



# AUTOMATIC RF TECHNIQUES GROUP

## NEWSLETTER

SUMMER 2011

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### *77<sup>th</sup> ARFTG Microwave Measurement Conference: “Design and Measurement of Microwave Systems”*

#### OVERVIEW



*The Baltimore Hilton, venue for the 77<sup>th</sup> ARFTG  
Microwave Measurement Conference*

More than 110 attendees participated in the 77<sup>th</sup> ARFTG Microwave Measurement Conference that took place at the Baltimore Hilton on June 10<sup>th</sup>, 2011. As is usual for Spring ARFTG conferences, this conference formed part of Microwave Week 2011, which also included the International Microwave Symposium (IMS), the Radio Frequency Integrated Circuits (RFIC) symposium, and many workshops, tutorials and other meetings. All these events took place at the Baltimore Convention Center or the Baltimore Hilton. As well as its conference, ARFTG also sponsored a meeting of the NVNA Users' Forum and three joint ARFTG/IMS Workshops. Taken together, these activities ran from Monday, June 6<sup>th</sup> through to Friday, June 10<sup>th</sup>.

For more information on ARFTG and its activities, including details of conferences past, present and future, visit the ARFTG website at [www.arftg.org](http://www.arftg.org).

#### CONFERENCE TECHNICAL SESSIONS

The 77<sup>th</sup> ARFTG conference began with a welcome and introduction from Mohamed Sayed, the Conference Chair. This conference received sponsorship from:

- RFMD (gold sponsor)
- Agilent Technologies (silver sponsor)
- Focus Microwaves (silver sponsor)
- High Frequency Engineering (silver sponsor)
- Maury Microwave (silver sponsor)
- Rohde and Schwarz (silver sponsor)

The overall conference theme was “Design and measurement of microwave systems”, and featured four technical sessions and an interactive forum. The technical sessions consisted of papers given as oral presentations and addressed measurement systems, calibration issues and techniques, on-wafer methods and uncertainty analysis, and broadband and mm-wave techniques. The interactive forum featured a total of 15 papers presented as posters during the breaks from the technical sessions.



*At a technical session above, attendees were able to learn about developments in microwave measurement.*

The best oral paper presentation, as selected by the conference attendees, was “Uncertainty in multiport S-parameter measurements” by A. Ferrero<sup>1</sup>, M. Garelli<sup>3</sup>, B. Grossman<sup>2</sup>, S. Choon<sup>2</sup>, and V. Tepatti<sup>1</sup> (<sup>1</sup>Politecnico di Torino, Italy, <sup>2</sup>Intel, United States, and <sup>3</sup>HFE, Switzerland). There was a tie for the best poster presentation. The winners here were “Contactless distance measurement method” by K. Hoffmann and Z. Skvor (Czech Technical University in Prague, Czech Republic) and “Real-time non-linear de-embedding” by F. Vanaverbeke<sup>1</sup>, W. De Raedt<sup>1</sup>, D. Schreurs<sup>2</sup> and M. Vanden Bossche<sup>3</sup> (<sup>1</sup>Imec, Belgium, <sup>2</sup>K. U. Leuven, Belgium, and <sup>3</sup>NMDG NV, Belgium).



*Interactive forum papers are presented as posters to encourage technical interactions between presenters and attendees.*

## CONFERENCE EXHIBITS

A total of fourteen companies chose to exhibit their latest equipment at this conference. These companies were:

- Agilent Technologies
- AMCAD Engineering
- Anritsu Company

- Cascade Microtech
- Constant Wave
- Focus Microwave
- HFE
- LeCroy
- Maury Microwave
- Mesuro
- NMDG
- OML, Inc.
- Rohde & Schwarz
- Tektronix

The attendees selected LeCroy as the best exhibitor at the conference.

To exhibit at future conferences, please contact the ARFTG Exhibits Chair, Brett Grossman ([exhibits@arftg.org](mailto:exhibits@arftg.org)). For sponsorship opportunities, contact the Sponsorship Chairs, Rusty Myers and Joe Gering ([sponsorship@arftg.org](mailto:sponsorship@arftg.org)).



*Exhibits from fourteen companies were available for attendees to visit. The exhibits were co-located with the interactive forum session during two extended breaks.*

## AWARDS LUNCHEON

ARFTG President, Ron Ginley, presided over the awards luncheon. This began with Certificates of Appreciation being presented to the organizers of the 77<sup>th</sup> conference: Conference Chair, Mohamed Sayed; Conference Host, John Gregory Burns; Technical Program Chair, Jon Martens; Exhibits Chair, Brett Grossman; and the Session Chairs Jon Martens, Uwe Arz, Leonard Hayden, Nick Ridler, and Brett Grossman.

