

103rd ARFTG Microwave Measurement Conference

Advanced Measurement Techniques for Next-G
Communication Systems



Friday, June 21st

♀ Convention Center 145 AB

**7:50
– 8:00**

Welcome to the 103rd ARFTG Microwave Measurement Conference

Conference Co-Chairs: Dominique Schreurs, Marco Spirito

TPC Co-Chairs: Mauro Marchetti and Dennis Lewis

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**8:00
– 9:40**

Session A: Measurements for 6G and Future-G Systems

Session Chair: Jon Martens | Anritsu

8:00
– 8:40

Keynote: Approaches to Industrialize and Characterize Near-THz Communication Systems

A1

Yves Baeyens | Nokia

8:40
– 9:00

Student Paper: Wideband Vector Signal Generation Using Multiple Narrowband Phase-Coherent Synchronous Signal Channels

A2-S

Zi Jun Su*, Ahmed Ben Ayed, Slim Boumaiza | University of Waterloo

9:00
– 9:20

Student Paper: Comparison of Signal Generation Techniques for D-Band for Component Testing

A3-S

Zi Jun Su¹, Nizar Messaoudi^{*,1,2}, Ahmed Ben Ayed¹, Jean-Pierre Teyssier², Slim Boumaiza¹ | ¹University of Waterloo, ²Keysight Technologies

9:20 – 9:40	Characterization Methods for Millimeter Wave IQ Mixers on the Example of a Planar Star Mixer
A4	Patrick Umbach*, Fabian Thome, Arnulf Leuther, Ruediger Quay Fraunhofer IAF
9:40 – 10:40	Break – Exhibits, Interactive Forum
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10:40 – 12:00	Session B: Characterization of Material Properties
	Session Chair: Rusty Myers Keysight Technologies
10:40 – 11:00	Temperature Humidity Bias Testing of a Wafer Embedded Coplanar Waveguide Line up to 40 GHz
B1	Lewis J Manning*, Ana Robador, James A Skinner National Physical Laboratory
11:00 – 11:20	Complex Permittivities of Ultra-Low-Loss 4H-SiC from 55 GHz to 330 GHz
B2	Yoshiyuki Yanagimoto, Shana Yanagimoto EM labs, inc., Tianze Li, James C.M.Hwang Cornell University
11:20 – 11:40	High Frequency Characterization of Ajinomoto Build-Up (ABF) Laminates for Millimeter Wave Applications
B3	Aditya Jogalekar*, ¹ Rajen Murugan ¹ , Mahadevan Iyer ² , Rashaunda Henderson ³ , Mahadevan Iyer ^{2,3} , ¹ Texas Instruments, ² Amkor Technologies Inc., ³ The University of Texas at Dallas
11:40 – 12:00	Characterization of Dielectric Materials at WM-380 Band (500 - 750 GHz) Using Three Broadband Measurement Techniques
B4	Xiaobang Shang*, ¹ Minjie Shu ² , Mira Naftaly ¹ , Nick Ridler ¹ , Stephen Hanham ³ ¹ National Physical Laboratory, ² Xi'an Jiaotong University, ³ Imperial College London

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**12:00
– 13:20**

ARFTG-103 Awards Luncheon

ARFTG President: Rusty Myers, ARFTG Awards: David Blackham

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**13:20
– 14:40**

Session C: mm-wave and Sub-THz measurements

Session Chair: Marco Spirito | TU Delft

13:20
– 13:40

Construction and Initial Studies on a 0.6 mm Coaxial Calibration Kit to 220 GHz

C1

Jon Martens*, Tom Roberts | Anritsu

13:40
– 14:00

Modified Semi-Additive Manufacturing of PCBs for Enabling Accurate Device Measurements at Millimeter-Wave and Sub-Terahertz Frequencies

C2

Arash Arsanjani*¹, Ziad Hatab¹, Ahmad Bader Althoman Alterkawi², Michael E Gadringer¹, Wolfgang Bösch¹ | ¹Graz University of Technology, ²AT&S AG

14:00
– 14:20

Student Paper: Repeatability of Programmable Waveguide Attenuators at 110-170 GHz and 220-330 GHz

C3-S

Piyaphat Phukphan*, Juha-Pekka Mäkelä, Klaus Nevala, Aarno Pärssinen, Marko E. Leinonen | University of Oulu

14:20
– 14:40

Experimental Determination of the Internal Aperture Dimensions of Sub-Terahertz Waveguides

C4

James A Skinner*, Nick Ridler | National Physical Laboratory

14:40
– 15:30

Break – Exhibits, Interactive Forum

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15:30
– 17:10

Session D: Advances in Linear and Non-Linear Measurements

Session Chair: Patrick Roblin | Ohio State University

15:30
– 15:50

Student Paper: Cold-Termination Noise-Parameter Measurements at Cryogenic Temperatures

D1-S

Marwa Safa (University of Calgary)*¹, Ismail Majed¹, Leo Belostotski², Karl Warnick³, Christopher Groppi⁴ | ¹University of Calgary, ²Nil, Brigham, ³Young University, ⁴Arizona State University

