

62nd ARFTG Microwave Measurements Conference
“Differential Measurements”
December 2-5, 2003
Hotel Boulderado

Tuesday and Wednesday, December 2-3

NIST/ARFTG Microwave Measurements Short Course

Organizer: David Walker <dwalker@boulder.nist.gov>

- VNA Error Models and Calibration Methods
- RF Connectors and Transmission Lines
- VNA Uncertainty
- Microwave Power Measurements
- Accurate On-Wafer Measurement
- Introduction to Optoelectronic Measurements
- Practical Optoelectronic Measurements
- Thermal Noise Measurements

Wednesday, December 3

12:00-1:00 Lunch (all participants)

1:00-5:00 Nonlinear Workshop

Organized by José Carlos Pedro <jcpedro@det.ua.pt>

- Nonlinear Behavioral Modeling of Microwave Systems: An Overview, J. C. Pedro; University of Aveiro
- Test Signals for Nonlinear Model Development and Validation, K.A. Remley and D. Schreurs; NIST, K. U. Leuven
- Time Domain Characterization of Power Amplifier Nonlinearity and Memory Effects, P. M. Asbeck, P. Draxler, I. Langmore, T. P. Hung, M. Li, D. Kimball and L. E. Larson; University of California San Diego, Qualcomm Inc.
- State of the Art Time-Domain Measurement and Modeling Techniques for Nonlinear Components and Systems, C. P. Silva, A. A. Moulthrop, M. S. Muha and C. J. Clark; The Aerospace Corp.
- Behavioral Models of Wideband Microwave Amplifiers from Measurements and Simulation, J. Wood, D. Root, and N. Tulifaro; Agilent Technologies, Inc.
- Measurement Issues in the Characterization of Memory Effects in RF Power Amplifiers, J. S. Kenney; Georgia Tech.

5:00-7:00 NVNA User's Group Meeting

Organized by Dominique Schreurs <Dominique.Schreurs@esat.kuleuven.ac.be> and Kate Remley
Moderated discussion on topics of interest

7:00 Conor O'Niells (All participants, no-host dinner)

Thursday, December 4

ARFTG Microwave Measurements Conference

General Chair: Dylan Williams

Technical Program Chairs: Dylan Williams <dylan@boulder.nist.gov> and Kate Remley <remley@boulder.nist.gov>

8:00-8:30 Breakfast

8:30-8:40 Welcome

8:40-10:00 Differential Measurements I

Dylan Williams, Session Chair

“Multi-port measurement-based package model extraction for single-ended and differential signaling,” Dong-Ho Han, Joong-Ho Kim, Lesley Polka, and Thomas G. Ruttan, Intel Corp.

“A coaxial to differential adapter,” James R. Broomall, Kailash C. Garg and Thomas Clupper, W.L. Gore & Associates, Inc.

“Measuring nonlinear differential RF amplifiers using one single-ended source,” Yves Rolain, Wendy Van Moer, Johan Schoukens and Rik Pintelon, Vrije Universiteit Brussel.

“Sub-10-picosecond differential TDR and TDT measurements,” Kipp Schoen, Picosecond Pulse Labs, Inc.

10:00-10:50 Break/Poster I

10:50-11:50 Temporal Measurements for 40 GB/s Systems

Tracy Clement, Session Chair

“An overview of high-speed time domain metrology at NPL and a roadmap for future work,” Andrew Smith, Matthew Harper and Anjan Basu, NPL.

“High-speed sampler modules for making 40 Gb/s eye diagram measurements,” Agoston Agoston, Steve Pepper, Robert Norton, John Ebner, and Kipp Schoen, Picosecond Pulse Labs, Inc.

“Broadband characterization of optoelectronic components to 65 GHz using VNA techniques,” Thomas Albrecht, Jon Martens, Tracy Clement, Paul Hale, and Dylan Williams, Anritsu Company, NIST.

11:50-12:50 Lunch

12:50-1:50 Nonlinear Measurements I

Ron Ginley, Session Chair

“Design and fabrication of a nonlinear phase reference device,” James C. Booth, Susan A. Schima, Jeffrey A. Jargon, and Donald C. DeGroot, NIST.

