Digital-controlled multimode multiband power amplifier with multiple gated transistor

ABSTRACT

Multimode multiband (MMMB) connectivity has become a de facto requirement for smartphones in order to accommodate the various different frequencies, bandwidths, output power, and modulation schemes. In this work, a two-stage single-chip MMMB power amplifier (PA) with multiple gated transistor technique has been designed to obtain dual-mode output power options, with its input matching and intermediate matching networks made tunable to enable switching of the PA output between low-band and high-band frequencies. In the low-band region, the PA offers 195 MHz of operating bandwidth starting from the frequency of 770 up to 965 MHz, covering the long term evolution (LTE) bands 5 and 8, with output saturated power of 27.3 dBm and peak power added efficiency (PAE) of 47.4%. In the high-band region, the PA has 900 MHz bandwidth starting from the frequency of 1.3 up to 2.2 GHz, covering the LTE bands 1, 2, and 3, with output saturated power of 27.9 dBm and peak PAE of 45.3%. The achieved ACPRs are −40 and −42 dBc in the low-band and high-band, respectively, which are well within the LTE linearity specifications. By using a low-cost CMOS process, the proposed MMMB PA has potential applications in the system-on-chip (SoC) integration of wireless transceiver.

Keyword: Efficiency; LTE; Multiband; Multimode; RF power amplifiers; WCDMA