

89th ARFTG Microwave Measurement Conference

Technical Program

0800-0810 **Welcome and Introduction**
(i) ARFTG President; (ii) Conference General Chair; (iii) Conference TPC Chair

Oral Session A: Communications I

Chair: Jon Martens, Anritsu

A-1 **Thermal Transport in Transistors Based on GaN and Novel 2D Materials**
0810-0840 **(Keynote)**
Ali Shakouri, Purdue University, West Lafayette, IN, USA

A-2 **Independent Component Analysis for Multi-Carrier Transmission for 4G/5G Power Amplifiers**
0840-0900 Praveen Jaruat¹, Girish Chandra Tripathi¹, Meenakshi Rawat¹, Patrick Roblin²
¹Indian Institute of Technology, Roorkee, India, ²The Ohio State University, Columbus, Ohio, USA

A-3 **Digital Predistortion for 5G Wideband Power Amplifiers Using Multiple Band-Limited Feedback Signals**
0900-0920 Qian Zhang, Wenhua Chen, Zhenghe Feng
Department of Electronic Engineering, Tsinghua University, Beijing, China

A-4 **Experimental Testbed for PA Characterization and Pre-Distortion with Relaxed Sampling Rate Requirements**
0920-0940 Peter Bagot¹, Souheil Ben Smida¹, Oualid Hammi²
¹University of Bristol, Bristol, UK, ²American University of Sharjah, Sharjah, United Arab Emirates

Break—Exhibits and Interactive Forum

0940-1040

Oral Session B: Calibration

Chair: Dave Blackham, Keysight Technologies

B-1 **Software Tools for Uncertainty Evaluation in VNA Measurements: A Comparative Study**
1040-1100 G. Avolio¹, D. F. Williams², S. Streett², M. Frey², D. Schreurs¹, A. Ferrero³, M. Dieudonne³
¹KU Leuven, Belgium, ²NIST, Boulder, CO, USA, ³Keysight Technologies, CA, USA

B-2 **Quantifying the Error Contribution of Noise Parameters on Y-Factor Noise Figure Measurements**
1100-1120 Ken Wong, Joe Gorin, Guoquan Lu
Keysight Technologies, Santa Rosa, CA

B-3 **An Accurate Calibration Method of Microwave Noise Sources Using Noise Wave De-embedding Techniques**
1120-1140 C.-Y. Edward Tong¹, Jake A. Connors², Edward Garcia³
¹Harvard-Smithsonian Center for Astrophysics, Cambridge, MA, USA, ²Harvard University, Physics Department, Cambridge, MA, USA, ³Noisewave Corporation, Whippany, NJ, USA.

- B-4**
1140-1200 **Mutual Interference in Calibration Line Configurations**
F.J. Schmückle¹, T. Probst², U. Arz², G.N. Phung¹, R. Doerner¹, W. Heinrich¹
¹Ferdinand-Braun-Institut, Leibniz-Institut für Höchstfrequenztechnik (FBH), Berlin, Germany,
²Physikalisch-Technische Bundesanstalt (PTB), Braunschweig, Germany

Awards Luncheon

1200-1320

Oral Session C: Communications II

Chair: Jeff Jargon, NIST

- C-1**
1320-1350 **Radio Frequency Nanoelectronics: Microwave Measurements in Miniature (Keynote)**
Thomas M Wallis, NIST, Boulder, CO
- C-2**
1350-1410 **Coherent multi-tone stimulus-response measurements with a VNA**
Jean-Pierre Teyssier, Joel Dunsmore, Jan Verspecht, Jim Kerr
Keysight Technologies, Santa Rosa CA
- C-3**
1410-1430 **Measurement-Based Analysis of the Throughput-Power Level Trade-off with Modulated Multisine Signals in a SWIPT System**
Steven Claessens, Mohammad Rajabi, Ning Pan, Sofie Pollin, and Dominique Schreurs
Department of Electrical Engineering, University of Leuven, Leuven, Belgium
- C-4**
1430-1450 **SLIC EVM - Error Vector Magnitude without Demodulation**
Karl Freiberger¹, Harald Enzinger¹, and Christian Vogel^{2,1}
¹Signal Processing and Speech Communication Laboratory, Graz University of Technology, Austria
²FH JOANNEUM – University of Applied Sciences, Austria