“Calibrated measurements of waveforms at internal nodes of MMICs with an LSNA and high impedance probes,” Tibault Reveyrand, Alain Mallet, Jean-Michel Nebus and Marc Vanden Bossche, CNES, University of Limoges, NMDG Engineering.

“Obtaining accurate IMD variation and imbalance measurements for identifying memory effects in high-power amplifiers,” Michael D. McKinley, Youngcheol Park, J. Stevenson Kenney, and Hyunchul Ku, Georgia Institute of Technology.

1:50-2:40 Break/Poster II

2:40-3:40 Circuits and Device Models

Kate Remley, Session Chair

“State-space modelling of slow-memory effects based on multisine vector measurements,” Dominique Schreurs, Kate A. Remley*, Maciej Myslinski, Raf Vandersmissen, K.U.Leuven, NIST, IMEC.

“Distributed and multi-time-constant electro-thermal modeling and its impact on ACPR in RF predistortion,” Wenhua Dai and Patrick Roblin, Ohio State University.

“An analytical approach to determine MOSFET RF extraction uncertainties due to S-parameter measurement errors,” Jan Saijets and Markku Åberg, VTT Information Technology.

3:40-4:00 Break

4:00-5:00 VNA Calibrations

Dylan Williams, Session Chair

“Accuracy study on the newly introduced Anritsu W1-connector calibration and verification kit,” Yeou-Song (Brian) Lee and Tom Roberts, Anritsu Company.

“Correcting for systematic errors in one-port calibration-standards,” John R. Juroshek and Dennis X. LeGolvan, NIST.

“Over-determined calibration schemes for RF network analysers employing generalised distance regression,” Nick M Ridler, Martin J Salter and Peter M Harris, NPL.

7:00 Conference dinner at Nabil’s
9:00 Engineer’s nightcap at Boulderado Bar

Friday, December 5

8:00-8:30 Breakfast

8:30-9:50 Nonlinear Measurements II
Kate Remley, Session Chair

“Statistics of microwave signals and their impact on the response of nonlinear dynamic systems,” José Carlos Pedro and Nuno Borges Carvalho, Universidade de Aveiro.

“The return of the sampling frequency converter,” Jan Verspecht, Jan Verspecht bvba.

“Determining the reciprocity of mixers through 3-port large signal network analyser measurements,” Wendy Van Moer and Yves Rolain, Vrije Universiteit Brussel.

“Curiosities on accurate large-signal measurements in combination with passive tuners,” Marc Vanden Bossche, NMDG Engineering.

9:50-10:10 Business meeting

10:10-10:30 Break

10:30-12:20 Differential Measurements II
Tom Ruttan, Session Chair

“SPICE-based mixed-mode s-parameter calculations for four port circuits,” Koochoo Jung and William R. Eisenstadt, University of Florida.

“A full grown differential signal source,” D. Rabijns, W. Van Moer and G. Vandersteen, Vrije Universiteit Brussel.

“Optimized impedance standard substrate designs for dual and differential applications,” Tim Leshner, Cascade Microtech, Inc.

(10 minute break)

“Load pull characterization system for differential devices,” Wei (Chris) Liu and Christos Tsironis, Focus Microwaves, Inc.

“Multiport SOLR calibrations: performance and an analysis of some standards Dependencies,” J. Martens, Anritsu Company.

12:20-1:20 Lunch

2:00-3:30 “Ask a Metrologist” tour at NIST

3:26 SkyRide from NIST to Denver International Airport (arrives 4:52)

4:22 SkyRide from NIST to Denver International Airport (arrives 5:52)

5:22 SkyRide from NIST to Denver International Airport (arrives 6:52)

Saturday, December 5 - Ski with Ron Ginley! rginley@boulder.nist.gov

Poster Session I

“On triplexers and their applications in harmonic load-pull,” Prabhu Patil, Ravi Varanasi, Dr.L.P. Dunleavy, University of South Florida.

“On radio interference filter measurement,” Karel Hoffmann and Zbynek Skvor, Czech Technical University in Prague.

“A Straight forward method of characterizing the Intrinsic Loss Characteristics of Symmetrical Two Port Networks,” Jayesh Nath and Michael B. Steer, North Carolina State University.

“CPW line-to-line coupling on glass and low resistivity silicon,” Balaji Lakshminarayanan and T. Weller, University of South Florida.

