R. JACOB (JAKE) BAKER, PH.D., P.E.

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PROFESSIONAL SUMMARY

Russel Jacob (Jake) Baker, Ph.D., P.E. (IEEE Student Member 1983, Member 1988, Senior Member 1997, and Fellow 2013) was born in Ogden, Utah, on October 5, 1964. He received the B.S. and M.S. degrees in electrical engineering from the University of Nevada, Las Vegas, in 1986 and 1988. He received the Ph.D. degree in electrical engineering from the University of Nevada, Reno in 1993. His Google Scholar profile is here and his ResearchGate profile is here.

From 1981 to 1987 he served in the United States Marine Corps (from September of 1982 in the Reserves, Fox Company, 2nd Battalion, 23rd Marines, 4th Marine Division). From 1985 to 1993 he worked for E. G. & G. Energy Measurements and the Lawrence Livermore National Laboratory designing nuclear diagnostic instrumentation for underground nuclear weapons tests at the Nevada Test Site. During this time, he designed, and oversaw the fabrication and manufacture of, over 30 electronic and electro-optic instruments including high-speed cable and fiber-optic receiver/transmitters, PLLs, frame- and bit-syncs, data converters, streak-camera sweep circuits, Pockels cell drivers, micro-channel plate gating circuits, and analog oscilloscope electronics. From 1991-1992 he was an adjunct faculty member in the department of electrical engineering at the University of Nevada, Las Vegas (UNLV). From 1993 to 2000 he served on the faculty in the department of electrical engineering at the University of Idaho (UI), first as an untenured Assistant Professor and then from 1998 as a tenured Associate Professor. In 2000 he joined a new electrical and computer engineering (ECE) program at Boise State University (BSU) where he was promoted to Full Professor in 2002. He then served as the ECE department chair at BSU from 2004 to 2007. At BSU he helped establish graduate programs in ECE including, in 2006, the university's second PhD degree. In 2012 he re-joined the faculty at UNLV as a tenured Full Professor of ECE. During his service at the UI, BSU, and UNLV he has been the major professor to more than 100 graduate students. In addition to this industry and academic experience, he has done consulting, both technical and expert witness, for over 200 companies.

Over the last 35+ years his research/development interests and publications have been, or currently are, focused on: analog-to-digital/digital-to-analog data conversion and transmission, optoelectronics (imagers, displays, LIDARs, APDs, SiPMs, and associated electronics), analog and digital integrated circuit design and fabrication, design of diagnostic electrical and electro-optic instrumentation for scientific research, integrated electrical/biological circuits and systems, array (memory, imagers, and displays) fabrication and design, CAD tool development and online tutorials, low-power interconnect and packaging (electrical and optical) techniques, design of wired/wireless communication and interface circuits, circuit design for the use and storage of renewable energy, power electronics and power supply design, and the delivery of online engineering education.

Dr. Baker is the named inventor on over 150 US patents. He is a member of the honor societies Eta Kappa Nu and Tau Beta Pi, a licensed Professional Engineer, a popular lecturer that has delivered over 50 invited talks around the world, an IEEE Fellow, and the author of the books CMOS Circuit Design, Layout, and Simulation, CMOS Mixed-Signal Circuit Design, and a coauthor of DRAM Circuit Design: Fundamental and High-Speed Topics. He received the 2000 Best Paper Award from the IEEE Power Electronics Society, the 2007 Frederick Emmons Terman Award,

the 2011 IEEE Circuits and Systems Education Award and the 2021 Wiley-IEEE Press Textbook Award for the 4th Edition of his book CMOS Circuit Design, Layout, and Simulation.

His service activities include the IEEE Press Editorial Board (1999-2004), editor for the Wiley-IEEE Press Book Series on Microelectronic Systems (2010-2018), the Technical Program Chair of the 2015 IEEE 58th International Midwest Symposium on Circuits and Systems (MWSCAS 2015), the IEEE Solid-State Circuits Society (SSCS) Administrative Committee (2011-2016), Distinguished Lecturer for the SSCS (2012-2015), Technology Editor (2012-2014) and Editor-in-Chief (2015-2020) for the IEEE Solid-State Circuits Magazine, IEEE Kirchhoff Award Committee (2020-2023), and advisor for the student branch of the IEEE at UNLV (2013-2023).

INDUSTRY EXPERIENCE

2008 - present: Expert witness in intellectual property disputes in electrical, electro-optic, and computer engineering matters for: 1) district court and ITC patent disputes, 2) inter partes reviews at the PTAB, and 3) arbitrations and mediations.

2013 - 2022: Worked with Freedom Photonics, Santa Barbara, CA, on the integration, fabrication and design, of optoelectronics with CMOS integrated circuits. Work includes the design of compact optical transceivers for range finding applications, high-efficiency integrated silicon avalanche photodetectors for quantum key receivers, Geiger mode SiGe receivers for long-range communications, cryptography, and the fabrication of near-infrared focal plane arrays. Packaging and testing of numerous chips fabricated in both CMOS and SiGe technologies using LEDs, ILDs, PIN, APDs, and ROICs.

2017 - 2019: Worked with Vorpal Research Systems, Las Vegas, NV on the design of integrated circuit electronics and optoelectronics for optical transceivers used in LIDARs/LADARs.

2016 - 2019: Worked with Attollo Engineering on the design of transient digitizers for the capture of high-speed signals for range finders using LEDs and lasers in compact optical transceivers.

2013 - 2018: Working with Mission Support and Test Services, LLC (MSTS, formerly National Security Technologies, LLC, [NSTec]) on the Design and Fabrication of Integrated electrical/photonic application specific integrated circuit (ASIC) design for use in the implementation of diagnostic instrumentation.

2013 - 2015: Consultant for OmniVision. Working on integrating CMOS image sensors (CIS) with memory for very high-speed consumer imager products. Design specialty DRAM, high-speed interfaces between CIS and DRAM, packaging techniques to pair the CIS with DRAM.

2010 - 2013: Worked with Arete' Associates on the design of high-speed compressive transimpedance amplifiers for LADAR projects and the design of ROIC unit cells. Work funded by the U. S. Air Force.

2013: Cirque, Inc. Consulting on the design of analog-to-digital interfaces for capacitive touch displays and pads.

2012: Consultant at Lockheed-Martin Santa Barbara Focal Plane Array. CMOS circuit design and fabrication for the development and manufacture of infrared components and imaging systems with an emphasis on highest sensitivity Indium Antimonide (InSb) focal plane arrays (FPAs) in linear through large staring formats. Product groups include FPAs, integrated dewar assemblies (IDCAs), camera heads, high-speed interfaces between image processors and imaging systems, and infrared imaging systems.

2010 - 2012: Working with Aerius Photonics (and then FLIR Inc. when Aerius was purchase by FLIR) on the design of Focal Plane Arrays funded (SBIRs and STTRs) by the U.S. Air Force, Navy, and Army. Experience with readout integrated circuits (ROICs) and the design/layout of photodetectors in standard CMOS.

2009 - 2010: Sun Microsystems, Inc. (and then Oracle) VLSI research group. Provided consulting on memory circuit design/fabrication and proximity connection (PxC) interfaces to DRAMs and SRAMs for lower power, 3D packaging, for memory modules and controllers implemented with FPGAs and custom ASICs.

2009 - 2010: Contour Semiconductor, Inc. Design of NMOS voltage and current references as well as the design of a charge pump for an NMOS memory chip.

1994 - 2008: Affiliate faculty (Senior Designer), Micron Technology. Designed CMOS circuits for DRAMs including DLLs, PLLs for embedded graphics chips, voltage references and regulators, data converters, field-emitting display drivers, sensing for MRAM (using delta-sigma data conversion topologies), SRAMs, RFIDs, CMOS active pixel imagers and sensors, power supply design (linear and switching), input buffers, etc. Worked on a joint research

project between Micron and HP labs in magnetic memory fabrication and design using the MTJ memory cell. Worked on numerous technologies ranging from LED lighting to medical imaging using CMOS image sensors (too many to list) resulting in numerous US patents (see following list). Considerable experience working with product engineering to ensure high-yield from the production line from fabrication to test. Co-authored a book on DRAM circuit design through the support of Micron. Gained knowledge in the entire memory design process from fabrication to packaging. Developed, designed, and tested circuit design techniques for multi-level cell (MLC) Flash memory using signal processing.

January 2008: Consultant for Nascentric located in Austin, TX. Provide directions on circuit operation (DRAM, memory, and mixed-signal) for fast SPICE circuit simulations.

May 1997 - May 1999: Consultant for Tower Semiconductor, Haifa, Israel. Designed CMOS integrated circuit cells for various modem chips, interfaces, and serial buses including USB circuits, charging circuits based upon power up/down circuits using an MOS or bandgap reference, pre-amplifiers, comparators, etc.

Summer 1998: Consultant for Amkor Wafer Fabrication Services, Micron Technology, and Rendition, Inc., Design PLLs and DLLs for custom ASICs and a graphics controller chip.

Summers 1994 - 1995: Micron Display Inc. Designing phase locked loop for generating a pixel clock for field emitting displays and a NTSC to RGB circuit on chip in NMOS. These displays are miniature color displays for camcorder and wrist watch size color television. Worked on the fabrication and design of video peripheral circuits for these displays.

September - October 1993: Lawrence Berkeley Laboratory. Designed and constructed a 40 A, 2 kV power MOSFET pulse generator with a 3 ns rise-time and 8 ns fall-time for driving Helmholtz coils.

Summer 1993: Lawrence Livermore National Laboratory, Nova Laser Program. Researched picosecond instrumentation, including time-domain design for impulse radar and imaging.

December 1985 - June 1993: (from July 1992 to June 1993 employed as a consultant while finishing up my Ph.D.), E.G.&G. Energy Measurements Inc., Nevada, Senior Electronics Design Engineer. Responsible for the design and manufacturing of instrumentation used in support of Lawrence Livermore National Laboratory's Nuclear Test Program. Responsible for designing and fabricating over 30 electronic and electro-optic instruments including: CCD camera design, communication networks, fiber optic transmitters employing high speed laser drive electronics, receivers employing envelop tracking for DC voltage restoration and regeneration of received information, receiver low noise amplifier design, frame synchronizers for re-assembling transmitted images, high-speed SRAM memory system design with battery back-up, calibration equipment design such as a tunnel diode pulse generator for testing compensation of oscilloscopes and DAC design for calibrating CCD readout electronics, power supply and battery charger designs, sweep circuits for streak cameras, Pockel's cell drive electronics, vertical amplifier design using HBTs for analog oscilloscopes used at the Nevada Test Site, and 10 kV ramp designs using a planar triode to name some of the designs.

This position provided considerable fundamental grounding in EE with a broad exposure ranging from the design of PC boards to, for example, the design of cable equalizers. Summarizing, gained experience in circuit design technologies including: bipolar, vacuum tubes (planar triodes for high voltages), hybrid integrated circuit fabrication and design, GaAs (high speed logic and HBTs), Mach-Zehnder interferometers, Pockels cells, krytrons, power MOSFETs, microwave techniques, power supplies, fiber optic transmitters/receivers, etc.

Summer 1985: Reynolds Electrical Engineering Company, Las Vegas, Nevada. Gained hands on experience in primary and secondary power system design, installation and trouble-shooting electric motors on mining equipment.

ACADEMIC EXPERIENCE

January 1991 – present: Professor of Electrical and Computer Engineering at the **University of Nevada, Las Vegas** from August 2012 to present. From January 2000 to July 2012 held various positions at **Boise State University** including: Professor (2003 – 2012), Department Chair (2004 - 2007), and tenured Associate Professor (2000 - 2003). From August 1993 to January 2000 was a tenured/tenure track faculty member at the **University of Idaho**: Assistant Professor (1993 - 1998) and then tenured Associate Professor (1998 - 2000). Lastly, from January 1991 to May 1993 held adjunct faculty positions in the departments of Electrical Engineering at the University of Nevada, Las Vegas and Reno. Additional details:

- Research is focused on analog and mixed-signal integrated circuit fabrication and design. Worked with multi-disciplinary teams (civil engineering, biology, materials science, etc.) on projects that have been funded by EPA, DARPA, NASA, Army, DMEA, Navy, and the AFRL.
- Current and past research and development interests are:
  - Design and packaging of electrical/optical systems (e.g., LiDARs/LADARs) using LEDs, semiconductor lasers, lens for focusing and directing light, integrated circuits, and associated control and communication systems/circuits.
  - Capacitive sensing techniques using delta-sigma modulation and interfacing to sensors
  - Design of high-voltage and energy switching circuits
  - Circuit design and fabrication for the control, use, and storage of renewable energy using thermoelectric generators
  - Design of electrical/biological/optical circuits and systems using electrowetting on dielectric for automating and controlling biological experiments
  - Design of readout integrated circuits (ROICs) for use with focal plane arrays (FPAs)
  - Heterogeneous integration of III-V photonic devices (e.g., FPAs and VCSELs) with CMOS
  - Methods (e.g., 3D packaging and capacitive interconnects) to reduce power consumption in semiconductor memories, memory modules, and digital systems using custom and non-custom (e.g., FPGAs) implementations
  - Analog and mixed-signal circuit fabrication and design for communication systems, synchronization, energy storage, data conversion, and interfaces
  - The design of writing and sensing circuitry for emerging nonvolatile memory technologies, focal planes, and displays (arrays) in nascent nanotechnologies (e.g., magnetic, chalcogenide)
  - Reconfigurable electronics design and fabrication using nascent memory technologies such as the memristor to implement FPGAs
  - Finding an electronic, that is, no mechanical component, replacement for the hard disk drive using nascent fabrication technologies
  - Power electronics circuit design for consumers and consumer electronics including power management and adaptive control to reduce power consumption
  - Design of bandpass delta-sigma modulators for IQ demodulation in wireless communication systems in OFDM, WiFi, 802.11, Bluetooth, 3G, 4G, etc.
  - University prototyping, fabricating, and packaging of integrated circuits
- Led, as chair, the department in graduate curriculum (MS and PhD), program development, and ABET accreditation visits.
- Worked with established and start-up companies to provide technical expertise and identify employment opportunities for students.
- Held various leadership and service positions including: ECE chair, graduate coordinator, college curriculum committee (chair), promotion and tenure committee, scholarly activities committee, faculty search committee, university level search committees, etc. Collaborate with College of Engineering faculty on joint research projects.
- Taught courses in circuits, analog IC design, digital VLSI design and fabrication, fiber optics, and mixed-signal integrated circuit design to both on- and, via the Internet, off-campus students. Research emphasis in integrated circuit design using nascent technologies.

