2015 85th ARFTG Microwave Measurement Conference

(ARFTG 2015)

Phoenix, Arizona, USA
22 May 2015

IEEE Catalog Number: CFP15ARF-POD
ISBN: 978-1-4799-8888-4

Session A: Nonlinear Measurements and Models

Chair: Jon Martens, Anritsu

Measurements for Millimeter-wave 5G Wireless Systems: Increased Frequency, Increased Bandwidth, Increased Calibration (Invited) ..... N/A

K. Remley, National Institute of Standards and Technology, Lafayette, United States

Comparison of Sampler and VNA based Large Signal Measurement Systems (LSNA) Under CW and Pulsed Operation 1

M. A. Casbon, P. J. Tasker, Cardiff University, Cardiff, United Kingdom

Towards a Denser Frequency Grid in Phase Measurements using Mixer-based Receivers 4

D. C. Ribeiro, P. M. Cruz, N. B. Carvalho, Universidade de Aveiro - IT, Aveiro, Portugal

A Compact Millimeter-wave Comb Generator for Calibrating Broadband Vector Receivers 9

P. D. Hale[1], K. A. Remley[1], D. F. Williams[1], J. A. Jargon[1], J. C. Wang[2], [1]National Institute of Standards and Technology, Boulder, United States, [2]Standards and Technology, Boulder, United States

Session B: Calibration and Verification

Chair: Leonard Hayden, Qorovo

Design and Analysis of a Verification Device for the Nonlinear Vector Network Analyzer 13

M. Rajabi[1], D. H. Humphreys[2], T. Nielsen[3], P. Barmuta[1,4], D. Schreurs[1], [1]KU Leuven, Leuven, Belgium, [2]National Physical Laboratory, Teddington, United Kingdom, [3]Keysight Technologies, Aalborg East, Denmark, [4]Warsaw University of Technology, Warsaw, Poland

Calibration of channel mismatch in time-interleaved real-time digital oscilloscopes 17

C. Cho[1], J. Lee[1], P. Hale[2], J. Jargon[2], P. Jeavons[2], J. Schlager[2], A. Dienstfrey[2], [1]Korean Research Institute of Standards and Science, Daejeon, Republic of Korea, [2]National Institute of Standards and Technology, Boulder, United States

Multiline TRL revisited 22

Y. Rolain, M. Ishteva, E. Van Nechel, F. Ferranti, VUB, Brussels, Belgium

Analyzing Uncertainty Matrices Associated with Multiple S-parameter Measurements 25

N. Ridler, M. Salter, National Physical Laboratory, Teddington, United Kingdom

Session C: 5G Communications

Chair: Peter Aaen, University of Surrey

Measuring 5G: Business as usual or time for a rethink? (Invited) ..... N/A
M. Rumney, Keysight Technologies, Wokingham, United Kingdom

Complex LO waveforms for wideband systems: some frequency-converter measurement implications 31
J. Martens, Anritsu, Morgan Hill, United States

A comparison of MIMO antenna efficiency measurements performed in Anechoic Chamber and Reverberation Chamber 36
T. Loh[1], W. Qi[2], [1]National Physical Laboratory, Teddington, United Kingdom, [2]Beijing Institute of Radio Metrology and Measurement, Beijing, China

Automated Wideband Test System, Measurement Uncertainty, and Design of On-chip Six-Port Reflectometers for 5G Applications 40
B. Hur, W. R. Eisenstadt, University of Florida, Gainesville, United States

Session D: Other Topics

Chair: Mitch Wallis, NIST

Rectangular-Waveguide Impedance 45
D. F. Williams[1], J. Jargon[1], U. Arz[2], P. D. Hale[1], [1]NIST, Boulder, United States, [2]PTB, Braunschweig, Germany

Power Control for S-parameters and Large Signal Characterization at (sub)-mmWave frequencies 50
L. Galatro, S. Galbano, A. Santaniello, M. Spirito, Delft University of Technology, Delft, Netherlands

Full-Wave Electromagnetic Modeling of Sub-millimeter Wave HEMT Parasitics 54
Y. Karisan, C. Caglayan, G. C. Trichopoulos, K. Sertel, The Ohio State University ElectroScience Laboratory, Columbus, United States

An Automatized Time-Domain Set-up for On-Wafer Characterization, Doherty Oriented, of High Power GaN HEMTs 56
L. Ayari[1], M. Ayad[2], E. Byk[2], M. Camiade[2], G. Neveux[1], D. Barataud[1], [1]XLIM, Limoges, France, [2]UMS, Villebon sur yvette, France

