DEFENSE LOGISTICS AGENCY
GEM & AME PROGRAMS

Onshore Trusted Microcircuit Manufacturing

Since 1987, the Microcircuit Emulation Center's Wafer Foundry located in Princeton, NJ has maintained semiconductor processing for a diverse array of technologies and provides on-demand manufacturing of microcircuits for the DLA Generalized Emulation of Microcircuits (GEM) and Advanced Microcircuit Emulation (AME) Programs. Our Foundry is accredited as a Department of War (DOW) Trusted supplier and is audited for conformance to MIL-STD-883 and MIL-PRF-38535.

The Wafer Foundry occupies 25,000 square feet and has ISO 4 (Class 10) and ISO 5 (Class 100) cleanrooms. Currently configured to process six-inch silicon and silicon-on-insulator (SOI) substrates, the facility utilizes advanced mainstream semiconductor process equipment systems which are maintained by vendor-trained staff and service contracts. The Wafer Foundry retains technical self-sufficiency, with the capability to perform all processing steps in-house, including ion implantation, chemical mechanical polishing, wet cleans, photolithography, dry and wet etching, thermal treatments, chemical vapor deposition, physical vapor deposition, in-line metrology, and wafer testing. Process technologies range within the 3.0 µm to 0.35 µm technology nodes, and include Analog, BiCMOS, CMOS, and Bipolar.

Emulation Process: Microcircuit Technology

Technology Node	>3.0 µm	1.5 µm	1.2 µm	0.8 µm	0.5 µm	0.35 µm
Process Technology	CMOS HV CMOS	CMOS BiCMOS HV CMOS	CMOS BiCMOS	CMOS BiCMOS DTI Schottky	CMOS SOI	CMOS
Microcircuit Applications	4000/B series, HiNIL, OpAmps	TTL, DTL, UHD, ROM/SRAM, High Speed CMOS, PLAs, PALs, ROM	Digital Logic, Small Micropro- cessor, ASICs, TTL, PLAs, PALs, ROM RadHard	Digital Logic, ASICs, FPGAs, ROM, N-Sub MOS, Schottky, 18K/64K SRAM , ECL 10K	Complex Logic, ASICs, FPGAs, ROM FCT FAST	Complex Logic, ASICs, FPGAs, 256K SRAM, Microprocessor, Microcontroller

In-House Wafer Processing Capabilities

Diffusion	Deposition	Photolithography	Implant	Etch	Metrology
LPCVD Films, Thermal Oxides, Drive & Anneal	Dielectrics, Metals, Epitaxial Silicon	DUV Stepper, I-Line Stepper, E-beam	Boron, Phosphorous, Arsenic	Dry & Wet, Metal, Poly,Oxide Silicon, Nitride, Trench, Chemical Polishing	Wafer Inspection, Defect Analysis, Yield Improvement

◆Class 10 and 100 Cleanrooms ◆25,000 sq ft Wafer Foundry ◆Computerized WIP Tracking System ◆Automated Lot Tracking and History ◆SPC Manufacturing Process ◆Fully Documented and Audited Procedures ◆Dedicated, Experienced and Skilled Operational maintenance ◆Process Development, and Integration Teams ◆Certified Operations Personnel ◆Maintenance & Facilities Activities Supported by On-site Team and Service Contracts ◆QML, ITAR and Trusted

The Wafer Foundry continuously maintains several process technologies and absorbs newly developed technologies that transition from the AME development program to the GEM production program. We execute split manufacturing which involves the creation of base or front-end-of-line (FEOL) processed wafers, where wafers are completed through the majority of the manufacturing flow and held in inventory. For each new request, a wafer is removed from inventory and processed through a personalization or back-end-of-line (BEOL) process to create the final microcircuit. This approach allows us to execute low-volume, high-product mix manufacturing to support customer requirements.

As Emulation technology advances and incorporates increasing technological diversity and greater reliability, we continually integrate state-of-the-art process equipment and procedural improvements in all maintained and developmental technologies. This is critical as it ensures equipment used to support all processing capabilities provides the highest uptime with minimal processing cycle time. These continuing improvements enable the Wafer Foundry to meet the requirements to support low-volume and high-product mix on-demand manufacturing with high yields.

Our Story

In the late 1980s, DLA recognized that microcircuit obsolescence threatened the readiness of many American defense systems. Numerous systems in the armed forces were designed and developed in the 1960s and 1970s. For example, the U.S. Air Force began flying the F-15 Eagle tactical fighter in 1972, and the U.S. Navy first tested the AEGIS phased-array radar at sea in 1973. Because of continued advancements in semiconductor technology, the original suppliers stopped manufacturing the microelectronic components used in these and other systems. In 1987, DLA contracted with SRI to begin research and development on how to best replace obsolete microcircuits with standardized, modern integrated circuits (IC). DLA and SRI collaborated to develop the GEM Program. Using its on-site Trusted semiconductor foundry and deep knowledge of IC design/development, SRI produces on-demand, Class Q microcircuits matching the Form-Fit-Function-Interface (F3I) criteria of the required microcircuit. DLA is developing the next generation of F3I microcircuit Emulation capability through the AME Program to further alleviate growing IC obsolescence issues caused by the continued rapid advancements in technology. The new capabilities developed by AME are utilized by the GEM Program to ensure the Emulation Programs continue to meet weapons systems wide-ranging requirements. SRI's semiconductor foundry is accredited as a Department of War (DOW) Trusted Foundry supplier, and our manufacturing processes are qualified to MIL-PRF-38535.