EDUCATION

- Ph.D. in Electrical Engineering; December 1993; University of Nevada, Reno, GPA 4.0/4.0. Dissertation Title: *Applying power MOSFETs to the design of electronic and electro-optic instrumentation.*
- M.S. and B.S. in Electrical Engineering: May 1986 and May 1988; University of Nevada, Las Vegas. Thesis Title: *Three-dimensional simulation of a MOSFET including the effects of gate oxide charge*.

MEMBERSHIPS IN PROFESSIONAL AND SCHOLARLY ORGANIZATIONS

IEEE (student, 1983; member, 1988; senior member, 1997; Fellow, 2013)
Member of the honor societies Eta Kappa Nu and Tau Beta Pi
Licensed Professional Engineer

HONORS AND AWARDS

- Consolidated Students of the University of Nevada, Las Vegas (CSUN) Faculty Award, 2017
- Tau Beta Pi UNLV Outstanding Professor of the Year in 2013, 2014, 2015 and 2016
- UNLV ECE Department Distinguished Professor of the Year in 2015
- IEEE Fellow for contributions to the design of memory circuits - 2013
- Distinguished Lecturer for the IEEE Solid-State Circuits Society, 2012 - 2015
- IEEE Circuits and Systems (CAS) Education Award - 2011
- Twice elected to the Administrative Committee of the Solid-State Circuits Society, 2011 - 2016
- Frederick Emmons Terman Award from the American Society of Engineering Education - 2007
- President's Research and Scholarship Award, Boise State University - 2005
- Honored Faculty Member - Boise State University Top Ten Scholar/Alumni Association 2003
- Outstanding Department of Electrical Engineering faculty, Boise State 2001
- Recipient of the IEEE Power Electronics Society's Best Paper Award in 2000
- University of Idaho, Department of Electrical Engineering outstanding researcher award, 1998-99
- University of Idaho, College of Engineering Outstanding Young Faculty award, 1996-97

SERVICE

Reviewer for IEEE transactions on solid-state circuits, circuits and devices magazine, education, instrumentation, nanotechnology, VLSI, etc. Reviewer for several American Institute of Physics journals as well (Review of Scientific Instruments, Applied Physics letters, etc.) Board member of the IEEE press (reviewed dozens of books and book proposals). Reviewer for the National Institutes of Health. Technology editor and then Editor-in-Chief for the Solid-State Circuits Magazine.

Led the Department on ABET visits, curriculum and policy development, and new program development including the PhD in electrical and computer engineering. Provided significant University and College service in infrastructure development, Dean searches, VP searches, and growth of academic programs. Provided university/industry interactions including starting the ECE department's advisory board. Held positions as the ECE department Master's graduate coordinator and coordinator for the Sophomore Outcomes Assessment Test (SOAT).

Also currently serves, or has served, on the IEEE Press Editorial Board (1999-2004), as a member of the first Academic Committee of the State Key Laboratory of Analog and Mixed-Signal VLSI at the University of Macau, as editor for the Wiley-IEEE Press Book Series on Microelectronic Systems (2010-2018), on the IEEE Solid-State Circuits Society (SSCS) Administrative Committee (2011-2016), as an Advisory Professor to the School of Electronic and Information Engineering at Beijing Jiaotong University, as a Distinguished Lecturer for the SSCS (2012-2015), as the Technical Program Chair for the IEEE 58th 2015 International Midwest Symposium on Circuits and Systems, MWSCAS 2015, as advisor for the student branch of the IEEE at UNLV (2013-2023), and as the Technology Editor (2012-2014) and Editor-in-Chief (2015-2020) for the *IEEE Solid-State Circuits Magazine*, and IEEE Kirchhoff Award Committee (2020-2023).

ARMED FORCES

From 1981 to 1987 served in the United States Marine Corps (from September of 1982 in the Reserves, Fox Company, 2nd Battalion, 23rd Marines, 4th Marine Division), Honorable Discharge. Military Occupational Specialty (MOS) was Machine Gunner (MOS 0331)

TEXTBOOKS AUTHORED

Baker, R. J., "CMOS Circuit Design, Layout and Simulation, Fourth Edition" *Wiley-IEEE Press*, 1234 pages. ISBN 9781119481515 (2019) **Over 50,000 copies of this book in print.** (Third Edition published in 2010, Revised Second Edition published in 2008, and Second Edition Published in 2005)

Baker, R. J., "CMOS Mixed-Signal Circuit Design," *Wiley-IEEE*, 329 pages. ISBN 978-0470290262 (second edition, 2009) and ISBN 9780471227540 (First Edition published in 2002)

Keeth, B., Baker, R. J., Johnson, B., and Lin, F., "DRAM Circuit Design: Fundamental and High-Speed Topics", *Wiley-IEEE*, 2008, 201 pages. ISBN: 9780470184752

Keeth, B. and Baker, R. J., "DRAM Circuit Design: A Tutorial", *Wiley-IEEE*, 2001, 201 pages. ISBN 0780360141

Baker, R. J., Li, H.W., and Boyce, D.E. "CMOS Circuit Design, Layout and Simulation," *Wiley-IEEE*, 1998, 904 pages. ISBN 9780780334168

BOOKS, OTHER (edited, chapters, etc.)

Saxena, V. and Baker, R. J., "Analog and Digital VLSI," chapter in the CRC Handbook on Industrial Electronics, edited by J. D. Irwin and B. D. Wilamowski, *CRC Press*, 2009 second edition.

Baker, R. J., "CMOS Analog Circuit Design," (A self-study course with study guide, videos, and tests.) IEEE Education Activity Department, 2000. ISBN 0-7803-4822-2 (with textbook) and ISBN 0-7803-4823-0 (without textbook)

Baker, R. J., "CMOS Digital Circuit Design," (A self-study course with study guide, videos, and tests.) *IEEE Education Activity Department*, 2000. ISBN 0-7803-4812-5 (with textbook) and ISBN 0-7803-4813-3 (without textbook)

Li, H.W., Baker, R. J., and Thelen, D., "CMOS Amplifier Design," chapter 19 in the CRC VLSI Handbook, edited by Wai-kai Chen, *CRC Press*, 1999 (ISBN 0-8493-8593-8) and the second edition in 2007 (ISBN 978-0-8493-4199-1)

INVITED TALKS AND SEMINARS

Have given over 50 invited talks and seminars at the following locations: AMD (Fort Collins), AMI semiconductor, Arizona State University, Beijing Jiaotong University, Boise State University, Carleton University, Carnegie Mellon, Columbia University, Dublin City University (Ireland), E.G.&G. Energy Measurements, Foveon, the Franklin Institute, Georgia Tech, Gonzaga University, Hong Kong University of Science and Technology, ICSEng Keynote, ICySSS keynote, IEEE Computing and Communication Workshop (CCWC), IEEE Electron Devices Conference (NVMTS), IEEE Workshop on Microelectronics and Electron Devices (WMED), Indian Institute of Science (Bangalore, India), Instituto de Informatica (Brazil), Instituto Tecnológico y de Estudios Superiores de Monterrey (ITESM, Mexico), Iowa State University, Lawrence Livermore National Laboratory, Lehigh University, Lockheed-Martin, Micron Technology, Nascentric, National Semiconductor, Princeton University, Rendition, Saintgits College (Kerala, India), Southern Methodist University, Sun Microsystems, Stanford University, ST Microelectronics (Delhi, India), Temple University, Texas A&M University, Tower Semiconductor (Israel), University of Alabama (Tuscaloosa), University of Arkansas, University of Buenos Aires (Argentina), University of Houston, University of Idaho, University of Illinois (Urbana-Champaign), Université Laval (Québec City, Québec), University of Macau, University of Maryland, Université de Montréal (École Polytechnique de Montréal), Xilinx (Ireland), University of Nevada (Las Vegas), University of Nevada (Reno), University of Toronto, University of Utah, Utah State University, and Yonsei University (Seoul, South Korea).

RESEARCH FUNDING (LAST 5 YEARS AS A PROFESSOR)

Recent funding listed below. In-kind, equipment, and other non-contract/grant funding [e.g., MOSIS support, money for travel for invited talks, etc.] not listed.

- Baker, R. Jacob, (2017-2023) "Tiled Silicon Photomultiplier Array Read-Out Integrated Circuit," NASA, $29,999 (Phase I), $225,238 (Phase II), and $79,697 (Phase IIE)
- Goldman, J., Menezes, J., and Baker, R. J., (2021-2022) "Monitored Compression Therapy: Using Smart Technology to Optimize the Treatment of Lower Extremity Swelling," UNLV Sports Research & Innovation Initiative. Proof of Concept Grant Program, $50,000
- Baker, R. Jacob, (2019-2021) "Dual-Mode, Extended Near-Infrared, Focal Plane Arrays Fabricated with CMOS Compatible GeSiSn Alloy Materials," DARPA, $149,998
- Baker, R. Jacob, (2018-2020) "Geiger Mode SiGe Receiver for Long-Range Optical Communications," NASA, $99,996
- Baker, R. Jacob, (2019) "Improved Quantum Efficiency Photo-Detector," Navy, $29,999

- Baker, R. Jacob, (2018-2019) "Tiled Silicon Photomultiplier Array Read-Out Integrated Circuit – Phase I," NASA, $29,999
- Baker, R. Jacob, (2017-2019) "Quantum Cryptography Detector Chip," Defense MicroElectronics Activity (DMEA), $266,029
- Baker, R. Jacob, (2017-2019) "Advanced Printed Circuit Board Design Methods for Compact Optical Transceiver," U.S. Army/DOD, $299,605
- Baker, R. Jacob, (2016-2018) "High-Sensitivity Monolithic Silicon APD and ROIC," U.S. Air Force/DOD, $299,665
- Baker, R. Jacob, (2017-2018) "Transimpedance Amplifier Integrated Circuit Collaboration," Department of Energy, National Security Technologies, LLC, $100,436
- Baker, R. Jacob, (2017) "Geiger Mode SiGe Receiver for Long-Range Optical Communications," NASA, $30,000
- Baker, R. Jacob, (2016-2017) "Testing and development of BiCMOS photodetectors and diagnostic instrumentation," Department of Energy, National Security Technologies, LLC, $181,605
- Baker, R. Jacob, (2016-2017) "Dual-Mode, Extended Near Infrared, Focal Plane Arrays fabricated with a Commercial SiGe BiCMOS Process," DARPA, $41,892

DOCTORAL STUDENT SUPERVSION

11. Mario Valles Montenegro (underway)
10. Sachin Namboodiri – A Multi-channel MCP-PMT based Readout Integrated Circuit for LiDAR Applications (2020)
9. Wenlan Wu – High-Speed Radhard Mega-Pixel CIS Camera for High-Energy Physics (2019)
8. Kostas Moutafis – A Highly-Sensitive Global-Shutter CMOS Image Sensor with On-Chip Memory for Hundreds of kilo-frames per second Scientific Experiments (2019)
7. Yiyan Li – Portable High Throughput Digital Microfluidics and On-Chip Bacteria Cultures (2016)
6. Yacouba Moumouni – Designing, Building, and Testing a Solar Thermoelectric Generation, STEG, for Energy Delivery to Remote Residential Areas in Developing Regions (2015)
5. Qawi IbnZayd Harvard – Low-Power, High-Bandwidth, and Ultra-Small Memory Module Design (2011)
4. Vishal Saxena – K-Delta-1-Sigma Modulators for Wideband Analog-to-Digital Conversion (2010)
3. Robert Russell Hay – Digitally-Tunable Surface Acoustic Wave Resonator (2009)
2. Xiangli Li (the first Boise State University College of Engineering PhD graduate) – MOSFET Modulated Dual Conversion Gain CMOS Image Sensors (2008)
1. Feng Lin, Research and Design of Low Jitter, Wide Locking-Range Phase-Locked and Delay-Locked Loops (2000)

MASTERS STUDENT SUPERVISION

93. Abraham Lopez (underway)
92. David Santiago (underway)
91. Khulan Tsogt (underway)
90. Jazmin Boloor (underway)
89. Minsung Cho (underway)
88. Chris Barr (underway)
87. Armani Alvarez – A Control Integrated Circuit for a Hysteretic Flyback Power Converter (2022)
86. Francisco Mata-carlos – A Wearable Electronic Monitoring Device for Low Pressure Garment Applications and Temperature Analysis for Prevention of Ulceration and Infection (2022)
85. Daniel Senda – Designs and Outcomes of Transcranial Magnetic Stimulation (TMS) and Repetitive Transcranial Magnetic Stimulation (rTMS) Circuits (2021)
84. James Skelly – Monitored Compression Therapy: Using Smart Technology to Optimize the Treatment of Lower Extremity Swelling (2021)
83. Gonzalo Arteaga – Current-mode photon-counting circuit with SiGe BiCMOS input stage (2020)
82. Jason Silic – Design and Fabrication of a 6-bit Current-Mode ADC for Lidar and High-Speed Applications (2020)
81. Brandon Wade (2020)
80. Mario Valles Montenegro – Front-End CMOS Transimpedance Amplifiers on a Silicon Photomultiplier Resistant to Fast Neutron Fluence (2020)
79. Jonathan DeBoy (2018)
78. Dane Gentry – Design, Layout, and Testing of SiGe APDs Fabricated in a BiCMOS Process (2018)

