

# A New Age of Unified High-Frequency Analog and Digital Circuits Digital Satellite Broadcast Tuner IC

## CXA3108Q CXA3038N

Satellite broadcasting using digital modulation first entered service in 1994 in the US, and similar service will begin this year, first in Europe and then in Japan. Thus digital satellite broadcasting is expanding rapidly on a worldwide scale. Sony has now developed a chip set for the tuners of digital satellite broadcast receivers. This chip set, which is introduced here, consists of the CXA3108Q, which takes full advantage of Sony's high-speed bipolar process technology and integrates an oscillator/mixer circuit and a PLL circuit for channel selection on a single chip, and the CXA3038N quadrature detector IC.

### CXA3108Q

- Supports an oscillator frequency of 2.7 GHz
- High gain and low noise figure
- On-chip channel selection PLL  
(Supports both I<sup>2</sup>C bus\* and 3-wire bus systems)

### CXA3038N

- Adjustment-free carrier recovery provided by an on-chip PLL circuit
- Minimal IQ quadrature error and minimal amplitude error

\* For I<sup>2</sup>C bus  
Purchase of Sony's I<sup>2</sup>C components conveys a license under Philips I<sup>2</sup>C Patent Right to use these components in an I<sup>2</sup>C system, provided that the system conforms to the I<sup>2</sup>C Standard Specifications as defined by Philips.

#### ■ On-Chip PLL Frequency Synthesizer Circuit <CXA3108Q>

The CXA3108Q integrates on a single chip two functions that were previously implemented on separate ICs: the L-band down converter functions (oscillator and mixer), and channel selection. The PLL control function supports both the I<sup>2</sup>C bus and the 3-wire bus and allows an even wider range of reference frequencies to be selected.

#### ■ Support for a 2.7-GHz Oscillator Frequency <CXA3108Q>

The adoption of the newly-developed P42 high-frequency linear process (f<sub>T</sub> = 30 GHz), and the use of a Sony's unique differential Colpitts oscillator circuit allows this device to provide a stable oscillator signal with no parasitic oscillation over the wide band of 1.3 to 2.7 GHz. As shown in figure 3, the frequency conversion characteristics of this device are extremely flat and feature high gain and low noise figure.

#### ■ Adjustment-Free Carrier Recovery <CXA3038N>

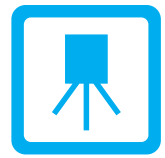
The CXA3038N provides adjustment-free operation of the carrier recovery function, which is required for 480-MHz band quadrature detection by including an on-chip PLL circuit. External control is not required, since the PLL circuit includes the divide data and it can replace the high-cost SAW resonator. Furthermore, to provide for cases where the carrier frequency needs to be adjusted, the device includes an A/D converter to allow the frequency to be adjusted over a range consisting of ±4 50-kHz steps from the center frequency of 479.5 MHz.

#### ■ Support for a Wide Range of Applications

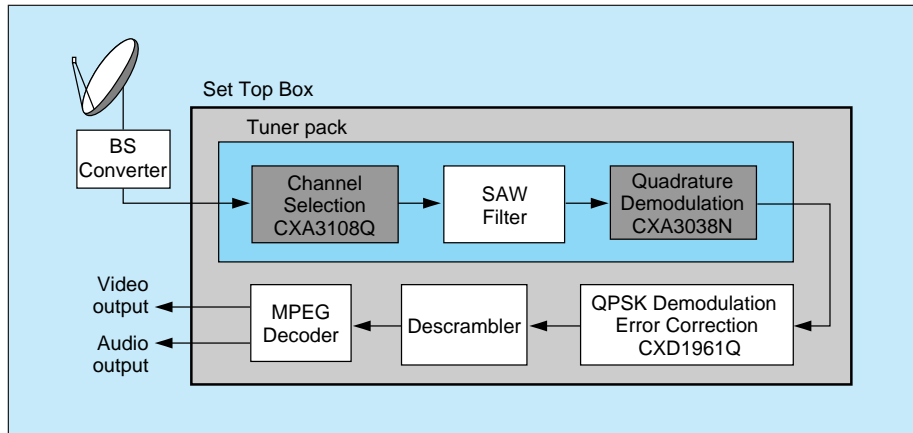
The CXA3108Q provides two IF output circuit systems and an external input pin for the PLL circuit, and can support applications such as single unit tuners for both analog and digital satellite broadcasts and tuners for both UHF and VHF broadcasts. Since the CXA3038N also includes an on-chip 32 frequency divider circuit for the local oscillator signal, it can also support the earlier carrier recovery technique, in which a PLL circuit was included in the QPSK demodulation IC used in a later stage. The CXA3108Q and CXA3038N have power consumption levels of 350 mW and 250 mW, respectively, and achieve a significant power reduction over most previous chip sets. This makes these devices optimal for bit stream output type tuner pack products that implement, in a single unit, the whole tuner up to the QPSK demodulation and error correction circuit, which requires consideration of the heat generation problem.

