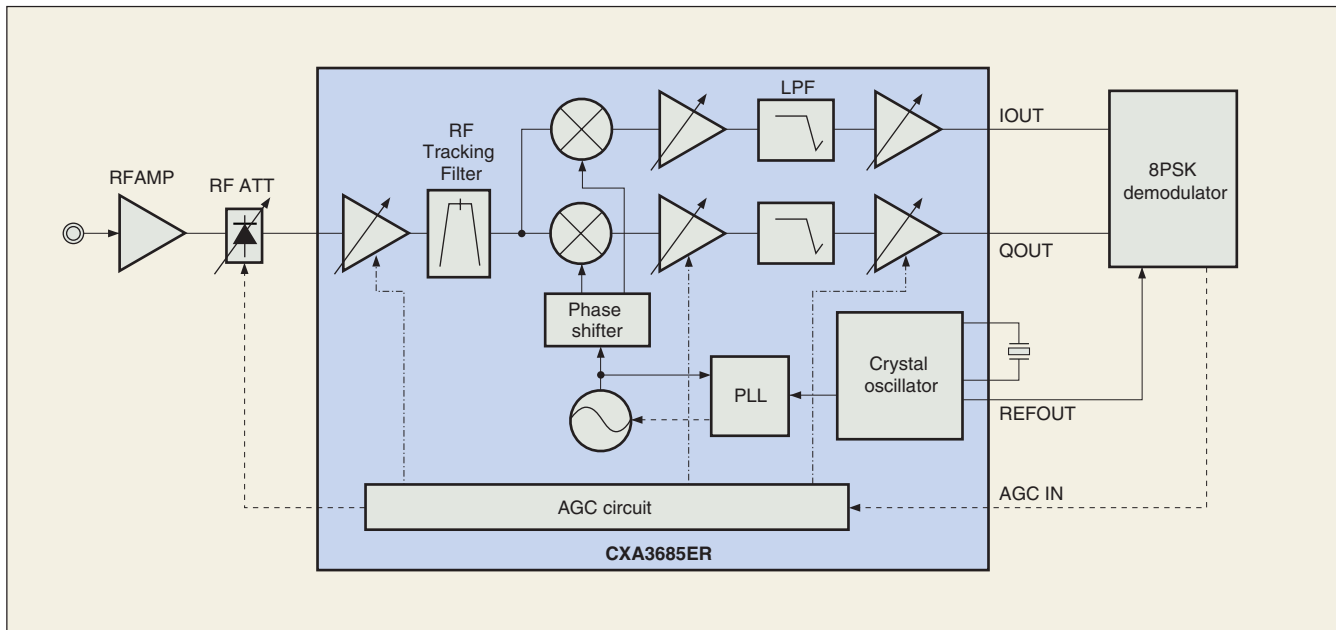
The CXA3685ER provides a power saving mode that can be controlled over the I²C bus allowing power consumption when not being used to be held to 180 mW. The CXA3685ER also provides input and output pins for a crystal oscillator reference signal, and not only can it share a crystal with another CXA3685ER, it can also share a crystal with a CXA3725ER terrestrial digital/analog broadcast tuner IC.

■ Reduced Number of External Components

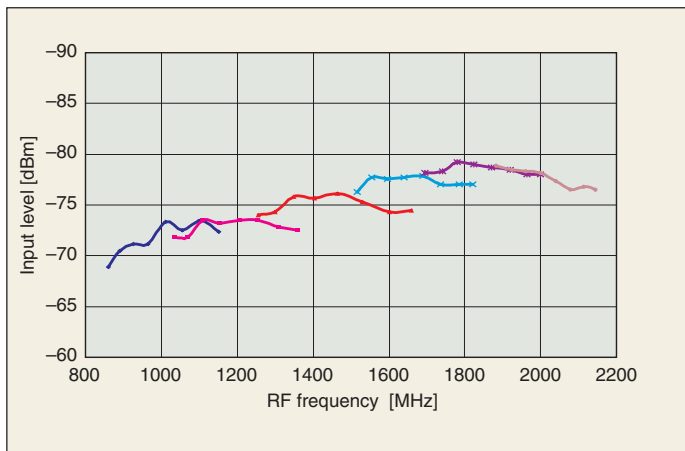
In addition to integrating both low-pass filter and VCO tank circuits on the same chip, the CXA3685ER also includes the control circuits required when an external attenuator circuit is used. While this control circuit is controlled by the AGC signal from the demodulator IC, its slope characteristics can be adjusted over the I²C bus.

