Special issue on selected papers from NORCHIP 2008

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This special issue is composed of papers from the 26th NORCHIP conference that was held in Tallinn, Estonia on November 17–18, 2008. The NORCHIP conference is the main microelectronics event of the Nordic and Baltic countries. The technical program of NORCHIP 2008 contained 61 papers, divided into 16 regular sessions and two poster sessions and was attended by almost 100 participants.

Selected papers from the conference were invited for this special issue. The guest editors feel that the following seven papers that were chosen based on rigorous review all contain contributions that will be of interest to the Analog Integrated Circuits and Signal Processing readers.

In the first paper, Dan Sandström, Mikko Varonen, Mikko Kärkkäinen and Kari Halonen from Helsinki University of Technology, Finland, present a three-stage V-band amplifier implemented in 65-nm baseline CMOS technology. The matching circuitry and interconnects are implemented with slow-wave coplanar waveguides to study the feasibility of using this type of a transmission line in amplifier design. Measured power gain, noise figure and 1-dB output compression point at 60 GHz are 13 dB, 6.3 dB and +4 dBm, respectively. The amplifier has 19.6 GHz of 3 dB bandwidth, thus covering entirely the unlicensed band around 60 GHz.

The second paper is coming from Norwegian University of Science and Technology and University of Oulu, Finland. Simo Hietakangas, Jukka Typpö and Timo Rahkonen

present a paper titled “Design of Integrated 1.6 GHz, 2 W Tuned RF Power Amplifier”. This paper describes the design of an integrated tuned power amplifier specified to operate at Inmarsat satellite uplink frequencies from 1626.5–1660.5 MHz. The aim of the paper is to show experiences related to the design of switching high power radio frequency (RF) amplifiers (PA) with integrated output pulse-shaping. The amplifier was implemented onto a GaAs substrate with depletion mode high electron mobility transistors (FETs).

In the third paper Jonas Fritzin and Atila Alvandpour from Linköping University, Sweden describe the design and implementation of a power amplifier (PA) for 802.11n WLAN fabricated in 65 nm CMOS technology, including the circuit architecture, modeling and design of the transformers, the extraction of the layout parasitics, and the output matching network design, which is followed by the experimental results. The PA utilizes 3.3 V thick gate oxide (5.2 nm) transistors and a two-stage differential configuration with integrated transformers for input and interstage matching. The PA meets the EVM and spectral requirements for a 72.2 Mbit/s, 64-QAM, 802.11n OFDM signal, at an average output power of 11.6 dBm, with an EVM of 3.8%.

The fourth paper by Oliver Schmitz, Sven Karsten Hampel, Christian Orlob, Marc Tiebout and Ilona Rolfes from Universität Hannover, Germany is titled “Body Effect Up- and Down-Conversion Mixer Circuits for Low-Voltage Ultra-Wideband Operation”. This paper presents fully differential up- and down-conversion mixer circuits manufactured in a triple well 45 nm CMOS process for low-voltage Ultra-Wideband transmitter and receiver applications. By presenting exemplary 45 nm CMOS bulk-driven mixer designs, the authors have pointed out flexible application of these designs within

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transmitter and receiver applications and the fundamental benefits of these mixer topologies for low voltage broadband operation.

The fifth paper is coming from Linköping University, Sweden. Timmy Sundström and Atila Alvandpour present a 6-bit 2.5-GS/s Flash ADC using Comparator Redundancy for Low Power in 90 nm CMOS. The aim of the paper is to show that redundancy can be used to achieve an overall energy efficient design at gigasample per second rate with the sole focus on designing for speed and low power at the building block level. As the mismatch induced comparator offsets will get worse with scaling, using comparator redundancy is a means for taking full advantage of decreased feature sizes in future CMOS processes, with higher speeds and lower power dissipation.

The authors of the sixth paper, Nashwa Abo Elneel, Erkan Aksoy, and Dietmar Schroeder from Hamburg University of Technology, Germany and CEA-LETI, Grenoble, France describe a novel adaptable analog/digital converter (ADC) that combines analog/digital conversion and entropy-coding for integrated data compression and low-power operation. The converter has high flexibility of operation in terms of adaptable resolution, conversion rate and input signal statistics. This feature allows to adaptively react to changes of the situation and to put the device in each case into the optimum configuration. Since the ADC can be configured on the fly to minimize power consumption, it is particularly suited for wireless sensor networks.

The seventh paper from University of Oulu by Ilkka Nissinen and Juha Kostamovaara presents noise and jitter characteristics of an on-chip voltage reference-locked ring oscillator used in the time-to-digital converter (TDC) of the integrated receiver of a pulsed time-of-flight laser range-finder. The frequency of the ring oscillator, 683 MHz, was locked to the on-chip voltage reference by means of a frequency-to-voltage converter, resulting in better than 90 ppm/°C stability. The noise and jitter transfer characteristics of the loop were derived, and simulations were performed to see the effects of different noise types (white and 1/f noise) on the cumulative jitter of the locked ring oscillator.

These seven papers have undergone normal review. We would like to express our gratitude to the reviewers for the comments and suggestions that have improved quality of the papers.

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