



AUTOMATIC RF TECHNIQUES GROUP NEWSLETTER

SUMMER 2019

NUMBER 61

Important deadlines:

Sep. 27, 2019: 94th conference (Jan. 2020) paper submission AND student sponsorship application deadlines

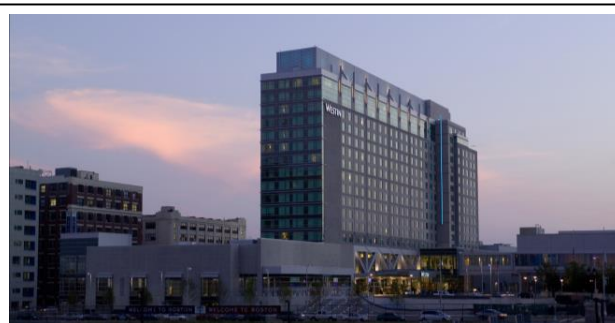
Oct. 1, 2019: Student fellowship applications due

Feb. 14, 2020: 95th conference (Jun. 2020) paper submission deadline

93rd ARFTG Microwave Measurement Symposium: Measurement Challenges for the Upcoming RF and Millimeter-wave Communications and Sensing Systems

OVERVIEW

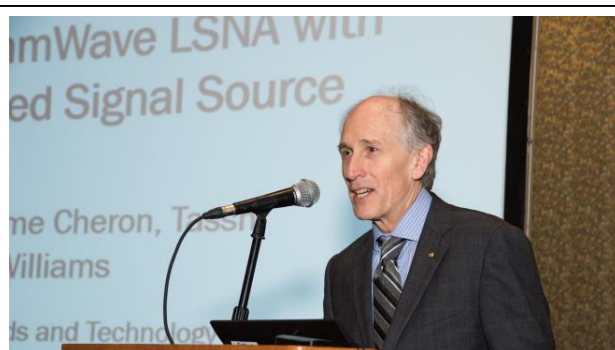
The Spring 2019 ARFTG Microwave Measurement Conference took place at the Westin Boston Waterfront Hotel in Boston, MA. The event was held on Friday, June 7, 2019 and was part of Microwave Week 2019, in conjunction with the International Microwave Symposium (IMS) and the RFIC Symposium. The ARFTG Symposium consisted of the 93rd ARFTG Conference, joint IMS/ARFTG sessions and workshops, an on-wafer measurement users' forum, and an NVNA users' forum. The theme of this symposium was "*Measurement Challenges for the Upcoming RF and Millimeter-wave Communications and Sensing Systems*". In addition to these technical events, there was an awards luncheon on Friday and a vendor exhibition during the conference. In total, ARFTG capped off an exciting week of activities for engineers, scientists, and technologists.



The Westin Boston Waterfront Hotel was the site of the 93rd (Spring 2019) ARFTG Symposium.

CONFERENCE TECHNICAL SESSIONS

The 93rd ARFTG Microwave Measurement Conference began on Friday, June 7th with introductions by ARFTG President, Dominique Schreurs, and Conference Co-Chairs, Mohammad Sayed and David Blackham. On this occasion, about 114 people attended, between ARFTG-only and RFIC+IMS+ARFTG superpass registrants. The conference consisted of four oral sessions (with 16 papers) and an interactive forum (with 11 papers) and was planned by Technical Program Co-Chairs, Marco Spirito and Patrick Roblin. The oral sessions included a keynote talk by Dr. Dylan Williams (NIST). The technical program can be found at www.arftg.org under the Past Conferences tab. Also, all ARFTG oral and interactive papers are archived in the IEEE Xplore Digital Library.



The Spring 2019 ARFTG keynote talk was given by Dylan Williams (NIST). (Photo by LylePhotos, Atlanta)

For the 93rd conference, the best oral paper, as voted on by the conference attendees, was “Characterizing amplifier modulation distortion using a vector network analyzer,” by Jan Verspecht, Augustine Stav, Sam Kusano, and Jean-Pierre Teyssier (Keysight Technologies). The best interactive forum paper was selected to be “Investigation of waveguide sensors for ultra-short-distance measurements,” by Aleksandra Baskakova and Karel Hoffmann (Czech Technical University in Prague). The conference attendees selected as the best student paper, “TRL error-box split to compensate for the bias dependency of ESD and antenna protection diodes in mm-wave,” by Carmine De Martino, Eduard Malotau, and Marco Spirito (TU Delft). Congratulations to our best paper awardees.