Interactive Forum

Chair: Ken Wong, Keysight Technologies

Physical Models for 2.4 mm and 3.5 mm Coaxial VNA Calibration Kits Developed within the NIST Microwave Uncertainty Framework 60

J. A. Jargon[1], C. Cho[2], D. F. Williams[1], P. D. Hale[1], [1]NIST, Boulder, United States, [2]KRISS, Daejeon, Republic of Korea

Transient Temperature Measurement of Microwave Devices 67

D. Kendig[1], K. Yazawa[1,2], A. Shakouri[2], [1]Microsanj, LLC, Santa Clara, United States, [2]Purdue University, West Lafayette, United States

Novel Components for a Fully Automated PIM and S-Parameter Test System 73

M. Grassl, W. Zissler, Spinner GmbH, Feldkirchen-Westerham, Germany

On the Implementation of the LZZ Calibration Technique in the S-Parameters Measurement of Devices Mounted in Test Fixtures 78

M. A. Pulido-Gaytan[1], J. A. Reynoso-Hernandez[1], M. d. Maya-Sanchez[1], A. Zarate-de Landa[2], J. R. Loo-Yau[3], [1]CICESE Research Center, Ensenada, Mexico, [2]Peregrine Semiconductor, San Diego, United States, [3]CINVESTAV Research Center, Zapopan, Mexico

De-embedding differential noise figure using the correlation of output noise waves 83

Y. Andee[1,2], C. Arnaud[1,2], F. Graux[3], F. Danneville[4], [1]Univ. Grenoble Alpes, Grenoble, France, [2]CEA, Grenoble, France, [3]Rohde&Schwarz, Meudon-la-Forêt, France, [4]IEMN, Villeneuve d'Ascq , France

A Simple Adaptive Method of Antenna Frequency Parameters Measurements with Local Reflections 87

A. A. Savin[1], V. G. Guba[2], [1]Tomsk State University of Control System and Radioelectronics, Tomsk, Russian Federation, [2]NPK Tair, Tomsk, Russian Federation

Measurement Setup for X-Parameter Characterization of BAW Resonators 91

W. Akstaller[1], A. Tag[1], C. Musolff[1], R. Weigel[1], A. Hagelauer[1], [1]Friedrich-Alexander Universitaet Erlangen-Nuernberg, Erlangen, Germany, [2]Erlangen, United States

Effects of the effective efficiency of the thermistor mount with WR-22(33 to 50 GHz) microcalorimeter 94

C. Ma, X. Cui, W. Yuan, Y. Li, National Institute of Metrology of China, Beijing, China

Microstrip Open - Problematic Calibration Standard 97

M. Haase, K. Hoffmann, Z. Skvor, Czech Technical Univeristy in Prague, Praha 6, Czech Republic

Consideration of Error Model with Cable Flexure Influences on Waveguides Vector Network Analyzers at submillimeter-wave frequency 101

M. Horibe[1], R. Kishikawa[1], Y. Kato[1], Y. Tsukahara[2], [1]National Institute of Advanced Industrial Science and Technology , Tsukuba, Japan, [2]Junkosha Inc., Kasama, Japan

Investigating Scattering Parameters Measurements for 50GHz High-speed Printed Circuit Boards (PCBs) 109

H. Huang[1,1], D. Liu[2,2], T. Guan[3,3], M. X. Liu[4,4], [1]National Institute of Metrology,China, Beijing, China, [2]Keysight Technologies Co,China, Beijing, China, [3]Huawei Technologies Co,Ltd,China, Shenzhen, China, [4]National Institute of Metrology,China, Beijing, China

A simplified calibration procedure for on-wafer power leveled S-parameter measurements at mm-wave 112

S. Galbano, L. Galatro, M. Spirito, TU Delft, Delft, Netherlands

Repeatability Performance of Non-Contact Probes in the 500-750 GHz Band 115

C. Caglayan, G. C. Trichopoulos, K. Sertel, ElectroScience Laboratory, Columbus, United States

Impedance Renormalization in CMOS-based Single-Element Electronic De-embedding 118

J. Chien, A. M. Niknejad, University of California, Berkeley, Berkeley, United States

V- and W-band waveguide microcalorimeters for millimeter-wave power standards 122

J. Kwon, Y. Hong, D. Lee, T. Kang, Korea Research Institute of Standards and Science, Daejeon, Republic of Korea

A 500 MHz Portable Evaluation Platform for Digital Pre-Distortion and Envelope Tracking Power Amplifiers 125

J. J. Yan, T. Nakatani, P. Theilmann, D. F. Kimball, MaXentric Technologies, La Jolla, United States