



## AUTOMATIC RF TECHNIQUES GROUP

### NEWSLETTER

SUMMER 2008

NUMBER 39

## *71<sup>st</sup> ARFTG Microwave Measurement Conference: “Network Analysis – 50 Years On”*

### OVERVIEW



*The Omni Hotel at CNN Center, venue for the  
71<sup>st</sup> ARFTG Microwave Measurement Conference*

More than 120 attendees participated in the 71<sup>st</sup> ARFTG Microwave Measurement Conference that took place at the Omni Hotel at CNN Center, Atlanta, Georgia, on June 20<sup>th</sup>, 2008. As is usual for Spring ARFTG conferences, this conference formed part of Microwave Week 2008, which also included the International Microwave Symposium (IMS), the Radio Frequency Integrated Circuits (RFIC) symposium, and many workshops, tutorials and other meetings. Most of these other events took place at the Georgia World Congress Center, right next door to the Omni Hotel. As well as its conference, ARFTG also sponsored a meeting of the

NVNA Users' Forum and two joint ARFTG/IMS Workshops. Taken together, these activities ran from Monday, June 16<sup>th</sup>, through to Friday, June 20<sup>th</sup>. This ARFTG conference received sponsorship from Agilent Technologies, Cascade Microtech and Tektronix.

A CD containing the 71<sup>st</sup> ARFTG conference digest, as well as the IMS digest, is available from the IEEE Online Catalog & Store at [www.ieee.org](http://www.ieee.org).

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 71<sup>st</sup> ARFTG conference began with a welcome and introduction from Nick Ridler, Conference Chair. The overall conference theme was “Network Analysis – 50 years on”, and featured a Keynote Speech, four technical sessions and an interactive forum. The Keynote Speech, titled “ARFTG 50 Year Network Analyzer History”, was given by Doug Rytting, of Rytting Consulting, Santa Rosa, United States. The technical sessions consisted of papers given as oral presentations. These technical sessions were titled “50 Years of VNAs”, “VNA Calibration”, “Passive Components” and “Active Devices”. The interactive forum featured a total of 10 papers presented as posters during the breaks from the technical sessions.



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

Selected by the conference attendees as best oral paper presentation from the technical sessions was “Monte Carlo Analysis of Measurement Uncertainties for On-Wafer Thru-Reflect-Line Calibrations” presented by U. Arz (PTB, Braunschweig, Germany), co-authored by J. Leinhos (Leibniz University Hannover, Hannover, Germany). Selected as the best interactive forum paper presentation was “Verification of Wafer-level Calibration Accuracy at High Temperatures” presented by A. Rumiantsev (SUSS MicroTec Test Systems GmbH), co-authored by R. Doerner (Ferdinand-Braun-Institut fuer Hoechsthfrequenztechnik (FBH), Berlin, Germany). Selected as best exhibitor at the conference was Tektronix.

As on previous occasions, the ARFTG conference also included an exhibits area and an awards luncheon, both of which are described below.

## CONFERENCE EXHIBITS

A total of twelve companies chose to exhibit their latest equipment at this conference. These companies were: Agilent Technologies ([www.agilent.com](http://www.agilent.com)), Cascade Microtech ([www.cmicro.com](http://www.cmicro.com)), Focus Microwaves Inc ([www.focus-microwaves.com](http://www.focus-microwaves.com)), Flann Microwave Ltd ([www.flann.com](http://www.flann.com)), Maury Microwave Corporation ([www.maurymw.com](http://www.maurymw.com)), Verspecht-Teyssier-DeGroote SAS ([www.vtd-rf.com](http://www.vtd-rf.com)), LA Techniques Ltd ([www.latechniques.com](http://www.latechniques.com)), Rohde & Schwarz ([www.rohde-schwarz.com](http://www.rohde-schwarz.com)), Sonnet Software Inc ([www.sonnetusa.com](http://www.sonnetusa.com)), Southwest Microwave Inc ([www.southwestmicrowave.com](http://www.southwestmicrowave.com)), SUSS MicroTec Inc ([www.suss.com](http://www.suss.com)) and Tektronix ([www.tek.com](http://www.tek.com)). To

exhibit at future conferences, please contact the ARFTG Exhibits Chair, Joe Tauritz ([jltauritz@ieee.org](mailto:jltauritz@ieee.org)).