Break—Exhibits and Interactive Forum

1450-1540

Oral Session D: General Measurement

Chair: Andrej Rumiantsev, MPI Corporation

- D-1**
1540-1600 **A Comparative Analysis of the Complexity/Accuracy Tradeoff in the Mitigation of RF MIMO Transmitter Impairments**
Zain Ahmed Khan^{1,2}, Peter Händel², and Magnus Isaksson¹
¹Dept. Electronics, Mathematics, and Natural Sciences, University of Gävle, Sweden
²ACCESS Linnaeus Center, Department of Information Science and Engineering, KTH Royal Institute of Technology, Stockholm, Sweden
- D-2**
1600-1620 **High Dynamic Range DC Coupled CW Doppler Radar for Accurate Respiration Characterization and Identification**
Ashikur Rahman, Victor Lubecke, Ehsan Yavari, Xiaomeng Gao, and Olga Boric-Lubecke
Department of Electrical Engineering, University of Hawaii at Manoa, Honolulu, Hawaii, USA
- D-3**
1620-1640 **New Interferometric Sensor for Scanning Near-Field Microwave Microscopy - Summary**
Karel Hoffmann
Czech Technical University in Prague, Prague, Czech Republic

D-4 **A Review of the IEEE 1785 Standards for Rectangular Waveguides**
Above 110 GHz
1640-1700 N M Ridler¹ and R A Ginley²
 ¹NPL, Teddington, UK, ²NIST, Boulder, CO, USA

Interactive Forum Session

Chair: Ron Ginley, NIST

Ultra-wideband Electromagnetic Detection of Biological Cells

N. Gholizadeh, X. Ma, H. Li, X. Du, Y. Ning, V. Gholizadeh, X. Cheng, and J. C. M. Hwang
Lehigh University, Bethlehem, PA 18015, USA

VNA Tools II: Calibrations Involving Eigenvalue Problems

Michael Wollensack, Johannes Hoffmann, Daniel Stalder, Juerg Ruefenacht, Markus Zeier
Federal Institute of Metrology METAS Lindenweg 50, 3003, Bern-Wabern, Switzerland

Trends for Computing VNA Uncertainties

David Blackham
Keysight Technologies, Santa Rosa, CA

TRL-Based Measurement of Active Antennas and Other More Complex Microwave Structures

Petr Ourednik, Viktor Adler, Premysl Hudec
Faculty of Electrical Engineering, Czech Technical University in Prague, Czech Republic

An Automated Fault Detection Program for Multichannel Bandwidth Limited System

Chi Van Pham¹, Benjamin Sawtelle¹, Stephen Imbach¹, Anh-Vu Pham¹, Jironghe²
¹Davis Millimeter Wave Research Center, University of California-Davis, Davis, CA,
²Huawei Technologies Co., Ltd., Bantian, Longgang District, Shenzhen, P.R. China

Setup and Calibration Procedure for LPE PA Characterization with Synchronous Input-Output Excitations

Filipe M. Barradas, Telmo R. Cunha and José C. Pedro
DETI, Universidade de Aveiro, Instituto de Telecomunicações

Performance Comparisons Between Impedance Analyzers and Vector Network Analyzers for Impedance Measurement Below 100 MHz frequency

Masahiro Horibe
National Metrology Institute of Japan, National Institute of Advanced Industrial Science and Technology, Japan

A Novel Experimental Method for Microwave Dielectric Characterization of Flexible or Rigid Thin Sheets

Ehsan Hajisaeid¹, Arcan F. Dericioglu^{1,2}, Alkim Akyurtlu¹
¹Electrical and Computer Engineering Department, University of Massachusetts – Lowell
²Metallurgical and Materials Engineering Department, Middle East Technical University, Ankara, Turkey

