



From the Guest Editors' Desk

Medical Applications of RF and Microwaves—Applications and Events

■ Dietmar Kissinger and J.-C. Chiao

The focus features of this issue of *IEEE Microwave Magazine*, as in the March and May issues, are dedicated to the research activities in the IEEE Microwave Theory and Techniques Society (MTT-S) Technical Committee Biological Effect and Medical Applications of Radio Frequency (RF) and Microwave (MTT-10). Specifically, this issue focuses on using microwave technologies in medical applications with practical scenarios. The research articles review developments in magnetic resonance imaging (MRI), microwave remote monitoring, and body phantom models for electromagnetic wave characterization. The reports about the two MTT-S-sponsored



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meetings, the 2014 IEEE International Microwave Workshop Series on RF and Wireless Technologies for Biomedical and Health care Applications (IMWS-Bio) and the 2015 IEEE Biomedical Wireless Technologies, Networks, and Sensing Systems Conference (BioWireless), highlight the synergistic energy and advances made by researchers and engineers in the RF/microwave and biomedical communities. The reports provide information about the current status of these meetings and

invite our readers to participate in the exchange of ideas and networking opportunities in the future events.

MRI offers a noninvasive method for the better assessment of patient health by providing both soft and hard tissue images with high contrast and high resolution. MRI has become standard medical practice; however, there is still a need for higher resolution, better portability, and functional imaging. Robert H. Caverly reviews the basic principles of MRI, technical details concerning engineering designs, and future trends in “MRI Fundamentals.” In particular, this article reviews MRI functions, enhancement of imaging quality and performance, instrumentation, and design considerations from an RF perspective. Microwave technologies will continue to improve and enhance the performance of MRI to make it applicable for more diagnostic and prognostic applications.

Mehran Baboli, Aditya Singh, Bruce Soll, Olga Boric-Lubecke, and Victor M. Lubecke review the sleep-monitoring

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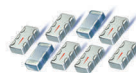
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RFIC 2016: IEEE Radio Frequency Integrated Circuits Symposium

San Francisco, CA, USA, May 22-24, 2016



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RFIC 2016 Call for Papers

The 2016 IEEE Radio Frequency Integrated Circuits Symposium (RFIC 2016) will be held in San Francisco, CA, USA, on May 22-24, 2016. For the latest information, please visit: rfic-ieee.org.

Electronic Paper Submission/Communication: Technical papers must be submitted via the RFIC 2016 website at rfic-ieee.org. Hard copies will not be accepted. Complete information on how and when to submit a paper will be posted on the RFIC 2016 [website](http://rfic-ieee.org) soon.

Technical Areas: The conference will solicit papers describing original work in RFIC design, system engineering, system simulation, design methodology, RFIC circuits, fabrication, testing, and packaging to support RF applications in areas such as, but not limited to:

- **Wireless Mobile ICs:** 3G/4G/LTE, WCDMA, TD-SCDMA, HSPA, WiMax, Mobile TV
- **Wireless Connectivity:** WLAN, 802.11xx, Bluetooth, FM, GPS, UWB, Wireless HD
- **Low Power Transceivers:** RFID, NFC, Zigbee, WPAN, WBAN, Biomedical, Sensor Nodes
- **RF Front-End Circuits:** RF and mm-wave LNAs, Mixers, VGAs, phase shifters, RF switches, Integrated FEM
- **Mixed-Signal RF and Analog Baseband Circuits:** RF and BB Converters (ADC/DAC), Sub-sampling/Over-sampling Circuits, and all analog baseband circuits including filters and modulators
- **Reconfigurable and Tunable Front-Ends:** SDR/Cognitive Radio, Wideband/Multi-band/Carrier Aggregation Front-Ends, Blocker-Tolerant, N-path filtering, Mixer-First Receivers, Digital RF circuits/architectures, RF BIST, and reconfigurable data converters
- **Large-Signal Circuits:** Power Amplifiers (RF & mm-Wave), Drivers, Advanced TX circuits, Linearization
- **VCOs and Frequency Multipliers:** RF and mm-Wave VCOs, Frequency Multipliers
- **Frequency Generation Circuits:** PLLs, Synthesizers, ADPLL, DDS, Frequency Dividers
- **Modeling, CAD and Characterization:** Modeling, EM Simulation, co-Simulation, Testing and Analysis of Active/Passive Devices, Packages and Modules
- **Process, Device and Packaging Technologies:** CMOS, SOI, SiGe, GaAs, GaN, MEMS, Integrated Passives, Photonic, Emerging Devices, Reliability, Packaging and Modules
- **mm-Wave SOCs:** mm-wave SOC and SIP systems above 20GHz for data, video, imaging apps, beam steering
- **High-Speed Data Transceivers:** Wireline, Wireless, Optical Transceivers, CDRs for High-Speed Data links

