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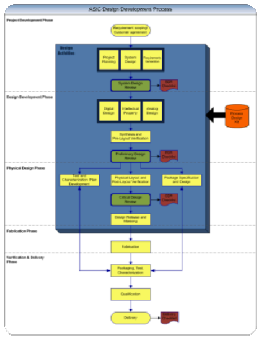
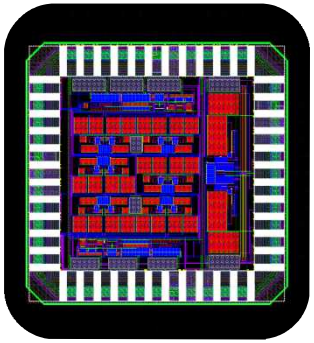
Sandia National Laboratories





Mixed Signal ASIC/SoC Products

Michael Holmes

Manager, Mixed Signal ASIC/SoC Products, 1753

April 26, 2013

U.S. DEPARTMENT OF ENERGY | NNSA National Nuclear Security Administration

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Sandia National Laboratories

Major Areas of Integrated Circuit (IC) Business Focus

- Develop *digital, analog, and mixed-signal integrated circuits (IC)* along with a deep understanding of technology offerings and design methodologies
  - Develop and maintain effective, efficient, and disciplined design methodologies with leading edge design tool suite
- Develop *high-reliability* integrated circuits for *high consequence systems*
  - Weapons system components
  - Security-based and/or classified components
- Develop *trusted* mixed-signal integrated circuits
  - Access to trusted people and facilities for design, layout, fabrication, packaging, test, qualification, and product delivery assuring full chain-of-custody
    - On-shore, US owned, no foreign nationals
    - Security clearances, processes and/or facilities
    - DOD trusted accreditation
  - Mature relationship with IBM Trusted foundry
  - Access to other government trusted suppliers
- Develop *radiation hardened* mixed-signal ICs
  - Access to strategic radiation hardened in-house technology
  - Radiation hardened by design for commercial technologies
- Deliver *low volume* integrated circuits
  - Providing ICs where commercial industry cannot or will not


ACCREDITATION OF TRUST

Microelectronics Trusted Source
CATEGORY 1A

By these presents the undersigned expresses the confidence of the Department of Defense, Defense Microelectronics Activity (DMEA) in the ability of the organization known as

Sandia National Laboratories
Microsystems, Science, Technology and Components

to deliver trusted foundry microelectronic goods and services to end users within the United States Government that correspond to Trusted Category 1A which meets Mission Assurance Category 1 as defined by Instruction 8500.2 of the Department of Defense Directives, effective this date.