In addition to the ARFTG Conference sessions on Friday, there were two IMS/ARFTG joint sessions on Thursday, June 6th:

- Th2E: Measurement at the Limits – chaired by Leonard Hayden (Qorvo) and Matt King (HRL Laboratories)
- Th3E: The Art of Large Signal Measurement and Calibration – chaired by Tibault Reveyard (XLIM) and Alfred Riddle (Quanergy Systems)

CONFERENCE SPONSORS AND EXHIBITS

The ARFTG conference wouldn’t be possible without the support of our corporate sponsors. ARFTG is pleased to thank the sponsors of this conference:

- Gold sponsors: Qorvo.
- Silver sponsors: Anritsu Company, Copper Mountain Technologies, Keysight Technologies, and Maury Microwave.

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

The exhibition provides an excellent opportunity to see the latest range of products available from 15 of the leading suppliers in microwave measurement industry. This conference’s exhibiting companies were: Advanced Test Equipment Rentals, AMCAD Engineering, Anritsu, Copper Mountain Technologies, Flann Microwave, FormFactor, Junkosha, Inc., Keysight Technologies, Maury Microwave Corp., Microsanj, MPI Corporation, OML Inc., Rohde & Schwarz, SPINNER GmbH, T Plus, and Virginia Diodes. The best exhibitor as voted by conference attendees was Maury Microwave. To exhibit at a future conference, please contact the Exhibits Chair, at exhibits@arftg.org.



ARFTG attendees discuss posters with interactive forum presenters. (Photo by LylePhotos, Atlanta)



The ARFTG exhibition provided access to a with range of exhibitors. (Photo by LylePhotos, Atlanta)

WORKSHOP

As part of the ARFTG Symposium, two joint IMS/ARFTG workshops were held on Monday, June 3rd.

- WMD: Measurement and Design Techniques for Next-Generation Communication Systems, which was organized by Antonio Raffo and Patrick Roblin and had approximately 70 attendees
- WMF: Measurement Challenges in Over-The-Air Testing, which was organized by Jon Martens and Nuno Borges Carvalho and had approximately 54 attendees

ANNUAL BUSINESS MEETING

There was no ARFTG business meeting held with the Spring 2019 ARFTG Conference. The next business meeting will be held at the Fall/Winter 2019/2020 Conference on January 28, 2020. We encourage everyone to attend.

CONFERENCE AWARDS

ARFTG President, Dominique Schreurs, presided over the conference awards ceremony, which took place during the awards luncheon on Friday, June 7th. Certificates of appreciation were presented to the organizers of the 93rd conference, namely Mohammad Sayed and Dave Blackham as Conference Co-Chairs and Marco Spirito and Patrick Roblin as Technical Program Co-Chairs.

Awards were also given for best papers and exhibitor from the previous (92nd) conference held in Orlando, FL. The best oral paper award went to “A 3D printed TE10 rectangular to TE01 circular waveguide transition for polymer waveguide characterization,” by M. del Mastro¹, M. Alonso del Pino², and M. Spirito¹ (¹ELCA, Delft University of Technology and ²NASA-Jet Propulsion Laboratory). The best interactive forum presentation was awarded to “Non-probe probing of printed circuits,” by JungHo Kang and Kyungsoo Chae (Samsung Electro-Mechanics). The best student paper was awarded to “Transient and steady-state thermal measurements of GaN-on-SiC HEMT transistors under realistic microwave drive conditions,” by Jonas Urbonas, Cristian Matei, and Peter H. Aaen (University of Surrey) The Best Exhibitor was awarded to Keysight Technologies.



*ARFTG President Dominique Schreurs and Treasurer Ron Ginley presents Jon Martens with an ARFTG Distinguished Service Award.
(Photos by LylePhotos, Atlanta)*

Additionally, Jon Martens (Anritsu) received the ARFTG Distinguished Service Award for his many years of service to ARFTG. There were no members elevated to life member status. If you feel you may qualify for ARFTG life member status, information can be found at <http://www.arftg.org/membership/lifemember.html>.

USERS FORUMS AND STANDARDS MEETINGS

The ARFTG Symposium hosted two users' forums Thursday, June 6th: the NVNA Users' Forum and the On-Wafer Measurement Users' Forum. Information on the both forums can be found under the Forums tab at www.arftg.org.

