

2019 93rd ARFTG Microwave Measurement Conference (ARFTG 2019)

**Boston, Massachusetts, USA
7 June 2019**



**IEEE Catalog Number: CFP19ARF-POD
ISBN: 978-1-7281-0507-9**

**Copyright © 2019 by the Institute of Electrical and Electronics Engineers, Inc.
All Rights Reserved**

Copyright and Reprint Permissions: Abstracting is permitted with credit to the source. Libraries are permitted to photocopy beyond the limit of U.S. copyright law for private use of patrons those articles in this volume that carry a code at the bottom of the first page, provided the per-copy fee indicated in the code is paid through Copyright Clearance Center, 222 Rosewood Drive, Danvers, MA 01923.

For other copying, reprint or republication permission, write to IEEE Copyrights Manager, IEEE Service Center, 445 Hoes Lane, Piscataway, NJ 08854. All rights reserved.

****** This is a print representation of what appears in the IEEE Digital Library. Some format issues inherent in the e-media version may also appear in this print version.***

IEEE Catalog Number:	CFP19ARF-POD
ISBN (Print-On-Demand):	978-1-7281-0507-9
ISBN (Online):	978-1-7281-0506-2

Additional Copies of This Publication Are Available From:

Curran Associates, Inc
57 Morehouse Lane
Red Hook, NY 12571 USA
Phone: (845) 758-0400
Fax: (845) 758-2633
E-mail: curran@proceedings.com
Web: www.proceedings.com

CURRAN ASSOCIATES INC.
proceedings
.com

Session A: Non-linear Measurement Techniques

Session Chairs: Marco Spirito, Patrick Roblin

Keynote: Design of an On-Chip mmWave LSNA with Load Pull and Advanced Signal Sources 1

Dylan Williams, Jerome Cheron, Richard Chamberlin, Tasshi Denis, NIST

Characterizing Amplifier Modulation Distortion Using a Vector Network Analyzer 2

Jan Verspecht, Augustine Stav, Jean-Pierre Teyssier, Sam Kusano, Keysight Technologies

Harmonic Cancellation Technique for Ultra-Wideband Filter-Less 5G Transmitter 6

Girish Chandra Tripathi¹, Meenakshi Rawat¹, Patrick Roblin²

¹Indian Institute of Technology, Roorkee, ²Ohio State University

A Novel Modulated Rapid Load Pull System with Digital Pre-Distortion Capabilities 10

Sattam F Alsahali¹, Dragan Gecan², Alexander Alt¹, Guofeng Wang¹, Syed M.H, Syed Anera¹, Peng Chen¹, Simon Woodington², Aamir Sheik², Paul J Tasker¹, Jonathan Lees¹

¹Cardiff University, ²MESURO

Session B: Mixed-Signal and MIMO Systems Calibration and Measurements

Session Chairs: Peter Aaen, Joe Gering

Frequency Response of Real-Time Digital Oscilloscope with Time-Interleaving Architecture 14

Chihyun Cho, Dong-Joon Lee, Hyun-Jee Goo, Joo-Gwang Lee, KRISS

Automatic Vector Signal Generator Calibration Method Suitable for Multiport Large-Signal Measurements 18

Tibault Reveyrand, Alexis Courty, Morgane Portelance, Pierre Medrel, Philippe Bouysse, Jean-Michel Nébus, XLIM

Calibrated Digital Predistortion Using a Vector Network Analyzer as the Receiver 22

Thaimí Niubó Alemán^{1,2}, Yunsik Hahn², Patrick Roblin², Jean-Pierre Teyssier³, J.A. Reynoso-Hernández¹, Vanessa Chen², Siddharth Rajan²

¹CICESE, ²Ohio State University, ³Keysight Technologies

Over-the-Air Phase Measurement and Calibration Method for 5G mmW Phased Array Radio Transceiver 26

Markku Jokinen, Olli Kursu, Nuutti Tervo, Jani Saloranta, Marko E. Leinonen, Aarno Pärssinen, University of Oulu

Session C: Calibration and Measurements from Coaxial to On-Wafer and From RF to sub mm-Wave

Session Chairs: Leonard Hayden, Andrej Rumiantsev

Confidence and Prediction Intervals for Microwave Calibrations and Measurements 30

Dylan Williams, Benjamin Jamroz, Jacob Rezac, NIST

S-Parameter Definition for Adapters with a Dielectrically Loaded Connector 34

Johannes Hoffmann, P. Huerlimann, M. Wollensack, J. Ruefenacht, M. Zeier, METAS

A TRL Error-box Split Procedure to Compensate for the Bias Dependency Effects in Device Test-Fixtures 38

