

Title: 79 GHz pulse compression radar front-end CMOS ICs

Abstract – A CMOS integrated circuit for 79 GHz pulse compression radar front-end including a transmitter and a receiver is presented in this paper. A low average-power and ultra-wideband 79-GHz pulse compression radar transmitter for short-range automotive radar is introduced. The 63-bit PN-coded pulse compression scheme using the proposed pulse-forming network and the PA with on/off operation achieves high power spectral density and a high efficiency of the transmitter. The proposed transmitter achieves a 4-GHz BW RF pulse with 14.5 dBm maximum output power and 160 mW of the average dc power consumption. We also present the UWB receiver, which consists of an adaptive gain-controllable low-noise amplifier (LNA) and gm-booster sub-harmonic mixers (SHMs) using a transformer-based feedback network. The proposed receiver has a noise figure of 10.5 dB and a variable conversion gain of -7.5 to 16 dB with the variations of the received power. At the end, a fully-integrated UWB pulse compression radar transceiver using a CMOS process, which comprise the transmitter and the I/Q receiver with VGAs, is demonstrated including the feature of the proposed radar transceiver and the range measurement results.

Key words – CMOS; integrated circuit, phase modulation; pulse compression; pulse radar; ultra-wide band (UWB); W-band; short-range radar(SRR); 79 GHz



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