Columbia Technology Ventures

High-performance switching mixer for improved signal transmission

Technology #cu13018

Mixers are important electrical circuits used to shift signals from one frequency range to another in communications systems. Switching mixers are a specific type of mixer used in radio frequency (RF) transceivers. Although switching mixers have several operational advantages over other mixer technologies, they generate harmonics of their local oscillator's (LO’s) fundamental frequency that may interfere with the desired signal. This technology is an improved design for a harmonic rejection mixer that eliminates high order harmonic frequencies. By employing several additional local oscillators to generate complementary harmonics, this technology is able to properly suppress unwanted harmonic signals and improve the performance of switching mixers.

Generation of complementary harmonics by multiple local oscillators enables improved harmonic rejection

Current switching mixer technologies suppress local oscillator (LO) harmonics by mixing the input signal with several scaled and phase-shifted copies of the LO signal. Since the gain coefficients of these copies are irrational and can only be approximated by analog circuits, the resulting harmonic rejection is incomplete. This technology incorporates additional LOs to generate more accurate complementary harmonics to reject the unwanted harmonics, thereby improving switching mixer performance.

The technology was demonstrated using simulations; it exhibits improved harmonic rejection in comparison to existing harmonic mixer designs.

Lab Director:

Peter R. Kinget, Ph.D.

Applications:

• High-performance broadband communication systems.
• Software-defined radio (SDR) systems that support high quality signal transmission.
Advantages:

- Improved rejection of unwanted harmonics by elimination of irrational gain coefficients and phase mismatches.
- Potentially improved performance of switching mixer circuits.

Patent information:

Patent Pending (WO/2014/015277)

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Related Publications:


Inventors

Peter Kinget