



AUTOMATIC RF TECHNIQUES GROUP NEWSLETTER

WINTER 2016

NUMBER 56

Important deadlines:

Feb. 15, 2017: 89th conference (spring 2017) paper submission deadline

Oct. 1, 2017: Student fellowship applications due

Sep. 29, 2017: 90th conference (fall 2017) paper submission and Ph.D. student sponsorship applications deadline

Fall 2016 ARFTG Microwave Measurement Symposium: Power Amplifiers and Systems Design for Wireless Applications

OVERVIEW



Hilton Austin, location of last fall's ARFTG Symposium

The Fall 2016 ARFTG Microwave Measurement Symposium took place at the Hilton Austin in Austin, TX. The event was held over four days: Tues., Dec. 6, 2016 to Fri., Dec. 9, 2016. The Symposium consisted of a short course on introduction to power amplifier design, an on-wafer measurement users' forum, an NVNA users' forum, a workshop on power amplifiers, and the main conference. The theme of this year's symposium was "*Power Amplifiers and Systems Design for Wireless Applications*". The main event was the 88th ARFTG Microwave Measurement Conference, which took place on Thurs. and Fri. In addition to these technical events, there was an awards banquet on Thurs. evening and a vendor exhibition during the conference. Taken together, this amounted to four days of exciting activities for engineers, scientists, and technologists.

SHORT COURSE ON POWER AMPLIFIER DESIGN

A 1 ½ day, introductory course on power amplifier design, organized by John Wood, was held on Dec. 6th &

7th. About 10 people attended this course with topics covering everything from small-signal amplifier design, high efficiency amplifier classes, modern communication signals, load modulation designs, supply modulation designs, measurement techniques, and linearization. We are very appreciative of the four instructors who made this short course successful: John Wood (Obsidian Microwave), Gayle Collins (Nuvotronics), Taylor Barton (University of Colorado), and Patrick Roblin (The Ohio State University).



The Short Course introduces attendees to a wide range of power amplifier design and characterization topics.

WORKSHOP

A workshop was held as part of the symposium. The theme was *PA Design Techniques for Future Wireless Systems*, and it was held on the afternoon of Fri., Dec. 9th and was organized by Zoya Popovic and Patrick Roblin. Approximately 20 people attended and heard lectures from Taylor Barton (University of Colorado), Patrick Roblin (The Ohio State University), Morten Olavsbraaten (Norwegian University of Science and Technology), Michael Roberg (Qorvo), Karun Rawat

(Indian Institute of Technology), and Zoya Popovic (University of Colorado).



A workshop on PA Design Techniques for Future Wireless Systems was presented at the Fall Symposium.

CONFERENCE TECHNICAL SESSIONS

The 88th ARFTG Microwave Measurement Conference began on Thursday, December 8th with introductions by ARFTG President and Conference Chair, Jon Martens. On this occasion, about 50 people attended. The conference consisted of six oral sessions and an interactive forum, defined by Technical Program Chair, Mitch Wallis. ARFTG is pleased to thank the sponsors of this conference:

Gold sponsors: Qorvo.

Silver sponsors: Anritsu Company, Copper Mountain Technologies, Maury Microwave, and MPI Corp.

For future sponsorship opportunities, contact the Sponsorship Chair, at sponsorship@arftg.org.



Attendees view the keynote talk by Paul Draxler (Qualcomm).

The best oral paper, as voted on by the conference attendees, was "The Impact of ENR and Coaxial Calibration in Accurate On-Wafer Noise Parameter Testing for Ultra-Low Noise Devices," by K. C. Kellogg, L. Dunleavy, S. Skidmore, and G. Simpson. (Modelithics, Inc. and Maury Microwave). The best interactive forum paper was selected to be "Lumped modeling of integrated MIM capacitors for RF applications," by F. Korndörfer and V. Mühlhaus (IHP

GmbH and Dr. Mühlhaus Consulting & Software GmbH). Congratulations to our best paper awardees.



ARFTG attendees discuss with interactive forum presenters.

CONFERENCE EXHIBITS

The exhibition provides an excellent opportunity to see the latest range of products available from some of the leading suppliers in microwave measurement industry. This conference's exhibiting companies were: Advanced Test Equipment Corp., Copper Mountain Technologies, Gowanda/TTE Filters, Junkosha, Keysight Technologies, Maury Microwave, MegaPhase, Spinner, Tektronix, and Wireless Telecom Group (Boonton & Noisecom). We welcome ATEC as a first-time exhibitor. The best exhibitor as voted by conference attendees was Spinner. To exhibit at a future conference, please contact the Exhibits Chair, at exhibits@arftg.org.



