

Anuj Madan

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EDUCATION

Georgia Institute of Technology – Atlanta , GA

Doctorate of Philosophy – Electrical and Computer Engineering

Aug 2011

Minor: Materials Science

Advisor: Dr. John Cressler

GPA: 3.76/4.0

Master of Science – Electrical and Computer Engineering

Aug 2008

Minor: Management

Advisor: Dr. John Cressler

GPA: 4.0/4.0

Punjab Engineering College – Chandigarh, India.

Bachelor of Engineering – Electronics and Communication Engineering

May 2006

GPA: 3.8/4.0 (estimated)

EXPERIENCE

SiGe Semiconductor, Inc.

Andover, MA

IC Design Engineer

Jun 2010 – present

- Key IP and product development for multi-throw cellular switches on SOI.
- Designed state-of-the-art RF switch and LNAs for WLAN modules using bulk and SOI CMOS.

Georgia Institute of Technology, SiGe Research Team

Atlanta, GA

Graduate Research Assistant

Aug 2006 – Jun 2010

- Design of high-power, high linearity RF switches in CMOS and SiGe BiCMOS.
- Switch-LNA integration for FEIC development.
- Measured and understood RF front-end reliability (switches, LNAs) for high RF power applications.
- Understood impact of device design and layout on linearity of SOI CMOS transistors (45 nm, 65 nm).
- Demonstrated total ionizing dose dependence in RF-CMOS type transistors for the first time.

International Business Machines (IBM), Systems and Technology Group

Essex Junction, VT

Analog, RF and Mixed-Signal Co-op

May 2008 – Aug 2008

- Designed PA device on 0.18 μm SOI CMOS technology.
- Characterized noise figure and developed LNAs on 0.18 μm SOI CMOS technology.

Sandisk Corporation, Strategic Research and Development

Milpitas, CA

Device Engineering Intern

May 2007 – Aug 2007

- Proposed and characterized pulse-programming approach on 56 nm NAND flash.
- Supported characterization of NAND flash on both 200 mm and 300 mm automatic probers.

SKILLS

- RF design experience on IBM's 7RF, 7RFSOI, 8HP, and 5PAe processes.
- Switch, LNA and PA design for front-end modules (FEM) and front-end integrated circuits (FEIC).
- High-frequency circuit and system level simulations in Cadence, ADS, EM simulations.
- RF characterization: S-parameters, Harmonics, Two-tone, 1/f noise, Load-Pull, Noise Figure.
- CMOS/BiCMOS/LDMOS process flow and device physics understanding using TCAD simulations.

POSITIONS OF RESPONSIBILITY

- Reviewer for IEEE Microwave Components Letters and other IEEE conferences.
- Mentored one masters student, one exchange student and one undergraduate student at Georgia Tech
- Set up 67 GHz test system in lab: S-parameter, two-tone (IIP3) and high RF power (36 dBm).
- Graduate Justice for Student Government Association, Georgia Tech since Aug 2008.

HONORS/AWARDS

- Best Student Paper award at 24th IEEE Bipolar Circuits and Technology Meeting (*BCTM 2010*).
- Best Student Paper award at 4th International SiGe Technology & Devices Meeting (*ISTDM 2008*).
- 2008 Georgia Tech Tower Award for academic excellence.
- 2007 IEEE Electron Devices Society Masters Student Fellowship.

PATENTS

- 1) "Simpler Measurement Approach for Characterizing Intermodulation Distortion," *US Patent 61/293,860 (Pending)*.
- 2) "Method of Using Inverse-Mode Bipolar Transistors for Improved Radio-Frequency Switches," *US Patent 13/082,450 (Pending)*.

PUBLICATIONS

Invited Papers:

- 1) **A. Madan**, A. Appaswamy, J.D. Cressler, "Operation of Strained-Si CMOS and SiGe HFETs in Extreme Environments," *15th IEEE Int'l Workshop on Physics of Semiconductor Devices*, 2009.
- 2) C. Kshirsagar, **A. Madan**, N. Bhat, "Device Performance Variations in Slanted Sidewall Tri-gate FinFETs", *Proc. IEEE Int'l Workshop on Physics of Semiconductor Devices*, 2005, pp.371-78.