77. James Mellot – Variable Transition Time Inverters in a Digital Delay Line with Analog Storage for Processing Fast Signals and Pulses (2018)
76. Eric Monahan – High Speed Fast Transient Digitizer Design and Simulation (2018)
75. Shada Sharif – Design and Analysis of First and Second Order K-Delta-1-Sigma Modulators in Multiple Fabrication Processes (2018)
74. Vikas Vinayaka – Analysis and Design of Analog Front-End Circuitry for Avalanche Photodiodes (APD) and Silicon Photo-Multipliers (SiPM) in Time-of-Flight Applications (2018)
73. Claire Tsagkari – Design, Fabrication and Testing of a Capacitive Sensor Using Delta-Sigma Modulation (2017)
72. Kevin Buck – Fast Transient Digitizer and PCB Interface (2015)
71. Marzieh Sharbat Maleki (2015)
70. Angsuman Roy – Design, Fabrication and Testing of Monolithic Low-Power Passive Sigma-Delta Analog-to-Digital Converters (2015)
69. Daniel Anderson – Design and Implementation of an Instruction Set Architecture and Instruction Execution Unit for the RZ9 Coprocessor System (2014)
68. Jared Gordon – Design and Fabrication of an Infrared Optical Pyrometer ASIC (2013)
67. Justin Butterfield (2012)
66. Adam Johnson – Methods and Considerations for Testing Resistive Memories (2012)
65. Ben Millemon – CMOS Characterization, Modeling, and Circuit Design in the Presence of Random Local Variation (2012)
64. Justin Wood (2012)
63. Chamunda Ndinawe Chamunda (2011)
62. Gary VanAckern – Design Guide for CMOS Process On-Chip 3D Inductors using Thru-Wafer Vias (2011)
61. Lucien Jan Bissey – High-Voltage Programmable Delta-Sigma Modulation Voltage-Control Circuit (2010)
60. Kaijun Li (2010)
59. Yingting Li (co-supervised with Maria Mitkova) (2010)
58. Lael Matthews (co-supervised with Said Ahmed-Zaid) (2010)
57. Priyanka Mukeshbhai Parikh (2010)
56. Todd Plum (co-supervised with Jeff Jessing) – Design and Fabrication of a Chemicapacitive Sensor for the Detection of Volatile Organic Compounds (2010)
55. Rahul Srikonda (2010)
54. Avani Falgun Trivedi (2010)
53. Kuang Ming Yap – Gain and Offset Error Correction for CMOS Image Sensors using Delta-Sigma Modulation (2010)
52. Mahesh Balasubramanian – Phase Change Memory - Array Development and Sensing Circuits using Delta-Sigma Modulation (2009)
51. Lincoln Bollschweiler (2009)
50. Shantanu Gupta (2009)
49. Qawi Harvard – Wide I_O DRAM Architecture Utilizing Proximity Communication (2009)
48. Avinash Rajagiri (2009)
47. Ramya Ramarapu (2009)
46. Harikrishna Rapole (2009)
45. Aruna Vadla (2009)
44. Hemanth Ande (2008)
43. Curtis Cahoon – Low-Voltage CMOS Temperature Sensor Design using Schottky Diode-Based References (2008)
42. Prashanth Busa (2008)
41. John McCoy III (2008)
40. Dennis Montierth – Using Delta-Sigma-Modulation for Sensing in a CMOS Imager (2008)
39. Rudi Rashwand (2008)
38. Barsha Shrestha (co-supervised with Zhu Han) – Wireless Access in Vehicular Environments using Bit Torrent and Bargaining (2008)
37. Eric Becker – Design of an Integrated Half-Cycle Delay Line Duty Cycle Corrector Delay Locked Loop (2007)

36. Matthew Leslie – Noise-Shaping Sense Amplifier for Cross-Point Arrays (2007)
35. Jose Monje (2007)
34. Sanghyun Park (2007)
33. Vishal Saxena – Indirect Feedback Compensation Techniques for Multi-Stage Operational Amplifiers (2007)
32. Meshack Appikatla (2006)
31. Eric Booth – Wide Range, Low Jitter Delay-Locked Loop Using a Graduated Digital Delay Line and Phase Interpolator (2006)
30. Sucheta Das (2006)
29. Krishna Duvvada – High Speed Digital CMOS Input Buffer Design (2006)
28. Krishnamraju Kurra (2006)
27. Soumya Narasimhan (2006)
26. Roger Porter (2006)
25. David Butler – Low-Voltage Bandgap Reference Design Utilizing Schottky Diodes (2005)
24. Dragos Dimitriu (2005)
23. Surendranath Eruvuru – Sensing Circuit Design for an Ion Mobility Spectrometer (2005)
22. Sandhya Sandireddy (2005)
21. Harish Singidi (2005)
20. Indira Vemula – Delta-Sigma Modulator Used in CMOS Imagers (2005)
19. Bhavana Kollimarla – A 1-Bit Analog-to-Digital Converter Using Delta Sigma Modulation for Sensing in CMOS Imagers (2004)
18. Sandeep Pemmaraju – High Voltage Charge Pump Circuit for an Ion Mobility Spectrometer (2004)
17. Ravindra Puthumbaka – Circuit Design for an Ion Mobility Spectrometer (2004)
16. Brandon Roth – Comparison of Asynchronous vs. Synchronous Design Technologies using a 16-bit Binary Adder (2004)
15. Jennifer Taylor – Reading and Writing Flash Memory Using Delta-Sigma Modulation (2004)
14. Jing Plaisted – Methods for Memory Testing (2003)
13. Murugesh Subramaniam – Flash Memory Sensing Using Averaging (2003)
12. Brian Johnson – Application of an Asynchronous FIFO in a DRAM Data Path (2002)
11. Scott Ward – Electrostatic Discharge (ESD) Protection in CMOS (2002)
10. Tyler Gomm – Design of a Delay-Locked Loop with a DAC-Controlled Analog Delay Line (2001)
9. Gexin Huang (2001)
8. Chris Atkins (2000)
7. Thaddeus Black (2000)
6. Zuxu Qin (2000)
5. Hao Chen (1999)
4. Doug Hackler (co-supervised with Steve Parke) – TMOS: A Novel Design for MOSFET Technology (1999)
3. Song Liu – Design of a CMOS 6-bit Folding and Interpolating Analog-to-Digital Converter (1999)
2. Ben Ba (1997)
1. Brent Keeth – A Novel Architecture for Advanced High Density Dynamic Random Access Memories (1996)

GRANTED US PATENTS

152. Baker, R. J., “Quantizing circuits having improved sensing,” **10,658,018**, May 19, 2020.
151. Baker, R. J., “Quantizing circuits having improved sensing,” **10,403,339**, September 3, 2019.
150. Baker, R. J., “Digital Filters with Memory,” **10,366,744**, July 30, 2019.
149. Baker, R. J., “Quantizing circuits having improved sensing,” **10,127,954**, November 13, 2018.
148. Baker, R. J. and Parkinson, W., “NMOS regulated voltage reference,” **9,753,481**, September 5, 2017.
147. Baker, R. J., “Digital Filters with Memory,” **9,734,894**, August 15, 2017.
146. Baker, R. J. and Keeth, B., "Optical interconnect in high-speed memory systems," **9,697,883**, July 7, 2017
145. Baker, R. J., “Comparators for delta-sigma modulators,” **9,641,193**, May 2, 2017.
144. Baker, R. J., “Quantizing circuits having improved sensing,” **9,449,664**, September 20, 2016.
143. Baker, R. J., “Error detection for multi-bit memory,” **9,336,084**, May 10, 2016.
142. Baker, R. J. and Keeth, B., “Optical interconnect in high-speed memory systems,” **9,299,423**, March 29, 2016.

141. Baker, R. J., “Methods for sensing memory elements in semiconductor devices,” **9,299,405**, March 29, 2016.
140. Baker, R. J., “Comparators for delta-sigma modulators,” **9,135,962**, September 15, 2015.
139. Baker, R. J., “Resistive memory element sensing using averaging,” **9,081,042**, July 14, 2015.
138. Baker, R. J., “Digital Filters with Memory,” **9,070,469**, June 30, 2015.
137. Baker, R. J., "Reference current sources,” **8,879,327**, November 4, 2014.
136. Baker, R. J. and Beigel, K. D., “Multi-resistive integrated circuit memory,” **8,878,274**, November 4, 2014.
135. Baker, R. J., “Methods for sensing memory elements in semiconductor devices,” **8,854,899**, October 7, 2014.
134. Baker, R. J., “Quantizing circuits with variable parameters,” **8,830,105**, September 9, 2014.
133. Baker, R. J., “Integrators for delta-sigma modulators,” **8,754,795**, June 17, 2014.
132. Baker, R. J., “Methods of quantizing signals using variable reference signals,” **8,717,220**, May 6, 2014.
131. Baker, R. J. and Keeth, B., “Optical interconnect in high-speed memory systems,” **8,712,249**, April 29, 2014.
130. Baker, R. J., “Resistive memory element sensing using averaging,” **8,711,605**, April 29, 2014.
129. Baker, R. J., “Memory with correlated resistance,” **8,681,557**, March 25, 2014.
128. Baker, R. J., “Reference current sources,” **8,675,413**, March 18, 2014.
127. Baker, R. J., “Methods for sensing memory elements in semiconductor devices,” **8,582,375**, November 12, 2013.
126. Linder, L. F., Renner, D., MacDougal, M., Geske, J., and Baker, R. J., “Dual well read-out integrated circuit (ROIC),” **8,581,168**, November 12, 2013.
125. Li, W., Schoenfeld, A., and Baker, R. J., “Method and apparatus for providing symmetrical output data for a double data rate DRAM,” **8,516,292**, August 20, 2013.
124. Baker, R. Jacob, “Resistive memory element sensing using averaging,” **8,441,834**, May 14, 2013.
123. Qawi, Q. I., Drost, R. J., and Baker, R. Jacob, "Increased DRAM-array throughput using inactive bitlines," **8,395,947**, March 12, 2013.
122. Baker, R. Jacob, “Memory with correlated resistance,” **8,289,772**, October 16, 2012.
121. Lin, F. and Baker, R. Jacob, “Phase splitter using digital delay locked loops,” **8,218,708**, July 10, 2012.
120. Baker, R. Jacob, “Subtraction circuits and digital-to-analog converters for semiconductor devices,” **8,194,477**, June 5, 2012.
119. Baker, R. J., “Digital Filters for Semiconductor Devices,” **8,149,646**, April 3, 2012.
118. Baker, R. J., “Error detection for multi-bit memory,” **8,117,520**, February 14, 2012.
117. Baker, R. J., “Integrators for delta-sigma modulators,” **8,102,295**, January 24, 2012.
116. Baker, R. J., “Devices including analog-to-digital converters for internal data storage locations,” **8,098,180**, January 17, 2012.
115. Baker, R. J. and Beigel, K. D., “Multi-resistive integrated circuit memory,” **8,093,643**, January 10, 2012.
114. Baker, R. J., “Quantizing circuits with variable parameters,” **8,089,387**, January 3, 2012.
113. Baker, R. J., “Reference current sources,” **8,068,367**, November 29, 2011.
112. Baker, R. J., “Methods of quantizing signals using variable reference signals,” **8,068,046**, November 29, 2011.
111. Baker, R. J., “Systems and devices including memory with built-in self-test and methods of making using the same,” **8,042,012**, October 18, 2011.
110. Baker, R. J., “Memory with correlated resistance,” **7,969,783**, June 28, 2011.
109. Baker, R. J. and Keeth, B., “Optical interconnect in high-speed memory systems,” **7,941,056**, May 10, 2011.
108. Baker, R. J., “K-delta-1-sigma modulator,” **7,916,054**, March 29, 2011.
107. Li, W., Schoenfeld, A., and Baker, R. J., “Method and apparatus for providing symmetrical output data for a double data rate DRAM,” **7,877,623**, January 25, 2011.
106. Lin, F. and Baker, R. J., “Phase splitter using digital delay locked loops,” **7,873,131**, January 18, 2011.
105. Hush, G. and Baker, R. J., “Complementary bit PCRAM sense amplifier and method of operation,” **7,869,249**, January 11, 2011.
104. Baker, R. J., “Subtraction circuits and digital-to-analog converters for semiconductor devices,” **7,839,703**, November 23, 2010.
103. Baker, R. J., “Digital Filters with Memory” **7,830,729**, November 9, 2010.
102. Baker, R. J., “Systems and devices including memory with built-in self test and methods of making using the same,” **7,818,638**, October 19, 2010.
101. Baker, R. J., “Integrators for delta-sigma modulators,” **7,817,073**, October 19, 2010.

100. Baker, R. J., “Digital filters for semiconductor devices,” **7,768,868**, August 3, 2010.
99. Baker, R. J., “Quantizing circuits with variable reference signals,” **7,733,262**, June 8, 2010.
98. Baker, R. J., “Quantizing circuits for semiconductor devices,” **7,667,632**, February 23, 2010.
97. Baker, R. J., and Beigel, K. D., “Multi-resistive integrated circuit memory,” **7,642,591**, January 5, 2010.
96. Baker, R. J., “Offset compensated sensing for a magnetic random access memory,” **7,616,474**, November 10, 2009.
95. Baker, R. J., “Resistive memory element sensing using averaging,” **7,577,044**, Aug. 18, 2009.
94. Baker, R. J., “Quantizing circuits with variable parameters,” **7,538,702**, May 26, 2009.
93. Baker, R. J., “Method and system for reducing mismatch between reference and intensity paths in analog to digital converters in CMOS active pixel sensors,” **7,528,877**, May 5, 2009.
92. Baker, R. J., “Method and system for reducing mismatch between reference and intensity paths in analog to digital converters in CMOS active pixel sensors,” **7,515,188**, April 7, 2009.
91. Taylor, J. and Baker, R. J., “Method and apparatus for sensing flash memory using delta-sigma modulation,” **7,495,964**, February 24, 2009.
90. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **7,489,575**, February 10, 2009.
89. Baker, R. J., “Per column one-bit ADC for image sensors,” **7,456,885**, November 25, 2008.
88. Staples, T. and Baker, R. J., “Input buffer design using common-mode feedback,” **7,449,953**, November 11, 2008.
87. Li, W., Schoenfeld, A., and Baker, R. J., “Method and apparatus for providing symmetrical output data for a double data rate DRAM,” **7,421,607**, September 2, 2008.
86. Baker, R. J., “Methods for resistive memory element sensing using averaging,” **7,372,717**, May 13, 2008.
85. Taylor, J. and Baker, R. J., “Method and apparatus for sensing flash memory using delta-sigma modulation,” **7,366,021**, April 29, 2008.
84. Hush, G. and Baker, R. J., “Method of operating a complementary bit resistance memory sensor and method of operation,” **7,366,003**, April 29, 2008.
83. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **7,330,390**, February 12, 2008.
82. Baker, R. J., “Input and output buffers having symmetrical operating characteristics and immunity from voltage variations,” **7,319,620**, January 15, 2008.
81. Staples, T. and Baker, R. J., “Method and apparatus providing input buffer design using common-mode feedback,” **7,310,018**, December 18, 2007.
80. Baker, R. J., “Offset compensated sensing for a magnetic random access memory,” **7,286,428**, October 23, 2007.
79. Baker, R. J., and Cowles, T. B., “Method and apparatus for reducing duty cycle distortion of an output signal,” **7,271,635**, September 18, 2007.
78. Baker, R. J., and Cowles, T. B., “Method and apparatus for reducing duty cycle distortion of an output signal,” **7,268,603**, September 11, 2007.
77. Hush, G., Baker, R. J., and Moore, J., “Skewed sense AMP for variable resistance memory sensing,” **7,251,177**, July 31, 2007.
76. Hush, G. and Baker, R. J., “Method of operating a complementary bit resistance memory sensor,” **7,242,603**, July 10, 2007.
75. Li, W., Schoenfeld, A., and Baker, R. J., “Method and apparatus for providing symmetrical output data for a double data rate DRAM,” **7,237,136**, June 26, 2007.
74. Moore, J. and Baker, R. J., “Rewrite prevention in a variable resistance memory,” **7,224,632**, May 29, 2007.
73. Baker, R. J., “Integrated charge sensing scheme for resistive memories,” **7,151,698**, December 19, 2006.
72. Baker, R. J., “Adjusting the frequency of an oscillator for use in a resistive sense amp,” **7,151,689**, December 19, 2006.
71. Baker, R. J., “Resistive memory element sensing using averaging,” **7,133,307**, Nov. 7, 2006.
70. Lin, F. and Baker, R. J., “Phase detector for all-digital phase locked and delay locked loops,” **7,123,525**, October 17, 2006.
69. Baker, R. J., and Beigel, K. D., “Integrated circuit memory with offset capacitor,” **7,109,545**, September 19, 2006.
68. Baker, R. J., “Input and output buffers having symmetrical operating characteristics and immunity from voltage variations,” **7,102,932**, September 5, 2006.
67. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **7,095,667**, August 22, 2006.

