Noise reduction and signal processing for Wireless Receivers

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Improving signal detection and reducing noise in wireless communications: As wireless technology evolves the demand is for greater functionality combined with decreased size and power consumption. Ultra low voltage (ULV) chip design will soon be the norm, with operating voltages of less than 1 volt (1V). While such architectures are advantageous in terms of cost, size, and efficiency, signal detection and noise handling becomes an issue, limiting the implementation of ULV design in wireless technology. New strategies for signal processing and noise filtering are needed to enable the move to ULV.

Wireless Receiver chip for noise reduction and improved signal processing: Current ULV design limits the dynamic range of RF receivers in band (in the frequency range the information is sent) this effects sensitivity. It also impairs the receiver’s ability to exclude in band and out of band interference or noise. As a result in cellular applications where large front-end amplification is necessary, the noise is typically amplified as well, effecting quality of final content such as voice data. The technology is an ULV RF receiver architecture, which compensates for these limitations. It uses a feed forward cancelation strategy, which is programmable (adjustable), to limit interference amplification plaguing ULV designs. A prototype has been fabricated using a 65nm CMOS process, which operates at 0.6V and meets GSM (900 MHz) specifications. The receiver showed a 15dB improvement in sensitivity with no increase in noise thanks to this new architecture.

Applications: • High sensitivity ULV wireless receiver for use in low power cellular (GSM, CDMA, etc.) devices such as phones and portable computing devices with cellular range data transceivers • As a receiver in local area network wireless devices employing WiFi, Bluetooth, or in GPS and RFID applications • Feed forward high sensitivity architecture can be used in any analog application, e.g. optical

Advantages: • Enables high signal sensitivity needed for cellular band with a low power ULV design • Feed forward architecture prevents amplification of the noise along with the signal • Amplifier is programmable (adjustable) and is compatible with GSM specifications • Uses 65nm CMOS fabrication process

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