Technical Format: The conference starts on Sunday, May 22, 2016 with workshops and short courses, followed by plenary talks, Industry Showcase and Reception. Monday, May 23 and Tuesday, May 24, 2016 will be comprised of presentations of contributed papers and special lunch-time panel sessions. RFIC also seeks 2-page short-format original industrial-only submissions on all the areas listed above. **RFIC Symposium has Best Student Paper Award and Industry Best Paper Award.**

Journal Submissions: Selected papers will be invited for special issues in IEEE Journal of Solid State Circuits and Transactions on Microwave Theory and Techniques.

Microwave Week 2016: The RFIC 2016 will be held in conjunction with the IEEE MTT-S International Microwave Symposium (IMS). Microwave Week 2016 will start with RFIC Symposium, and followed by IMS Symposium, Microwave Historical Exhibit and ARFTG Microwave Measurement Conference.

Industrial Exhibition: This two-day Exhibition expects about **900 Exhibitors** who represent the state-of-the-art of the industry covering everything needed for RF and microwave production including materials, technologies, components and subsystems, as well as RF IC design and simulation software, and measurement and fabrication equipment. It is a perfect venue for engineers to find the best available for their RF IC and microwave products.

Beyond RFIC: San Francisco is a welcome and dynamic city. In addition to close to the Silicon Valley, it offers countless attractions to visitors including the Golden Gate Bridge, Fisherman's wharf, beaches, museums, vibrant city life and wineries. For more details, please go to San Francisco Travel website.

Electronic Submission Deadlines

Technical Paper Summaries in PDF format:

8 January 2016

Final Manuscripts for the Digest and CD-ROM:

9 March 2016

All submissions must be made at rfic-ieee.org in pdf form. Hard Copies are not accepted.



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measurement results from an integrated 2.45-GHz noncontact physiological radar monitoring system with a type-I polysomnography system in "Good Night." The system targets non-invasive diagnosis of obstructive sleep apnea that is associated with risks of developing cardiovascular diseases and stroke. Noninvasive measurement of physiological parameters, such as respiration rates, heart beat, and body motions, removes constraints and stress from the patients. Therefore, researchers are able to obtain more accurate information about patients' sleep patterns. The measurement results indicate successful operation for overnight studies in detecting various sleep parameters.

A comprehensive review of human phantom models for electromagnetic characterization is reviewed by Ahmed T. Mobashsher and Amin M. Abbosh in "Artificial Human Phantoms." Materials and their RF performance for mimicking body parts are discussed as well as features and functions of the main ingredients for intended applications. Using artificial phantoms to emulate different human body parts and imitate their anatomy can help accelerate design, characterization, and commercialization of body-centric implantable and wearable wireless devices and systems. Limitations of existing phantoms are also discussed as areas for future research and development. As wearable electronics are more widely used for daily long-term applications, establishing realistic test phantoms can provide more insight into design.

MTT-S and MTT-10 committee members have been actively supporting two meetings outside of the technical sessions and workshops in the International Microwave Symposium (IMS). IMWS-Bio is an initiative promoted by MTT-S members and the Geographic Committee to complement the efforts at IMS and BioWireless, both have been held in North America. In 2013, IMWS-Bio was held in Singapore, and in 2014, it was held at the London Canary Wharf Hilton, London, United Kingdom, from 8 to 10 December. Prof. Yang Hao (chair) and Prof. Akram

Alomainy (technical program chair) from the Queen Mary University of London, along with many volunteers, organized a multidisciplinary event for 120 participants from 24 countries. The peer-reviewed meeting provided an international and cross-Society [MTT-S, the IEEE Antennas and Propagation Society (AP-S), and the Institution of Engineering and Technology (IET)]

forum to exchange research information on topics of bioelectromagnetics, RF and wireless technologies for medical systems and health care services. Authors were invited to submit their extended-version manuscripts to the miniature special issue of *IEEE Transactions on Microwave Theory and Techniques (T-MTT)* scheduled to be published in October 2015. The 2015

