

65<sup>th</sup> ARFTG Microwave Measurements Conference

Conference Theme:  
**Millimeter-Wave Applications**

17 June 2005  
Renaissance Long Beach Hotel  
Long Beach, CA

Conference Chair  
Technical Program Chair

Tom Ruttan, Intel Corporation  
Nick Ridler, National Physical Laboratory

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# 65<sup>th</sup> ARFTG Conference

**8:00 to 8:15 AM**    **Welcome and introduction**

**8:15 to 9:45 AM**    **VNA Calibration**

Nick Ridler, Session Chair

**Towards generic calibration**

Peter S Blockley<sup>1</sup> and James G Rathmell<sup>2</sup>

<sup>1</sup> Macquarie University, Sydney, Australia

<sup>2</sup> The University of Sydney, Sydney, Australia

Pages 1 - 4

**A simple calibration algorithm for partially leaky model multiport vector network analyzers**

Valeria Teppati, Andrea Ferrero, Daniela Parena and Umberto Pisani  
Politecnico di Torino, Torino, Italy

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**Improved multimode calibration standards for 40 GHz measurements of active devices**

Tekamül Büber<sup>1</sup>, Alberto Rodríguez<sup>1,2</sup>, Lawrence P Dunleavy<sup>2</sup>,  
Noyan Kinayman<sup>1</sup>, Alan Jenkins<sup>1</sup>, Ian Gresham<sup>1</sup>, Adil Khalil<sup>1</sup> and  
Ratana Wohler<sup>1</sup>

<sup>1</sup> M/A-COM Inc, Lowell, MA

<sup>2</sup> University of South Florida, Tampa, FL

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**Verification of the wafer-level LRM+ calibration technique for GaAs applications up to 110 GHz**

Ralf Doerner<sup>1</sup> and Andrej Rumiantsev<sup>2</sup>

<sup>1</sup> Ferdinand-Braun-Institut fuer Hoehstfrequenztechnik (FBH), Berlin, Germany

<sup>2</sup> SUSS MicroTec Test Systems GmbH, Sacka, Germany

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**9:45 to 10:30 AM**    **Break and Interactive Forum**

**10:30 to 12:00 AM**    **Millimeter-Wave Applications**

Mohamed Sayed, Session Chair

**Millimeter wave tests and instrumentation**

Mohamed M Sayed

Microwave and Millimeter Wave Solutions, Santa Rosa, CA

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**Simplified broadband mm-wave pulsed VNA profiling measurements**

J Martens and P Kapetanic  
Anritsu Company, Morgan Hill, CA  
Pages 31 - 36

**Measurement accuracy of the Anritsu 76 GHz radar test system ME7220A**

Yeou-Song (Brian) Lee and Ramzi Abou-Jaoude  
Anritsu Company, Morgan Hill, CA  
Pages 37 - 44

**Measuring the on wafer noise figure of a W-band LNA – an application**

John Gregory Burns, Howard Fudem and Michael R Murphy  
Northrop Grumman Corporation, Linthicum, MD  
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**12:00 to 1:30 PM Lunch and awards**

**1:30 to 3:00 PM Active Device Characterization**

Tom Ruttan, Session Chair

**Exploration of power amplifier performance using a digital demodulation loadpull measurement procedure**

Jiang Liu, Lawrence P Dunleavy and Huseyin Arslan  
University of South Florida, Tampa, FL  
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**An improved coupling method for time domain load-pull measurements**

Fabien De Groote<sup>1</sup>, Jan Verspecht<sup>2</sup>, Christos Tsironis<sup>3</sup>,  
Denis Barataud<sup>1</sup>, Jean-Pierre Teyssier<sup>1</sup>  
<sup>1</sup> University of Limoges, Brive, France  
<sup>2</sup> Jan Verspecht bvba, Steenhuffel, Belgium  
<sup>3</sup> Focus Microwaves, Quebec, Canada  
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**Three-port RF characterization of MOS transistors**

Umashankar Mahalingam<sup>1,2</sup>, Subhash C Rustagi<sup>1</sup> and  
Ganesh S Samudra<sup>2</sup>  
<sup>1</sup> Institute of Microelectronics, Singapore  
<sup>2</sup> National University of Singapore, Singapore  
Pages 55 - 60

**Pulsed-IV pulsed-RF measurements using a large signal network analyzer**

Seok Joo Doo<sup>1</sup>, Patrick Roblin<sup>1</sup>, Sunyoung Lee<sup>1</sup>, Dominique Chaillot<sup>2</sup> and Marc Vanden Bossche<sup>3</sup>

<sup>1</sup> The Ohio State University

<sup>2</sup> On leave from CEA

<sup>3</sup> NMDG

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**3:00 to 3:45 PM Break and Interactive Forum**

**3:45 to 5:00 PM General Measurement and Measures of Quality**

Yeou-Song (Brian) Lee, Session Chair

**A preliminary study of different metrics for the validation of device and behavioral models**

Massimo Pirazzini<sup>1</sup>, Guillermo Fernández<sup>2</sup>, Ahmed Alabadelah<sup>3</sup>, Giorgio Vannini<sup>1</sup>, Monica Barciela<sup>2</sup>, Enrique Sánchez<sup>2</sup> and Dominique Schreurs<sup>3</sup>

<sup>1</sup> University of Ferrara, Ferrara, Italy

<sup>2</sup> University of Vigo, Vigo, Spain

<sup>3</sup> K U Leuven, Leuven, Belgium

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**On peculiarities of S-parameter measurements**