Carmine De Martino, Eduard Malotau, Marco Spirito, TU Delft

Electronic Calibration of One-Port Networks at Submillimeter Wavelengths using Schottky Diodes as On-Wafer Standards 44

Linli Xie¹, Matthew Bauwens², Souheil Nadri¹, Michael Cyberey¹, Alexander Arsenovic³, Arthur Lichtenberger¹, N. Scott Barker¹, Robert M Weikle II¹

¹ University of Virginia, ² Dominion MicroProbes, ³ 810 Labs

Session D: Other Areas of RF and Microwave Measurement Techniques

Session Chairs: Jim Booth, Jeffrey Jargon

Differential Noise Measurements: Sensitivities and Uncertainties with Direct Correlation- and Balun-Based Methods 48

Jon Martens, Anritsu

Experimental Verification and Imaging of Radiation Due to Coaxial-to-Microstrip Transitions 53

Haris Votsi, Jonas Urbonas, Peter Aaen, University of Surrey

The HF-VNA, an Interferometric Approach for the Accurate Measurement of Extreme Impedances 57

Raffaele Romano¹, Faisal Mubarak², Marco Spirito³, Luca Galatro^{1,3}

¹ Vertigo Technologies, ² VSL, ³ TU Delft

Non-Contact Characterization of Antenna Parameters via One-Port Open-Fixture Network Calibration 63

Seckin Sahin, Niru Nahar, Kubilay Sertel, Ohio State University

Interactive Forum

Session Chair: Rusty Myers

Investigating the Effects of IF Bandwidth and Averaging on Calibrated Scattering-Parameter Measurements 67

Jeff Jargon, Amanda Koepke, Paul Hale, NIST

Noise Power Ratio Prediction and Measurement of a Ku band GaN Power Amplifier 71

Matthew Cullen, Mark Cavin, Lowell Hoover, Alan Cherrette, Lockheed Martin Space

Two-Tone Intermodulation Measurement of W-band Amplifiers based on High-Linearity Frequency Down-Conversion 75

Yuh-Jing Hwang, Academia Sinica Institute of Astronomy and Astrophysics

Low-Cost & Light-Weight 6 GHz Band Resin Based Cavity for Dielectric Plate Characterizations using Additive Manufacturing Techniques 79

Takashi Shimizu, Yoshinori Kogami, Utsunomiya University

Investigation of Waveguide Sensors for Ultra-Short-Distance Measurements 83

Aleksandra Baskakova, Karel Hoffmann, Czech Technical University in Prague

Impact of RFIC Spurious Noise on Receiver of Cellular Handset in Communication State 87

Masafumi Iwaki^{1,2}, Kazuhiro Matsumoto¹, Kazuhiko Kobayashi¹

¹ Taiyo Yuden, ² Chiba University

Identity Authentication System using a Support Vector Machine (SVM) on Radar Respiration Measurements 91

Shekh M M Islam¹, Ashikur Rahman², Narayana Prasad¹, Olga Boric-Lubecke¹, Victor M Lubecke¹

¹ University of Hawaii, ² Aptiv

Machine Learning in a Quality Managed RF Measurement Workflow 96

Eric W Sanders^{1,5}, John M. Bass², Arpita Bhutani³, MaryAnn S. Ho⁴, James C. Booth⁵

¹ University of Colorado, ² Rose-Hulman Institute of Technology, ³ Peak to Peak Charter School, ⁴ Fairview High School, ⁵ NIST

Waveguide Method for Surface Impedance Measurements on Composite Material Substrates 100

Dimitrios Fakis^{1,2}, Chris Worrall³, Mihalios Kazilas^{1,3}

¹ Brunel University, ² National Structural Integrity Research Centre, Cambridge ³ TWI

Methodology of Nanoscale Electrical Characterization for Wide-Range Dielectric Permittivity Materials by Scanning Microwave Microscopy 105

Masahiro Horibe, Iku Hirano, AIST

Spectral Purity Measurement of Millimeter-Wave Signal Sources 109

Jae-Yong Kwon^{1,2}, Aditia Nur Bakti², No-Weon Kang¹

¹ KRIS, ² University of Science and Technology, Daejeon

Challenges in Terahertz Fiber Based Inter-Device Communications N/A

Kathirvel Nallappan, Hichem Guerboukha, Yang Cao, Chahe Nerguizian, Maksim Skorobogatiy
Ecole Polytechnique de Montreal

Presenter Biographies