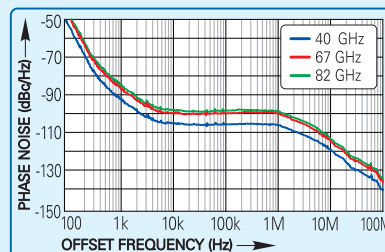
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IMWS-Bio will be held from 21 to 23 September 2015 in Taipei, Taiwan. More details can be found at <http://www.imws2015.org/>.

BioWireless was held in San Diego 25–28 January 2015. It has been held as part of the Radio and Wireless Week (RWW) since 2011. Chairs Dr. Katia Grenier from Laboratory for Analysis and Architecture of Systems, France, and Prof. Syed Kamrul Islam from the University of Tennessee, along with the technical committees, organized five oral technical sessions as well as poster and demonstration sessions. During RWW, plenary speaker Dr. Chris van Hoof from IMEC at the University of Leuven, Belgium, presented “Wearable Wireless Sensor Technologies for Truly Personalized Medicine and Wellness,” showing state-of-the-art research advances in wearable electronics for fitness, health care, and monitoring. During “Microwave Biosensing Developments in Asia,” a workshop organized by Prof. Hung-Wei Wu from Kun Shan University, Taiwan, and Prof. J.-C. Chiao from the University of Texas at

Arlington, five distinguished speakers from Korea, Singapore, China, Japan, and Taiwan presented their research on medical applications with microwaves and millimeter waves. Authors were also invited to submit extended versions of their manuscripts to the special issue of *T-MTT* scheduled to be published in October 2015. The 2016 BioWireless will be held from 24 to 27 January 2016 in Austin, Texas. More details can be found at <http://www.mtt.org/rww.html>.

The special issues of *IEEE Microwave Magazine* for March, May, and July 2015 feature the multi-disciplinary nature and broad scope covered by Technical Committee MTT-10. Thirteen articles and two reports showcase the advances of scientific and engineering accomplishments in biomedical and clinical applications utilizing RF and microwave technologies, as well as the collaborative

energy and innovative ideas coming from this quickly growing community.

We appreciate all authors and reviewers for their contributions, not only to these issues but also to our Society, helping make the world better by

promoting innovation in health care. We hope these articles are humble initiatives that inspire our readers. Special appreciation goes to IEEE MTT-S, AP-S, the IEEE Engineering in Medicine and Biology Society, and IET for their technical, financial, and volunteer support. We would like to thank Dr. Alfred Riddle, *IEEE Microwave Magazine* editor in chief,

and Sharri Shaw for administrating the review processes and making final decisions on these articles. We heartily thank the authors and all reviewers for their significant contributions.

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MicroBusiness (continued from page 12)

comments. But managers' responsibilities are to their organizations, not to individuals like me. If they felt that it was in the best interest of the organization to share my comments, it was their prerogative to do so.

What is clear is that I was in the wrong. I should not have complained to these managers. I should have expressed my concerns directly. In the first case, I should have gone to my new manager and shared the concerns my peers and I had. Worst of all, I was naïve. The GM had just announced our new manager. It was exceptionally unlikely that the GM would change that decision. Even worse, I did not even have an alternative in mind.

I did not learn the error of my ways until yet another episode. I do not recall what my concern was or the coworker it was about. I recall complaining to a senior manager, who wisely commented that he was sure that I would be taking up this concern directly with the person I was commenting on. I am sure that I did, and I am sure that the outcome was better than any action the senior manager would have taken.

I still am tempted to complain about issues with people, projects, and dynamics to peers and managers. However, I know that going directly to the source of the concern is the most effective way to handle these issues.

When you have an issue with someone else and you feel the need to tell a colleague or a manager something in confidence, this is my advice—do not. In a business setting, it is natural to have differences of opinion with others. The best way to deal with differences is directly. The person you are talking to should be the person you are talking about.

An important corollary is to never assume e-mails are confidential. I have given you a couple examples that demonstrate this. I am sure that you have enough of your own examples to prove this point.

