Ultraminiature High-Performance IF/PLL • VCO 3-in-1 Module for W-CDMA Cellular Phones

CXM4001GA
CXM4002GA

The FOMA next-generation W-CDMA cellular phone system began full-scale service in October 2001.
While Sony has already released an IF chip set consisting of the CXA3328TN/EN, CXA3309ER, and CXA3329ER, for this system, Sony is now releasing the CXM4001GA and CXM4002GA 3-in-1 IF modules which add an RF/IF dual PLL•VCO chip to the first-generation transmission/reception chips as the second stage of Sony ICs for the W-CDMA cellular phone system.

- **Three chips mounted in a single 8 mm × 8 mm LFLGA*1 package**
- **Support for representative IF types**
- **Low-noise low-distortion transmission/reception IF AGC**
- **RF/IF dual PLL•VCO**
- **Built-in PLL loop filter**

*1: Low profile fine pitch land grid array

Three Chips Mounted in a Single 8 mm × 8 mm LFLGA Package

These products package three chips, a reception IF AGC/quadrature demodulator, a transmission IF AGC/quadrature modulator, and an RF/IF dual PLL •VCO in a single 8 mm × 8 mm package, achieving a significant reduction in mounting area.

Support for Representative Intermediate Frequencies

These products support representative IF types for end products designed as superheterodyne W-CDMA cellular phones. The CXM4001GA supports the 380 MHz reception IF/570 MHz transmission IF combination, while the CXM4002GA supports the 190 MHz reception IF/380 MHz transmission IF combination.

Low-Noise Low-Distortion, and Low-Power Consumption Transmission/Reception IF AGC

For system structural reasons, both the transmission and reception power must be controlled in W-CDMA cellular phones. These products achieve gain control ranges of over 88 dB in the reception IF AGC circuit, and over 68 dB in the transmission IF AGC circuit. Furthermore, special efforts in the reception IF AGC circuit design allow this circuit to achieve both low distortion and low noise, characteristics that are normally in a tradeoff relationship. Similarly, since the transmission IF AGC also achieves excellent adjacent channel interference characteristics, these products achieve low distortion and low noise and thus provide optimal characteristics for W-CDMA cellular phones.

RF/IF Dual PLL•VCO

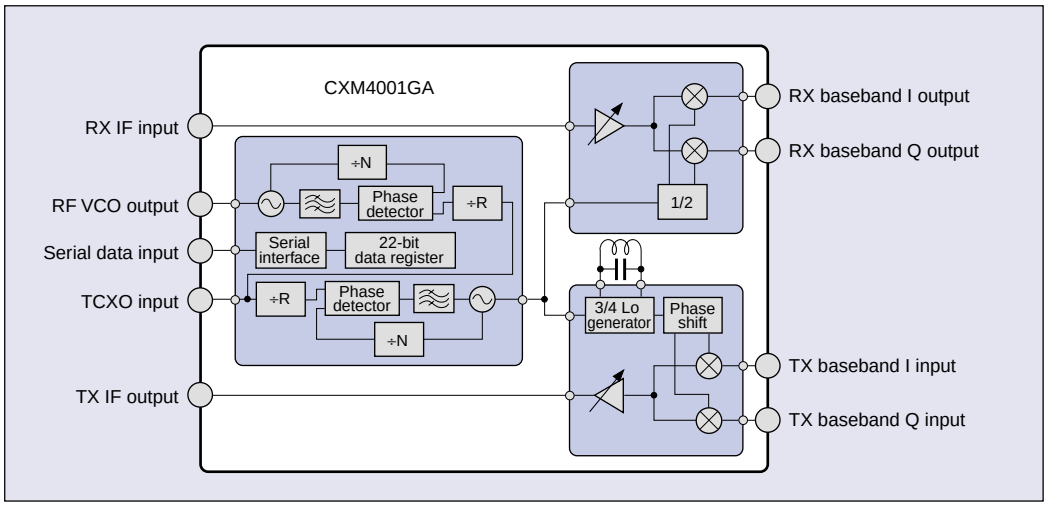
Since these products include both the RF (radio frequency) and IF (intermediate frequency) VCO and PLL circuits, the inter-component wiring is simplified and PWB design is eased. These internal VCO and PLL circuits achieve low phase noise and high-speed locking characteristics that are more than adequate for the requirements of the W-CDMA standards.