66. Baker, R. J., “Offset compensated sensing for a magnetic random access memory,” **7,082,045**, July 25, 2006.
65. Baker, R. J., “System and method for sensing data stored in a resistive memory element using one bit of a digital count,” **7,009,901**, March 7, 2006.
64. Hush, G. and Baker, R. J., “Complementary bit resistance memory sensor and method of operation,” **7,002,833**, February 21, 2006.
63. Lin, F. and Baker, R. J., “Phase detector for all-digital phase locked and delay locked loops,” **6,987,701**, January 17, 2006.
62. Baker, R. J., “Adjusting the frequency of an oscillator for use in a resistive sense amp,” **6,985,375**, January 10, 2006.
61. Baker, R. J., “Method for reducing power consumption when sensing a resistive memory,” **6,954,392**, October 11, 2005.
60. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **6,954,391**, October 11, 2005.
59. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **6,954,390**, October 11, 2005.
58. Lin, F. and Baker, R. J., “Phase splitter using digital delay locked loops,” **6,950,487**, September 27, 2005.
57. Baker, R. J., “Method and apparatus for measuring current as in sensing a memory cell,” **6,930,942**, August 16, 2005.
56. Baker, R. J., “Offset compensated sensing for a magnetic random access memory,” **6,917,534**, July 12, 2005.
55. Baker, R. J., “Dual loop sensing scheme for resistive memory elements,” **6,914,838**, July 5, 2005.
54. Baker, R. J., “High speed low power input buffer,” **6,914,454**, July 5, 2005.
53. Baker, R. J., and Beigel, K. D., “Method for stabilizing or offsetting voltage in an integrated circuit,” **6,913,966**, July 5, 2005.
52. Moore, J. and Baker, R. J., “PCRAM rewrite prevention,” **6,909,656**, June 21, 2005.
51. Baker, R. J., “Integrated charge sensing scheme for resistive memories,” **6,901,020**, May 31, 2005.
50. Hush, G., Baker, R. J., and Moore, J., “Skewed sense AMP for variable resistance memory sensing,” **6,888,771**, May 3, 2005.
49. Baker, R. J., “Method for reducing power consumption when sensing a resistive memory,” **6,885,580**, April 26, 2005.
48. Moore, J. and Baker, R. J., “PCRAM rewrite prevention,” **6,882,578**, April 19, 2005.
47. Baker, R. J., “Integrated charge sensing scheme for resistive memories,” **6,870,784**, March 22, 2005.
46. Baker, R. J., “Sensing method and apparatus for a resistive memory device,” **6,859,383**, February 22, 2005.
45. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **6,856,564**, February 15, 2005.
44. Baker, R. J., “Offset compensated sensing for a magnetic random access memory,” **6,856,532**, February 15, 2005.
43. Baker, R. J., “Dual loop sensing scheme for resistive memory elements,” **6,829,188**, Dec. 7, 2004.
42. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **6,826,102**, Nov. 30, 2004.
41. Baker, R. J., “Resistive memory element sensing using averaging,” **6,822,892**, Nov. 23, 2004.
40. Baker, R. J., “System and method for sensing data stored in a resistive memory element using one bit of a digital count,” **6,813,208**, Nov. 2, 2004.
39. Baker, R. J., “Wordline driven method for sensing data in a resistive memory array,” **6,809,981**, Oct. 26, 2004.
38. Baker, R. J., “Noise resistant small signal sensing circuit for a memory device,” **6,798,705**, Sept. 28, 2004.
37. Baker, R. J., “Methods and apparatus for measuring current as in sensing a memory cell,” **6,795,359**, Sept. 21, 2004.
36. Hush, G. and Baker, R. J., “Complementary bit PCRAM sense amplifier and method of operation,” **6,791,859**, Sept. 14, 2004.
35. Baker, R. J., “Method and apparatus for sensing resistance values of memory cells,” **6,785,156**, August 31, 2004.
34. Lin, F. and Baker, R. J., “Phase detector for all-digital phase locked and delay locked loops,” **6,779,126**, August 17, 2004.
33. Baker, R. J., and Lin, F. "Digital dual-loop DLL design using coarse and fine loops," **6,774,690**, August 10, 2004.
32. Hush, G., Baker, R. J., and Voshell, T., “Producing walking one pattern in shift register,” **6,771,249**, August 3, 2004.
31. Baker, R. J., “Sensing method and apparatus for resistance memory device,” **6,741,490**, May 25, 2004.

30. Li, W., Schoenfeld, A., and Baker, R. J., “Method and apparatus for providing symmetrical output data for a double data rate DRAM,” **6,704,881**, March 9, 2004.
29. Baker, R. J., “Method and system for writing data in an MRAM memory device,” **6,687,179**, February 3, 2004.
28. Baker, R. J., “High speed digital signal buffer and method,” **6,683,475**, January 27, 2004.
27. Baker, R. J., “High speed low power input buffer,” **6,600,343**, July 29, 2003.
26. Baker, R. J., “Offset compensated sensing for magnetic random access memory,” **6,597,600**, July 22, 2003.
25. Baker, R. J., “Sensing method and apparatus for resistive memory device,” **6,577,525**, June 10, 2003.
24. Baker, R. J., “Method and apparatus for sensing resistance values of memory cells,” **6,567,297**, May 20, 2003.
23. Baker, R. J., “High-speed digital signal buffer and method,” **6,538,473**, March 25, 2003.
22. Baker, R. J. and Beigel, K. D., "Electronic device with interleaved portions for use in integrated circuits," **6,509,245**, January 21, 2003.
21. Baker, R. J., "Resistive memory element sensing using averaging," **6,504,750**, January 7, 2003.
20. Baker, R. J., "High-speed digital signal buffer and method," **6,483,347**, November 19, 2002.
19. Baker, R. J., and Lin, F., "Digital dual-loop DLL design using coarse and fine loops," **6,445,231**, September 3, 2002.
18. Baker, R. J., "Method and apparatus for receiving synchronous data," **6,424,684**, July 23, 2002.
17. Baker, R. J. and Beigel, K. D., "Comb-shaped capacitor for use in integrated circuits," **6,410,955**, June 25, 2002.
16. Baker, R. J., "High-speed, low-power input buffer," **6,407,588**, June 18, 2002.
15. Miller, J., Schoenfeld, A., Ma, M., and Baker, R. J., "Method and apparatus for improving the performance of digital delay locked loop circuits," **6,316,976**, Nov. 13, 2001.
14. Keeth, B. and Baker, R. J., "Low skew differential receiver with disable feature," **6,256,234**, July 3, 2001.
13. Keeth, B. and Baker, R. J., "Low skew differential receiver with disable feature," **6,104,209**, August 15, 2000.
12. Miller, J., Schoenfeld, A., Ma, M., and Baker, R. J., "Method and apparatus for improving the performance of digital delay locked loop circuits," **6,069,506**, May 30, 2000.
11. Keeth, B. and Baker, R. J., "Low skew differential receiver with disable feature," **6,026,051**, February 15, 2000.
10. Baker, R. J., and Manning, T. A., "Method and apparatus for adaptively adjusting the timing of a clock signal used to latch digital signals, and memory device using same," **6,026,050**, February 15, 2000.
9. Baker, R. J., and Manning, T. A., "Method and apparatus for adaptively adjusting the timing of a clock signal used to latch digital signals, and memory device using same," **5,953,284**, September 14, 1999.
8. Baker, R. J., "Fully-differential amplifier," **5,953,276**, September 14, 1999.
7. Hush, G., Baker, R. J., and Voshell, T., "Timing Control for a Matrixed Scanned Array". **5,909,201**, June 1, 1999.
6. Hush, G. and Baker, R. J., "Field emission display having pulsed capacitance current control," **5,894,293**, April 13, 1999.
5. Baker, R. J., "Adaptively biased voltage regulator and operating method," **5,874,830**, February 23, 1999.
4. Hush, G. Baker, R. J., and Voshell, T., "Serial to Parallel Conversion with a Phase-Locked Loop," **5,818,365**, October 1, 1998.
3. Hush, G., Baker, R. J., and Voshell, T., "Timing Control for a Matrixed Scanned Array," **5,638,085**, June 10, 1997.
2. Wilson, A. J., Baker, R. J., and Schoenfeld, A., "Waveshaping circuit generating two rising slopes for a sense amplifier pulldown device," **5,614,856**, March 25, 1997.
1. Hush, G., Baker, R. J., and Voshell, T., "Serial to Parallel Conversion with a PLL," **5,598,156**, January 28, 1997.

INVITED TALKS (PARTIAL LISTING)

- Harvard, Q. I. and Baker, R. J., “Low-Power, High-Bandwidth, and Ultra-Small Memory Module Design,” a presentation covering semiconductor packaging, DRAM architectures, and I/O circuits. The goal of this work is to investigate replacing the currently used dual in-line memory modules (DIMMs) with a smaller and a lower power memory module, a “Nano-Module.”
- Baker, R. J., and Campbell, K. A., “Reconfigurable Analog Electronics using the Memristor.”
- Baker, R. J., and Saxena, V., “A K-Delta 1-Sigma Modulator for Wideband Analog-to-Digital Conversion.”
- Li, K., Saxena, V., and Baker, R. J., "The Baker ADC: An Overview,"
- Saxena, V., and Baker, R. J., "High-Speed Op-Amp Design: Compensation and Topologies for Two and Three Stage Designs,"
- Baker, R. J., "Circuit Design for MLC Flash: Towards a Semiconductor Replacement for the Hard Disk Drive."

- Baker, R. J., Terman Award Acceptance Speech, given at the Frontiers in Education Conference (FIE 2007), Milwaukee, WI, October 11, 2007.
- Baker, R. J., "The One-Transistor, One-Capacitor (1T1C) Dynamic Random Access Memory (DRAM), and its Impact on Society," presented at the Franklin Institute, in the symposium honoring Dr. Robert H. Dennard and his receipt of the 2007 Benjamin Franklin Medal in Electrical Engineering, April 25, 2007.
- Baker, R. J. and Saxena, V., "Design of Bandpass Delta-Sigma Modulators: Avoiding Common Mistakes."
- Baker, R. J., "Sensing Circuits for Resistive Memory."
- Hadrick, M. and Baker, R. J., "Sensing in CMOS Imagers using Delta-Sigma Modulation."
- Baker, R. J., "Design of High-Speed CMOS Op-Amps for Signal Processing," IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED), April, 2005
- Baker, R. J., "Delta-Sigma Modulation for Sensing," IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED), April, 2004
- Rivera, B. and Baker, R. J., "Design and Layout of Schottky Diodes in a Standard CMOS Process," MURI Review, November, 2001.

REFEREED JOURNAL PAPERS

26. Lopez, A., Strong, H. N., McGlothen, K. I., Hines, D. J., and Baker, R. J., "A compact avalanche-transistor based pulse generator for transcranial infrared light stimulation (TILS) experiments," *Instruments*, 2022, 6, 20.
25. Senda, D., Strong, H., Hines, D., Hines, R., and Baker, R. J., "A Compact 1200V, 700A, IGBT-Based Pulse Generator for Repetitive Transcranial Magnetic Stimulation In Vivo Laboratory Experiments," *Review of Scientific Instruments*, Vol. 92, Issue 8, August 30, 2021.
24. Wu, W., Baker, R. J., Bikkina, P., Long, Y., Levy, A., and Mikkola, E., "Design and Analysis of a Feedback Time Difference Amplifier with Linear and Programmable Gain," Analog Integrated Circuits and Signal Processing, *Springer*, 16 October, 2017.
23. Moumouni, Y. and Baker, R. J., "Modeling, Simulation, and Implementation of a Solar Thermoelectric Energy Harvesting System," *Journal of Energy and Power Engineering*, vol. 10, pp. 296-312, 2016.
22. Li, Y., Baker, R. J., and Raad, D., "Improving the Performance of Electrowetting on Dielectric Microfludics Using Piezoelectric Top Plate Control," *Sensors and Actuators B: Chemical*, vol. 229, pp. 63-74, 2016.
21. Li, Y., Li, H., and Baker, R. J., "A Low-Cost and High-Resolution Droplet Position Detector for an Intelligent Electrowetting on Dielectric Device," *Journal of Laboratory Automation*, Vol. 20, No. 6, pp. 663-669, 2015.
20. Moumouni, Y., Ahmad, S., and Baker, R. J., "A System Dynamics Model for Energy Planning in Niger," *International Journal of Power and Energy Engineering*, Vol. 3, No. 6, pp. 308-322, 2014.
19. Estrada, D., Ogas, M. L., Southwick III, R. G., Price, P. M., Baker, R. J., and Knowlton, W. B., *Impact of Single pMOSFET Dielectric Degradation on NAND Circuit Performance*, Microelectronics Reliability, Vol. 48, No. 3, pp 354-363, 2008.
18. Leslie, M. B., and Baker, R. J., "Noise-Shaping Sense Amplifier for MRAM Cross-Point Arrays," *IEEE Journal of Solid-State Circuits*, Vol. 41, No. 3, pp. 699-704, 2006.
17. Hess, H. L., and Baker, R. J., "Transformerless Capacitive Coupling of Gate Signals for Series Operation of Power MOS Devices," *IEEE Transactions on Power Electronics,* Vol. 15, No. 5, pp. 923-930, 2000.
16. Lin, F., Miller, J., Schoenfeld, A., Ma, M., and Baker, R. J., "A Register-Controlled Symmetrical DLL for Double-Data-Rate DRAM," *IEEE Journal of Solid-State Circuits*, Vol. 34, No. 4, pp. 565-568, 1999.
15. Bruce, J. D., Li, H. W., Dallabetta, M. J., and Baker, R. J., "Analog layout using ALAS!" *IEEE Journal of Solid-State Circuits*, Vol. 31, No. 2, pp. 271-274, 1996.
14. Li, H. W., Dallabetta, M. J., and Baker, R. J., "An interactive impulse response extraction system," *Review of Scientific Instruments* 66(10), 5092-5095, 1995.
13. Ward, S. T., Baker, R. J., and Li, H. W., "A microchannel plate image intensifier gating circuit capable of pulse widths from 30 ns to 10 us," *Measurement Science and Technology*, Vol. 6, No. 11, pp. 1631-1633, 1995.
12. Keeth, B., Baker, R. J., and Li., H. W., "CMOS transconductor VCO with adjustable operating and center frequencies," *Electronics Letters,* 31(17), 1397-98, 1995.
11. Baker, R. J., "Time domain operation of the TRAPATT diode for picosecond-kilovolt pulse generation," *Review of Scientific Instruments,* 65(10), 3286-88, 1994.