This was followed by awards being presented for the previous (76<sup>th</sup>) conference, held in Clearwater Beach, Florida. The award for best oral paper presentation was given to “Rectangular-waveguide vector-network-analyzer calibrations with imperfect test ports” by

Dylan Williams (NIST, US). The award for best interactive forum paper presentation was given to “Measurement of micromachined submillimeter waveguide circuits”, by X. Shang, M. J. Lancaster, M. Ke, and Y. Wang (University of Birmingham, UK). The best exhibitor award went to Anritsu Company.

## NVNA USERS’ FORUM

The meeting of the NVNA Users’ Forum was held on Thursday afternoon, June 9<sup>th</sup>, also at the Baltimore Hilton. The forum was moderated by Joe Gering and attended by 45 people. There were two main discussion topics: (1) nonlinear de-embedding and (2) NVNA calibration, verification, & traceability. For the first topic, Prof. Antonio Raffo gave a presentation on theory and background and Mr. Frederik Vanaverbeke performed a practical de-embedding demonstration. To stimulate discussion for the second topic, the forum organizers presented the results of a survey taken by nonlinear measurement equipment vendors and national standards laboratories. This survey addressed methods of NVNA calibration, issues with verification, and the path for traceability. This subject generated a lively discussion. The subject of a measurement round-robin came up during the discussions, and NIST has since offered to host the round-robin as part of the ARFTG measurement comparison program. The presentations for this meeting and more information can be found at [http://www.arftg.org/about\\_nvna.html](http://www.arftg.org/about_nvna.html).



*The NVNA users’ forum was held on Thursday, June 9<sup>th</sup>.*

## JOINT ARFTG/IMS WORKSHOPS

Three joint ARFTG/IMS workshops were held during Microwave Week 2011 at the Baltimore Convention Center. The first two workshops took place on Monday, June 6<sup>th</sup> and were entitled “Practical compression, IMD, load pull and behavioral modeling measurements” (organized by Jon Martens, Anritsu, US and Nuno Borges Carvalho, IT- Universidade de Aveiro, Portugal) and “Laboratory class: wafer-level S-

parameter calibration techniques” (organized by Andrej Rumiantsev, Cascade Microtech Germany). The third workshop took place on Friday, June 10<sup>th</sup> and was entitled “The design flow of microwave power amplifiers: challenges and future trends” (organized by Dominique Schreurs, K. U. Leuven, Belgium and Antonio Raffo, University of Ferrara, Italy).

## FUTURE EVENTS

### NVNA Users’ Forum

This next meeting will be held during European Microwave Week 2011, which takes place from October 9<sup>th</sup> to 14<sup>th</sup> in Manchester, UK (information on European Microwave Week is available at [www.eumweek.com](http://www.eumweek.com)). Time and location details will be available at [www.arftg.org](http://www.arftg.org) closer to the meeting. Suggestions for discussion topics for this users’ forum meeting can be sent to Kristoffer Andersson ([kristoffer.andersson@chalmers.se](mailto:kristoffer.andersson@chalmers.se)).

### Fall 2011 ARFTG Symposium

This year’s Fall ARFTG Symposium will comprise the 78<sup>th</sup> Microwave Measurement Conference, an advanced course on RF PA concepts and the NVNA Users’ Forum. This year, the symposium will be co-located with the IEEE Power Amplifier Symposium. All of these events will be held at Tempe Mission Palms Hotel in Tempe, Arizona on November 29<sup>th</sup> through December 2<sup>nd</sup>, 2011. Registration through all events will be possible at [www.arftg.org](http://www.arftg.org). A preliminary timetable for all of these events is given on the next page.

### *IEEE Power Amplifier Symposium*

This one day meeting provides an informal forum for discussing innovative work in the area of power amplifiers covering handset and base-station technologies, voice, video and data from HF through mm-wave. Technical papers will cover areas including design techniques for power amplifiers, device and IC technology for power amplifiers, system requirements and transmitter architectures, and linearization techniques. The submission deadline for two page abstracts (with supporting data) for consideration is September 9<sup>th</sup>, 2011 and submissions are done through the same website as for the ARFTG conference below. For more information, see [www.arftg.org](http://www.arftg.org) or [www.Pasymposium.ucsd.edu](http://www.Pasymposium.ucsd.edu) or contact the general chair, John Wood ([John.Wood@freescale.com](mailto:John.Wood@freescale.com))