Built-in PLL Loop Filter

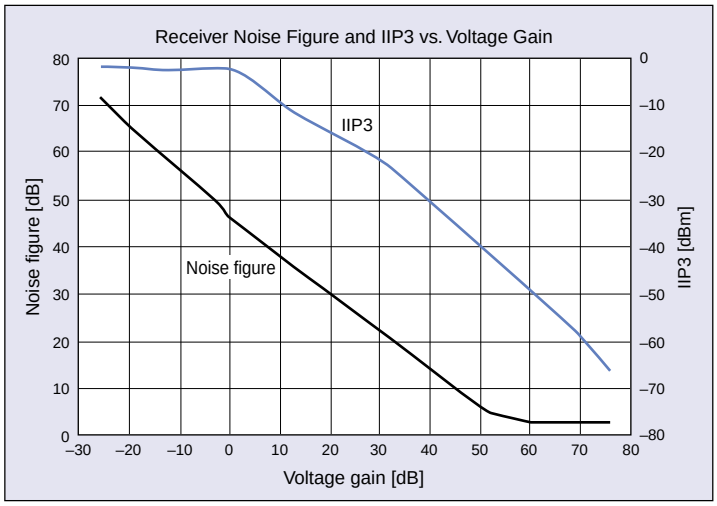
The inclusion of built-in PLL loop filters in the CXM4001GA and CXM4002GA obviates the need for the associated external components and reduces the mounting area required for such components. Furthermore, these products provide PLL characteristics that are stable at all times and thus are devices that are extremely easy to use.

V O I C E

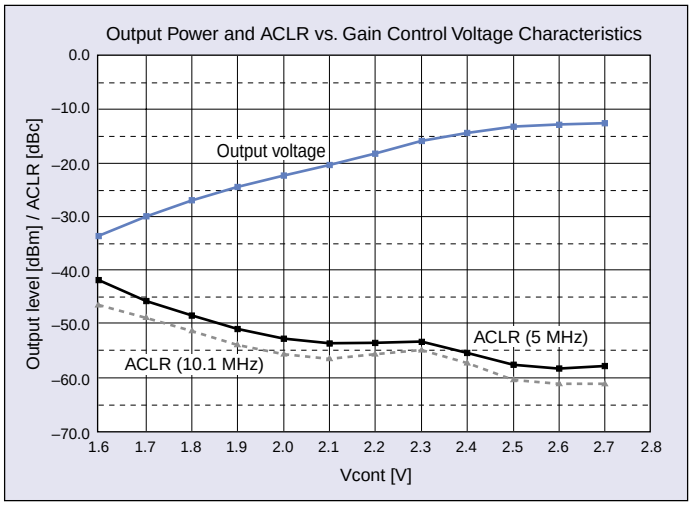
We were able to form an internal RF VCO resonator from an on-chip capacitor and a bonding wire functioning as an inductor. While I was able to adjust the frequency by changing the length of the bonding wire, I had a lot of trouble getting the conditions exactly right.



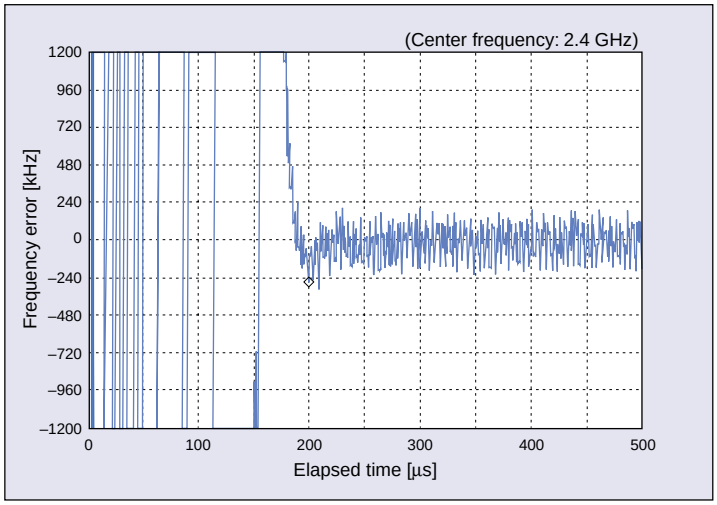
■ **Figure 1 CXM4001GA Block Diagram**



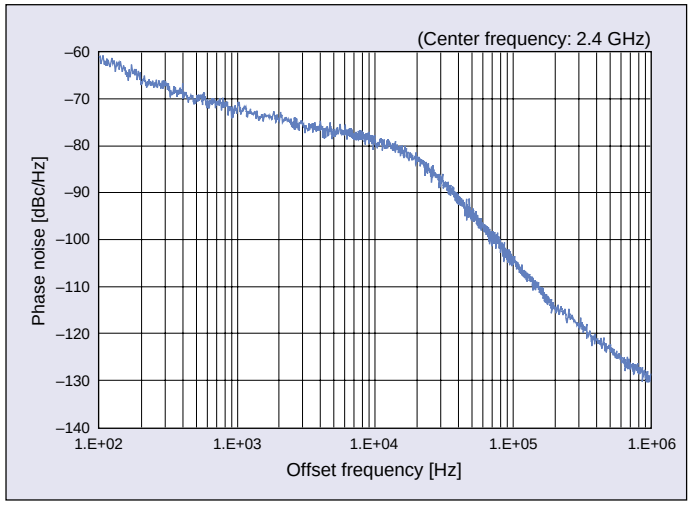
■ **Figure 2 Receiver Noise Figure and IIP3 vs. Voltage Gain Characteristics**



■ **Figure 3 Transmitter Output Power and ACLR vs. Gain Control Voltage Characteristics**



■ **Figure 4 RF PLL Lock-Up Time Characteristics**



■ **Figure 5 RF PLL Phase Noise vs. Offset Frequency Response**