ARFTG allows for extensive interaction between attendees and exhibitors.

ANNUAL BUSINESS MEETING

The annual ARFTG Business Meeting was held on Dec. 8th, 2016. A significant part consisted of electing five members to the ARFTG Executive Committee. Biographies for the candidates were distributed prior to voting. The outcome of the voting was the election (or re-election) of five members to ExCom: David Blackham, Leonard Hayden, Jeffery Jargon, Marco Spirito, and Jean-Pierre Teyssier. There were also reports from the ARFTG Treasurer and Secretary.

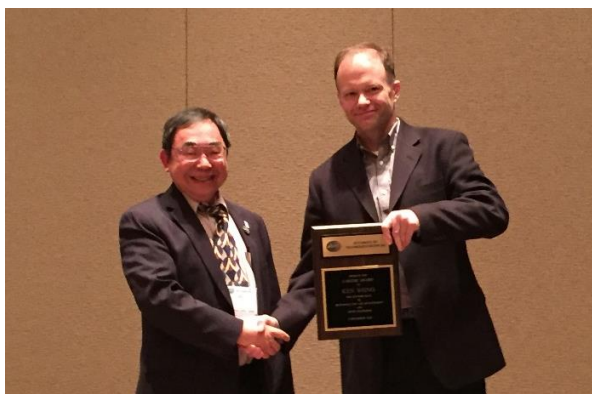
CONFERENCE AWARDS

ARFTG President, Jon Martens, presided over the conference awards ceremony, which took place during the banquet on Thursday evening. Certificates of appreciation were presented to the organizers of the 88th conference, namely Jon Martens as Conference Chair, Mitch Wallis, as Technical Program Chair, and Abhay Samant as Local Host.



ARFTG President Jon Martens presents the ARFTG Distinguished Service Award to Mohamed Sayed.

Awards were also given for best papers and exhibitors from the previous (87th) conference held in San Francisco, CA. The best oral paper award went to "Traceable Calibration with 1.0 mm Coaxial Standards," by J. Hoffmann, M. Wollensack, J. Ruefenacht, D. Stalder, and M. Zeier (Federal Institute of Metrology METAS). The best interactive forum presentation was awarded to "Wideband RF Characterization Setup with High Dynamic Range Low Frequency Measurement Capabilities," by S. Gustafsson, C. Fager, K. Buisman, and M. Thorsell (Chalmers University of Technology). The Best Exhibitor was awarded to Keysight Technologies.



ARFTG President Jon Martens presents the ARFTG Career Award to Ken Wong.

This was followed by the ARFTG Awards. On this occasion, a Distinguished Service Award was presented to Mohamed Sayed for "Outstanding leadership and dedicated service to ARFTG", and a Career Award was presented to Ken Wong for "Contributions to microwave test and measurement and ARFTG leadership". No ARFTG members were elevated to Life Member status at this conference; however, qualification information is at <http://www.arftg.org/membership/lifemember.html>.

USERS FORUMS AND STANDARDS MEETINGS

The inaugural meeting of the On-Wafer Measurement Users' Forum was held on Dec. 7th. The On-Wafer Forum was organized by Andrej Rumiantsev (MPI), hosted by Leonard Hayden (Qorvo), and had approximately 18 participants. As the first meeting, the Forum had one technical update, "Microwave Metrology On-a-Chip," from Jim Booth (NIST) and one discussion topic, "On the Logistics and Culture of a Users' Forum," led by Joe Gering (Qorvo). The attendees were in favor of continuing the On-Wafer Forum.



ARFTG hosted the inaugural On-Wafer Measurement Users' Forum.

The fall meeting of the NVNA Users' Forum was also held on Dec. 7th. It was organized by Apolinar Reynoso Hernandez and Patrick Roblin, and hosted by Patrick Roblin, and had about 15 participants. A student research update on "On-Wafer Measurement of Amplifier Chips" was provided by Sylvain Laurent (XLIM), Jacques Sombrin (TESA), Raymond Quéré (XLIM) and Jean-Pierre Teyssier (Keysight). Patrick Roblin (The Ohio State Univ.) also led a round table discussion on research interests related to NVNAs with an in depth discussion on nonlinear measurements for broadband signals. More information on the NVNA Users' Forum can be found under the NVNA tab at www.arftg.org.

