

**“On the Design of a Mixed-Signal Multi-Mode Transceiver Front-End for Cellular Terminal RFICs”**, pp.160-166

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**Abstract** – Developments aimed at the software-defined-radio (SDR) concept for cellular applications have received increasing attention due to the necessity of multi-mode/multi-system capable terminals for next generation cellular communication systems. This paper describes a single-chip implementation of a highly configurable digital-front-end (DFE) enabling multimode capable RF transceiver for cellular applications. The DFE’s functionality includes sample-rate-conversion, channel filtering, dynamic range control, and signal conditioning for data transmission via a digital interface between RFIC and baseband IC. The described partitioning shifts some of the functionality, traditionally located in the analog-front-end (filtering, gain control, etc.) to the digital-front-end. The technology shift towards RFCMOS further favors this strongly digital transceiver architecture. The transceiver testchip with a die size of 16 mm<sup>2</sup> has been fabricated in 0.12- $\mu$ m RF-CMOS. The power consumption for the DFE is 16 to 32-mW@1.5V in receive (Rx) mode, and 45 to 75-mW@1.5V in transmit (Tx) mode, respectively. The receiver shows a error-vector-magnitude (EVM) of 5.3 % in UMTS mode and 7 % in IS-95 configuration at the digital baseband interface.