*The Tektronix stand that was chosen as Best Exhibitor at the 71st ARFTG conference*

## AWARDS LUNCHEON

ARFTG President, Leonard Hayden, presided over the awards luncheon. This began with Certificates of Appreciation being presented to the organizers of the 71<sup>st</sup> conference: Conference Chair, Nick Ridler; Conference Host, Chris Ward; Technical Program Chair, Roger Pollard; Exhibits Chair, Joe Tauritz; and the Session Chairs, Mohamed Sayed, Dave Blackham, Andrea Ferrero, Dave Walker and Chris Ward. This was followed by awards being presented for the previous (70<sup>th</sup>) conference, held in Tempe, Arizona. The award for best oral paper presentation was given to Martin Randus (co-author Karel Hoffmann) for the paper, “A Simple Method for Extreme Impedances Measurement”. The award for best interactive forum paper presentation was given to J E Zúñiga-Juárez (co-authors Andrés Zárate-de Landa, J A Reynoso-Hernández, M C Maya-Sánchez, Juan Luis del Valle-Padilla and José Raúl Loo-Yau), for the paper “An Investigation on the Modified Cold-FET Method for Determining Gate Resistance and Inductance of the Packaged GaN and SiC Transistors”. And finally the best exhibitor award was presented to Agilent Technologies.

## NVNA USERS’ FORUM - INTERNATIONAL

The ‘international’ meeting of the NVNA Users’ Forum was held on Thursday afternoon, June 19<sup>th</sup>, at the Omni Hotel at CNN Center, Atlanta.

Approximately 30 people from industry, government and academia attended the meeting. The meeting featured a discussion topic and a research update. The discussion topic concerned “Choice of Bias Tee for Minimizing Memory Effects in Weakly Nonlinear Distortion Measurements and for use in Pulsed Measurements” and was moderated by Kate Remley and John Wood. The research update was given by Daniel Gunyan, of Agilent Technologies, and concerned “Measurement Applications for the Mixer-Based NVNA”, which highlighted measurements such as bit streams, narrow RF pulses and multi-tone signals. A summary of this meeting will be available shortly at [www.arftg.org](http://www.arftg.org).

## JOINT ARFTG/IMS WORKSHOPS

Two joint ARFTG/IMS workshops were held during Microwave Week 2008. Both workshops took place on Monday, June 16<sup>th</sup>, at the Georgia World Congress Center, Georgia. The first workshop, titled “High Speed Signal Integrity Workshop with Emphasis on Jitter”, was organized by Thomas Ruttan (Intel Corp) and Mike Resso (Agilent Technologies). The second workshop, titled “Applications and Misapplications of Measurement Uncertainty”, was organized by Nick Ridler (National Physical Laboratory (NPL)), Daniel Pasquet (ENSEA) and Andrej Rumiantsev (SUSS MicroTec Test Systems GmbH).

## FUTURE EVENTS

### NVNA Users’ Forum – Europe

This meeting will be held during European Microwave Week 2008, which takes place from October 27<sup>th</sup> to 31<sup>st</sup>, 2008, in Amsterdam, The Netherlands. (Information on European Microwave Week is available at [www.eumweek.com](http://www.eumweek.com).) The NVNA Users’ meeting will be on Thursday, October 30<sup>th</sup>, from 08:30am to 09:50am. The agenda for the meeting has already been fixed and forms one of the Technical Sessions of the 38<sup>th</sup> European Microwave Conference (session EuMC39, see page 57 of the European Microwave Week Program Book, available at [www.eumweek.com](http://www.eumweek.com)).

### Fall 2008 ARFTG Symposium

This year’s fall ARFTG Symposium will comprise the 72<sup>nd</sup> Microwave Measurement Conference, the NIST/ARFTG Short Course, a Nonlinear Measurement Workshop, a Multiport/Differential Measurement for Signal Integrity Workshop and the NVNA Users’ Forum. All these events will be held at the Red Lion Jantzen Beach Hotel on the Columbia River, from

December 9<sup>th</sup> to 12<sup>th</sup>, 2008. The timetable for these events is given below.



*The Red Lion Jantzen Beach Hotel, Portland, Oregon, venue for the Fall 2008 ARFTG Symposium*

#### Fall 2008 ARFTG Symposium - schedule of events

|  |   |
|--|---|
| Tuesday<br>December 9 <sup>th</sup><br>8.00am – 5.00pm       | NIST / ARFTG<br>Short Course  |
| Wednesday<br>December 10 <sup>th</sup><br>8.00am – 12.00noon |   |
| Wednesday<br>December 10 <sup>th</sup><br>1.15pm – 5.00pm    | Nonlinear Measurement<br>Workshop:<br>“Time-Domain Approaches:<br>Issues, Solutions and<br>Evaluations” |
| Thursday<br>December 11 <sup>th</sup><br>8.00am – 5.00pm     | 72 <sup>nd</sup> Microwave<br>Measurement Conference  |
| Friday<br>December 12 <sup>th</sup><br>8.00am – 12.00noon    |   |
| Friday<br>December 12 <sup>th</sup><br>1.15pm – 3.15pm       | NVNA Users’ Forum   |
| Friday<br>December 12 <sup>th</sup><br>1.15pm – 5.00pm       | Multiport / Differential<br>Measurement for Signal<br>Integrity Workshop                                |

### ***Microwave Measurement Conference***

The theme for the 72<sup>nd</sup> ARFTG Microwave Measurement Conference is “Time Domain and Frequency Domain Measurement”. The deadline for submitting a paper for consideration by the conference Technical Program Committee is September 8<sup>th</sup>, 2008.