As is always the case at ARFTG conferences, there were several standards committees that held meetings: IEEE P287, Recommended Practice for Precision Coaxial Connectors at RF, Microwave and Millimeter-wave

Frequencies; IEEE P1765, Recommended Practice for Estimating the Uncertainty In Measurements of Modulated Signals for Wireless Communications with Application to Error Vector Magnitude and Other System-Level Distortion Metrics, and IEEE P1770, Recommended Practice for The Usage of Terms Commonly Employed in the Field of Large-Signal Vector Network Analysis.



The Ala Moana Hotel, site for the 89th ARFTG Microwave Measurement Conference.

FUTURE EVENTS

Spring 2017 ARFTG Conference

The 89th ARFTG Microwave Measurement Conference will be held on June 9, 2017 in Honolulu, Hawaii, as part of Microwave Week 2017, in conjunction with IMS (www.ims2017.org) and the RFIC symposium (rfic-ieee.org). The ARFTG conference theme is “*Advanced Technologies for Communications*”. **The deadline for submission of paper abstracts (with supporting data and figures) is Feb. 15, 2017.** For up-to-date information, visit www.arftg.org or contact the Conference Chair, Peter Aaen (p.aaen@surrey.ac.uk) or the TPC Chair, Nick Ridler (nick.ridler@npl.co.uk).

As part of the 89th ARFTG conference activities, it is also planned to have joint IMS/ARFTG technical sessions, to hold users’ forums, and to co-sponsor two workshops that will be taking place during Microwave Week 2017: Novel 5G Applications of Nonlinear Vector Network Analyzer for Broadband Modulation and Millimeter Wave Characterization (organized by Patrick Roblin and Apolinar Reynoso Hernandez) and New developments in microwave measurements for planar circuits and components (organized by Matthias Ohlrogge).

Students interested in obtaining financial assistance to attend the conference should contact the Conference Chair. Any awards will be discretionary, and preference will be given to authors of accepted papers.

NVNA Users’ Forum

An NVNA Users’ Forum occurs at all ARFTG conferences. Please send your ideas for the meeting at the

spring ARFTG with IMS in Honolulu (Jun. 8-9, 2017), fall ARFTG in Boulder (Nov. 28 - Dec. 1, 2017), or any future meetings to the Forum organizers: Apolinar Reynoso Hernandez (apolinar@cicese.mx), Patrick Roblin (roblin@ece.osu.edu), Dominique Schreurs (dominique.schreurs@kuleuven.be), or Jean-Pierre Teyssier (jean-pierre_teyssier@keysight.com).

In addition, an NVNA meeting is also held in Europe. The next European meeting will be during INMMiC at the Graz University of Technology in Graz, Austria on Apr. 20-21, 2017. Please send your suggestions to Dominique Schreurs (dominique.schreurs@kuleuven.be) or Michael Gadringer (michael.gadringer@tugraz.at). More information on the latest activities and schedules can be found at the ARFTG web site, www.arftg.org under the NVNA tab.

On-Wafer Meas. Users’ Forum

After a successful pilot event in Austin, a forum to discuss on-wafer measurement challenges and innovative ideas among users is planned for the spring ARFTG with IMS in Honolulu (Jun. 8-9, 2017). More information will be available closer to the conference at the ARFTG web site, www.arftg.org.

Fall 2017 ARFTG Symposium

The Fall 2017 ARFTG Microwave Measurement Symposium will be held in Boulder, CO, from Tues., Nov. 28 through Fri., Dec. 1, 2017. It is planned to hold the 90th ARFTG Conference, a short course, two workshops and the NVNA Users’ Forum. The paper submission deadline is Sep. 29, 2017. For more information, contact the Conference Chair, Ron Ginley (ronald.ginley@nist.gov) or the TPC Chair, Mitch Wallis (thomas.wallis@nist.gov). More information will be available at www.arftg.org.

ARFTG STUDENT PROGRAMS

ARFTG typically awards one or more graduate fellowships annually to students working in RF/microwave measurement related topics. The application instructions and criteria for the next award cycle are published at www.arftg.org. ARFTG may also provide sponsorships to support Ph.D. students attending the fall conference. For information on sponsorships at future conferences, see www.arftg.org or contact the sponsorships chair at sponsorship@arftg.org.

ADDENDUM

Every effort has been made to publish correct information in this newsletter. Significant errors should be reported to the ARFTG Executive Committee Secretary Peter Aaen (p.aaen@surrey.ac.uk), so that corrections can be reported in the next issue.