

# Ultraminiature PHS Receiver Front-End GaAs MMIC for Portable Communication Applications

## CXG1034TN CXG1061TN

The needs for device miniaturization are increasing rapidly due to the competition in miniaturization and weight reduction in PHS and PDC portable telephone terminals.

The CXG1034TN mixer, which integrates all matching circuits other than the IF output pin matching circuit, and the CXG1061TN low-noise amplifier and mixer, which eliminates the need for interstage filters, can provide a significant reduction in the required mounting area due not only to a reduction in the number of components, but also to the adoption of a 10-pin TSSOP ultraminiature package.

- Low distortion
- Built-in matching circuits
- 27-dBc image rejection ratio (CXG1061TN)
- 10-pin TSSOP ultraminiature package

### ■ Low Distortion

The adoption of a Sony-original switching technique in the mixer block allows these products to achieve the low-distortion characteristics of +1.5 dBm at a conversion gain of 8 dB in the CXG1034TN and -13 dBm at a conversion gain of 22 dB in the CXG1061TN.

### ■ Built-in Matching Circuits

Matching circuits formed from inductors and capacitors are required to avoid serious degradation of device characteristics at high microwave frequencies. However, because the frequency response are quite sharp, problems that prevent the device's inherent characteristics from being achieved in practice occur occasionally. Such problems may be caused by phase differences in the pattern wiring when these circuits are implemented on a printed circuit board in an end product. The CXG1034TN incorporates matching circuits on chip for both the RF and LO high-frequency input pins. Not only does this allow the number of external components to be reduced, it also, at the same time, makes the IC easier to be used. Although the CXG1061TN uses external matching circuits for the RF input pin and some of the interstage areas to prevent reduction of the image rejection ratio and degradation of the noise figure due to the low Q value of internal inductors, all other matching circuits are integrated on the chip.

### ■ 27-dBc Image Rejection Ratio (CXG1061TN)

An image rejection ratio of about 60 dBc is required in portable telephones for use with the PHS (Personal Handyphone System) standard. In normal reception systems, the image rejection ratio is achieved with the combination of two interstage filters inserted between the antenna end top filter, the low-noise amplifier, and the mixer. Since miniature low-insertion loss filters with an image rejection ratio of 40 dBc or higher have already been achieved, interstage filters would not be necessary if the remaining 20 dBc could be achieved in the IC itself. The CXG1061TN achieves an image rejection ratio of 27 dBc by forming an interstage filter with built-in passive components and an external inductor.

### ■ Ultraminiature 10-Pin TSSOP Package

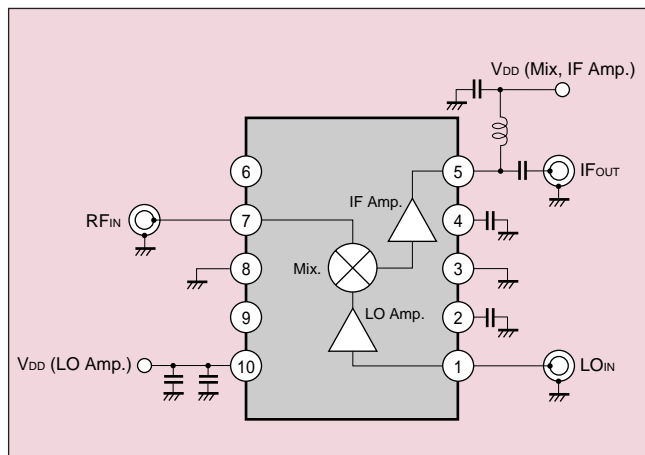
Both the CXG1034TN and the CXG1061TN are provided in a 10-pin TSSOP package, which is a Sony-developed miniature package. This package is extremely small, measuring only  $3.2 \times 2.8$  mm, including the pins and can contribute to reduced mounting areas in end products.