“Repeatability study of commercial harmonic phase standards,” Jeffrey A. Jargon and Donald C. DeGroot, NIST.

“De-embedding effects on HBT device performance,” Debabani Choudhury, Meena Madhav, Michael D. Wetzel and Joseph F. Jensen, HRL LABORATORIES, LLC.

Poster Session II

“Wideband VIP power divider with differential output,” V. Sokol, K. Hoffmann, Z. Skvor, Czech Technical University in Prague.

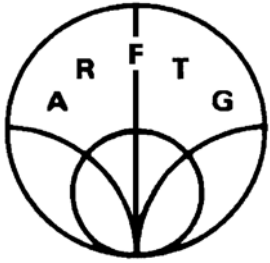
“Multiport scattering parameter measuring system,” T. Meyer, A. Jöstingmeier, N. Spiliotis and A. S. Omar, University of Magdeburg.

“Bistatic scattering from vegetation canopy in millimeter waves,” S. Helhel, A.H. Serbest, A. VERTIY, B. Çolak, S.Demirel University, Cukurova University, TUBITAK-MAM, EMC Electronics San. Ltd.

“Large-signal state-space model for Ge-based MHEMTs: Constructin and validation by an amplifier in multilayer thin-film technology,” R. Vandersmissen, D. Schreurs, G. Carchon, and G. Borghs, IMEC.

“Novel B-spline behavioral model extracted and verified using vectorial harmonic and multitone data,” Jiarui Lina and Patrick Roblin, Ohio State University.

“The blood sugar estimation through measurement of dielectric constant by using microwaves,” B. Prabhakara Rao, V. Malleswara Rao, C. Dharma Raj, and A. Somasekhar Rao, JNTU College of Engineering, GITAM, S.E. Railway Hospital.



Short Course on Microwave Measurements and Instrumentation

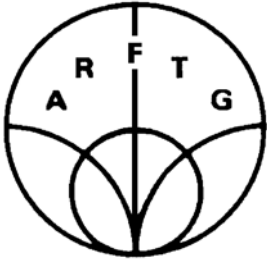
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PRELIMINARY AGENDA

Tuesday, December 2

- 7:30 a.m. – 8:00 a.m. **Registration**
- 8:00 a.m. – 9:15 a.m. **VNA Error Models and Calibration Methods**
Doug Rytting – Agilent
- 9:15 a.m. – 9:50 a.m. **RF Connectors and Transmission Lines**
John Juroshek – NIST
- 9:50 a.m. – 10:20 a.m. **Break**
- 10:20 a.m. – 11:00 a.m. **VNA Uncertainty**
John Juroshek – NIST
- 11:00 a.m. – 12:15 p.m. **Microwave Power Measurements**
Tom Crowley – NIST
- 12:15 p.m. – 1:30 p.m. **Lunch**
- 1:30 p.m. – 2:00 p.m. **Accurate On-Wafer Measurement**
Dylan Williams - NIST
- 2:00 p.m. – 2:45 p.m. **Introduction to Optoelectronic Measurements**
Paul Hale – NIST
- 2:45 p.m. – 3:05 p.m. **Break**
- 3:05 p.m. – 3:45 p.m. **Practical Optoelectronic Measurements**
Tracy Clement – NIST
- 3:45 p.m. – 5:00 p.m. **Thermal Noise Measurements**
Jim Randa – NIST



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PRELIMINARY AGENDA

Wednesday, December 3

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| 8:00 a.m. – 8:50 a.m. | Uncertainty Analysis
<i>Nick Ridler – NPL</i> |
| 8:50 a.m. – 9:35 a.m. | Phase Noise Measurements
<i>Ed Godshalk – Maxim</i> |
| 9:35 a.m. – 10:15 a.m. | Introduction to Wireless
Measurements
<i>Jan Verspecht</i> |
| 10:15 a.m. – 10:30 a.m. | Break |
| 10:30 a.m. – 11:15 p.m. | Large-Signal Network Analysis
<i>Jan Verspecht</i> |
| 11:15 a.m. – 12:00 p.m. | EMC in the Measurement Laboratory
<i>Howard Reader – University of
Stellenbosche</i> |