10. Baker, R. J. and Ward, S. T., "Designing nanosecond high voltage pulse generators using power MOSFETs," *Electronics Letters,* 30(20), 1634-35, 1994.
9. Baker, R. J. and Johnson, B. P., "Sweep circuit design for a picosecond streak camera," *Measurement Science and Technology,* 5(4). 1994.
8. Baker R. J., Hodder, D. J., Johnson, B. P., Subedi, P. C., and Williams, D. C., "Generation of kilovolt-subnanosecond pulses using a nonlinear transmission line" *Measurement Science and Technology,* 4(8), 893-95, 1993.
7. Baker R. J., and Johnson, B. P., "Series operation of power MOSFETs for high speed, high voltage switching applications," *Review of Scientific Instruments* 65(6), 1993.
6. Baker R. J., and Johnson, B. P., "Applying the Marx bank circuit configuration to power MOSFETs," *Electronics Letters* 29(1), 56-57. 1993.
5. Baker R. J., and Johnson, B. P., "Stacking power MOSFETs for use in high speed instrumentation," *Review of Scientific Instruments,* 63(12), 5799-5801, 1992.
4. Baker R. J., and Johnson, B. P., "A 500 Volt nanosecond pulse generator using cascode connected power MOSFETs," *Measurement Science and Technology,* 3(8), 775-77, 1992.
3. Baker R. J., Perryman, G. T., and Watts, P. W., "A fiber-optically triggered avalanche transistor," *IEEE Transactions on Instrumentation and Measurement,* 40(3), 649-52, 1991.
2. Baker R. J., "High voltage pulse generation using current mode second breakdown in a bipolar junction transistor," *Review of Scientific Instruments,* 62(4), 1031-1036, 1991.
1. Baker R. J., and Pocha, M. D. "Nanosecond switching using power MOSFETs," *Review of Scientific Instruments* 61(8), 2211-2213, 1990.

REFERRED CONFERENCE PAPERS AND MAGAZINE ARTICLES

85. Strong, H., Senda, D., Baker, R. J., and Hines, D., "Focal Stimulation of Movement Related Cortical Potentials in Mice using a Novel TMS Circuit Design," *Brain Stimulation*, Vol. 14, Issue 6, November, 2021.
84. Arteaga, G., Namboodiri, S. P., Roy, A., and Baker, R. J., "Current Comparator with SiGe BiCMOS Input Stage for Photon-Counting LiDAR Applications," *IEEE 64th International Midwest Symposium on Circuits and Systems*, August 9-11, pp. 420-423, 2021.
83. Namboodiri, S. P. and Baker, R. J., "Incorporation of Chopping in Continuous Time K-Delta-1-Sigma Modulator," IEEE 19th IEEE Interregional NEWCAS Conference, June 13-16, 2021.
82. Namboodiri, S. P., Arteaga, G., Skelly, J., Mata-carlos, F., Roy, A., and Baker, R. J., "A Current-Mode Photon Counting Circuit for Long-Range LiDAR Applications," *IEEE 63rd International Midwest Symposium on Circuits and Systems*, August 9-12, pp. 146-149, 2020.
81. Vinayaka, V., Namboodiri, S. P., Roy, A., and Baker, R. J., "Segmented Digital SiPM," *IEEE 62nd International Midwest Symposium on Circuits and Systems*, August 4-7, pp. 1118-1121, 2019.
80. Mellott, J. K., Monahan, E., Vinayaka, V., Namboodiri, S. P., Roy, A., and Baker, R. J., "Variable Fast Transient Digitizer," *IEEE 62nd International Midwest Symposium on Circuits and Systems*, August 4-7, pp. 125-128, 2019.
79. Vinayaka, V., Namboodiri, S. P., Abdalla, Kerstetter, B., Mata-Carlos, F., Senda, D., Skelly, J., Roy, A., and Baker, R. J., "Monolithic 8x8 SiPM with 4-bit Current-Mode Flash ADC with Tunable Dynamic Range," *Proceedings of the ACM Great Lakes Symposium on VLSI (GLSVLSI)*, pp. 57-62, Tysons Corner, VA, May 9-11, 2019.
78. Woodson, M., Estrella, S., Hay, K., Roy, A., Sun, K., Morgan, J., Beling, A., Baker, R. J., Renner, D., and Mashanovitch, M., "Photodetection at or below 1 micron wavelengths," *Proc. SPIE 10912, Physics and Simulation of Optoelectronic Devices XXVII*, 1091210, March 8, 2019.
77. Buck, K. and Baker, R. J., "Fast Transient Digitizer Chip for Capturing Single-Shot Events," *Proceedings of 12th IEEE Dallas Circuits and Systems Conference*, October 9-10, 2016.
76. Wu, W., Baker, R. J., Kumar, P., Garcia, F., and Mikkola, E., "A Linear High Gain Time Difference Amplifier Using Feedback Gain Control," *Proceedings of 12th IEEE Dallas Circuits and Systems Conference*, October 9-10, 2016.
75. Moumouni, Y. and Baker, R. J., "Analysis of a Residential 5kW Grid-tied Photovoltaic System," *Proceedings of the 2016 Clemson University Power Systems Conference*, March 8-11, 2016.
74. Moumouni, Y. and Baker, R. J., "LTspice Model of a Solar Thermoelectric Generation System," *Proceedings of the 2016 Clemson University Power Systems Conference*, March 8-11, 2016.

73. Li, Y. and Baker, R. J., "Computer Vision Assisted Measurement of the Displacements of a Bimorph Piezoelectric Cantilever Beam," Proceedings of the IEEE Biomedical Circuits and Systems (BioCAS 2015) Conference, October 22-24, 2015.
72. Li, Y. and Baker, R. J., "A Highly Efficient and Reliable Electrowetting on Dielectric Device for Point-of-Care Diagnostics," *Proceedings of 11th IEEE Dallas Circuits and Systems Conference*, October 12-13, 2015.
71. Roy, A. and Baker, R. J., "A Low-Power Switched-Capacitor Passive Sigma-Delta Modulator," *Proceedings of 11th IEEE Dallas Circuits and Systems Conference*, October 12-13, 2015.
70. Li, Y. and Baker, R. J., "Precise EWOD Top Plate Positioning Using Inverse Preisach Model Based Hysteresis Compensation," *Proceedings of 11th IEEE Dallas Circuits and Systems Conference*, October 12-13, 2015.
69. Moumouni, Y. and Baker, R. J., "Buffer Sizing of Concentrated Photovoltaic Batteries: An Economic Analysis," *IEEE 58th International Midwest Symposium on Circuits and Systems*, pp. 704-707, August 2-5, 2015.
68. Moumouni, Y. and Baker, R. J., "Application of Used Electric Vehicle Batteries to Buffer Photovoltaic Output Transients," *IEEE 58th International Midwest Symposium on Circuits and Systems*, pp. 700-703, August 2-5, 2015.
67. Roy, A., Meza, M., Yurgelon, J., and Baker, R. J., "An FPGA Based Passive K-Delta-1-Sigma Modulator," *IEEE 58th Midwest Symposium on Circuits and Systems*, pp. 121-124, August 2-5, 2015.
66. Moumouni, Y. and Baker, R. J., "Concise Thermal to Electrical Parameters Extraction of Thermoelectric Generator for Spice Modeling," *IEEE 58th International Midwest Symposium on Circuits and Systems*, pp. 596-599, August 2-5, 2015.
65. Moumouni, Y. and Baker, R. J., "Improved SPICE Modeling and Analysis of a Thermoelectric Module," *IEEE 58th International Midwest Symposium on Circuits and Systems*, pp. 600-603, August 2-5, 2015.
64. Li, Y., Li, H., and Baker, R. J., "Volume and Concentration Identification by Using an Electrowetting on Dielectric Device," *Proceedings of 10th IEEE Dallas Circuits and Systems Conference*, October 12-13, 2014.
63. Li, Y., Chen, R., and Baker, R. J., "A Fast Fabricating Electro-wetting Platform to Implement Large Droplet Manipulation," *Proceedings of the IEEE 57th International Midwest Symposium on Circuits and Systems*, pp. 326-329, August 3-6, 2014.
62. Roy, A. and Baker, R. J., "A Passive 2nd-Order Sigma-Delta Modulator for Low-Power Analog-to-Digital Conversion," *Proceedings of the IEEE 57th International Midwest Symposium on Circuits and Systems*, pp. 595-598, August 3-6, 2014.
61. Baker, R. J., "Massive Open Online Courses for Educating Circuit Designers: What Works and What Doesn't," IEEE Solid-State Circuits Magazine, Vol. 6, No. 2, pp. 63-65, 2014.
60. Montierth, D., Strand, T., Leatham, J., Linder, L., and Baker, R. J., "Performance and Characteristics of Silicon Avalanche Photodetectors in the C5 Process," *IEEE 55th International Midwest Symposium on Circuits and Systems*, August 5-8, 2012.
59. VanAckern, G., Baker, R. J., Moll, A. J., and Saxena, V. "On-Chip 3D Inductors using Thru-Wafer Vias," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, April 20, 2012.
58. Yap, K. and Baker, R. J., "Two Techniques to Reduce Gain and Offset Errors in CMOS Image Sensors using Delta-Sigma Modulation," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, April 20, 2012.
57. Labaziewicz, A. and Baker, R. J., "A 2 GHz Effective Sampling Frequency K-Delta-1-Sigma Analog-to-Digital Converter," *Proceedings of the IEEE 54th International Midwest Symposium on Circuits and Systems*, August 7-10, 2011**.**
56. Saxena, V., Balagopal, S., and Baker, R. J., "Systematic Design of Three-Stage Op-amps using Split Length Compensation," *Proceedings of the IEEE 54th International Midwest Symposium on Circuits and Systems*, August 7-10, 2011**.**
55. Harvard, Q. and Baker, R. J., "A Scalable I/O Architecture for Wide I/O DRAM," *Proceedings of the IEEE 54th International Midwest Symposium on Circuits and Systems*, August 7-10, 2011**.**
54. Wald, S., Baker, R. J., Mitkova, M., and Rafla, N., "A Non-Volatile Memory Array Based on Nano-Ionic Conductive Bridge Measurements," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 43-46, April 22, 2011.

53. Saxena, V. and Baker, R. J., "Synthesis of Higher-Order K-Delta-1-Sigma Modulators for Wideband ADCs," *Proceedings of the IEEE 53rd International Midwest Symposium on Circuits and Systems*, August 1-4, 2010**.**
52. Saxena, V. and Baker, R. J., "Indirect Compensation Techniques for Three-Stage Fully-Differential Op-Amps," (invited) *Proceedings of the IEEE 53rd International Midwest Symposium on Circuits and Systems*, August 1-4, 2010**.**
51. Harvard, Q., Baker, R. J., and Drost, R., "Main Memory with Proximity Communication: A Wide I/O DRAM Architecture," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 40-43, April 16, 2010.
50. Yap, K. M. and Baker, R. J., "Gain Error Correction for CMOS Image Sensor using Delta-Sigma Modulation," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 52-55, April 16, 2010.
49. Gagliano, C. and Baker, R. J., "A Compact Delay-Locked Loop for Multi-Phase Non-Overlapping Clock Generation," *Proceedings* (poster) *of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, April 16, 2010.
48. Montierth, D., Yap, K. M., and Baker, R. J., "CMOS Image Sensor using Delta-Sigma Modulation," *4th Annual Austin Conference on Integrated Circuits & Systems*, Oct. 26-27, 2009.
47. Saxena, V. and Baker, R. J., "Synthesis of Higher-Order K-Delta-1-Sigma Modulators for Wideband Analog to Digital Conversion," *4th Annual Austin Conference on Integrated Circuits & Systems*, Oct. 26-27, 2009.
46. Li, K., Saxena, V., Zheng, G., and Baker, R. J., "Full Feed-Forward K-Delta-1-Sigma Modulator," *4th Annual Austin Conference on Integrated Circuits & Systems*, Oct. 26-27, 2009.
45. Bollschweiler, L., English, A., Baker, R. J., Kuang, W., Chang, Z.-C., Shih, M.-H., Knowlton, W.B., Hughes, W.L., Lee, J., Yurke, B., Cockerham, N. S., and Tyree, V. C., "Chip-Scale Nanophotonic Chemical and Biological Sensors using CMOS Process," *Proceedings of the IEEE 52nd Midwest Symposium on Circuits and Systems*, pp. 413-416, August 2-5, 2009**.**
44. Saxena, V., Li, K., Zheng, G., and Baker, R. J., "A K-Delta 1-Sigma Modulator for Wideband Analog to Digital Conversion," *Proceedings of the IEEE 52nd International Midwest Symposium on Circuits and Systems*, pp. 411-415, August 2-5, 2009**.**
43. Saxena, V. and Baker, R. J., "Indirect Compensation Techniques for Three-Stage CMOS Op-amps," *Proceedings of the IEEE 52nd International Midwest Symposium on Circuits and Systems*, pp. 9-12, August 2-5, 2009**.**
42. Regner, J., Balasubramanian, M., Cook, B., Li, Y., Kassayebetre, H., Sharma, A., Baker, R. J., and Campbell, K. A., "Integration of IC Industry Feature Sizes with University Back-End-of-Line Post Processing: Example Using a Phase-Change Memory Test Chip," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 28-31, April, 2009.
41. Gupta, S. Saxena, V., Campbell, K. A., and Baker, R. J., "W-2W Current Steering DAC for Programming Phase Change Memory," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 59-62, April, 2009.
40. Rapole, H., Rajagiri, A., Balasubramanian, M., Campbell, K. A., and Baker, R. J., "Resistive Memory Sensing Using Delta-Sigma Modulation," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 63-66, April, 2009.
39. Kassayebetre, H., Regner, J., Rajagiri, A., Sharma, A., Hay, R. R., Baker, R. J., and Campbell, K.A., "Surface Acoustic Wave Device Fabrication using Zinc Oxide and Chalcogenide Thin Films**,"** poster presentation at the *IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, April, 2009.
38. Ande, H. K., Busa, P., Balasubramanian, M., Campbell, K. A., and Baker, R. J., "A New Approach to the Design, Fabrication, and Testing of Chalcogenide-Based Multi-State Phase-Change Nonvolatile Memory," *Proceedings of the IEEE 51st International Midwest Symposium on Circuits and Systems*, pp. 570-573, August 10-13, 2008**.**
36. Saxena, V., and Baker, R. J., "Compensation of CMOS Op-Amps using Split-Length Transistors," *Proceedings of the IEEE 51st Midwest Symposium on Circuits and Systems*, pp. 109-112, August 10-13, 2008**.**
36. Saxena, V., and Baker, R. J., "Indirect Compensation Technique for Low-Voltage Op-Amps," *Proceedings of the 3rd Annual Austin Conference on Integrated Systems and Circuits (ACISC)*, May 7-9, 2008**.**