### *Microwave Measurement Conference*

The theme for the 78<sup>th</sup> ARFTG Microwave Measurement Conference is “High power RF

measurement techniques". The deadline for submitting a summary (with supporting data) for consideration by the conference Technical Program Committee is September 9<sup>th</sup>, 2011. To submit a paper, go to [http://www.mtt-tpms.org/symposia\\_v6/ARFTG\\_Fall/start.html](http://www.mtt-tpms.org/symposia_v6/ARFTG_Fall/start.html). As on previous occasions, the conference will offer ample opportunity for participants to interact with leading professionals in related RF and microwave fields. For more information, visit [www.arftg.org](http://www.arftg.org) or contact the Conference Chairs, Mohamed Sayed ([mmsayed@sbcglobal.net](mailto:mmsayed@sbcglobal.net)) or John Wood, ([John.Wood@freescale.com](mailto:John.Wood@freescale.com)), or the Technical Program Chair, Peter Aaen ([Peter.Aaen@freescale.com](mailto:Peter.Aaen@freescale.com)).

#### Fall 2011 ARFTG Symposium – tentative schedule

Tuesday November 29 8:00 am – 5:00 pm	IEEE Power Amplifier Symposium
Wednesday November 30 8:00 am – 5:00 pm	Advanced Course on RF PA Concepts
TBD	NVNA Users' Forum
Thursday December 1 8:00 am-5:00 pm	78 <sup>th</sup> Microwave Measurement Conference
Thursday December 1 6:30 pm – 10:00 pm	Awards Banquet
Friday December 2 8:00 am – 3:00 pm	78 <sup>th</sup> Microwave Measurement Conference (continued)

#### ***Advanced Course on RF PA Concepts***

This one day short course will present several important aspects of RF power amplifier and system design. Invited speakers will present lectures on subjects including Doherty PA design, digital pre-distortion, digital communications signals and their measurements, harmonic terminations for high-efficiency PAs, and envelope tracking techniques. For more information, visit [www.arftg.org](http://www.arftg.org) or contact the course organizer, Steve Cripps ([Stevehywave@aol.com](mailto:Stevehywave@aol.com)).

#### ***NVNA Users' Forum***

This meeting will also take place during the Fall 2011 ARFTG Symposium. The program should be available at [www.arftg.org](http://www.arftg.org) approximately one month prior to the meeting. Suggestions for discussion topics can be sent to Patrick Roblin ([roblin@ece.osu.edu](mailto:roblin@ece.osu.edu)).



*The Tempe Mission Palms Hotel, Tempe, Arizona,  
venue for the Fall 2011 ARFTG Symposium*

### **Spring 2012 ARFTG activities**

The 79<sup>th</sup> ARFTG Microwave Measurement Conference will be held on June 22<sup>nd</sup>, 2012, in Montreal, Canada, as part of Microwave Week 2012, in conjunction with IMS ([www.ims2012.org](http://www.ims2012.org)) and the RFIC symposium ([www.rfic2012.org](http://www.rfic2012.org)). The conference theme is "Non-linear measurement systems". **The deadline date for submission of electronic paper summaries (with supporting data) is December 31, 2011.** For up-to-date information, visit [www.arftg.org](http://www.arftg.org) or contact the Conference Chair, Dominique Schreurs ([Dominique.Schreurs@esat.kuleuven.be](mailto:Dominique.Schreurs@esat.kuleuven.be)) or the Technical Program Chair, Jean-Pierre Teyssier ([j-pierre.teyssier@xlim.fr](mailto:j-pierre.teyssier@xlim.fr)).

It is also planned to hold a meeting of the NVNA Users' Forum, as part of the Spring 2012 ARFTG activities, and to co-sponsor appropriate workshops that will be taking place during Microwave Week 2012.

### **STUDENT FELLOWSHIP**

The next application deadline for the ARFTG Microwave Measurement Student Fellowship is October 1, 2011. The purpose of this fellowship is to recognize and provide financial assistance to graduate students who show promise and interest in pursuing research related to microwave measurement techniques. For more information, visit [www.arftg.org](http://www.arftg.org) or contact the fellowship coordinator, Dominique Schreurs ([dominique.schreurs@esat.kuleuven.be](mailto:dominique.schreurs@esat.kuleuven.be)).

### **ADDENDUM**

Every effort has been made to publish correct information in this newsletter. Significant errors should be reported to the ARFTG Executive Committee Secretary, Jon Martens ([jmartens@anritsu.com](mailto:jmartens@anritsu.com)), so that corrections can be reported in the next issue.