A Method for Improving High-Insertion-Loss Measurements with a Vector Network Analyzer

Jeffrey A. Jargon and Dylan F. Williams
National Institute of Standards and Technology, Boulder, CO, USA

Complex permittivity measurement for a low loss dielectric rod using a novel 50 GHz band TM_{010} mode cavity

Takashi Shimizu, Hikaru Inada, Yoshinori Kogami
Graduate School of Engineering, Utsunomiya University

A Phase Reference Standard Free Setup for Two-path Memory Model Identification of Wideband Power Amplifier

Kassem El-Akhdar¹, Damien Gapillout^{1,2}, Christophe Mazière², Sébastien Mons¹, and Edouard Ngoya¹
¹XLIM, University of Limoges, Limoges, France
²AMCAD Engineering, Limoges, France

Cryogenic Probe for Two-Port Calibration at 4.2 K and Above

Daniel E. Oates, Richard L. Slattery, David J. Hover
MIT Lincoln Laboratory Lexington MA USA

Design of WR-6 (110 GHz ~ 170 GHz) Waveguide Microcalorimeter

Wenze Yuan¹, Xiaohai Cui¹, Yong Li¹, Guangyu Wei^{1,2} and Fei Gao²
¹National Institute of Metrology, Beijing, China
²School of Information and Electronics, Beijing Institute of Technology, Beijing, China

Minimizing Discontinuities in Wafer-Level Sub-THz Measurements up to 750 GHz for Device Modeling Applications with Emphasis on Probe-Tip Power Calibration

Choon Beng Sia
Cascade Microtech Inc, Singapore

Pad-Open-Short De-embedding Method Extended for 3-Port Devices and Non-Ideal Standards

W. Khelifi*, T. Reveyrand*, J. Lintignat*, B. Jarry*, R. Quéré*, L. Lapierre†, V. Armengaud†
*XLIM, 123 av. Albert Thomas, 87060 Limoges Cedex, France
†CNES, 18 av. E. Belin, 31400 Toulouse, France

A Millimeter Wave MIMO Testbed for 5G Communications

Tian Hong Loh, David Cheadle, Philip Miller
National Physical Laboratory, Teddington, United Kingdom

Measurement of Scaled Complex Enclosures for EMI Applications

Bo Xiao¹, Steven M. Anlage^{1,2}
¹Electrical and Computer Engineering, University of Maryland, College Park, MD, USA
²Center for Nanophysics and Advanced Materials, Physics Department, College Park, MD, USA

Mismatch uncertainty in RF & microwave power measurements

H. Silva, G. Monasterios, and A. Henze
Instituto Nacional de Tecnologia industrial (INTI), Lab. Metrologia RF & Microondas

Load-Pull Measurements using Centroidal Voronoi Tessellation

Paweł Barmuta*†, Konstanty Łukasik*†, Francesco Ferranti‡, Gian Piero Gibiino§, Arkadiusz Lewandowski†, Dominique Schreurs*
*KU Leuven, †Warsaw University of Technology, ‡CNRS UMR, §University of Bologna

Broadband Microwave Dielectric Characterization Method for Printable Dielectric Inks

Elicia Harper, Mahdi Haghzadeh, Ehsan Hajisaeid, Craig Armiento, and Alkim Akyurtlu
University of Massachusetts Lowell, Lowell, MA, USA

Conference Schedule Overview

Time	Activity	Duration
8:00 – 8:10	Welcome & Introduction	5 mins
8:10 – 9:40	Technical Session A	90 mins
9:40 – 10:40	Break Exhibition Interactive Forum Session	60 mins
10:40 – 12:00	Technical Session B	80 mins
12:00 – 13:20	Awards Luncheon	80 mins
13:20 – 14:50	Technical Session C	90 mins
14:50 – 15:40	Break Exhibition Interactive Forum Session	50 mins
15:40 – 17:00	Technical Session D	80 mins