35. Cahoon, C., and Baker, R. J., "Low-Voltage CMOS Temperature Sensor Design using Schottky Diode-Based References," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 16-19, April, 2008.
34. Knowlton, W. B., Araujo, D., Price, P.M., Brotherton, J., Coonse, K., Hendricks, K., Southwick III, R. G., Henderson, J., Oxford, J., Moll, A., Kuang, W., and Baker, R. J., "Progress Towards a Biomolecular Nanowire Sensor Array for Biomedical Applications," invited talk presented at the 6th Annual INBRE/COBRE Research Conference, Moscow, ID, August 6, 2007
33. Knowlton, W. B., Araujo, D., Price, P.M., Brotherton, J., Coonse, K., Southwick III, R.G., Oxford, J., Moll, A., Baker, R. J., and Kuang, W., "Development of Biomolecular Nanostructure Sensor Arrays," presented at the Sensors and Sensor Technology session for the program of the 88th annual meeting of the AAAS, Pacific Division, June 2007, Boise, ID
32. Knowlton, W. B., Kuang, W., Araujo D., Price, P. M., Brotherton, J., Coonse, K. Bollschweiler, L., Southwick, R., Oxford, J. Moll, A., and Baker, R. J., "Nanofabrication of 3D Sensor Arrays for Detection," Advanced Fuel Cycle Workshop, May 8-9, 2007, Boise, ID
31. Loo, S. M., Cole, J., Youngberg, R., Baker, R. J., Gribb, M. M., "Field-programmable gate array in a miniature ion mobility spectrometer sensor system," *Proceedings of the 2006 International Conference on Embedded Systems & Applications*, June 26-29, 2006, Las Vegas, NV.
30. Saxena, V., and Baker, R. J., "Indirect Feedback Compensation of CMOS Op-Amps," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 3-4, April, 2006.
29. Duvvada, K., Saxena, V., and Baker, R. J., High Speed Digital Input Buffer Circuits, *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 11-12, April, 2006.
28. Saxena, V., Plum, T. J., Jessing, J. R., and Baker, R. J., "Design and Fabrication of a MEMS Capacitive Chemical Sensor System," *Proceedings of the IEEE/EDS Workshop on Microelectronics and Electron Devices (WMED)*, pp. 17-18, April, 2006.
27. Gorseth, T. L., Estrada, D., Kiepert, J., Ogas, M. L., Cheek, B. J., Price, P. M., Baker, R. J., Bersuker, G., and Knowlton, W.B., "Preliminary Study of NOR Digital Response to Single pMOSFET Dielectric Degradation," presented at the *Workshop on Microelectronic Devices* (Boise, Idaho; April 14, 2006)
26. Sevier, D., Gribb, M., Plumlee, D., Moll, A. J., Hill, H. H., Hong, F., Baker, R. J., Loo, S. M., Walters, R. and Imonigie, J., "An In-Situ Ion Mobility Spectrometer Sensor System for Detecting Gaseous VOCs in the Vadose Zone," *Fourth International Conference on Unsaturated Soils* (*UNSAT '06*) *Conference, April 2-6, 2006, Carefree, AZ.*
25. Gribb, M., Hill, H. H., Baker, R. J., Loo, S. M., and Moll, A. J., "Ion Mobility Spectrometer (IMS) Sensor Project," presented at the *Environmental & Subsurface Science Symposium*, Inland Research Alliance, Sept. 19-21, 2005, Big Sky, Montana.
24. Ogas, M. L., Price, P. M., Kiepert J., Baker R. J., Bersuker G., and Knowlton W.B., *Degradation of Rise Time in NAND Gates Using 2.0 nm Gate Dielectrics*, oral presentation and publication at the 2005 IEEE Integrated Reliability Workshop, October 2005.
23. Butler, D. L. and Baker, R. J., *Low-Voltage Bandgap Reference Design Utilizing Schottky Diodes*, *Proceedings of the IEEE 48th International Midwest Symposium on Circuits and Systems*, Aug. 7-10, 2005.
22. Cheek, B. J., Southwick III, R. G., Ogas, M. L., Nagler, P. E., Whelchel, D., Kumar, S., Baker, R. J., and Knowlton, W. B., "Preliminary Soft Breakdown (SBD) Effects In CMOS Building Block Circuits," poster presentation at *2004 IEEE International Integrated Reliability Workshop*, Oct. 18-21, 2004.
21. Ogas, M., Southwick, R. G., Cheek, B. J., Lawrence, C. E., Kumar, S., Haggag, A., Baker, R. J., and Knowlton, W. B., "Multiple Waveform Pulse Voltage Stress Technique for Modeling Noise in Ultra-Thin Oxides," poster presentation at the *Workshop on Microelectronics and Electron Devices*, Boise, Idaho, April 16, 2004.
20. Ogas, M. L., Southwick III, R. G., Cheek, B. J., Baker, R. J., Bersuker, G., and Knowlton, W. B., "Survey of Oxide Degradation in Inverter Circuits Using 2.0nm MOS Devices," in *Proceedings of the 2004 IEEE International Integrated Reliability Workshop*, pp. 32-36.
19. Cheek, B. J., Stutzke, N., Santosh, K., Baker, R. J., Moll, A. J., and Knowlton, W. B., Investigation of Circuit-Level Oxide Degradation and its Effect on CMOS Inverter Operation Performance and MOSFET Characteristics, *2004 IEEE International Reliability Physics Symposium*, April, 25-29.

18. Stutzke, N., Cheek, B. J., Wiscombe, M., Lowman, T., Kumar, S., Baker, R. J., Moll, A. J., and Knowlton, W. B., *Effects of Circuit-Level Stress on Inverter Performance and MOSFET Characteristics*, 2003 IEEE International Integrated Reliability Workshop, Oct, 20-23.
17. Ogas, M. L., Southwick, R. G., Cheek, B. J., Lawrence, C. E., Kumar, S., Haggag, A., Baker, R. J., and Knowlton, W. B., *Investigation of Multiple Waveform Pulse Voltage Stress (MWPVS) Technique in Ultra-Thin Oxides*, poster presentation at the 2003 IEEE International Integrated Reliability Workshop Oct, 20-23.
16. Baker, R. J., *Mixed-Signal Design in the Microelectronics Curriculum,* IEEE University/Government/Industry Microelectronics (UGIM) Symposium, June 30 - July 2.
15. Hartman, J. A., Baker, R. J., Gribb, M., Hill, H. H., Jessing, J., Moll, A. J., Prouty, and Russell, D., *A Miniaturized Ion Mobility Spectrometer (IMS) Sensor for Wireless Operation*, FAME (Frontiers in Assessment Methods for the Environment) Symposium, Sponsored by NSF, Minneapolis, Minnesota, August 10-13, 2003.
14. Lawrence, C.E., Cheek, B. J., Lawrence, T. E., Kumar, S., Haggag, A., Baker, R. J., and Knowlton, W. B., *Gate Dielectric Degradation Effects on nMOS Devices Using a Noise Model Approach*, IEEE University/Government/Industry Microelectronics (UGIM) Symposium, June 30 - July 2, 2003.
13. Cheek, B., Lawrence, C., Lawrence, T., Gomez, J., Caldwell, T., Kiri, D., Kumar, S., Baker, R. J., Moll, A. J., and Knowlton, W. B., *Gate Dielectric Degradation Effects on nMOS Devices and Simple IC Building Blocks (SICBBs),* IEEE Electron Devices Society Boise Meeting, Boise, ID Oct. 25, 2002.
12. Lawrence, C., Cheek, B., Caldwell, T., Lawrence, T., Kiri, D., Kumar, S., Baker, R. J., Moll, A. J., and Knowlton, W. B., *Pulse voltage stressing of ultrathin gate oxides in NMOS devices, poster session at IEEE International Integrated Reliability Workshop,* October 21-24, 2002.
11. Cheek, B., Lawrence, C., Lawrence, T., Caldwell, T., Kiri, D., Kumar, S., Baker, R. J., Moll, A. J., and Knowlton, W. B., Circuit level reliability of ultrathin gate oxides for SICBBs: Preliminary study concentrated on the effect of stress on the NMOSFET of an inverter, poster session at the IEEE International Integrated Reliability Workshop, October 21-24, 2002.
10. Baker, R. J., "Sensing Circuits for Resistive Memory," *IEEE Electron Devices Society* Meeting, Boise, Idaho October 25, 2002.
9. Rivera, B., Baker, R. J., Melngailis, J., "Design and Layout of Schottky Diodes in a Standard CMOS Process," 2001 International Semiconductor Device Research Symposium, Washington DC, Dec. 2001.
8. Hess, H. and Baker, R. J., "Easier Method to Simultaneously Trigger Series-Connected MOS Devices," *Power Systems World Conference* 2000, Boston, Massachusetts, September 2000.
7. Baker, R. J., and Hess, H., "Transformerless Capacitive Coupling of Gate Signals for Series Operation of Power MOSFET Devices." *International Electric Machines and Drives Conference,* Seattle, Washington, May 1999, pp. 673-676.
6. Baker, R. J., "A windows based integrated circuit design tool for distance education," *International Conference on Simulation and Multimedia in Engineering Education*."
5. Chen, H. and Baker, R. J., "A CMOS Standard-Cell Library for the PC-based LASI Layout System," *Proceedings of the 41st International Midwest Symposium on Circuits and Systems, August 9-12, 1998.*
4. Liu, S. and Baker, R. J., "Process and temperature performance of a CMOS beta-multiplier voltage reference," *Proceedings of the 41st International Midwest Symposium on Circuits and Systems, August 9-12, 1998.*
3. Boyce, D.E. and Baker, R. J., "A Complete Layout System for the PC," *IEEE 40th International Midwest Symposium on Circuits and Systems*, 1997.
2. Baker, R. J., and Blair, J. J., "Step response considerations and the design of a suitable step generator for high speed digitizer testing," *LLNL's Third Annual Workshop on High Speed Digitizers,* April 3-4, Las Vegas, Nevada, 1991.
1. Baker, R. J., "Step-recovery diodes sharpen pulses," *Engineering Design News Magazine*, pp. 154-156, May 10, 1990.

EXPERT WITNESS EXPERIENCE (LAST 5 YEARS)

The law firms and clients (underlined) whom I have provided expert witness services in electrical and computer engineering are listed below. I have been deposed 92 times, given expert testimony at 12 trials (7 USITC, 2 D. Del., 1 Arbitr., 1 S.D. Cal., and 1 E.D. Tex.), and participated in 1 mediation.

Norton Rose Fulbright LLP (Austin, TX and Dallas, TX)

Case – *Current Lighting Solutions, LLC d/b/a GE Current* v. Jiaxing Super Lighting Electric Appliance Co., Ltd.
Case Number – IPR2023-00271. Petition filed on December 14, 2022.
Case Subject Matter – LED lighting, lamps, tube lamps, assembly, and associated circuits and electronics.
Work Performed – Provided expert consulting services and wrote declaration for inter partes review.

Paul Hastings LLP (Washington, DC)

Case – Ex Parte Reexaminations
Case Numbers – 90/015155 and 90/015156. Requests filed on November 7, 2022.
Case Number – 90/015134. Request filed on October 14, 2022.
Case Number – 90/015130. Request filed on September 30, 2022.
Case Subject Matter – Packaging and fabrication of light emitting diodes (LEDs).
Work Performed – Provided expert consulting services and wrote declaration.

Sheppard, Mullin, Richter & Hampton LLP (Menlo Park, CA)

Case – Bell Semiconductor, LLC v. NXP, SMC, Micron, Nvidia, *Advanced Micro Devices (AMD)*, *Acer*, Infineon, Qualcomm, Motorola Mobility, and Western Digital
Case Number – ITC Investigation No. 337-TA-1340. Complaint filed October 6, 2022.
Case Subject Matter – Electronic devices, semiconductor devices, and components.
Work Performed – Provided expert consulting services.

O'Melveny & Myers LLP (Los Angeles, CA)

Case – Daedalus Prime LLC v. *Samsung Electronics* and TSMC
Case Number – ITC Investigation No. 337-TA-1335. Complaint filed September 12, 2022.
Case Subject Matter – Semiconductor devices, mobile devices, and components.
Work Performed – Provided expert consulting services.

