Design of cmos rfic uwb carrier-less and carrier-based transmitters

Meng Miao, author

Abstrak

This paper presents new carrier-based and carrier-less ultra-wideband (UWB) transmitter architectures and their CMOS implementation. The carrier-based transmitter designed using a 0.18-?m CMOS process adopts a double-stage switching to enhance RF-power efficiency, reduce dc-power consumption and circuit complexity, and increase switching speed and isolation. Measurement results show that the generated UWB signal can vary from 2 V peak-to-peak with 3-dB 4-ns pulse width to 1 V with 0.5 ns, covering 10-dB signal bandwidths from 0.5 to 4 GHz, respectively. The generated UWB signal can be tuned to cover the entire UWB frequency range of 3.1 to 10.6 GHz. The carrier-less transmitter integrates tuning delay circuit, square-wave generator, impulse-forming circuit, and pulse-shaping circuit in a single chip using a standard low-cost 0.25-?m CMOS process. It can generate monocycle pulse and Gaussian-type impulse (without the pulse-shaping circuitry) signals with tunable pulse duration. Measured results show that the carrier-less transmitter can produce 0.3–0.6 V peak-to-peak monocycle pulse with 140–350 ps tunable pulse-duration and 0.5–1.3 V peak-to-peak impulse signal with 100–300 ps tunable pulse-duration.