Journal/Letters:

- 1) **A. Madan**, M.J. McPartlin, C. Masse, W. Vaillancourt, J.D. Cressler, "A Highly Linear, 5-GHz Cascode LNA with Sub-1.0 dB Noise Figure in 180 nm SOI CMOS Technology," (Under Review).
- 2) **A. Madan**, M.J. McPartlin, Z.-F. Zhao, C.-W.P. Huang, C. Masse, J.D. Cressler, "Fully-Integrated Switch-LNA Front-end IC Design in CMOS: A Systematic Approach for WLAN," (Under Review).
- 3) E.P. Wilcox, S.D. Phillips, P. Cheng, T.K. Thrivikraman, **A. Madan**, J.D. Cressler, G. Vizkelethy, P.W. Marshall, C. Marshall, J.A. Babcock, K. Kruckmeyer, R. Eddy, G. Cestra, B. Zhang, "Single Event Transient Hardness of a New Complementary (nnp + pnp) SiGe HBT Technology on Thick-Film SOI," *IEEE Trans. Nucl. Sci.*, vol.57, no.6, pp. 3293-3297, 2010.
- 4) R. Arora, E. Simoen, E.X. Zhang, D.M. Fleetwood, R.D. Schrimpf, K.F. Galloway, B.K. Choi, J. Mitard, M. Meuris, C. Claeys, **A. Madan**, J.D. Cressler, "Effects of Halo Doping and Si Capping Layer Thickness on Total-Dose Effects in Ge p-MOSFETs," *IEEE Trans. Nucl. Sci.*, vol.57, no.4, pp. 1933-1939, 2010.
- 5) **A. Madan**, R. Verma, R. Arora, E.P. Wilcox, J.D. Cressler, P.W. Marshall, R.D. Schrimpf, P.F. Cheng, L. Del Castillo, Q. Liang, G. Freeman, "The Enhanced Role of Shallow-Trench Isolation in Ionizing Radiation Damage of 65 nm RF-CMOS on SOI," *IEEE Trans. Nucl. Sci.*, vol.56, no.6, pp. 3256-3261, 2009.
- 6) **A. Madan**, S.D. Phillips, J.D. Cressler, P.W. Marshall, Q. Liang, G. Freeman, "Impact of Proton Irradiation on the RF Performance of 65nm SOI CMOS Technology," *IEEE Trans. Nucl. Sci.*, vol. 56, no. 4, pp. 1914-1919, 2009.
- 7) **A. Madan**, J.D. Cressler, S.J. Koester, "Low-frequency noise in Buried-Channel SiGe n-MODFETs," *Solid State Electronics*, vol.53, no. 8, pp. 901-904, 2009.
- 8) **A. Madan**, G.S. Samudra, Y.-C. Yeo, "Strain Optimization of Ultra-Thin Body Transistors with Silicon-Germanium Source and Drain," *Journal Appl. Phys.*, vol. 104, no. 8, pp. 084505, 2008.
- 9) **A. Madan**, B.Jun, R.M. Diestelhorst, A.Appaswamy, J.D. Cressler, R.D Schrimpf, D.M. Fleetwood, P.W. Marshall, T.Isaacs-Smith, J.R. Williams, S.J. Koester, "The Radiation Tolerance of Strained Si/SiGe n-MODFETs", *IEEE Trans. Nucl. Sci.*, vol. 54, no. 6, pp. 2251-56, 2007.

Conferences:

- 1) R. Arora, K.A. Moen, **A. Madan**, J.D. Cressler, E. Zhang, D.M. Fleetwood, R.D. Schrimpf, A.K. Sutton, and H.M. Nayfeh, "Impact of body tie and source/drain contact spacing on the hot carrier reliability of 45-nm RF-CMOS," *Proc. IEEE IIRW*, 2010, pp. 56-60.
- 2) **A. Madan**, J.D. Cressler, A.J. Joseph, "A High-Linearity Inverse-Mode SiGe BiCMOS RF Switch," *Proc. BCTM*, 2010, pp. 61-64 (**Best Student Paper**).
- 3) **A. Madan**, S. Seth, J.D. Cressler, X. Bi, K. Green, "Understanding and Modeling of Linearity in Silicon-Germanium Heterojunction Bipolar Transistors," *Proc. Techcon 2010*.
- 4) **A. Madan**, T. Thrivikraman, S. Seth, R. Verma, J. Poh, J.D. Cressler, "A New and Simple Measurement Approach for Characterizing Intermodulation Distortion Without Using a Spectrum Analyzer," *Proc. IEEE SiRF*, 2010, pp. 88-91.
- 5) T. Thrivikraman, **A. Madan**, J.D. Cressler, "On the Large Signal Robustness of SiGe HBT LNAs for High-Frequency Wireless Applications," *Proc. IEEE SiRF*, 2010, pp. 156-159.
- 6) **A. Madan**, J. Mo, R. Arora, S.D. Phillips, J.D. Cressler, P.W. Marshall, R.D. Schrimpf, S.J. Koester, "Radiation Effects in SiGe p-MODFETs Grown on Silicon-On-Sapphire Substrates," *Proc. RADECS, 2009*.
- 7) **A. Madan**, S.D. Phillips, E.P. Wilcox, J.D. Cressler, P.W. Marshall, P.F. Cheng, L. Del Castillo, Q. Liang, G. Freeman, "The Enhanced Role of Shallow-Trench Isolation in Ionizing Radiation Damage of 65 nm RF-CMOS on SOI," *IEEE NSREC*, 2009.
- 8) **A. Madan**, T. Thrivikraman, J.D. Cressler, "Failure Mechanisms in CMOS-based RF Switches

- Subjected to RF Stress,” *Proc. of Int’l Reliability Physics Symposium (IRPS)*, pp. 741-744, 2009.
- 9) **A. Madan**, S.D. Phillips, J.D. Cressler, P.W. Marshall, Q. Liang, G. Freeman, “Impact of Proton Irradiation on the RF Performance of 65nm SOI CMOS Technology,” *Proc. RADECS*, 2008, pp.47-52.
 - 10) **A. Madan**, J.D. Cressler, S.J. Koester, “Low Frequency Noise in Buried-Channel SiGe n-MODFETs”, *Proc. IEEE Int’l SiGe Technology & Devices Meeting*, 2008, pp. 60-61. (**Best Student Paper**)
 - 11) **A. Madan**, B.Jun, R.M. Diestelhorst, A.Appaswamy, J.D. Cressler, R.D Schrimpf, D.M. Fleetwood, P.W. Marshall, T.Isaacs-Smith, J.R. Williams, S.J. Koester, “The Radiation Tolerance of Strained Si/SiGe n-MODFETs”, *IEEE NSREC*, 2007.
 - 12) K.-J. Chui, K.-W. Ang, **A. Madan**, A. Du, C.-H. Tung, N. Balasubramanian, G. Samudra, Y.-C. Yeo, “Ultra-Thin-Body P-MOSFET featuring Silicon-Germanium Source/Drain Stressors with High Germanium Content formed by Local Condensation”, *Proc. of IEEE ESSDERC*, 2006, pp.85-88.
 - 13) K.-J. Chui, K.-W. Ang, **A. Madan**, G.-H. Wang, C.-H. Tung, L.-Y. Wong, Y. Wang, S.-F. Choy, N. Balasubramanian, M.-F. Li, G. Samudra, Y.-C. Yeo, “Source/Drain Germanium Condensation for P-Channel Strained Ultra-Thin Body Transistors, *Tech. Dig IEDM*, 2005, pp. 493-496.
 - 14) **A. Madan**, S.C. Bose, P.J. George, Chandra Shekhar, “Evaluation of Device Parameters of HfO₂/SiO₂/Si Gate Dielectric Stack for MOSFETs”, *Proc. IEEE VLSI Design Conference*, 2005, pp.386-391.
 - 15) **Anuj Madan**, G.S. Sandha, “Reduced Area Overhead Thermal Gradient Correction for a MOS based IC”, *Proc. IEEE Int’l Conference on Microelectronics*, 2004, pp.88-91.