## V O I C E

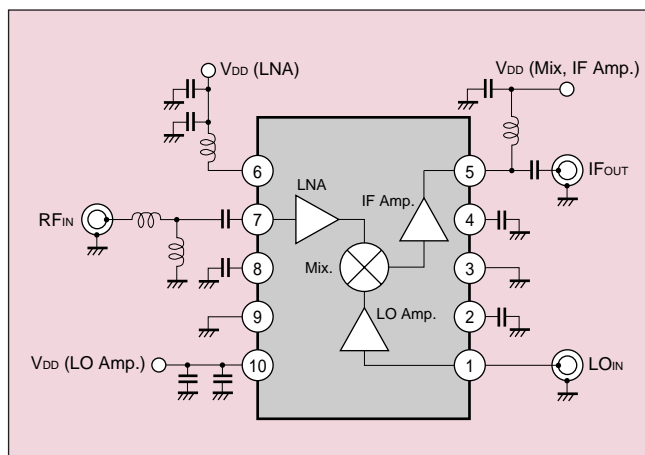
The CXG1034TN and CXG1061TN were developed for ease of use and the largest possible reduction in mounting areas. We are currently working on integrating these circuits with the transmission system since we would like to implement the PHS RF block in a single package.



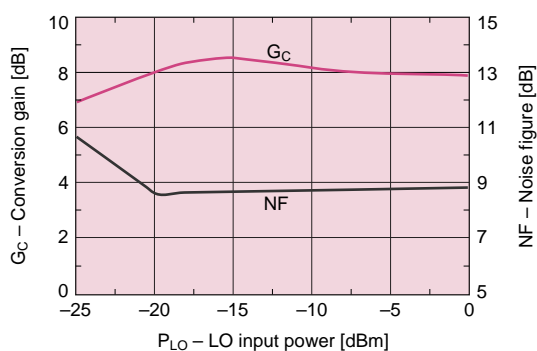
# New Products



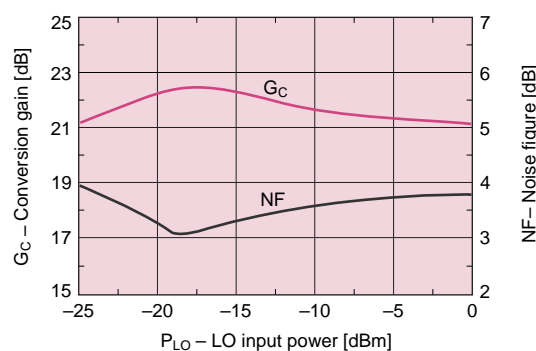
■ Figure 1-1 CXG1034TN Application Circuit Example



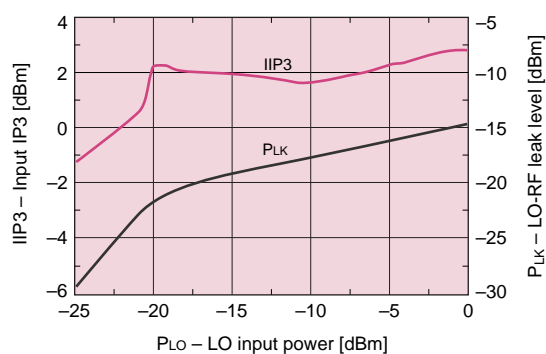
■ Figure 1-2 CXG1061TN Application Circuit Example



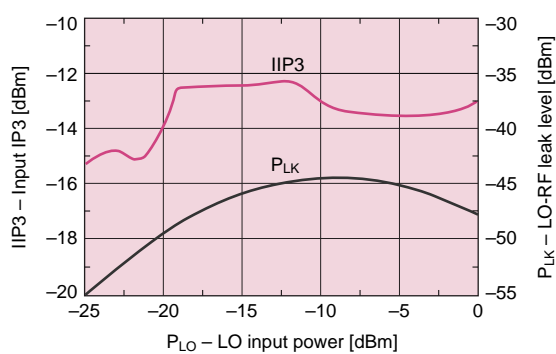
■ Figure 2-1 CXG1034TN GC/NF PLO Dependence



■ Figure 2-2 CXG1061TN GC/NF PLO Dependence



■ Figure 3-1 CXG1034TN IIP3/PLK PLO Dependence



■ Figure 3-2 CXG1061TN IIP3/PLK PLO Dependence

■ Table 1 Main Characteristics

Conditions:  $V_{DD} = 3.0V$ ,  $f_{RF} = 1.90GHz$ ,  $f_{LO} = 1.66GHz$ ,  $P_{LO} = -15dBm$

Item	Symbol	CXG1034TN	CXG1061TN	Unit
Current consumption	$I_{DD}$	5	7	mA
Conversion gain	$G_c$	8	22	dB
Noise figure	NF	8.5	3.3	dB
Input IP3	IIP3	1.5	-13	dBm
Image rejection ratio	IMR	—	27	dBc
LO to RF leak level	$P_{LK}$	-19	-46	dBm