## V O I C E

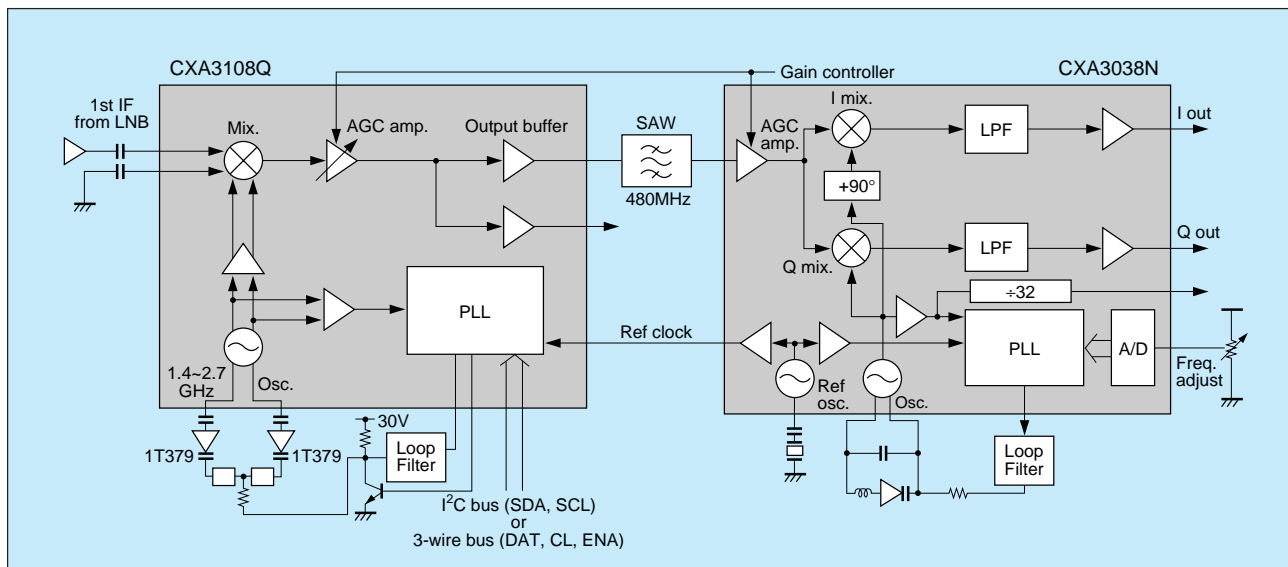
These products combine both high-frequency/low-noise analog circuits and high-speed digital circuits in a single chip, and incorporate a wide range of techniques for suppressing mutual interference between these circuits. We are convinced that these ICs will contribute to reduced costs and significant miniaturization in digital satellite broadcast tuners.



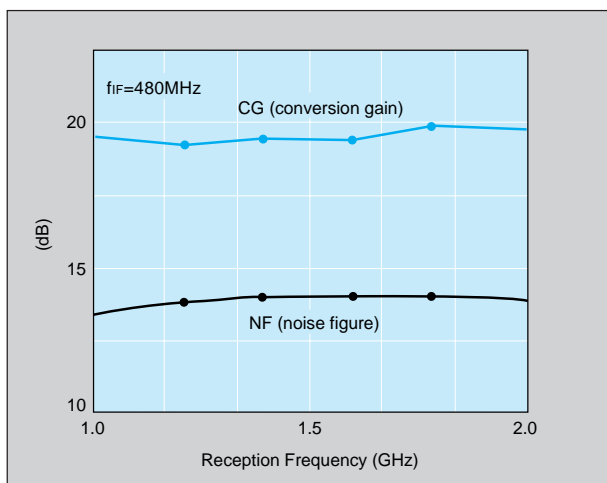
# New Products



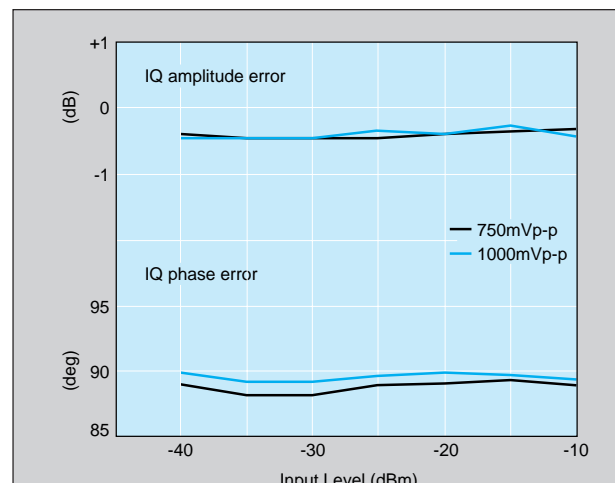
■ Figure 1 Digital Satellite Broadcast Reception Set Top Box Block Diagram



■ Figure 2 CXA3108Q and CXA3038N Block Diagram



■ Figure 3 CXA3108Q Frequency Conversion Characteristics



■ Figure 4 CXA3038N Quadrature Error