A low power 2.4 GHz variable-gain low noise amplifier for wireless applications

ABSTRACT

A 2.4 GHz variable-gain low noise amplifier (VGLNA) intended for use in a Wide-band Code Division Multiple Access receiver was designed in 0.18 um CMOS process for low voltage and low power applications. Rivaling classical designs using voltage mode approach, this design used the current mode approach, utilizing the current mirror principle to obtain a controllable gain range from 8.26 dB to 16.95 dB with good input and output return losses. By varying the current through the widths of transistors and a bias resistor, the VGLNA was capable of exhibiting 8 dB gain tuning range without degrading the noise figure. Therefore, higher gain was possible at lower current and thus at lower power consumption. Total power consumption simulated was 4.63 mW from a 1 V supply and this gave a gain/power quotient of 3.66 dB/mW. Comparing this with available published data, it was observed that this work demonstrated a good gain tuning range and the lowest noise figure with such power consumption.

Keyword: Current mode; Low power applications; Noise figure; VGLNA; WCDMA