The NVNA Users' Forum is organized by Patrick Roblin (OSU), Dominique Schreurs (KU Leuven), Jean-Pierre Teyssier (Keysight), J. Apolinar Reynoso Hernandez (CICESE), Tibault Reveyrand (XLIM), and Karun Rawat (IIT Roorkee). This meeting was led by Karun Rawat and Patrick Roblin had about 41 participants with this agenda:

- Welcome – Prof. Karun Rawat, IIT Roorkee
- Large-Signal Characterization of SOI MOSFETs Using NVNA and Active Load-Pull – Dr. Manuel Pulido, Andres Zarate, pSemi Corp. A Murata Co.
- Discussion: Use of NVNA in device characterization and model validation
- Large Signal Characterization of Dual-Input PAs – Chenyu Liang¹ and Thaimi Niubo Aleman^{2,1} (PhD students) ¹The Ohio State University, ²CICESE Ensenada
- NIST Approach to Calibrating an LSNA on an Arbitrary Frequency Grid – Aric Sanders, National Institute of Standards and Technology
- Discussion & Feedback
- Farewell

The January 2019 On-Wafer Measurement Users' Forum was organized by Andrej Rumiantsev (MPI Corporation), Marco Spirito (TU Delft), and Jon Martens (Anritsu). The forum had approximately 40 participants with this agenda:

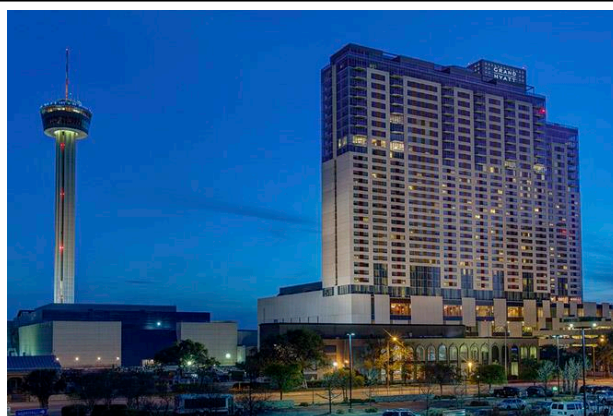
- Introduction and Opening – Andrej Rumiantsev, MPI Corporation, Marco Spirito, TU Delft, Jon Martens, Anritsu
- On-wafer calibration techniques from 4K to 175C – Gavin Fisher, FormFactor
- Evaluation of silicon substrate losses at millimeter-wave frequencies – Lucas Nyssens, UCL
- Towards ultra-precise probing in on-wafer measurements – Faisal Mubarak, VSL
- Transfer of uncertainties with commercial calibration substrates – Uwe Arz, PTB

- Reproducible on-wafer measurement demonstrated over 300 GHz – Masahiro Horibe, AIST
- PAR2822 "Recommended Practices for Microwave, Millimeter-wave and THz On-Wafer Calibrations and Measurements", quick update – Andrej Rumiantsev, MPI Corporation
- Farewell

FUTURE EVENTS

January 2020 ARFTG Symposium

The Fall/Winter 2019/20 ARFTG Microwave Measurement Symposium will be held in San Antonio, TX, on January 26-29, 2020 and will once again be co-located with Radio Wireless Week (radiowirelessweek.org). The conference theme is “*RF to Millimeter-Wave Measurement Techniques for 5G and Beyond*”. It is planned to hold the 94th ARFTG Conference, a short course, a workshop, a joint RWW/ARFTG exhibit, and the users’ forums. **The paper abstracts (with supporting data and figures) submission deadline is September 27, 2019.** For information, visit www.arftg.org or contact the Conference Co-Chairs, Andrej Rumiantsev (a.rumiantsev@ieee.org) and Joe Gering (joe.gering@qorvo.com) or the TPC Co-Chairs, Joel Dunsmore (joel_dunsmore@keysight.com) and Marco Spirito (M.Spirito@tudelft.nl). The tentative program is given in the adjacent table and includes the conference, an exhibit, a short course, a workshop, and user forums.



The Grand Hyatt San Antonio is the site for the 94th ARFTG Microwave Measurement Conference

Spring 2020 ARFTG Conference

The 95th ARFTG Microwave Measurement Conference will be held on June 26, 2020 in Los Angeles, CA, as part of Microwave Week 2020, in conjunction with IMS (ims-ieee.org) and the RFIC symposium (rfic-ieee.org). The ARFTG conference theme is “*Microwave and Millimeter-Wave Measurements for the Connected World*”. **The deadline for submission of paper abstracts (with supporting data and figures) is February 14, 2020.** For information, visit www.arftg.org or contact the Conference Chair, Jon Martens (Jon.Martens@anritsu.com) or the TPC Chair, Peter Aaen (peter.aaen@gmail.com).