DLA Piper (Chicago, IL and Washington, DC)

Case – Ampt, LLC v. *SolarEdge Technologies, Inc.*
Case Number – ITC Investigation No. 337-TA-1327. Complaint filed July 28, 2022.
Case Subject Matter – Solar power optimizers, inverters, and components.
Work Performed – Provided expert consulting services.

Paul Hastings LLP (Austin, TX and Washington, DC)

Case – *Samsung Electronics Co., Ltd.* v. Scramoge Technology Ltd.
Case Numbers – IPR2022-01052, IPR2022-01053, and IPR2022-01058. Petitions filed on May 26, 2022.
Case Numbers – IPR2022-01054, IPR2022-01055, IPR2022-01056, and IPR2022-01057. Petitions filed on May 24, 2022.
Case Number – IPR2022-00939. Petition filed on April 29, 2022.
Case Subject Matter – An antenna that supports wireless charging.
Work Performed – Provided expert consulting services and wrote declaration for inter partes review.

Orrick, Herrington & Sutcliffe LLP (Houston, TX, Irvine, CA, and Menlo Park, CA)

Case – Ex Parte Reexaminations
Case Number – 90/015020. Request filed on May 2, 2022.
Case Number – 90/014906. Request filed on November 12, 2021.
Case Number – 90/014899. Request filed on November 10, 2021.
Case Number – 90/014888. Request filed on October 21, 2021.
Case Numbers – 90/014886 and 90/014887. Requests filed on October 20, 2021.
Case Number – 90/014885. Request filed on October 19, 2021.
Case Subject Matter – Universal Serial Bus (USB) for charging.
Work Performed – Provided expert consulting services and wrote declarations**.**

DLA Piper (Chicago, IL, Austin, TX, and Washington, DC)

Case – *SolarEdge Technologies, Inc.* v. Fronius International GMBH
Case Number – IPR2022-00849. Petition filed on April 14, 2022.
Case Subject Matter – Mechanical assembly and enclosure whereby an upper housing part is detached from a lower housing part using a "rotate-and-lift" feature.
Work Performed – Provided expert consulting services and wrote declaration for inter partes review.

Kirkland & Ellis LLP (New York, NY)

Case – *Samsung Electronics Co.* v. Sonrai Memory Ltd.
Case Numbers – IPR2022-00305 and IPR2022-00306. Petitions filed on December 10, 2021.
Case Subject Matter – USB devices and circuits for saving power.
Work Performed – Provided expert consulting services including writing declarations for inter partes reviews.

Haynes and Boone, LLP (Washington, DC)

Case – *Unified Patents, LLC* v. Arigna Technology Limited
Case Number – IPR2022-00285. Petition filed on December 9, 2021.
Case Subject Matter – High voltage driver circuit for driving power devices such as insulated gate bipolar transistors (IGBTs).
Work Performed – Provided expert consulting services, wrote declaration for inter partes review and was deposed.

Paul Hastings LLP (Washington, DC)

Case – *Samsung Electronics Co., Ltd.* v. Lynk Labs, Inc.
Case Numbers – IPR2022-00149 and IPR2022-00150. Petitions filed on November 12, 2021
Case Numbers – IPR2022-00100 and IPR2022-00101. Petitions filed on October 28, 2021.
Case Numbers – IPR2022-00051, IPR2022-00052, and IPR2022-00098. Petitions filed on October 27, 2021.
Case Numbers – IPR2021-01575 and IPR2021-01576. Petitions filed on October 1, 2021.
Case Numbers – IPR2021-01299, IPR2021-01300, IPR2021-01345, IPR2021-01346, and IPR2021-01347. Petitions filed on September 7, 2021.
Case Subject Matter – Circuit design, including switching power supply design, rectifiers, power factor correction, etc. for lighting and displays using light emitting diodes (LEDs).
Work Performed – Provided expert consulting services, wrote declarations, and was deposed ten times.

Haynes and Boone, LLP (Plano, TX)

Case – *Pure Storage, Inc.* v. Digital Cache, LLC
Case Number – IPR2022-00121. Petition filed on October 29, 2021.
Case Subject Matter – Non-volatile memory (NVM) devices capable of retaining stored data in case of a power failure.
Work Performed – Provided expert consulting services and wrote declaration for inter partes review.

Banner Witcoff (Washington, DC)

Case – *SolarEdge Technologies Ltd.* v. Koolbridge Solar, Inc.

Case Numbers – IPR2022-00007, IPR2022-00008, IPR2022-00009, IPR2022-00010, IPR2022-00011, and IPR2022-00012. Petitions filed on October 11, 2021.

Case Numbers – IPR2022-00013, IPR2022-00014, and IPR2022-00015. Petitions filed on October 8, 2021.

Case Subject Matter – DC-to-AC converters using full-bridges, multi-level conversion for power systems, and other electronics for harvesting solar energy.

Work Performed – Provided expert consulting services, wrote declarations for inter partes reviews, and was deposed.

Paul Hastings LLP (Austin, TX and Washington, DC)

Case – *Samsung Electronics Co., Ltd.* v. LED Wafer Solutions LLC

Case Number – IPR2021-01554. Petition filed on September 20, 2021.

Case Number – IPR2021-01526. Petition filed on September 10, 2021.

Case Number – IPR2021-01506. Petition filed on September 7, 2021.

Case Number – IPR2021-01491. Petition filed on September 3, 2021.

Case Subject Matter – Packaging of light emitting diodes (LEDs).

Work Performed – Provided expert consulting services and wrote declarations.

Paul Hastings, LLC (Washington, DC)

Case – Ex Parte Reexamination

Case Number – 90/014,846. Request filed on August 30, 2021.

Case Subject Matter – Wireless power transmission and ways to wirelessly charge and/or discharge a battery.

Work Performed – Provided expert consulting services and wrote declaration.

Jones Day (San Diego, CA and Pittsburgh, PA)

Case – *SOLiD, Inc.* v. CommScope Technologies LLC

Case Numbers – IPR2021-01390, IPR2021-01391, IPR2021-01392, IPR2021-01393, and IPR2021-01394. Petitions filed on August 12, 2021.

Case Subject Matter – Digital antenna system that enables extension of radio frequency (RF) analog signals from base stations to areas (e.g., inside of buildings) where access to such signals is inhibited.

Work Performed – Provided expert consulting services for inter partes reviews and wrote declaration.

Unified Patents, LLC (Washington, DC)

Case – Ex Parte Reexamination

Case Number – 90/019,015. Request filed on July 20, 2021.

Case Subject Matter – Voltage-controlled oscillator (VCO) temperature compensation.

Work Performed – Provided expert consulting services and wrote declaration.

Winston & Strawn LLP (Dallas, TX and Palo Alto, CA)

Case – *Micron Technology, Inc.; Micron Semiconductor Products, Inc.; Micron Technology Texas LLC* v. Unification Technologies LLC

Case Numbers – IPR2021-00940, IPR2021-00941, and IPR2021-00942. Petitions filed on June 4, 2021.

Case Subject Matter – Solid-State Drive (SSD), flash non-volatile memory management, memory controller operation and addressing.

Work Performed – Provided expert consulting services for inter partes reviews and wrote declarations.

Hill, Kertscher & Wharton, LLP (Atlanta, GA)

Case – Kaijet Technology v. *Sanho Corporation*

Case Number – IPR2021-00886. Petition filed on April 30, 2021.

Case Subject Matter – Port extension apparatus for headphone jack, USB (Universal Serial Bus or Type-C ports), and video ports such as VGA (Video Graphics Array), DVI (Digital Visual Interface), HDMI (High-Definition Multimedia Interface), DP (Display Port), and mini-DP.

Work Performed – Provided expert consulting services for inter partes review, wrote declaration, was deposed.

O'Melveny & Myers LLP (Los Angeles, CA and New York, NY)

Case – Solas OLED LTD. v. *Samsung Electronics Co. LTD.*

Case Number – Texas, ED (Marshall) 2:21-cv-00105. Complaint filed March 22, 2021.

Case Subject Matter – Touch-sensors for gesture recognition and signal processing for capacitive touch displays.

Work Performed – Provided expert consulting services including writing declaration for claim construction.

O'Melveny & Myers LLP (San Francisco, CA)

Case – Super Interconnect Technologies LLC v. *Google LLC*

Case Number – Texas, ED (Marshall) 2:18-cv-00463 (complaint filed November 2, 2018) and Texas, WD (Waco) 6:21-cv-00259 (complaint filed March 15, 2021).

Case Subject Matter – Transmission of data and clock signals. Serial signals such as transition minimized differential signaling. Communications between processors and non-volatile storage such as Universal Flash Storage (UFS) and embedded MultiMedia Controller (eMMC).

Work Performed – Provided expert consulting services and wrote expert reports.

Orrick, Herrington & Sutcliffe LLP (Houston, TX, and Irvine, CA)

Case – Fundamental Innovation Systems International LLC v. *Anker Innovations and Fantasia Trading LLC d/b/a Ankerdirect*

Case Number – Delaware, 1:21-cv-00339. Complaint filed on March 5, 2021.

Case Subject Matter – Universal Serial Bus (USB) for charging mobile devices.

Work Performed – Provided expert consulting services.

Orrick, Herrington & Sutcliffe LLP (Houston, TX, Irvine, CA, and Menlo Park, CA)

Case – *TCT Mobile Inc. and TCL Communication, Inc.* v. Fundamental Innovation Systems International LLC

Case Numbers – IPR2021-00597, IPR2021-00598, and IPR2021-00599. Petitions filed on February 26, 2021.

Case Number – IPR2021-00428. Petition filed on January 13, 2021.

Case Number – IPR2021-00410. Petition filed on January 11, 2021.

Case Number – IPR2021-00395. Petition filed on December 31, 2020.

Case Subject Matter – Universal Serial Bus (USB) for charging mobile devices.

Work Performed – Provided expert consulting services including writing declarations for inter partes reviews. Was deposed twice.

Paul Hastings LLP (Austin, TX and Washington, DC)

Case – *Samsung, Inc.* v. Pictos Technologies, Inc.

Case Number – IPR2021-00557. Petition filed on February 18, 2021.

Case Number – IPR2021-00436. Petition filed on January 19, 2021.

Case Numbers – IPR2021-00437 and IPR2021-00438. Petitions filed on January 15, 2021.

Case Subject Matter – Solid-state imaging devices including red, green, and blue pixels, data conversion circuits, and interpolation circuits. CMOS imagers including fabrication and design, active pixels, and semiconductor physics.

Work Performed – Provided expert consulting services and wrote declarations for inter partes reviews.

O'Melveny & Myers LLP (San Francisco, CA) and DLA Piper (New York, NY)

Case – Solas OLED Ltd. v. *BOE Technology Group Co. Ltd. and Samsung Electronics*

Case Number – ITC Investigation No. 337-TA-1243. Complaint filed January 5, 2021.

Case Subject Matter – Active matrix OLED display devices and components

Work Performed – Provided expert consulting services, wrote expert reports, was deposed, and testified at trial.

Paul Hastings LLP (Washington, DC)

Case – *Samsung, Inc.* v. Garrity Power Services LLC

Case Number – IPR2021-00389. Petition filed on December 31, 2020.

Case Subject Matter – Power electronics including full-bridge PWM modules for wireless power transmission using magnetic coupling via antennas and transformers. Design of inductors and coils.

Work Performed – Provided expert consulting services and wrote declaration for inter partes reviews.

Morgan, Lewis & Bockius LLP (Palo Alto, CA and Shanghai, CN)

Case – Monolithic Power Systems, Inc. v. *Meraki Integrated Circuit Technology, Inc. and Promate Electronic Company, LTD.*

Case Number – Texas, WD (Waco) 6:20-cv-00876. Complaint filed on December 24, 2020.

Case Subject Matter – Design of switching power supplies including synchronous rectification.

Work Performed – Provided expert consulting services including declaration for claim construction, trade secret analysis and declaration, and Markman tutorial.

Winston & Strawn LLP (Dallas, TX and Palo Alto, CA)

Case – *Micron Technology, Inc.; Micron Semiconductor Products, Inc.; Micron Technology Texas LLC; Dell Technologies Inc.; Dell Inc.; and HP Inc.* v. Unification Technologies LLC

Case Numbers – IPR2021-00343, IPR2021-00344, and IPR2021-00345. Petitions filed on December 22, 2020.

Case Subject Matter – Solid-State Drive (SSD), flash non-volatile memory management, memory controller operation and addressing.

Work Performed – Provided expert consulting services for inter partes reviews, wrote declarations, and was deposed.

Jones Day (Chicago, IL and Dallas, TX)

Case – WSOU Investments, LLC d/b/a Brazos Licensing and Development v. *Xilinx, Inc.*

Case Numbers – Delaware, 1:20-cv-01231 and Delaware, 1:20-cv-01233. Complaints filed on November 23, 2020 and September 16, 2020.

Case Subject Matter – Controlling power cycles in communication devices and transferring multiple asynchronous clock signals.

Work Performed – Provided expert consulting services and wrote claim construction declaration.

O'Melveny & Myers LLP (Los Angeles, CA)

Case – Cosemi Technologies, Inc. v. EverPro Technologies, Fibbr Technologies, *Logitech, Inc.*, and Facebook Technologies

Case Number – ITC Investigation No. 337-TA-1233. Complaint filed October 28, 2020.

Case Subject Matter – Data cables, including HDMI, Display Port, and USB Type A, USB Type C and USB Type A/C data cables.

Work Performed – Provided expert consulting services.

Kirkland & Ellis LLP (Boston, MA and New York, NY)

Case – Pictos Technologies, Inc. v. *Samsung Electronics Co., LTD. and Samsung Semiconductor, Inc.*

Case Number – ITC Investigation No. 337-TA-1231. Complaint filed September 25, 2020.

Case Subject Matter – Solid-state imaging devices including red, green, and blue pixels, correction of bad pixels, data conversion circuits, and interpolation circuits. CMOS imagers including fabrication and design, active pixels, and semiconductor physics.

Work Performed – Provided expert consulting services and wrote expert report.

Orrick, Herrington & Sutcliffe LLP (Houston, TX, Irvine, CA, and Menlo Park, CA)

Case – Fundamental Innovation Systems International LLC v. *TCT Mobile Inc. and TCL Communication, Inc.*

Case Number – Delaware, 1:20-cv-00552. Complaint filed on September 11, 2020.

