Design and Testing of Millimeter-Wave/Subterahertz Circuits and Systems

With this last D&T issue of 2014, we welcome our readers to a topic we have yet to cover: millimeter wave (mm-wave) and subterahertz (sub-THz) circuits. We are excited to bring this focused and timely issue before you, with the goal of highlighting some of the most trailblazing solutions to contemporary challenges in the design and test of mm-wave and sub-THz circuits/systems. The wide applicability and concrete industry examples of this issue’s selected articles fill an important and interesting gap in D&T’s topical coverage to date. I am happy to shed light on the impressive list of articles in this special issue. (The guest editors will do a much better job at this than I!)

As eloquently introduced by our esteemed guest editors Drs. Heo and Kim, our first article is coauthored by Plouchart, Parker, Sadhu, Valdes-Garcia, Friedman, Wang, Li, Sanduleanu, and Balteanu, which addresses adaptive circuit design as applied to mm-wave circuits. Proposing adaptive developments in all of indirect sensing, integration of circuit loops, and microcontroller algorithms, the authors demonstrate effective design and test for communication circuits that maximize production and minimize energy expended.

Our second selection, coauthored by Yu, Baylon, Wettin, Heo, Pande, and Mirabbasi, introduces multi-channel wireless network-on-chip (WNoC) architecture as a remedy for interconnect structure in multicore processors. With various mm-wave frequency band examples, the potential performance improvements and efficiency of a triple-band mm-wave transceiver is shown, in direct comparison with conventional WNoC architectures.

Next, an article by Lu, Loke, and Jung directly addresses an important concern amid the improvements that 3-D stacked integrated circuits (3-D SICs) have made in integration density: yield loss during manufacturing and the resulting test costs. The article outlines the pros and the cons of mm-wave wireless interconnect in 3-D SIC testing and presents a solution to conventional shortcomings through a contact-free input/output testing example.

Continuing the focus of this special issue, our fourth selection by Yeh, Chiong, Chen, and Wang brings forth the approach of the monolithic microwave integrated circuit (MMIC) to mm-wave frequency operation. In light of historical applications that called for mitigation of crowded frequencies, the authors propose the importance and design of mm-wave MMIC mixers across a diverse array of modern applications, imperative for understanding trends of future communication.

We close our issue with a paper by Kazemipour, Salhi, Kleine-Ostmann, and Schrader, which proposes an update to classic conversion-loss measurement using only relative RF power measurement. Methods and results are supported by two commercial test cases.

I would like to take this opportunity to sincerely thank our guest editors, Dr. Deukhyoun Heo and Dr. Jonghae Kim, for putting considerable effort into...
bringing this special issue together, and providing such a clear and enticing introduction that sets the stage for our articles and facilitates this issue's readability. I would also like to send a large thank you to all of our contributors in 2014—from authors to reviewers to all the editorial board and magazine production members.

A special thanks goes to Scott Davidson and Theo Theocharides for continuously stepping up to provide contributions to every issue, always in a highly constructive and timely manner.

See you all in 2015 with an exciting slate of Design & Test general interest and special issues! Please do bring your ideas and suggestions to our attention as well! We always like to hear and learn from our readership.

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