Users’ Forums

An NVNA Users’ Forum occurs at all ARFTG conferences. Please send your ideas for the meeting at the fall/winter ARFTG with RWW in San Antonio, TX (January 26-29, 2020), the spring ARFTG with IMS in Los Angeles (June 25-26, 2020), or any future meetings to the forum organizers: Patrick Roblin (roblin.1@osu.edu), Dominique Schreurs (dominique.schreurs@kuleuven.be), Jean-Pierre Teyssier (jean-pierre_teyssier@keysight.com), J. Apolinar Reynoso Hernandez (apolinar@cicese.mx), Tibault Reveyard (reveyard@gmail.com), and Karun Rawat (karunrawat@gmail.com). In addition, the next European meeting will be during INMMiC at Cardiff University in Cardiff, UK on April 16-17, 2020. More information on the latest activities and schedules can be found at the ARFTG web site, www.arftg.org under the Forums tab.

Jan 2020 ARFTG Symposium – tentative schedule

Sunday, Jan. 26 8:00 am – 5:00 pm	NIST/ARFTG Short Course
Monday, Jan. 27 8:00 am – 12:00 pm	NIST/ARFTG Short Course
Monday, Jan. 27 8:00 am – 12:00 pm	NVNA & On-Wafer Users’ Forums
Monday, Jan. 27 1:00 pm – 5:00 pm	92 nd Microwave Measurement Conference
Monday, Jan. 27 1:00 pm – 7:00 pm	Joint RWW/ARFTG Exhibition
Monday, Jan. 27 6:00 pm – 7:00 pm	RWW/ARFTG Reception (in Exhibition Hall)
Tuesday, Jan 28 8:00 am - 5:00 pm	92 nd Microwave Measurement Conference
Tuesday, Jan 28 8:00 am – 4:00 pm	Joint RWW/ARFTG Exhibition
Tuesday, Jan 28 10:00 am - 12:00 pm	Joint RWW/ARFTG Plenary
Tuesday, Jan 28 12:00 pm - 1:30 pm	Awards Luncheon
Wednesday, Jan. 29 8:00 am - 12:00 pm	Workshop
Wednesday, Jan. 29 8:00 am - 3:00 pm	IEEE Standards Committee Meetings

Additionally, an On-Wafer Measurements Users' Forum occurs at all ARFTG conferences. Please send your ideas for the meeting at the fall/winter ARFTG with RWW in San Antonio, TX (January 26-29, 2020), the spring ARFTG with IMS in Los Angeles (June 25-26, 2020), or any future meetings to the forum organizers: Andrej Rumiantsev (a.rumiantsev@ieee.org), Marco Spirito (M.Spirito@tudelft.nl), and Jon Martens (Jon.Martens@anritsu.com). In addition to the ARFTG meetings, the On-Wafer Measurements Users' Forum is planning meetings in Europe at EuMW-2019 (Paris, October 3, 2019) and Asia at APMC-2019 (Singapore, December 2019). More information on the latest activities and schedules can be found at the ARFTG web site, www.arftg.org under the Forums tab.

ARFTG STUDENT PROGRAMS

ARFTG typically awards one or more *ARFTG Roger Pollard Memorial Student Fellowships in Microwave Measurement* to recognize and provide financial assistance to graduate students who show promise and interest in pursuing research related to microwave measurement techniques. The next application deadline is October 1, 2019. The application instructions and criteria for the next award cycle are published at www.arftg.org, or you may contact the education chair, Jim Booth, at studentfellowship@arftg.org.

ARFTG may also grant ARFTG Student Sponsorships to help M.S. and Ph.D. students defray the expense of attending the fall/winter conference. Students are required to present a paper and provide volunteer service at the conference. The application deadline is September 27, 2019. For information on sponsorships at future conferences, see www.arftg.org or contact the sponsorship chair, Joe Gering, at sponsorship@arftg.org.

Students interested in obtaining financial assistance to attend the spring conference should contact the conference chairs (chairs@arftg.org). Any awards will be discretionary, and preference will be given to authors of accepted papers.

ADDENDUM

Every effort has been made to publish correct information in this newsletter. Significant errors should be reported to the ARFTG Secretary, Joe Gering (joe.gering@qorvo.com), so that corrections can be reported in the next issue.