As on previous occasions, the conference will offer ample opportunity for participants to interact with leading professionals in fields such as RF communications and other microwave technologies. For more information, visit [www.arftg.org](http://www.arftg.org) or contact the Conference Chair, Tom Ruttan ([Thomas.g.ruttan@intel.com](mailto:Thomas.g.ruttan@intel.com)), or the Technical Program Chair, Leonard Hayden ([Leonard.Hayden@ieee.org](mailto:Leonard.Hayden@ieee.org)).

### ***NIST / ARFTG Short Course***

This one-and-a-half day short course will include topics specific to the conference theme (i.e. “Time Domain and Frequency Domain Measurement”). Additional topics include: connectorised and on-wafer S-parameters, power, thermal noise, phase noise and nonlinear measurements, and uncertainty analysis.

For more information, visit [www.arftg.org](http://www.arftg.org) or contact the short course organizer, Dominique Schreurs ([dominique.schreurs@esat.kuleuven.be](mailto:dominique.schreurs@esat.kuleuven.be)).

### ***Measurement Workshops***

For more information about ARFTG’s highly successful measurement workshops, visit [www.arftg.org](http://www.arftg.org) or contact the workshop organizer, Jean-Pierre Teyssier ([teyssier@brive.unilim.fr](mailto:teyssier@brive.unilim.fr)). The fall 2008 ARFTG symposium will feature two such workshops:

1. Nonlinear Measurement Workshop: “Time-Domain Approaches: Issues, Solutions and Evaluations”. This Workshop proposes a tour of up-to-date approaches for time-domain waveform measurements at nonlinear device terminals, especially high power transistors. The planned topics include: passive and active loadpull waveform engineering, large signal network analysis, time domain measurement of very high power and strongly mismatched devices.
2. Multiport/Differential Measurement for Signal Integrity Workshop. Signal integrity is now a ‘hot’ topic, linking microwave engineers and high-speed digital system designers. As many fast digital systems are making use of differential signals, this workshop will focus on RF multiport and differential measurement techniques that are useful for signal integrity measurements and design improvements.

### ***NVNA Users’ Forum – US***

This meeting will also take place during the fall 2008 ARFTG symposium. The program should be available at

[www.arftg.org](http://www.arftg.org) approximately one month prior to the meeting. Those with potential agenda items for this meeting should contact the Forum organizers: John Wood ([john.wood@freescale.com](mailto:john.wood@freescale.com)), Jean-Pierre Teyssier ([teyssier@brive.unilim.fr](mailto:teyssier@brive.unilim.fr)) and Dominique Schreurs ([dominique.schreurs@esat.kuleuven.be](mailto:dominique.schreurs@esat.kuleuven.be)).

### ***Spring 2009 ARFTG activities***

The 73<sup>rd</sup> ARFTG Microwave Measurement Conference will be held on June 12<sup>th</sup>, 2009, in Boston, Massachusetts, as part of Microwave Week 2009, in conjunction with IMS ([www.ims2009.org](http://www.ims2009.org)) and the RFIC symposium ([www.rfic2009.org](http://www.rfic2009.org)). The ARFTG conference theme is “Practical Applications of Non-Linear Measurements”. For more information, visit [www.arftg.org](http://www.arftg.org) or contact the Conference Chair, Charles Wilker ([wilker@ieee.org](mailto:wilker@ieee.org)) or the Technical Program Chair, Dave Blackham ([dave\\_blackham@agilent.com](mailto:dave_blackham@agilent.com)).

It is also planned to hold a meeting of the NVNA Users’ Forum – International, as part of the spring 2009 ARFTG activities, and to co-sponsor appropriate workshops and/or tutorials that will be taking place during Microwave Week 2009.

### ***UPDATED ARFTG CD***

The highly successful ARFTG digests compilation CD that contains the digests from the ARFTG conferences that took place during the years 1982 to 2001 has now been supplemented with an additional CD that brings this collection up to date with digests from conferences from 2002 to 2007. The cost of the combined CDs is currently \$105 for members or \$140 for non-members. In future, it is planned to merge these two CDs into one that will contain *all* ARFTG conference digests from 1982 to date. In addition, a CD containing the Nonlinear Measurement Workshop compendium of six workshops presentation material, 2001 through to 2006, is also available for purchase. The cost is currently \$70 for members or \$105 for non-members.

Additional information on purchasing either or both of the above CDs can be obtained by contacting Jim Taylor ([jtaylor114@kc.rr.com](mailto:jtaylor114@kc.rr.com)), the ARFTG Executive Secretary.

### ***CORRECTIONS***

Every effort has been made to publish correct information in this newsletter. Significant errors should be reported to the ARFTG Executive Committee Secretary, Nick Ridler ([nick.ridler@ieee.org](mailto:nick.ridler@ieee.org)), so that corrections can be reported in the next issue.