Yves Rolain<sup>1</sup>, Wendy Van Moer<sup>1</sup>, Jeff Jargon<sup>2</sup> and Don DeGroot<sup>2</sup>

<sup>1</sup>Vrije Universiteit Brussel, Brussels, Belgium

<sup>2</sup> NIST, Boulder, CO

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**Phasor angle definition suitable for intermodulation measurements**

Giovanni Loglio<sup>1</sup>, Jeffrey Jargon<sup>2</sup> and Donald C DeGroot<sup>2</sup>

<sup>1</sup> Universita' degli Studi di Firenze - DET, Firenze, Italy

<sup>2</sup> NIST, Boulder, CO

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## **Interactive Forum – poster papers**

**Improved Y factor noise measurement using the second stage contribution to advantage**

Alan M Victor<sup>1</sup> and Michael B Steer<sup>2</sup>

<sup>1</sup> Harris Microwave Communications Division

<sup>2</sup> North Carolina State University, Raleigh, NC

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**Use of transfer switches in different configurations between custom switch relay boxes and VNA's**

Branko M Narancic  
Filtronic Comtek Oy, Kempele, Finland  
Pages 95 - 101

**Analysis of results in complex-valued intercomparisons**

Manuel Rodríguez  
Instituto Nacional de Técnica Aeroespacial (INTA), Madrid, Spain  
Pages 103 - 112

**The measurement of the characteristic impedance of transmission lines using nanoscale resistive films**

Jimmy G M Yip<sup>1</sup>, M-H John Lee<sup>2</sup>, Nick M Ridler<sup>1</sup> and Richard J Collier<sup>2</sup>  
<sup>1</sup> National Physical Laboratory (NPL), Teddington, UK  
<sup>2</sup> University of Cambridge, Cambridge, UK  
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**MPT, a universal multi-purpose tuner**

Christos Tsironis, Roman Meierer, Bryan Hosein, Tim Beauchamp and Raymond Jallad  
Focus Microwaves Inc, Quebec, Canada  
Pages 117 - 121

**Assembly influence on S-parameters of packaged transistor**

Vratislav Sokol, Petr Cerny, Karel Hoffmann and Zbynek Skvor  
Czech Technical University in Prague, Prague, Czech Republic  
Pages 123 - 127

**Simple, broadband relative phase measurement of intermodulation products**

Aaron Walker, Michael Steer and Kevin Gard  
North Carolina State University, Raleigh, NC  
Pages 129 - 133

**An RF power amplifier modelled with a simple fifth order polynomial extracted from basic characterizations**

Amel Zine<sup>1</sup>, Ghislaine Maury<sup>2</sup>, Fabien Ndagijimana<sup>2</sup> and Caroline Arnaud<sup>1</sup>  
<sup>1</sup> STMicroelectronics, Crolles Cedex, France  
<sup>2</sup> IMEP-ENSERG, Grenoble – Cedex 1, France  
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**An automated IPX characterization system**

Jean-François J Nowakowski  
STMicroelectronics, Crolles Cedex, France  
Pages 143 - 147

**7 state PTP for vector network analyzer**

Vadim Zavodny, Karel Hoffmann and Zbynek Skvor  
Czech Technical University in Prague, Prague, Czech Republic  
Pages 149 - 152

**Small-signal operation-based simplified verification of non-linear models for millimeter-wave electron devices**

A Raffo<sup>1</sup>, A Santarelli<sup>2</sup>, P A Traverso<sup>2</sup>, G Vannini<sup>1</sup> and F Filicori<sup>2</sup>

<sup>1</sup> University of Ferrara, Ferrara, Italy

<sup>2</sup> University of Bologna, Bologna, Italy

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**Testing dynamic accuracy of vector network analyzers using the 40 GHz step attenuator**

Yeou-Song (Brian) Lee

Anritsu Company, Morgan Hill, CA

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**Line-attenuator-line: an alternative method for in-fixture calibration**

J A Reynoso-Hernández, J R Loo-Yau, Hugo Ascencio-Ramírez, Juan Alberto Saldivar, J E Zúñiga-Juárez and María del Carmen Maya-Sánchez

Centro de Investigación Científica y de Educación Superior de Ensenada (CICESE), Ensenada, B C México

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**Phase shift effects in sampling microwave measurement systems**

Giovanni Loglio<sup>1</sup>, Jeffrey Jargon<sup>2</sup>, Donald C DeGroot<sup>2</sup> and Zoya Popovic<sup>3</sup>

<sup>1</sup> Università degli Studi di Firenze - DET, Firenze, Italy

<sup>2</sup> NIST, Boulder, CO

<sup>3</sup> University of Colorado at Boulder, Boulder, CO

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**A study on electrical design, modelling and validation methods for 1<sup>st</sup> and 2<sup>nd</sup> level high-speed interconnects**

Dong-Ho Han<sup>1</sup>, Anne Augustine<sup>1</sup>, Jiangqi He<sup>1</sup> and Thomas G Ruttan<sup>2</sup>

<sup>1</sup> Intel corp, Chandler, AZ

<sup>2</sup> Intel corp, Hillsboro, OR

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**Wide-bandwidth, vector-corrected measurement with high spurious-free dynamic range**

Peter Blockley<sup>1</sup>, Daniel Gunyan<sup>2</sup> and Jonathan B Scott<sup>2</sup>

<sup>1</sup> Macquarie University, Sydney, Australia

<sup>2</sup> Agilent Technologies, Santa Rosa, CA

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**Automated calibration of noise figure measurement path of a low noise RF receiver**

Ghassan Ibrahim

Bloomsburg University, Bloomsburg, PA

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