15:50
– 16:10

Traceable RF Power Metering Procedures with Thermoelectric Sensors

D2

Zenn Roberts*, Daniel C Gray, Vincent Neylon, Angela Stelson, Aaron Morgan Hagerstrom, Christian Long, | National Institute for Standards and Technology

16:10
– 16:30

Student Paper: Comparative Study on De-embedding of Highly Assymetrical Differential Devices using Multimode TRL and Applicability of Mode Separation

D3-S

Milan Rother*,¹ Martin Maier¹, Franz Engelsberger², Macej Wojnowski², Vadim Issakov¹ | ¹Technische Universität Braunschweig, ²Infineon

16:30
– 16:50

Linearizability Assessment of a 3.5 GHz 16-Chain Fully Digital MIMO Transmitter Under Wideband Modulated Signals

D4

Hoda Barkhordarpour*, Jin Gyu Lim, Ahmed Ben Ayed, Patrick Mitran, Slim Boumaiza | University of Waterloo

16:50
– 17:10

RF Power Amplifier Model Extraction for Accurate and Fast Load Pull Simulations with Wideband Signals

D5

Wissam Saabe*,¹ Christophe Maziere (Amcad Engineering)¹, Arnaud Delias¹, Sebastien Mons², Edouard Ngoya² | ¹Amcad Engineering, ²XLIM, UMR n°7252, University of Limoges

17:10
– 17:20

ARFTG-103 Conference Closing

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9:40
– 15:30

Interactive Forum

Session Chair: Dennis Lewis, Boeing

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| P1 | <p>Comparison of S-Parameter Measurement Methods for Attenuators</p> <p>Andreas Schramm*, Frauke Gellersen, Karsten Kuhlmann PTB</p> |
| P2 | <p>Smart Signals: Key to Decrease Measurement Time?</p> <p>Yves Rolain*, Sander De Keersmaeker, Dries Peumans, Gerd Vandersteen Vrije Universiteit Brussel</p> |
| P3 | <p>Exploring Phase Skew in Load-pull Configurations</p> <p>Alex K. Chang, Rafael Lopez, John J. Dominguez, Osman Ceylan* Maury Microwave</p> |
| P4 | <p>Uncertainty in Vector Mixer Measurements using Harmonic Phase Reference Calibration</p> <p>Joel Dunsmore* Keysight Technologies</p> |
| P5-S | <p>Student Paper: Calibration of an Oscilloscope-Based NVNA for Periodic Modulated Signals</p> <p>Miles Lindquist*, Patrick Roblin Ohio State University</p> |
| P6 | <p>A Fast High Sensitivity Power Transfer Device Approach for (sub)mm-Wave Applications</p> <p>Bart Louwes¹, Marco Pelk², Juan Bueno Lopez², Ehsan Shokrolahzade², Carmine De Martino³, Marco Spirito^{*2} ¹THUAS, ¹TU Delft, ³Vertigo Technologies</p> |
| P7 | <p>Ultra-Fast Characterization Setup for Empirical Optimization of Dual-Input Power Amplifiers</p> <p>Shuichi Sakata^{*1}, Shinro Yatsuda², Ayano Yano², Rikito Matsuo², Yuji Komatsuzaki¹, Shintaro Shinjo¹, Takana Kaho², Koji Yamanaka¹ ¹Mitsubishi Electric Corporation, ²Shonan Institute of Technology</p> |
| P8-S | <p>Student Paper: A 2-Tier TRL Calibration Technique to Assess Flip-Chip Interconnects at D-Band</p> |

Nick van Rooijen^{*,1}, Rik Bokhorst¹, Sander Dorrestein², Francesca Chiappini², Paolo Sberna¹, Nuria Llombart¹, Marco Spirito¹, Maria Alonso-delPino¹ | ¹TU Delft, ²CITC, TNO

P9-S **Student Paper:** On-Wafer Characterisation of Noise Parameters of GaN HEMTs at between 77 K and 400 K

Jing Wang^{*}, Afesomeh Ofiare, Qingxia Li, James Kelly, Edward Wasige, Chong Li | University of Glasgow

P10 Using Commercial Source Measure Units for Traceable RF Power Measurements

Daniel C Gray^{*}, Aaron Morgan Hagerstrom, Zenn Roberts, Christian Long | National Institute for Standards and Technology

P11 Inclined vs. Horizontal Waveguide Port Saver Approach in WR3.4 Band for On-Wafer Measurements

Pranav Kumar Shrivastava^{*,1}, Gavin Fisher¹, Giancarlo Chirico² | ¹FormFactor GmbH, ²FormFactor Inc.

P12 Efficient Computational Complexity Reduction of Digital Predistortion using PLS Method for Beamforming Systems

Dusari Nageswara Rao^{*}, Meenakshi Rawat | Indian Institute of Technology, Roorkee

P13-S **Student Paper:** Inverted Scanning Microwave Microscopy of GaN/AlN High-Electron Mobility Transistors

Xiaopeng Wang^{*,1}, Kazuki Nomoto¹, Gianluca Fabi¹, Richard Al Hadi², Marco Farina³, Debdeep Jena¹, Huili Grace Xing¹, James C. M. Hwang¹ | ¹Cornell University, ²École de technologie supérieure, ³Marche Polytechnic University
