High-voltage integrated transmitting circuit with differential driving for CMUTs

In this paper, a high-voltage integrated differential transmitting circuit for capacitive micromachined ultrasonic transducers (CMUTs) used in portable ultrasound scanners is presented. Due to its application, area and power consumption are critical and need to be minimized. The circuitry is designed and implemented in AMS 0.35 μ m high-voltage process. Measurements are performed on the fabricated integrated circuit in order to assess its performance. The transmitting circuit consists of a low-voltage control logic, pulse-triggered level shifters and a differential output stage that generates pulses at differential voltage levels of 60, 80 and 100 V, a frequency up to 5 MHz and a measured driving strength of 2.03 V/ns with the CMUT electrical model connected. The total on-chip area occupied by the transmitting circuit is 0.18 mm2 and the power consumption at the ultrasound scanner operation conditions is 0.936 mW including the load. The integrated circuits measured prove to be consistent and robust to local process variations by measurements.

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