

72nd ARFTG Microwave Measurement Symposium
Fall 2008



Time Domain and Frequency
Domain Measurement

December 9th-12th 2008
Red Lion Hotel on the River – Jantzen Beach
Portland, OR



TABLE OF CONTENTS

SESSION A: TIME DOMAIN MEASUREMENT

Gating Effects in Time Domain Transforms	1
<i>J. Dunsmore</i>	
Measurements of Characteristic Impedance of High Frequency Cables with Time Domain Reflectometry (TDR)	9
<i>L. Navarro, E. Mayevskiy, T. Chairet</i>	
Comparison Between Root-Impulse-Energy and Vector Network Analyzer Methods for Measuring Loss on Printed Circuit Boards	20
<i>M.R. Harper, N.M. Ridler, M.J. Salter</i>	

INTERACTIVE FORUM 1: TIME DOMAIN AND LINEAR NETWORK MEASUREMENT

Time-domain and Mechanical Assessments of 1.0 mm Coaxial Air Lines	26
<i>M. Horibe, M. Shida, K. Komiyama</i>	
Hidden Problems in Precise Calibration on Microstrip	37
<i>J. Raboch, K. Hoffmann, Z. Skvor, P. Hudec</i>	
A Simple Method for Extreme Impedances Measurement – Experimental Testing	40
<i>M. Randus, K. Hoffmann</i>	

SESSION B: LINEAR NETWORK MEASUREMENT

Wideband Measurement of Extreme Impedances with a Multistate Reflectometer	45
<i>A. Lewandowski, D. LeGolvan, R.A. Ginley, T.M. Wallis, A. Imtiaz, P. Kabos</i>	
Statistical Measurement Techniques for Equivalent Source Mismatch of 1.85 mm Power Splitter	50
<i>T.M. Wallis, A. Lewandowski</i>	
An Envelope Domain Measurement Test Setup to Acquire Linear Scattering Parameters	54
<i>E. Zenteno, M. Isaksson, D. Wisell, N. Keskitalo, O. Andersen</i>	

SESSION C: NON-LINEAR NETWORK ANALYSIS APPLICATIONS

Microwave Characterization of Optically Modulated Photo-induced Switches with a Passivation Layer Using an LSNA	58
<i>C.R. Neve, G. Poesen, D. Schreurs, J.P. Raskin, J. Stiens, R. Vounckx</i>	
Nonlinear Network Analysis for Modern Communication Devices and Systems	64
<i>E. Zenteno, O. Andersen, M. Isaksson, N. Keskitalo, D. Wisell</i>	
RF Waveform Metrology for Characterization of Non-linear Amplifiers	69
<i>D.A. Humphreys, G. Watkins, K.A. Morris, J. Miall</i>	

INTERACTIVE FORUM 2: NON-LINEAR NETWORK MEASUREMENT

Power Amplifier Behavioral Modeling Performance Comparison of the LSNA and the Modulation-Domain System	73
<i>P.N. Landin, C. Fager, M. Isaksson, K. Andersson</i>	
Simultaneous Measurement of High and Low Frequency Response of Non-Linear Microwave Circuits	79
<i>G. Avolio, G. Pailloncy, D. Schreurs, M.V. Bossche, B. Nauwelaers</i>	
Design and Testing of a Software Feedback Loop for Power Leveling	85
<i>X. Cui, T.P. Crowley</i>	

SESSION D: NON-LINEAR NETWORK TEST EQUIPMENT

Load-Pull + NVNA = Enhanced X-Parameters for PA Designs with High Mismatch and Technology-Independent Large-Signal Device Models	88
<i>G. Simpson, J. Horn, D. Gunyan, D.E. Root</i>	
A New Technique for Decreasing the Characterization Time of Passive Load-Pull Tuners to Maximize Measurement Throughput	92
<i>C. Roff, J. Graham, J. Sirois, B. Noori</i>	
Inexpensive Solution to Double RF Bandwidth of Vector Signal Generator	97
<i>D. Schreurs, J.A. Romero, J.M. San Roman, M. Homayouni, G. Avolio, B. Nauwelaers</i>	

SESSION E: SPECTRUM AND NOISE MEASUREMENT

Real-Time Spectrum Analysis Reveals Time Domain Characteristics of Frequency Domain Signals	102
<i>T.C. Hill</i>	
Using Spectrum Analyzer to Determine Frequency Modulation Accuracy of a Synthesizer and its Measurement Uncertainty	109
<i>Y.S. Lee</i>	
In-situ Silicon Integrated Tuner for Automated On-wafer MMW Noise Parameters Extraction of Si HBT and MOSFET in the Range 60-110GHz	119
<i>Y. Tagro, D. Gloria, S. Boret, Y. Morandini, G. Dambrine</i>	
A New Noise Parameter Measurement Method Results in More than 100x Speed Improvement and Enhanced Measurement Accuracy	123
<i>G. Simpson, D. Ballo, J. Dunsmore, A. Ganwani</i>	

INTERACTIVE FORUM 3: CALIBRATION AND POWER MEASUREMENT

Comparison of On-Wafer Multiline TRL and LRM+ Calibrations for RF CMOS Applications	132
<i>A. Rumiantsev, S.L. Sweeney, P.L. Corson</i>	
A General Closed-Form Solution to Multi-Port Scattering Parameter Calculations	137
<i>P. Wittwer, P.J. Pupalakis</i>	
Benchmarking Comparison of Thermal and Diode Sensors for Pulsed Power Measurement	144
<i>S.S. Meena, C. Baylis, L. Dunleavy</i>	

SESSION F: CALIBRATION

Reciprocity-based Multiport De-embedding and an Analysis of Standard Sensitivity 151
J. Martens

Traceability of Vector Network Analyzer Measurements 157
K. Wong

The Influence of Calibration Substrate Boundary Conditions on CPW Characteristics and Calibration Accuracy at mm-Wave Frequencies 168
A. Rumiantsev, R. Doerner, E.M. Godshalk

Software Solutions for Linear and Non-Linear Microwave Measurements and Calibrations 174
A. Ferrero, V. Teppati, M. Garelli, S. Bonino, U. Pisani

Author Index