V O I C E

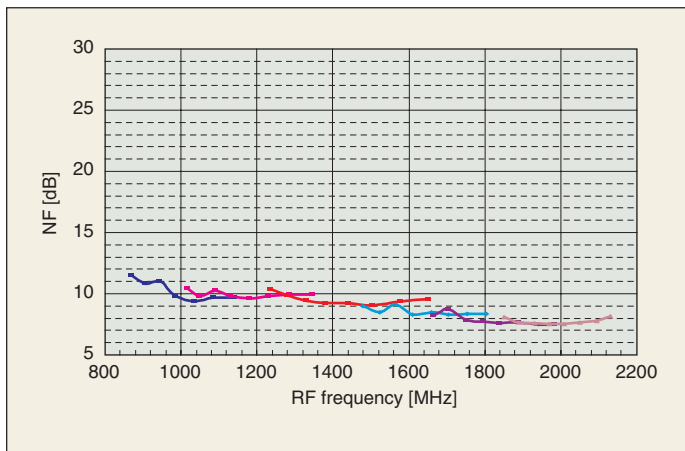
The main issue we faced in designing the CXA3685ER was how to reduce the voltage without sacrificing the operating characteristics of the device. The area that was particularly difficult was the baseband output circuit. Since this device is fabricated in a BiCMOS process, we were able to achieve our goals by using circuits that take advantage of the features of both bipolar and CMOS devices. While concern for performance and power consumption go without saying, we also targeted ease of use in this design effort. We strongly recommend that you consider this device.



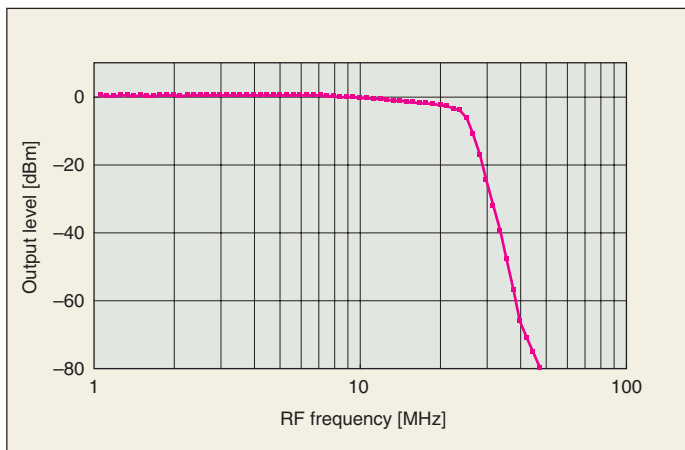
■ Figure 1 TV Tuner System Structure Example



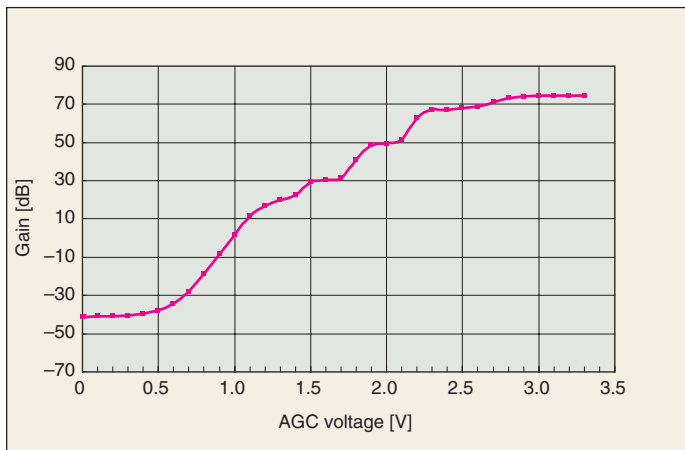
■ Figure 2 Input Sensitivity (IQ output: 0.7 Vp-p)



■ Figure 3 Noise Figure (at full gain)



■ Figure 4 Baseband Low-Pass Filter Frequency Characteristics



■ Figure 5 AGC Characteristics