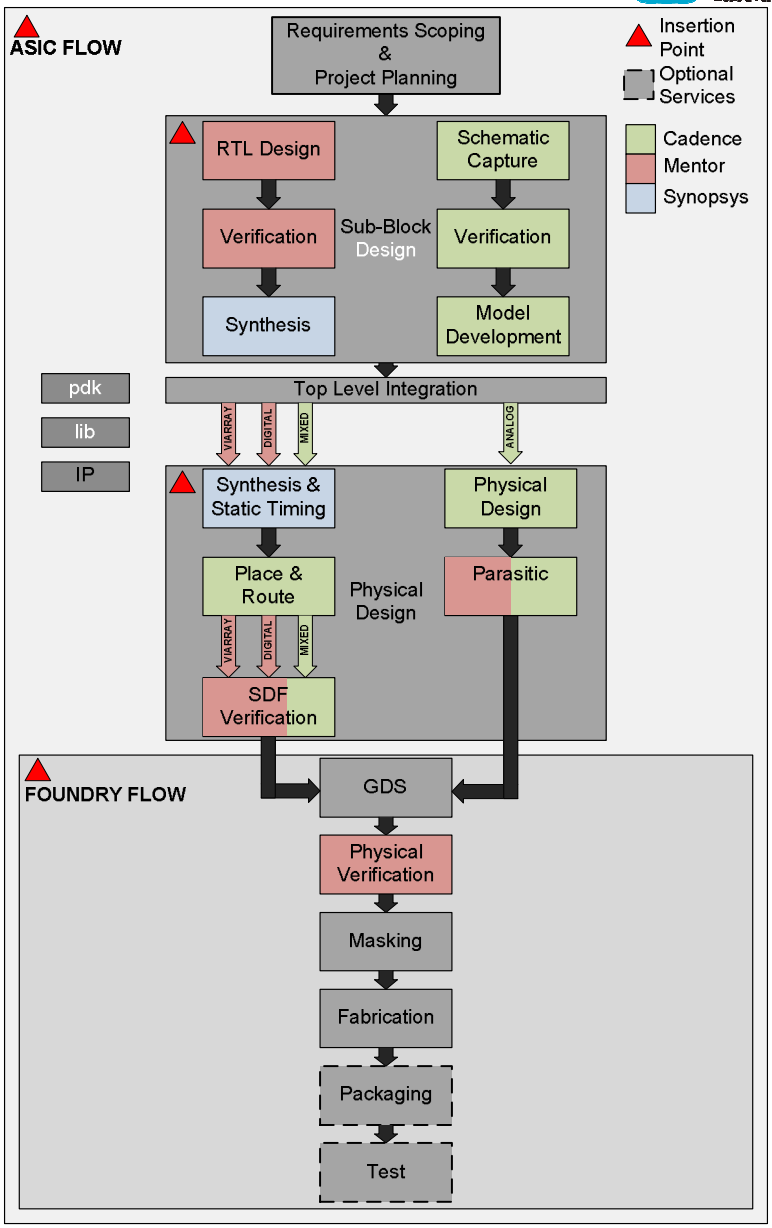
146 — Site Accreditation Number
14213 — Cage Code
3 Jan 2013 — Effective Date
3 Jan 2015 — Renewal Date
Ted Dion, Director, Defense Microelectronics Activity

Mixed Signal ASIC/SoC

Michael Holmes, 505-284-9673, mlholme@sandia.gov

Design Engagement Models

- Staff Expertise In Mixed-Signal Integrated Circuit Design
- Work with Customers to Develop Mixed-Signal Integrated Circuits
  - ASIC Design Flow Insertion Points
    - Turnkey - Full Flow
    - Joint Design/Development
    - Design Hand Off: Synthesis and Physical Design
    - Foundry Flow (GDS -> Silicon)
      - Dedicated Lot
      - Multi-Project Wafer Program (MPW)
      - *Optional Packaging
      - *Optional Test
- Full Mixed-Signal IC Design Flow
  - Full Trusted Flow
  - Full Custom Analog Design
  - RTL Synthesis & Automated Place-Route (APR)
  - Mixed-Signal Design Verification
  - Latest Industry Design Tools



Mixed Signal ASIC/SoC

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Trusted Microfabrication Facilities

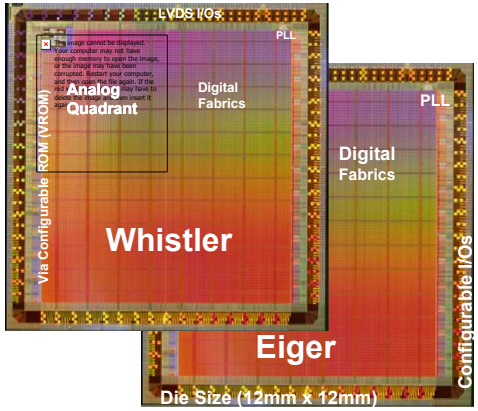
- Microelectronics Technology To Deliver Specialized ICs

MESA Trusted Silicon Foundry

- Sandia is a certified DMEA Trusted Supplier Silicon Process Technology
- NNSA's primary supplier of custom rad-hard ICs for weapon life extension programs
  - 350nm Radiation Hardened CMOS
  - 3.3V, Silicon-on-Insulator
  - Mixed signal extensions
- Low Volume Mixed Signal Radiation Hardened ASICs
  - Low Cost Multi-Project Wafer Program (MPW)
  - Quick Turn Structured ASIC ViArray Platforms
  - Low Volume Production ASICs
- Supports silicon bulk *and* silicon surface micromachining

