



IS-54/IS-136 IF Baseband CHIPSET

THREE-CHIP SOLUTION FOR IF AND BASEBAND CONVERSION

Analog Devices has integrated all of the requirements for IS-54/IS-136 intermediate-frequency (IF) and baseband conversion onto three devices — the AD607, the AD7013 and the AD7011. The resulting chipset provides an easy-to-use solution for time-domain/multiple-access (TDMA) cellular and personal-communication systems (PCS) handsets.

The AD607 IF amplifier and quadrature demodulator handles the demanding tasks of linear automatic gain control (AGC) and precise quadrature demodulation.

The AD7013 completes the receiver signal path by converting the analog baseband TDMA signal into digital form for processing. It includes on-chip A/D and D/A converters for system monitoring and control.

The AD7011 integrates a dual 10-bit digital-to-analog converter with a digital filter to generate the transmitted signal.

Together, these three chips form the core of an IS-54 and IS-136 handset or mini-cell design. High integration levels ease the path to complete handset implementations that easily meet the demands of today's fast-evolving market.

Together, the AD607, AD7013 and AD7011 form the signal processing core of an IS-54 or IS-136 handset or mini-cell design.



FEATURES

- High-performance IF and baseband chips work seamlessly to reduce product-development time
- Straightforward interfaces to Analog Devices digital signal processors (DSPs) to ease handset design
- On-chip auxiliary A/D and D/A converters provide additional system control and monitoring functions to optimize handset performance
- All chips include battery-saving power-down modes to extend standby time

THE MOST ADVANCED IF AMPLIFIER AVAILABLE

The AD607 IF amplifier and quadrature demodulator integrates the equivalent of as many as five chips in a single "Shrink Small Outline" package. It includes a "Gilbert-cell" mixer that operates up to 250 MHz, a high-performance linear AGC amplifier and a quadrature demodulator that can handle IF signals from 100 kHz to 12 MHz, fully compatible with the most common frequency plans used in IS-54/IS-136 systems. The device can achieve over 100 dB of precise "linear-in-dB" gain control.

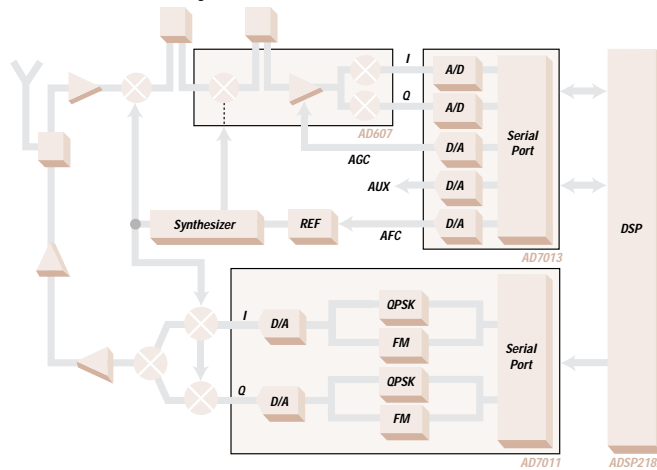
Designed for cellular handsets, where low power consumption is imperative, the AD607 can operate to full specifications down to 2.7 volts, consuming only 25 mW of power at full-frequency. In addition, a power-down mode reduces power consumption to near zero during standby.

The quadrature demodulator in the AD607 provides in-phase and quadrature (I & Q) outputs, which most advanced communications systems require. When combined with suitable dual matched A/D converters, these outputs allow digital demodulation of the received signal.

The AD607's performance comes from a combination of innovative design and advanced process technology. Analog Devices' exclusive "complementary bipolar" manufacturing process, with matched NPN and PNP transistors, is ideally suited to these low-voltage designs where high linearity and low noise are critical.

The AD7013 provides matched A/D converters for the AD607's I and Q signals. Using sigma-delta conversion technology, the matched I- and Q-channel converters utilize digital filtering for high-performance and rejection of adjacent-channel signals. These digital filters comply with all IS-54 and IS-136 specifications, and can operate in either digital (TDMA) or analog (AMPS) modes.

IS-136 Handset Block Diagram



Completing the chipset, the AD7011 generates the transmit signal for the handset or mini-cell system. Accepting a bit stream from the digital signal processor, the AD7011 translates the bits into IS-54/IS-136 QPSK signals with on-chip digital filters and signal-shaping functions. The AD7011 also provides FM modulation when the analog fallback mode is needed.

"ONE-STOP SHOPPING" FOR THE MOST CRITICAL COMPONENTS IN YOUR DESIGN

The IF and mixed-signal section is the most difficult part of any handset design. Excessive noise, difficult circuit layout and inadequate grounding represent the source of many redesigns. Problems in the signal chain cause most type-approval failures.

Analog Devices can help. Our IF amplifiers always work seamlessly with our baseband converters. We stand ready with evaluation boards, complete application notes and application support to assist you in completing your designs. And you know that Analog Devices is the undisputed leader in mixed-signal products. We achieved that position by providing the support that our customers need.

ANALOG DEVICES IN COMMUNICATIONS

Analog Devices is committed to supplying the communications industry with the highest-performance solutions at the lowest possible cost. We meet the needs of today's broadband wired and wireless markets with leadership capabilities in analog, digital and mixed signal processing, RF signal processing, data conversion, interfaces and total system design.

IS-54/IS-136 CHIPSET

The Analog Devices IS-54/IS-136 chipset consists of the AD607 IF amplifier and quadrature demodulator, along with the AD7013 and AD7011 A/D and D/A converters.

AD607

The AD607 is a 3-volt low-power receiver IF subsystem that operates at input frequencies as high as 500 MHz and IFs from 400 kHz to 12 MHz. It consists of a mixer, IF amplifiers, I and Q demodulators, a phase-locked quadrature oscillator, AGC detector and a biasing system with external power-down. It is packaged in a 20-pin SSOP.

AD7013 CONVERTER

The AD7013 completes the receiver signal path by converting the analog baseband TDMA signal to digital form for processing. This device includes on-chip A/D and D/A converters for system monitoring and control. The AD7013 provides matched A/D converters for the I and Q signals. Using sigma-delta A/D conversion technology, the matched I- and Q-channel converters utilize digital filtering for high performance and rejection of adjacent-channel signals. These digital filters comply with all IS-54 and IS-136 specifications, and operate in either digital (TDMA) or analog (AMPS) modes.

AD7011 CONVERTER

The AD7011 integrates a dual 10-bit D/A converter with a digital filter to generate the transmitted signal. Accepting the bit stream from the digital signal processor, the AD7011 translates the bits into IS-54/IS-136 QPSK signals with on-chip digital filters and signal-shaping functions. The AD7011 also provides FM modulation when the analog fallback mode is needed.