Case Subject Matter – Universal Serial Bus (USB) for charging mobile devices.

Work Performed – Provided expert consulting services including writing declarations, expert report on invalidity, and was deposed.

Walters Wilson LLP (Redwood City, CA)

Case – *Western Digital Corporation and SanDisk, LLC* v. Martin Kuster

Case Numbers – IPR2020-01410 and IPR2020-01411. Petitions filed on August 3, 2020.

Case Subject Matter – Computer connectors such as universal serial bus (USB) that connect to peripheral devices such as mice, keyboards, displays, printers, external storage, etc.

Work Performed – Provided expert consulting services for inter partes review, wrote declarations and was deposed.

O'Melveny & Myers LLP (Los Angeles, CA)

Case – *Advanced Micro Devices, Inc.* v. Monterey Research, LLC

Case Number – IPR2020-01315. Petition filed on July 16, 2020.

Case Number – IPR2020-00985. Petition filed on May 26, 2020.

Case Subject Matter – Reading and writing to semiconductor memory such as SRAM and double data rate (DDR) DRAM. Buffer circuits with variable current supplies for controlling the rise and fall times of output signals.

Work Performed – Provided expert consulting services for inter partes review, wrote declarations and was deposed twice.

Winston & Strawn LLP (Dallas, TX and Palo Alto, CA)

Case – Unification Technologies LLC v. *Micron Technology, Inc.; Micron Semiconductor Products, Inc.; Micron Technology Texas LLC*

Case Number – Texas, WD (Waco) 6:20-cv-00500. Complaint filed June 5, 2020.

Case Subject Matter – Solid-State Drive (SSD), flash non-volatile memory management, memory controller operation and addressing.

Work Performed – Provided expert consulting services, wrote declaration for claim construction, and was deposed.

Ari Law, P.C. (Palo Alto, CA) and Hill, Kertscher & Wharton, LLP (Atlanta, GA)

Case – *Sanho Corporation* v. Kaijet Technology, Magic Control Technology, and Star View Global

Case Numbers – Georgia, ND (Atlanta) 1:18-cv-05385 (third amended complaint filed November 14, 2019) and Georgia, ND (Atlanta) 1:20-cv-02150 (filed May 19, 2020).

Case Subject Matter – Port extension apparatus for headphone jack, USB (Universal Serial Bus or Type-C ports), and video ports such as VGA (Video Graphics Array), DVI (Digital Visual Interface), HDMI (High-Definition Multimedia Interface), DP (Display Port), and mini-DP.

Work Performed – Provided expert consulting services, wrote declaration for claim construction, and expert reports. Was deposed.

Orrick, Herrington & Sutcliffe LLP (Houston, TX, Irvine, CA, and Menlo Park, CA)

Case – Fundamental Innovation Systems International LLC v. *Coolpad Group Limited, Coolpad Technologies, Inc., and Yulong Computer Telecommunication Scientific Co. Ltd.*

Case Number – Texas, ED (Marshall) 2:20-cv-00117. Complaint filed on April 23, 2020.

Case Subject Matter – Universal Serial Bus (USB) for charging mobile devices.

Work Performed – Provided expert consulting services including writing declaration for claim construction.

Pillsbury Winthrop Shaw Pittman LLP (San Francisco, CA and Shanghai, China)

Case – *SMIC, Americas* v. Innovative Foundry Technologies LLC

Case Numbers – IPR2020-00837 and IPR2020-00839. Petitions filed on April 14, 2020.

Case Subject Matter – Methods of manufacturing a semiconductor component, such as a short-channel MOS device, including forming graded-junctions using spacers along the sidewalls of a transistor's gate.

Work Performed – Provided expert consulting services for inter partes reviews and wrote declarations.

Russ August & Kabat (Los Angeles, CA)

Case – *Oyster Optics, LLC* v. Ciena Corporation

Case Number – California, ND (Oakland) 3:20-cv-02354. Complaint filed on April 7, 2020.

Case Subject Matter – Fiber optic telecommunication systems.

Work Performed – Provided expert consulting services, wrote claim construction declaration, and was deposed.

Russ August & Kabat (Los Angeles, CA)

Case – Seoul Semiconductor Co., Ltd. v. *Document Security Systems, Inc.*
Case Number – IPR2020-00938. Petition filed on May 18, 2020.
Case – Nichia Corporation v. *Document Security Systems, Inc.*
Case Number – IPR2020-00908. Petition filed on May 18, 2020.
Case – Cree, Inc. v. *Document Security Systems, Inc.*
Case Number – IPR2020-00557. Petition filed on February 11, 2020.
Case Subject Matter – Light emitting diodes (LEDs) as a light source, extraction of light.
Work Performed – Provided expert consulting services, wrote declaration for inter partes reviews, and was deposed three times.

Paul Hastings LLP (Austin, TX and Washington, DC)

Case – *Flex Logix Technologies, Inc.* v. Konda Technologies Inc.
Case Numbers – IPR2020-00260, IPR2020-00261, and IPR2020-00260. Petitions filed on December 16, 2019.
Case Numbers – PGR2019-00037, PGR2019-00040, and PGR2019-00042. Petitions filed on March 18, 2019.
Case Subject Matter – FPGA layout routing for integrated circuits and networks, electrical and computer engineering.
Work Performed – Provided expert consulting services and wrote declarations for post grant and inter partes reviews.

DLA Piper (Chicago, IL, Houston, TX, and Washington, DC) and White & Case LLP (New York, NY and Washington, DC)

Case – M-Red Inc. v. *Panasonic Corporation*
Case Number – Texas, ED (Marshall) 2:19-cv-00251. Complaint filed on July 16, 2019.
Case Subject Matter – Integrated circuit electronics adjustment, such as ring oscillators, using auto calibration. Evaluating a known good die using both wire and flip-chip interconnects.
Work Performed – Provided expert consulting services and wrote declaration for claim construction.

Paul Hastings LLP (Austin, TX and Washington, DC)

Case – *Samsung, Inc.* v. NuCurrent, Inc.
Case Number – IPR2019-01217. Petition filed on June 19, 2019.
Case Numbers – PGR2019-00049 and PGR2019-00050. Petitions filed on May 28, 2019.
Case Numbers – IPR2019-00858, IPR2019-00859, IPR2019-00860, IPR2019-00861, IPR2019-00862, and IPR2019-00863. Petitions filed on March 22, 2019.
Case Subject Matter – Wireless power transmission using magnetic coupling via antennas and transformers. Design of inductors and coils.
Work Performed – Provided expert consulting services and wrote declarations for post grant and inter partes reviews. Was deposed five times.

DLA Piper (East Palo Alto, CA)

Case – Invensas Corporation and Tessera Advanced Technologies, Inc. v. *NVIDIA Corporation*
Case Number – Delaware, 1:19-cv-00861. Complaint filed on May 8, 2019.
Case Subject Matter – Reference voltage circuits (programmable bandgaps) having a substantially zero temperature coefficient using bipolar and MOS transistors.
Work Performed – Provided expert consulting services.

Irell & Manella LLP (Los Angeles, CA)

Case – *VLSI Technology LLC* v. Intel Corporation
Case Number – Texas, WD (Waco) 6:19-cv-00256. Complaint filed on April 11, 2019.
Case Subject Matter – Static Random Access Memory (SRAM) having a variable power supply using charge-sharing capacitors, methods for designing digital systems, and hardware managed interrupt control.
Work Performed – Provided expert consulting services, wrote expert reports, declaration, and was deposed.

Paul Hastings LLP (Austin, TX and Washington, DC)

Case – *Samsung, Inc.* v. ProMOS Technologies, Inc.

Case Numbers – IPR2019-00779, IPR2019-00780, IPR2019-00781, IPR2019-00784, and IPR2019-00785. Petitions filed on March 5, 2019.

Case Subject Matter – Programmable latches that include non-volatile programmable elements, digital delay elements, and decoders for memory chips.

Work Performed – Provided expert consulting services, wrote declarations for inter partes reviews, and was deposed four times.

Pillsbury Winthrop Shaw Pittman LLP (San Francisco, CA)

Case – *Kingston Technology Company, Inc.* v. Memory Technologies, LLC

Case Numbers – IPR2019-00645, IPR2019-00648, IPR2019-00651, and IPR2019-00654. Petitions filed on January 31, 2019.

Case Numbers – IPR2019-00642, IPR2019-00643, and IPR2019-00644. Petitions filed on January 30, 2019.

Case Number – IPR2019-00638. Petition filed on January 29, 2019.

Case Subject Matter – Memory cards including PC cards, compact flash ("CF") cards, secure digital ("SD") cards, programmable credit cards, and embedded multimedia cards ("eMMC"). Uses of EEPROM and Flash memory in built-in operating system (BIOS).

Work Performed – Provided expert consulting services for inter partes reviews and wrote declarations.

Morrison & Foerster LLP (San Francisco, CA) and Schwabe, Williamson & Wyatt PC (Portland, OR)

Case – Steven A.W. de Jaray, Perienne de Jaray, and Darrell R. Oswald v. *Lattice Semiconductor Corporation*

Case Number – Oregon, Circuit Court (Multnomah), 3:19-cv-00086. Complaint filed on January 17, 2019.

Case Subject Matter – Export controlled integrated circuits in various packages. Programmable logic devices (PLDs).

Work Performed – Provided expert consulting services. wrote expert reports, and was deposed.

Russ August & Kabat (Los Angeles, CA)

Case – Ring LLC v. *SkyBell Technologies, Inc.*

Case Numbers – IPR2019-00443, IPR2019-00444, IPR2019-00445, IPR2019-00446, and IPR2019-00447. Petitions filed on December 17, 2018.

Case Subject Matter – Electronic doorbell system with digital chime, video, motion detection, wired and wireless communication, and control panel.

Work Performed – Provided expert consulting services, wrote declarations for inter partes reviews, and was deposed three times.

Baker Botts LLP (Austin, TX)

Case – *Semiconductor Components Industries, LLC d/b/a ON Semiconductor* v. Power Integrations, Inc.

Case Numbers – IPR2018-01810, IPR2018-01812, IPR2018-01816, and IPR2018-01818. Petitions filed on September 28, 2018.

Case Subject Matter – Switched-mode power supplies (e.g., flyback, buck, boost), controllers, transformers, and sensing multiple voltage values.

Work Performed – Provided expert consulting services and wrote declarations for inter partes reviews.

Kirkland & Ellis LLP (Washington, DC) and Fish & Richardson P.C. (Washington, DC)

Case – *Samsung Electronics Co., LTD. and SK hynix Inc.* v. BiTMICRO, LLC

Case Number – IPR2018-01720. Petition filed on September 19, 2018.

Case Number – IPR2018-01545. Petition filed on August 23, 2018.

Case Subject Matter – Solid state storage drives, stacked consumer electronics components (3D packaging, solder balls, flip-chip, TSVs, etc.), and products.

Work Performed – Provided expert consulting services including writing declarations for inter partes reviews.

Knobbe, Martens, Olson, & Bear, LLP (Los Angeles, CA) and White & Case LLP (Palo Alto, CA and Washington, DC)

Case – *Toshiba America Information Systems, Inc. and MSI Computer Corp.* v. Walletex Microelectronics Ltd.

Case Number – IPR2018-01538. Petition filed on August 10, 2018.

Case Subject Matter – Double-sided male USB and various card-shaped devices and connectors, electrical and computer engineering.

Work Performed – Provided expert consulting services including writing declarations for inter partes review and was deposed.

Jones Day (Cleveland, OH and Pittsburgh, PA)

Case – Intel Corp. v. *Qualcomm, Inc.*

Case Numbers – IPR2018-01344 and IPR2018-01346. Petitions filed on July 6, 2018.

Case Numbers – IPR2018-01261, IPR2018-01293, and IPR2018-01295. Petitions filed on June 29, 2018.

Case Subject Matter – Communications, e.g., PCI Express (PCIe), USB, Firewire (IEEE-1394), between two processing nodes within a computing device such as a cell phone, tablet, or computer.

Work Performed – Provided expert consulting services for inter partes reviews including writing declaration and was deposed.

Orrick, Herrington & Sutcliffe LLP (Menlo Park, CA) and Weil, Gotshal & Manges LLP (Redwood Shores, CA)

Case – *Micron Technology, Inc.* v. North Star Innovations, Inc.

Case Numbers – IPR2018-00998 and IPR2018-00999. Petitions filed on May 1, 2018.

Case Number – IPR2018-00989. Petition filed on April 27, 2018.

Case Subject Matter – Output circuits for memory integrated circuits and voltage boosting circuits.

Work Performed – Provided expert consulting services including writing declarations for inter partes reviews, and was deposed.

Paul Hastings LLP (Austin, TX and Washington, DC)

Case – *Samsung, Inc.* v. Red Rock Analytics, LLC

Case Numbers – IPR2018-00555, IPR2018-00556, and IPR2018-00557. Petitions filed on February 5, 2018.

Case Subject Matter – Calibration of IQ balance in transceivers in wireless communications (OFDM, 802.11, Bluetooth, 3G, 4G, etc.).

Work Performed – Provided expert consulting services and wrote declarations for inter partes reviews.

Covington & Burling LLP (Palo Alto, CA and Washington, DC)

Case – Phenix (sic) Longhorn, LLC v. *Texas Instruments, Inc.*

Case Number - Texas, ED (Marshall) 2:18-cv-00020. Complaint filed January 22, 2018.

Case Subject Matter – Circuit with non-volatile memory for gamma correction in a display screen.

Work Performed – Provided expert consulting services, wrote declaration for claim construction, expert reports, and was deposed twice.

Kirkland & Ellis LLP (Washington, DC) and Fish & Richardson P.C. (Washington, DC)

Case – BiTMICRO, LLC v. *Samsung Electronics Co., LTD.*, *SK hynix Inc.*, *Dell Inc.*, *Lenovo Group Inc.*, *HP Inc.*, *ASUSTek Computer Inc.*, *ASUS Computer International*, *ACER Inc.*, *VAIO Corporation*, and *Transcosmos America Inc.*

Case Number – ITC Investigation No. 337-TA-1097. Complaint filed January 8, 2018.

Case Subject Matter – Solid state storage drives (SSDs), stacked electronics components (3D packaging, solder balls, flip-chip, TSVs, etc.), and products.

Work Performed – Provided expert consulting services including direct witness statement, deposition, and testified at trial for pilot 100-day ITC proceeding.