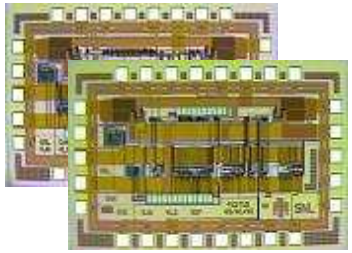
MESA MicroFab

- Compound Semiconductor Epitaxial Growth
- Compound Semiconductor Discretes, IC's and Opto
- Mixed-Technology Integration and Processing
- Materials Characterization



Rad-Hard ViArray Platforms

Low Cost Multi-Project Wafers



Custom Rad-Hard Mixed Signal ASICs

Mixed Signal ASIC/SoC

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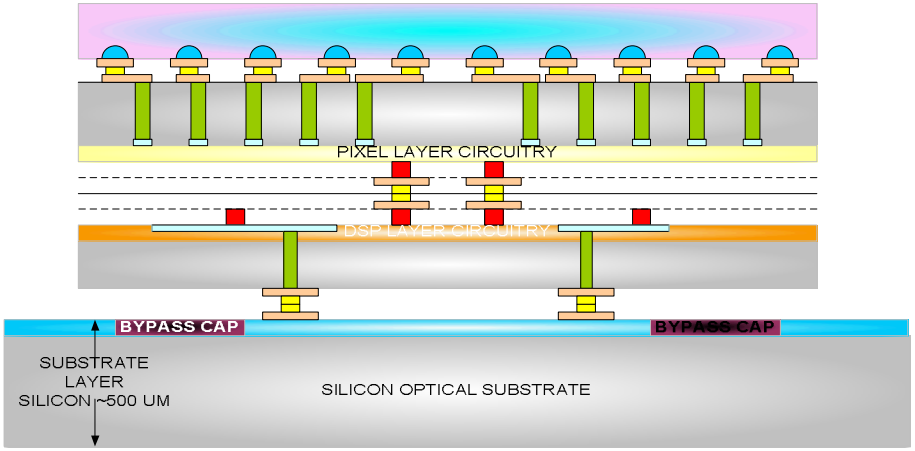
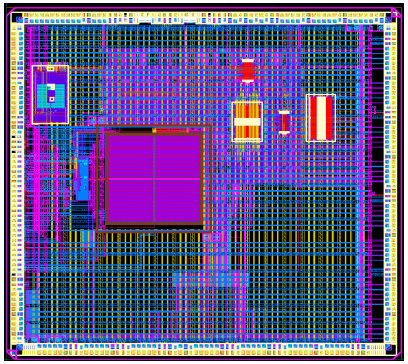
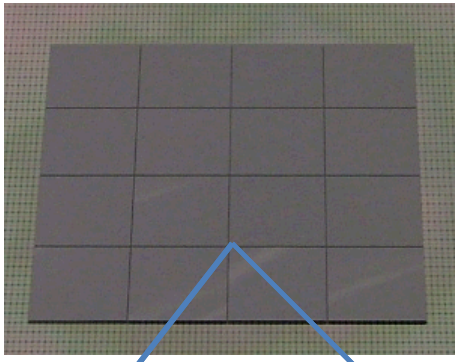
Recent Integrated Circuit Applications

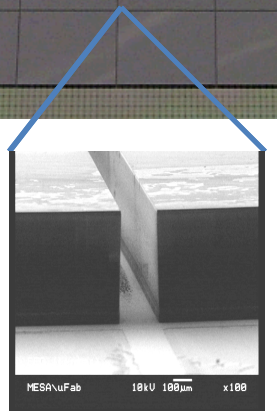
- **Focal Plane Array Design**
  - Remote Sensing
  - High Speed X-Ray Imaging
  - Advanced Packaging & 3D Integration
- **NW Program Support**
  - Secure Processing
  - Full Custom Analog
- **Secure Processing**
  - NSA Certified Designs
- **Technology Assessments**
  - Memory Characterization
  - Fundamental Device Response
- **Research Collaboration**
  - Physically Uncloneable Functions (PUFs)
  - Radiation Effects
  - Memristors
  - Exascale Computing
  - Sensors

Tiled 3D FPA Architecture









- **Large Format Array**
  - Precision Singulation
  - 4-Side Abutment
  - Modular
  - Monolithic Detector

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